Final
Environmental Impact Statement

FOR THE DESCHUTES BASIN
HABITAT CONSERVATION PLAN
VOLUME II PART A: APPENDICES 1-A THROUGH 3.1-C

October 2020

U.S. Fish and Wildlife Service
Columbia–Pacific Northwest
Interior Region 9

In collaboration with Bureau of Land Management, Bureau of Reclamation, National Marine Fisheries Service, U.S. Forest Service, Oregon Department of Agriculture, Oregon Department of Environmental Quality, Oregon Department of Fish and Wildlife, Oregon Water Resources Department, Crook County, Deschutes County, Jefferson County, and the Confederated Tribes of Warm Springs of Oregon

Estimated lead agency & applicant total costs associated with developing and producing this EIS
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Volume II, Part A: Appendices 1-A through 3.1-C

October 2020

Cover Photo Credits: Crane Prairie Reservoir (top photo), FWS; Crooked River (bottom photo), FWS; bull trout (top inset), Joel Satore; Oregon spotted frog (middle inset), FWS; steelhead trout (bottom inset), Oregon State University

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Glossary

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Glossary

Adverse effects: Those that exceed the stated thresholds.

Affected environment: Under NEPA, a description of the existing environment to be affected by the proposed action. (40 CFR 1502.15.)

Alternative: Under NEPA, a reasonable way to fix the identified problem or satisfy the stated need. (40 CFR 1502.4.)

Applicants: The applicants in this EIS include the eight irrigation districts making up the Deschutes Basin Board of Control, as well as the City of Prineville. The applicants are jointly submitting one habitat conservation plan and requesting one incidental take permit covering the nine applicants from the U.S. Fish and Wildlife Service and one incidental take permit from the National Marine Fisheries Service. The applicants are referred to as the permittees in the Deschutes Basin HCP. In the context of this EIS, the applicants will become permittees when the incidental take permits are issued.

Beneficial effects: Those effects that would improve environmental conditions.

Conservation strategy: A series of conservation measures implemented by the applicants to reduce and offset the adverse effects of covered activities on the covered species. The ITPs also authorize any take that may result from these measures and authorize monitoring measures.

Cooperating agency: Under NEPA, any federal agency with jurisdiction or special expertise with respect to any environmental issue addressed in the EIS. (40 CFR 1508.16.)

Council on Environmental Quality (CEQ): The council established under Title II of NEPA to develop federal agency-wide policy and regulations for implementing the procedural provisions of NEPA, resolve interagency disagreements concerning proposed major federal actions, and to ensure that federal agency programs and procedures are in compliance with NEPA.

C*overed activities*: The activities with the potential to result in take of covered species for which the applicants are applying for incidental take coverage*.* The covered activities for the Deschutes Basin HCP include storage, release, diversion, and return of irrigation water by the DBBC member districts and groundwater withdrawals, effluent discharges, and surface water diversions by the City of Prineville.

Covered lands and waters: The specific aquatic, wetland, riparian, and floodplain habitats affected by the covered activities and where incidental take of covered species would occur (Figure 1-1).

Covered species: Those species for which the applicants are seeking incidental take coverage. They include three species listed as threatened under the ESA—Oregon spotted frog (*Rana pretiosa*), Middle Columbia River steelhead trout (*Oncorhynchus mykiss*), and bull trout (*Salvelinus confluentus*)—and two nonlisted species—the Middle Columbia River spring Chinook salmon (*Oncorhynchus tshawytscha*), and sockeye salmon (*O. nerka*), both of which could become listed during the term of the ITPs.

Critical habitat: The specific areas within the geographic area, occupied by the species at the time it was listed, containing the physical or biological features that are essential to the conservation of endangered and threatened species and that may need special management or protection. Critical habitat may also include areas that were not occupied by the species at the time of listing but are essential to its conservation.

Cumulative actions: Those past, present, and reasonably foreseeable future actions, the effects of which, when added to the incremental impact of the proposed action or action alternatives on the human environment, inform the assessment of cumulative effects in the study area.

Cumulative effect: Under NEPA, the incremental environmental impact or effect of the proposed action, together with impacts of past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR 1508.7.)

Debitage: Waste material produced in the making of prehistoric stone implements.

Environmental consequences: Under NEPA, the environmental effects of project alternatives, including the proposed action, any adverse environmental effects which cannot be avoided, the relationship between short-term uses of the human environment, and any irreversible or irretrievable commitments of resources which would be involved if the proposal should be implemented. (40 CFR 1502.16.)

Environmental impact statement (EIS): A detailed written statement required by section 102(2)(C) of NEPA, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources. (40 CFR 1508.11.)

Fry: Young salmon that have consumed all of the yolk sac, grown in size, and emerged from the gravel nest (redd).

Grab samples: Instantaneous sample of the water at a given time and location.

Gaining reach: A reach of a stream or river that has a channel that is lower than the groundwater table and tends to gain water from the groundwater system.

Historic property: Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register including artifacts, records, and remains which are related to such district, site, building, structure, or object.(16 U.S.C. Section 470(w)(5).)***Human environment***: Under NEPA, the human environment includes the natural and physical environment and the relationship of people with the environment. (40 CFR 1508.14.)

Hydrograph: A graph showing the rate of flow versus time past a specific point in a river, stream, or other conduit carrying flow. In this EIS, the rate of flow is expressed in cubic feet per second (cfs).

Impact (effect): Under NEPA, a direct result of an action which occurs at the same time and place; an indirect result of an action which occurs later in time or in a different place and is reasonably foreseeable; or the cumulative results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. (40 CFR 1508.8.)

Irretrievable commitments: Future options that are those that are lost for a period of time.

Irreversible commitments: Decisions affecting non-renewable resources that cannot be reversed. Such decisions are considered irreversible because their implementation would affect a resource to the point that renewal can occur only over an extremely long period of time or at great expense or because they would cause the resource to be destroyed, become extinct, or removed. *Irreversible* describes the loss of future options and applies to the impacts of using nonrenewable resources or resources that are renewable only over a long period of time.

Key life history period: For Oregon spotted frog, the analysis considered breeding, summer rearing, fall (pre-winter), and overwintering periods.

Lead Agency: Under NEPA, the agency or agencies responsible for preparing the environmental impact statement. (40 CFR 1508.16.)

Lithic: Of, relating to, or being a stone tool.

Losing reach: A reach of a stream or river that has a channel that is higher than the groundwater table and tends to lose water into the groundwater system.

Lower Deschutes River: The Deschutes River downstream of and including Lake Billy Chinook.

Middle Deschutes River: The Deschutes River downstream of the city of Bend to Lake Billy Chinook.

National Environmental Policy Act of 1969 (NEPA): Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and utilize public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements and prepare appropriate NEPA documents to facilitate better environmental decision making. NEPA requires federal agencies to review and comment on federal agency environmental plans/documents when the agency has jurisdiction by law or special expertise with respect to any environmental impacts involved. (42 U.S.C. 4321-4327) (40 CFR 1500-1508.)

Neutral reach: A reach of a stream of river that neither loses nor gains water from the groundwater system.

No effect: A determination that an effect would have no effect on the human environment.

No-action alternative: Under NEPA, the alternative where current conditions and trends are projected into the future without another proposed action. (40 CFR 1502.14(d).)

Not adverse: Effects that are not adverse are those that could occur but do not exceed thresholds.

Notice of intent (NOI): A notice that an environmental impact statement will be prepared and considered. (40 CFR 1508.22.)

Oregon spotted frog site: A habitat patch where breeding has been confirmed (breeding site), or an area where multiple Oregon spotted frogs have been detected (occupied site).

Permit term: The length of time covered by the ITPs. The permit term proposed in the Deschutes Basin HCP is 30 years.

Proposed action: Under NEPA, a plan that contains sufficient details about the intended actions to be taken, or that will result, to allow alternatives to be developed and its environmental impacts analyzed. (40 CFR 1508.23.)

Record of decision (ROD): A concise public record of decision prepared by the federal agency, pursuant to NEPA. that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation. (40 CFR 1505.2.)

Scope: Under NEPA, the range of actions, alternatives, and impacts to be considered in an environmental impact statement. (40 CFR 1508.25.)

Scoping: Under NEPA, an early and open process for determining the extent and variety of issues to be addressed and for identifying the significant issues related to a proposed action. (40 CFR 1501.7.)

Spill return flow: Diverted irrigation water that is returned to a river or creek without being applied to irrigated lands.

Study area: The geographic area considered for potential effects on each resource. The area was defined to encompasses where the proposed action and alternatives have the potential to result in effects on the human environment.

Tailwater: Water that has been applied to irrigated lands and subsequently allowed to return to a river or creek through surface or groundwater flow.

Take: To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct, of a listed, endangered, or threatened species.

Tribal resources: Refers to treaty-reserved rights to tribal fishing, hunting, gathering practices, and pasturing of stock including access to areas associated with a tribe's treaty rights. These resources may include plants, animals, or fish used for commercial, subsistence, and ceremonial purposes. Tribal resources include all natural resources, including water, relevant to treaty and federally recognized tribes with ceded lands and usual and accustomed stations in the study area.

Upper Deschutes Basin: The basin upstream of Lake Billy Chinook related to the Deschutes River.

Upper Deschutes River: The Deschutes River upstream of and including the city of Bend.

Appendix 1-B
References Cited

Appendix 1-B
References Cited

Summary

Deschutes Basin Board of Control and City of Prineville. 2020. *Final Deschutes Basin Habitat Conservation Plan. Submittal to U.S. Fish and Wildlife Service and National Marine Fisheries Service in Support of Application for Endangered Species Act Section 10 Incidental Take Permits*. Deschutes Basin Board of Control, Madras, OR.

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Chapter 5, Additional Topics Required by NEPA

None

Chapter 6, List of Preparers

None

Chapter 7, Distribution List

None

Appendix 1-C
Scoping Report

Scoping Report for the Deschutes Basin Habitat Conservation Plan Environmental Impact Statement

Department of the Interior
U.S. Fish and Wildlife Service
Bend Field Office
63095 Deschutes Market Rd
Bend, OR 97701
Contact: Peter Lickwar

June 2018

Contents

Acronyms and Abbreviations

CFR	Code of Federal Regulations
DBBC	Deschutes Basin Board of Control
EIS	Environmental Impact Statement
ESA	federal Endangered Species Act of 1973
ITP	incidental take permit
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
The Services	U.S. Fish and Wildlife Service and National Marine Fisheries Service
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service

Chapter 1
Introduction

1.1 Proposed Action Overview

The U.S. Fish and Wildlife Service (USFWS) is preparing an Environmental Impact Statement (EIS) to evaluate the potential impacts associated with issuance of incidental take permits (ITPs) under the Endangered Species Act of 1973, as amended (ESA), for the proposed Deschutes Basin Habitat Conservation Plan (HCP) by USFWS and National Marine Fisheries Service (NMFS), referred to collectively as the Services.

The Deschutes Basin Board of Control (DBBC)[1] and the City of Prineville, Oregon, referred to collectively as the permittees, are preparing the Deschutes Basin HCP because their activities have the potential to incidentally take species listed under the ESA in the Deschutes Basin.

The species for which the ITPs would be issued to the permittees are collectively referred to as the *covered species.* The covered species for the Deschutes Basin HCP are three species listed as threatened under the ESA (Oregon spotted frog [*Rana pretiosa*], middle Columbia River steelhead trout [*Oncorhynchus mykiss*] and bull trout [*Salvelinus confluentus*] and two unlisted species (Chinook salmon [*Oncorhynchus tshawytscha*], and sockeye salmon [*Oncorhynchus nerka*]

The activities covered under the Deschutes Basin HCP, referred to as *covered activities*, include operation and maintenance of dams and reservoirs; operation and maintenance of diversions, pumps, and intakes; diversion of water for irrigation; return of flow to a river or creek; groundwater withdrawals and effluent discharges.

The Deschutes Basin HCP also includes a conservation strategy, a series of conservation measures implemented by the permittees to reduce the adverse effects of covered activities on the covered species. The ITPs also authorize any take that may result from the conservation strategy as well as monitoring measures. Conveyance and delivery of water to patron lands is not a covered activity in the Deschutes Basin HCP and therefore is not addressed in this chapter.

The EIS will evaluate the environmental impacts resulting from the issuance of an ITP for the Deschutes Basin HCP, as well as reasonable alternatives to the proposed action.

1.2 Purpose of the Proposed Action

The purpose of the federal action is to review and approve a request for an ITP for the Deschutes Basin HCP which, if granted, would authorize the incidental take of the covered species. The purpose of the ITP issuance is to comply with the ESA by providing protection and conservation of certain listed species while enabling the permittees to conduct legally authorized activities. The ITPs would also require implementation of the Deschutes Basin HCP.

[1] The DBBC consists of eight irrigation districts—Arnold, Central Oregon, Lone Pine, North Unit, Ochoco, Swalley, Three Sisters, and Tumalo.

Section 9 of ESA (16 United States Code [U.S.C.] 1531 et seq.) and its implementing regulations prohibit the take of animal species listed as endangered or threatened. The term *take* is defined in the ESA as: “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct” (16 U.S.C. 1532(19)). *Harass* is further defined in the Service’s regulations as “an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering” (50 Code of Federal Regulations [CFR] 17.3). *Harm* is further defined in the Service’s regulations as “an act which actually kills or injures listed wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, and sheltering” (50 CFR 17.3).

Under Section 10(a) of ESA, the Service may issue permits to authorize incidental take of listed animal species. *Incidental take* is defined by the ESA as take that is "…incidental to, and not the purpose of, the carrying out of an otherwise lawful activity” (50 CFR 17.3). Section 10(a)(1)(B) of ESA contains provisions for issuing ITPs to non-federal entities for take of endangered and threatened species, provided the applicant prepares a conservation plan (ESA Section 10(a)(2)(A)) and satisfies the issuance criteria provided in ESA Section 10(a)(2)(B), which require that:

- The taking will be incidental.
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.
- The applicant will ensure that adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided.
- The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild.
- The applicant will ensure that other measures that the Service may require as being necessary or appropriate will be provided.
- The Service has received such other assurances as may be required that the HCP will be implemented.

1.3 NEPA Compliance

The National Environmental Policy Act (NEPA) states that any federal agency undertaking a “major federal action” likely to “significantly affect the quality of the human environment” must prepare an EIS (42 U.S.C. 4332(2)(C)). Significance is determined by evaluating the context and intensity of impacts, as defined in 40 CFR 1508.27. Based on these guidelines, the USFWS, as lead federal agency, has determined that issuance of an ITP under the proposed Deschutes Basin HCP may have significant effects on the human environment and requires preparation of an EIS before a decision to issue federal permits is made.

The EIS will consider the impacts of the proposed action—the issuance of an ITP—on the human environment. The EIS will also include analysis of a reasonable range of alternatives to the proposed action. Alternatives considered in the EIS may include, but are not limited to, variations in the permit term permit structure; the quantity of take permitted; the amount, location, and/or type of conservation, monitoring, or mitigation provided ; the scope of covered activities; or a combination of these. Additionally, a no-action alternative will be evaluated in the EIS. The no-action alternative provides a baseline for comparing the effects of the proposed action and other action alternatives considered in the EIS.

The first formal step in the NEPA process is the scoping phase. The primary purpose of the scoping process is to provide interested parties such as the public, organizations, and agencies an opportunity to assist in developing the scope of the EIS analysis by identifying important issues and alternatives related to the proposed action that should be considered in the NEPA document.

This report summarizes comments, feedback, and input received during the 60-day scoping period for the Deschutes Basin HCP EIS. The scoping period for this effort began July 21, 2017, and closed on September 22, 2017.

Chapter 2
Scoping Activities

2.1 Scoping Notification

The scoping period was announced through a Notice of Intent (NOI) to Prepare a Draft Environmental Impact Statement for the Deschutes Basin HCP and to hold scoping meetings. The NOI was published in the Federal Register, a news release distributed to regional and local media, and public notice as described below. As noted above, the scoping period began July 21, 2017, and closed on September 22, 2017.

2.1.1 Notice of Intent

The Service published an NOI in the Federal Register (www.federalregister.gov) on July 24, 2017 (82 FR 34326). The NOI provides background information on the proposed action, as well as information on how to participate in the EIS scoping process. A copy of the NOI is provided in Appendix A, *NEPA Notice of Intent*.

2.1.2 News Release

A news release announcing the initiation of the scoping process and the four public meetings was sent to 878 media outlets throughout Oregon via Meltwater, a service company contracted by the Service for distribution of news bulletins and releases. Materials used for the news release are provided in Appendix B, *Scoping Display Advertisements, and Informational Flyer*.

2.1.3 Public Notice

Public notice of the initiation of the scoping process and the four public meetings was put on various community calendars in Central Oregon. The Deschutes Basin HCP Applicants also informed their patrons regarding the scoping meetings and the 60-day comment period. Materials used for the public notice are provided in Appendix B, *Scoping Display Advertisements, and Informational Flyer*.

2.2 Public Scoping Meetings

Four public scoping meetings were held in August 2017. The locations, dates, and times of the scoping meetings are as follows.

- August 14, 2017, Inn at Cross Keys Station, 66 NW Cedar Street, Madras, Oregon
  - 2:00–4:00 p.m.
  - 6:00–8:00 p.m.
- August 15, 2017, U.S. Forest Service, 63095 Deschutes Market Road, Bend, Oregon
  - 2:00–4:00 p.m.
  - 6:00–8:00 p.m.

The scoping meeting presentations are provided in Appendix C. Scoping meeting materials are presented in Appendix D.

Fifty-two written comments were received during the scoping period. Comments were received from the National Park Service and the Environmental Protection Agency; the Oregon Department of Fish and Wildlife and the Oregon Department of Environmental Quality; and the Crook County Court, Crook-Wheeler County Farm Bureau, the Jefferson County Farm Bureau, and the Oregon Farm Bureau. Appendix E present the comments received from public agencies. The Service did not receive comments from any Tribe.

Chapter 3
Summary of Comments Received

During the scoping period, 52 written comment submissions were received. Comments were received via letter and email. The Service identified 11 categories that encompassed the concerns and recommendations in the scoping comments. Comments are summarized in the sections below by each of these categories.

3.1 Management Issues and Goals

Sixty percent of commenters addressed management issues and goals.

3.1.1 Flows

Comments related to instream flows included the following suggestions and statements.

- The NEPA analysis should assess what flows are necessary in covered stream reaches to ensure recovery of the HCP's covered species.
- The objective and function of the HCP should be to achieve the minimum instream flow needs for the five covered species (Oregon spotted frog, bull trout, steelhead, sockeye salmon, and spring Chinook salmon).
- Flow needs must be identified in the Draft EIS and should include, but should not be limited to, instream water rights already set by the Oregon Department of Fish and Wildlife (ODFW) and the Oregon Water Resources Department.

3.1.2 Water Conservation

Comments related to water conservation included the following suggestions and statements.

- The HCP should require that all conserved water resulting from the HCP conservation measures be returned to the river and its tributaries.
- The HCP should describe in detail and mandate the process of transferring water rights to instream water rights. It should also require the DBBC districts and patrons to transfer their most senior water rights to instream flows.
- The HCP and ITP package of measures should include some provisions that require improvements in on-farm efficiencies as conservation measures, especially in Central Oregon Irrigation District (COID) and other low-efficiency districts.
- In addition to requiring improvements in on-farm efficiencies, the HCP could also use flow requirements for each of the covered parties to compel on-farm efficiencies.
- On-farm efficiency measures could include fallowing unproductive fields, planting less water-intensive crops, installing more efficient water application methods, and piping and/or lining private conveyances. These projects could be funded in part by grants through the Natural Resources Conservation Service's PL-566 program.

3.1.3 Water Quality

Comments related to water quality included the following suggestions and statements.

- The HCP must include conservation measures that result in improved water quality throughout the Basin. The HCP should condition the issuance of an ITP on the covered parties' maintenance of water quality standards pertinent to the health and survival of the covered species (e.g., dissolved oxygen, total dissolved gases, pH, and water temperature), including current Oregon Water Resources Department targets and future Total Maximum Daily Load standards set by the Oregon Department of Environmental Quality for the Deschutes River and its tributaries. Substandard water quality conditions in the Deschutes River Basin are largely caused by the activities of the covered parties, including warm surface water caused by artificial storage and release and agricultural run-off.
- The Draft EIS must consider impacts on water quality in the Deschutes Basin. This should include impacts not only to the upper Deschutes River and its tributaries, but also impacts on the river's lower 100 miles, which is a federally designated Wild and Scenic River and a treasured recreation destination. The Draft EIS should examine how these water quality impacts will affect resident and anadromous fish, birds, and other wildlife throughout the Deschutes Basin.
- The Draft EIS must take a close look at how water quality above and below the Pelton Round Butte Project will be impacted by management changes made pursuant to the HCP.
- The EIS analysis should include water quality in the covered reservoirs, including the Crane Prairie, Wickiup, Crescent, Prineville, and Ochoco reservoirs.

3.1.4 Groundwater

Comments related to groundwater included the following suggestion.

- The HCP should include an analysis of the conservation measures' impacts on groundwater and springs. This analysis should include local effects of conservation measures (including piping projects) on nearby springs and groundwater tables, as well as basin-wide effects on aquifers and springs.

3.1.5 Non-Essential Use

Comments related to non-essential water use included the following suggestions and statements.

- All unnecessary or nonessential designations of water should be eliminated to meet the goals of the HCP.
- The 2016 historical listing of a section of the Pilot Butte Canal by the National Park District is an example of a non-essential use of water that is detrimental to meeting the needs of ranchers, farmers, fish and wildlife, local residents, visitors, and a healthy/vibrant Deschutes River Basin.
- Additional non-essential uses of Deschutes River Basin water include preservation of property values, preservation of private water features, and preservation of open canal water views to private property owners bordering irrigation canals.

3.1.6 Piping

Comments related to piping included the following suggestions and statements.

- Piping canals and laterals for the purpose of conserving water and restoring flows to the Deschutes River should be supported. However, the water conserved from the projects should stay in the river so that the river and associated riparian ecosystems can be restored.
- Piping and/or lining of canals and laterals could have a negative effect of preventing the critical groundwater recharge service these conveyances currently provide. The Draft EIS analysis should include both local effects of conservation measures (including piping projects) on nearby springs and groundwater tables, as well as basin-wide effects on aquifers and springs.
- The current emphasis by the irrigation districts on big pipes is too narrow. While some piping of larger canals may be appropriate, it should not dominate the HCP and end up sinking the effort with its unrealistic cost. A diverse solution that draws on all approaches is best.
- The HCP should prioritize the piping and pressurization of smaller, on-farm laterals that serve individual users or small groups of users. Such projects are more cost-effective and they allow for continued spring and groundwater recharge from the larger, first-order canals and diversions while promoting efficient water use by individual users. Piping and pressurizing first-order diversions will only benefit those users whose laterals and on-farm irrigation systems are also pressurized.
- All piping projects should be designed to meet delivery needs. No extra diversion should be engineered or permitted.
- Water is not "lost" through leaking irrigation canals; rather, it recharges groundwater aquifers. Cold springs that are essential to threatened species (e.g., steelhead, bull trout) could be impacted if water is not able to seep into the ground from canals and ditches.
- Senior rights holders may lose incentive to conserve water through measures such as those currently employed by farmers in Jefferson County. Conservation measures must be developed and implemented. These measures could include use of drip irrigation, sprinklers, or pumpback systems; demand-based delivery; and a metered system that rewards irrigators for efficiency and conservation through lower bills.
- The HCP should condition the issuance of an irrigation district's ITP on the transfer of all rights to water conserved through PL-566 piping projects to instream flows.

3.1.7 Recreation

Comments related to recreation included the following suggestions and statements.

- The HCP should take into account the impacts of river recreation as flow regimes are altered.
- The HCP should assess adverse impacts on some forms of recreation, such as reservoir fishing, which is an important part of the local economy.

3.1.8 Hydropower

Comments related to hydropower included the following suggestions and statements.

- The HCP should include an analysis of the impacts of a hydropower plant being installed on Wickiup Dam—especially the possibility of invasive fish that prey on OSF being released from the reservoir into the river below the dam.
- The HCP should address effects of hydropower production, including accelerated degradation of channel morphology and wetland habitat affecting covered species, and how economic gain for irrigation districts related to hydropower production is an incentive for higher flows.
- The Draft EIS must note whether the Proposed Action includes facilities that generate hydropower and, if so, it must describe all facilities and infrastructure (both anticipated new construction and modifications to existing works) that are related to or necessary for power generation.
- On-farm deliveries should be metered and measured to ensure that extra water isn't diverted for hydropower. No extra diversion for hydropower should be engineered or permitted.
- Development of hydroelectric power facilities and revenue will create a disincentive to implement conservation systems, as drawing more river water would produce more revenue for the irrigation districts.

3.1.9 Diversion

Comments related to diversion included the following suggestions and statements.

- The Draft EIS should detail the status of fish screens, along with upstream and downstream passage facilities at each diversion. This should include the status of the Crescent Lake dam, Crane Prairie Reservoir dam, and Wickiup Reservoir dam fish screens and fish passage facilities.
- The Draft EIS should include information that confirms those facilities currently equipped with screens are sufficient to safely exclude juvenile and adult OSFs. The Draft EIS should also present the impacts associated with those diversions and dams that are not screened or adequately screened, including the North Unit Irrigation District North Canal Diversion screen.

3.1.10 Conservation

Commenters addressed several categories of conservation activities that include water, fish and wildlife, and economic resources.

3.2 Economics

Forty-four percent of commenters addressed analysis of economic impacts or sources of funding for the HCP.

3.2.1 Applicant Funding Mechanisms

Comments related to applicant funding mechanisms included the following suggestions and statements.

- As the entities largely responsible for the historic take of covered species in the Deschutes River Basin, as well as the entities seeking protection from liability under the ESA through this HCP and ITP, the eight DBBC irrigation districts should be the primary source of funding to implement the HCP's conservation measures.
- Any funding made available to the DBBC districts through the PL-566 program should actually benefit the Deschutes River or its tributaries, and not be used to meet the districts' other obligations, including the potential "firming up" of supply to junior irrigation districts.
- The HCP should consider more than just high-cost large capital projects, such as first-order canal and lateral piping projects, to increase water conservation to meet flow requirements.
- The HCP should consider "bottom-up" water conservation projects where smaller laterals and diversions are piped and pressurized.
- The HCP should consider market-based solutions where some irrigation district patrons can voluntarily reduce their water use for a small cost, leading to low-cost transfer of irrigation water rights to instream water rights.
- Prineville and the irrigation districts and/or individuals within the districts could earn water reduction credits that can be sold or traded between irrigation districts or to third party investors. Credits would be earned as water usage reduction projects are completed.
- The preferred method of the districts for achieving needed mitigation appears to be, as reflected in PL-566 proposals, big pipes which will cost nearly $1 billion. That is not practical or cost effective, as contrasted with piping of private laterals which was found by COID and the Farmers Conservation Alliance to be both cheap and effective. The COID and Farmers Conservation Alliance found that piping of COID's main canals would cost $700 million and conserve 89,500 acre-feet of water per year. The same study found that modernizing the district's private laterals would cost $36.5 million and conserve 35,284 acre-feet of water per year. Piping smaller private laterals in COID achieves 39% of the water savings at only 5% of the cost of main canal piping projects.

3.2.2 Effect on Local Economy

Comments related to effects on the local economy included the following suggestions and statements.

- The Draft EIS should consider the economic impacts of changes in management or irrigation availability caused by the HCP. Even slight changes in management can have serious consequences for local businesses, and economic information needs to be accurate, comprehensive, and on a scale that truly considers all farmers, businesses, and community members who are impacted by management changes.
- The U.S. Fish and Wildlife Service should do a thorough and comprehensive evaluation of the economic impacts that the proposed conservation measures could have on the overall economy of the Deschutes Basin The Draft EIS must analyze the socioeconomic impacts and benefits of its alternatives.

3.3 Environmental Conditions and Issues

Twenty-seven percent of commenters addressed concerns about environmental conditions and issues including but not limited to the environmental baseline, covered species, the ecology and life history of the covered species, ecosystem services, and climate change.

3.3.1 Environmental Baseline

Comments related to the environmental baseline included the following suggestions and statements.

- The HCP must set a baseline of current conditions that includes conservation measures already adopted by the DBBC districts, against which additional conservation measures required by the HCP will be measured. This is in addition to the setting of proper, biologically defensible instream flows.
- The HCP should not use current environmental and climate conditions as a baseline for stream flows. Instead, the HCP should anticipate these projected hydrological conditions in its analysis of the effect of proposed conservation measures on stream flows.
- The Draft EIS should be clear what flow regime constitutes the hydrologic baseline for purposes of assessing impacts and should describe the surface water/groundwater interaction in the scope area.
- The Draft EIS must use a technically credible and substantiated hydrologic baseline that is developed for changed climate conditions and that is not simply based on past hydrology.

3.3.2 Covered Species

Comments related to covered species included the following suggestions and statements.

- The EIS should include other sensitive species in the area of NEPA analysis, including redband trout.
- The HCP EIS must have a description of covered species habitat conditions and how each species' habitat conditions change with project operations, or how each species responds to those changes. Without this comprehensive discussion of changing habitat conditions and responses, there is no basis for analysis of impacts on covered species or their habitat.

3.3.3 Ecology/Life History of Covered Species

Comments related to the ecology/life history of covered species included the following suggestions and statements.

- The life history of native species should be addressed in the HCP.
- Very little is known about OSF biology and ecology in a reservoir environment, and a more comprehensive understanding of the frog's needs within the Applicant's managed irrigation delivery system is needed.
- The HCP should ensure that the timing of reservoir releases relates to and supports the life history of the OSF as well as listed and native fish species.

- There need to be binding minimum flows in the Crooked River system and Upper Deschutes River system that sustain and benefit all life history stages of those species for which the ITP is being proposed.
- Measures to address, contribute, and or otherwise meet biological objectives/needs for all life history stages of steelhead trout and Chinook salmon in Whychus Creek should be analyzed.
- Summer flows must be reduced and winter flows increased to meet all of the life history needs of the OSF and listed fish species and to improve habitat conditions. Summer flows also need to be reduced to approximate a more natural hydrograph.
- Information on the life history of the Oregon spotted frog in particular must be thoroughly provided, including the interrelated habitat needs of the Oregon spotted frog in relation to the other four covered species.

3.3.4 Ecosystem Services

Comments related to ecosystem services included the following suggestions and statements.

- The HCP's effects on ecosystem services, both positive and negative, should be analyzed and disclosed in the EIS. Of key importance in this context is the role of salmon as a provisioning species. Salmon produce highly valued food products harvested in various commercial, subsistence, and personal use fisheries across the North Pacific. Salmon are also a principal focus of the spiritual and cultural lives of diverse native communities in the Pacific Northwest.
- The ecosystem services of salmon and steelhead, which are the principal food item of many terrestrial wildlife species and a source of marine-derived nutrients to coastal lakes and streams, must be acknowledged, accounted for using quantitative (where feasible) or qualitative means, and fully considered in decision making.

3.3.5 Climate Change

Comments related to climate change included the following suggestions and statements.

- The Draft EIS must incorporate the best available science in assessing the efficacy of the alternatives in light of probable changes caused by the warming climate. To do so, the Draft EIS must include hydrologic analysis that is integrated with and based on credible and substantiated climate change modeling.
- If climate change threatens the species by impacting the quality or quantity of its habitat in the future, or increasing its vulnerability to pathogens or exotic species, this increased vulnerability should be taken into account by the EIS analysis.

3.4 Monitoring and Adaptive Management

Nineteen percent of commenters addressed monitoring and adaptive management requirements. Comments included the following suggestions and statements.

- It is important that all aspects of the HCP’s conservation measures be monitored as they are implemented.

- A robust and thorough adaptive management plan should be in place to ensure that all measures achieve their stated biological goals and objectives.
- Effects monitoring should be thoroughly addressed in the EIS analysis.
- The HCP should include a comprehensive and robust monitoring program that can identify the positive and negative effects of management actions.
- HCP should plan for and implement a detailed monitoring and evaluation program. This program should be used to make adjustments to the HCP and ITP as needed in order to continually protect covered species. If the conservation measures adopted in the HCP result in reduced populations of covered species, excessive take of species, or additional loss or degradation of covered species' habitat, then the HCP and ITP should be amended during the permit period. Such loss or degradation of covered species' habitat should include, but not be limited to, reduced flows in the Deschutes River and its tributaries, and degraded water quality including increases in water temperature.
- A comprehensive monitoring program should be implemented with triggers that make changes seasonally and/or annually as needed.

3.5 Permit Duration

Twelve percent of commenters addressed permit duration. Comments included the following suggestions and statements.

- Permit durations could range from 5 to 40 years. It is important that the advantages and disadvantages of a range of timeframes be thoroughly analyzed.
- The more difficult it is to make effective and timely adjustments to the issued ITP, the shorter the duration of the ITP should be.
- The duration of the ITP should not exceed the limits of the climate change models used in the EIS analysis for assessing predicted effects. An initial short duration permit with a required review of consequences of initial provisions and execution should be issued, after which the ITP could be renewed for progressively longer periods as information and practices are refined.
- Permit length should be commensurate with the current understanding of the covered species' biology and ecology.

3.6 New Information and Current Science

Twelve percent of commenters addressed new information and current science. Comments included the following suggestion.

- The EIS should use the most up-to-date information available on covered species, and apply the most recently developed analytical methods.

3.7 Alternatives

Twelve percent of commenters addressed alternatives to the action. Comments included the following suggestions and statements.

- The EIS should evaluate alternatives that set biological goals, objectives, and conservation measures that optimize Deschutes River flows for Oregon Spotted Frog and listed fish.
- Two specific alternatives should be evaluated: "run-of-the-river" and "supply-based" proposals, which seek to maximize reservoir stability, provide early spring flows that inundate riverine wetlands used by breeding frogs, reduce the impact of fall drawdown on frogs utilizing off-channel habitats, and provide winter flows that inundate off-channel winter habitat.
- The EIS should evaluate alternatives under a standard of technological and/or implementation practicability absent cost. The EIS should analyze the full range of efficiency, management, and water transfer measures (on farm, conveyance, water management, duty reduction, etc.) that will fully avoid adverse impacts on species, absent cost, to determine practicability.
- The EIS should evaluate an alternative where avoidance of all harm to species is achieved. Additionally, the EIS should analyze an alternative where the combination of avoidance, minimization, and mitigation leaves no remaining adverse impacts on the species—in other words, all impacts are offset. Finally, the EIS should analyze an alternative where a net benefit is achieved that will enhance species chances of recovery, as the legislative record for the ESA indicates was the intent of Congress. The EIS analyses of these alternatives should not be constrained by what the applicant deems economically practicable or feasible.
- The EIS should evaluate dry year alternatives where biological flows for fish/OSF are met, regardless of what is proposed by the Applicants in their draft Deschutes Basin Habitat Conservation Plan.
- Any and all alternatives analyses should include an analysis of the alternative under climate change scenarios. The Deschutes Basin Habitat Conservation Plan should be required to identify potential climate-related changes and develop specific management responses.
- The Draft EIS should select a range of alternatives that allows for evaluation of all major actions available to offset DBBC and City of Prineville impacts and not reduce the likelihood of recovery of Covered Species.
- Other specific alternatives should be considered, and the EIS analysis of each alternative should clearly articulate whether and to what degree they achieve the goals and objectives outlined in the purpose and need statement.
- The EIS should consider a Modified Flows Alternative with a range of enhanced upper Deschutes winter flows to help meet the needs of covered species. Flows could include 300 cfs, 450 cfs, and 600 cfs.
- The EIS should consider Middle Deschutes summer flows to improve conditions for fish species and improve water quality. Such a range should include 250 cfs (ODFW instream water right amount) but also lower flows such as 175 cfs (to understand how resources and water quality may be impacted especially if the lower Middle Deschutes flows occur in conjunction with additional cold water inflows from Tumalo Creek).

- In Whychus Creek, the alternative should consider flow ranges in the 45 cfs to 65 cfs range during irrigation season. In the Crooked River, the Draft EIS should analyze minimum flows below Bowman Dam of 80 cfs, 120 cfs, and 140 cfs. The ODFW has determined that a minimum of 80 cfs is necessary in the storage season to protect the resources in the tailwater fishery.
- The EIS should consider a Recovery Alternative which offers a vision for species recovery in the Deschutes watershed from which to assess how well implementation of the HCP Conservation Strategy will contribute to attaining the vision.
- The EIS should include a wide range of alternatives, included market-oriented solutions, piping of private laterals, storage, on-farm efficiencies, and some main canal piping.
- It is not possible for the public to identify and suggest proposed "reasonable alternatives" to the HCP because the public has not yet been permitted to read the HCP and does not know what is included in the document. The Draft HCP should be released to the public immediately and the scoping period should be extended to provide adequate time for the public to identify reasonable alternatives to the HCP for inclusion in the Draft EIS.
- EIS analysis should include those alternatives which provide for "certainty" in respect to necessary flows required as a basis for quality habitat condition in which each species is dependent. There is a need for binding minimum flows in the Crooked River system and Upper Deschutes River system that sustain and benefit all life history stages of those species for which the ITP is being proposed.

3.8 Action Area

Eight percent of commenters addressed the action area size and scope. Comments included the following suggestions and statements.

- The exact area that will be covered must be delineated in the Draft EIS.
- The Draft EIS should be clear about what area constitutes: 1) the "permit area" where the incidental take authorization applies; 2) the "plan area" that will be used for activities described in the HCP; and, 3) the area encompassed in the NEPA review.
- The NEPA scoping materials are unclear as to whether the Metolius River is included in the scope of the NEPA analysis. It is appropriate and necessary to include the Metolius River watershed.
- Given that the Proposed Action can directly and cumulatively affect species outside the designated HCP area, the NEPA scope should include the entire range of the species covered by the HCP. This is necessary to allow USFWS to make its required finding that the impact of take will not appreciably reduce the likelihood of survival and recovery of the species.

3.9 Current and Planned Activities

Three percent of commenters addressed examples of planned and current activities. Comments included the following suggestions and statements.

- The U.S. Bureau of Reclamation and Deschutes River Conservancy's Basin Study Work Group (BSWG) is actively forming policy ideas to conserve water and improve instream flows in the Basin. Some of their ideas might include new or re-imagined water storage options to better serve the DBBC districts while keeping more water in stream channels. If implemented, these ideas would drastically alter the baseline conditions the HCP is meant to address. The HCP should coordinate its conservation measures with the ideas and proposals of the BSWG.
- The practicability component of the HCP the cost estimates being generated by the BSWG process are concerning, and the cost estimates often discussed in BSWG are wildly expensive and astonishingly biased. The process has been directed and manipulated by the irrigators towards an outrageously over-engineered solution set that will likely fail the practicability test. The BSWG work products show that there are far cheaper and practical solutions.

3.10 Covered Activities, Avoidance, Minimization, and Mitigation

Three percent of commenters addressed covered activities that include avoidance, minimization, and mitigation measures. Comments included the following suggestions and statements.

- Conservation measures must avoid, minimize, and/or mitigate impacts to the maximum extent practicable, in that order.
- Measures should describe the specific actions that the permittee will implement to achieve the biological objectives in support of the HCP goals.
- Measures must be based on the biological needs of the species.
- As to the maximum extent practicable standard, the EIS should evaluate alternatives under a standard of technological and/or implementation practicability absent cost.

3.11 Covered Parties

Four percent of commenters addressed the HCP should require the DBBC districts to exercise authority over their users.

Chapter 4
Next Steps in Planning Process

The Service will consider all of the public scoping comments in its development of the EIS. Public scoping comments help identify issues for analysis and alternatives within the EIS. The Service will develop a reasonable range of alternatives to the proposed action, which will be carried forward for full analysis in the EIS. For each of the reasonable alternatives carried forward for full analysis, the EIS will identify potentially affected resources and assess potential impacts on each of those resources. If needed, measures to mitigate resource impacts will be included.

Following completion of the environmental review process, the Service will publish a Notice of Availability and a request for comments on the Draft EIS. The Draft Deschutes Basin HCP will be released for public review and comment concurrent with the Draft EIS. A comment period of no less than 60 days will follow the publication of the Draft EIS and may include meetings to accommodate public participation. The Service will consider all comments on the Draft EIS in the preparation of the Final EIS, which will include responses to all substantive comments received. Following the comment period, the Draft EIS may be modified based on the substantive comments received.

When complete, the Final EIS and responses to substantive comments will be made available to the public for a minimum 30-day review period. A Record of Decision will be issued by the Service following the review period of the Final EIS.

Appendix A
NEPA Notice of Intent

(3) Enhance the quality, utility, and clarity of the information to be collected; and

(4) Minimize the burden of the collection of information on those who are to respond, including using appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

Information Collection Requirement

Title: Security Appointment Center (SAC) Visitor Request Form and Foreign National Vetting Request.

Type of Request: New collection.

OMB Control Number: 1652–XXXX.

Form(s): TSA Form 2802.

Affected Public: Visitors to TSA facilities in the National Capital Region.

Abstract: The Secretary of the Department of Homeland Security (DHS) is authorized to protect property owned, occupied, or secured by the Federal Government. *See* 40 U.S.C. 1315. *See also* 41 CFR 102–81.15 (requires Federal agencies to be responsible for maintaining security at their own or leased facilities). DHS Instruction Manual 121–01–011–01 (Visitor Management for DHS Headquarters and DHS Component Headquarters Facilities (April 19, 2014)) requires all DHS components to vet visitors using the National Crime Information Center (NCIC) system before allowing them access to agency facilities. The Security Appointment Center (SAC) Visitor Request Form and Foreign National Vetting Request process manages risks posed by individuals entering the building who have not been subject to a criminal history records check. TSA will use the collected information (social security number, date of birth and, if a foreign visitor, passport information) to vet visitors via the NCIC system.

Number of Respondents: 24,702.

Estimated Annual Burden Hours: An estimated 412 hours annually.

Dated: July 19, 2017.

Christina A. Walsh,

TSA Paperwork Reduction Act Officer, Office of Information Technology.

[FR Doc. 2017–15490 Filed 7–21–17; 8:45 am]

BILLING CODE 9110–05–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

[FWS–R1–ES–2017–N064; FXES11140100000–178–FF01E00000]

Notice of Intent To Prepare a Draft Environmental Impact Statement for the Proposed Deschutes River Basin Habitat Conservation Plan in Oregon

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of intent; notice of public scoping meetings; request for comments.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), intend to prepare a draft environmental impact statement (EIS) in accordance with the requirements of the National Environmental Policy Act (NEPA) to evaluate the potential impacts on the human environment caused by alternatives to the Deschutes River Basin Habitat Conservation Plan (Deschutes River Basin HCP). The Deschutes River Basin HCP is being prepared in support of a request for an Endangered Species Act (ESA) incidental take permit (ITP) or ITPs authorizing incidental take of listed species caused by covered activities. The potential applicants for the ITP(s) include the City of Prineville, the Arnold Irrigation District, Central Oregon Irrigation District, North Unit Irrigation District, Ochoco Irrigation District, Swalley Irrigation District, Three Sisters Irrigation District, Tumalo Irrigation District, and the Lone Pine Irrigation District in Oregon. These eight irrigation districts comprise the Deschutes Basin Board of Control (DBBC). We are also announcing the initiation of a public scoping period to engage Federal, Tribal, State, and local governments and the public in the identification of issues and concerns, potential impacts, and possible alternatives to the proposed action for consideration in the draft EIS. The National Marine Fisheries Service (NMFS) is a cooperating agency in the draft EIS process.

DATES: The public scoping period begins with the publication of this notice in the **Federal Register.** To ensure consideration, please send your written comments postmarked no later than September 22, 2017. The Service will consider all comments on the scope of the draft EIS analysis that are received or postmarked by this date. Comments received or postmarked after this date will be considered to the extent practicable.

Public meetings: The Service will conduct four public scoping meetings: Two in Madras, Oregon, and two in Bend, Oregon. The two Madras scoping meetings will be held on August 14, 2017, from 2 to 4 p.m. and 6 to 8 p.m., respectively, and the two Bend scoping meetings will be held on August 15, 2017, from 2 to 4 p.m. and 6 to 8 p.m., respectively.

ADDRESSES: To request further information or submit written comments, please use one of the following methods and note that your information request or comment is in reference to the development of the Deschutes Basin HCP and the preparation of the associated draft EIS:

- *U.S. mail:* U.S. Fish and Wildlife Service, Bend Field Office, Attn: Peter Lickwar, 63095 Deschutes Market Road, Bend, Oregon 97701–9857.
- *In-person Drop-off, Viewing, or Pickup:* Call (541) 383–7146 to make an appointment during regular business hours to drop off comments or view received comments at the above location. Written comments will also be accepted at the public meetings.
- *Email: peter_lickwar@fws.gov.* Include "Deschutes River Basin HCP–draft EIS" in the subject line of the message.
- *Fax:* U.S. Fish and Wildlife Service at 541–383–7638; Attn: Peter Lickwar.

We request that you send comments by only one of the methods described above. See the Public Availability of Comments section below for more information.

Public meetings: The addresses of the scoping meetings are as follows:

Madras, Oregon: Inn at Cross Keys Station, 66 NW Cedar St, Madras, OR 97741.

Bend, Oregon: U.S. Forest Service Building, 63095 Deschutes Market Road, Bend, OR 97701.

FOR FURTHER INFORMATION CONTACT: Peter Lickwar, U.S. Fish and Wildlife Service, (see **ADDRESSES** above); email at *peter_lickwar@fws.gov* or telephone 541–383–7146. If you use a telecommunications device for the deaf, please call the Federal Relay Service at 800–877–8339.

SUPPLEMENTARY INFORMATION: The Service intends to prepare a draft EIS in accordance with the requirements of NEPA to evaluate the potential impacts on the human environment caused by alternatives to the Deschutes River Basin HCP. The Deschutes River Basin HCP is being prepared in support of a request for an ESA ITP or ITPs authorizing incidental take of listed species caused by covered activities. The potential applicants for the ITP(s) include the City of Prineville, the Arnold Irrigation District, Central

Oregon Irrigation District, North Unit Irrigation District, Ochoco Irrigation District, Swalley Irrigation District, Three Sisters Irrigation District, Tumalo Irrigation District, and the Lone Pine Irrigation District in Oregon. These eight irrigation districts (Districts) comprise the DBBC.

We are also announcing the initiation of a public scoping period to engage Federal, Tribal, State, and local governments and the public in the identification of issues and concerns, potential impacts, and possible alternatives to the proposed action for consideration in the draft EIS. The conservation measures in the Deschutes River Basin HCP would be designed to minimize and mitigate impacts caused by the take of covered listed species that may result from the storage, release, diversion and return of irrigation water by the Districts and the City of Prineville.

This notice was prepared pursuant to pursuant to section 10(c) of the ESA (16 U.S.C. 1531 *et seq.*), and the requirements of NEPA (42 U.S.C. 4321 *et seq.*), and its implementing regulations in the Code of Federal Regulations at 40 CFR 1506.6. The primary purpose of the scoping process is for the public and other agencies to assist in developing the draft EIS by identifying important issues and identifying alternatives that should be considered.

The NMFS is a cooperating agency in the draft EIS process, and intends to adopt the draft EIS to address the impacts of issuing an ITP addressing listed species under its jurisdiction.

Background

Section 9 of the ESA prohibits "take" of fish and wildlife species listed as endangered under section 4 (16 U.S.C. 1538 and 16 U.S.C. 1533, respectively). The ESA implementing regulations extend, under certain circumstances, the prohibition of take to threatened species (50 CFR 17.31). Under section 3 of the ESA, the term "take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" (16 U.S.C. 1532(19)). The term "harm" is defined by regulation as "an act which actually kills or injures wildlife. Such acts may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" (50 CFR 17.3). The term "harass" is defined in the regulations as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (50 CFR 17.3).

Under section 10(a) of the ESA, the Service may issue permits to authorize incidental take of listed fish and wildlife species. "Incidental take" is defined by the ESA as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Section 10(a)(1)(B) of the ESA contains provisions for issuing ITPs to non-Federal entities for the take of endangered and threatened species, provided the following criteria are met:

- The taking will be incidental;
- The applicant will, to the maximum extent practicable, minimize and mitigate the impact of such taking;
- The applicant will develop a proposed HCP and ensure that adequate funding for the plan will be provided;
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and
- The applicant will carry out any other measures that the Service may require as being necessary or appropriate for the purposes of the HCP.

Regulations governing permits for endangered and threatened species are at 50 CFR 17.22 and 17.32.

Plan Area

The Plan Area for the Deschutes River Basin HCP covers approximately 10,700 square miles of land in central Oregon. Bounded by the Cascades Mountains on the west, the Ochoco Mountains on the east, and the Columbia River to the north, the Deschutes River Basin includes six major tributaries above Lake Billy Chinook. Tributaries to the Deschutes River above the lake include the Crooked River, Metolius River, Little Deschutes River, Crescent Creek, Tumalo Creek, and Whychus Creek. Major tributaries of the lower Deschutes River include Shitike Creek, Trout Creek, Warm Springs River, and the White River. The first water diversions in the Deschutes River Basin started in the late 1860s, however, irrigation districts did not start to form until circa 1900.

The eight irrigation districts (Districts) are quasi-municipal corporations formed and operated under Oregon State law to distribute water to irrigators within designated district boundaries. The Districts span Crook, Deschutes, Jefferson, Klamath, and Wasco counties in Oregon. The Districts lie along and utilize the waters of the Deschutes River and its tributaries, including the Little Deschutes River, Crescent Creek, Crooked River, Ochoco Creek, Tumalo Creek, Whychus Creek, and a number of smaller tributaries within the greater Deschutes River Basin. The City of Prineville (City), located in Crook County, is a municipality of about 7,350 residents. The City lies at the confluence of the Crooked River and Ochoco Creek, and has an economy based on agriculture and light industry.

The goals of the proposed Deschutes River Basin HCP are to avoid and minimize incidental take of the covered species associated with the Districts' and the City's activities, and to mitigate the impacts of unavoidable take, primarily by modifying irrigation water storage, release, and diversion operations in the Deschutes River Basin, including the mainstem Deschutes River and its tributaries. The Deschutes River Basin HCP would provide a district-wide permitting approach for the Districts and the City. The proposed term for the Deschutes River Basin HCP and ITP(s) is from 20 to 40 years.

Covered Activities

The Districts and the City are seeking incidental take authorization under the ESA for activities that they conduct, permit, or otherwise authorize. The proposed covered activities may include, but are not limited to: Operation and maintenance of storage dams and reservoirs; operation and maintenance of diversions, pumps, and intakes; operation and maintenance of water conveyance and delivery systems; diversion of water; return flow; and conservation measures and associated construction activities.

Covered Species

Covered species under the proposed Deschutes River Basin HCP include threatened and endangered species listed under the ESA, and currently unlisted species that have the potential to become listed during the life of the HCP. The Districts and the City are proposing to seek incidental take coverage for three federally listed species, and two non-listed species. The Deschutes River Basin HCP would provide long-term conservation and management of these species, which are discussed in more detail in the following paragraphs.

The Oregon spotted frog (*Rana pretiosa*) is a native aquatic species endemic to the Pacific Northwest. It was federally listed as threatened under the ESA on September 29, 2014 (79 FR 51658).

The bull trout (*Salvelinus confluentus*) is a member of the genus *Char*, and is native to Oregon. The bull trout has specific habitat requirements that influence its abundance and distribution. The bull trout is seldom found in waters where temperatures exceed 59 to 64 degrees Fahrenheit. The final listing determination of threatened status for the bull trout in the coterminous United States was made on November 1, 1999 (64 FR 58910).

The steelhead (*Oncorhynchus mykiss*) in the Deschutes River Basin is part of the Middle Columbia River Distinct Population Segment that was listed by NMFS as threatened, effective on February 6, 2006 (71 FR 834). However, on January 15, 2013, NMFS issued a final rule that designated the steelhead upstream of the Pelton Round Butte Hydroelectric Project on the Deschutes River as a nonessential experimental population (78 FR 2893). This designation has an expiration date of 12 years from the effective date of the rule. Unlike other anadromous members of the family Salmonidae, steelhead do not necessarily die after spawning and sometimes spawn more than once.

The Districts and the City also propose to cover the following non-listed species under NMFS jurisdiction under the Deschutes River Basin HCP: The sockeye salmon (*Oncorhynchus nerka*), and the Middle Columbia River spring-run Chinook salmon (*Oncorhynchus tshawytscha*).

Draft Environmental Impact Statement

For purposes of NEPA compliance, preparation of an EIS is required for actions that are expected or have the potential to significantly impact the human environment (40 CFR 1500–1508).

To determine whether a proposed Federal action would require the preparation of an EIS, the Service must consider two distinct factors: Context and intensity (40 CFR 1508.27, Service and National Marine Fisheries Service HCP Handbook 2016). Context refers to the geographic scale (local, regional, or national) of significance of short and/or long-term effects/impacts of a proposed action. Intensity refers to the severity of the effects/impacts relative to the affected settings, including the degree to which the proposed action affects: an endangered or threatened species or designated critical habitat; public health or safety; scientific, historic or cultural resources; or other aspects of the human environment.

In determining whether the preparation of an EIS is warranted, we must also consider the ten components of intensity, as set forth under 40 CFR 1508.27(b):

1. Impacts that may be both beneficial and adverse. A significant impact may exist even if the Federal agency believes that on balance the effect will be beneficial.

2. The degree to which the proposed action affects public health or safety.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.

5. The degree to which the potential impacts are highly uncertain or involve unique or unknown risks.

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.

8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the ESA.

10. Whether the action threatens a violation of Federal, state, or local law or requirements imposed for the protection of the environment.

In this case, and after considering the above factors, the Service has determined that the Deschutes River Basin HCP–ITP action has the potential to significantly impact the human environment for the following reasons:

The Deschutes River Basin encompasses 10,500 square miles in Central Oregon and the Deschutes River is a major tributary to the Columbia River. On that basis, the covered area is of local, regional, and national significance.

The Applicants store, manage, and release water from the Deschutes River and its reservoirs for irrigation and municipal purposes. Hundreds of miles of irrigation conveyance systems are managed by the Applicants. Under the Deschutes River Basin HCP, modernization of these conveyance systems, which is already underway, is a covered activity that is likely to result in water conservation for farmers and listed species, and take decades to complete. Some portions of the conveyance systems have been listed on the National Historic Register, and will require additional analysis under NEPA. The covered activities may affect four ESA-listed species (the Oregon spotted frog, steelhead, spring chinook and the bull trout) and their critical habitat that by virtue of their listings and designations are of local, regional, and national significance. Given the geographic scale of the HCP and the nature and scope of the covered activities and species, the context and intensity of potential adverse and beneficial impacts of implementing the HCP on the human environment are likely to be of local, regional, and national significance.

The Service performed internal NEPA scoping for the Deschutes River Basin HCP–ITP action in close coordination with NMFS as a cooperating agency. During that internal scoping process, Service and NMFS staff reviewed the proposed ITP action and the purpose and need for taking the action, and identified the environmental issues requiring detailed analysis as well as identified connected, similar, and cumulative actions. The internal scoping analysis concluded that the proposed ITP action:

- Involves instream flow and habitat restoration decisions that significantly affect biodiversity and ecosystem functions across a large geographic area;
- Involves management decisions that are significantly controversial;
- Has highly uncertain effects or involve unique or unknown risks to biological, physical or other factors;
- Establishes precedents for future actions with significant effects;
- Will contribute to other individually insignificant but cumulatively significant impacts;
- Will have positive effects on wetlands, rivers, and ecologically critical areas but may have adverse effects on historic resources (canals) and farmlands;
- May affect some areas covered by the National Historic Preservation Act;
- Will adversely affect endangered or threatened species, their critical habitat, or other non-target species; and
- Will have social or economic impacts interrelated with significant natural or physical environmental effects.

The Service also determined with NMFS that the proposed Deschutes River Basin HCP–ITP action: Is of sufficient size and complexity to warrant an EIS; is similar to previous HCP's issued in the Pacific Northwest that likewise required the preparation of an EIS; and may have significant effects on the human environment. On that basis and in accordance with regulations at 40 CFR 1501.4, 1507.3, and 1508.27, the Service believes preparation of an EIS is warranted. As such, we do not intend to prepare an environmental assessment for this action.

Therefore, before deciding whether to issue an ITP(s) for the Deschutes River Basin HCP, we will prepare a draft EIS to analyze the environmental impacts associated with this action. As noted above, NMFS is a cooperating agency in the draft EIS process, and intends to adopt the draft EIS to address the impacts on the human environment of issuing an ITP(s) addressing listed species under its jurisdiction.

Under NEPA, a reasonable range of alternatives to a proposed project is developed and considered in the Service's environmental review document. In the draft EIS, the Service will consider the following alternatives: (1) No action (no ITP issuance); (2) the proposed action, which includes the issuance of take authorizations as described in the proposed Deschutes River Basin HCP; and (3) a range of additional reasonable alternatives. Alternatives considered for analysis in a draft EIS for an HCP may include: Variations in the permit term or permit structure; the level of take allowed; the level, location, or type of minimization, mitigation, or monitoring provided under the HCP; the scope of covered activities; the list of covered species; or a combination of these factors.

The draft EIS will identify and analyze the potential direct, indirect, and cumulative impacts of Service authorization of incidental take under permit issuance and of implementing the proposed Deschutes River Basin HCP on biological resources, land uses, utilities, air quality, water resources, cultural resources, socioeconomics and environmental justice, recreation, aesthetics, and other environmental issues that could occur with implementation of each alternative. The Service will also identify measures, consistent with NEPA and other relevant considerations of national policy, to avoid or minimize any significant impacts of the proposed action on the quality of the human environment. Following completion of the draft EIS, the Service will publish a notice of availability and a request for comment on the draft EIS and the applicants' permit application(s), which will include a draft of the proposed Deschutes River Basin HCP.

Public Scoping

The primary purpose of the scoping process is for the public to assist the Service, Districts, and the City in developing a draft EIS by identifying important issues and alternatives related to the applicants' proposed action. The scoping meetings will include presentations by the Service, Districts, and the City followed by informal questions and discussions. The Service welcomes written comments from all interested parties in order to ensure we identify a full range of issues and alternatives related to the proposed permit request. The Service requests that comments be specific. In particular, we seek comments on the following:

1. Management issues and goals to be considered in the development of the HCP;
2. Existing environmental conditions in the Districts and the City;
3. Other plans or projects that might be relevant to this proposed project;
4. Permit duration;
5. Areas and specific landforms that should or should not be covered;
6. Biological information concerning species in the proposed plan area;
7. Relevant data concerning these species;
8. Additional information concerning the range, distribution, population size, and population trends of the covered species;
9. Current or planned activities in the Plan Area and their possible impacts on the covered species;
10. Species that should or should not be covered;
11. Covered activities including potential avoidance, minimization, and mitigation measures;
12. Monitoring and adaptive management provisions;
13. Funding suggestions; and
14. Alternatives for analysis.

We will accept written comments at the public meetings. You may also submit written comments to the Service at our U.S. mail address, by email, or by fax (see **ADDRESSES** above). Once the draft EIS and draft HCP are prepared, there will be further opportunity for public comment on the content of these documents through an additional 90-day public comment period.

Public Availability of Comments

Comments and materials we receive, as well as supporting documentation we use in preparing the draft EIS, will become part of the public record and will be available for public inspection by appointment, during regular business hours, at the Service's Bend Field Office (see **FOR FURTHER INFORMATION CONTACT** section). Before including your address, phone number, email address, or other personal identifying information in your comment(s), you should be aware that your entire comment(s)—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment(s) to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Reasonable Accommodation

Persons needing reasonable accommodations to attend and participate in the public meeting should contact Peter Lickwar (see **FOR FURTHER INFORMATION CONTACT**). To allow sufficient time to process requests, please call no later than August 1, 2017. Information regarding the applicants' proposed action is available in alternative formats upon request.

Authority

The environmental review of this project will be conducted in accordance with the requirements of the NEPA of 1969 as amended (42 U.S.C. 4321 *et seq.*), Council on Environmental Quality Regulations (40 CFR parts 1500–1508), other applicable Federal laws and regulations, and applicable policies and procedures of the Service. This notice is furnished in accordance with 40 CFR 1501.7 of the NEPA regulations to obtain suggestions and information from other agencies and the public on the scope of issues and alternatives to be addressed in the draft EIS.

Theresa E. Rabot,

Deputy Regional Director, Pacific Region, U.S. Fish and Wildlife Service, Portland, Oregon.

[FR Doc. 2017–15479 Filed 7–21–17; 8:45 am]

BILLING CODE 4333–15–P

DEPARTMENT OF THE INTERIOR

National Park Service

[NPS–WASO–NAGPRA–23496; PPWOCRADN0–PCU00RP14.R50000]

Notice of Intent To Repatriate Cultural Items: Cincinnati Art Museum, Cincinnati, OH

AGENCY: National Park Service, Interior.

ACTION: Notice.

SUMMARY: The Cincinnati Art Museum, in consultation with the appropriate Indian Tribes or Native Hawaiian organizations, has determined that the cultural items listed in this notice meet the definition of sacred objects. Lineal descendants or representatives of any Indian Tribe or Native Hawaiian organization not identified in this notice that wish to claim these cultural items should submit a written request to the Cincinnati Art Museum. If no additional claimants come forward, transfer of

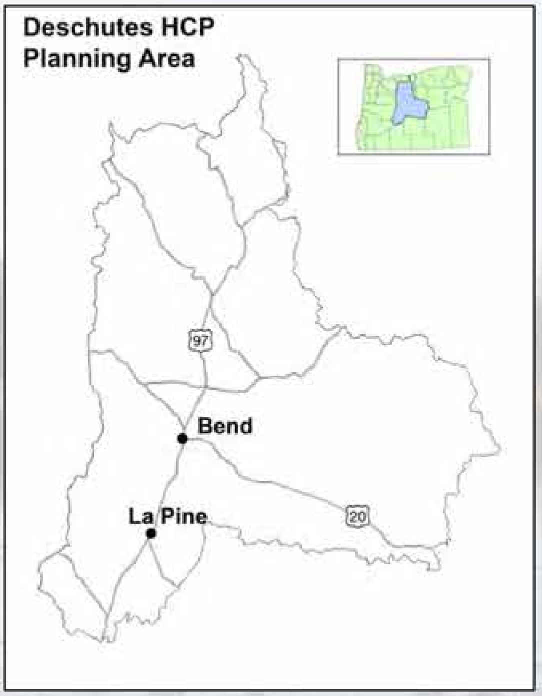
Appendix B

Scoping Display Advertisements and Informational Flyer

Deschutes River Basin

Habitat Conservation Plan (HCP)

Providing reliable water for farmers and residents in the Deschutes Basin while conserving fish, wildlife, and water resources for future generations.



U.S. Fish and Wildlife Service (Service) is working with the Deschutes Basin Board of Control, City of Prineville, NOAA Fisheries, the Bureau of Reclamation, and others to develop a 20-40 year HCP that will ensure sufficient, reliable water is available for the people and wildlife of the Deschutes River Basin.

This HCP will become part of an application for one or more Endangered Species Act incidental take permits authorizing the incidental take of listed species caused by activities covered under this plan (e.g., operation, maintenance, and construction of water storage and delivery systems).

The HCP will cover ~10,700 mi² of land in the Deschutes River Basin of central Oregon. This Basin includes six major tributaries above Lake Billy Chinook. (Credit: USFWS).

Species Addressed

Three Federally-threatened (T) and two non-listed (NL) species. The Service has jurisdiction over Oregon spotted frog (T) and bull trout (T). NOAA is lead for steelhead (T), sockeye salmon (NL), and spring Chinook salmon (NL).

Bull trout habitat in the Deschutes River Basin (Credit: USFWS)

What are HCPs?

HCPs are planning documents required as part of an application for an incidental take permit. They describe the anticipated effects of the proposed taking; how those impacts will be minimized, or mitigated; and how the HCP is to be funded.

HCPs can apply to both listed and non-listed species, including those that are candidates or have been proposed for listing. Conserving species before they are in danger of extinction or are likely to become so can also provide early benefits and prevent the need for listing.

https://www.fws.gov/endangered/what-we-do/hcp-overview.html

Bull trout (Credit: J.Sartore/National Geographic)

Oregon spotted frog (Credit: T.Waterstrat/USFWS)

Upper Deschute River (Credit: B.Moran/USFWS)

Stay Connected:

Questions? Call: (541) 383-7146 and ask for Peter Lickwar or Bridget Moran.

Visit our Deschutes HCP Webpage: http://bit.ly/DeschutesHCP

Follow us on Facebook: http://bit.ly/OFWOfacebook

Appendix C
Scoping Meeting Presentations (DBBC and FWS)

Deschutes Basin Habitat Conservation Plan

NEPA Public Scoping

August 14, 2017 – Madras, OR

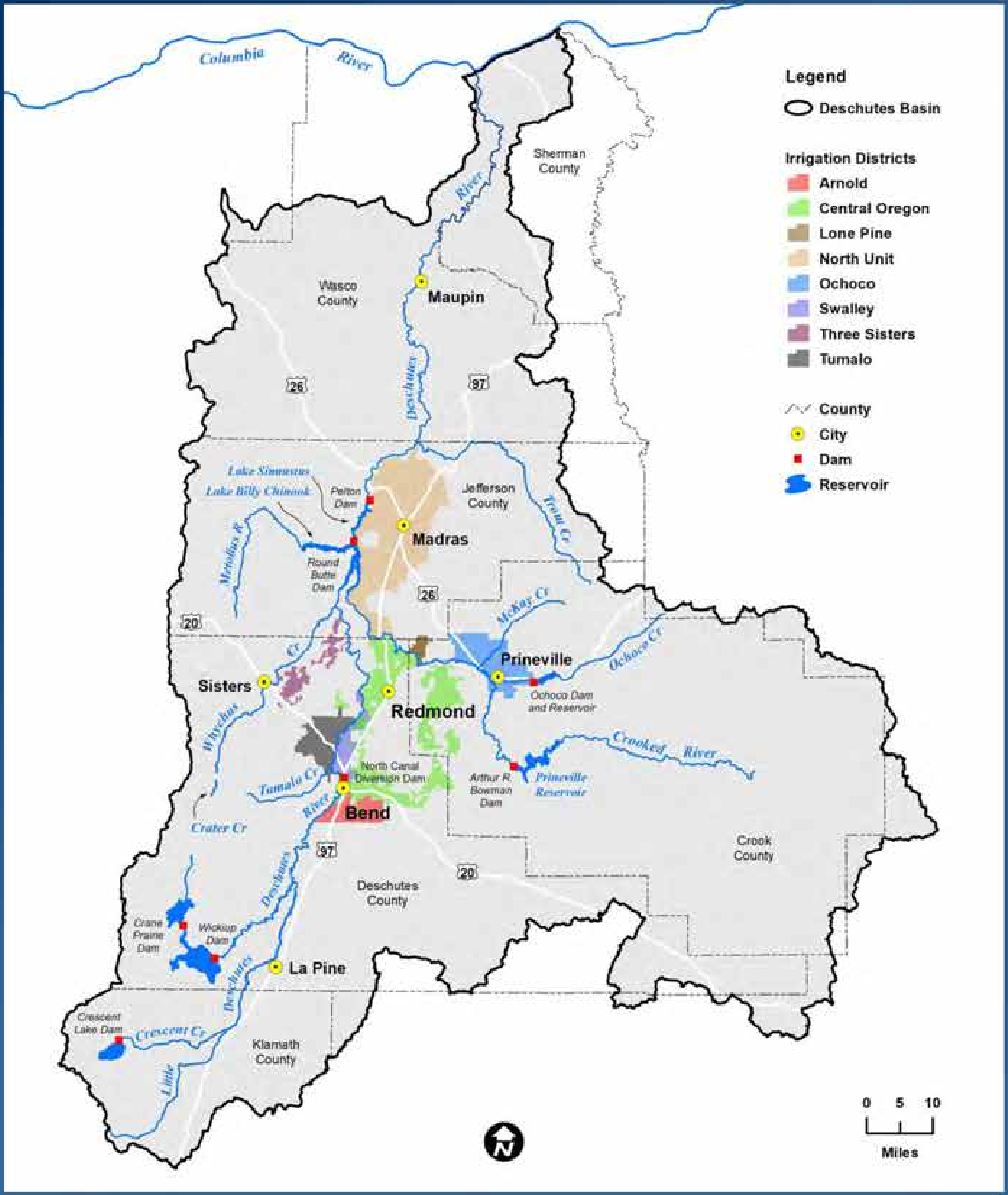
August 15, 2017 – Bend, OR

The Deschutes Basin Habitat Conservation Plan (DBHCP)

- An HCP is required for activities covered by an Incidental Take Permit issued under the Federal Endangered Species Act
- Deschutes Basin HCP will modify Irrigation District and City of Prineville activities to minimize and mitigate the impacts of those activities on the species covered by the Incidental Take Permits
- Has been in collaborative development since 2010

DBHCP Covered Parties

- Eight Irrigation Districts of the Deschutes Basin Board of Control (DBBC)
  - Arnold Irrigation District (AID)
  - Central Oregon Irrigation District (COID)
  - Lone Pine Irrigation District (LPID)
  - North Unit Irrigation District (NUID)
  - Ochoco Irrigation District (OID)
  - Swalley Irrigation District (SID)
  - Three Sisters Irrigation District (TSID)
  - Tumalo Irrigation District (TID)
- City of Prineville, Oregon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Sherman County
Wasco County
Maupin
Deschutes River
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Lake Billy Chinook
Pelton Dam
Round Butte Dam
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Jefferson County
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Prineville Reservoir
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DBHCP Covered Species

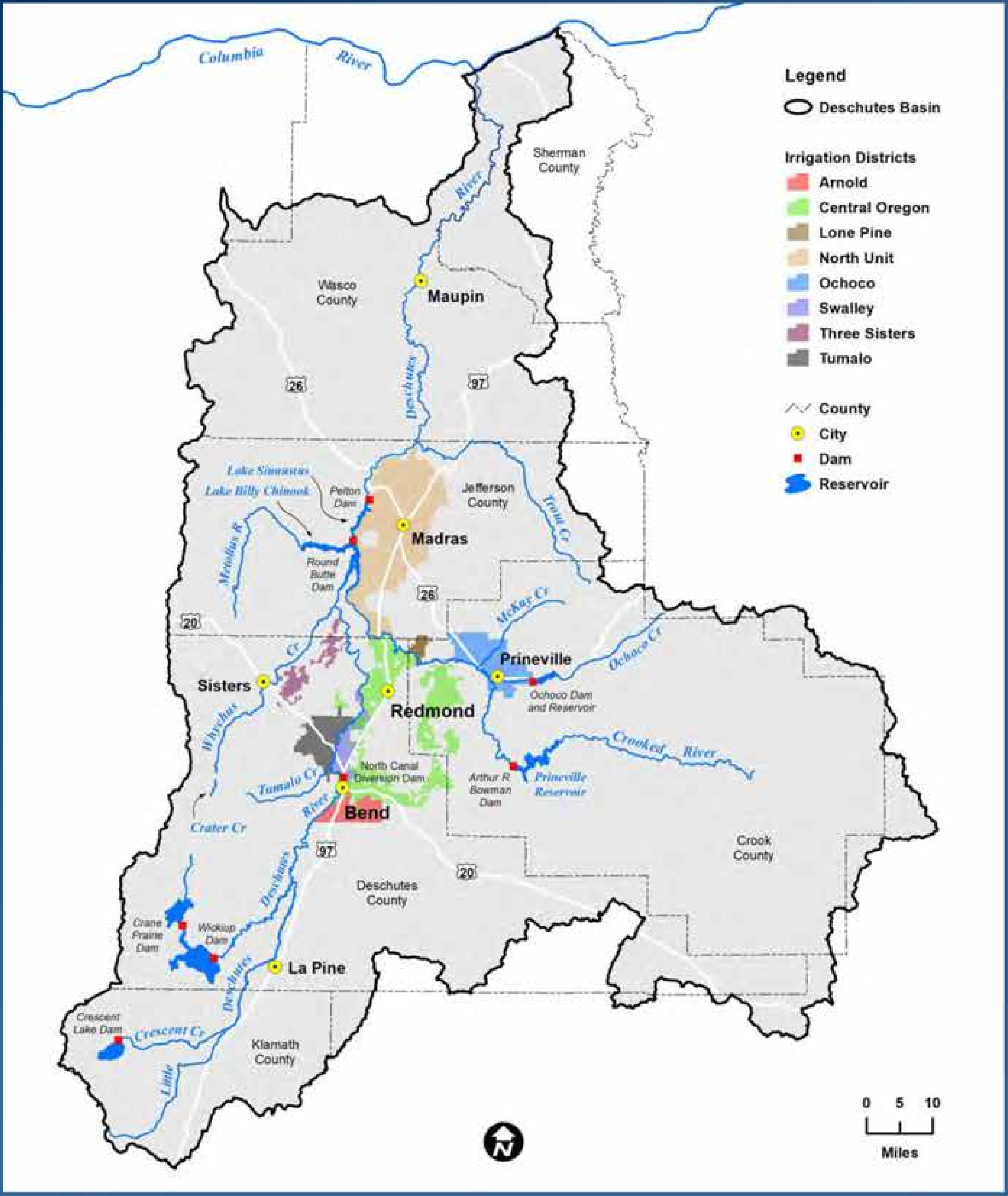
- Bull Trout
- Middle Columbia River Steelhead Trout
- Middle Columbia River Spring Chinook Salmon
- Deschutes River Summer/Fall Chinook Salmon
- Sockeye Salmon
- Oregon Spotted Frog

DBHCP Covered Activities

- Storage and Release of Irrigation Water
- Diversion of Irrigation Water
- Conveyance and Delivery of Irrigation Water
- Irrigation Return Flows
- Existing Hydropower
- City of Prineville Activities

Storage and Release of Water

- Five Main Storage Reservoirs
  - Crane Prairie Reservoir – Deschutes River; 4,900 acres
  - Wickiup Reservoir – Deschutes River; 11,200 acres
  - Crescent Lake Reservoir – Crescent Creek; 4,008 acres
  - Prineville Reservoir – Crooked River; 3,028 acres
  - Ochoco Reservoir – Ochoco Creek; 1,060 acres
- Reservoirs store water in fall, winter and early spring; and release water during irrigation season (Apr – Oct)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Wickiup Reservoir

Ochoco Reservoir

Storage and Release of Water

- Four Reregulating Reservoirs
  - Haystack – North Unit Main Canal; 230 acres
  - Upper Tumalo – Tumalo Feed Canal; 165 acres
  - Watson – Whychus Creek Main Canal; 80 acres
  - McKenzie Canyon – Whychus Creek Main Canal; 12 acres
- Operated to buffer short-term fluctuations in demand

Diversion of Water

- 19 Primary Diversion Structures
  - Divert stored water and live (natural) flow
  - Screened to prevent entrainment where fish are present
  - Passage for upstream and downstream movement where fish are present

North Canal Dam (Deschutes River)

North Canal Dam (Deschutes River)

Tumalo Creek Diversion

Tumalo Creek Diversion

Red Granary Diversion (Ochoco Creek)

Red Granary Diversion (Ochoco Creek)

Whychus Creek Diversion

Whychus Creek Diversion

Diversion of Water

- 112 Pumps and Small Diversions
  - Most are owned and operated by patrons
  - Very small diversion rates
  - Most are currently unscreened

Crooked River Patron Pump

Crooked River Patron Pump

Conveyance and Delivery of Water

- Collectively over 1,170 miles of canals, ditches and pipelines
- Old canals are the focus of on-going water conservation projects
- District authority/responsibility ends at point of delivery to patron

Pilot Butte Canal

Pilot Butte Canal Piping Project

Lone Pine Pipe at Crooked River

Return Flows

- 46 identified points where irrigation water is returned to natural water body
  - Operational spills from canals
  - Surface runoff at downstream ends of Districts

Lone Pine Return to Crooked River

Juniper Canyon Return to Crooked River

Existing Hydropower

- Eight hydropower generators on existing canals
  - Siphon – Central Oregon Canal
  - Juniper Ridge – Pilot Butte Canal
  - Ponderosa – Swalley Main Canal
  - Mile 45 – North Unit Main Canal
  - Monroe Drop – North Unit Main Canal
  - Watson – Whychus Creek Main Canal
  - Watson Net Meter Micro – Whychus Creek Main Canal
  - McKenzie – Whychus Creek Main Canal

Example of Hydraulic Head on the Pilot Butte Canal

Juniper Ridge Hydroelectric Project

City of Prineville Activities

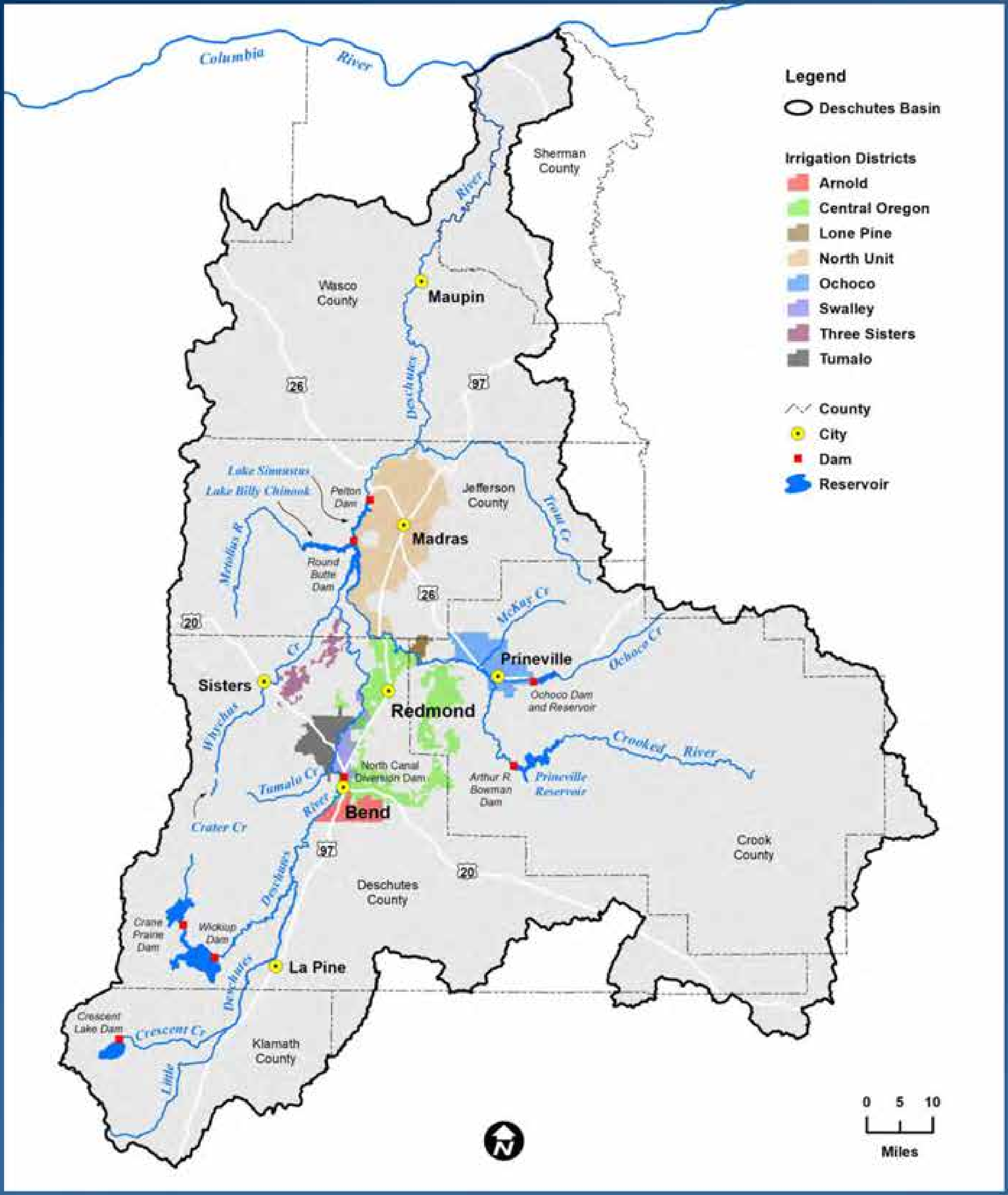
- Small diversions from Crooked River and Ochoco Creek (as OID patron)
- Groundwater pumping for municipal use
- Discharge of treated effluent to Crooked River

DBHCP Covered Lands

- Beds, banks and waters of the following:
  - Deschutes River (Crane Prairie Reservoir to mouth)
  - Crescent Creek (Crescent Lake Reservoir to mouth)
  - Little Deschutes River (Crescent Creek to mouth)
  - Tumalo Creek (lower 21.7 miles)
  - Whychus Creek (TSID Diversion to mouth)

DBHCP Covered Lands

- Crooked River (Prineville Reservoir to mouth)
- Ochoco Creek (Ochoco Reservoir to mouth)
- McKay Creek (Jones Dam to mouth)
- Lytle Creek (lower 5.7 miles)
- Trout Creek (Mud Springs Creek to mouth)
- Mud Springs Creek (lower 8 miles)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Term of the DBHCP

- To be determined (20 – 50 years)

Need for the DBHCP

Effects of the Covered Activities
on the
Covered Species

Oregon Spotted Frog

- **Distribution on the Covered Lands**
  - Crane Prairie Reservoir
  - Wickiup Reservoir
  - Deschutes River (Wickiup to Bend)
  - Crescent Creek (downstream of Crescent Dam)
  - Little Deschutes River

Oregon Spotted Frog

- **Affected by:**
  - Fluctuation of reservoir levels
  - Seasonal high and low stream flows
  - Rapid changes in stream flow
  - All related to storage and release of irrigation water

Bull Trout

- **Distribution on the Covered Lands**
  - Deschutes River (upstream to Big Falls)
  - Whychus Creek (upstream to RM 2.4)
  - Crooked River (upstream to Opal Springs)

Bull Trout

- **Affected by:**
  - Flow reductions during summer (irrigation diversions) and winter (irrigation storage)

Steelhead Trout

- **Distribution on the Covered Lands (current and potential)**
  - Deschutes River (upstream to Big Falls)
  - Trout Creek and lower Mud Springs Creek
  - Whychus Creek (upstream to RM 37)
  - Crooked River (upstream to Bowman Dam)
  - Ochoco Creek (upstream to Ochoco Dam)
  - McKay Creek (upstream to RM 19)

Steelhead Trout

- **Affected by:**
  - Flow reductions during summer (irrigation diversions) and winter (irrigation storage)
  - Return flows

Chinook Salmon

- **Distribution on the Covered Lands (current and potential)**
  - Deschutes River (upstream to Big Falls)
  - Whychus Creek (upstream to RM 37)
  - Crooked River (upstream to Bowman Dam)

Chinook Salmon

- **Affected by:**
  - Flow reductions during summer (irrigation diversions) and winter (irrigation storage)
  - Return flows

Sockeye Salmon

- **Distribution on the Covered Lands (current and potential)**
  - Deschutes River (upstream to Big Falls)
  - Whychus Creek (upstream to RM 2.4)
  - Crooked River (upstream to Opal Springs)

Sockeye Salmon

- **Affected by:**
  - Flow reductions during summer (irrigation diversions) and winter (irrigation storage)

National Environmental Policy Act, the Endangered Species Act, and Habitat Conservation Plans

National Environmental Policy Act, the Endangered Species Act, and Habitat Conservation Plans

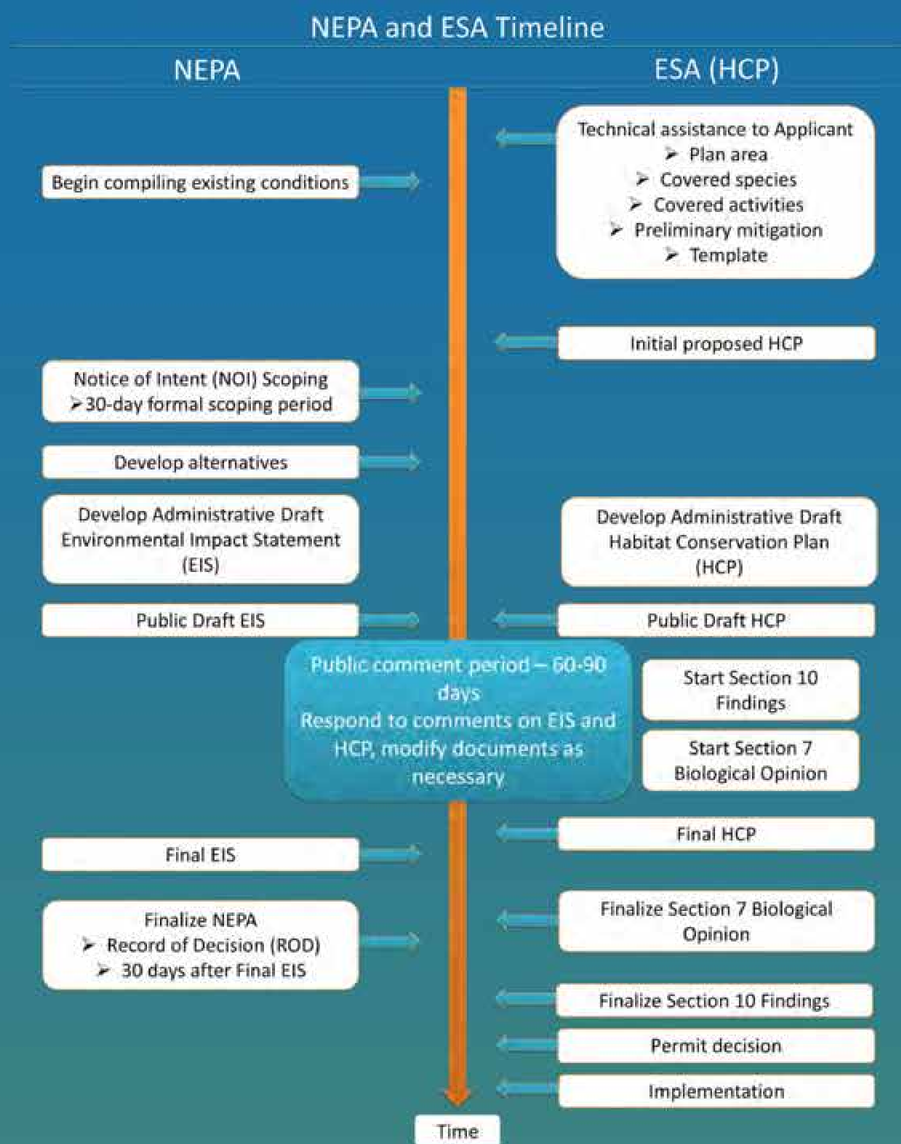
Why are we here?

- The DBBC and the City of Prineville are preparing a Habitat Conservation Plan (HCP) for several Deschutes River-dependent species.

- In response, USFWS will prepare an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) for the HCP.

- Preparation of an EIS, triggers scoping.

ESA/NEPA Processes



Scoping

Why do Scoping?

- Scoping engages the public and asks for input
- The process identifies significant environmental issues for further analysis
- Other, less significant environmental issues, are identified but further analysis may not be necessary.

Scoping

- Get involved to help us identify important issues

- Give us your comments

  the public comment period goes through September 22, 2017

NEPA Options

	Categorical Exemption	Environmental Assessment	Environmental Impact Statement
Notice of Intent (NOI)	--	--	✓
Scoping	--	--	✓
Notice of Availability (NOA) of Draft HCP and Draft NEPA document	✓	✓	✓
Draft review period	30 days	30-60 days	60-90 days
Final document	--	Optional	✓
Responses to comments	--	Optional	✓
Final NOA	--	--	30 days
Decision document	Categorical Exclusion Questionaire	Finding of No Significant Impact (FONSI)	Record of Decision (ROD)

Scoping

We want comments on:

- Alternatives to the proposed action
- Measures to avoid, mitigate, or minimize effects
- Existing environmental conditions in the basin
- Permit duration
- Covered species and activities
- Biological goals and objectives of the HCP
- Any other significant issues

National Environmental Policy Act

The NEPA process:

- Is required for the Service to approve an Applicants' HCP.
- Helps the Service make decisions based on our understanding of the environmental consequences of approving the HCP.
- Is used to identify and take actions that protect, restore, and enhance the environment.
- Analyzes the effects of all the alternatives considered.

National Environmental Policy Act

NEPA considers the impacts of a federal action on elements of the human environment such as:

- water quality
- wetlands
- air quality
- socio-economic and cultural resources
- fish and wildlife species including ESA-listed

Environmental Impact Statement and Habitat Conservation Plans

The Service will prepare an EIS because the HCP is likely to:

- Cover a significant portion of the basin
- Cover multiple species and multiple activities
- Cover water management activities in the basin
- Affect the human environment and listed species

Environmental Impact Statement

What does an EIS include?

- Purpose and need for the action
- Alternatives (no action, proposed action, others)
- Affected environment
- Environmental effects of the alternatives
- Cumulative effects

Endangered Species Act

Endangered Species Act

Purpose

- To protect and recover imperiled species and the ecosystems upon which they depend.

Endangered Species Act

Species listed as endangered or threatened:

- ‘Threatened’ means a species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

- ‘Endangered’ means a species is in danger of extinction throughout all or a significant portion of its range.

Endangered Species Act (ESA)

ESA protects endangered and threatened species and their habitats by prohibiting "take"

- **Take** means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct."

Endangered Species Act (ESA)

- **Section 9 of the ESA** states it is unlawful for anyone to take endangered or threatened species.

However….

- **Section 10 of the ESA** allows incidental take of threatened and endangered species, if take occurs under an approved habitat conservation plan.

Habitat Conservation Plans

- Incidental Take refers to take that results from carrying out an otherwise lawful activity (for example, residential and commercial development, or road construction)
- A Habitat Conservation Plan is a voluntary plan developed by a non-Federal applicant in order to receive an incidental take permit.

Habitat Conservation Plans

The Applicant's HCP must describe and include:

- Impacts likely to result from the taking of the species
- Measures the applicants will take to minimize and mitigate impacts
- Adequate funding to perform those measures
- Alternative actions that would not result in take and reasons those alternatives are not being used
- Additional measures as required by the Service

Habitat Conservation Plans

To approve the Applicant's HCP and issue an incidental take permit, the Service must determine:

- Taking is incidental
- The Applicants will, to the maximum extent practicable, minimize and mitigate the impacts of the taking
- The Applicants ensure adequate funding for the plan
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild
- Any measures required by the Service will be met

Next Steps/Timeline

- NEPA Scoping
  -Public comment period ends 9/22/2017
- Draft EIS and draft HCP
  - Public comment period (2018)
- Final EIS and final HCP
  - Public comment period (2019)
- HCP Implementation

Contact Us

Send comments to:

Peter Lickwar peter_lickwar@fws.gov

More information:
http://bit.ly/DeschutesHCP

August 14-15, 2017

Appendix D

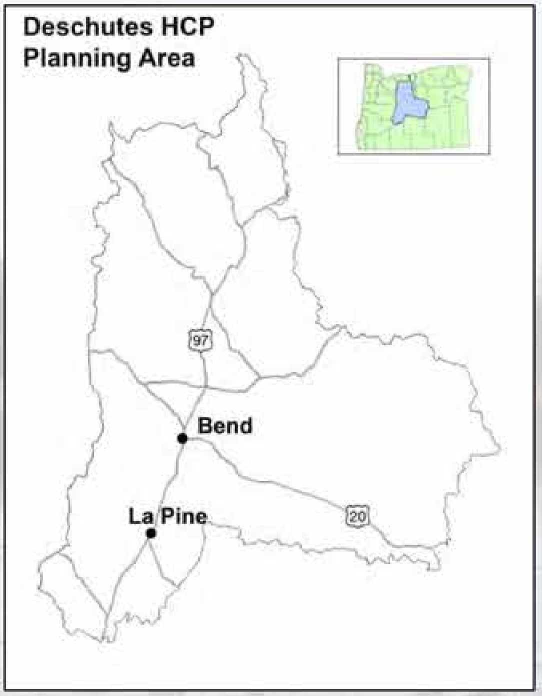
Scoping Meeting Materials

U.S. Fish & Wildlife Service

Deschutes River Basin

Habitat Conservation Plan (HCP)

Providing reliable water for farmers and residents in the Deschutes Basin while conserving fish, wildlife, and water resources for future generations.



U.S. Fish and Wildlife Service (Service) is working with the Deschutes Basin Board of Control, City of Prineville, NOAA Fisheries, the Bureau of Reclamation, and others to develop a 20-40 year HCP that will ensure sufficient, reliable water is available for the people and wildlife of the Deschutes River Basin.

This HCP will become part of an application for one or more Endangered Species Act incidental take permits authorizing the incidental take of listed species caused by activities covered under this plan (e.g., operation, maintenance, and construction of water storage and delivery systems).

The HCP will cover ~10,700 mi^2 of land in the Deschutes River Basin of central Oregon. This Basin includes six major tributaries above Lake Billy Chinook. (Credit: USFWS).

Species Addressed

Three Federally-threatened (T) and two non-listed (NL) species. The Service has jurisdiction over Oregon spotted frog (T) and bull trout (T). NOAA is lead for steelhead (T), sockeye salmon (NL), and spring Chinook salmon (NL).

Bull trout habitat in the Deschutes River Basin (Credit: USFWS)

What are HCPs?

HCPs are planning documents required as part of an application for an incidental take permit. They describe the anticipated effects of the proposed taking; how those impacts will be minimized, or mitigated; and how the HCP is to be funded.

HCPs can apply to both listed and non-listed species, including those that are candidates or have been proposed for listing. Conserving species before they are in danger of extinction or are likely to become so can also provide early benefits and prevent the need for listing.

https://www.fws.gov/endangered/what-we-do/hcp-overview.html

Bull trout (Credit: J.Sartore/National Geographic)

Oregon spotted frog (Credit: T.Waterstrat/USFWS)

Upper Deschute River (Credit: B.Moran/USFWS)

Stay Connected:

Questions? Call: (541) 383-7146 and ask for Peter Lickwar or Bridget Moran.

Visit our Deschutes HCP Webpage: http://bit.ly/DeschutesHCP

Follow us on Facebook: http://bit.ly/OFWOfacebook

Habitat Conservation Plans Under the Endangered Species Act

John Cleckler/USFWS

The endangered California tiger salamander is among the listed species included in the East Contra Costa County Habitat Conservation Plan.

Introduction

Why should we save endangered species? Congress answered this question in the introduction to the Endangered Species Act of 1973 (Act), recognizing that endangered and threatened species of wildlife and plants "are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people."

After this finding, Congress said that the purposes of the Act are ". . . to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved [and] to provide a program for the conservation of such . . . species. . . ." Habitat Conservation Plans (HCPs) under section 10(a)(1)(B) of the Act provide for partnerships with non-Federal parties to conserve the ecosystems upon which listed species depend, ultimately contributing to their recovery.

What are HCPs?

HCPs are planning documents required as part of an application for an incidental take permit. They describe the anticipated effects of the proposed taking; how those impacts will be minimized, or mitigated; and how the HCP is to be funded.

HCPs can apply to both listed and nonlisted species, including those that are candidates or have been proposed for listing. Conserving species before they are in danger of extinction or are likely to become so can also provide early benefits and prevent the need for listing.

Who needs an incidental take permit?

Anyone whose otherwise-lawful activities will result in the "incidental take" of a listed wildlife species needs a permit. The U.S. Fish and Wildlife Service (FWS) can help determine whether a proposed project or action is likely to result in "take" and whether an HCP is needed. FWS staff can also provide technical assistance to help design a project to avoid take. For example, the project could be designed with seasonal restrictions on construction to minimize disturbance to a species.

What is the benefit of an incidental take permit and habitat conservation plan to a private landowner?

The permit allows the permit-holder to legally proceed with an activity that would otherwise result in the unlawful take of a listed species. The permit-holder also has assurances from the FWS through the "No Surprises" regulation.

What is "take"?

The Act defines "take" as ". . . to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." "Harm" includes significant habitat modification that actually kills or injures a listed species through impairing essential behavior such as breeding, feeding, or sheltering.

Section 9 of the Act prohibits the take of endangered and threatened species. The purpose of the incidental take permit is to exempt non-Federal permit-holders—such as States and private landowners— from the prohibitions of section 9, not to authorize the activities that result in take.

What do habitat conservation plans do?

In developing habitat conservation plans, people applying for incidental take permits describe measures designed to minimize and mitigate the effects of their actions— to ensure that species will be conserved and to contribute to their recovery.

Habitat conservation plans are required to meet the permit issuance criteria of section 10(a)(2)(B) of the Act:

- (i) taking will be incidental;
- (ii) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking;

- (iii) the applicant will ensure that adequate funding for the plan will be provided;
- (iv) taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and
- (v) other measures, as required by the Secretary, will be met.

What needs to be in HCPs?

Section 10 of the Act and its implementing regulations define the contents of HCPs. They include:

- an assessment of impacts likely to result from the proposed taking of one or more federally listed species.
- measures that the permit applicant will undertake to monitor, minimize, and mitigate for such impacts, the funding available to implement such measures, and the procedures to deal with unforeseen or extraordinary circumstances.
- alternative actions to the taking that the applicant analyzed, and the reasons why the applicant did not adopt such alternatives.
- additional measures that the Fish and Wildlife Service may require.

HCPs are also required to comply with the Five Points Policy by including:

1. biological goals and objectives, which define the expected biological outcome for each species covered by the HCP;
2. adaptive management, which includes methods for addressing uncertainty and also monitoring and feedback to biological goals and objectives;
3. monitoring for compliance, effectiveness, and effects;
4. permit duration which is determined by the time-span of the project and designed to provide the time needed to achieve biological goals and address biological uncertainty; and
5. public participation according to the National Environmental Policy Act.

What are "No Surprises" assurances?

The FWS provides "No Surprises" assurances to non-Federal landowners through the section 10(a)(1)(B) process. Essentially, State and private landowners are assured that if "unforeseen circumstances" arise, the FWS will not require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed to in the HCP without the consent of the permit-holder. The government will honor these assurances as long as permit-holders are implementing the terms and conditions of the HCPs, permits, and other associated documents in good faith. In effect, the government and permit-holders pledge to honor their conservation commitments.

Are incidental take permits needed for listed plants?

There are no Federal prohibitions under the Act for the take of listed plants on non-Federal lands, unless taking those plants is in violation of State law. However, the FWS analyzes the effects of the permit on listed plant species because section 7 of the Act requires that issuing an incidental take permit may not jeopardize any listed species, including plants. In general, it is a good idea to include conservation measures for listed plant species in developing an HCP.

What is the process for getting an incidental take permit?

The applicant decides whether to seek an incidental take permit. While FWS staff members provide detailed guidance and technical assistance throughout the process, the applicant develops an HCP and applies for a permit. The components of a completed permit application are a standard application form, an HCP, an Implementation Agreement (if applicable), the application fee, and a draft National Environmental Policy Act (NEPA) analysis. A NEPA analysis may result in a categorical exclusion, an environmental assessment, or an environmental impact statement.

While processing the permit application, the FWS prepares the incidental take permit and a biological opinion under section 7 of the Act and finalizes the NEPA analysis documents. Consequently, incidental take permits have a number of associated documents.

How do we know if we have listed species on our project site?

For assistance, check with the appropriate State fish and wildlife agency, the nearest FWS field office, or the National Marine Fisheries Service (NMFS), for anadromous fish such as salmon.

What kinds of actions are considered mitigation?

Mitigation measures are actions that reduce or address potential adverse effects of a proposed activity on species included in an HCP. They should address specific conservation needs of the species and be manageable and enforceable. Mitigation measures may take many forms, including, but not limited to, payment into an established conservation fund or bank; preservation (via acquisition or conservation easement) of existing habitat; enhancement or restoration of degraded or a former habitat; establishment of buffer areas around existing habitats; modifications of land use practices, and restrictions on access. Which type of mitigation measure used for a specific HCP is determined on a case by case basis, and is based upon the needs of the species and type of impacts anticipated.

What is the legal commitment of a HCP?

Incidental take permits make binding the elements of HCPs. While incidental take permits have expiration dates, the identified mitigation may be in perpetuity. Violating the terms of an incidental take permit may constitute unlawful take under section 9 of the Act.

Who approves an HCP?

The FWS Regional Director decides whether to issue an incidental take permit, based on whether the HCP meets the criteria mentioned above. If the HCP addresses all of the requirements listed above, as well as those of other applicable laws, the FWS issues the permit.

What other laws besides the Endangered Species Act are involved?

In issuing incidental take permits, the FWS complies with the requirements of NEPA and all other statutes and regulations, including State and local environmental/planning laws.

Who is responsible for NEPA compliance during the HCP process?

The FWS is responsible for ensuring NEPA compliance during the HCP process. However, if the Service does not have sufficient staff resources, an applicant may, within certain limitations, prepare the draft NEPA analysis. Doing so can benefit the applicant and the government by expediting the application process and permit issuance. In cases like this, the FWS provides guidance, reviews the document, and takes responsibility for its scope, adequacy, and content.

Does the public get to comment on our HCP? How do public comments affect our HCP?

The Act requires a 30-day period for public comments on applications for incidental take permits. In addition, because NEPA requires public comment on certain documents, the FWS operates the two comment periods concurrently. Generally, the comment period is 30 days for a Low Effect HCP, 60 days for an HCP that requires an environmental assessment, and 90 days for an HCP that requires an environmental impact statement. The FWS considers public comments in permit decisions.

What kind of monitoring is required for a HCP, and who performs it?

Three types of monitoring may be required: compliance, effectiveness, and effects. In general, the permit-holder is responsible for ensuring that all the required monitoring occurs. The FWS reviews the monitoring reports and coordinates with the permit-holder if any action is needed.

Does the Fish and Wildlife Service try to accommodate the needs of HCP participants who are not professionally involved in the issues?

Because applicants develop HCPs, the actions are considered private and, therefore, not subject to public participation or review until the FWS receives an official application. The FWS is committed to working with people applying for permits and providing technical assistance throughout the process to accommodate their needs.

However, the FWS does encourage applicants to involve a range of parties, a practice that is especially valuable for complex and controversial projects. Applicants for most large-scale, regional HCPs choose to provide extensive opportunities for public involvement during the planning process. Issuing permits is, however, a Federal action that is subject to public review and comment. There is time for such review during the period when the FWS reviews the information. In addition, the FWS solicits public involvement and review, as well as requests for additional information during the scoping process when an EIS is required.

Are independent scientists involved in developing an HCP?

The views of independent scientists are important in developing mitigation and minimization measures in nearly all HCPs. In many cases, applicants contact experts who are directly involved in discussions on the adequacy of possible mitigation and minimization measures. In other cases, the FWS incorporates the views of independent scientists indirectly through their participation in listing documents, recovery plans, and conservation agreements that applicants reference in developing their HCPs.

How does the FWS ensure that species are adequately protected in HCPs?

The FWS has strengthened the HCP process by incorporating adaptive management when there are species for which additional scientific information may be useful during the implementation of the HCP. These provisions allow FWS and NMFS to work with landowners to reach agreement on changes in mitigation strategies within the HCP area, if new information about the species indicates this is needed. During the development of HCPs, the FWS and NMFS discuss any changes in strategy with landowners, so that they are aware of any uncertainty in management strategies and have concurred with the adaptive approaches outlined.

What will the FWS do in the event of unforeseen circumstances that may jeopardize the species?

The FWS will use its authority to manage any unforeseen circumstances that may arise to ensure that species are not jeopardized as a result of approved HCPs. In the rare event that jeopardy to the species cannot be avoided, the FWS may be required to revoke the permit.

How can I obtain information on numbers and types of HCPs?

Our national HCP database displaying basic statistics on HCPs is available online from our Habitat Conservation Planning page at http://ecos.fws.gov/conserv_plans/servlet/gov.doi.hcp.servlets.PlanReportSelect?region=9&type=HCP.

U. S. Fish and Wildlife Service
Endangered Species Program
4401 N. Fairfax Drive, Room 420
Arlington, VA 22203
703-358-2171
http://www.fws.gov/endangered/what-we-do/hcp-overview.html

April 2011

Appendix E

Agency and Tribal Cooperating Agency Letters

Weidner , Emily <emily_weidner@fws.gov>

Fwd: Scoping comments

1 message

Lickwar , Peter <peter_lickwar@fws.gov> Mon, Sep 25, 2017 at 9:27 AM
To: Emily Weidner <emily_weidner@fws.gov>

---------- Forwarded message ----------
From: LAMB Bonnie <bonnie.lamb@state.or.us>
Date: Fri, Sep 22, 2017 at 2:11 PM
Subject: Scoping comments
To: "Lickwar, Peter" <peter_lickwar@fws.gov>

Hi Peter – Here are DEQ's comments on the Deschutes HCP scoping process. Thanks for the opportunity to provide comments.

Bonnie

Bonnie Lamb

DEQ Basin Coordinator

475 NE Bellevue Dr., Suite 110

Bend, OR 97701

(541) 633-2027

--
Peter Lickwar
USFWS Bend, Oregon
Phone 541-383-7146

DEQ EIS Scoping Comments 092217.pdf
1607K

Oregon

Kate Brown, Governor

Department of Environmental Quality
Eastern Region Bend Office
475 NE Bellevue Drive, Suite 110
Bend, OR 97701
(541) 388-6146
FAX (541) 388-8283
TTY 711

Date: September 22, 2917

To: Peter Lickwar

From: Bonnie Lamb

Re: Deschutes River Basin HCP Scoping

DEQ would like to offer the following comments for your consideration as the EIS and draft HCP are further developed. I provided extensive comments during the period 2012-2014 when I was involved in stakeholder and technical working groups. I trust that these earlier comments will be reviewed as well. I provided specific comment letters on Tasks 3-6 (June 28, 2012) and on Chapter 5 (November 20, 2014). In addition, I submitted "track changes" and/or email comments on many of the different Tasks and Chapters, including: Table A-2, Study 15 (Phases 1 and 2), Study 2 (Phases 1- 3), and Studies 3-6 (Phase 2). I have attempted to summarize some of these comments here, but not with the level of detail that I provided earlier. I can provide you with copies of my earlier comments if you do not have them in your files.

1. Most of the water bodies identified as part of the Plan Area are included on Oregon's 303(d) list of impaired water bodies for one or more of the following parameters: temperature, dissolved oxygen, pH, chlorophyll-*a*, turbidity, sedimentation, aquatic weeds/algae, *E. coli*, total dissolved gas, biological criteria, flow modification, habitat modification. Resident fish and aquatic life are identified as beneficial uses impacted by all of these parameters, with the exception of *E. coli* and aquatic weeds/algae.

   We have not completed Total Maximum Daily Loads, which would identify causes of the impairments, for any of these listings. However, based on preliminary modeling done in the Deschutes Basin as well as in other parts of the state, it is very likely that some of the covered activities could contribute to the impairments. The EIS and HCP should address the effects of the covered activities on known water quality impairments and indicate how proposed conservation measures will contribute to attainment of water quality standards. While not exhaustive, the following list describes some of the potential impacts of covered activities:
   - Irrigation return flows can contribute pollutants, including heat, nutrients, pathogens (including fish pathogens such as *C. shasta)*, sediments/turbidity, and pesticides, to water bodies which support listed species. These pollutants can in turn affect in-stream temperature, pH, dissolved oxygen, growth of aquatic plants or algae, and fish health.
   - Diversion of water and reduced flows below the point(s) of diversion can contribute to a number of water quality impairments, including temperature, dissolved oxygen, pH, chlorophyll-a, growth of aquatic weeds or algae, and biological criteria.
   - The storage of water in reservoirs can affect the quality of the water. By impounding water, conditions can be created which lead to the growth of aquatic weeds and algae and/or contribute to water quality impairments for dissolved oxygen, pH or temperature. Algal blooms have been documented in most of the reservoirs covered by the Plan. In addition, storage of water during the non-irrigation season results in reduced flows below the reservoir, which can expose stream banks to freeze-thaw processes.

- The timing and release of water from reservoirs can contribute to water quality impairments downstream in a number of ways: (1) impairments in the reservoirs (or constituents that contribute to impairment, such as nutrients) can be passed downstream; (2) increased flows below reservoirs early in the irrigation season can transport sediment downstream from stream banks which were exposed to freeze-thaw processes during the winter; (3) below Wickiup and Prineville Reservoirs, studies have demonstrated elevated total dissolved gas levels (exceeding state standards) at high flow release levels and ODFW has documented the presence of bubble-gas disease in fish in the Crooked River below Prineville Reservoir.
- The activities of the City of Prineville have the potential to affect water quality in Ochoco Creek and Crooked River through possible reductions in stream flow (diversions and groundwater pumping) and discharge of treated wastewater to the Crooked River.

2. During the earlier development of the HCP, the Bureau of Reclamation was contracted to do a review of existing water quality data in the Deschutes Basin (Phase 1 for Studies 3-6, dated March 2013). I reviewed that document and provided a number of comments. I would encourage you to look at these comments, as I am not going to repeat them all here. While the report provided a good start at compiling existing data, it missed quite a bit of data that I knew about. And there has been a quite a bit more data collected since that time, including some TMDL studies in the Upper and Little Deschutes Subbasins and toxics monitoring throughout the basin. In addition, DEQ's Pesticide Stewardship Program began a pilot monitoring program in the Agency Plains area in 2014. Data from this effort could inform the discussion of water quality associated with return flows. Let me know if you would like assistance accessing any of DEQ's data.
3. While I recognize the importance of developing conservation measures to protect the Oregon spotted frog, I would encourage the USFWS to pay equal attention to the habitat and water quality needs of the listed and non-listed fish species that will be covered by this HCP in the middle Deschutes reach above Lake Billy Chinook. While these fish cannot pass up the Deschutes River beyond Big Falls, the flow and water quality impacts of water management activities in and upstream of Bend can be seen in the Deschutes River downstream of Big Falls. Restoring flows in the middle Deschutes is also important for protecting non-listed resident aquatic species.
4. Groundwater discharge through springs along lower Whychus Creek, lower Crooked River and the lower portion of the middle Deschutes River provides a significant source of water to these reaches. In most cases this water provides important cold water habitat for aquatic species. Given the relationship between leaking canals and groundwater discharge above Lake Billy Chinook, it is likely that conservation measures (such as piping canals) will reduce spring flow. The EIS and HCP should model these impacts and develop appropriate mitigation measures, recognizing that leaving an additional 5 cfs of water instream at the point of diversion does not have the same water quality benefits as 5 cfs of spring water.
5. In September, 2014, Conservation Measures were presented to the HCP Working Group in a draft Chapter 5. In this draft, it was unclear what the biological or ecological goals of the proposed measures were. As Conservation Measures are developed through this current EIS/HCP effort, they should be developed to ensure that the biological needs of the covered species are met. This could include quantifying the amount of habitat provided and/or improvements in water quality.
6. Given the complexity of water management in the Deschutes Basin and the limitations of models, it will be very important to have an adequate monitoring program in place to evaluate the impacts of the covered activities and proposed conservation measures over time. For water quality, DEQ maintains a network of long-term ambient monitoring stations in the Deschutes Basin. While this information will be helpful, there are not enough of these stations and they are not monitored frequently enough to be used in understanding the effects of activities covered under the HCP. As part of their monitoring responsibilities under the HCP, the applicants should commit to contributing to the development of a more comprehensive water quality monitoring program in the Plan Area. A number of entities have expressed interest in having

such a monitoring program in place and DEQ will be glad to assist with development of a monitoring strategy.

7. While likely outside of the scope of the HCP, DEQ staff wanted to identify two other potentially related water quality issues.
   - Water quality standards and beneficial uses apply to the canals. Irrigation canals are subject to NPDES permits.
   - The covered activities have the potential to affect local drinking water sources. For reference, the only public water system using surface water within the Plan Area is the City of Bend which has an intake on Bridge Creek. (City of Sisters has an intake on Pole Creek in the Whychus Creek Watershed, however the source is currently listed as inactive/emergency.) There are ~250 federally recognized public water systems using groundwater in the Plan Area. At least 12 community water systems, including the Cities of Bend and Prineville as well as Deschutes Valley Water District, have wells within 500 feet of the covered lands. Wells within 500 feet of surface water are typically flagged by the Oregon Health Authority for potential hydraulic connection to the surface water body. Additional information on public water supply locations can be provided if needed.

As you are well aware, many of the water management changes that will be considered in the EIS/HCP process are also being evaluated as part of the on-going Deschutes Basin Study. I would encourage you to utilize the results of the Basin Study to help inform the Deschutes River Basin HCP.

Please feel free to contact me if you have any questions about these comments. I can be reached at lamb.bonnie@deq.state.or.us or (541) 633-2027. Thank you for the opportunity to provide comments.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

September 21, 2017

Peter Lickwar
U.S. Fish and Wildlife Service
Bend Field Office
63095 Deschutes Market Road
Bend, OR 97701-9857

Dear Mr. Lickwar:

The EPA has reviewed the July 24, 2017 Federal Register Notice of Intent from the US Fish and Wildlife Service to prepare a Draft Environmental Impact Statement for the Proposed Deschutes River Basin Habitat Conservation Plan in Oregon (EPA Project Number 17-0034-FWS). Our comments are in accordance with EPA responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act. Section 309 specifically directs the EPA to review and comment in writing on the environmental impacts associated with all major federal actions.

The Deschutes River Basin HCP is being prepared in response to a request for incidental take permits under the Endangered Species Act. ITPs under the ESA would authorize the incidental take of federally-listed species caused by permitted activities (i.e., the storage, release, diversion and return of irrigation water). Species proposed for inclusion in the HCP include three federally-listed species (Oregon spotted frog, bull trout, and steelhead) and two currently unlisted species that have the potential to become listed during the life of the HCP (sockeye salmon and spring Chinook salmon). The potential applicants for the ITPs include the Irrigation Districts that comprise the Deschutes Basin Board of Control: the Arnold Irrigation District, Central Oregon Irrigation District, North Unit Irrigation District, Ochoco Irrigation District, Swalley Irrigation District, Three Sisters Irrigation District, Tumalo Irrigation District, the Lone Pine Irrigation District, and the City of Prineville.

According to the NOI, the EIS will evaluate a no action alternative; the proposed action, which would include the issuance of take authorizations as described in the proposed HCP; and a range of additional reasonable alternatives. As the EIS is developed, we encourage the Service to develop materials (especially web-based materials) to help the public and decision-makers understand and engage in dialogue about these alternatives. We also stress the importance of structuring the alternatives analysis so that components of individual alternatives can be extracted or incorporated as appropriate in the Final EIS. It should be possible for a hybrid alternative to emerge through the planning process, so long as it is within the spectrum of the alternatives analyzed in the Draft EIS.

We commend the parties to the HCP for their recognition of the value and importance of aquatic habitats in the Deschutes Basin and for their proactive efforts to conserve them. We also appreciate the DBBC's support, along with that of the Bureau of Reclamation, of the Deschutes Basin Study Work Group. This work will be foundational to a robust analysis of HCP alternatives through the NEPA process.

Because the available scoping materials do not lay out specific alternative directions, it is difficult to offer detailed comments or suggestions on how alternatives might be modified. Our attached comments do, however, make suggestions related to providing an adequate range of alternatives and highlight key issues that we recommend be addressed as the EIS is developed. We appreciate the opportunity to participate early in the planning process. If you would like to discuss these comments, please contact me at (503) 326-2859 or by electronic mail at kubo.teresa@epa.gov.

Sincerely,

Teresa Kubo
Office of Environmental Review and Assessment

Enclosure:

1. EPA Region 10 Scoping Comments on the NOI to Prepare a Draft Environmental Impact Statement for the Deschutes River Basin Habitat Conservation Plan

EPA Region 10 Scoping Comments on the NOI to Prepare a Draft Environmental Impact Statement for the Deschutes River Basin Habitat Conservation Plan (HCP)
September 21, 2017

Range of Alternatives

EISs should include a range of alternatives, which meet the stated purpose and need, goals and objectives, and responds to issues identified during the scoping process. The alternatives analysis should compare alternatives with respect to how well they respond to the stated purpose and need, goals and objectives, and scoping issues.

The Council on Environmental Quality recommends that all reasonable alternatives be considered, even if some of them could be outside the capability of the applicant or the jurisdiction of the agency preparing the EIS.[1]

In the interest of providing an adequate range of alternatives, we recommend the inclusion of a conservation alternative, as well as an alternative that would emphasize meeting municipal and agricultural needs. We recommend the conservation alternative broadly seek to maximize habitat protection and restoration and include the following considerations:

- Stream flows in the Upper Deschutes that mimic the natural hydrograph of the river. In the Upper Deschutes that would mean higher winter flows and lower summer flows. This would require flow modification at Wickiup, Crane Prairie and Crescent reservoirs, as well as conservation actions by the relevant irrigation districts;
- Increasing Deschutes River flows in the Middle Deschutes from the current protected flow of 134 cfs to the instream flow target of 250 cfs and increasing stream flow in Tumalo Creek from the current protected flow of 17.2 cfs to 54 cfs. Multiple lines of evidence show reduced stream temperatures at higher stream flows would be achieved through stream flow restoration in the middle Deschutes River and Tumalo Creek;[2]
- Required minimum flows in the Crooked River (as determined by the relevant regulatory agencies) during periods of drought;
- The inclusion of shaping flows during reservoir storage season (March 1 – April 15) to improve Oregon Spotted Frog (OSF) breeding conditions and limit the potential for egg desiccation; and,
- Opportunities for habitat restoration (consider opportunities on Forest Service land such as Ryan Ranch; areas around Wickiup Reservoir that could be physically modified to improve or create habitat; opportunities on private land; opportunities on BLM land, such as the Casey Tract on the Little Deschutes),

Water Quality

Water quality degradation is one of EPA's primary concerns. We recommend that the EIS disclose which waters may be impacted by the proposed HCP, the nature of the potential impacts, and the specific pollutants likely to impact those waters. It should also report those waterbodies potentially affected by the project that are listed on the State's most current EPA-approved 303(d) list of impaired waters. The EIS should describe any existing restoration and enhancement efforts for those waters, and

[1] http://ceq.hss.doe.gov/NEPA/regs/40/1-10.HTM#2

[2] http://www.upperdeschuteswatershedcouncil.org/wp-content/uploads/2016/12/2015-Middle-Deschutes-River-Instream-Flow-Restoration-and-Temperature-Response_FINAL.pdf

how the project will coordinate with Oregon DEQ as they develop TMDLs for the rivers and streams in the Upper Deschutes and Little Deschutes sub-basins. The EIS should also describe on-going protection efforts, and any mitigation measures that will be implemented to avoid further degradation of water quality within impaired waters. The state designates, and EPA approves, the applicable beneficial uses and associated criteria for protecting surface waters. These, combined with anti-degradation provisions, are considered the state water quality standards. The anti-degradation provision of the CWA and State of Oregon WQS apply to those waterbodies where WQS are currently being met. This provision prohibits degrading the water quality unless a robust analysis shows that important economic and social development necessitates some degradation. The EIS evaluation should determine and discuss how the antidegradation provisions of the CWA and Oregon WQS would be met. See 40 CFR 131, as well as the State of Oregon WQS, for more information regarding beneficial uses, water quality criteria, and antidegradation policies and procedures.

Align Conservation Efforts with Current Landscape-Level Strategies
We support and encourage partnerships among federal, state, local, and non-governmental entities to strategically and collaboratively conserve, restore, and maintain aquatic and wetland habitat. We recommend that strategic efforts include the following:

- Identify and prioritize the largest, most intact habitat patches;
- Identify and establish corridors/connections between and among habitat patches;
- Provide redundancy of habitats in the landscape;
- Identify and protect important refugia and biodiversity hotspots for wetland dependent plant and animal species;
- Restore degraded habitats, particularly those with the greatest potential for restoration and for meeting landscape-level conservation strategies;
- Seek to complement, augment, and connect with the important conservation work occurring within the planning area (such as at Ryan Ranch);
- Seek management agreements with landowners of working lands that contain remnant and/or high quality habitat; and,
- Provide incentives to landowners to retain and maintain wetland habitats and to have compatible land uses.

Active Management to Restore and Maintain Aquatic Habitats in the Deschutes Basin.
Management activities, such as aquatic habitat and wetland restoration, the construction of cattle exclosure fencing, and the removal and control of invasive species will be an important component of species protection and recovery. These actions need to be legal, feasible with respect to cost/funding and logistics, and reasonably acceptable to jurisdictions, landowners, and neighbors. We support the inclusion of active management, as proposed above, among the covered activities.

Climate Considerations
The EIS should disclose the extent to which the HCP and potential issuance of an ITP would incorporate consideration of future climate. It is projected that the Pacific Northwest could see rising stream temperatures, which are expected to reduce cold-water fisheries habitat; changes in the timing and length of seasons, which would influence changes in the ranges, phenology, community composition, biotic interactions and behavior of plants, insects, and animals (including predatory species); and increased winter rainfall, which will be accompanied by a reduction in snow pack, earlier snowmelts,

and increased runoff. This will affect hydrology and reservoir operation, as well as the potential timing and intensity of wildfire. The EIS should discuss the relevant potential effects of predicted future climate scenarios on the proposed actions, and how the HCP and ITP(s) would incorporate mitigation, adaptation, and education measures.

Monitoring and Adaptive Management

Monitoring and adaptive management will be critical to the success of the HCP. We recommend that adaptive management plans include:

- A timeline for periodic reviews and adjustments, as well as a mechanism to consider and implement additional mitigation measures, as necessary;
- Specific thresholds that would trigger changes in management actions, monitoring or mitigation;
- Criteria for determining whether additional mitigation measures are needed; and,
- A commitment to implementation of the proposed monitoring plan.

Ecosystem Services

The HCP's effects on ecosystem services, both positive and negative, should be analyzed and disclosed in the EIS. Of key importance in this context is the role of salmon as a provisioning species. Salmon produce highly valued food products harvested in various commercial, subsistence, and personal-use fisheries across the North Pacific. Salmon are also a principal focus of the spiritual and cultural lives of diverse native communities in the Pacific Northwest.

Salmon and steelhead also provide many ecosystem supporting services. Salmon are the principal food item of many terrestrial wildlife species[3,4] and a source of marine-derived nutrients to coastal lakes and streams[5,6,7]. They also act as watershed engineers that structure streambed habitats and alter sediment composition during spawning[8]. We recommend that these services be acknowledged, accounted for using quantitative (where feasible) or qualitative means, and fully considered in decision making.

This analysis should include the following elements,[9] which are basic tenets of the NEPA process:

- Describe the Federal action;
- Identify and classify key ecosystem services in the location of interest, i.e., the affected environment;
- Assess the impact of the Federal action on ecosystem services relative to the baseline;
- Assess the effect of the changes in ecosystem services associated with the Federal action; and
- Integrate ecosystem services analyses into decision making.

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[4] Merz, J. E., and P. B. Moyle. 2006. Salmon, wildlife, and wine: marine-derived nutrients in human-dominated ecosystems of central California. *Ecological Applications* 16(3):999–1009.

[5] Bilby, R. E., Fransen, B. R., and P. B. Bisson. 1996. Incorporation of nitrogen and carbon from spawning coho salmon into the trophic system of streams: evidence from stable isotopes. *Canadian Journal of Fisheries and Aquatic Sciences* 53:164–173

[6] Cederholm, C. J., M. D. Kunz, T. Murota, and A. Sibatani. 1999. Pacific salmon carcasses: essential contributions of nutrients and energy for aquatic and terrestrial ecosystems. *Fisheries* 24:6–15.

[7] Finney, B. P., I. Gregory-Eaves, J. Sweetman, M. S. V. Douglas, and J. P. Smol. 2000. Impacts of climate change on Pacific salmon abundance over the past 300 years. *Science* 290:795–799.

[8] Schindler, D. E., M. D. Scheuerell, J. W. Moore, S. M. Gende, T. B. Francis, and W. J. Palen. 2003. Pacific salmon and the ecology of coastal ecosystems. *Frontiers in Ecology and the Environment* 1(1):31–37.

[9] http://www2.epa.gov/eco-research/ecosystems-services

Cumulative Impacts
Cumulative impacts result when the effects of an action are added to other effects on a resource in a particular place and within a particular time. It is the combination of these effects, and any resulting environmental degradation, that should be the focus of cumulative impact analysis.

In analyzing the HCP alternatives, we recommend the EIS characterize resources, ecosystems and communities in terms of their response to change and capacity to withstand stresses. The EIS should focus on resources which are "at risk" or have the potential to be significantly impacted under the various alternatives.

The EPA has issued guidance on how we are to provide comments to lead federal agencies on the assessment of cumulative impacts in Draft EISs, Consideration of Cumulative Impacts in EPA Review of NEPA Documents, which can be found on the EPA's web site at:
https://www.epa.gov/nepa/cumulative-impacts-guidance-national-environmental-policy-act-reviews.
The guidance states that in order to assess the adequacy of the cumulative impacts assessment, five key areas should be considered. The EPA tries to assess whether the cumulative effects analysis:

(1) Identifies resources, if any, that are being cumulatively impacted;
(2) Determines the appropriate geographic area (within natural ecological boundaries) and the time period over which the effects have occurred and would occur;
(3) Describes a benchmark or baseline;
(4) Looks at all past, present, and reasonably foreseeable future actions that have affected, are affecting, or would affect resources of concern; and,
(5) Includes scientifically defensible threshold levels.

Coordination with Tribal Governments
Development of the EIS should be conducted in consultation with all affected tribal governments, consistent with Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments). The EIS should discuss whether or not the proposed project would affect tribal natural and/or cultural resources and address any concerns of the tribes in accordance with federal tribal trust responsibilities.

NPS Comments on Deschutes River Basin HCP

Lee Kreutzer: LKreutzer@nps.gov 8/4/2017

Thank you for this opportunity to participate in scoping for the Deschutes River Basin Habitat Conservation Plan. This office of the National Park Service, National Trails Intermountain Region, administers the Oregon National Historic Trail (NHT). We ask the Fish and Wildlife Service to determine whether the NHT falls within the area of potential effect for this undertaking, and if so, if the undertaking has potential to affect the NHT. Please add this office to the contact list for the planning process. Our point of contact will be Lee Kreutzer, Cultural Resources Specialist, who can be reached via email at Lee_Kreutzer@nps.gov and by phone at 801-741-1012 ext 118.

Weidner , Emily <emily_weidner@fws.gov>

Fwd: ODFW Deschutes River Basin HCP - draft EIS Comments

1 message

Lickwar , Peter <peter_lickwar@fws.gov> Mon, Sep 25, 2017 at 9:29 AM
To: Emily Weidner <emily_weidner@fws.gov>

---------- Forwarded message ----------
From: Ted Wise <ted.g.wise@state.or.us>
Date: Fri, Sep 22, 2017 at 7:50 PM
Subject: ODFW Deschutes River Basin HCP - draft EIS Comments
To: "Lickwar, Peter" <peter_lickwar@fws.gov>
Cc: Brett Hodgson <brett.l.hodgson@state.or.us>

Dear Mr. Lickwar:

Attached is the September 22, 2017 Oregon Department of Fish and Wildlife Deschutes River Basin HCP - draft EIS Comment Letter.

Should you have any questions on our comments please don't hesitate to call or email.

Thank-you.

- Ted W.

****

Ted Wise

Oregon Department of Fish & Wildlife

East Region Hydropower Coordinator

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Bend, Oregon 97702

Email: ted.g.wise@state.or.us

Office Phone: 541-633-1115

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Peter Lickwar

USFWS Bend, Oregon
Phone 541-383-7146

ODFW Comments _ DBHCP EIS Scoping 9-22-17.pdf
185K

Oregon
Kate Brown, Governor

Department of Fish and Wildlife
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September 22, 2017

Peter Lickwar
United States Fish and Wildlife Service
U.S. Fish and Wildlife Service, Bend Field Office
63095 Deschutes Market Road,
Bend, OR 97701

Subject: ODFW Comments for the 2017 Deschutes River Basin Habitat Conservation Plan - draft EIS Scoping Process

Dear Peter:

Please accept the Oregon Department of Fish & Wildlife (ODFW) comments for the Deschutes River Basin Habitat Conservation Plan (DBHCP) - draft Environmental Impact Statement (EIS).

These comments serve as part of ODFW's continued DBHCP involvement including previously submitted remarks pertinent to the draft Chapter 5 DBHCP document detailing proposed mitigation measures released in August of 2014 by the "potential applicants for the ITP(s) including the City of Prineville and members of the Deschutes Basin Board of Control (i.e., Arnold, Central Oregon, North Unit, Ochoco, Swalley, Three Sisters, Tumalo, and Lone Pine Irrigation Districts in Oregon), collectively hereafter referred to as the Applicant. Our comments detail information and analysis that ODFW feels is important to be included as part of the 2017 DBHCP draft EIS scoping process. The lack of detailed species biological information and the generalized description of the Applicant's operations makes it challenging to provide more than cursory comments at this time. ODFW's comments contained herein at this initial stage, therefore are general in scope and are presented based on the understanding that as more information, including alternatives, are developed further, additional input from our agency will be provided. A comprehensive and thorough description and analysis of the impacts and the effects and any proposed mitigation actions for, and through, the DBHCP EIS is profoundly important to the aquatic habitats and listed species for which the Applicants are requesting Incidental Take Coverage.

ODFW appreciates the opportunity to provide input on the proposed HCP EIS and is hopeful that through continued effort, a sustainable habitat conservation plan beneficial to fish and wildlife species and the Applicant will emerge. ODFW is committed to providing input and working with the United States Fish and Wildlife Service, National Marine Fisheries Service and the Applicant in the effort to craft a DBHCP that appropriately provides for the habitat considerations of those species for which Incidental Take Coverage is being sought. Should you have any questions pertaining to these comments please do not hesitate to contact me.

Sincerely,

Ted Wise
Hydropower Coordinator – East Region
Oregon Department of Fish Wildlife
61374 Parrell Road
Bend, Oregon 97701
541-633-1115
ted.g.wise@state.or.us

COMMENTS OF OREGON DEPARTMENT OF FISH AND WILDLIFE ON DESCHUTES BASIN MULTI-SPECIES HABITAT CONSERVATION PLAN – DRAFT ENVIRONMENTAL IMPACT STATEMENT

The stated action for this particular draft Environmental Impact Statement (EIS) scoping is the issuance of an Incidental Take Permit(s) (ITP) for a proposed Deschutes Basin Multi-species Habitat Conservation Plan (DBHCP). The ITP is to provide coverage from incidental take for four salmonid fishes and one amphibian. The Mid-Columbia Summer Steelhead Trout (*Oncorhynchus mykiss*) and Bull Trout (*Salvelinus confluentus*) are currently federally listed threatened and endangered species. The other two salmonids which are proposed for coverage are Chinook Salmon (*Oncorhynchus tshawytscha*) and one population of Sockeye Salmon/Kokanee (*Oncorhynchus nerka)*. One federally listed threatened and endangered amphibian is to be covered – the Oregon spotted frog (*Rana pretiosa*).

Oregon Department of Fish & Wildlife Summary Comments

- Detailed information should be included in the DBHCP/EIS document pertaining to a thorough understanding of the habitats and life histories of all the species for which Incidental Take Coverage is being sought.

- The Applicant and United States Fish and Wildlife Service (USFWS) should provide the information necessary to allow a comprehensive review of the Oregon Spotted Frog (OSF) needs in conjunction with the biological/habitat needs of the other species in the upper Deschutes River reaches. This includes the need for a better understanding of the stream flow needs as related to the aquatic, riparian and wetland habitats.

- In respect to the duration of the proposed ITP, it is important that advantages and disadvantages of a range of timeframes be thoroughly analyzed. This should include timeframes of 5,10,15, 20 and 25 years.

- The length of the issued ITP is important to consider in respect to the limitations of models used to analyze such considerations such as climate change and in respect to limitations presented by the available information for each species as affected by the Applicant's operations.

- The analysis of the appropriate length of the ITP should include ability of Applicant's ability to fund the necessary mitigation measures.

- The analysis of the term of the ITP should be based on the flexibility of using an adaptive management model that allows timely and appropriate adjustments to management actions, during the life of the permit. The more difficult it is to make effective and timely adjustments to the issued DBHCP ITP, the shorter the duration of the ITP should be.

- The DBHCP EIS should include an analysis of the instream flow necessary in the Deschutes River, Whychus Creek and Crooked River to support quality habitat conditions for all life stages of the species for which "incidental take coverage" is being requested. Analyzed instream flow scenarios for those areas affected by the Applicants' activities and infra-structure should be built on a sound biological basis.

- The draft EIS Plan should thoroughly detail/analyze how any proposed mitigation measures and will contribute to objectives of the ESA-recovery plan for Mid-Columbia steelhead.

- The DBHCP EIS analysis should include those alternatives which provide for "certainty" in respect to necessary flows required as a basis for quality habitat condition in which each species is dependent. There is a need for binding minimum flows in the Crooked River system and Upper Deschutes River system that sustain and benefit all life history stages of those species for which the ITP is being proposed. This includes in particular, mid-Columbia Summer Steelhead Trout, Chinook Salmon, Bull Trout and the Oregon Spotted Frog.

- The draft DBHCP/EIS should address cumulative effects of the Applicant's activities in concert with other anthropologic impacts. A cumulative effects analysis should be in provided to adequately address effects of the Applicant's past and future activities.

- The DBHCP/EIS should thoroughly describe and address the City of Prineville's potential effects of future development and land uses on the covered species.

- An analysis is needed of the potential effects of climate change in relation to the proposed DBHCP.

- Compliance, effectiveness and effects monitoring should be thoroughly addressed in the EIS analysis.

- The effects/impacts of a no-action alternative to those species for which ITP coverage is being sought should be thoroughly examined. This should include limitations resulting from aspects of the current flow regimes for each of the stream systems on each of the species habitats and life history stages.

- The Summer Steelhead Trout population located in Deschutes River and tributaries downstream of the Pelton Round Butte Hydroelectric Project, Pelton Dam (RM 100) (Trout Creek, Sagebrush Creek, Mud Springs Creek), while federally listed under the Endangered Species Act (ESA) as a Threaten Species; are not part of the ESA 10(j) experimental designation given to Summer Steel Trout population that is above the Pelton Round Butte Project.

- The EIS should provide that alternatives analyzed are consistent with applicable Oregon Revised Statutes (ORS) and Oregon Administrative Rules (OAR).

Comments

ODFW recommends that in respect to enabling a sound analysis of the effects, impacts and potential mitigation measures commensurate with the impacts to the species, an adequate and thorough presentation of background information is necessary. ODFW recommends that the following information be included for each species proposed for ITP coverage:

I. Existing Information

A. Historical and Current Information Concerning Presence/Absence and Spatial and Temporal Distribution of Each Species on the Covered Lands
B. Life History
C. Biological Status
D. Species Habitat Condition Pre Covered Project Impacts.
E. Condition of Each Species' Existing Habitats
F. Habitat Capacity Estimates

II. Data Gaps
A. Presence/Absence and Spatial and Temporal Distribution Data Needs
B. Biological Status Data Needs
C. Habitat Data Needs

III. Effects of Covered Activities on the Species, Including Changes in Habitat Distribution, Abundance and Quality resulting from Covered Activities.

IV. Sensitivity of Each Species to Habitat Modifications Anticipated with Conservation Measures.

Information on historic and current habitats should be included for all species for which the Applicants are seeking coverage. A similar exercise was undertaken by the DBBC and City of Prineville in 2010 for assessing the implications of including redband trout as a covered species in the DBHCP (Biota Pacific Environmental Services 2010). For purposes of the redband trout assessment, "*covered lands included all surface waters, wetlands and riparian lands from the shoreline of all irrigation water reservoirs, including the irrigation supply network, downstream to elevation 1,945 feet above mean sea level, which is the maximum pool of Lake Billy Chinook.*" In this vein the EIS analysis should provide context on historical fish production in areas above all the storage dams for which the applicants are requesting coverage. An example of this information is to be found in Study 14-2: Evaluation of Fish Passage Options for Ochoco Dam (R2 Resource Consultants, Inc. 2014). This study was completed in March of 2104, by R2 Resource Consultant, Inc. and Biota Pacific Environmental Sciences, Inc. for the Deschutes Basin Board of Control (DBBC) and the City of Prineville. This study in concert with other available resources should be utilized as a part of the basis for informing the effects analysis. Additional sources have discussed historic anadromous habitats above Bowman Dam. The effects of restricted access to areas of more favorable spawning and rearing habitats is certainly a consideration in respect to effects analysis of the Applicant's operations.

Fish screens and their operation are required by Oregon statutes. The DBHCP ITP EIS should include a detailed accounting of irrigation diversions and associated dams or obstructions for which the Applicants are requesting ITP coverage. ODFW recommends that the EIS include information detailing the presence or absence of screens or passage facilities. If a diversion or passage barrier is equipped with a screen and or fish passage facility, information on date of installation (age) and condition of the screen or passage facility should be included.

Stream flow alteration by the Applicant's water storage and diversion facilities affect fish habitat in many ways including: the amount and distribution of spawning and rearing habitat; the risk of damaging incubating eggs or larval fish by scour or desiccation; risk of stranding fish in low flows; conditions for upstream and downstream migration; the biophysical factors that form and maintain stream channels and the lack of access to historically productive upper basin spawning and rearing habitats. Alteration of rivers and streams is also known to result in habitat fragmentation, as wetlands are drained or hydrologically altered.

The EIS should include a full ecological flow analysis which considers the frequency, magnitude, timing, rate of change, and duration of flow events necessary to support stream structure and function. The analysis of effects related to covered activities should account for those changes in river morphology, riparian habitats and wetlands, changes to water quality including water temperatures, changes in large woody debris inputs and blockages to historic habitats. These changes in habitats include effects to those riverine, riparian and wetland habitats inundated by the reservoirs proposed for ITP coverage. Changes in flow as a result of the Applicants' operations are significant in almost every month and reach. The DBHCP EIS should analysis the effects of significantly altered annual flow regimes resulting from the Applicant's infrastructure and operational activities on the riparian, wetlands, floodplains and general river geomorphology.

This statement should be expanded to include effects of altered flow regimes to riparian habitats, wetlands, river bank stability. Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands is recognized as a major factor contributing to loss of biological diversity and ecological function in aquatic ecosystems, including floodplains. Alteration of natural flow regimes in rivers and streams and their floodplains and wetlands has a variety of impacts which include: Reduction of habitat due to change in area, frequency and duration of activating floodplains and terminal wetlands. Riparian zones and the organisms inhabiting them can be dramatically altered as a result of change in flow patterns along the length of the stream course. As noted by (Poff et al. 1997), six components of flow regimes: amplitude, magnitude, frequency, duration, timing, and rate of change of hydrologic conditions, strongly influence the structure and function of riparian ecosystems. With respect to magnitude, for example, the width of riparian vegetation communities and their biomass increase with mean and median annual flow volume and drainage size in alluvial river channels (Stromberg 1993).

The EIS should detail and analyze the effects down ramping and up ramping rates of flow releases at all the Applicant's storage reservoir dams and diversion dams on the river environment and those species proposed for ITP coverage.

Deschutes River, Little Deschutes River and Crescent Creek

There are a number of the Applicant's patrons that individually divert small amounts of water at 33 locations on the Deschutes River. There should be a clear accounting of whether or not a diversion or passage barrier is equipped with a screen and or fish passage facility. Information on date of installation (age) and condition of the screen or passage facility should be included. A map with the location of each diversion, regardless of size, should accompany the diversion descriptions. This informational need applies to all stream reaches within the Applicant's operational framework, including the Crooked River and its tributaries and Whychus Creek.

The diversion of between 1200 cfs and 1700 cfs of instream flow during the spring; summer and early fall should be analyzed for its effect on fish and OSF habitat and OSF life stages.

The Central Oregon Irrigation District (COID), Siphon Power Project (FERC License 3571), located at approximately rivermile (RM) 169.5, about two miles above Bend. The EIS should analyze the environmental effects on OSF of the project. Please include information on the specifics of COID's Siphon Power, including operations, aspects of diverted flow, the bypass reach flows and other information that is pertinent to the proposed DBHCP and the ITP.

Return flows

In previous documents it has been identified that there are eight return flows directly to the Deschutes River, five of these enter the river at one of the reservoirs associated with the Pelton Round Butte Hydroelectric Project, and the other three enter the river downstream of Pelton Reregulating Dam. The rivermile (RM) location should be included in a table format for each point where irrigation flows return to the river. In addition the origin of the water that is being returned to the river should also be included.

The potential for irrigation return flows originating in the Deschutes River to contribute infectious Ceratonova shasta (C. Shasta) actinospores into the Crooked River and Trout Creek needs to be examined. This situation may result in a higher potential for infection of susceptible fish, including Summer Steelhead Trout and Chinook Salmon. Preliminary work done by ODFW (Stocking 2008) and others (Zielinski et al. 2010.) indicate a concern that warrants further investigation and that this issue needs be addressed as part of the EIS analysis.

Storage, Release and Diversion of Irrigation Water

Crane Prairie Reservoir and Wickiup Reservoir serve as thermal heat sinks. Data collected by the Upper Deschutes Watershed Council (UDWC) in 2004, (UDWC 2004) indicates that warming occurs in Crane Prairie and Wickiup to the extent that the baseline temperature is so high that any downstream cooling influences, i.e. Fall River and Spring River, are insufficient to bring temperatures back down into a range that meets criteria and is favorable for fish. Thus the negative thermal influence of the storage and release of the water for irrigation begins at the reservoirs and continues downstream into Bend and into the middle Deschutes River reach and subsequently into the reach below Big Falls. The warmer water in the middle Deschutes river reach is, at least in part, potentially attributable to the upstream reservoirs. Additionally, the North Canal Dam impoundment is a point of potential heat uptake for any water that continues downstream into the middle Deschutes River reach. This information should be included as part of the EIS analysis including a thorough description of the ecological changes as a result of the impoundment of large quantities of water for irrigation.

Water Quality

Information on water quality in Crescent Lake, Crane Prairie Reservoir or Wickiup Reservoir should be included in the EIS. Is the water quality in any of these reservoirs degraded during the summer months, and do they experience algae blooms as temperatures warm, including large blooms of the blue-green algae *Aphanizomenon* or the cyanobacteria *Microcystis?*

Entrainment of Covered Species

The DBHCP EIS should detail the status of fish screens, along with upstream and downstream passage facilities at each diversion. This should include the status of the Crescent Lake dam, Crane Prairie Reservoir dam and Wickiup Reservoir dam fish screens and fish passage facilities. The EIS should include information that substantiates that those facilities currently equipped with screens are sufficient to safely exclude juvenile and adult OSFs and the impacts associated those diversions and dams that are not screened or adequately screened including the North Unit Irrigation District North Canal Diversion screen.

Middle Deschutes River Instream Flow during the Irrigation Season

Should conversions of irrigation water rights for purposes of meeting flow targets be proposed, these conversions should be analyzed for potential effects on spring inputs into the middle Deschutes reach. Mitigation actions that may be proposed to provide groundwater mitigation credits in exchange for surface flows should be analyzed in respect to impacts of groundwater withdrawals that may reduce spring and seep inputs into any portion of the middle Deschutes between Bend Lake Billy Chinook. Reducing the amount of spring inflow by allowing groundwater withdraws in exchange for the upper Deschutes River flows warmed in Crane Prairie Reservoir and Wickiup Reservoir and the upper reaches of the Deschutes multiplies the warming effect on the middle Deschutes River reach. Mitigation practices that counter act efforts to reduce instream temperature are cause for concern.

The use of temporary leases to meet instream flow targets should analyzed as to the long term assurances of this type of flow mitigation. Temporary leases by their nature are temporary and do not amount to a permanent transfer of a water right to instream use. The need for having the foundation of any instream flow program/effort being based on certificated permanent instream water should be analyzed in the EIS.

Oregon Spotted Frog Comments and Recommendations

Length of the DBHCP:

Typically, HCP's identify specific actions designed to protect federally listed species and provide assurances to the Applicant that only those actions specified in the HCP will be required during the life of the permit. A long lived HCP may be appropriate when the needs of the listed species and their responses to management actions are well understood, but a shorter term HCP is appropriate in situations where significant biological and ecological knowledge gaps exist and timely adjustments to management actions may be needed to protect a species. The latter description exemplifies the current situation with respect to the Oregon spotted frog (OSF) in the Upper Deschutes River Basin. Our understanding of the frog's ecological needs and ability to function within the managed irrigation system has improved over the last few years, but most of that knowledge relates to the riverine environment and is far from complete. To date very little is known about OSF biology and ecology in a reservoir environment. Clearly, a more comprehensive understanding of the frog's needs within the Applicant's managed irrigation delivery system is needed.

Considering the above discussion, ODFW recommends that either: The term of the HCP is limited to a maximum of 5 to 10 years so that, if necessary, appropriate management modifications can be made following permit expiration, or a longer term (15 – 25 years) HCP is developed using an adaptive management model that allows timely and appropriate adjustments to management actions, during the life of the permit, as our understanding of the frog's biology and ecology within the managed system improve.

Biological and Ecological Information Gaps:

The purpose of an HCP is to protect federally listed species that exist where anthropogenic activities might otherwise cause their destruction. This is achieved by providing the Applicant with an incidental take permit that allows limited take of a listed species while requiring the Applicant to follow specific management actions designed to minimize or mitigate take by conserving the habitat upon which the species depend, thereby contributing to the recovery of the species as a whole.

Execution of a successful HCP requires that the needs of the listed species and their responses to management actions are well understood. However, as previously mentioned, our biological and ecological understanding of the OSF ability to function within the managed irrigation system is far from complete. Although important knowledge has been gained in the riverine system significant knowledge gaps exist and very little is known about OSF biology and ecology in a reservoir environment.

In order to meet the purpose of the HCP, ODFW believes that its development must address critical biological and ecological information gaps such as:
**Note: Efforts to address some of these questions are currently underway, but many are not.*

OSF Biology and Ecology:

What is the timing of oviposition, hatching, metamorphosis and overwintering habitat use in the mainstem Deschutes River, Crane Prairie Reservoir, Crescent Creek and the Little Deschutes River?

What is the survival rate of OSF life history stages and the effective population size in the mainstem Deschutes River, Crane Prairie Reservoir, Crescent Creek and the Little Deschutes River?

What is the relative contribution of OSF life history stages to population persistence, stability, and growth?

Which life history stages are the most sensitive to management actions and most likely to limit population stability or growth?

What is the range of OSF movements (distance and pathway) between breeding, rearing and overwintering habitats?

Is OSF survival effected by the selection of low quality vs. high quality overwintering sites?

OSF Habitat:

What are the locations and relative quality of OSF overwintering habitat on the mainstem Deschutes River, Crane Prairie Reservoir, Crescent Creek and the Little Deschutes River?

What are the flow contributions of Big Marsh Creek to Crescent Creek and the Little Deschutes River?

What mix of wetland vegetation is best suited for OSF egg and larval survival and how can water elevations be managed in the mainstem Deschutes River, Crane Prairie Reservoir, Crescent Creek and the Little Deschutes River to meet the desired conditions?

What are the potential long-term changes in wetlands along the mainstem Deschutes if future more stable flows are realized?

What is the potential for restoration projects, such as Ryan Ranch, to assist in recovery of OSF in the Upper Deschutes Basin?

Irrigation System Management Effects on Habitat and OSF:

What are the surface elevations that will inundate or expose key vegetation zones of sedges and rushes, important to oviposition and tadpole survival, in Crane Prairie Reservoir?

How does the timing and different ramp up and ramp down flow rates influence the timing and survival rates associated with oviposition, hatching, early tadpole development, and movement to overwintering sites in the mainstem Deschutes River, Little Deschutes River and Crescent Creek?

Does the fall drawdown on the Deschutes River below Wickiup Reservoir result in standing of juvenile or adult OSF in isolated pools or habitat and if so what drawdown rates preclude standing?

What is the relationship between year round in-stream flows and key OSF habitats on the mainstem Deschutes River, Little Deschutes River and Crescent Creek?

Invasive Species:

What are the conditions and mechanisms that may allow non-native flora and fauna to depress OSF populations?

What are the locations of established non-native flora and fauna populations, capable of depressing OSF populations, in the Upper Deschutes River Basin and what are the mechanisms that allowed their establishment?

How do changes in water elevation in Crane Prairie Reservoir limit or exacerbate predation on OSF by non-native species such as brown bullheads?

How do changes in water elevation in Crane Prairie Reservoir limit or exacerbate the spread and establishment of non-native flora such as reed canary grass?

Will flow rates designed to benefit various OSF life history stages also benefit non-native flora and fauna in the mainstem Deschutes River, Little Deschutes River and Crescent Creek?

Monitoring:

Beyond the need to address OSF biological and ecological knowledge gaps, the HCP should include a comprehensive and robust monitoring program that can identify the positive and negative effects of management actions on:

- All OSF life history stages
- OSF population stability and status in both the riverine and reservoir environs

- OSF habitat responses to management actions, and
- Invasive flora and fauna capable of depressing OSF populations.

Whychus Creek

Overview of Current Conditions

A good description of the current flow condition of Whychus Creek is in part found in the TSID Main Canal Piping Project (Phases 4-6) grant application dated May 17, 2012 as prepared by the Deschutes Resources Conservancy (DRC) in conjunction with TSID. The current condition of Whychus Creek is described as, *"Flow alterations due to irrigation diversions have occurred since the late 1800s in Whychus Creek. The stream is severely over allocated as rights have been issued authorizing diversion of more water than typically flows in the creek. Presently, the creek enjoys natural flows from its headwaters until it reaches river mile 23, where a series of major irrigation diversions remove close to 90% of the flow for a 5-mile stretch (Golden and Aylward, 2006). Below the City of Sisters, springs and return flow gradually rewater the creek around river mile 18, though flows remain insignificant as compared to the natural hydrograph. These conditions persist each year starting in April and ending in October. Insufficient instream flow has led to a decrease in water quality including elevated water temperatures throughout much of the watershed. As a result, Whychus Creek has been listed on Oregon's 303(d) list since 1998 for temperature (DEQ, 2002). In addition to poor water quality, fish habitat has suffered as a result of irrigation withdrawals. Impacts include increases in the channel width to depth ratio, reduced pool habitat, loss of oxbows and sloughs, loss of riparian habitat, and diminished channel/floodplain connectivity (NPCC, 2004). The decline of water quality and fish habitat in Whychus Creek and its correlation to low instream flow is well documented in a variety of watershed assessments published by a wide array of natural resource agencies."* The above description of the current Whychus creek conditions should be included in the Overview of Current Conditions for the EIS.

The DBHCP EIS should include an analysis of the instream flow necessary in Whychus creek for providing quality habitat conditions supportive of each of the life stages of the species for which "incidental take" is being requested.

In previous documents there has been reference to "*one TSID patron that will divert water by pumping directly from Whychus Creek upstream of TSID's diversion and that this will be a covered activity.*" The EIS should detail this particular diversion and include information as to whether or not it is screened to prevent fish entrainment and as to whether or not the pump/diversion is gaged to ensure proper usage of water.

Whychus Creek Flow

Measures to address, contribute and or otherwise meet biological objectives/needs for all life history stages of steelhead trout and Chinook salmon in Whychus Creek should be analyzed.

As noted previously discussed the pros and cons of being dependent on instream leases should be analyzed. The EIS should explore the positive aspects of having the foundation of any instream flow program/effort based on explicitly dedicated certificated permanent instream water.

Whychus Creek Fish Screens and Fish Passage

Upstream and downstream passage is required at all artificial obstructions in those Oregon waters in which migratory native fish are currently or have historically been present. Correspondingly ODFW's fish screen statute requires the owner or operator of a diversion located in waters in which native and naturally spawning fish are currently present, to address fish screen requirements. NMFS also has fish screening and passage laws that apply to the waters of Whychus Creek. Additionally, TSID's Water Right Certificate No. 87798 certificate issued in October of 2012, by the Oregon Water Resources Department (OWRD) for use of water for hydroelectric purposes contains a condition declaring that the "water right holder shall construct, operate and maintain all fish screens, by-pass devices and fish passages as required by the Oregon Department of Fish & Wildlife.

ODFW asks that a paragraph be included that accurately describes the current state of covered species in the Whychus Creek system. This should be information pertaining to the Summer Steelhead, Chinook Salmon and Sockeye Salmon re-introduction efforts. It should discuss the extent and sites of releases of Summer Steelhead Trout and Chinook Salmon fry, downstream movement of juvenile smolts and any information on returning adult Summer Steelhead Trout or Chinook Salmon that may have entered or attempted to enter the Whychus creek system

Water Temperature

The draft EIS should include an analysis of the results of progressively increasing the instream flows beyond 30.19 cfs. For example what are the benefits of increasing the permanent instream flow to 35 cfs, 40 cfs, etc... ?

The draft EIS should address those instream flows necessary to maintain the stream temperature at ODEQ criteria for all the life stages of steelhead trout and Chinook salmon? How does ensuring 30 cfs of flow at the Sisters OWRD gage affect the flow and temperature in the downstream reaches of Whychus Creek?

In recent years through extensive monitoring conducted by the Upper Deschutes Watershed Council (UDWC) it has been demonstrated that 20 cfs and 30 cfs instream minimum flow does not provide adequate summer stream temperatures for salmonids. In the manner of the DBHCP draft EIS should consider/analyze information pertaining to instream flow which provides in instream temperatures that meet ODEQ criteria for all the life stages of anadromous and resident salmonids found in Whychus creek.

Where is cold water refugia located in the Whychus Creek system?

The EIS should analyze flows needed to provide for more suitable bull trout habitat, including stream temperatures upstream of Alder Springs? Bull trout have recently been documented at approximately RM 6 in Whychus Creek (ODFW 2014) several miles above Alder Springs perhaps indicating they might move further up Whychus Creek if more suitable conditions are achieved.

Crooked River, Ochoco Creek, McKay Creek and Lytle Creek

The EIS should include discussion as to how dams and altered flow regimes impact the river ecosystem. Alteration to natural flow regimes can occur through reducing or increasing flows, altering seasonality of flows, changing the frequency, duration, magnitude, timing, predictability and variability of flow events, altering surface and subsurface water levels and changing the rate of rise or fall of water levels. (Walker 1985; Gehrke *et al.* 1995; Kingsford 1995; Maheshwari *et al.* 1995; Poff *et al.* 1997; Boulton and Brock 1999; Robertson *et al.* 1999, 2001.

As mentioned in preceding comments, the effects of altering a river's natural flow regime can result in negative impacts to stream channel morphology, riparian habitats, water quality and many other aspects of the riverine environment. The Applicant's covered activities have altered flow regimes on the Crooked River. This can affect fish habitat in many ways, including: the amount and distribution of spawning and rearing habitat; the risk of damaging incubating eggs or larval fish by scour or desiccation; risk of stranding fish in low flows, conditions for up and downstream migration; the biophysical factors that form and maintain stream channels and the lack of access to historically productive upper basin spawning and rearing habitats. Alteration of rivers and streams is known to result in habitat fragmentation, as wetlands are drained or hydrologically altered. This can lead to changes in species composition as wetlands species are replaced by upland species; loss of genetic integrity when isolated habitats are too small to support viable populations; and increased numbers of competitor, predator, and parasite species tolerant of disturbed environments. Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands is recognized as a major factor contributing to loss of biological diversity and ecological function in aquatic ecosystems, including floodplains.

A significant water quality issue is dissolved gas (particularly nitrogen) super saturation during periods of releases of high volume of water from Bowman Dam. Due to the configuration of the outlet structure of Bowman Dam, atmospheric nitrogen is entrained in the Crooked River at levels that exceed the standards set by the Oregon Department of Environmental Quality when discharge exceeds approximately 600 cubic feet per second. At high enough levels of entrained nitrogen, deleterious effects are manifested in aquatic organisms through a condition known as gas bubble disease (Porter, T, and B. Hodgson. 2016).

The EIS should analyze water quality in Prineville Reservoir or Ochoco Reservoir. Is the water quality in any of these reservoirs degraded during the summer months, and do they experience algae blooms as temperatures warm, including blooms of the blue-green algae *Aphanizomenon or* the cyanobacteria *Microcystis?*

Under current conditions access to numerous miles of historic mainstem and headwater tributary spawning and rearing habitat is blocked by Ochoco Dam and Bowman Dam. The EIS should analysis the extent of the upstream historic habitats and benefits of having the access to historic habitats.

The EIS overview of current conditions for the OID and Crooked River Basin should include the status of fish screens and fish passage at all dams, diversions, infiltration galleries, pumps and locations where water is diverted on Johnson Creek, Dry Creek, McKay Creek and Lytle Creek. This applies to the passage and screening status of Bowman Dam and Ochoco Dam. A table should be included in the draft EIS which allows a reader to easily discern the status of each diversion, pump etc..

In respect to existing screens: It is important that if an existing screen does not meet current NMFS criteria that it be replaced with a screen that does meet current NMFS criteria including approach velocities, screen mesh etc... This should apply to older screens that at one time may have met standards, but are no longer compliant. Please include an analysis of the screens and or downstream and upstream fish passage facilities at Bowman Dam and Ochoco Dam.

ODFW asks that a paragraph be included that accurately describes the current state of covered species in the Crooked River system. This should be information pertaining to the Summer Steelhead and Chinook Salmon re-introduction efforts. It should discuss the extent and sites of releases of Summer Steelhead Trout and Chinook Salmon fry, downstream movement of juvenile smolts and any information on returning adult steelhead trout or Chinook salmon that may have entered or attempted to enter the Crooked River system.

How do flows at or near 3000 cfs affect the Crooked River channel morphology?

What is the historic recurrence timeframe for large flow events approaching 3000 cfs below Bowman Dam?

What studies have been to done to assess the benefits to fish habitat of higher flows as might have been experienced during natural conditions?

Ecological Flows or Seasonally Varying Flow are should be addressed. Flow variability with storage irrigation is much less than unregulated. Moderately high flows in March, April, May and other times can potentially provide many ecologically important benefits. At a minimum the DBHCP EIS should include Indicators of Hydrologic Alteration (IHA) model runs on existing, proposed and unregulated flows.

Previous efforts that modeled flow alternatives and assessed Crooked River environmental flows (Hardin 1993, Hardin 2011, Hardin, T. 2001, WPN 2010) should be incorporated into the EIS analysis in terms of flow scenarios that might provide more certainty of year round suitable habitat for summer steelhead and Chinook salmon.

Water Temperature

What are the net indirect effects on stream flow temperature of the reservoir releases and return flows?

What is the effect of the colder tail-water flows below Bowman Dam on Summer Steelhead Trout and Chinook Salmon habitat?

How does the current condition of riparian vegetation, channel morphology and habitat along the Crooked River and tributary streams affected by the irrigation diversions interrelate to current water temperature?

Oregon Department of Environmental Quality (ODEQ) has conducted modeling efforts demonstrating that increased flows past OID had significant temperature benefits. It is logical that these temperatures be examined in the DBHCP EIS analysis?

What are the temperatures of the tributaries flowing into the Crooked River above Prineville reservoir?

What are the temperatures immediately below the OID Crooked River diversion compared to temperatures immediately above the diversion during the irrigation season?

How would increasing flow affect the temperatures downstream of the OID Crooked River diversion?

What are the temperatures of the tributaries flowing into Ochoco reservoir?

Water Quality

How does water quality in Prineville and Ochoco Reservoirs affect the water quality (pH, turbidity) downstream of the dams throughout the year?

The DBHCP EIS should include a complete description of the effects and impacts of its infrastructure and operations. This acknowledgement of the full potential impacts of impoundment and alteration of flow regimes on the ecology of the affected streams is essential to proposing conservation measures that satisfactorily compensate for those effects.

Adequate flows necessary to recover and sustain healthy fish populations (specifically summer steelhead and Chinook salmon) need to be dependably available regardless of irrigation season timing. A flow regime that provides quality habitat conditions (not minimal) for all the stages of Summer Steelhead Trout, Chinook Salmon and other covered species in the Crooked River and its tributaries should be to the objective of "Conservation Measures" provided during the irrigation season.

What are the current ramping rate standards utilized by the Irrigation Districts or BOR downstream of their reservoir storage facilities? Rapid flow reductions can adversely affect fish populations by dewatering spawning, rearing, or foraging habitat and may strand fish. Smaller juvenile fish (less than about 50 mm long) are most vulnerable to potential stranding due to weak swimming ability and preference for shallower, near-shore habitats. River channel configuration, channel substrate type, time of day, and flow level before down-ramping (antecedent flow) are also key factors that determine stranding incidence.

Flows identified/analyzed in the DBHCP EIS should be based on scientific assessment that provides effective habitat for all life history stage requirements.

Please explain BOR's role in managing the flow releases out of Ochoco Reservoir?

What are the current flow conditions on Ochoco Creek during the irrigation season?

Please analyze the flows necessary to provide for adult migration, spawning, incubation, rearing and outmigration of Summer Steelhead and Chinook Salmon on Ochoco Creek?

How much habitat and what are the habitat conditions for anadromous fish above Jones Dam?

How much flow is diverted out of stream at Jones Dam during the irrigation season?

Please analyze what year round flow regime in McKay Creek would provide quality habitat for all life history stages of Summer Steelhead and Chinook Salmon?

The Crooked River Flow Assessment Report (Watershed Professionals Network 2011) conducted for the Deschutes River Conservancy and The Nature Conservancy should be incorporated into the discussion of environmental flows for the Crooked River. This report included IHA analyses for all the major Crooked River reaches. The IHA results quantify the hydrological differences between flow scenarios. Also, the input files for IHA are ~20 year daily flow series, which can easily be used to generate flow exceedance curves by reach and scenario.

An example of the how differing flows can affect fish habitat is found in a study conducted for the Ochoco Irrigation District by Vaughn etc. al. 2010. Significant changes were observed in the wetted area of the Crooked River and associated fish habitats. An excerpt from this 2010 report reads, "*Stream segments were categorized into three different types of habitat: pools, glides, and riffles. In May, the 1.6 km study reach was comprised of 16 different habitat units of which 49% were pools, 23% glides, and 28% riffles. During the October sampling effort there were 23 habitat units within the same study reach. The proportion of habitat types changed as well and was now dominated by glide habitat, 76%, with the remaining area made up of 16% pools and only 9% riffles. <u>The increase in habitat units identified during the survey in the fall and the corresponding shift in dominant habitat type is expected due to the large decrease in flow observed during the second sampling effort.</u> The flow in October was only 35% of the flow we observed during our May surveys (90 cfs vs. 245 cfs), which reduced water velocity through the study reach and altered the length of area classified as riffle habitat. The lower flows decreased the average wetted channel width from 31 m to 28 m and decreased the average depth in glides, 0.8 m vs. 0.4 m, but did not affect maximum pool depth which held steady at 1.3 m during both seasons.*"

Bull Trout Seasonal Foraging

Bull Trout are currently present immediately downstream of Deschutes Valley Water District's hydropower facility. Once upstream fish passage is constructed at this facility Bull Trout will once again have access to the lower reaches of the Crooked River above this point. Please analyze flow scenario(s) at which temperatures would be suitable during the various seasons of the year for Bull Trout foraging.

Trout Creek and Mud Springs Creek

Drain inputs should not be responsible for contributing to elevated temperatures or volumetric inputs of warmer water than in the Mud Springs Creek or Trout Creek system. Please include an analysis in the EIS on this point.

Sedimentation in Mud Springs is an acute issue. ODFW biologists who have operated a fish trap on lower Trout Creek since 1998 have observed turbidly issues emanating from Mud Springs Creek on an annual basis. Beginning in the mid-2000's high turbidity levels have been observed in Trout Creek throughout the irrigation season. The extreme turbidity inputs stop 3-4 days after the irrigation season ends around Oct 15th. This pattern was continuing still be observed into December 2014. The amount of sediment deposited over the spring and summer is quite significant and silt depths in pools can reach 2 - 3 feet deep directly below the confluence of Mud Springs. (T. Nelson per com 2014). This information should be included as part of the analysis for the ITP EIS.

ODFW recommends that conservation measures are needed to eliminate the temperature issues resulting from the 58 -11 and 61 -11 drain inputs into Mud Springs Creek.

ODFW recommends that conservation measures are needed to address the acute turbidity situation occurring annually in Mud Springs Creek during the irrigation period. The sediment levels observed in Mud Springs and Trout Creek at the confluence of Mud Springs Creek have the potential to effect incubating Summer Steelhead Trout eggs and fry emergence.

Climate Change

Climate Change should be accounted for in the draft EIS analysis. If climate change threatens the species by impacting the quality or quantity of its habitat in the future, or increasing its vulnerability to pathogens or exotic species, that increased vulnerability should be taken into account by the EIS analysis. The duration of the ITP should not exceed the limits of the climate change models used in the EIS analysis for assessing predicted effects.

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Appendix 1-E

Response to Comments

Appendix 1-E Contents

Acronyms and Abbreviations

1855 Treaty	Treaty with the Tribes of Middle Oregon (1855)
af	acre-feet
APE	area of potential effect
applicants	Deschutes Basin Board of Control member districts (i.e., the Arnold, Central Oregon, Lone Pine, North Unit, Ochoco, Swalley, Three Sisters, and Tumalo Irrigation Districts) and the City of Prineville
BiOp	biological opinion
CFR	Code of Federal Regulations
CEQ	Council on Environmental Quality
covered activities	Take of the covered species that may occur incidental to the storage, release, diversion, and return of irrigation water by the Deschutes Basin Board of Control member districts, and groundwater withdrawals, effluent discharges, and surface water diversions by the City of Prineville
covered species	Oregon spotted frog (*Rana pretiosa*), bull trout (*Salvelinus confluentus*), Middle Columbia River steelhead trout (*Oncorhynchus mykiss*), sockeye salmon (*Oncorhynchus nerka*)
CTWS	Confederated Tribes of Warm Springs
CWA	Clean Water Act
DBBC	Deschutes Basin Board of Control
DOI	U.S. Department of the Interior
Draft EIS	draft environmental impact statement
Draft HCP	Draft Deschutes Basin Habitat Conservation Plan
EA	environmental assessment
ESA	Endangered Species Act
FLP	form letter plus
FWS	U.S. Fish and Wildlife Service
HCP	habitat conservation plan
HCP Handbook	*Habitat Conservation Planning and Incidental Take Permit Processing Handbook*
ID	irrigation district
IRMP	Integrated Resources Management Plan
ITP	incidental take permit
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
ODEQ	Oregon Department of Environmental Quality
OR	Oregon
Ordinance 80	Tribal Water Code
OWRD	Oregon Water Resources Department
Reclamation	Bureau of Reclamation
RM	river mile
ROD	Record of Decision
SHPO	State Historic Preservation Office
the Services	U.S. Fish and Wildlife Service and the National Marine Fisheries Service
U.S.C.	United States Code

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Introduction and Approach to Response to Comments

Introduction

The U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) (referred to collectively as the Services) received incidental take permit (ITP) applications on August 30, 2019, from the Deschutes Basin Board of Control (DBBC) member districts (i.e., the Arnold, Central Oregon, Lone Pine, North Unit, Ochoco, Swalley, Three Sisters, and Tumalo Irrigation Districts [IDs]) and the City of Prineville (referred to collectively as the applicants) in accordance with the requirements of the Endangered Species Act, as amended (ESA) (16 United States Code [U.S.C.] § 1531 *et seq.*). The applicants prepared the Draft Deschutes Basin Habitat Conservation Plan (Draft HCP) in support of the ITP applications and are seeking authorization for take of the federally threatened Oregon spotted frog (*Rana pretiosa*) and bull trout (*Salvelinus confluentus*) from FWS, and take of the federally threatened Middle Columbia River steelhead trout (*Oncorhynchus mykiss*) and the non-listed sockeye salmon (*Oncorhynchus nerka)* from NMFS. Hereafter, these four species are collectively referred to as the covered species.

The ITPs, if issued, would authorize take of the covered species that may occur incidental to the storage, release, diversion, and return of irrigation water by the DBBC member districts, and groundwater withdrawals, effluent discharges, and surface water diversions by the City of Prineville (covered activities).

The Draft HCP specified the impacts that would likely result from the taking of covered species, and describes the steps the applicants will take to minimize and mitigate such impacts. The Draft HCP also discussed alternative actions to the taking that were considered by the applicants and the reasons why such alternatives are not being analyzed further. The Draft HCP described the covered species' life history and ecology, and the HCP's biological goals and objectives, adaptive management actions, monitoring, and funding assurances.

In response to the ITP applications, FWS, as the lead federal agency, prepared a draft environmental impact statement (Draft EIS) in accordance with the requirements of the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 *et seq.*). The proposed federal action being evaluated in the EIS is the issuance of ITPs in response to the ITP applications from the applicants. The ITPs would authorize incidental take of the covered species that could result from covered activities over the permit term. The Draft EIS analyzed the proposed action and a reasonable range of alternatives to the proposed action. In total, four alternatives were analyzed in the Draft EIS, including a no-action alternative. The environmental consequences of each alternative were analyzed to determine if significant impacts on the human environment would occur.

In accordance with the ESA and NEPA, the Services circulated the Draft HCP and Draft EIS for public review and comment on October 4, 2019. This appendix describes the public review process; comments received on both the the Draft HCP and Draft EIS; the general approach to responding to comments; and the format, content, and organization of, and terminology used for responding to comments. It also provides responses to the comments received, details on modifications to the proposed action and action alternatives, and any revisions that have been made between the Draft HCP and Final HCP and Draft EIS and Final EIS.

Summary of Draft HCP and Draft EIS Public Review Process

The Draft HCP and Draft EIS were released by the Services for public review and comment on October 4, 2019 (84 *Federal Register* 53164 and 53114), opening a 45-day public review and comment period. However, in response to public requests, the Services granted a 15-day extension (84 *Federal Register* 58169 and 61026) to the review and comment period, thereby increasing the public review and comment period to 60 days. The Services accepted comments via online submission or hardcopy mail provided the comments were received by 11:59 p.m. Eastern Standard Time on December 3, 2019. The Services also held two open house public meetings in Bend and Prineville, Oregon, on October 15 and 16, 2019, where computers were available for attendees to use and submit comments.

Comments were submitted either in form letters or unique letters. Form letters are letters based on a standard template, rather than letters that were independently composed and, therefore, contain the same content. Three separate form letter variants (FL-1, FL-2, and FL-3) were received. If unique content was identified in the form letters, the letters were coded as a form letter plus (FLP) and the unique comments were reviewed, considered, and responded to seperately, providing the comment related to substantive issues on the Draft HCP and Draft EIS. Unique letters are letters that were independently composed and that contain unique comments submitted by a single commenter or multiple commenters. By the December 3, 2019 deadline, the Services received 224 unique letters and 1,387 form letters of which 71 were classified as an FLP from federal, state, and local agencies and governments; Tribes; organizations; and the general public.

Comments on the Draft HCP and Draft EIS covered a broad range of policy and environmental issues. Major topic areas that elicited frequent comments included process, adequancy of the analysis, consideration of alternatives, additional information requests, and human environment impacts. The responses to comments provided in this appendix represent the Services' best effort to carefully and objectively review and consider the comments and supporting evidence provided by the commenters.

Regulatory Context

The purpose of public review of the Draft HCP and Draft EIS is to evaluate the adequacy of the environmental analysis for compliance with ESA and NEPA and to provide comments on the proposed action. As such, one purpose of the responses to comments contained in this appendix is to address those substantial environmental issue(s) raised by commenters. This typically requires clarification of points contained in the Draft HCP and Draft EIS released in October 2019. Lead agencies are not obligated to undertake every suggestion, provided that the agency responds to substantive environmental issues and makes a good-faith effort at disclosure in a reasoned way. Given this, the Services are not required to respond to comments unrelated or not germane to the alternatives or the evaluation of potential environmental impacts contained in the Draft HCP or Draft EIS.

Ultimately, the Services will each make a decision on about whether to issue ITPs to the applicants, relying on the statutory and regulatory criteria for ITPs set forth in ESA and its implementing regulations. The Services' decisions will also be informed by the analyses and findings in the Final HCP and Final EIS.[1] To support our final permit decisions, the Services will each independently

[1] Although the Services do not solicit comments on the Final EIS and are not required to respond to any comments received during this period, the Services will consider the comments before making our final permit decisions.

prepare an ESA Section 10 findings document and an ESA Section 7 Biological Opinion (BiOp) on the proposed ITP actions prior to issuing separate records of decision (RODs).

Approach to Responding to Comments Received on the Draft HCP and Draft EIS

The following summarizes the Services' approach took when identifying, considering, and responding to the comments received on the Draft HCP and Draft EIS.

- The Services identified, considered, and responded to comments contained in each letter providing the comments related to substantive issues on the Draft HCP and Draft EIS, were within the scope of ESA and NEPA, and related to the environmental analysis contained in the Draft HCP and Draft EIS. If the substance of the letter did not meet these criteria, the comment was not grouped, summarized, or responded to.
- The Services identified, considered, and responded to information contained in an attachment to a comment letter if the attachment commented on substantive issues related to the environmental analysis contained in the Draft HCP and Draft EIS. If the attachment did not meet this criterion, the comment was not grouped, summarized, or responded to, but was reviewed and circulated to authors for reference while responding to comments.
- When reviewing the letters received, the Services initially determined whether a letter was a unique letter or a form letter. Out of the 1,387 form letters received, three master form letters were identified on which all other form letters were based; the contents of these master form letters were reviewed, considered, and responded to. If unique content was identified in form letters, outside of what was contained in the master form letters, the letters were classified as an FLP and the unique comments identified were reviewed, considered, and responded to separately.
- On initially reviewing each comment, a theme (e.g., process) and related subtopic (e.g., length of comment period) was allocated to each comment to allow grouping of like comments. Each comment or related group of comments was then summarized and responded to. The corresponding letter reference (refer to the *Indices of Commenters* section of this appendix) for which each comment summary is based are also provided so the reader can identify the commenter. The allocated references provided by the Services are unique to each commenter and do not relate to any numbers or references provided by the commenter in their letters. Any commenter who submitted a form letter with unique content has been allocated two letter references, which relate to the form letter (FL) they submitted, and the unique content identified as an FLP.
- Some commenters submitted multiple copies of their comment letters. To be thorough, the Service reviewed all submissions from a single commenter to determine if the submissions were duplicative in nature or whether a commenter had submitted a variant to their previous submission. If the Services identified unique comments in the duplicative submission, the unique comments were coded and grouped as such. However, if no unique comments were identified between the versions, then only one version of the duplicative submission was coded. By employing this strategy, the Services are confident that it has completely reviewed and responded to all comments from the same commenter.
- The Services reviewed the comments in the exact form they were provided by commenters. This included review of comments with misspellings, grammatical errors, or writings presented in the

comments that were not clearly understood. Every attempt was made to understand the commenters' comments to provide a response; however, the Services cannot infer meaning or intent of comments.

- During the process of reviewing and responding to comments on the Draft HCP and Draft EIS, revisions and clarifications were made to the Final HCP and Final EIS. These changes included corrections to editorial errors and omissions, as well as clarifying text and adding supporting information. These changes are noted in responses, where required, and are summarized in Final EIS Chapter 1, *Purpose and Need*.
- The Responses to Comments section of this appendix presents all comment summaries and their associated responses, and it is organized by comment theme and subtopic to assist with navigation. To further support commenters identify responses to their comments, each unique comment letter reference, as presented in the *Indices of Commenters* section, is referenced against each corresponding comment summary and response. Where reference is made in this appendix to the Draft HCP or Draft EIS, the content and reference remains the same in the Final HCP and Final EIS, unless otherwise noted. Any revisions or updates made between draft and final versions of these documents are explicitly referenced in the responses, as required.

Organization of Appendix 1-E

The remainder of this appendix is organized as follows.

- *Introduction and Approach to Responses to Comments* (this section), describes the public review process; public comments received on the Draft HCP and Draft EIS; approach applied to reviewing and responding to comments; and the format, content, and organization of and terminology used in this appendix.
- *Indices of Commenters* provides a list of the comment letter references and names of commenters, when provided, for federal, state, and local agencies and governments; tribes; organizations; and the general public. These indices are organized by commenter type, commenter name, and letter reference. Readers should use these indices to identify the letter reference or references associated with their submissions and then locate the responses to their comments in the *Responses to Comments* section of this appendix. Any commenter who submitted a form letter with unique content has two letter references, which relate to the FL they submitted, and the unique content identified as an FLP.

Copies of the comment letters submitted to the Services are not included in this appendix. All comment letters can be accessed and viewed at https://www.regulations.gov and by doing the following.

- Enter Docket ID: FWS-R1-ES-2019-0091 into the home page search bar.
- In the area for the Draft Environmental Impact Statement and Draft Habitat Conservation Plan, select the "Open Docket Folder."
- Scroll down to the "Comments" area and select "View All" to locate individual letters submitted. All commenter letters have been entered by name and can be sorted alphabetically.

Indices of Commenters

The following indices list the comment letter reference and name of commenters, when provided, for federal, state, and local agencies and governments; tribes; organizations; and the general public, and include form letters and FLPs. These indices are organized by organization, commenter name, and letter reference. Readers should use these indices to identify the letter reference or references associated with their submissions and then locate the responses to their comments in the *Responses to Comments* section of this appendix. Indices are organized by commenter type as described in Table 1. Tables 2 through 6 list the commenters per index category and includes the letter reference ID, commenter name, and organization name, if applicable. Tables 7 and 8 list the form letters and FLP submissions. Any commenters who submitted a form letter with unique content has two letter references that, which relate to the form letter (i.e., FL-1, FL-2, and FL-3) they submitted and the unique content identified as an FLP.

Table 1. Summary of Indices

Index ID	Commenter Type
FED	Federal Agency
STATE	State Agency
LOCAL	Local Agencies and Governments
TRIBE	Native American Tribes
ORG	Organizations
FL	Form Letter
FLP	Form Letter Plus
GP	General Public

Table 2. Federal Agencies

Letter Reference	First Name	Last Name	Organization Name
FED-1	Jill	Nogi	U.S. Environmental Protection Agency
FED-2	Kristen	McBride	U.S. Forest Service

Table 3. State Agencies

Letter Reference	First Name	Last Name	Organization Name
STATE-1	Kyle	Gorman	Oregon Water Resources Department
STATE-2	Jennifer	Wigal	Oregon Department of Environmental Quality
STATE-3	Stephanie	Page	Oregon Department of Agriculture
STATE-4	Michael	Harrington	Oregon Department of Fish and Wildlife

Table 4. Local Agencies and Governments

Letter Reference	First Name	Last Name	Organization Name
LOCAL-1	Peter	Gutowsky	Deschutes County
LOCAL-2	Anonymous	Anonymous	Jefferson County Soil & Water Conservation District
LOCAL-3	Mae	Huston	Jefferson County

Table 5. Native American Tribes

Letter Reference	First Name	Last Name	Organization Name
TRIBE-1	Josh	Newton	The Confederated Tribes of the Warm Springs

Table 6. Organizations

Letter Reference	First Name	Last Name	Organization Name
ORG-1	George	Wuerthner	RESTORE OUR DESCHUTES
ORG-2	Michael	Eisele	Coalition for the Deschutes
ORG-3	Sarah	Cloud	Deschutes River Alliance
ORG-4	Mathieu	Federspiel	Juniper Group Sierra Club
ORG-5	Geri	Hauser	League of Women Voters of Deschutes County
ORG-6[a]	Priscilla	Macy	Oregon Outdoors Coalition
ORG-7	Thomas	O'Keefe	American Whitewater
ORG-8	Priscilla	Macy	Oregon Outdoors Coalition
ORG-9	Gary	Farnam	Sunriver Anglers
ORG-10	Kate	Fitzpatrick	Deschutes River Conservancy
ORG-11	Mike	Riley	The Environmental Center
ORG-12	Paul	Dewey	Central Oregon LandWatch
ORG-13	George	Endicott	Central Oregon Cities Organization
ORG-14	Chandra	Ferrari	Trout Unlimited
ORG-15	Kimberley	Priestley	WaterWatch of Oregon and Center for Biological Diversity
ORG-16	Anonymous	Anonymous	Upper Deschutes Watershed Council
ORG-17	Doug	Heiken	Oregon Wild
ORG-18	Mary Anne	Cooper	Oregon Farm Bureau
ORG-19	Gail	Snyder	COALITION FOR THE DESCHUTES
ORG-20	Mike	Taylor	Wild River Owners Association
ORG-21	Brad	Chalfant	Deschutes Land Trust
ORG-22	Joanne	Richter	Great Old Broads for Wilderness, Central OR Bitterbrush Broads
ORG-23	Paul	Lipscomb	Oregon Land and Water Alliance
ORG-24	Megan	Hill	Portland General Electric

[a] ORG-6 is not referenced in the remainder of this appendix as it was a duplicate of letter ORG-8.

Table 7. Form Letters

Letter Reference
FL-1
FL-2
FL-3

Table 8. Form Letter Plus

Letter Reference	First Name	Last Name
FLP-1	Tiana	Fabiana
FLP-2	Andrew	Coughlin
FLP-3	Amanda	Dalrymple
FLP-4	Devon	Decembre
FLP-5	Dana	Wolff
FLP-6	Renee	Wirth
FLP-7	Karissa	Viebeck
FLP-8	Erik	Richardson
FLP-9	Kelli	Cromsigt
FLP-10	Hayley	Anderson
FLP-11	Lisa	Windom
FLP-12	Don	LeBart
FLP-13	Kurt	Brocker
FLP-14	Aaron	Wille
FLP-15	Erik	Skoog
FLP-16	Mike	Gaglianese
FLP-17	Kent	Pressman
FLP-18	Jeff	Boyer
FLP-19	Elizabeth	Stauder
FLP-20	Robert	VanBishler
FLP-21	Willam	Carwile
FLP-22	Peter	Necarsulmer
FLP-23	Tessa	Miles
FLP-24	Dan	Puffinburger
FLP-25	Bryon	Salaz
FLP-26	Michele	McKay
FLP-27	Dorothy	Wile
FLP-28	Carol	Lemley
FLP-29	Chelsy	McNeil
FLP-30	Jesse	Rosenzweig
FLP-31	Kevney	Dugan
FLP-32	George	Conlan
FLP-33	Sarah	Bodo
FLP-34	Kent	Pressman
FLP-35	Debra	Spresser
FLP-36	Zachary	Sauer
FLP-37	Phil	Hager
FLP-38	Hunter	Parrott
FLP-39	Mikal	Lilly
FLP-40	Jesse	Kingdon
FLP-41	John	Fischer
FLP-42	Christine	Mellon
FLP-43	Terry	Miller
FLP-44	Jordan	Real
FLP-45	Jamie	Dawson
FLP-46	Harvey	Hillis
FLP-47	Tim	Etlick
FLP-48	Matthew	Ramsey
FLP-49	Caroline	House
FLP-50	Scott	Buchholz
FLP-51	Andrew	Skolnick
FLP-52	John	Amoroso
FLP-53	Nathaniel	Merrill
FLP-54	Donna	Harris
FLP-55	Rebecca	Kay
FLP-56	Donald	O'Brien
FLP-57	John	Bauman
FLP-58	Forrest	Peck
FLP-59	Rod	Bonacker
FLP-60	Edward	Denson
FLP-61	Dorothy	Wylie
FLP-62	Kevin	Mooney
FLP-63	Geoffrey	Bergen
FLP-64	Barb	Morris
FLP-65	Mike	Reed
FLP-66	Caleb	Bryce
FLP-67	Karen	Lillebo
FLP-68	David	Bredendick
FLP-69	Vail	Borne
FLP-70	Kyle	Collins
FLP-71	Patrick	Buresh

Table 9. General Public

Letter Reference	First Name	Last Name	Letter Reference	First Name	Last Name
GP-1	Jean	Publieee	GP-40	Lewis	McFarland
GP-2	Kim	Brannock	GP-41	Ben	Johnston
GP-3	Anonymous	Anonymous	GP-42	Susan	Barmeyer
GP-4	Kent	Brenner	GP-43	Bryan	Greene
GP-5	Andy	Prather	GP-44	Michael	Giamellaro
GP-6	Jeff	Komar	GP-45	Lex	Shapiro
GP-7	John	Butler	GP-46	Brooks	Foster
GP-8	Trey	Frye	GP-47	Orion	Junkins
GP-9	Erich	Weidenkeller	GP-48	Nathaniel	Merrill
GP-10	Travis	Mack	GP-49	Blake	Lund
GP-11	Mikhail	Djukanovich	GP-50	Isabel	Svevens
GP-12	Jack	White	GP-51	Phillip	Hagen
GP-13	Mike	Mallin	GP-52	Audrey	Roth
GP-14	Ida	Gurule	GP-53	Finley	Treu
GP-15	Anonymous	Anonymous	GP-54	Carly	Cameron
GP-16	Ryan	Fogelman	GP-55	Ethan	Cunningham
GP-17	Pete	LeRoy	GP-56	Poppy	Donnell
GP-18	Craig	Heaton	GP-57	Caitlin	Houston
GP-19	Amanda	Hardin	GP-58	Ellie	Safford
GP-20	Laura	Grayson	GP-59	Arianna	Larson
GP-21	Tony	Newbill	GP-60	Ziann	Simpson
GP-22	Clayton	Chambers	GP-61	Cameron	Wescott
GP-23	Peter	Baer	GP-62	Jasper	Sparks
GP-24	Tony	Newbill	GP-63	Biancha	Emery
GP-25	Brian	Manselle	GP-64	Hazel	Donnelly
GP-26	Brandon	Shotwell	GP-65	Lincoln	Riverman
GP-27	Tony	Newbill	GP-66	Finley	Hasler
GP-28	Tony	Newbill	GP-67	Violet	Rodhouse
GP-29	Mark	Lemley	GP-68	Ben	Davison
GP-30	Jean	Publieee	GP-69	Ayu	Larsen
GP-31	Peter	Geiser	GP-70	Sophia	Balk
GP-32	John	Schubert	GP-71	Eli	Basurto
GP-33	Nancy	Burgon	GP-72	David	Shanks
GP-34	Craig	Lacy	GP-73	Manuel	Baptista
GP-35	Bill	Marlett	GP-74	Richard	Kovacs
GP-36	Tomas	Amodio	GP-75	Christina	Snyder
GP-37	Kyle	Watt	GP-76	Michael	Harves
GP-38	Eva	Eagle	GP-77	Adam	Harvey-Kelly
GP-39	Wendy	Hutchens	GP-78	Chris	Casad

Letter Reference	First Name	Last Name
GP-79	Charlie	Quinn
GP-80	Brian	Crockford
GP-81	Drew	Erickson
GP-82	Earl	Alderson
GP-83	Anonymous	Anonymous
GP-84	John	Casey
GP-85	Robert	Rayner
GP-86	Earl	Haramaki
GP-87	Eric	Staley
GP-88	Rebecca	Gilson
GP-89	Emily	Craybill
GP-90	Kathleen	Schroeder
GP-91	Cooper	Morrow
GP-92	Jeremy	Huwe
GP-93	J.J.	Howard
GP-94	Jacob	Dodd
GP-95	Wayne	Chubb
GP-96	John	Hamburg
GP-97	Eric	Miller
GP-98	Troy	Leedy
GP-99	Monica	Helms
GP-100	Cairn	O'Donnell
GP-101	Jodell	Born
GP-102	Craig	Laurie
GP-103	Amanda	Studdard
GP-104	David	Burrus
GP-105	Ryan	Kovach
GP-106	Lled	Smith
GP-107	Myria	Gautreaux
GP-108	Tom	Bell
GP-109	Christie	Dobson
GP-110	A.	Briggs
GP-111	Brad	Asmus
GP-112	Stephen	Junkins
GP-113	Kyle	Anderson
GP-114	Scott	Baker
GP-115	Zach	Koepke
GP-116	Tucker	Ruberti
GP-117	Anonymous	Anonymous
GP-118	Timothy	Dragila
GP-119	Scott	Gerber

Letter Reference	First Name	Last Name
GP-120	Bonnie	Campbell
GP-121	Bradley	Smith
GP-122	George	Wuerthner
GP-123	Rynda	Clark
GP-124	Boris	Boris
GP-125	Alex	Murray
GP-126	Jayson	Bowerman
GP-127	Tim	Overland
GP-128	Chris	Salaz
GP-129	Susan	Strible
GP-130	Jay	Dicharry
GP-131	Jodi	Mauldin
GP-132	Zachary	Price
GP-133	Mark	Buckley
GP-134	Nathan	Boddie
GP-135	Riley	Kirby
GP-136	Dean	Boyle
GP-137	Robin	Vora
GP-138	Natalie	Danielson
GP-139	Mary Ellen	Collentine
GP-140	Craig	Weigand
GP-141	Lee Ann	Ross
GP-142	Rob	Galyen
GP-143	Gary	Boldt
GP-144	Michael	Zapp
GP-145	Jeffrey	Richardson
GP-146	Mickey	Killingsworth
GP-147	Phil	Fine
GP-148	Kelsey	Ward
GP-149	Richard	Rushton
GP-150	Gary	Harris
GP-151	Mike	Weber
GP-152	Neil	Baunsgard
GP-153	Grant	Pynes
GP-154	Wade	Flegel
GP-155	Laurie	Doherty
GP-156	Kevin	Richards
GP-157	Martin	Richards
GP-158	Samuel	Lowry
GP-159	Elise	Wolf
GP-160	Janice	Flegel

Letter Reference	First Name	Last Name
GP-161	Moey	Newbold
GP-162	Nancy	Klatt
GP-163	Michael	McLandress
GP-164	Reese	Mercer
GP-165	Spencer	Brinson
GP-166	Thomas	Warner
GP-167	Stanley	Webb
GP-169	Stu	Garrett
GP-170	Shawn	Chesley
GP-171	Rebekah	Ratcliff
GP-172	William	Kuhn
GP-173	Judy	Clinton
GP-174	Brandon	Kave
GP-175	Matt	Goetz
GP-176	Amy	Hart
GP-177	Alex	Scagliotti

Letter Reference	First Name	Last Name
GP-178	Anonymous	Anonymous
GP-179	Kathleen	Roche
GP-180	Haley	Smith
GP-181	Eileen	Harrington
GP-182	Christian	Blady
GP-183	Joanne	Brown
GP-184	Robert	Pederson
GP-185	Dustin	Balderach
GP-186	Michael	Jasa
GP-187	Kimberly	Paxton-Hagner
GP-188	Gabriel	Parr
GP-189	Jim	Powell
GP-190	Steven	Aguilu
GP-191	Sylvia	McFarland
GP-192	Yancy	Lind

Response to Comments Overview

The Services are responsible for to complying with ESA and NEPA requirements. A Final HCP and EIS is supposed to inform decision-makers before a decision is made. As such, the Services objectively considered all comments made and received during the public meetings and comment period (40 Code of Federal Regulations [CFR] § 1503.4).

The purpose of each response to a comment on the Draft HCP and Draft EIS is for the lead agency to address the substantive environmental issue(s) that may be raised by each comment. According to the regulations, possible responses include modifying the alternatives, including the proposed action; developing and evaluating new alternatives; making factual corrections; or explaining why the comments do not warrant further agency response (40 CFR § 1503.4). Another purpose of public review of the Draft HCP and Draft EIS is to evaluate the adequacy of the environmental documents and their analyses for compliance with NEPA (40 CFR § 1503.4).

Within this appendix, the Services provide responses to comments, assertions, and questions related to the proposed action and action alternatives and the analyses in the Draft HCP and Draft EIS. The Services have not addressed comments that are beyond the scope of the environmental analysis in the EIS or that do not raise environmental concerns. Council on Environmental Quality (CEQ) guidelines state that comments on an EIS "shall be as specific as possible and may address either the adequacy of the statement or the merits of the alternatives or both" (40 CFR § 1503.3(a)).

Multiple commenters provided a variety of personal and professional background information in their comments. This type of information is not considered to be a substansive comment on the Draft HCP or Draft EIS; therefore, it does not require a response. The Services do, however, acknowledge receipt of this information. Additionally, commenters often paraphrased or quoted directly from the Draft HCP or Draft EIS. Again, the Services acknowledge receiving this information but have provided responses only to the portions of the comments that raised substantive environmental issues or that directly applied to the Draft HCP or Draft EIS. The Services also acknowledge receipt of comments in general support of one or more of the action alternatives, as well as those in general opposition of the proposed action and action alternatives.

While each response addresses the public comments recieved, these comments often related to additional subjects addressed in other responses. Accordingly, responses reference related responses, as appropriate, where recurring comments and common themes overlap with other subject matter areas.

Where reference is made within this appendix to the Draft HCP or Draft EIS, the content and reference remains the same in the Final HCP and Final EIS, unless otherwise noted. Any revisions or updates made between the draft and final documents are explicitly referenced in the responses, as required.

This section includes, for ease of reference, a table of contents on the following page to help guide readers to specific subject areas. The table of contents is based on the common themes and subtopics found in the comments that were received.

Response to Comments on the Draft HCP

1 Process

Endangered Species Act Procedural Requirements

HCP-1.1 Independent Analyses by Services

One commenter suggested that the Services have not conducted independent analyses necessary to meet the ITP issuance standards, including verifying the applicants' financial, legal, engineering, and scientific representations.

Commenters

ORG-12

Response

The Services released the Draft HCP and Draft EIS to solicit public review of and comment on both documents before making permit decisions on the ITP application. Each Service will make separate findings regarding compliance with Section 10 of the ESA and will decide whether to issue ITPs based on the Final HCP. In order for the Services to issue an ITP, the following criteria must be met: (1) the taking will be incidental to otherwise lawful activities; (2) an applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (3) the applicant will ensure that adequate funding for the plan will be provided; (4) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and (5) the applicant will carry out any other measures the Services require as necessary or appropriate for the purposes of the plan. 50 CFR § 17.32(b)(2); 50 CFR § 222.307(c)(2).

HCP-1.2 Sufficiency of Information to Make Findings in Support of ITPs

One commenter stated that the Draft HCP provides insufficient information for the Services to make legally required findings to issue the ITPs.

Commenters

ORG-12

Response

The Services released the Draft HCP and Draft EIS to solicit public review of and comment on both documents before making permit decisions on the ITP application. Each Service will make separate findings regarding compliance with Section 10 of the ESA and will decide whether to issue ITPs based on the Final HCP.

HCP-1.3 Endangered Species Act Section 7 Consultation

One commenter stated that the ESA requires the Services to consider impacts from water tourism through the Section 7 consultation process.

Commenters

GP-27

Response

Before making permit decisions, the Services will each independently conduct a "jeopardy analysis" and prepare an ESA Section 10 findings document and ESA Section 7 BiOp addressing whether the proposed action is likely to jeopardize the continued existence of listed species in the wild or to destroy or adversely modify designated critical habitat for listed species. The BiOps will evaluate the environmental baseline, the condition of the listed species or its designated critical habitat in the action area, and the past and present impacts of all federal, state, or private actions and other human activities. The BiOps will be completed following publication of the Final EIS but prior to completion of the Records of Decision, and they will be incorporated into the Records of Decision.

Public Participation in Developing HCP

HCP-1.4 Public Comment on Scope of HCP

One commenter stated that the applicants should have provided the public with more detailed information regarding the intended scope of the Draft HCP during public review and comment on the scope of the Draft EIS or otherwise solicited additional public input during development of the Draft HCP.

Commenters

ORG-3

Response

The HCP is a voluntary, applicant-driven document. HCP applicants and the Services are not required to seek public input during initial development of an HCP. Nevertheless, due to the high level of public interest in the HCP, the Services and the applicants consulted extensively with the public during development of the Draft HCP. As detailed in Section 2.3 of the Final HCP, the Services and applicants met on a regular basis from 2009 through 2019 with a Working Group of interested agencies and organizations and a Stakeholder Group that was open to any member of the public with an interest in the HCP. The Stakeholder Group, which met eight times since 2008, was open to anyone within the Deschutes Basin with an interest in the effects of the HCP on biological, economic, or social resources in the basin.

Under NEPA, FWS, as the lead agency, must seek public input regarding the scope of the Draft EIS that analyzes the effects of and alternatives to the Proposed Action. FWS requested public review and comment during scoping on the Draft EIS to assist the Services in "identifying important issues and alternatives related to the applicants' proposed action." Notice of Intent to Prepare a Draft Environmental Impact Statement for the Proposed Deschutes River Basin Habitat Conservation Plan in Oregon, 82 Fed. Reg. 34,326, 34,329 (July 24, 2017). FWS also provided a 60-day scoping period for the Draft EIS between July 21, 2017 and September 22, 2017, during which four public meetings were held in central Oregon and 52 written comments were received, which FWS considered in the development of the Draft EIS.

FWS complied with all public participation requirements under NEPA.

HCP-1.5 Public Participation During HCP Development

One commenter stated that the Draft HCP does not accurately describe public participation during development of the Draft HCP. The commenter stated that environmental nongovernmental organizations were not adequately involved in developing the Draft HCP.

Commenters

ORG-15

Response

Chapter 2 of the Draft HCP accurately describes stakeholder involvement activities during development of the Draft HCP. While public input into the development of a Draft HCP is not a requirement of ESA Section 10, as described in Chapter 2 of the Draft and Final HCPs, there were many opportunities for stakeholder involvement, and the final conservation strategy in the HCP reflects that involvement.

The HCP is a voluntary, applicant-driven document. HCP applicants and the Services are not required to seek public input during initial development of an HCP. Nevertheless, due to the high level of public interest in the HCP, the Services and the applicants consulted extensively with the public during development of the Draft HCP. As detailed in Section 2.3 of the Final HCP, the Services and applicants met on a regular basis from 2009 through 2019 with a Working Group of interested agencies and organizations and a Stakeholder Group that was open to any member of the public with an interest in the HCP. The Stakeholder Group, which met eight times since 2008, was open to anyone within the Deschutes Basin with an interest in the effects of the HCP on biological, economic, or social resources in the basin.

Consultation with Tribes

HCP-1.6 Tribal Trust Responsibilities

One commenter stated that the Services have legal duties to protect tribal trust resources, including bull trout, Chinook salmon, and MCR steelhead, and to advocate for conservation measures in the HCP that will restore or enhance tribal trust resources.

Commenters

TRIBE-1

Response

Throughout the development of the draft HCP, the Services strongly advocated for conservation measures related to tribal trust resources, however the HCP is a voluntary, applicant-driven document. The Services crafted the action alternatives to examine the effects of providing greater protections for listed fish species, as well as for non-listed Chinook salmon. Thus, the Services evaluated various possible modifications to the applicants' proposed conservation measures in the Crooked River (CR-1 to CR-4) in Alternatives 3 and 4 of the Draft EIS.

The applicants' actions and the Bureau of Reclamation (Reclamation)'s storage and release of water from Bowman Dam both occur and overlap in the Crooked River. For that reason, each Service will analyze actions proposed by the applicants under the HCP and actions by Reclamation pursuant to the Crooked River Act in one BiOp that evaluates both the Services' issuance of ITPs and Reclamation's operations of Bowman Dam on the Crooked River. Reclamation releases water from Bowman Dam for the benefits of fish and wildlife. Optimizing the utility of that water could address some of the concerns identified by the Tribe in its comments. The Services will ensure that Reclamation is aware of the Tribe's concern regarding shaping of flows in the Crooked River.

2 Proposed Corrections to the HCP

Potential Errors and Required Corrections

HCP-2.1 Typographical and Technical Errors

Commenters asserted various typos or other technical errors in the Draft HCP or otherwise recommended technical changes to the presentation of data and other information in the Draft HCP.

<u>Commenters</u>

STATE-1, STATE-3, ORG-9, ORG-12, ORG-14, ORG-15, ORG-16

<u>Response</u>

The Services and the applicants have reviewed all comments regarding technical aspects of the Draft HCP, and the applicants have worked with the Services to revise the Final HCP to reflect those technical changes necessary or otherwise appropriate to present accurate information based on the best available science.

3 Comments on Introduction and Background

Introduction

HCP-3.1 Water Rights Administration by State of Oregon

One commenter stated that the Draft HCP provides an incomplete description of how the Deschutes River functions, because the introductory paragraph on page 2-1 of the Draft HCP does not mention that the State of Oregon, through the Deschutes Watermaster, regulates, monitors, and distributes water among the reservoirs and irrigation district canals throughout the year in accordance with state law and the water rights held by the Districts. The commenter stated that the Oregon Water Resources Department (OWRD) is the authority on water rights in Oregon and that any water management changes implemented under the HCP must comply with Oregon water law.

<u>Commenters</u>

STATE-1

Response

The Services agree that the State of Oregon, through OWRD and its staff, regulates the exercise of water rights in Oregon and that any water management changes implemented under the HCP must comply with Oregon water law. All conservation measures in Final HCP Chapter 6, *Habitat Conservation,* have been reviewed by OWRD staff and with full consideration for the responsibilities and authorities of OWRD.

HCP-3.2 Description of Value of Agriculture to Local Economy

One commenter recommended that the economic information on page 2-4 of the Draft HCP be updated using the 2017 Census of Agriculture, which the commenter stated is more reliable than the sources relied on by the Draft HCP.

Commenters

ORG-18

Response

The economic information on page 2-4 of the Draft HCP was provided as background to demonstrate the applicants' need for ITP coverage. The Services acknowledge the source cited by the commenter and can confirm that the 2017 Census of Agriculture has been used, in the Draft EIS Chapter 3, Section 3.5, *Land Use and Agricultural Resources*, to define the affected environment in the study area and support the analysis of the effects on land use and agricultural resources that would result from the proposed action and alternatives. Given this the Services will consider this information in our decision on the ITP applications.

HCP-3.3 HCP Working Group

One commenter appreciated the interdisciplinary HCP Working Group implemented by the applicants. The commenter believed that scientific aspects of the Draft HCP were thoroughly analyzed by Mount Hood Environmental.

Commenters

GP-176

Response

The Services acknowledge this comment.

4 Scope of HCP and ITPs

HCP and ITP Term

HCP-4.1 Reduced HCP and ITP Term

Commenters stated that the proposed 30-year ITP term for the HCP and EIS alternatives, is too long. Commenters believed that the Draft HCP does not provide adequate conservation benefits to support a 30-year permit term, does not contain sufficient flexibility, or does not adequately account for changing future conditions, including climate change and changing land use patterns in the Deschutes Basin. Recommendations from commenters included a shorter permit term or a process to regularly update the HCP.

Commenters

ORG-1, ORG-2, ORG-5, ORG-9, ORG-12, ORG-14, ORG-20, ORG-23, GP-29, GP-34, GP-124, GP-134, GP-172, GP-178, GP-190, GP-191, FLP-17

Response

The basis for the 30-year term is described in Final HCP Section 11.3, *Alternatives to the 30-year Term of the HCP*. The ESA does not specify what the term of an ITP and HCP should be; rather it allows the Services and the applicants the flexibility to identify a term that is appropriate to the activities and species being covered. Previous ITPs and accompanying HCPs have been as short at 15 years and as long as 100 years. During the development of the HCP the applicants worked closely with the Services and the multi-interest Working Group to determine the appropriate term. Periods of less than 30 years would provide less regulatory certainty for the applicants and less time to realize the fish and wildlife benefits of the increased instream flows the HCP would provide. The 30-year term is necessary to phase in the conservation measures at a rate that will not cause more harm than good. For example, as noted in Final HCP Section 8.4, *Oregon Spotted Frog*, the proposed winter flow increases in the Upper Deschutes River have to be phased in over a decade or more to avoid sudden shifts in seasonal hydrology that could inadvertently reduce or eliminate important Oregon spotted frog habitats. The applicants will also need several years to implement the infrastructure changes needed to continue irrigation operations with reduced water, as well as several years of regulatory certainty after the changes are made to recover the financial investments they will need to make. Initially the applicants proposed a term of 50 years, but the length was reduced to 30 years due to feedback from the Working Group. This is a very common length for HCPs of this size.

While comments made on the EIS regarding the permit term are outside the scope of the EIS analysis and NEPA, it should be noted, that in accordance with the NEPA regulations (40 CFR § 1502.14), the Services have evaluated in the Draft EIS a range of reasonable alternatives, which include variations in the proposed ITP term. Under Alternative 4 the Services would issue 20-year ITPs to the applicants for incidental take of each agency's respective covered species likely to be caused by the covered activities in the Deschutes Basin. Please refer to the Final EIS Chapter 2, *Alternatives*, Section 2.1.4, Alternative 4: *Enhanced and Accelerated Variable Streamflows*, for a full description of Alternative 4.

HCP-4.2 Support for 30-Year HCP and ITP Term

One commenter supported the proposed 30-year term for the HCP and requested ITPs. The commenter stated that the 30-year term is necessary for the applicants to justify and seek funding for the investments required to implement the HCP and to support the continued viability of farming and ranching in Central Oregon.

Commenters

ORG-18

Response

The Services acknowledge this comment. Refer to response to comment HCP-4.1, *Reduced HCP and ITP Term* for further discussion of the applicants' decision to request a 30-year permit term.

Relationship between Applicants

HCP-4.3 Severability of Covered Activities

One commenter disagreed with the description of the covered activities in the Draft HCP as activities undertaken by each applicant that are independent of and geographically separated from the activities of the other applicants and have clearly discernable impacts.

Commenters

ORG-12

Response

The applicants include eight irrigation districts and one municipality, each with independent legal authorities and independent legal obligations to deliver water within designated geographic boundaries, consistent with Oregon law. Refer to Final HCP, Chapter 2, *Introduction and Background*. Although some—but not all—of the applicants share water sources, no applicant has legal authority to direct the operations of any other applicant, and no applicant has jurisdiction extending to all of the covered lands. The applicants have collaborated with the Services to develop independent final conservation measures to mitigate the impacts of the take from the applicants' separate covered activities. While the applicants have distinct actions within the HCP, they collectively submitted the Deschutes Basin HCP and are seeking one joint permit from each Service.

In addition, the Final HCP includes an inter-district coordination agreement that sets forth procedures to ensure that the HCP continues to provide adequate conservation benefits throughout the HCP term, in the event that any applicant discontinues its obligations under the HCP. Refer to Final HCP, Appendix B-1, *Inter-District Agreement by and among Arnold Irrigation District, Central Oregon Irrigation District, Lone Pine Irrigation District, North Unit Irrigation District, Ochoco Irrigation District, Swalley Irrigation District, Three Sisters Irrigation District, Tumalo Irrigation District, and the City of Prineville to Implement the Deschutes Basin Habitat Conservation Plan.*

HCP-4.4 Inter-District Cooperation and Coordination

Commenters recommended that the HCP include additional requirements for cooperation and coordination between the Districts, including provisions to address the possibility that an applicant may discontinue its obligations under the HCP. One commenter recommended that the Services issue a single ITP for the applicants as a group.

Commenters

ORG-12, ORG-14, GP-189

Response

The Services released the Draft HCP and Draft EIS to solicit public review of and comment on both documents before making permit decisions on the ITP application. While the applicants have distinct actions within the HCP, they collectively submitted the Deschutes Basin HCP and are seeking one joint permit from each Service. The Services will ensure that the ITPs, if ultimately issued, contain adequate assurances that the Final HCP will be implemented. In addition, the Final HCP includes an inter-district coordination agreement that sets forth procedures to ensure that the HCP continues to provide adequate conservation benefits throughout the HCP term, in the event that any applicant discontinues its obligations under the HCP. Refer to Final HCP, Appendix B-1, *Inter-District Agreement by and among Arnold Irrigation District, Central Oregon Irrigation District, Lone Pine Irrigation District, North Unit Irrigation District, Ochoco Irrigation District, Swalley Irrigation District, Three Sisters Irrigation District, Tumalo Irrigation District, and the City of Prineville to Implement the Deschutes Basin Habitat Conservation Plan*.

HCP-4.5 Conservation Measures Requiring Coordination between Central Oregon ID and North Unit ID

Commenters recommended that the HCP include additional conservation measures requiring cooperation and coordination between Central Oregon ID and North Unit ID, including water sharing and trading.

Commenters

ORG-12, ORG-22, GP-189, FLP-6, FLP-19, FLP-29, FLP-44

Response

The HCP is a voluntary, applicant-driven document. Although some—but not all—of the applicants share water sources, no applicant has legal authority to direct the operations of any other applicant, and no applicant has jurisdiction extending to all of the covered lands. The applicants have collaborated with the Services to develop independent final conservation measures to mitigate the impacts of the take from the applicants’ separate covered activities, to provide long-term mitigation based on the biological needs of the covered species, while balancing the applicants’ obligations to continue delivering water pursuant to Oregon state law.

Covered Lands and Waters

HCP-4.6 Geographical Extent of Covered Lands and Waters

Commenters recommended that the HCP cover a smaller geographical area than proposed in the Draft HCP or include additional explanation or clarification regarding the reasoning behind the geographical extent of the covered lands and waters and the extent of the conservation benefits throughout the covered lands and waters.

Commenters

ORG-12, GP-31, GP-189

Response

The covered lands and waters include all aquatic, wetland, riparian, and floodplain habitats affected by the covered activities. Refer to Final HCP, Section 3.2, *Covered Lands and Waters*. The covered activities are those activities that may result in incidental take and are within the applicants' control. Refer to Final HCP, Section 3.5, *Covered Activities and Facilities*. The applicants are seeking incidental take coverage for all covered activities and have proposed a comprehensive set of conservation measures designed to minimize and mitigate the effect of the take from those covered activities to the maximum extent practicable.

Covered Activities and Facilities

HCP-4.7 Activities by Irrigation District Patrons

Commenters recommended that activities by irrigation district patrons be included within the definition of "covered activities" or that irrigation district patrons be required to implement conservation measures under the HCP.

Commenters

ORG-3, ORG-12

Response

The HCP is a voluntary, applicant-driven conservation proposal by eight irrigation districts (the Districts) and the City of Prineville. To approve the HCP and issue ITPs, the Services must have adequate assurances that the conservation measures in the HCP will be implemented.

The Districts have legal obligations to manage their diversion systems and deliver water to irrigation district patrons, but they do not have control over their patrons' use of that water beyond the Districts' point of delivery, and they do not have legal authority over other lawful activities on private property owned by their patrons. For example, the Districts cannot compel patrons to modify their irrigation infrastructure to increase irrigation efficiency, if the infrastructure complies with state law and property-specific water rights. The Districts cannot legally transfer irrigation rights appurtenant to their patrons' lands without the consent of the patrons (Oregon Revised Statutes [ORS] 540.580(2)(c), Oregon Administrative Rule [OAR] 690-385-2000(1)(n), and OAR 690-385-4200). The Districts also cannot deny or limit delivery of available water to irrigation district patrons, because the Districts are legally obligated to supply sufficient water to satisfy District-delivered water rights appurtenant to patrons' lands, if patrons request water and there is adequate water supply (ORS 545.221). Furthermore, the covered species are not present on patron lands and the Districts' patrons have not sought incidental take coverage under the HCP for activities on their private property, therefore, the commenters' recommendations are outside the scope of the HCP.

Accordingly, the applicants have collaborated with the Services to develop final conservation measures that the applicants have legal authority to implement to mitigate the impacts of incidental take from their own covered activities.

HCP-4.8 Commitments to Acquire Instream Water Rights

Commenters recommended that the HCP include legal commitments to acquire instream water rights for additional stream flows created as a result of the conservation measures and that the applicants subordinate existing irrigation rights to instream water rights.

Commenters

ORG-12, ORG-14, ORG-15

Response

The applicants have collaborated with the Services to develop a final conservation strategy that will provide long-term benefits to the covered species based on their biological needs, primarily through enforceable minimum flow requirements that the applicants must achieve. Acquiring instream water rights, or subordinating existing irrigation rights to instream water rights, are not necessary to provide assurances that those enforceable conservation measures will be implemented. At the same time, to the extent the applicants utilize Oregon state-law programs such as the Allocation of Conserved Water statutes, the applicants anticipate that the conserved water generated from such programs will be protected instream (or reflected in a flow augmentation right) as required by state law.

Otherwise, in many cases, the recommendation exceeds the scope of the applicants' legal authority. As noted, the Districts cannot legally transfer irrigation rights appurtenant to their patrons' lands without the consent of the patrons. Refer to response to comment HCP-4.7, *Activities by Irrigation District Patrons,* for further discussion of the Districts' legal obligations and authorities. Additionally, OWRD is the entity that administers and regulates water rights in Oregon and must approve all requests to transfer water rights. Refer to response to comment HCP-3.1, *Water Rights Administration by State of Oregon,* for further discussion of OWRD's legal authorities. Accordingly, the applicants cannot provide adequate assurances that any commitment to acquire instream water rights would be implemented.

Covered Species

HCP-4.9 ITP Coverage of Unlisted Species

One commenter expressed concern that the Draft HCP proposes to extend ITP coverage to Spring Chinook and Sockeye salmon, which are currently not listed under ESA. The commenter recommended that the Services consider additional mitigation opportunities in the event that the listing status of either species changes.

Commenters

GP-176

Response

Congress intended that HCPs include, when possible, conservation measures for species not listed under ESA at the time that an HCP is developed. HCP Handbook at 1-2. "Covering species likely to be listed within the term of the permit can benefit the permittee by ensuring the terms of an HCP will not need to be changed over time with subsequent species listings. It can also provide early protection for many species and, ideally, prevent subsequent declines and in some cases the need to list such species." *Id.* When HCP applicants seeks ITP coverage for an unlisted species, the Services and the applicants must apply the same legal standards that apply to Endangered Species Act-listed species. *Id.* at 15-6.

The applicants have revised their request for ITP coverage and are no longer seeking ITP coverage for Mid-Columbia River Spring Chinook salmon. The applicants are still seeking ITP coverage for sockeye salmon, in the event that the species becomes listed under ESA during the proposed 30-year permit term. To issue ITP coverage for incidental take of sockeye salmon as a result of the covered activities, the Services must find that the Final HCP satisfies all permit issuance criteria that would otherwise apply if sockeye salmon were actually listed under ESA.

Relationship to Other Laws and Policies

HCP-4.10 Deschutes Basin Water Supply

One commenter stated that the HCP should not be viewed as a comprehensive solution to complex and interrelated water supply issues in the Deschutes basin, including the need for a sustainable groundwater supply.

Commenters

ORG-13

Response

The Services agree. The applicants have submitted an HCP and ITP application to minimize and mitigate the effects of the covered activities, rather than to address all water supply issues in the Deschutes Basin. Refer to response to comment HCP-7.1, *Greater Benefits to Covered Species or Habitat Generally Recommended,* for further discussion of the conservation scope of the HCP.

HCP-4.11 Consistency with Regional Regulatory Frameworks

One commenter recommended that the Draft HCP include additional information regarding how the HCP relates to and is integrated with other regional water management strategies and plans, including the Deschutes Groundwater Mitigation Program, the Water Quality Status and Action Plan for the Deschutes basin, and irrigation district Water Management and Conservation Plans.

Commenters

FED-1

Response

The HCP supplements existing water management frameworks, including the strategies and plans identified by the commenter. The HCP is not intended to supersede those frameworks, nor is it intended to resolve all water supply or water quality problems in the Deschutes basin. Additionally, if the Services approve the Final HCP and issue the ITPs, the applicants will be required to comply with all other sources of law to maintain their ITP coverage. Refer to response to comment HCP-3.1, *Water Rights Administration by State of Oregon,* for further discussion of other legal authorities governing the applicants' activities.

In developing the HCP, a key consideration was retaining necessary flexibility to adapt to and comply with future changes in law or policy. For that reason, the applicants committed to a conservation strategy that relies primarily on achieving minimum flow targets, but does not specify the mechanisms by which the applicants will achieve additional water supply to meet those minimum flow targets. Similarly, in Final HCP Section 6.2.5, *Conservation Measures for Wickiup Reservoir and Upper Deschutes River*, the applicants have committed to contribute additional conservation funding, but have not committed to specific conservation projects, to ensure flexibility to use those funds most effectively as habitat conditions and the needs of the covered species continue to evolve in the basin. The HCP was developed to provide sufficient conservation measures to minimize and mitigate the effect of the applicants' take on the covered species to the maximum extent practicable, without interfering with other water management solutions in the Deschutes Basin.

HCP-4.12 Irrigation District Efficiency as a Prerequisite to ITP Issuance

One commenter stated that the Services cannot issue the ITPs until the applicants implement irrigation efficiency measures that the commenter stated are required by Oregon water law.

Commenters

ORG-23

Response

The applicants have an obligation to be in compliance with all state and federal laws. The applicants must also have the legal authority to successfully conduct the proposed activity in order to meet the ESA Section 10 (a)(1)(b) issuance criteria. The Services' obligations are to make permit decisions consistent with the ESA Section 10 (a)(1)(b) issuance criteria, including minimizing and mitigating impacts of the applicants' take to the maximum extent practicable.

HCP-4.13 Legal Obligations of Irrigation Districts

One commenter stated that the Draft HCP does not accurately describe the Districts' legal obligations to deliver water to their patrons.

Commenters

ORG-15

Response

As explained in Section 2.2, *Need for Incidental Take Coverage,* Section 11.2, *Take Avoidance*, and elsewhere throughout the Draft and Final HCP, the Districts cannot deny or limit delivery of available water to irrigation district patrons, because the Districts are legally obligated to supply sufficient water to satisfy District-delivered water rights appurtenant to patrons' lands, if patrons request water and there is adequate water supply.

5 Current Conditions

Current Conditions of Covered Lands

HCP-5.1 Irrigation District Operations

One commenter provided background information regarding the applicants and their operations.

Commenters

ORG-12

Response

The Services acknowledge the information and resources cited by the commenter, much of which is included in Chapters 2 through 4 of the Draft and Final HCPs. The Services will consider that information in our decisions on the ITP applications.

HCP-5.2 Historical and Current Condition of Stream Channels

One commenter provided background information regarding historical and current hydrological conditions on the covered lands.

Commenters

ORG-15

Response

The Services acknowledge the information and resources cited by the commenter. The studies and documents listed in the comment were reviewed during the development of the HCP, and the authors of many of the documents were participants in the HCP Working Group. The conservation strategy of the HCP was developed with full consideration of the available information. While the HCP does not cover all fish species that reside in the Upper Deschutes River, many of the fish-related studies identified in the comment were nonetheless useful in the development of the HCP and are reflected in the conservation measures in Final HCP Chapter 6, *Habitat Conservation*. The HCP would result in a significant improvement in the hydrology of the Upper Deschutes River toward the historical (pre-development) regime by increasing winter flows and decreasing summer flows downstream of Wickiup Dam. As noted throughout the Final HCP, however, complete return to the natural hydrograph of the Upper Deschutes is not possible due to changes to land use and river morphology, as well as irrigation needs..

HCP-5.3 Current Conditions of Prineville Reservoir

One commenter stated that the Draft HCP does not accurately describe current conditions at Prineville Reservoir. The commenter stated that Ochoco ID manages Prineville Reservoir. The commenter stated that the Draft HCP does not discuss storage projects above Prineville Reservoir that affect winter inflows to Prineville Reservoir. The commenter stated that the Draft HCP does not accurately describe the impact of the Crooked River Act on Crooked River flows below Bowman

Dam, because Reclamation has not applied for secondary instream water rights to permanently protect those flows instream.

Commenters

ORG-15

Response

The comment regarding the potential to address impacts from storage projects above Prineville Reservoir is outside the scope of the HCP. Otherwise, the Crooked River subbasin conservation measures in Final HCP Section 6.5, *Crooked River, Ochoco Creek and McKay Creek*, are designed to complement the actions implemented by Reclamation. The EIS analyzed alternatives that included a secondary instream water right for the releases of uncontracted water; however Reclamation has not taken that action to date.

The applicants' actions and Reclamation's storage and release of water from Bowman Dam both occur and overlap in the Crooked River. For this reason, those actions will be analyzed in one BiOp from each Service that evaluates (a) the Service's potential issuance of ITPs and (b) Reclamation's operations of Bowman Dam on the Crooked River.

Current Conditions of Covered Species

HCP-5.4 Historical Accounts of Anadromous Fish Conditions

One commenter provided background information regarding the historical abundance and distribution of covered anadromous fish species in the Upper Deschutes basin. The commenter recommended that the HCP reference that information.

Commenters

ORG-12

Response

At the onset of the HCP development process in 2009, all participants in the Working Group (including FWS, NMFS, ODFW, and others) participated in a formal process to provide the applicants with information on the covered lands and covered species they considered pertinent to the development of the HCP. The Services and the applicants reviewed the provided information when developing HCP Chapters 4, *Current Condition of the Covered Lands*, 5, *Current Conditions of the Covered Species*, and 6, *Habitat Conservation*, and the numerous technical reports prepared collaboratively with the Working Group between 2010 and 2018. While some early anecdotal accounts are not cited in the Final HCP, all relevant and available information on the history, status, and most importantly future potential of the covered species was considered.

HCP-5.5 Current Conditions of Oregon Spotted Frog

One commenter provided background information regarding current conditions of Oregon spotted frog and the impacts of the applicants' operations on Oregon spotted frog.

Commenters

ORG-15

Response

The Services acknowledge the information and resources cited by the commenter. The applicants worked closely with FWS and ODFW on the development of the conservation measures for the Oregon spotted frog. All pertinent and available information was considered in the development of an approach that is both achievable and effective.

HCP-5.6 Future Range of Oregon Spotted Frog

One commenter generally stated that Oregon spotted frog will expand their range below the City of Bend in the next 30 years. The commenter recommended that the Draft HCP illustrate that range, evaluate the potential impacts of dredging Mirror Pond Lake on Oregon spotted frog range, and account for water temperatures below the City of Bend. The commenter did not cite specific authorities in support of the comment.

Commenters

GP-34

Response

The HCP considers the Oregon spotted frog's historical range (downstream to Lower Bridge) and current range (downstream to the Old Mill District) in the Deschutes River. Within this range, however, the HCP does not attempt to speculate on the potential impacts of future activities by other parties. Those activities, if they occur and if they impact Oregon spotted frogs, would be subject to Endangered Species Act compliance separate from the HCP

6 Goals and Objectives

General Comments on Goals, Objectives, and Rationale

HCP-6.1 Specificity of Goals and Objectives

Commenters generally stated that the Draft HCP does not contain "S.M.A.R.T." (specific, measurable, achievable, realistic, and time-bound) goals and objectives, adequate explanation regarding the scientific assumptions underlying the goals and objectives, or an adequate implementation plan.

Commenters

ORG-14, ORG-23

Response

The commenters did not identify specific concerns regarding the measurable resource objectives and rationales for the proposed conservation measures in Draft HCP Chapter 6, *Habitat Conservation*. Before deciding whether to approve the HCP and issue the ITPs, the Services will ensure that the Final HCP contains goals and objectives, rationales, and enforceable final conservation measures based on the biological needs of the covered species that comply with the requirements of ESA.

HCP-6.2 Goals and Objectives Based on Biological Needs of Covered Species

One commenter generally stated that the Draft HCP's goals and objectives are not clearly tied to the biological needs of the covered species and that the proposed conservation measures collectively and individually are not designed to achieve those biological needs and meet the "maximum extent practicable" standard.

Commenters

ORG-15

Response

The HCP Handbook states that the HCP include measurable goals and objectives based on the biological needs of the covered species, to inform a comprehensive conservation strategy that minimizes and mitigates impacts of the take to the maximum extent practicable (refer to HCP Handbook pages 6-17 through 6-18). There is no requirement that individual goals, objectives, or conservation measures independently achieve or recite the maximum extent practicable standard.

In Draft HCP Chapter 6, *Habitat Conservation*, the applicants identified measurable resource objectives for each proposed conservation measure to achieve habitat conditions based on the biological needs of the covered species. Before deciding whether to approve the HCP and issue the ITPs, the Services will ensure that the Final HCP contains goals and objectives, rationales, and enforceable final conservation measures based on the biological needs of the covered species that comply with the requirements of ESA.

HCP-6.3 Goals and Objectives Based on Sustaining Current Populations

One commenter stated that the Draft HCP's goals and objectives improperly focus on sustaining current populations of the covered species and should, instead, be designed to enhance the chance of survival or recovery for the covered species—and, in particular, the Oregon spotted frog.

Commenters

ORG-15

Response

The goals and objectives in any HCP must be designed to address the biological needs of the covered species. It is not necessary to state this within each goal, and doing so can distract from the biological aspects of the goal. Before deciding whether to approve the HCP and issue the ITPs, the Services will ensure that the Final HCP conservation strategy will minimize and mitigate the impacts of the taking to the maximum extent practicable and ensure that the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild. 16 U.S.C. §§ 1539(a)(2)(B)(ii), (iv).

Specific Comments on Goals, Objectives, and Rationale

HCP-6.4 Wickiup Reservoir Goal No. 1

One commenter stated that Wickiup Reservoir Goal No. 1 in the Draft HCP, as well as the Measurable Resource Objectives and Rationale for that Goal, improperly focuses on sustaining current Oregon spotted frog populations, which is inadequate to ensure long-term survival of the species.

Commenters

ORG-15

Response

Wickiup Reservoir Goal No. 1 is to improve the Deschutes River population of Oregon spotted frogs over the long term, which is a cornerstone of any sound conservation and recovery effort. The HCP focuses on increasing the amount and quality of Oregon spotted frog habitat along the Deschutes River between Wickiup Dam and Bend, not simply on maintaining the existing condition. In the case of the Deschutes River, accomplishing this goal will likely require an increase over time in the amount and quality of habitat for the Oregon spotted frogs, as the conservation measures for the Upper Deschutes River are designed to do.

The comment suggested a winter flow of 600 cfs in the Upper Deschutes, but extensive hydrologic modeling and thorough review of natural hydrologic conditions have demonstrated that 600 cfs is not a sustainable minimum flow. The HCP recognizes this, and utilizes instead a long-term goal of 400-500 cfs during the winter. The comment also suggests summer caps on flow, and these are now included in conservation measure WR-1.

HCP-6.5 Middle Deschutes River Goal No. 1

One commenter stated that Middle Deschutes River Goal No. 1 in the Draft HCP is not tied to the biological needs of fish.

Commenters

ORG-15

Response

No covered species inhabit the reach of the Deschutes River most influenced by the applicant's stock water runs. Conservation measure DR-1 was included in the HCP at the request of ODFW, but it was not tied to the specific needs of any covered species.

HCP-6.6 Measurable Resource Objective for Middle Deschutes River Goal No. 1

One commenter stated that proposed conservation measure DR-1 in the Draft HCP does not achieve the Measurable Resource Objective for Middle Deschutes River Goal No. 1 to maintain a minimum winter flow of 250 cfs or maintain minimum summer flows.

Commenters

ORG-15

Response

The applicants explained how proposed conservation measure DR-1 will achieve the Measurable Resource Objective for Middle Deschutes River Goal No. 1 in Final HCP subsections 6.2.8, *Conservation Goals and Objectives for the Middle Deschutes River*, 6.2.9, Conservation Measure for the Middle Deschutes River, and 6.2.10, Rationale for Conservation Measure DR-1. The DR-1 measure applies to the winter storage season only, and therefore would not maintain minimum summer flows. It is important to note that there are no covered species in the Middle Deschutes River, until you get down below the natural barrier of Big Falls. Before making final decisions on the applicants' permit application, the Services will complete findings and recommendations memoranda in conjunction with decisions on the ITP applications pursuant to 16 U.S.C. § 1539(a)(2)(B), documenting how (if approved) the Final HCP complies with the legal criteria for HCPs and ITPs under ESA Section 10.

HCP-6.7 Rationale for Middle Deschutes River Goal No. 1

One commenter stated that the Rationale for Middle Deschutes River Goal No. 1 in the Draft HCP does not address winter diversions by Lone Pine ID, North Unit ID, Tumalo ID, and Three Sisters ID and, therefore, does not accurately represent the scope of the applicants' impacts on winter water in the Middle Deschutes River.

Commenters

ORG-15

Response

The applicants explained the effects of proposed Conservation Measure DR-1 in Final HCP Section 6.2.10, *Rationale for Conservation Measure DR-1,* and in multiple locations in Final HCP Chapter 8 that evaluate the effects on the covered species. Lone Pine ID and North Unit ID do not divert water outside the irrigation season. Tumalo ID does not divert water from the Deschutes River outside the irrigation season. Three Sisters ID does not divert water from the Deschutes River, and it does not divert water at all during December through February. The Services acknowledge the information and resources cited by the commenter. Before making final decisions on the applicants' permit application, the Services will complete findings and recommendations memoranda in conjunction with our decisions on the ITP applications pursuant to 16 U.S.C. § 1539(a)(2)(B), documenting how the Final HCP (if approved) complies with the legal criteria for HCPs and ITPs under ESA Section 10, including minimizing and mitigating the impacts of take from the covered activities to the maximum extent practicable.

HCP-6.8 Whychus Creek Goal No. 1

One commenter stated that Whychus Creek Goal No. 1 in the Draft HCP does not commit to offsetting impacts on fish or mitigation to the maximum extent practicable.

Commenters

ORG-15

Response

The HCP Handbook states that the HCP include measurable goals and objectives based on the biological needs of the covered species, to inform a comprehensive conservation strategy that minimizes and mitigates impacts of the take to the maximum extent practicable (refer to HCP Handbook pages 6-17 through 6-18). There is no requirement that individual goals, objectives, or conservation measures independently achieve or recite the maximum extent practicable standard.

In Draft HCP Chapter 6, *Habitat Conservation*, the applicants identified measurable resource objectives for each proposed conservation measure to achieve habitat conditions based on the biological needs of the covered species. Before deciding whether to approve the HCP and issue the ITPs, the Services will ensure this same chapter of the Final HCP contains goals and objectives, rationales, and enforceable final conservation measures based on the biological needs of the covered species that comply with the requirements of ESA.

HCP-6.9 Measurable Resource Objectives for Whychus Creek Goal No. 1

One commenter stated that the Measurable Resource Objectives for Whychus Creek Goal No. 1 in the Draft HCP are not tied to the biological needs of fish.

Commenters

ORG-15

Response

The measurable resource objectives for Whychus Creek have been updated since publication of the Draft HCP. Refer to Final HCP, Section 6.4.1, *Conservation Goal and Objectives for Whychus Creek*.

HCP-6.10 Goals and Objectives for Crooked River Subbasin

One commenter stated that the Draft HCP's goals and objectives and monitoring provisions for the Crooked River subbasin are not sufficiently "S.M.A.R.T." because they do not include biological metrics to track effectiveness or guide adaptive management related to reintroduction of anadromous salmonids.

Commenters

ORG-14

Response

The HCP's Crooked River subbasin Goal No. 1 is to *assist* in the reintroduction of anadromous salmonids in the Crooked River subbasin by contributing to instream flows. The combination of conservation measures CR-1 through CR-6 address habitat and low flow conditions at critical locations and seasons to achieve this objective.

The applicants' covered activities and Reclamation's storage and release of water from Bowman Dam both occur and overlap in the Crooked River. The HCP addresses effects of the covered activities observed in the Crooked River, where those effects are within the applicants' discretion and control; however, other effects are the result of Reclamation's storage and release of water from Bowman Dam and are, therefore, not appropriate to address through the HCP. For this reason, each Service will issue a BiOp that analyzes both the Services' issuance of ITPs and Reclamation's operations of Bowman Dam on the Crooked River. Further measures, monitoring, or other related terms and conditions resulting from Reclamation's action may be required as a result of the interagency consultation process under ESA Section 7.

HCP-6.11 Crooked River Goal No. 1

One commenter stated that Crooked River Goal No. 1 in the Draft HCP, as well as the Measurable Resource Objectives and Rationale for that Goal, do not address the biological needs of anadromous species.

Commenters

ORG-15

Response

The HCP Handbook states that the HCP include measurable goals and objectives based on the biological needs of the covered species, to inform a comprehensive conservation strategy that minimizes and mitigates impacts of the take to the maximum extent practicable (refer to HCP Handbook pages 6-17 through 6-18).

The HCP's Crooked River subbasin Goal No. 1 is to *assist* in the reintroduction of anadromous salmonids in the Crooked River subbasin by contributing to instream flows. The combination of conservation measures CR-1 through CR-6 address habitat and low flow conditions at critical locations and seasons to achieve this objective. The Crooked River Measurable Resource Objectives support this goal by establishing minimum flows in the Crooked River and its tributaries, to eliminate extremely low flows in the Crooked River. In addition, the applicants have revised their request for ITP coverage and are no longer seeking ITP coverage for Mid-Columbia River Spring Chinook salmon.

Before deciding whether to approve the HCP and issue the ITPs, the Services will ensure that the Final HCP contains goals and objectives, rationales, and enforceable final conservation measures based on the biological needs of the covered species that comply with the requirements of ESA.

HCP-6.12 Measurable Resource Objective 1-C for Crooked River Goal No. 1

One commenter recommended that Crooked River Objective 1-C be tied to flow increases that will result from the McKay Water Switch and that Ochoco ID commit to a deadline for the exchange and winter flow minimums.

Commenters

ORG-15

Response

Ochoco ID cannot commit to a schedule for completion or ultimate outcome of the McKay Water Switch, because the switch involves multiple parties other than Ochoco ID. Since publication of the Draft HCP and Draft EIS, the U.S. Department of Agriculture's Natural Resources Conservation Service has released a draft Environmental Analysis evaluating canal piping in the Crooked River basin, to which the McKay Water Switch relates.

HCP-6.13 Crooked River Goals No. 2 and No. 3

One commenter stated that Crooked River Goal No. 2 in the Draft HCP, as well as the Measurable Resource Objectives and Rationale for that Goal, do not address the biological needs of anadromous species and do not adequately commit to offsetting impacts on listed species.

Commenters

ORG-15

Response

The HCP Handbook states that the HCP include measurable goals and objectives based on the biological needs of the covered species, to inform a comprehensive conservation strategy that minimizes and mitigates impacts of the take to the maximum extent practicable (refer to HCP Handbook pages 6-17 through 6-18). There is no requirement that individual goals, objectives, or conservation measures independently achieve or recite the maximum extent practicable standard.

In Draft HCP Chapter 6, *Habitat Conservation*, the applicants identified measurable resource objectives for each proposed conservation measure to achieve habitat conditions based on the biological needs of the covered species. Before deciding whether to approve the HCP and issue the ITPs, the Services will ensure that the Final HCP contains goals and objectives, rationales, and enforceable final conservation measures based on the biological needs of the covered species that comply with the requirements of ESA.

HCP-6.14 Measurable Resource Objectives for Crooked River Goal No. 3

One commenter stated that the Measurable Resource Objectives for Crooked River Goal No. 3 should commit to maintaining fish screens to NMFS standards and address barrier removal.

Commenters

ORG-15

Response

The Draft HCP has been revised, and final conservation measure CR-5 requires Ochoco ID to meet NMFS fish screen requirements upon replacement. It is not necessary to state that commitment in the Final HCP goals and objectives.

7 Habitat Conservation Strategy, Generally

Benefits to Covered Species

HCP-7.1 Greater Benefits to Covered Species or Habitat Generally Recommended

Commenters generally supported improved habitat for wildlife in the Deschutes basin, generally stated that the Draft HCP does not provide adequate conservation benefits, generally recommended that the HCP provide a greater overall benefit to the covered species or their habitat, or generally recommended that the applicants commit to additional mitigation activities.

Commenters

TRIBE-1, ORG-24, ORG-17, ORG-22, GP-2, GP-16, GP-23, GP-28, GP-31, GP-36, GP-41, GP-85, GP-86, GP-88, GP-91, GP-96, GP-97, GP-105, GP-122, GP-123, GP-132, GP-137, GP-139, GP-145, GP-148, GP-155, GP-159, GP-165, GP-179, GP-184, GP-188, GP-189, FL-1, FL-2, FLP-12, FLP-22, FLP-26, FLP-28, FLP-45, FLP-52, FLP-55, FLP-63

Response

The Final HCP is designed to minimize and mitigate the impacts of take caused by the operational activities (covered activities) of eight irrigation districts and the City of Prineville (the applicants). The covered activities modify the timing and magnitude of flow in the Deschutes River and a number of its tributaries through the storage, release, diversion, and return of irrigation water. The Deschutes basin is a highly altered, complex hydrological system, and changes in surface hydrology caused by the covered activities alter the quantity and/or quality of aquatic habitats for listed species in both positive and negative ways. Furthermore, other numerous human and non-human activities influence the status of the covered species and their habitat in the Deschutes basin, including urban and rural land use practices and climate change. Those activities are beyond the applicants' control and responsibility to mitigate and are therefore beyond the scope of this HCP.

Under ESA Section 10, HCP applicants must minimize and mitigate the impacts of the taking from their actions for which they are seeking incidental take coverage (the "covered activities") to the maximum extent practicable and ensure that the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild. 16 U.S.C. §§ 1539(a)(2)(B)(ii), (iv). This requirement does not extend to minimizing and mitigating the effects of actions by other parties.

The approach of the Draft as well as the Final HCP is to modify those activities within the applicants' control (the covered activities) to minimize and mitigated the adverse effects caused by the covered activities.

HCP-7.2 Prioritization of Covered Species

Commenters generally stated that the HCP prioritizes the needs of Oregon spotted frog over other covered species and recommended that the HCP include additional commitments to mitigate impacts on covered fish species, including bull trout, salmon, and MCR steelhead, and balance the biological needs of various covered species.

Commenters

TRIBE-1, ORG-24, ORG-19

Response

The HCP proposes a conservation strategy designed to minimize and mitigate the impacts of take to all covered species to the maximum extent practicable. An HCP cannot prioritize one species over another, but must instead address each covered species individually. To approve the ITP, the Services' HCP findings memorandum and Record of Decision must document how the conservation strategy for each covered species minimizes and mitigates the impacts of take to the maximum extent practicable. Historical and current water management practices in the Upper Deschutes Basin have severely degraded the habitat for the Oregon spotted frog; therefore, the conservation measures needed to minimize and mitigate impacts of the covered activities on Oregon spotted frog are extensive.

HCP-7.3 Greater Benefits to Covered Fish Species Recommended

Commenters stated that the Draft HCP does not provide adequate conservation benefits to covered fish species or recommended that the HCP provide a greater overall benefit to covered fish species, including through higher stream flows.

Commenters

ORG-24, ORG-12, ORG-22

Response

Throughout the development of the Draft HCP, the Services strongly advocated for conservation measures for the covered fish species, however the HCP is a voluntary, applicant-driven document. The Services crafted the Draft EIS action alternatives to examine greater protections for listed fish species, as well as non-listed Chinook salmon, and thus evaluated various possible modifications to the proposed conservation measures in the Crooked River (CR-1 to CR-4) in Alternatives 3 and 4 of the Draft EIS.

The applicants' actions and Reclamation's storage and release of water from Bowman Dam both occur and overlap in the Crooked River. For that reason, each Service will analyze actions proposed by the applicants under the HCP and actions by Reclamation pursuant to the Crooked River Act in one BiOp that evaluates both the Services' issuance of ITPs and Reclamation's operations of Bowman Dam on the Crooked River. Reclamation releases water from Bowman Dam for the benefits of fish and wildlife. Optimizing the utility of that water could address some of the concerns identified by the commenter. The Services will ensure that Reclamation is aware of the commenter's concern regarding shaping of flows in the Crooked River.

HCP-7.4 Greater Benefits to Oregon Spotted Frog Recommended

Commenters stated that the Draft HCP does not provide adequate conservation benefits to Oregon spotted frog or recommended that the HCP provide a greater overall benefit to Oregon spotted frog.

Commenters

ORG-15, ORG-22, GP-148

Response

Based on public review of and comment on the Draft HCP, as well as further technical assistance from FWS, the applicants have revised the Final HCP's conservation strategy to provide greater protections for Oregon spotted frog than initially proposed in the Draft HCP. Refer to Final HCP Chapter 6, *Habitat Conservation*.

HCP-7.5 Higher Stream Flows Generally Recommended

Commenters generally supported higher stream flows within the Deschutes basin, generally stated that stream flows proposed under the Draft HCP do not provide adequate conservation benefits, or generally recommended that the HCP provide higher stream flows. Some commenters proposed specific flow targets.

Commenters

ORG-17, ORG-20, GP-31, GP-84, GP-96, GP-123 GP-139, GP-155, GP-159, GP-161, GP-163, GP-183, GP-185, GP-188, FL-2, FLP-26

Response

In the Final HCP, the applicants have modified the proposed conservation measures to provide additional conservation benefits designed to minimize and mitigate the impacts of take from the covered activities to the maximum extent practicable. The modified conservation measures provide for higher stream flows designed to provide conservation benefits to the covered species. Refer to Final HCP Chapter 6, *Habitat Conservation*.

HCP-7.6 Ecologically Relevant Stream Flows Generally Recommended

Commenters generally supported "ecologically relevant" stream flows or stream flows based on the biological needs of the covered species.

Commenters

ORG-20, GP-148

Response

The Services agree. The conservation measures in Final HCP Chapter 6, *Habitat Conservation*, provides stream flows designed to be ecologically relevant and provide conservation benefits based on the biological needs of the covered species.

HCP-7.7 Timing of Stream Flow Regimes Generally Recommended

Commenters generally supported stream flow regimes that provide adequate water and habitat for the covered species throughout their life cycles.

Commenters

ORG-12, ORG-22

Response

The Services agree. The conservation measures in Final HCP Chapter 6, *Habitat Conservation*, are designed to work in concert with other habitat management and enhancement efforts in the basin to meet the biological needs of the covered species.

HCP-7.8 Specificity of Plans to Achieve Higher Stream Flows

Commenters generally requested additional specificity regarding how the HCP will achieve higher stream flows.

Commenters

ORG-17, GP-124, FLP-26

Response

The HCP conservation strategy achieves higher stream flows through minimum flow targets that the applicants must meet. The HCP includes enforcement measures if the applicants do not meet those flow targets, designed to provide adequate conservation benefits to the covered species and minimize and mitigate the impacts of take from the covered activities to the maximum extent practicable. However, to provide the applicants necessary flexibility, the HCP does not specify the mechanisms through which the applicants must achieve water conservation required to meet minimum flow targets. If the Final HCP is approved, the applicants will meet flow targets through a variety of approaches, including operational adjustments, water efficiency and infrastructure projects, water-market transactions, and other options.

HCP-7.9 Expedited Conservation Measures Generally Recommended

Commenters generally recommended that the HCP provide conservation benefits, including higher stream flows, immediately or sooner than proposed in the Draft HCP. Some commenters proposed specific timelines.

Commenters

ORG-4, ORG-17, GP-24, GP-31, GP-35, GP-123, GP-139, GP-158, GP-161, GP-163, GP-182, FLP-26, FLP-28

Response

In the Final HCP, the applicants have modified the proposed conservation measures to accelerate the rate at which stream flows are increased and result in higher stream flows than previously proposed in the Draft HCP. Refer to Final HCP Chapter 6, *Habitat Conservation*.

HCP-7.10 Natural Hydrological Conditions Recommended

Commenters generally recommended that the Deschutes River or other streams within the Deschutes basin be returned to natural hydrological conditions.

Commenters

ORG-11, GP-96, GP-121, GP-122, GP-188

Response

Due to the highly modified nature of the Deschutes basin, in general, and the covered lands, in particular, a return to natural hydrologic conditions may not necessarily provide the desirable level of habitat function to support the covered species. The conservation measures in Final HCP Chapter 6, *Habitat Conservation*, are guided and shaped by knowledge of natural hydrologic conditions, but they ultimately are designed to provide favorable conditions for the covered species in the context of current stream morphology, and land and water use.

HCP-7.11 Consideration of Climate Change Generally Recommended

Commenters generally recommended that the HCP provide adequate conservation benefits to account for the future effects of climate change on the covered species or water supplies.

Commenters

ORG-12, ORG-22, GP-31, GP-35, GP-105, GP-139, GP-145, GP-146, FLP-55, FLP-70, FLP-71

Response

The Final HCP has been designed to ensure that the applicants implement operational changes to minimize and mitigate the impacts of take from the covered activities to the maximum extent practicable and provide adequate conservation benefits to the covered species, primarily by ensuring higher stream flows throughout the HCP term and giving the covered species priority over irrigation for water in the event of climate change.

HCP-7.12 Impacts on Tourism and Recreational Interests

Commenters generally recommended that the HCP account for impacts of altered stream flows on tourism and recreational interests or include recreational stakeholders in development of the HCP.

Commenters

GP-24, GP-36 GP-83, GP-133, GP-175

Response

The comment is outside the scope of the HCP; however, the Services considered impacts of the HCP on tourism and recreation in the Draft EIS. Refer response to comment, EIS-17.2, *Recreation Flow Study*, for additional information.

HCP-7.13 Habitat Impacts Caused by Tourism and Recreational Interests

One commenter generally recommended that water tourism be included in the ITP process and that the HCP require mitigation for habitat impacts caused by water tourism.

Commenters

GP-27

Response

Water tourism is not within the scope of the covered activities proposed by the applicants and, therefore, the comment is outside the scope of the HCP.

HCP-7.14 Changes to Oregon Water Law or Water Rights Recommended

Commenters generally recommended that Oregon water law or existing water rights be modified to allocate water more efficiently or equitably.

Commenters

GP-40, GP-122, GP-138, GP-144, GP-185, GP-189, FLP-17

Response

The comment is outside the scope of the HCP. The applicants must comply with existing water law. Neither the Services nor the applicants have legal authority to modify existing water rights to allocate water more efficiently or equitably.

HCP-7.15 Costs and Risks to North Unit ID

Commenters generally raised concerns regarding economic costs and risks to North Unit ID from implementing the HCP or other water conservation measures. Commenters stated that North Unit ID already delivers irrigation water relatively efficiently and that, as the District with the most junior water rights, North Unit ID will disproportionately bear the costs and risks of the HCP. Some commenters recommended that the HCP include provisions to decrease economic risk to North Unit ID farmers during droughts or other low-water years.

Commenters

LOCAL-3, GP-124, GP-138, GP-140, GP-146, GP-147, GP-150, GP-152, GP-162, FLP-11

Response

The applicants considered economic costs and risks to North Unit ID during HCP development. A key consideration during HCP development was the practical ability of all applicants—including North Unit ID—to complete water conservation improvements necessary to implement the conservation measures and achieve the minimum flow targets identified in the HCP. The applicants collaborated with the Services to develop a Final HCP designed to minimize and mitigate the impact of take from the covered activities to the maximum extent practicable, recognizing and managing those costs and risks to all applicants.

HCP-7.16 Support of Draft HCP as Proposed

Commenters supported the Draft HCP as proposed. Commenters stated that the HCP provides a reasonable compromise among stakeholders that provides adequate conservation benefit to covered species, while providing the applicants and irrigation district patrons sufficient time to adapt.

Commenters

STATE-3, ORG-18, GP-140, GP-162

Response

The Services acknowledge this comment.

Conservation Measure Implementation, Generally

HCP-7.17 HCP Conservation Measure Implementation Strategy

Commenters stated that the Draft HCP does not adequately explain how the proposed conservation strategy will be implemented and recommended that the HCP include additional explanation and procedures to ensure that the HCP is successfully implemented.

Commenters

ORG-3, ORG-22

Response

Final HCP Chapter 6, *Habitat Conservation*, includes a compliance and enforcement protocol to ensure that the HCP is successfully implemented.

HCP-7.18 Exceptions to HCP Conservation Measures

One commenter stated that the Draft HCP conservation measures include compliance exceptions that may prevent the intended conservation benefits from occurring. The commenter recommended that the HCP include additional assurances that adequate stream flows will be achieved to protect the covered species at all times.

Commenters

ORG-3

Response

Final HCP Chapter 6, *Habitat Conservation*, includes a compliance and enforcement protocol and minimum flow requirements based on the biological needs of the covered Species. The applicants have incorporated additional compliance obligations into all conservation measures in the Final HCP that include enforceable minimum or maximum flow or surface elevation targets.

HCP-7.19 Contingency Plans for HCP Conservation Measures

One commenter stated that the Draft HCP does not adequately address “contingency plans” for the proposed conservation measures—*i.e.*, alternative requirements under the HCP when certain conditions occur. The commenter stated that existing contingency plans in the Draft HCP conservation measures include loopholes that allow the applicants to meet less-protective standards that do not achieve intended long-term conservation benefits, and recommended that the applicants include additional contingency plans in some of the proposed conservation measures.

Commenters

ORG-3

Response

Final HCP Chapter 6, *Habitat Conservation*, includes a compliance and enforcement protocol for each conservation measure. Chapter 7, *Monitoring, Reporting and Adaptive Management*, includes monitoring and adaptive management requirements for the conservation measures, and Chapter 9, *Changed and Unforeseen Circumstances*, includes changed circumstances provisions. All of these are designed to achieve long-term conservation benefits based on the biological needs of the covered Species. The Services will evaluate and document the adequacy of those measures and provisions before making final decisions on the ITP applications.

HCP-7.20 Conservation Funding Implementation

Commenters recommended additional guidelines defining how conservation funds created by the proposed conservation measures in the Draft HCP would be spent to achieve intended conservation benefits and mitigate the impacts of applicants’ incidental take.

Commenters

ORG-3, ORG-14

Response

The conservation measures providing conservation funding are a key part of the HCP’s phased conservation strategy. The conservation funding will be used to help minimize and mitigate the impact of take from the covered activities as the applicants adapt their operations over time, to achieve long-term stream flow conditions necessary to meet the biological needs of the covered species. The Final HCP includes additional conservation funding commitments by the applicants, specifically Conservation Measure UD-1, the Upper Deschutes Conservation Fund. Conservation Measure UD-1 will be used “to improve or enhance habitat in the Upper Deschutes Basin for the Oregon spotted frog and other aquatic species, or otherwise address conditions in the Upper Deschutes Basin that affect the conservation and recovery of the Oregon spotted frog in the wild.” Therefore, funding could be allocated from Conservation Measure UD-1 to implement habitat restoration actions at specific sites to address and improve site-specific functionality during implementation of the flow regime under the proposed action.

HCP-7.21 Conservation Measures Requiring Third-Party Cooperation

Commenters recommended that the Draft HCP include additional detail explaining how proposed Conservation Benefits requiring third-party cooperation will be implemented to achieve intended conservation benefits.

Commenters

ORG-3, ORG-14

Response

The conservation measures in Final HCP Chapter 6, *Habitat Conservation*, do not require cooperation from parties who are not covered by the HCP in order to achieve the intended benefits to the covered species. Several of the conservation measures are designed to work synergistically with the actions of non-applicant parties to provide greater overall benefits to the covered species, but the actions of those other parties are not necessary for the HCP to achieve the levels of minimization and mitigation required under ESA. The Final HCP would achieve long-term conservation benefits primarily through enforceable minimum flow requirements based on the biological needs of the covered species. Although the applicants do not have legal authority to require irrigation district patrons to implement conservation measures on private property, the applicants have also committed to working with their patrons on a voluntary basis, to improve irrigation efficiency and modernize infrastructure in their districts.

HCP-7.22 Timing to Implement Conservation Measures Requiring Third-Party Cooperation

One commenter recommended that the HCP "provide better implementation timing" for proposed Conservation Measures WC-1 and CR-5. The commenter recommended that Conservation Measure WC-1 require that target flows be achieved within the first or second year of the HCP term. The commenter also recommended extending the five-year patron-assistance period in proposed Conservation Measure CR-5 and including a deadline for patrons to install fish screens on their diversions.

Commenters

ORG-3

Response

In the Final HCP, the applicants have revised Conservation Measure WC-1 to require that Three Sisters ID pass all water the district has converted to permanent instream water rights on Whychus Creek (currently 31.18 cfs) at its diversion for the full term of the HCP. Refer to Final HCP Section 6.4, *Whychus Creek*. The applicants did not incorporate the commenter's recommendations for Conservation Measure CR-5. Refer to response to comment HCP-4.7, *Activities by Irrigation District Patrons,* for further discussion of the applicants' limited authority to regulate private activities by irrigation district patrons.

HCP-7.23 HCP Criteria and Legal Standards for ITP Issuance

Commenters stated that the Draft HCP does not satisfy legal requirements for HCPs or ITP issuance under ESA.

Commenters

TRIBE-1, ORG-24, ORG-3, ORG-12, ORG-14, ORG-15, ORG-22

Response

The Services will complete findings and recommendations memoranda in conjunction with our decisions on the ITP applications pursuant to 16 U.S.C. § 1539(a)(2)(B), documenting how the Final HCP complies with the legal criteria for HCPs and ITPs under ESA Section 10. The applicants have collaborated with the Services to develop a Final HCP designed to meet all legal requirements for ITP issuance, including attempting to demonstrate that the Final HCP will provide adequate conservation benefits based on the biological needs of the covered species; will minimize and mitigate the impacts of take from the covered activities to the maximum extent practicable; will include adequate funding assurances; will not appreciably reduce the likelihood of survival and recovery of the covered species in the wild; and will include other implementation assurances required by the Services.

Some commenters urged the Services to conduct or require the applicants to conduct additional or different analyses, or address specific scientific studies or other information in the HCP. The Services acknowledge all additional scientific information, analyses, and resources cited by commenters and will take that information into account—as well as information provided in the Final HCP and the Final EIS—in their ITP issuance decision documents and the corresponding HCP-specific BiOps required under ESA Section 7. Refer to HCP Handbook, Chapters 14 and 15 (identifying Services' responsibilities and required analyses to finalize the HCP and issue ITPs).

8 Specific Comments Regarding Draft Conservation Measures

Recommendations for Draft Crane Prairie Reservoir Conservation Measure

HCP-8.1 Crane Prairie Reservoir Operations and Flow Regimes

Commenters expressed concern regarding impacts of stream flow levels and fluctuations on covered species as a result of operations at Crane Prairie Reservoir. Commenters recommended specific operational measures and flow regimes for Crane Prairie Reservoir or specific modifications to proposed conservation measure CP-1 in the Draft HCP.

Commenters

STATE-4, ORG-3

Response

The operational constraints on Crane Prairie Reservoir in conservation measure CP-1 were designed specifically to balance the need to maintain and enhance Oregon spotted frog habitat in Crane Prairie Reservoir with habitat conditions downstream of the reservoir (refer to Final HCP, Section

6.2.1.4, *Crane Prairie Goal No. 2*). Habitat conditions within the reservoir were prioritized as the reservoir supports an abundance of Oregon spotted frog. The applicants determined, with technical assistance from the Services, that modifications of this measure or additional constraints on the operation of Crane Prairie Dam, including ramping rates and minimum flows, could cause undesirable fluctuations in reservoir water levels and diminish the benefits of the conservation measure to Oregon spotted frogs. While the reservoir contains several hundred acres of highly valuable Oregon spotted frog habitat, the reach of the river downstream of Crane Prairie Dam contains limited habitat for Oregon spotted frog. The one wetland where Oregon spotted frogs breeding has occurred is strongly influenced by water storage in Wickiup Reservoir and not by flows in the Deschutes River. Consequently, modifications to the operation of Crane Prairie Dam would provide little benefit to Oregon spotted frogs downstream of the reservoir, while having detrimental effects on Oregon spotted frogs within the reservoir. No other covered species occur within Crane Prairie reservoir or in the Deschutes River downstream of the reservoir.

Recommendations for Draft Upper Deschutes River and Wickiup Reservoir Conservation Measures

HCP-8.2 Higher Upper Deschutes River Instream Winter and Spring Flow Targets

Commenters recommended that the HCP require higher minimum instream winter and spring flows than provided in proposed conservation measure WR-1 in the Draft HCP. Commenters cited scientific studies supporting a need for higher minimum winter instream flows to achieve necessary conservation benefits for Oregon spotted frog. Some commenters also stated that the flow targets in proposed conservation measure WR-1 do not provide necessary conservation benefits for covered fish species.

Some commenters proposed specific instream flow targets. For example, some commenters stated that winter instream flows of 400 cfs will not achieve necessary conservation benefits and that instream flows of 500 cfs or higher are necessary to support Oregon spotted frog. Some commenters supported the instream flow targets presented in Draft EIS Alternatives 3 and 4.

Commenters

STATE-4, ORG-2, ORG-3, ORG-9, ORG-10, ORG-12, ORG-14, ORG-15, ORG-16, ORG-22, GP-120, GP-122, GP-124, GP-148, GP-169, GP-179, GP-189, FL-3, FLP-26

Response

The applicants and the Services have collaborated to revise the Draft HCP and develop final conservation measures for the Upper Deschutes River, based on the biological needs of the covered species, designed to minimize and mitigate the impacts of the take to the maximum extent practicable. Final conservation measure WR-1 provides for accelerated flow increases and, ultimately, higher instream flows than initially proposed in the Draft HCP. The Services will document in our final decision documents on the ITP applications whether the final conservation measures meet legal requirements for the HCP and ITP issuance and collectively provide adequate conservation benefits for the covered species.

HCP-8.3 Accelerated Timing of Upper Deschutes River Instream Winter Flow Targets

Commenters stated that the HCP should require higher minimum instream winter flows more quickly than the timeline provided in proposed conservation measure WR-1 in the Draft HCP. Commenters stated that an accelerated timeline for instream winter flows is necessary to support short- and long-term survival of Oregon spotted frog. Some commenters also stated that an accelerate timeline is required to provide necessary conservation benefits for covered fish species. Some commenters stated that the applicants could feasibly accelerate the timeline to increase minimum instream winter flows, and that the Draft HCP overstates the economic impacts on the applicants of doing so.

One commenter stated that the HCP does not adequately explain or justify the phased implementation approach in the Draft HCP, based on scientific data.

Commenters

STATE-4, ORG-2, ORG-3, ORG-9, ORG-10, ORG-11, ORG-12, ORG-14, ORG-15, ORG-22, GP-120, GP-122, GP-124, GP-148, GP-169, GP-179, GP-189, FL-3, FLP-26

Response

The applicants have collaborated with the Services to revise the Draft HCP and develop final conservation measures for the Upper Deschutes River, based on the biological needs of the covered species, designed to minimize and mitigate the impacts of the take to the maximum extent practicable. Final conservation measure WR-1 provides for accelerated flow increases and, ultimately, higher instream flows than initially proposed in the Draft HCP. The Services will document in our final decision documents on the ITP applications whether the final conservation measures meet legal requirements for the HCP and ITP issuance and collectively provide adequate conservation benefits for the covered species.

As noted in the analyses of effects in Final HCP Section 8.4, *Oregon Spotted Frog*, increasing winter flows in the Upper Deschutes River causes an unavoidable decrease in summer flows that would likely have a negative impact on Oregon spotted frog. To avoid these potential negative impacts, the winter increases must be achieved gradually to allow for spotted frogs to adjust to a change in summer inundation timing and duration within wetland habitats. A gradual change will allow the Upper Deschutes River time to recover from the past 70 years of modified hydrologic regime. This recovery will be aided by habitat restoration and enhancement activities funded by the HCP's Upper Deschutes Basin Conservation Fund. The timing and rate of increase in the Final HCP are designed to balance the desire to increase winter flows as soon as possible with the need to gradually decrease summer flows.

HCP-8.4 Variable Upper Deschutes River Flows and Annual Releases from Wickiup Dam

Commenters recommended that the HCP include provisions to manage instream flows in the Upper Deschutes River variably, based on annual hydrological conditions. Some commenters proposed specific revisions to proposed conservation measure WR-1 in the Draft HCP or specific mechanisms to manage Upper Deschutes River flows variably.

Commenters

ORG-10, ORG-12, ORG-14

Response

The applicants and the Services have collaborated to revise the Draft HCP and develop final conservation measures for the Upper Deschutes River, based on the biological needs of the covered species, designed to minimize and mitigate the impacts of the take to the maximum extent practicable.

Final conservation measure WR-1 creates additional flexibility to manage instream flows during the HCP term, compared to the conservation strategy for the Upper Deschutes River initially proposed in the Draft HCP. The Services will document in our final decision documents on the ITP applications whether the final conservation measures meet legal requirements for the HCP and ITP issuance and collectively provide adequate conservation benefits for the covered species.

HCP-8.5 Upper Deschutes River Flow Timeline Tied to Dates

Commenters recommended that proposed conservation measure WR-1 in the Draft HCP tie instream flow targets to specific years (*e.g.*, 2020 to 2024), rather than date ranges such as Years 1 through 5 of the HCP term.

Commenters

ORG-11, ORG-20

Response

Implementation years have been used in the HCP rather than calendar years, because the HCP was developed over a long time frame, and the use of calendar years would have required frequent revisions to the working draft of the HCP. The Final HCP still relies on the use of implementation years, but Year 1 of the HCP term is now clearly defined in Final HCP Section 6.1.2, *Organization of Chapter 6*, as 2021.

HCP-8.6 Annual Progress Requirements for Upper Deschutes River Flow Increases

One commenter recommended that the HCP require the applicants to demonstrate progress annually toward increasing instream flows in the Upper Deschutes River by at least 20 cfs per year.

Commenters

ORG-14

Response

Conservation Measure WR-1 of the Final HCP now includes provisions for increasing flows on a regular basis as water becomes available to the Districts through conservation. Final HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*, includes requirements for annual reporting to the Services on flows in particular and HCP implementation in general.

HCP-8.7 Incremental Instream Protection of Conserved Water in Upper Deschutes River

One commenter recommended that the HCP accelerate the timeline to increase flow targets in the Upper Deschutes River by including additional commitments to protect conserved water in the Upper Deschutes River as the applicants complete canal piping and other irrigation efficiency projects.

Commenters

ORG-10

Response

Conservation Measure WR-1 of the Draft HCP has been revised to reflect this recommendation in the Final HCP.

HCP-8.8 Permanent Instream Protection of Increased Flows in the Upper Deschutes River

One commenter recommended that the HCP include additional commitments to permanently protect increased Upper Deschutes River flows instream.

Commenters

ORG-15

Response

The applicants have collaborated with the Services to develop a final conservation strategy designed to provide long-term benefits to the covered species based on their biological needs, primarily through enforceable minimum flow requirements that the applicants must achieve. Acquiring instream water rights, or subordinating existing irrigation rights to instream water rights, are not necessarily required to provide assurances that those enforceable conservation measures will be implemented. At the same time, to the extent the applicants utilize Oregon state-law programs such as the Allocation of Conserved Water statutes, the applicants anticipate that the conserved water generated from such programs will be protected instream (or reflected in a flow augmentation right) as required by state law.

Otherwise, in many cases, the recommendation exceeds the scope of the applicants' legal authority. As noted, the Districts cannot legally transfer irrigation rights appurtenant to their patrons' lands without the consent of the patrons. Refer to response to comment HCP-4.7, *Activities by Irrigation District Patrons,* for further discussion of the Districts' legal obligations and authorities. Additionally, the OWRD is the entity that administers and regulates water rights in Oregon and must approve all requests to transfer water rights. Refer to response to comment HCP-3.1, *Water Rights Administration by State of Oregon,* for further discussion of OWRD's legal authorities.

HCP-8.9 Enforcement of Minimum Flow Targets in Proposed Conservation Measure WR-1

Commenters stated that proposed conservation measure WR-1 in the Draft HCP contains exception that would allow the applicants not to achieve minimum flow targets under certain circumstances and does not adequately account for low-water years. The commenters recommend that the HCP include additional requirements for the applicants to achieve hard minimum flow targets at all times.

Commenters

ORG-3, ORG-12, ORG-15

Response

The Draft HCP has been revised. Final HCP Chapter 6, *Habitat Conservation*, identifies required compliance targets and allowable ranges of deviation for all items in final Conservation Measure WR-1. Flows outside of the allowable ranges of deviation that are beyond the applicants' control shall not be considered out of compliance with the final conservation measure. Before deciding whether to approve the Final HCP and issue the ITPs, the Services will ensure that the HCP contains enforceable conservation measures based on the biological needs of the covered species that minimize and mitigate the impacts of the taking to the maximum extent practicable.

HCP-8.10 Upper Deschutes River Summer Instream Flow Caps

Commenters recommended that the HCP conservation measures include upper limits on allowable summer flows in the Upper Deschutes.

Commenters

STATE-4, ORG-12, ORG-14, ORG-15, ORG-22, GP-179, FL-3

Response

The Draft HCP has been revised. Conservation Measure WR-1 in Final HCP Chapter 6, *Habitat Conservation*, includes upper limits on allowable summer flows in the Upper Deschutes, beginning no later than year 8 of HCP implementation (calendar year 2028).

HCP-8.11 Upper Deschutes River Instream Flow Targets During Shoulder Seasons

One commenter recommended that the HCP include additional commitments to use conserved water to increase flows between the City of Bend and Lake Billy Chinook for the benefit of anadromous fish species during the shoulder seasons from mid-September to mid-October and mid-April to mid-May.

Commenters

STATE-4

Response

As shown in Final HCP Chapter 6, *Habitat Conservation*, Figure 6-21, flows in the Deschutes River between Bend and Lake Billy Chinook are predicted to increase from historical levels in all months under the HCP, including the shoulder months at the beginning and end of the irrigation season. This is primarily the result of increased releases from Wickiup Reservoir to benefit Oregon spotted frogs between Wickiup Dam and Bend, but the releases may exceed irrigation demands at the Bend diversions in most months, and the result will be increased flows downstream of Bend. Covered fish species occupy only the lower 12 miles of this reach between Big Falls and Lake Billy Chinook. As noted in the analyses of effects to covered fish species in Final HCP Chapter 8 and Final EIS Chapter 4, shoulder-season flows are not considered limiting factors for the covered species in this reach of the Deschutes River.

HCP-8.12 Upper Deschutes River Ramping Rates

Commenters recommended that the HCP include additional commitments to implement ramping rates below the applicants' diversions. Commenters proposed specific ramping rates and ramping schedules.

Commenters

STATE-4, ORG-12

Response

The Draft HCP has been revised. Conservation Measure WR-1 in Final HCP Chapter 6, *Habitat Conservation*, includes required ramping rates and corresponding allowable ranges of deviation for the Upper Deschutes River.

HCP-8.13 Timing Recommendations for Annual Flow Targets in Proposed Conservation Measure WR-1

Commenters recommended that the annual flow targets in proposed conservation measure WR-1 be timed to coincide with Oregon spotted frog life stages, or that the HCP justify its timeline tied to the irrigation season. Commenters stated that the annual timeline in proposed conservation measure WR-1 would increase flows too late in the spring and decrease flows too late in the fall.

Commenters

ORG-3, ORG-14, ORG-15

Response

The Draft HCP has been revised. Conservation Measure WR-1 in Final HCP Chapter 6, *Habitat Conservation*, aligns with the habitat requirements of the Oregon spotted frog. The Services acknowledge the information and resources cited by the commenters. Before making final decisions on the applicants' permit application, the Services will complete findings and recommendations memoranda in conjunction with our decisions on the ITP applications pursuant to 16 U.S.C. § 1539(a)(2)(B), documenting how the Final HCP complies with the legal criteria for HCPs and ITPs under ESA Section 10, including minimizing and mitigating the impacts of take from the covered activities to the maximum extent practicable and ensuring that taking will not appreciably reduce the likelihood of survival and recovery of the covered species in the wild.

HCP-8.14 Support for Timing and Magnitude of Proposed Stream Flow Targets for Upper Deschutes River

Commenters generally supported the timing and magnitude of increased flow targets for the Upper Deschutes River proposed in the Draft HCP, which the commenters stated would provide adequate conservation benefits to Oregon spotted frog or were reasonable to allow the river system and the applicants and their patrons sufficient time to adapt. One commenter stated that the hydrologic modeling in the Draft HCP was well developed and easy to understand.

Commenters

GP-33, GP-166

Response

The Services acknowledge this comment. For further discussion of the Final HCP's conservation measures for the Upper Deschutes River, refer to response to comment HCP-8.2, *Higher Upper Deschutes River Instream Winter and Spring Flow Targets,* and Final HCP Chapter 6, *Habitat Conservation*.

HCP-8.15 Active Revegetation in Conjunction with Instream Flow Increases

Commenters recommended that the HCP include additional commitments to actively revegetate Oregon spotted frog habitat, in conjunction with instream flow increases.

Commenters

ORG-15, GP-179

Response

The Draft HCP has been revised. The Final HCP includes District contributions of $150,000 per year to the Upper Deschutes Basin Habitat Conservation Fund (Conservation Measure UD-1). FWS intends that fund to be used to support restoration and enhancement (including revegetation) of Oregon spotted frog habitat concurrent with improvements in flows under the HCP.

HCP-8.16 Guidance for Services' Management of Releases from Wickiup Reservoir

One commenter recommended that the HCP include additional guidance to explain how the Services would manage releases of stored water from Wickiup Reservoir, as provided in Item G of the Draft HCP.

Commenters

TRIBE-1

Response

The Draft HCP has been revised. Conservation Measure WR-1 in Final HCP 6, *Habitat Conservation*, includes language identifying the purposes for which additional releases from Wickiup Reservoir would occur. It is important to clarify that FWS does not manage flows. FWS can provide technical assistance, but water management operations are conducted by the applicants and related state and federal agencies.

Comments on Biological Effectiveness of Draft Upper Deschutes River and Wickiup Reservoir Conservation Measures

HCP-8.17 Connectivity and Genetic Diversity of Oregon Spotted Frog

One commenter stated that proposed conservation measure WR-1 in the Draft HCP does not adequately ensure connectivity between Oregon spotted frog habitats on the Upper Deschutes River below Wickiup Dam, thereby threatening genetic diversity of the species.

Commenters

ORG-15

Response

Please refer to response to comment EIS-14.7, *Genetic Diversity of Oregon Spotted Frog*.

HCP-8.18 Effects of Historical Wickiup Reservoir Operation

One commenter stated that Section 6.2.6.2 of the Draft HCP does not accurately describe the hydrological impacts of historical Wickiup Reservoir operations.

Commenters

ORG-15

Response

The Services acknowledge all additional scientific information, analyses, and resources cited by the commenter and will take that information into account—as well as information provided in the Final HCP and the Final EIS—in our ITP issuance decision documents and the corresponding HCP-specific BiOps required under ESA Section 7.

Historical operation of Wickiup Reservoir is described in the HCP for background information only, because the ITPs, if issued, would only cover future operation of the reservoir.

HCP-8.19 Effects of Proposed Conservation Measure WR-1 on Hydrology of the Upper Deschutes River

One commenter stated that Draft HCP Section 6.2.6.3 incorrectly assumes that higher winter releases will result in lower summer flows.

Commenters

ORG-15

Response

The Draft HCP has been revised. Final HCP Chapter 6, *Habitat Conservation,* reflects the results of Reclamation's hydrologic modeling of the effects of the HCP on the Deschutes River. This modeling has been done with input from multiple experts inside and outside the basin and has been subject to formal peer review. The modeling continues to demonstrate that increasing winter flows in the Upper Deschutes River (decreasing winter storage) will simultaneously decrease summer flows that historically have been largely determined by the release of storage.

HCP-8.20 Effectiveness of Proposed Conservation Measure WR-1 to Achieve Stated Conservation Objectives for Oregon Spotted Frog

One commenter stated that the Draft HCP does not contain adequate conservation measures to achieve its stated objectives for Oregon spotted frog habitat. The commenter cited scientific studies and opinions of a biologist retained by the commenter in support of the comment.

Commenters

ORG-15

Response

The Draft HCP has been revised. Conservation Measure WR-1 in Final HCP Chapter 6, *Habitat Conservation,* aligns with the habitat requirements of the Oregon spotted frog. The Services acknowledge the information and resources cited by the commenters. Before making final decisions on the applicants' permit application, the Services will complete findings and recommendations memoranda in conjunction with our decisions on the ITP applications pursuant to 16 U.S.C. § 1539(a)(2)(B), documenting how the Final HCP complies with the legal criteria for HCPs and ITPs under Section 10 of ESA, including minimizing and mitigating the impacts of take from the covered activities to the maximum extent practicable and ensuring that taking will not appreciably reduce the likelihood of survival and recovery of the covered species in the wild.

HCP-8.21 Oregon Spotted Frog Critical Habitat

One commenter stated that the Draft HCP does not contain adequate conservation measures to provide or restore Primary Constituent Elements (PCEs) for Oregon spotted frog habitat.

Commenters

ORG-15

Response

The conservation strategy for the Oregon spotted frog in Final HCP Chapter 6, *Habitat Conservation*, includes measures that address the PCEs for Oregon spotted frog critical habitat. The Upper Deschutes Conservation Fund (Conservation Measure UD-1) will provide funding to further enhance critical habitat.

Recommendations for Middle Deschutes River Conservation Measures

HCP-8.22 Middle Deschutes River Flow Targets

Commenters stated that the HCP should require year-round minimum flows for the Middle Deschutes River or otherwise manage flows to achieve more even flows year-round. Some commenters recommended that the HCP require year-round minimum flows of 250 cfs or higher in the Middle Deschutes River.

Commenters

ORG-5, ORG-12, ORG-15, ORG-22, GP-137

Response

No covered species inhabit the reach of the Middle Deschutes River most influenced by the covered activities. Conservation measure DR-1 is included in the HCP at the request of ODFW, but it was not tied to the specific needs of any covered species.

HCP-8.23 Instantaneous Flows for Proposed Conservation Measure DR-1

One commenter recommended that proposed conservation measure DR-1 in the Draft HCP require measurement of instantaneous flows, rather than average daily flows, as proposed in the draft conservation measure.

Commenters

ORG-15

Response

In collaboration with the Services, the applicants chose not to incorporate this recommendation into the Final HCP. As noted, conservation measure DR-1 was included in the HCP at the request of ODFW and is not tied to the specific needs of any covered species.

Comments on Biological Effectiveness of Draft Middle Deschutes River Conservation Measures

HCP-8.24 Coordinated Stock Runs as Conservation Measure

Commenters stated that proposed conservation measure DR-1 in the Draft HCP will not provide an adequate conservation benefit to the covered species, because the conservation measure does not provide adequate summer or year-round flows, address thermal impairments during the summer, or account for other winter water diversions (including diversions for storage, hydroelectric power, and other winter uses) that could prevent winter flows from achieving the target provided in the conservation measure. Some commenters stated that the proposed measure, requiring Arnold ID, Central Oregon ID, and Swalley ID to coordinate winter diversions for stock runs, will not provide a conservation benefit to covered species because Arnold ID, Central Oregon ID, and Swalley ID have coordinated stock runs as a best management practice in the past.

Commenters

ORG-12, ORG-15 ORG-22

Response

Conservation measure DR-1 is specific to winter flows in the Deschutes River below Bend. Other conservation measures in the Final HCP address the other flow and temperature issues raised by the commenters, or those issues are otherwise evaluated in the analyses of effects in the Final HCP and Final EIS.

Additionally, best management practices are not enforceable. By including the coordination of winter stock diversions as a conservation measure in the Final HCP, the applicants have made enforceable commitments to implement those best management practices in the future.

Comments on Biological Effectiveness of Draft Crescent Creek Conservation Measures

HCP-8.25 Enforcement of Minimum Flow Targets in Proposed Conservation Measure CC-1

One commenter stated that proposed conservation measure CC-1 in the Draft HCP contains an exception that would allow the applicants not to achieve minimum flow targets when there is not sufficient inflow to Crescent Lake Reservoir.

Commenters

ORG-3

Response

The Draft HCP has been revised, and the specific concern raised in this comment does not apply to the revised language in Conservation Measure CC-1 in Final HCP Chapter 6, *Habitat Conservation*.

HCP-8.26 Relationship Between Draft Crescent Creek Conservation Measures and Biological Needs of Covered Fish Species

One commenter stated that proposed Conservation Measure CC-1 is based on the applicants' needs during the irrigation season and does not achieve the biological needs of covered fish species throughout their life cycles.

Commenters

ORG-3

Response

No covered fish species reside in Crescent Creek or the Little Deschutes River, and the operation of Crescent Lake Reservoir has almost immeasurable effects on habitat for covered fish species in the

Deschutes River downstream of Big Falls. Conservation measure CC-1 is not intended to have benefits to covered fish species.

Recommendations for Whychus Creek Conservation Measures

HCP-8.27 Conservation Measures to Improve Flows and Temperatures in Whychus Creek

Commenters recommended that the HCP include additional conservation measures to increase stream flows and improve temperature conditions in Whychus Creek. Specific recommendations included acquiring senior instream water rights to permanently protect increased stream flows, incorporating a hard minimum flow target in proposed conservation measure WC-1 in the Draft HCP, and requiring instream flows to the low point of Whychus Creek (Sisters gauge 14076050).

Commenters

STATE-4, ORG-24, ORG-12, ORG-14, ORG-15, ORG-16, ORG-21, ORG-22, GP-177

Response

Over the past 10 years, Three Sisters ID has piped its entire canal system and placed more than 31 cfs permanently instream in Whychus Creek. The District has no more water to place instream without reducing deliveries to patrons. Despite those limitations, Final HCP Chapter 6, *Habitat Conservation*, includes additional commitments to conserve water instream that are within Three Sisters ID control. The District has committed to assist patrons with piping of their individual irrigation systems, which could reduce demand (diversions) in the future; provide conservation funding to secure instream transfers from willing participants; and provide additional conservation funding to support instream habitat improvements. With technical assistance from the Services, the applicants designed this combination of conservation measures to be implemented in conjunction with other third-party conservation efforts not covered by the HCP, to improve flow and temperature conditions in Whychus Creek. Final HCP Chapter 9, *Changed and Unforeseen Circumstances,* also includes a changed circumstances provision that would require the Services to reevaluate Three Sisters ID's ITP coverage for covered fish species, in the event that the HCP's biological objectives for Whychus Creek are not achieved.

HCP-8.28 Enforcement and Implementation of Proportional Water Right Sharing under Draft Conservation Measure WC-1

Commenters recommended that the HCP include additional commitments to adjust flows in Whychus Creek and better implement real-time proportional water right sharing under proposed Conservation Measure WC-1 in the Draft HCP, based on a "flow calculator" or similar tool to continuously measure and monitor flows in Whychus Creek.

Commenters

ORG-10, ORG-16, ORG-21

Response

The Services agree with the recommendation. The final conservation measures for Whychus Creek in Final HCP Chapter 6, *Habitat Conservation*, include a requirement for Three Sisters ID to monitor instream flows when it is diverting water and adjust its diversions to pass required instream flows on an hourly basis when the flow reaching the Three Sisters ID diversion is 60 cfs or less. Instream flows when Three Sisters ID is diverting will be determined by using the proportionality calculator developed by Three Sisters ID and the Deschutes River Conservancy in 2019.

HCP-8.29 Timeline to Manage Flows on 60-Minute Average Basis under Draft Conservation Measure WC-1

Commenters recommended that the HCP accelerate the timeline in proposed conservation measure WC-1 to manage flows on a 60-minute average basis. Some commenters recommended that Three Sisters ID begin managing flows on a 60-minute average basis immediately during the HCP term. One commenter recommended that Three Sisters ID automate its operations to begin managing flows on a 60-minute average basis "within one year."

Commenters

ORG-12, ORG-16, GP-177

Response

The Services agree with the recommendation to accelerate the timeline for Three Sisters ID to manage flows on a 60-minute average basis. The Draft HCP has been revised, and Final HCP Chapter 6, *Habitat Conservation*, includes this requirement.

HCP-8.30 Whychus Creek Stream Gauge Accuracy under Draft Conservation Measure WC-1

One commenter recommended that the stream gauge selected to measure Whychus Creek flows under the Draft HCP meet accuracy standards. The commenter recommended that if stream gauge 14076020 (proposed under Draft conservation measure WC-1) does not consistently meet accuracy standards, gauge 140706050 be used instead.

Commenters

ORG-16

Response

The Services agree that accurate stream gauge monitoring is important for successful implementation of the final conservation measures for Whychus Creek. The Draft HCP has been revised, and Final HCP Chapter 6, *Habitat Conservation*, now uses the appropriate gauge to monitor flows in Whychus Creek.

HCP-8.31 Support for Proposed Conservation Measure WC-2

One commenter supported proposed conservation measure WC-2 in the Draft HCP and supported Three Sisters ID working with the Deschutes River Conservancy to implement instream leasing to increase flows in Whychus Creek.

Commenters

ORG-16

Response

Final Conservation Measure WC-2 in Final HCP Chapter 6, *Habitat Conservation*, includes a commitment by Three Sisters ID to provide annual conservation funding for instream leasing, which would be administered by the Deschutes River Conservancy.

HCP-8.32 Restoration Activities Funded by Proposed Conservation Measure WC-2

One commenter supported proposed conservation measure WC-2 in the Draft HCP, but recommended limiting the use of all funds secured under the measure to transactions to restore stream flow, rather than other aquatic habitat restoration / enhancement activities in Whychus Creek. The commenter recommended that use of the funds be expanded beyond temporary instream leasing to other types of stream flow restoration projects, including management agreements.

Commenters

ORG-10

Response

The Draft HCP has been revised, and Final HCP Chapter 6, *Habitat Conservation*, includes the addition of conservation measure WC-6, the Whychus Creek Habitat Conservation Fund. This $10,000-per-year commitment will be dedicated to habitat restoration work, thus freeing up the Whychus Creek Temporary In-Stream Leasing Fund (final conservation measure WC-2) to fund water leasing.

HCP-8.33 Inflation Adjustment for Conservation Funds in Proposed Conservation Measure WC-2

Commenters recommended that the amount of Three Sisters ID's annual conservation fund commitment in proposed conservation measure WC-2 be adjusted annually for inflation.

Commenters

ORG-10, ORG-16

Response

The Draft HCP has been revised. Final HCP Chapter 6, *Habitat Conservation*, states that the fund in final conservation measure WC-2 will include an inflation factor.

HCP-8.34 Conservation Measures to Improve Other Water Quality Parameters in Whychus Creek

Commenters recommended that the HCP include additional conservation measures to improve water quality parameters other than flow and temperature in Whychus Creek.

Commenters

STATE-4, ORG-22

Response

Recognizing that the applicants largely do not have control over water quality conditions other than temperature and stream flows resulting from the covered activities, the applicants collaborated with the Services to develop a conservation strategy to mitigate incidental take only from those known water quality impacts under the applicants' jurisdiction (temperature, surface water elevations, and rates and volumes of stream flows). The applicants have revised the Final HCP and their request for ITP coverage accordingly. For further discussion of the HCP's treatment of other water quality parameters, refer to response to comment HCP-9.14, *Conservation Measures to Improve Water Quality Other than Temperature and Stream Flows*.

HCP-8.35 Pulse Flows to Reduce Stream Temperatures in Whychus Creek

One commenter suggested that pulse flows could be a way to reduce stream temperatures in Whychus Creek, while allowing Three Sisters ID to meet minimum flow requirements.

Commenters

ORG-16

Response

The applicants chose not to incorporate this recommendation into the Final HCP. For further discussion of the applicants' and Services' respective roles in selecting a final conservation strategy, refer to response to comment HCP-9.1, *Other Conservation Strategies Proposed by Commenters*.

HCP-8.36 Details Regarding Three Sisters ID Winter Flows under the HCP

One commenter recommended that the HCP include additional detail and commitments to minimize impacts from irrigation withdrawals between November and March.

Commenters

ORG-16

Response

The Draft HCP's characterization of Three Sisters ID's winter diversions was incorrect. This has been corrected in Final HCP Chapter 6, *Habitat Conservation*, in the Final HCP. Three Sisters ID does not intend to divert water from December through February. Diversions in November and March will be limited in magnitude.

HCP-8.37 Limitations on Winter Use of Three Sisters ID Water Rights

One commenter recommended that the Draft HCP prohibit winter use of Three Sisters ID's water rights for stock watering or require that stock water be tied to needs of the number of animals that are being served by water.

Commenters

ORG-12

Response

The recommendation is outside the scope of the HCP. Three Sisters ID cannot deny or limit delivery of available water to irrigation district patrons, because Three Sisters ID is legally obligated to supply sufficient water to satisfy water rights appurtenant to patrons' lands, if patrons request water and there is adequate water supply.

The Draft HCP's characterization of Three Sisters ID's winter diversions was incorrect. This has been corrected in Final HCP Chapter 6, *Habitat Conservation*, in the Final HCP. Three Sisters ID does not intend to divert water from December through February. Diversions in November and March will be limited in magnitude.

HCP-8.38 Encouragement of Temporary Leasing, Generally

One commenter generally stated that the number of temporary instream leases by irrigation district patrons may be declining. The commenter suggested that irrigation districts, generally, and Three Sisters ID, specifically, should encourage and should not actively discourage temporary instream leasing by patrons.

Commenters

ORG-12

Response

The comment is outside the scope of the HCP. However, in final conservation measure WC-2 in Final HCP Chapter 6, *Habitat Conservation*,, Three Sisters ID has committed to provide $6,000 annually to the Whychus Creek Temporary Instream Leasing Fund, to be adjusted annually for inflation.

Comments on Biological Effectiveness of Draft Whychus Creek Conservation Measures

HCP-8.39 Analysis for Whychus Creek

One commenter stated that the Draft HCP does not describe how Draft EIS Alternatives 1 through 4 will improve baseline conditions or minimize and mitigate irrigation impacts in Whychus Creek.

Commenters

STATE-4

Response

The HCP is not the document where the alternatives developed through the NEPA process are evaluated. For further discussion of the required HCP alternatives analysis, refer to response to comment HCP-16.1, *Consideration of Alternatives, Generally*.

The applicants analyzed the effects of the proposed conservation measures for Whychus Creek in Final HCP Chapter 6, *Habitat Conservation*, and Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*. The applicants analyzed alternatives to the proposed conservation measures for Whychus Creek in Final HCP Chapter 11, *Alternatives to the Proposed Incidental Take*.

To the extent that the commenter suggested that the applicants are responsible for mitigating the impacts of irrigated agriculture, generally, in Whychus Creek, refer to response to comment HCP-9.14, *Conservation Measures to Improve Water Quality Other than Temperature and Stream Flows*.

HCP-8.40 Conservation Benefits of Increased Flows in Proposed Conservation Measure WC-1

Commenters stated that proposed conservation measure WC-1 in the Draft HCP will not result in high enough summer flows in Whychus Creek to address temperature impairments and meet the biological needs of covered species. Commenters recommended that the HCP set hard minimum flow targets to be measured at the Sisters stream gauge 14076050. Some commenters stated that increased stream flows must be protected by permanent senior instream water rights in order to achieve necessary conservation benefits.

Commenters

STATE-4, ORG-12, ORG-14, ORG-15, ORG-16, ORG-21, ORG-22

Response

The final conservation measures for Whychus Creek in Final HCP Chapter 6, *Habitat Conservation*, reflect revisions to the Draft HCP to address multiple comments related to points of measurement and effectiveness.

HCP-8.41 Calculation of Instream Flows in Proposed Conservation Measure WC-1

Commenters stated that the instream flow articulated in proposed conservation measure WC-1 in the Draft HCP is inaccurate, because it does not adequately account for other diversions downstream. Commenters recommended that the measure be revised to reflect all certificated instream water rights converted from Three Sisters ID irrigation water rights since 2005.

Commenters

ORG-10, ORG-12, ORG-16

Response

The final conservation measures for Whychus Creek in Final HCP Chapter 6, *Habitat Conservation*, reflect revisions to the Draft HCP to address multiple comments related to points of measurement and effectiveness.

HCP-8.42 Measurement and Maintenance of Instream Flows in Whychus Creek

Commenters stated that the Draft HCP measures instream flows in Whychus Creek at a location that does not accurately characterize the effects on covered species. Commenters recommended that the HCP require flows in Whychus Creek to be measured in Sisters at stream gauge number 14076050 instead and that the Draft HCP effects analysis be based on measurements at that location, or that the Draft HCP account for measurement differences at the two gauges.

Commenters

STATE-4, ORG-10, ORG-12, ORG-14, ORG-16

Response

The final conservation measures for Whychus Creek in Final HCP Chapter 6, *Habitat Conservation*, have been revised to address multiple comments related to points of measurement and effectiveness.

HCP-8.43 Technical Comments on Proposed Conservation Measure WC-1

One commenter raised multiple technical recommendations regarding management of stream flows under proposed conservation measure WC-1 in the Draft HCP.

Commenters

FED-2

Response

The final conservation measures for Whychus Creek in Final HCP Chapter 6, *Habitat Conservation*, have been revised to address multiple comments related to points of measurement and effectiveness.

HCP-8.44 Clarification on Funding for Temporary Instream Leasing in Proposed Conservation Measure WC-2

Commenters recommended additional analysis regarding how the applicants determined that an annual contribution of $6,000 to fund temporary instream leasing, as provided in proposed conservation measure WC-2 in the Draft HCP, would provide adequate conservation for the covered species.

Commenters

STATE-4, ORG-24, ORG-12, ORG-14

Response

The Draft HCP has been revised. Final HCP Chapter 6, *Habitat Conservation*, includes additional conservation measures for Whychus Creek (including additional conservation funding) and Chapter 9, *Changed and Unforeseen Circumstances* includes provisions, in the event the conservation measures in the Final HCP prove to be insufficient to accomplish the HCP's measurable resource objectives for Whychus Creek.

HCP-8.45 Conservation Benefits of Three Sisters ID Fish Screen and Passage Maintenance in Proposed Conservation Measure WC-3

Commenters stated that proposed conservation measure WC-3 in the Draft HCP, requiring Three Sisters ID to maintain fish screens at its diversion, does not provide adequate conservation because Three Sisters ID is required to operate and maintain fish screens, bypass devices, and fish passages pursuant to state statute.

Commenters

STATE-4, ORG-12, ORG-14, ORG-15

Response

Three Sisters ID voluntarily installed fish screens and provided fish passage at its Whychus Creek diversion during development of the HCP. Installation of the new diversion and fish screens cannot be considered conservation measures under the HCP, because Three Sisters ID completed those actions proactively. However, the continued maintenance and operation of the facilities to NMFS standards will provide benefits to the covered species that warrant including those actions in the HCP analysis.

HCP-8.46 Clarification Regarding Enforcement for Piping of Three Sisters ID Patron Laterals in Proposed Conservation Measure WC-4

Commenters requested additional clarification regarding how proposed conservation measure WC-4 in the Draft HCP will be modified or enforced to provide adequate conservation benefits if Three Sisters ID patrons do not cooperate with Three Sisters ID and implement piping of their lateral canals.

Commenters

ORG-14, ORG-15

Response

Three Sisters ID cannot compel its patrons to pipe laterals or take other steps to reduce irrigation demand that are not otherwise required under Oregon water law, as further explained in Final HCP Section 2.2, *Need for Incidental Take Coverage* and Section 11.6, *Alternatives for Whychus Creek*. Final conservation measure WC-4 in Final HCP Chapter 6, *Habitat Conservation*, requires Three Sisters ID to encourage and assist willing patrons with piping, but the conservation measure does not require the District or its patrons to conduct piping. Final HCP Chapter 9, *Changed and Unforeseen Circumstances*, also now contains a Changed Circumstances provision to account for the possibility that final conservation measure WC-4 and other conservation measures under the Final HCP may not be sufficient to accomplish the HCP's resource objectives for Whychus Creek.

HCP-8.47 Conservation Benefits of Proposed Conservation Measure WC-4

Commenters stated that proposed conservation measure WC-4 in the Draft HCP does not provide adequate conservation benefits, because the Draft HCP does not contain commitments to acquire permanent senior instream water rights for any conserved water achieved through piping.

Commenters

STATE-4, ORG-12

Response

The final conservation measures for Whychus Creek in Final HCP Chapter 6, *Habitat Conservation*, include an additional requirement that Three Sisters ID bypass all water the District has converted to permanent instream water rights on Whychus Creek at its diversion, as well as all future additional conversions of senior water rights to permanent instream use.
For further discussion of the recommendation to acquire instream water rights, refer to response to comment HCP-4.8, *Commitments to Acquire Instream Water Rights*.

HCP-8.48 Credit for Conservation Projects Included in Proposed Conservation Measures for Whychus Creek

Commenter stated that some of the Draft HCP's proposed conservation measures for Whychus Creek do not provide adequate conservation benefits because public funding and work has already been invested to implement and achieve those measures. The commenter stated that completed projects should be incorporated into the HCP's environmental baseline.

Commenters

ORG-12, ORG-15

Response

The environmental baseline for Whychus Creek has been modified in Final HCP Chapter 6, *Habitat Conservation*, to reflect completed conservation actions by Three Sisters ID.

General Comments on Conservation Strategy for the Crooked River, McKay Creek, and Ochoco Creek

HCP-8.49 Consistency with Crooked River Act

Commenters stated that the Draft HCP's goals and objectives and analyses for the Crooked River, Ochoco Creek, and McKay Creek and proposed conservation measure CR-1 are inconsistent with the Crooked River Act. Some commenters that the applicants do not have the legal authority to direct the timing or rate of uncontracted storage from Prineville Reservoir. Some commenters stated that the Crooked River Act requires maintaining a higher minimum instream winter flow in the Crooked River than proposed in the Draft HCP. Some commenters stated that, to comply with the Crooked River Act, the applicants must obtain a secondary instream water right under state law.

Commenters

STATE-4, ORG-14, ORG-15

Response

The conservation measures for the Crooked River subbasin in Final HCP Chapter 6, *Habitat Conservation*, are not inconsistent with the Crooked River Act. The Crooked River Act provides a framework for the storage and release of uncontracted water from Prineville Reservoir for downstream fish and wildlife purposes. Meanwhile, the conservation measures for the Crooked River subbasin provide for Ochoco ID to maintain a daily average flow of 50 cfs below Bowman Dam outside the active irrigation season under certain conditions, among other measures. The Services and the applicants expect for the Crooked River Act and the Final HCP to be implemented in concert with one another.

The Crooked River Act requires Reclamation to store and release uncontracted water in Prineville Reservoir pursuant to an annual release schedule developed by Reclamation, in consultation with the Services. The Services anticipate that, as Reclamation develops the annual release schedule in the future, it will take into account the conservation measures for the Crooked River subbasin in developing the schedule. Reclamation's actions with regard to the Crooked River subbasin will be further assessed pursuant to ESA Section 7.

Recommendations for Crooked River, Ochoco Creek, and McKay Creek Conservation Measures

HCP-8.50 Instream Protection of Increased Flows in Lower Crooked River

Commenters recommended that the Draft HCP include additional commitments to maintain instream flows from releases of uncontracted storage water from Prineville Reservoir to Lake Billy Chinook. Some commenters recommended permanently protecting instream flows through secondary instream water rights.

Commenters

STATE-1, STATE-4, ORG-24, ORG-12, ORG-14, ORG-15

Response

The Draft HCP has been revised. Final HCP Chapter 6, *Habitat Conservation*, includes an additional conservation measure (CR-7) requiring the applicants to bypass uncontracted releases of "pulse flows" on the Crooked River. Reclamation holds the storage right for the uncontracted (fish and wildlife) water in Prineville Reservoir, not the applicants. Accordingly, while the applicants can refrain from diverting the uncontracted releases, the applicants cannot take action to permanently protect this water from all diversions. The decision whether to apply to OWRD for a permanent instream water right rests with Reclamation.

Storage, allocation, and release of water from Bowman Dam is a federal discretionary action. As such, it is subject to interagency consultation pursuant to ESA Section 7. Because many of Reclamation's management actions are closely related to and would overlap with the applicants' actions pursuant to the HCP, the Services will analyze both sets of actions concurrently with the proposed issuance of the ITPs. Before deciding whether to issue the ITPs, each Service will issue a separate BiOp that evaluates the applicants' actions pursuant to the HCP, as well as Reclamation's water management actions pursuant to the Crooked River Act.

Comments on Biological Effectiveness of Crooked River, Ochoco Creek, and McKay Creek Conservation Measures

HCP-8.51 Increased Flows in Crooked River Subbasin

Commenters generally supported increasing year-round minimum stream flows in the Crooked River subbasin to address temperature concerns, support reintroduction of anadromous fish pursuant to the Pelton Round Butte FERC license, or otherwise support the biological needs of covered species. Commenters stated that the minimum flow requirements in the Draft HCP provide inadequate conservation benefits to the covered species.

Commenters

ORG-12, ORG-14, ORG-22, GP-179, FL-3

Response

Before deciding whether to issue the ITPs, the Services will determine whether the Final HCP's conservation measures for the Crooked River meet all ITP issuance criteria, including minimizing and mitigating impacts of the applicants' take to the maximum extent practicable. As noted, the Services are concurrently conducting interagency consultation with Reclamation, under ESA Section 7, to evaluate Reclamation's continued operation of Prineville Reservoir on the Crooked River. The conservation measures for the Crooked River in Final HCP Chapter 6, *Habitat Conservation*, were designed to be implemented concurrently with the Crooked River Act. The Services will rely on uncontracted storage in Prineville Reservoir (which was authorized by Congress in 2014 for fish and wildlife use) and other operational flexibilities of Reclamation to address Reclamation's impacts on the covered species in the Crooked River.

HCP-8.52 Practicability of Increased Flows in Crooked River Subbasin

One commenter stated that increasing instream flow releases to the Crooked River would be financially feasible for the applicants and, therefore, practicable.

Commenters

ORG-15

Response

HCP applicants are not required to justify impracticability of any alternative that they do not select, nor are they required to conduct a full alternatives or practicability analysis for other possible conservation strategies proposed by members of the public. Before making decisions on the applicants' ITP applications, the Services will evaluate whether the Final HCP satisfies all HCP and ITP issuance standards under ESA, including providing a conservation strategy that minimizes and mitigates the impacts of applicants' incidental take to the maximum extent practicable. For further analysis of the conservation benefits expected from the HCP, refer to Final HCP Chapter 6, *Habitat*

Conservation, and Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species.* For further discussion of the HCP practicability analysis, refer to response to comment HCP-17.2, *Practicability of Other Possible Conservation Approaches, Generally*.

HCP-8.53 Instream Flow Rates in Proposed Conservation Measure CR-1

Commenters stated that the instream flows in proposed conservation measure CR-1 in the Draft HCP are too low and do not meet the biological needs of covered species, including steelhead, Chinook salmon, and bull trout. Commenters recommended that the Draft HCP include additional commitments to maintain instream flows of at least 80 cfs below Bowman dam during the storage season.

Commenters

STATE-4, ORG-10, ORG-12, ORG-14, ORG-15 GP-179, FL-3

Response

Final HCP conservation measure CR-1 in Final HCP Chapter 6, *Habitat Conservation*, was designed to be implemented in conjunction with Reclamation's management actions pursuant to the Crooked River Act and to provide additional water instream if Reclamation's releases of uncontracted stored water from Prineville Reservoir are insufficient to achieve minimum flow targets.

The Crooked River Act is a separate federal law that directs Reclamation to store, allocate, and release water from Bowman Dam on the Crooked River, pursuant to an annual release schedule developed by Reclamation, in consultation with the Services. The Services agree that higher flows in the winter benefit fish in the Crooked River, and they have previously recommended in the annual release schedule that Reclamation manage releases from Prineville Reservoir to achieve higher winter flows.

Certain aspects of Reclamation's implementation of the Crooked River Act are discretionary federal actions subject to interagency consultation under ESA Section 7. Because many of Reclamation's management actions are closely related to and would overlap with the applicants' actions pursuant to the HCP, the Services will analyze both sets of actions concurrently with the proposed issuance of the ITPs. Before deciding whether to issue the ITPs, each Service will issue a separate BiOp that evaluates the applicants' actions pursuant to the HCP, as well as Reclamation's water management actions pursuant to the Crooked River Act.

HCP-8.54 Enforcement of Minimum Flow Requirements in Proposed Conservation Measure CR-1

One commenter recommended that the HCP include hard minimum flow targets for proposed conservation measure CR-1.

Commenters

ORG-15

Response

Final HCP Chapter 6, *Habitat Conservation*, includes a compliance and enforcement protocol and minimum flow requirements based on the biological needs of the covered species. The applicants have incorporated additional compliance obligations into all conservation measures in the Final HCP that include enforceable minimum or maximum flow or surface elevation targets.

HCP-8.55 Question Regarding Minimum Flows in Proposed Conservation Measure CR-1

One commenter requested clarification regarding whether water temporarily leased from Ochoco ID patrons will count toward the minimum flow requirement in proposed conservation measure CR-1. The commenter recommended that water temporarily leased from Ochoco ID patrons be additional to the minimum 50 cfs required in the proposed conservation measure.

Commenters

ORG-10

Response

Conservation measure CR-1, as revised in Final HCP Chapter 6, *Habitat Conservation*,, does not require that water temporarily leased from Ochoco ID patrons be additional to the required minimum 50 cfs. Ochoco ID has several options for ensuring this minimum flow, including voluntary lease agreements with Ochoco ID patrons.

HCP-8.56 Rationale for and Effects Proposed Conservation Measure CR-1

One commenter raised concerns regarding the analyses supporting the Draft HCP's rationale for proposed conservation measure CR-1 and effects of the conservation measure.

Commenters

STATE-4

Response

Final HCP Chapter 6, *Habitat Conservation*, and Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species,* explain the applicants' rationale for proposed and final conservation measure CR-1 and the effects of the measure.

HCP-8.57 Rationale for Proposed Conservation Measure CR-1

One commenter stated that the Draft HCP incorrectly describes the amount of stored water available for downstream fish and wildlife from Prineville Reservoir.

Commenters

ORG-15

Response

The Services acknowledge that the Crooked River Act does provide a mechanism for the 10,000 af (af) of rental water requested by the North Unit ID, from Prineville Reservoir, for annual temporary water service contracting to be made available for downstream fish and wildlife in a given year. While the Crooked River Act does state this 1) North Unit ID has informed the Services that it anticipates using all of the 10,000 acre-foot rental account, in each year during implementation of the HCP, and 2) Reclamation has informed the Services that it has no discretion regarding issuing a contract annually to North Unit ID if they request it; therefore, the Services did not consider this 10,000-af volume of water available for fish and wildlife purposes. . The applicants did not support or include a conservation measure for this water to be used for downstream fish and wildlife.

Storage and release of this 10,000-af rental volume of water, consistent with the Crooked River Act, is a Reclamation action and, therefore, to the extent there are discretionary aspects to these actions, they will be subject to interagency consultation under ESA Section 7. Because many of Reclamation's management actions are closely related to and would overlap with the applicants' actions pursuant to the HCP, the Services will analyze both sets of actions concurrently with the proposed issuance of the ITPs. Before deciding whether to issue the ITPs, each Service will issue a separate BiOp that evaluates the applicants' actions pursuant to the HCP, as well as Reclamation's water management actions pursuant to the Crooked River Act.

HCP-8.58 Rationale for Proposed Conservation Measure CR-1

One commenter stated that the Rationale for proposed conservation measure CR-1 in the Draft HCP does not tie the measure to the biological needs of fish. The commenter stated that the Rationale incorrectly assumed that the allocation of uncontracted storage under the Crooked River Act is the primary mechanism to meet Endangered Species Act requirements.

Commenters

ORG-15

Response

The Crooked River Act provides for the storage and release of uncontracted water in Prineville Reservoir for downstream fish and wildlife purposes, and was taken into account in the development of the Crooked River subbasin conservation measures. The Services and the applicants expect for the Crooked River Act and the Final HCP to be implemented in concert with one another.

Certain aspects of Reclamation's implementation of the Crooked River Act are discretionary federal actions subject to interagency consultation under ESA Section 7. Because many of Reclamation's management actions are closely related to and would overlap with the applicants' actions pursuant to the HCP, the Services will analyze both sets of actions concurrently with the proposed issuance of the ITPs. Before deciding whether to issue the ITPs, each Service will issue a separate BiOp that evaluates the applicants' actions pursuant to the HCP, as well as Reclamation's water management actions pursuant to the Crooked River Act.

HCP-8.59 Proposed Conservation Measure CR-1 — Effects of Historical Operations on Hydrology of Crooked River

One commenter stated that Section 6.5.3.2 of the Draft HCP incorrectly describes the division of water rights under the Crooked River Act. The commenter also stated that the Draft HCP fails to compare the effects of historical operations to the biological needs of steelhead, Chinook salmon, and bull trout in the Crooked River system.

Commenters

ORG-15

Response

Final HCP Chapter 4, *Current Conditions of the Covered Lands and Waters*, and 5, *Current Conditions of the Covered Species* describe the status of the covered lands and covered species. Final HCP Chapter 6, *Habitat Conservation*, describes historical hydrology of the covered lands and summarizes the effects of historical irrigation activities on shaping the current conditions of the covered lands. No additional detail on historical conditions or activities is necessary in the Final HCP. If the Services decide to issue the ITPs, the permits would cover the applicants' future operations only. Applicants for section 10 ITPs are not required to provide mitigation for activities that occurred prior to permit issuance; however, the conservation measures must be designed to address the effects of the covered activities based on the current condition of the covered species.

HCP-8.60 Ochoco ID Summer Mitigation

One commenter stated that the Draft HCP does not include conservation measures for Ochoco ID to provide mitigation during summer months. The commenter stated that the proposed conservation measures in the Draft HCP would require storing 13,000 af of uncontracted water in Prineville Reservoir through the irrigation season, which would reduce the water available to increase flows for fish during summer.

Commenters

ORG-15

Response

The conservation measures for the Crooked River in Final HCP Chapter 6, *Habitat Conservation*, emphasize winter flows and smolt migration flows because the Services and ODFW have identified those conditions as the likely limiting factors for covered fish species. As discussed in Final HCP Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*, increasing summer flows at the expense of winter flows would likely not increase overall numbers of covered fish in the river.

The Services are also conducting an interagency consultation with Reclamation, under ESA Section 7, regarding continued operation of Prineville Reservoir, including the use of uncontracted storage in the reservoir for fish and wildlife.

HCP-8.61 Ochoco ID Commitments to Protect Water Instream

One commenter recommended that the Draft HCP include additional commitments requiring Ochoco ID to protect conserved water obtained through piping projects and other infrastructure updates instream.

Commenters

ORG-15

Response

Unlike most irrigation canals that convey Deschutes River water, the canals in Ochoco ID have relatively minor seepage losses. This is due to significant differences in the geologies of the Crooked River and Deschutes subbasins. Water that does leak from Ochoco ID's canals quickly finds its way to irrigated lands (via downslope canals) or to the Crooked River, where it plays a significant role in supporting summer instream flows. Ochoco ID has identified opportunities for system improvements to increase efficiency, but these will not result in significant reductions in diversion rates. Any improvements supported by state funds will require simultaneous placement of water instream on a proportional basis.

HCP-8.62 Proposed Conservation Measure CR-2 — Flows Passed Through Ochoco Reservoir

One commenter stated that the applicants and the Services do not have authority to determine whether water from temporary or permanent instream water right transfers upstream of Ochoco Reservoir will be passed through the reservoir. The commenter stated that OWRD will determine whether it is feasible to pass through that water.

Commenters

STATE-1

Response

The final conservation measure CR-1 in Final HCP Chapter 6, *Habitat Conservation,* was modified to recognize that OWRD makes this determination.

HCP-8.63 Proposed Conservation Measure CR-2 — Support for Flows Passed Through Ochoco Reservoir

One commenter supported the provisions in proposed conservation measure CR-2 in the Draft HCP to pass through Ochoco Reservoir water from temporary or permanent instream water right transfers upstream. The commenter supported the provisions stating that those pass-through flows would be additive minimum flow requirements in proposed conservation measure CR-2.

Commenters

ORG-10

Response

The Draft HCP has been revised. Final conservation measure CR-2 in Final HCP Chapter 6, *Habitat Conservation* addresses this comment.

HCP-8.64 Proposed Conservation Measure CR-2 — Monitoring and Compliance Provisions

One commenter recommended additional real-time monitoring and compliance provisions for proposed conservation measure CR-2, noting that there is no telemetry gauge present at the low spot in Ochoco Creek.

Commenters

ORG-10

Response

The applicants chose not to incorporate this recommendation into the Final HCP, because real-time monitoring and compliance for final conservation measure CR-2 is not feasible for Ochoco ID at this time. Final HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*, includes additional monitoring and compliance provisions applicable to all final conservation measures.

HCP-8.65 Conservation Benefits of Proposed Conservation Measure CR-2

Commenters recommended that the HCP include additional information regarding how proposed conservation measure CR-2 will provide adequate conservation benefits for covered species.

Commenters

ORG-14, ORG-15

Response

As noted in Final HCP Section 6.5.4.3, *Effects of DBHCP Measures CR-2 on the Hydrology of Ochoco Creek*, of the Final HCP the effects of conservation measure CR-2 on the hydrology of Ochoco Creek would be relatively minor. This is because of the generally low and variable natural flows in Ochoco Creek that limit opportunities for flow improvement. Increasing flows in the creek to the extent needed to support migration, spawning, and rearing by covered species would dramatically decrease the availability of water to portions of Ochoco ID; an outcome that the District considers impracticable.

HCP-8.66 Minimum Flows in Ochoco Creek

Commenters recommended that the Draft HCP require minimum flows of 5 cfs in winter in Ochoco Creek. One commenter recommended that the Draft HCP require minimum flows of 10 cfs in summer in Ochoco Creek

Commenters

STATE-4, ORG-12

Response

Hydrologic and habitat analyses presented in Final HCP Chapter 6, *Habitat Conservation*, and Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species,* indicate that the increased flows proposed by the commenters would have marginal benefit to the covered species, but would have significant economic impacts on Ochoco ID patrons. Additionally, decreased access to Ochoco Creek water would require Ochoco ID to rely more heavily on Crooked River (Prineville Reservoir) storage, which would indirectly decrease the average amount of uncontracted storage available in Prineville Reservoir. The Final HCP's conservation measures for the Crooked River have been carefully developed to balance the use of water with the availability of water, and to prevent unintended negative consequences to the covered species.

HCP-8.67 Instream Protection for Releases from Ochoco Reservoir

Commenters recommended that the HCP include additional commitments to maintain water released from Ochoco Reservoir instream to Lake Billy Chinook.

Commenters

ORG-12, ORG-15

Response

The availability of instream protection for conserved water is determined by OWRD in accordance with Oregon water law. Final HCP Chapter 6, *Habitat Conservation*, indicates that Ochoco ID will avoid storing or diverting water that has been placed instream above Ochoco Reservoir, if authorized by OWRD. Additional instream protection of that water would be determined by OWRD and is, therefore, outside the scope of the HCP.

HCP-8.68 Proposed Conservation Measure CR-2 — Effects of Historical Operations on Hydrology of Ochoco Creek

One commenter stated that Draft HCP, Section 6.5.4, does not adequately discuss the flow requirements needed to support all life cycles of covered species in Ochoco Creek or explain how proposed conservation measure CR-2 will offset take.

Commenters

ORG-15

Response

Hydrologic and habitat analyses presented in Final HCP Chapter 6, *Habitat Conservation*, and Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*, indicate that the increased flows proposed by the commenters would have marginal benefit to the covered species, but would have significant economic impacts on Ochoco ID patrons. Additionally, decreased access to Ochoco Creek water would require Ochoco ID to rely more heavily on Crooked River (Prineville Reservoir) storage, which would indirectly decrease the average amount of uncontracted storage available in Prineville Reservoir. The conservation measures for the Crooked River in Final HCP Chapter 6, *Habitat Conservation*, have been carefully developed to balance the use of water with the availability of water, and to prevent unintended negative consequences to the covered species.

Before making final decisions on the applicants' permit application, the Services will complete findings and recommendations memoranda in conjunction with our decisions on the ITP applications pursuant to 16 U.S.C. § 1539(a)(2)(B), documenting how the Final HCP complies with the legal criteria for HCPs and ITPs under Section 10 of ESA, including minimizing and mitigating the impacts of take from the covered activities to the maximum extent practicable.

HCP-8.69 Minimum Flows in McKay Creek

One commenter recommended that the Draft HCP require minimum flows of 5 cfs in winter in McKay Creek.

Commenters

ORG-12

Response

McKay Creek is unregulated during the winter. Ochoco ID does not divert water from McKay Creek during the winter, and the District has no way to increase winter flow or ensure a minimum flow.

HCP-8.70 Instream Protection for McKay Creek

One commenter recommended that the HCP include additional commitments to maintain water in McKay Creek instream to Lake Billy Chinook.

Commenters

ORG-12

Response

The OWRD determines the availability of instream protection of conserved water in accordance with Oregon water law. Ochoco ID has no ability to commit to instream protection for water conserved by other parties. As required by conservation measure CR-2, Ochoco ID will avoid diverting water that is placed instream in McKay Creek by upstream parties, but Ochoco ID cannot commit to protecting that water from other downstream diverters.

HCP-8.71 Timing of McKay Creek Water Switch in Proposed Conservation Measure CR-3

One commenter recommended that the McKay Creek Water Switch in proposed conservation measure CR-3 in the Draft HCP be implemented within the first five years of the HCP term. The commenter stated that Ochoco ID should be responsible for funding and implementing the exchange, rather than the Deschutes River Conservancy.

Commenters

ORG-24

Response

Conservation measure CR-3 ensures implementation of a voluntary agreement between Ochoco ID and the Deschutes River Conservancy. Ochoco ID cannot control the timing of the McKay Water Switch. However, the Services note that the project is moving forward, and the U.S. Department of Agriculture Natural Resources Conservation Service recently announced the availability of a Draft Watershed Plan-Environmental Assessment for the Ochoco Irrigation District Infrastructure Modernization Project.

HCP-8.72 Deadline for of McKay Creek Water Switch in Proposed Conservation Measure CR-3

One commenter recommended that the Draft HCP include a deadline to implement the McKay Creek Water Switch in proposed conservation measure CR-3.

Commenters

ORG-24, ORG-15

Response

Ochoco ID cannot control the timing of the McKay Water Switch. However, the Services note that the project is moving forward, and the U.S. Department of Agriculture Natural Resources Conservation Service recently announced the availability of a Draft Watershed Plan-Environmental Assessment for the Ochoco Irrigation District Infrastructure Modernization Project.

HCP-8.73 Support for McKay Creek Water Switch

One commenter supported the McKay Creek Water Rights Switch in proposed conservation measure CR-3 in the Draft HCP.

Commenters

ORG-10

Response

The Services acknowledge this comment.

HCP-8.74 Question Regarding Minimum Flows in Proposed Conservation Measure CR-3

One commenter requested clarification regarding whether water obtained through the McKay Creek Water Switch and other leases or permanent water rights transfers would count toward the minimum flow requirement in proposed conservation measure CR-3. The commenter recommended that the water be additive to the minimum flows required in the measure.

Commenters

ORG-10

Response

The relationship between the McKay Water Switch and the minimum instream flows in McKay Creek is explained in Table CR-3 of final conservation measure CR-3 in Final HCP Chapter 6, *Habitat Conservation*. Water placed instream as a result of the McKay Creek Water Switch will be additive to, but will not replace, Ochoco ID's instream commitments of 2 to 5 cfs (depending on stream reach).

HCP-8.75 Crooked River Conservation Fund – Proposed Conservation Measure CR-4

Commenters requested clarification regarding whether the Crooked River Conservation Fund in proposed conservation measure CR-4 is adequate to ensure that minimum flows will be achieved or will mitigate impacts on covered species. Commenters recommended that the Draft HCP include additional analysis regarding the conservation benefits of proposed conservation measure CR-4. Commenters recommended that the Draft HCP include additional commitments to increase the amount of the conservation fund.

Commenters

STATE-4, ORG-14

Response

Before deciding whether to issue the ITPs, the Services will determine whether the Final HCP's conservation measures for the Crooked River meet all ITP issuance criteria, including minimizing and mitigating impacts of the take to the maximum extent practicable. As noted, the Services are concurrently conducting interagency consultation with Reclamation, under ESA Section 7, to evaluate the continued operation of Prineville Reservoir on the Crooked River.

If the Services decide to issue the ITPs, the funds to be provided under final conservation measure CR-4 would be used for a number of purposes, including instream and riparian habitat improvements. The funds could also be used to secure temporary or permanent instream water rights, but those purposes are not expected to be the sole use of the funds.

HCP-8.76 Recommendations for Crooked River Conservation Fund – Proposed Conservation Measure CR-4

One commenter supported the Crooked River Conservation Fund in proposed conservation measure CR-4 in the Draft HCP. The commenter recommended that the fund be dedicated to dry-year leasing, potentially include adaptive management provisions regarding use of the fund, or increase the annual contribution to the fund. The commenter recommended that any instream water rights acquired through the fund be additive to the minimum flows required under the Draft HCP.

Commenters

ORG-10

Response

The Services agree, and final conservation measure CR-4 has been clarified in Final HCP Chapter 6, *Habitat Conservation*. Any water leased would be treated in accordance with Oregon water law and could be additive to other protected flows, but it would not be additive to the other flow commitments of the HCP.

HCP-8.77 Conservation Benefits of Ochoco ID Fish Screen and Passage Maintenance in Proposed Conservation Measure CR-5

Commenters stated that the Draft HCP's fish passage and screening conservation measures to be implemented by Ochoco ID do not provide adequate conservation because Ochoco ID is already required to implement those measures.

Commenters

ORG-12, ORG-14

Response

Ochoco ID has screened all of its diversions that are accessible to covered species (diversions from within canals are not screened). However, the continued maintenance and operation of the facilities to NMFS standards will provide benefits to the covered species that warrant including those actions in the HCP analysis. Additionally, including the screens in conservation measure CR-5 provides an added level of assurance that covered fish species will be protected from entrainment.

HCP-8.78 NMFS Screening Standards for Proposed Conservation Measure CR-5

One commenter recommended that proposed conservation measure CR-5 in the Draft HCP require Ochoco ID to meet NMFS fish screen requirements.

Commenters

ORG-15

Response

Conservation measure CR-5 in Final HCP Chapter 6, *Habitat Conservation*, requires Ochoco ID to meet NMFS fish screen requirements upon replacement.

HCP-8.79 Timing of Draft HCP Conservation Measure CR-5

One commenter stated that Draft HCP conservation measure CR-5 should be modified to require the applicants to assist irrigation patrons with fish screening throughout the life of the HCP to better protect covered fish species.

Commenters

ORG-3

Response

The applicants chose not to incorporate this recommendation into the Final HCP. For further discussion of the applicants' and Services' respective roles in selecting a final conservation strategy, refer to response to comment HCP-9.1, *Other Conservation Strategies Proposed by Commenters*.

HCP-8.80 Minimum Flows in Proposed Conservation Measure CR-6

One commenter requested clarification regarding whether the minimum flow requirements in proposed conservation measure CR-6 will increase as new conserved water becomes available. The commenter recommended that the Draft HCP consider additional commitments to maintain conserved water instream.

Commenters

ORG-10

Response

The minimum flow requirements in final conservation measure CR-6 will not increase as a result of future conserved water projects. Final HCP Chapter 6, *Habitat Conservation*, explains the relationship between final conservation measure CR-6 and future conserved water projects. The Deschutes River Conservancy and North Unit ID interpret their voluntary agreement to mean that any water reaching the North Unit ID pumps, other than water released from Prineville Reservoir for the District's benefit or any water that has an instream water right, shall be considered toward meeting the flow requirements downstream of the pumps, and OWRD follows this same interpretation. North Unit ID may not divert water protected by an instream water right senior to the District's, but the District may count all water that passes its pumps toward meeting the requirements of final conservation measure CR-6.

HCP-8.81 Revisions to Dry Year Declaration in Proposed Conservation Measure CR-6

Commenters recommended revising proposed conservation measure CR-6 in the Draft HCP to update the Dry Year Declaration criteria to provide additional management flexibility for North Unit ID and accommodate future revisions to the agreement upon which the Dry Year Declaration requirement is based.

Commenters

ORG-10, ORG-12

Response

The Dry Year Declaration criteria is the result of an agreement between North Unit ID and the Deschutes River Conservancy, and changes to this agreement are beyond the scope of the HCP. The Services have requested that OWRD revisit the dry year/non-dry year determination closer to the day of allocation.

HCP-8.82 Clarification Regarding Deschutes River Conservancy Agreement – Proposed Conservation Measure CR-6

One commenter requested additional clarification regarding the Draft HCP's statement on page 6-99 that North Unit ID's agreement with the Deschutes River Conservancy is "voluntary."

Commenters

ORG-14

Response

North Unit ID's agreement with the Deschutes River Conservancy was a voluntary agreement between the two parties as part of a joint effort to increase instream flows in the Crooked River. However, aspects of that agreement were incorporated into North Unit ID's certificated water rights issued by the Oregon Water Resources Department.

HCP-8.83 Conservation Benefit of Proposed Conservation Measure CR-6

One commenter requested additional clarification regarding the conservation benefit of proposed conservation measure CR-6 in the Draft HCP. The commenter stated that, because releases of uncontracted storage from Prineville Dam will ultimately be protected instream, proposed conservation measure CR-6 does not provide a clear conservation benefit. The commenter recommended that North Unit ID commit to meeting a minimum flow regardless of whether the source is live flow or stored water.

Commenters

ORG-15

Response

The commenter's assumption that "releases of uncontracted storage from Prineville Dam will ultimately be protected instream" is not substantiated. Reclamation holds the storage right for the uncontracted (fish and wildlife) water and has not applied to OWRD for the secondary instream water right referenced by the commenter.

Under final conservation measure CR-6 in Final HCP Chapter 6, *Habitat Conservation*, the 10,000 af of rental water available to North Unit ID. From Prineville Reservoir, pursuant to temporary water service contracts are managed by Reclamation pursuant to its authority under the Crooked River Act. Accordingly, that water is beyond the scope of North Unit ID's bypass agreement with the Deschutes River Conservancy and is not subject to the minimum flow requirements provided in final Conservation Measure CR-6. The language in final Conservation Measure CR-6 has been updated to reflect that it is only the 10,000 af of water purchased under a temporary water service contract, or other stored water rights purchased by North Unit ID, that are not included in this bypass flow.

HCP-8.84 Relationship Between Crooked River Conservation Measures and Biological Needs of Covered Fish Species

One commenter recommended that proposed Conservation Measures CR-1, CR-2, and CR-3 be tied to the biological needs and life cycles of covered fish species, rather than the irrigation season. The commenter stated that the measures will not provide an adequate conservation benefit to covered fish species and that timing protective flows to match fish life cycles would minimally burden the applicants.

Commenters

ORG-3

Response

All conservation measures in Final HCP Chapter 6, *Habitat Conservation*, were designed to address the needs of the covered species, but many are stated in terms that are relevant to irrigation to align them with the covered activities and to facilitate their effective implementation by the applicants. Final HCP Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*, evaluates the effects of all final conservation with respect to the biological needs of the covered species. Before deciding whether to issue the ITPs, the Services will evaluate whether the Final HCP satisfies all ITP issuance criteria, including providing adequate conservation benefits for the covered species.

HCP-8.85 Conservation Measures to Improve Flow and Temperature – Crooked River Subbasin

Commenters recommended that the HCP include additional conservation measures to minimize or mitigate the impacts of irrigation withdrawals on covered species in the Crooked River. One commenter stated that Ochoco ID's irrigation withdrawals in the Crooked River result in low summer flows and high water temperatures, which degrade habitat and contribute to exceedances of state water temperature standards. One commenter recommended that the Draft HCP include additional commitments to mitigate temperature exceedances and water quality impacts from return flows during the irrigation season.

Commenters

ORG-24, ORG-14

Response

Recognizing that the applicants largely do not have control over water quality conditions other than temperature and stream flows resulting from the covered activities, the applicants collaborated with the Services to develop a conservation strategy to mitigate incidental take only from those known water quality impacts under the applicants' jurisdiction (temperature, surface water elevations, and rates and volumes of stream flows). The applicants have revised the Final HCP and their request for ITP coverage accordingly. For further discussion of the HCP's treatment of other water quality parameters, refer to response to comment HCP-9.14, *Conservation Measures to Improve Water Quality Other than Temperature and Stream Flows*.

HCP-8.86 Conservation Measures to Improve Water Quality – Crooked River Subbasin

Commenters recommended that the HCP include additional conservation measures to improve water quality in the Crooked River subbasin and the Lower Deschutes River. One commenter recommended that HCP conservation measures include monitoring of nutrient discharges and stated that reducing nutrient discharges in the Crooked River subbasin could help water-quality-limited streams achieve water quality criteria.

Commenters

STATE-2, STATE-4, ORG-24, ORG-14, ORG-15, ORG-22, FED-2, GP-192

Response

The recommendation to address nutrient discharges is outside the scope of the HCP. For further discussion of the HCP's treatment of water quality impacts, including nutrient discharges, refer to response to comment HCP-9.14, *Conservation Measures to Improve Water Quality Other than Temperature and Stream Flows*.

HCP-8.87 Conservation Measures to Modify Bowman Dam Release Structures

One commenter recommended that the HCP should include additional commitments to modify the Bowman Dam release structures to eliminate nitrogen super saturation during high flow and spill events above 600 cfs, to reduce the occurrence of gas bubble disease in protected species. The commenter stated that Reclamation owns Bowman Dam, but recommended that Ochoco ID, as the dam operator, "pursue meaningful resolution" of gas bubble disease.

Commenters

ORG-12

Response

Elevated total dissolved gasses (TDG) and resulting gas bubble disease downstream of Bowman Dam are the result of flood control releases from Prineville Reservoir and are, therefore, outside the scope of the HCP. Ochoco ID does not have the financial capabilities or legal authority to address those impacts through the HCP.

As noted, the Services are concurrently conducting interagency consultation with Reclamation, under ESA Section 7, to evaluate the continued operation of Prineville Reservoir on the Crooked River.

HCP-8.88 Ochoco ID Protest of Instream Water Right

One commenter recommended that Ochoco ID remove its protest for the instream water right in the Lower Crooked River.

Commenters

ORG-12, ORG-15

Response

The applicants chose not to incorporate this recommendation into the Final HCP. For further discussion of the applicants' and Services' respective roles in selecting a final conservation strategy, refer to response to comment HCP-9.1, *Other Conservation Strategies Proposed by Commenters*.

HCP-8.89 Conservation Measures Related to Ochoco ID Patron Pumps

One commenter recommended that the HCP require telemetry, measuring, and reporting for all Ochoco ID patron pumps.

Commenters

ORG-15

Response

Ochoco ID patrons operate more than 60 small pumps to divert water directly from Ochoco Creek and the Crooked River. The patron pumps are not covered activities under the HCP. Each pump is the responsibility of the respective patron and is subject to individual compliance with ESA. The funding of telemetry at each of the pumps is beyond the financial capabilities and authorities of Ochoco ID. The Services will continue to work with all irrigators and other water users in the Deschutes Basin that are not parties to the Deschutes Basin HCP to ensure that they are in compliance with ESA.

HCP-8.90 Conservation Measures Related to North Unit ID Storage in Prineville Reservoir

One commenter recommended that the HCP consider whether North Unit ID can call on its 10,000 af of rental water in Prineville Reservoir later in the season (July 1 through October 1) or otherwise coordinate with Reclamation to achieve maximum protection to downstream fish resources.

Commenters

ORG-14

Response

The applicants chose not to incorporate the recommendation into the Final HCP, because of the need for North Unit ID to retain flexibility in its use of the 10,000 af of rental water made available, from Prineville Reservoir to North Unit ID through temporary water service contracts pursuant to the Crooked River Act. That flexibility is necessary for North Unit ID to prepare for and respond to early-season water supply shortages anticipated as a result of constraints on North Unit ID's operations resulting from the Final HCP's conservation measures for the Deschutes River.

9 Other Proposed Conservation Strategies

Other Proposed Conservation Strategies, Generally

HCP-9.1 Other Conservation Strategies Proposed by Commenters

A number of commenters proposed that the HCP include specific additional or different conservation measures.

Commenters

FED-1, STATE-1, STATE-2, STATE-4, ORG-24, ORG-3, ORG-9, ORG-10, ORG-11, ORG-12, ORG-14, ORG-16, ORG-19, ORG-20, ORG-22, GP-28, GP-114, GP-124, GP-133, GP-137, GP-138, GP-177, GP-189, GP-192, FL-2, FLP-71

Response

The HCP is a voluntary, applicant-driven document. In collaboration with the Services, the applicants have developed a final conservation strategy designed to provide long-term mitigation based on the biological needs of the covered species, while balancing the applicants' obligations to continue delivering water pursuant to Oregon state law.

Before making decisions on the applicants' ITP applications, the Services will ensure that the Final HCP satisfies all HCP and ITP issuance standards under ESA. If the Final HCP meets those standards, including providing a conservation strategy that minimizes and mitigates the impacts of applicants' incidental take to the maximum extent practicable, the Services will issue the ITPs.

The Services appreciate commenters' suggestions for other possible conservation strategies. The applicants have collaborated with the Services to consider other potential conservation strategies, including strategies proposed by commenters. Based on those comments, in some cases, the applicants have revised the Draft HCP to include additional or revised conservation measures in the Final HCP to provide adequate conservation benefits to the covered species intended to meet ITP issuance standards.

Habitat Restoration and Conservation Funding

HCP-9.2 Applicant-Supported Conservation Fund for Habitat Restoration

Commenters recommended that the HCP include additional commitments by the applicants to provide conservation funding for stream channel and habitat restoration in the Deschutes River. Some commenters provided specific recommendations regarding how conservation funding should be administered or the types of conservation projects that should be funded. Some commenters specifically supported the creation of an Upper Deschutes River Conservation Fund, as proposed in Alternatives 3 and 4 of the Draft EIS.

Commenters

FED-1, STATE-2, STATE-4, ORG-3, ORG-9, ORG-10, ORG-11, ORG-14, ORG-16, ORG-19, ORG-20, GP-174, GP-189,

Response

The applicants have committed to additional conservation funding in the Final HCP by including conservation measure UD-1 in Chapter 6, *Habitat Conservation*, which provides $150,000 annually to support habitat restoration projects.

HCP-9.3 Applicant-Supported Conservation Fund for Water Market Transactions

Commenters recommended that the HCP include additional commitments by the applicants to provide conservation funding to support water market transactions, including leasing, water banking, and permanent transfers of water rights instream.

Commenters

STATE-4, ORG-12

Response

The Draft HCP has been revised, and Final HCP Chapter 6, *Habitat Conservation*, includes the addition of conservation measure WC-6, the Whychus Creek Habitat Conservation Fund. This $10,000-per-year commitment will be dedicated to habitat restoration work, thus freeing up the Whychus Creek Temporary In-Stream Leasing Fund (final conservation measure WC-2) to fund water leasing.

The Services also note that Central Oregon ID and the Deschutes River Conservancy have recently initiated a water-marketing program to address topics the commenters raised, although that program is outside the scope of the HCP.

HCP-9.4 Applicant-Directed Habitat Restoration

Commenters recommended that the HCP conservation measures include additional commitments by the applicants to implement habitat restoration projects throughout the covered lands.

Commenters

ORG-3, ORG-14

Response

The applicants are water managers and are not experts in habitat restoration. Accordingly, the applicants have not committed to implement habitat restoration projects but have committed to contribute funds for habitat-restoration work that the Services, in coordination with other restoration experts, believe will benefit the covered species. The Final HCP reflects those commitments.

HCP-9.5 Habitat Restoration Related to Beavers

Commenters recommended that the HCP include conservation measures to restore beaver habitats.

Commenters

ORG-20, GP-137

Response

In Final HCP Chapter 6, *Habitat Conservation*, the applicants have committed to contribute additional conservation funding. Final conservation measure UD-1 provides $150,000 annually to support habitat restoration projects. The Services recognize the ecological benefits that beaver provide on the landscape and agree that projects benefiting beaver would also benefit the covered species.

HCP-9.6 Management of Non-Native Fish

One commenter recommended that the HCP include additional commitments to prevent migration of bullheads and largemouth bass out of Wickiup Reservoir.

Commenters

ORG-9

Response

In Final HCP Chapter 6, *Habitat Conservation*, the applicants have committed to contribute additional conservation funding. Final conservation measure UD-1 provides $150,000 annually to support habitat restoration projects. The Services recognize the ecological benefits of preventing migration of bullheads and largemouth bass from migrating out of Wickiup Reservoir. The Services, in coordination with other restoration experts, will evaluate whether projects to control the migration of non-native species are the best use of the Upper Deschutes Basin Conservation Fund.

Water Marketing and Water Supply

HCP-9.7 Market-Based Solutions

Commenters recommended that the HCP utilize a conservation strategy founded on market-based incentives to increase stream flows, including market-based tools identified in the Deschutes Basin Study.

Commenters

ORG-12, GP-133, GP-138, FL-2

Response

HCPs are applicant-driven processes. applicants draft the HCP with technical assistance provided by the Services. The Services do not choose the conservation measures that applicants propose, but they do provide guidance regarding the effectiveness of those measures to meet the biological goals and objectives detailed in the HCP.

For the Deschutes Basin HCP, the applicants proposed a conservation strategy based primarily on enforceable minimum flow targets, but chose to retain flexibility in how those minimum flow targets will be achieved. The Final HCP allows the applicants to pursue a variety of mechanisms to implement the final conservation measures. Those implementation mechanisms may include the market-based tools that the commenters identified, as well as other options.

HCP-9.8 Conservation Measures to Achieve Additional Water Supply

One commenter recommended that the applicants evaluate other water supply sources, including utilizing reregulating reservoirs such as Haystack Reservoir, to accommodate higher winter flows earlier within the HCP term.

Commenters

ORG-14

Response

The applicants chose not to incorporate this recommendation into the Final HCP. For further discussion of the applicants' and Services' respective roles in selecting a final conservation strategy, refer to response to comment HCP-9.1, *Other Conservation Strategies Proposed by Commenters*.

HCP-9.9 Use of Diversion Dams

One commenter recommended using diversion dams to collect water during high-water events and eliminate the need for in-river dams for irrigation.

Commenters

GP-6

Response

The applicants chose not to incorporate this recommendation into the Final HCP. For further discussion of the applicants' and Services' respective roles in selecting a final conservation strategy, refer to response to comment HCP-9.1, *Other Conservation Strategies Proposed by Commenters*.

Other Proposed Conservation Measures

HCP-9.10 Conservation Measures Relating to Revenue from Hydroelectric Projects

One commenter recommended that the HCP prohibit irrigation districts from collecting revenue from hydroelectric projects or require irrigation districts to apply that revenue toward achieving flow targets under the HCP.

Commenters

GP-35

Response

The applicants chose not to incorporate this recommendation into the Final HCP. For further discussion of the applicants' and Services' respective roles in selecting a final conservation strategy, refer to response to comment HCP-9.1, *Other Conservation Strategies Proposed by Commenters*.

HCP-9.11 Conservation Measures to Limit Tourism

One commenter recommended that the HCP consider limiting or prohibiting tourism in key habitat areas during Oregon spotted frog breeding and spawning periods.

Commenters

GP-28

Response

The applicants do not have authority to limit or otherwise prohibit tourism in key habitat areas during Oregon spotted frog breeding and spawning periods and, therefore, this recommendation is outside the scope of the HCP. The Services note that anyone who harms Oregon spotted frogs would not be covered by the ITPs and, therefore, may be separately liable under ESA.

For further discussion of the applicants' and Services' respective roles in selecting a final conservation strategy, refer to response to comment HCP-9.1, *Other Conservation Strategies Proposed by Commenters*.

HCP-9.12 Conservation Measures Requiring Stakeholder Cooperation

One commenter recommended that the HCP include additional commitments to cooperate with all stakeholders to address water conservation and management and changes to the law.

Commenters

ORG-5

Response

The applicants chose not to incorporate this recommendation into the Final HCP. However, the Services and the applicants remain committed to collaborating with regional stakeholders to address water supply issues in the Deschutes basin. For further discussion of the applicants' and Services' respective roles in selecting a final conservation strategy, refer to response to comment HCP-9.1, *Other Conservation Strategies Proposed by Commenters*.

HCP-9.13 Conservation Measures Relating to Livestock Grazing and Agricultural Runoff

One commenter recommended that the HCP include additional commitments to mitigate the impacts of livestock grazing and agricultural runoff.

Commenters

GP-192

Response

The applicants do not have authority over impacts from livestock grazing and agricultural runoff on private property and, therefore, this recommendation is beyond the scope of the HCP.

For further discussion of the limited scope of applicants' authority over private irrigation and agricultural practices, refer to response to comment HCP-4.7, *Activities by Irrigation District Patrons*. For further discussion of the HCP's conservation strategy to address water quality impacts from the covered activities, refer to response to comment HCP-9.14, *Conservation Measures to Improve Water Quality Other than Temperature and Stream Flows*.

Water Quality

HCP-9.14 Conservation Measures to Improve Water Quality Other than Temperature and Stream Flows

Commenters generally recommended that the HCP include additional commitments by the applicants to improve water quality parameters other than temperature or parameters related to stream flows. Commenters recommended that the HCP improve water quality throughout the covered lands and Waters and, in particular, in the Crooked River subbasin. Some commenters recommended specific additional conservation measures to mitigate water quality impacts of irrigation district return flows or irrigated agriculture, generally. Recommendations included conservation funding for water-quality improvement projects—including riparian restoration to enhance pollutant filtering—and on-farm irrigation efficiencies and other water-conservation measures to reduce agricultural runoff. Commenters also recommended that the applicants commit to additional water quality monitoring.

Commenters

FED-1, STATE-2, STATE-4, TRIBE-1, ORG-24, ORG-3, ORG-12, ORG-14, ORG-20, ORG-22, GP-139, FED-2, GP-177, GP-192

Response

Under Section 10 of ESA, the applicants must minimize and mitigate the impacts of taking resulting from their covered activities to the maximum extent practicable and ensure that the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild. 16 U.S.C. §§ 1539(a)(2)(B)(ii), (iv).

The Draft HCP proposes to include all "return flows" under the applicants' jurisdiction within the scope of the ITPs to be issued by the Services. The term "return flow" refers to diverted irrigation water that is allowed to flow back into a natural river or creek and includes "tailwaters" and "spills." Refer to HCP, Chapter 3, *Scope of the DBHCP*. Both types of return flows are otherwise lawful activities that the applicants operate in compliance with all applicable laws. By altering the hydrology of the Deschutes basin, the applicants' return flows and other covered activities contribute to temperature impairments and other water quality impairments related to surface water elevations and the rates and volumes of stream flows.

As commenters noted, other water quality constituents and parameters—including nutrient discharges—also affect aquatic species and their habitats throughout the Deschutes basin. Multiple sources contribute to nutrient and other water quality impairments in the basin, including agricultural practices and other nonpoint and point sources related to urban and rural human activities. The Draft HCP and the Draft EIS accounted for those existing water quality impairments as part of their environmental baselines in evaluating the impacts of the covered activities. However, as discussed throughout the Draft HCP, many sources of water quality impairments throughout the basin are beyond the applicants' control. Those sources include agricultural runoff from irrigated agriculture, generally, and irrigation practices by irrigation district patrons beyond the point of delivery. For further discussion of the limited scope of applicants' authority over private irrigation practices, refer to response to comment HCP-4.7, *Activities by Irrigation District Patrons*.

Recognizing that the applicants largely do not have control over water quality conditions other than temperature and stream flows resulting from the covered activities, the applicants developed a conservation strategy to mitigate incidental take only from those known water quality impacts under the applicants' jurisdiction (temperature, surface water elevations, and rates and volumes of stream flows). The applicants have revised Final HCP Chapter 3, *Scope of the DBHCP*, and their request for ITP coverage accordingly.

The approach adopted in the Final HCP ensures necessary flexibility for the applicants to implement other water quality improvements that may be legally required in the future. To the extent that the covered activities are contributing water quality impacts other than those related to temperature, surface water elevations, and stream flows, the final conservation strategy defers to the Oregon Department of Environmental Quality (ODEQ) as the appropriate entity to manage those water quality impacts comprehensively throughout the Deschutes basin. ODEQ is currently developing or has proposed to develop TMDLs for water-quality-limited streams throughout the Deschutes basin. Through the TMDL process, ODEQ will identify and allocate responsibility for water quality impairments throughout the basin. At that time, the applicants will comply with any new legal requirements and will continue to operate their return flows and other covered activities in compliance with all applicable laws. The applicants will also continue to comply with all other ODEQ and EPA water quality requirements, including NPDES permit requirements, to the extent that they apply to the covered activities.

In addition, the applicants did not adopt additional conservation measures proposed by commenters to reduce or otherwise address water quality impairments from irrigated agriculture, generally, or other sources not within the applicants' direct control.

HCP-9.15 Analysis and Mitigation for Return Flows Operated by Irrigators

Commenters stated that the HCP should have analyzed the water quality impacts from return flows operated directly by irrigators, included those return flows within the scope of the covered activities, or committed to conservation measures to mitigate the impacts of those non-District return flows.

Commenters

ORG-24, ORG-3, ORG-12, ORG-14, ORG-22, GP-192

Response

As commenters noted, the term "return flow" can also refer to locations where water from irrigation returns to surface waters after being applied to agricultural land. The applicants are not seeking ITP coverage for agricultural runoff or return flows operated directly by irrigators. The applicants do not have jurisdiction over irrigation practices on private property past the point of delivery. To the extent that irrigated agriculture contributes to water quality impairments throughout the covered lands, the Draft HCP and Draft EIS, as well as the Final HCP and Final EIS, account for those impacts through their environmental baselines.

For further discussion of the limited scope of applicants' authority over private irrigation and agricultural practices, refer to response to comment HCP-4.7, *Activities by Irrigation District Patrons*. For further discussion of the HCP's conservation strategy to address water quality impacts from the covered activities, refer to response to comment HCP-9.14, *Conservation Measures to Improve Water Quality Other than Temperature and Stream Flows*.

Other Conservation Measures for Covered Fish Species

HCP-9.16 Conservation Measures to Enhance Smolt Migration

One commenter recommended that the HCP include additional conservation measures to increase steelhead and salmon survival during smolt outmigration.

Commenters

ORG-24

Response

Final HCP Chapter 6, *Habitat Conservation*, includes a new conservation measure CR-7 to protect spring smolt migration pulse flows in the Cooked River from diversion by the applicants.

HCP-9.17 Conservation Measures to Improve Bull Trout Habitat

Commenters recommended that the HCP include additional commitments to improve habitat for bull trout, including by addressing temperature impairments in bull trout habitat.

Commenters

ORG-3, ORG-12

Response

The applicants have committed to several conservation measures, which should improve habitat for bull trout. These include improved instream flows in several stream reaches affected by HCP covered activities, such as the mainstem Deschutes River downstream of Big Falls, Whychus Creek, and the Crooked River and its tributaries. However, the applicant's ability to make other additional commitments to improve bull trout habitat is limited because the applicants do not have authority regarding adverse effects from factors such as habitat fragmentation and nonnative fish species. Specifically, the applicants do not have the authority to address the factors that resulted in bull trout being extirpated from the Upper Deschutes River in the 1950s. For example, they do not own

Reclamation dams, which have fragmented and inundated historic bull trout habitats, and cannot address fish passage issues at the dams. Similarly, they do not have the ODFW's fisheries management authority needed to reduce the populations of nonnative fish species that adversely affect bull trout.

HCP-9.18 Conservation Measures to Reintroduce Bull Trout

One commenter recommended that the HCP include additional commitments to assess the feasibility of reintroducing bull trout above Big Falls, including funding eDNA analysis.

Commenters

ORG-14

Response

The applicants have not proposed any additional commitments regarding reintroduction of bull trout above Big Falls. Any discussion regarding reintroduction of bull trout and/or any related Endangered Species Act (10)(j) population releases is outside the scope of the HCP.

Irrigation Piping and Water Conservation

HCP-9.19 Increased Irrigation and Water Use Efficiency, Generally

Commenters stated that one or more of the Districts—or irrigation districts, irrigated agriculture, or water users, generally—use water inefficiently. Some commenters supported additional HCP commitments to increase irrigation efficiency, including on-farm efficiencies, instream water leasing, and water sharing or other coordination between the Districts.

Commenters

ORG-2, ORG-12, ORG-15, ORG-22, GP-7, GP-31, GP-35, GP-36, GP-41, GP-84, GP-96, GP-116, GP-124, GP-132, GP-133, GP-138, GP-139, GP-144, GP-145, GP-152, GP-155, GP-159 GP-161 GP-187, GP-189, FL-2, FLP-3, FLP-9, FLP-11, FLP-12, FLP-13, FLP-19, FLP-21, FLP-23, FLP-26, FLP-27, FLP-28, FLP-29, FLP-31, FLP-33, FLP-35, FLP-40, FLP-41, FLP-47, FLP-49, FLP-55, FLP-56, FLP-57, FLP-59, FLP-65

Response

The applicants have proposed a conservation strategy to increase stream flows in the Deschutes Basin over time, for the benefit of the covered species. The applicants' proposed conservation strategy relies primarily on enforceable flow targets that the applicants must meet to comply with the HCP. If the Services approve the Final HCP and issue the ITPs, those enforceable flow targets will decrease the overall amount of water available for irrigation and will necessarily require the applicants to increase the efficiency of irrigation delivery systems or secure alternative sources of water.

On-farm irrigation efficiency projects and other market-based transactions between private water users are beyond the scope of the HCP. However, the Services and the applicants are committed to improving irrigation efficiencies in the Deschutes basin through irrigation district modernization projects (including canal piping) and supporting on-farm efficiency projects, to the extent consistent with the applicants' legal authorities under Oregon state law. For further discussion of the limited scope of applicants' authority over private irrigation and agricultural practices, refer to response to comment HCP-4.7, *Activities by Irrigation District Patrons*.

HCP-9.20 Irrigation and Water Use Efficiency, Generally

One commenter stated that irrigators use water relatively efficiently and that irrigation modernization efforts could further improve efficiency.

Commenters

GP-24

Response

The Services agree that modernization of irrigation delivery systems and practices provides great opportunity for conservation.

HCP-9.21 Reducing Irrigated Agriculture in the Deschutes Basin

One commenter supported reducing irrigated agriculture in the Deschutes basin and stated that crops grown in the Deschutes basin can be grown with greater water efficiency in other locations.

Commenters

GP-122

Response

Changing agricultural use patterns in the Deschutes Basin is outside of the scope of the Deschutes Basin HCP. For further discussion of the limited scope of applicants' authority over private irrigation and agricultural practices, refer to response to comment HCP-4.7, *Activities by Irrigation District Patrons*.

HCP-9.22 Opposition to Irrigation District Piping, Generally

Some commenters generally opposed irrigation district piping and other infrastructure upgrades or stated that the HCP over-relies on those projects. Commenters noted the relatively high cost of irrigation district piping compared to other water conservation measures and stated that other water conservation measures could be implemented more quickly. Commenters stated that piping projects disincentivize water conservation; some commenters believed that piping projects will ultimately prioritize hydroelectric power generation over efficient water deliveries. One commenter opposed piping of irrigation canals specifically within the City of Bend.

Commenters

ORG-22, GP-2, GP-34, GP-35, GP-123, GP-124, GP-144, GP-145, GP-169, FL-2

Response

The Final HCP provides the applicants necessary flexibility to implement the conservation measures through a variety of approaches, including operational adjustments, water efficiency and infrastructure projects (including irrigation district piping), water-market transactions, and other options.

HCP-9.23 Support of Irrigation District Piping, Generally

Commenters generally supported irrigation district piping and other irrigation district infrastructure upgrades as a means to promote water conservation or as a partial or complete strategy to implement the HCP.

Commenters

ORG-19, GP-152, GP-166, FLP-55, FLP-57, FLP-71

Response

The Services agree that modernization of irrigation delivery systems and practices provides great opportunity for conservation.

HCP-9.24 Water Conservation Alternatives to Irrigation District Piping

Commenters recommended that the HCP include commitments to implement alternative water conservation measures instead of or in conjunction with irrigation district piping. Recommended alternative water conservation measures included inter-District coordination and water sharing, water-market-based transactions (including water leasing and transfers), use of storage reservoirs, on-farm water conservation and irrigation efficiency measures by irrigation district patrons, piping of irrigation district laterals before piping main canals, and metering and on-demand delivery practices by the Districts.

Commenters

ORG-3, ORG-12, ORG-14, ORG-17, ORG-19, ORG-22, ORG-23, GP-84, GP-31, GP-35, GP-116, GP-123, GP-124, GP-144, GP-145, GP-152, GP-155, GP-161, GP-169, GP-172, GP-184, GP-187, GP-189, FL-2, FLP-10, FLP-14, FLP-17, FLP-19, FLP-21, FLP-23, FLP-26, FLP-27, FLP-33, FLP-34, FLP-35, FLP-40, FLP-55, FLP-57, FLP-59, FLP-65

Response

The Final HCP provides the applicants necessary flexibility to implement the conservation measures through a variety of approaches, including operational adjustments, water efficiency and infrastructure projects (including irrigation district piping), water-market transactions, and other options.

HCP-9.25 Inclusion of Irrigation District Piping in Draft HCP

One commenter stated that the Draft HCP should have included irrigation district piping commitments in the conservation measures and analyses.

Commenters

ORG-12

Response

The applicants' proposal allows for a variety of tools to be used to meet the minimum flows required by the final conservation measures. The broader the toolset available to the applicants, the greater the opportunity to realize necessary conservation benefits.

The piping of irrigation district canals is not required for successful implementation of the HCP. If the Services decide to issue the ITPs, the applicants expect to complete piping during the HCP term to ensure that they can obtain replacement water as their access to Crane Prairie, Wickiup, and Crescent Lake storage decreases. However, the instream flow targets required under the HCP are enforceable, regardless of whether the applicants acquire additional sources of water.

As further explained in Final HCP Section 1.9 –*Costs and Funding of the Habitat Conservation Measures*, and Section 9.9, *Inability of NUID to Secure Alternate Sources of Irrigation Water*, the applicants are justifiably optimistic that they can achieve necessary water conservation to implement the minimum flow targets through ongoing and planned piping of irrigation district canals to reduce seepage losses and increase the efficiency of the applicants' irrigation deliveries. However, two factors outside of the applicants' control bear on the timing and financial feasibility of completing those piping projects. The first is the availability of funding. The second is the potential for legal challenges to piping projects. Because of those external uncertainties, the applicants did not include planned piping projects within the scope of the HCP's conservation measures.

As an acknowledgement of the potential economic impact on North Unit ID from delayed acquisition of replacement water, Final HCP Chapter 9, *Changed and Unforeseen Circumstances*, contains an additional changed circumstances provision that, if triggered, would allow the applicants to delay increasing winter minimum flows at WICO for up to two years. However, the new changed circumstances provision would not prevent the applicants from implementing—or the Services from enforcing—the conservation measure requiring increased winter minimum flows. Instead, the provision would simply allow North Unit ID up to two additional years to achieve the HCP's required minimum flow targets in the event of extreme economic circumstances that trigger the new changed circumstances provision.

HCP-9.26 Uncertainty of Funding for Irrigation District Piping

Commenters stated that there is uncertainty regarding the availability of funding for irrigation district piping.

Commenters

LOCAL-3, GP-84

Response

The Services understand that future funding of projects depends on future actions that may or may not occur. As such, the Draft HCP has been revised. Chapter 9, *Changed and Unforeseen Circumstances*, has been updated to reflect this uncertainty.

HCP-9.27 Practicability of Alternative Water Conservation Approaches

One commenter stated that the Draft HCP does not provide adequate mitigation because it does not adequately analyze the practicability of possible alternative mechanisms to conserve water besides irrigation district piping. The commenter stated that the applicants should have considered a basin-wide water conservation approach, based on inter-district coordination and water sharing, market-based water transactions, and voluntary and involuntary mechanisms to reduce water consumption by irrigation district patrons.

Commenters

ORG-12

Response

The applicants are not required to include all possible conservation strategies proposed by commenters as part of the HCP's alternatives analysis or justify impracticability of any conservation strategy proposed by commenters. Refer to HCP Handbook, Section 5.6.

For further discussion of the required HCP alternatives analysis, refer to response to comment HCP-16.1, *Consideration of Alternatives, Generally*. For further discussion of the HCP practicability analysis, refer to response to comment HCP-17.2, *Practicability of Other Possible Conservation Approaches, Generally*.

10 Monitoring, Reporting, and Adaptive Management

Effectiveness Monitoring and Adaptive Management

HCP-10.1 HCP Monitoring and Adaptive Management Provisions

Commenters recommended that the HCP include additional monitoring and adaptive management provisions and/or additional information and procedures to explain how monitoring and adaptive management provisions in the conservation measures would function. Commenters recommended that all conservation measures in the Final HCP include adaptive management provisions for all covered species on all covered lands. Some commenters provided specific recommendations regarding the additional elements that the commenters believed the HCP's monitoring and adaptive management programs should include.

Commenters

FED-1, ORG-3, ORG-10, ORG-11, ORG-12, ORG-14, ORG-15, ORG-20, ORG-22, GP-189

Response

The applicants (with input from the Services) developed the compliance and effectiveness monitoring and adaptive management provisions in Final HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*, which are consistent with the requirements of ESA. Compliance monitoring, as distinguished from effectiveness monitoring, is necessary to ensure that the applicants implement the conservation measures as required and the Services can adequately respond to noncompliance events. The applicants have updated the Final HCP to include compliance monitoring provisions for all conservation measures.

In contrast to compliance monitoring, effectiveness monitoring and adaptive management are not appropriate or required for every conservation measure. As further explained in Chapter 7 of the Final HCP, the applicants (with input from the Services) have determined that effectiveness monitoring and adaptive management measures are not necessary for those conservation measures where their effectiveness is not scientifically uncertain and where adaptive management would not be useful or appropriate to respond to scientific uncertainty. For those measures with uncertainty, adaptive management is included in Chapter 7.

HCP-10.2 Adaptive Management Procedures to Address Climate Change

Commenters recommended that the HCP and EIS include adaptive management provisions or general flexibility to address uncertainty surrounding the effects of climate change throughout the HCP term and for all EIS alternatives.

Commenters

ORG-10, ORG-11, ORG-12, ORG-14, ORG-17, GP-169, FLP-26

Response

The Final HCP has been designed to ensure that the applicants implement operational changes to minimize and mitigate the impacts of take from the covered activities to the maximum extent practicable and provide adequate conservation benefits to the covered species, primarily by ensuring higher stream flows throughout the HCP term and giving the covered species priority over irrigation for water in the event of climate change. With input from the Services, the applicants determined that adaptive management provisions are not necessary to address climate change, based on the conservation approach provided in Final HCP Chapter 6, *Habitat Conservation*.

The proposed action and Alternatives 3 and 4 in the EIS include an adaptive management and monitoring program to ensure that the intended benefits to the covered species are being achieved. While adaptive management provisions were determined not to be necessary to address climate change, adaptive management and monitoring would provide a mechanism for identifying uncertainties and implementing effectiveness monitoring to inform future water management to adapt to the impact on the covered species from future climate change conditions. The adaptive management proposed can therefore result in changes in operational criteria based on new information to avoid adverse effects which may arise from conditions resulting from climate change.

HCP-10.3 HCP Effectiveness Monitoring and Adaptive Management — Crooked River Subbasin

Commenters specifically recommended that the HCP include additional effectiveness monitoring and adaptive management provisions for the proposed conservation measures relating to the Crooked River subbasin and/or additional information and procedures to explain how adaptive management provisions in the conservation measures would function. Some commenters provided specific recommendations for adaptive management on the Crooked River and its tributaries.

Commenters

FED-1, TRIBE-1, ORG-3, ORG-10

Response

The applicants' covered activities and Reclamation's storage and release of water from Bowman Dam both occur and overlap in the Crooked River. The HCP addresses effects of the covered activities observed in the Crooked River, where those effects are within the applicants' discretion and control; however, other effects are the result of Reclamation's storage and release of water from Bowman Dam and are, therefore, not appropriate to address through the HCP. For this reason, each Service will issue a BiOp that analyzes both the Services' issuance of ITPs and Reclamation's operations of Bowman Dam on the Crooked River. Further measures, monitoring, or other related terms and conditions resulting from Reclamation's action may be required as a result of the interagency consultation process under ESA Section 7.

HCP-10.4 HCP Effectiveness Monitoring and Adaptive Management — Crane Prairie Reservoir

Commenters specifically recommended that the HCP include additional effectiveness monitoring and adaptive management provisions for the proposed conservation measures relating to management of Crane Prairie Reservoir and/or additional information and procedures to explain how adaptive management provisions in the conservation measures would function. Some commenters provided specific recommendations for adaptive management of the reservoir, including adaptive management of reservoir levels to address impacts of invasive and predatory species.

Commenters

STATE-4, ORG-3, ORG-14

Response

Conservation Measure CP-1 in Final HCP Chapter 6, *Habitat Conservation*, includes additional provisions for management of Crane Prairie Reservoir to combat invasive species.

HCP-10.5 HCP Effectiveness Monitoring and Adaptive Management — Whychus Creek

Commenters specifically recommended that the HCP include additional effectiveness monitoring and adaptive management provisions for the proposed conservation measures relating to Whychus Creek and/or additional information and procedures to explain how adaptive management provisions in the conservation measures would function. Some commenters provided specific recommendations for adaptive management in Whychus Creek.

Commenters

FED-1, TRIBE-1, ORG-3, ORG-10

Response

The Draft HCP has been revised. In lieu of adaptive management, Final HCP Chapter 9, *Changed and Unforeseen Circumstances*, includes a changed circumstances provision that will be triggered in the event that the HCP's biological objectives for Whychus Creek are not met.

HCP-10.6 HCP Effectiveness Monitoring and Adaptive Management — Upper Deschutes

Commenters recommended that the HCP include additional effectiveness monitoring and adaptive management provisions for the proposed conservation measures relating to the Upper Deschutes River and/or additional information and procedures to explain how adaptive management provisions in the conservation measures would function. Some commenters provided specific recommendations for adaptive management in the Upper Deschutes River.

Commenters

ORG-10, ORG-14

Response

Final HCP Chapter 6, *Habitat Conservation*, of the Final HCP includes provisions for adaptive management in the implementation of conservation measure WR-1 and management of flows in the Upper Deschutes River.

HCP-10.7 HCP Effectiveness Monitoring and Adaptive Management — Steelhead

One commenter requested additional clarification regarding how adaptive management provisions in the conservation measures relating to steelhead would function.

Commenters

ORG-10

Response

The Draft HCP has been revised. In lieu of adaptive management, Final HCP Chapter 9, *Changed and Unforeseen Circumstances*, includes a changed circumstances provision that will be triggered in the event that the HCP's biological objectives for Whychus Creek are not met.

HCP-10.8 HCP Effectiveness Monitoring and Adaptive Management — Oregon Spotted Frog

Commenters specifically recommended that the HCP include additional effectiveness monitoring and adaptive management provisions for the proposed conservation measures relating to Oregon spotted frog and/or additional information and procedures to explain how adaptive management provisions in the conservation measures would function. Some commenters provided specific recommendations for adaptive management, including requiring egg mass counts and habitat surveys at all known Oregon spotted frog breeding sites and additional commitments or explanation to ensure the adequacy of funding by the applicants for the egg mass counts and monitoring required by proposed Adaptive Management Measures CP-1.1 and CP-1.2.

Commenters

FED-1, ORG-10, ORG-12, ORG-15, GP-33

Response

Final HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*, includes additional adaptive management and monitoring provisions for the Oregon spotted frog. In particular, provisions were added to fund Oregon spotted frog egg mass surveys and habitat assessments in the Upper Deschutes basin.

HCP-10.9 Water Quality Monitoring and Adaptive Management

One commenter recommended that the HCP include additional commitments by the applicants to conduct effectiveness monitoring adaptive management for water quality, including on the Crooked River. The commenter recommended that the HCP include additional adaptive management provisions to explain how Total Maximum Daily Loads would be integrated into the proposed conservation measures.

Commenters

FED-1

Response

The recommendation is outside the scope of the HCP. For further discussion of the HCP's treatment of water quality impacts and the related conservation strategy, refer to response to comment HCP-9.14, *Conservation Measures to Improve Water Quality Other than Temperature and Stream Flows*.

Additional Monitoring

HCP-10.10 Monitoring Requirements for Redband Trout

One commenter recommended that the HCP include additional commitments to monitor redband trout populations.

Commenters

ORG-14

Response

Redband trout are not a covered species. The recommendation is beyond the scope of the HCP.

Compliance Monitoring and Enforcement

HCP-10.11 HCP Enforcement Measures

One commenter recommended that the HCP include additional provisions relating to enforcement of the HCP and/or additional information to explain how enforcement would occur. The commenter recommended that the HCP identify enforcement response actions in the event of noncompliance, including consequences, fines, and a defined process under which the applicants could lose ITP coverage.

Commenters

ORG-3, GP-188

Response

Final HCP Chapter 6, *Habitat Conservation*, includes a compliance protocol that specifies enforcement procedures and the applicants' and Services' respective obligations in the event of noncompliance. The protocol was designed to ensure reporting of noncompliance events in as near-real-time as possible, and to ensure that any necessary remedial action is taken as quickly as possible to maintain adequate conservation benefits to the covered species.

HCP-10.12 Frequency of HCP Compliance Reporting

Commenters recommended that the HCP require more frequent or real-time compliance reporting to better respond to real-time changes in river conditions that may adversely affect the covered species. One commenter recommended that the applicants be required to submit annual compliance reports earlier than the January 31 reporting date included in the Draft HCP, to allow more time to respond to noncompliance events before crucial life stages of covered species occur in March through April.

Commenters

FED-1, ORG-3, ORG-10, ORG-11, ORG-14, ORG-16

Response

Compliance and reporting requirements have been updated in Final HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*. The applicants have committed to reporting noncompliance events in as near-real time as possible, given the complexity of the Deschutes basin system and the variability of operations within the Districts. Some specific suggestions raised by commenters, including developing a network of stream gauges for real-time monitoring of flow and water quality and automating all District operations, were outside the scope of this HCP and are not necessary to minimize and mitigate the impacts of take resulting from the covered activities to the maximum extent practicable.

HCP-10.13 Availability of Monitoring and Compliance Information to the Public

Commenters recommended increased public transparency in monitoring and adaptive management under the HCP, including making monitoring and compliance information publicly available.

Commenters

ORG-14, ORG-20

Response

Any monitoring and compliance information submitted to the Services is publicly available. The annual report would be posted on the FWS' Deschutes Basin HCP website, currently located at: https://www.fws.gov/Oregonfwo/articles.cfm?id=149489716.

HCP-10.14 Third-Party Monitoring and Compliance Reporting

Commenters recommended that the HCP include additional commitments by the applicants to work with or fund an independent third party to oversee compliance monitoring and reporting under the HCP.

Commenters

ORG-11, ORG-14, ORG-20

Response

The applicants have committed to a monitoring, compliance, and enforcement protocol in Final HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*, designed to meet the requirements of ESA. Third-party oversight is not necessary to ensure that the Final HCP meet ITP issuance standards.

HCP-10.15 Water Conservation Reporting

One commenter recommended that the HCP include additional commitments by the applicants to monitor and report information about water conservation by irrigation district patrons.

Commenters

GP-189

Response

The recommendation is outside the scope of the HCP. Refer to response to comment HCP-4.7, *Activities by Irrigation District Patrons,* for further discussion of the Districts' legal obligations and authorities related to private irrigation activities.

HCP-10.16 Monitoring Based on Species Recovery

One commenter recommended that the HCP require the applicants to monitor recovery or preservation of the covered species, rather than minimum flow compliance.

Commenters

GP-189

Response

Recognizing that the long-term goal of ESA is to bring species to a point where Endangered Species Act protections are no longer necessary, that does not mean that individual HCPs must ensure full recovery of covered species. In Final HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*, the applicants have proposed compliance monitoring and effectiveness monitoring and adaptive management measures based on the goals and objectives of this HCP that meet the requirements of ESA. Monitoring of the status of the species or the success of the federal recovery effort is outside the scope of the HCP. However, Final HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*, does include additional adaptive management and monitoring provisions for the Oregon spotted frog. In particular, provisions were added to fund Oregon spotted frog egg mass surveys and habitat assessments in the Upper Deschutes basin. These monitoring data will help inform the FWS' future status assessments.

HCP-10.17 Funding for Oregon Water Resources Department

One commenter supported increasing funding for OWRD to expand the agency's capacity to monitor instream water rights.

Commenters

ORG-10

Response

The recommendation is outside the scope of the HCP.

11 Analysis of Effects on Covered Species and Impacts of Take

Analysis of Effects, Generally

HCP-11.1 Effects of Consecutive Dry Years

One commenter stated that the Draft HCP does not adequately address the effects of consecutive dry years on the covered species. The commenter recommended that the HCP describe how it would adapt in dry years or consecutive dry years.

Commenters

STATE-4

Response

Dry years are a natural occurrence in the Deschutes basin, and the conservation strategies of the HCP were specifically designed to account for them. Most of the conservation measures of the Final HCP require the sharing of water between irrigation use and instream habitat for the covered species. In all cases, the Final HCP prioritizes water for the covered species over water for irrigation. During dry years, water for irrigation would be reduced while water for covered species would remain constant unless drought conditions become severe and water is available for neither irrigation nor the covered species.

HCP-11.2 Effects of City of Prineville's Covered Activities

One commenter stated that the Draft HCP does not adequately analyze the effects, including water quality effects, of the City of Prineville's activities on the covered species or propose conservation measures to address those effects.

Commenters

STATE-4

Response

As described in Section 3.5.10, *City of Prineville Activities*, of the Draft and Final HCP, the City of Prineville is seeking ITP coverage for a limited set of covered activities: municipal groundwater withdrawals and discharge of municipal effluent to the Crooked River. In addition, as noted, the applicants have revised their request for ITP coverage to include only those water quality effects of the covered activities related to temperature, surface water elevations, and rates and volumes of stream flows. The applicants have collaborated with the Services to develop a final conservation strategy designed to minimize and mitigate the impacts of take from the City of Prineville's covered activities to the maximum extent practicable.

For further discussion of the HCP's conservation strategy to address water quality impacts from the covered activities, refer to response to comment HCP-9.14, *Conservation Measures to Improve Water Quality Other than Temperature and Stream Flows*.

HCP-11.3 Presentation of Hydrological Data in HCP

One commenter had suggestions for different ways of organizing and presenting hydrological information graphically in the HCP.

Commenters

STATE-4

Response

The presentation of large data sets in a public document is always challenging. The applicants considered multiple approaches before arriving at the format in the HCP. Fortunately, the digital format of the Final HCP allows readers to enlarge the graphs for greater resolution. All graphs in the Final HCP are high-resolution images that can be greatly expanded to discern details.

HCP-11.4 Presentation of Outputs in Tables

One commenter requested an explanation of the minimum flow presented for April 1 through September 15 (Years 21-30 of the HCP term) in Draft HCP, Tables 8-38 and 8-42. The commenter advocated using a seven-day moving average of model output in the table for minimum and maximum flows.

Commenters

STATE-1

Response

The numbers questioned by the commenters (148 cfs in Table 8-38 and 267 cfs in Table 8-42) were calculation errors in the Draft HCP. Those errors have been corrected in Final HCP Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*. Minimum flows are provided in these and other tables, because a number of the HCP's conservation measures require calculating minimum flows on a daily average basis. The use of seven-day averages would not be appropriate for this analysis.

HCP-11.5 Reference Conditions

Commenters suggested greater reliance on the use of natural flows as a reference condition for evaluating the effects of the HCP.

Commenters

STATE-4, ORG-12, ORG-15

Response

The HCP analysis of effects compares future conditions under the HCP to both natural (unregulated) and historical (regulated) conditions. This approach and the supporting rationale are explained in Final HCP Section 6.1.1, *HCP Approach to Minimization and Mitigation*. The Final HCP includes extensive discussion and documentation of natural conditions on the covered lands, and it explains in detail why return to natural conditions in the Deschutes basin is neither achievable nor desirable for the covered species. In many cases, changes to the physical structure of the covered rivers and creeks over the past 70 years have left them incapable of supporting the covered species under natural flows. Nevertheless, an understanding of natural conditions is essential to a clear understanding of the effects of the HCP on the covered species. Natural conditions are therefore identified and described throughout the analyses in Final HCP Chapter 6, *Habitat Conservation Plan*, and Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*.

Water Quality Effects on Covered Species

HCP-11.6 Draft HCP Water Quality Analysis

Commenters stated that the Draft HCP generally did not adequately analyze the water quality impacts of the covered activities—including irrigation district return flows and runoff from irrigated agriculture—and their effects on the covered species to support issuance of the ITPs. Some commenters stated that the Draft HCP did not adequately analyze the water quality impacts of the covered activities specifically within the Crooked River subbasin and Lower Deschutes River.

Commenters

TRIBE-1, ORG-24, ORG-3, ORG-12, ORG-14, ORG-22, GP-192

Response

The ITPs being sought by the applicants cover the take of Endangered Species Act-listed species that occurs or could occur during the performance of the otherwise lawful activities of storing, releasing, diverting, and returning irrigation water. As required by federal law, the ITPs focus on addressing compliance with ESA. The ITPs do not provide the applicants with permission or approval related to any other regulatory requirements they may have, including compliance with the federal Clean Water Act (CWA). Consequently, the applicants collaborated with the Services to develop an HCP that minimizes and mitigates only those water quality effects of the covered activities for which the applicants are seeking ITP coverage, and only to the extent those activities affect covered species. In Final HCP Chapter 6, *Habitat Conservation*, and Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*, the applicants conducted those water quality analyses necessary to support their request for ITP coverage, but did not conduct other water quality analyses outside the scope of the HCP or the ITP applications.

For further discussion of the HCP's conservation strategy to address water quality impacts from the covered activities, refer to response to comment HCP-9.14, *Conservation Measures to Improve Water Quality Other than Temperature and Stream Flows*.

Effects Analysis — Anadromous Fish, Generally

HCP-11.7 Consideration of Previous Flow and Water Quality Studies for Fish

One commenter stated that the Draft HCP did not consider previous stream flow and water temperature modeling and studies.

Commenters

ORG-22

Response

The applicants, with technical assistance from the Services, conducted an extensive and exhaustive review of available information on the covered lands over the past 11 years, including all available studies and models. A number of studies were not used in the Final HCP's analysis because the applicants, with input from the Services, determined that those studies were: a) redundant, b) obsolete and replaced by more recent studies, or c) related to topics or resources unaffected by the covered activities. The models and studies used in the Final HCP and Final EIS have been subject to extensive peer review within and outside the HCP Working Group.

HCP-11.8 Fish Habitat in the Crooked River

Commenters offered views different from those presented in the Draft HCP on current habitat conditions and future habitat potential for Covered fish species in the Crooked River.

Commenters

ORG-24, ORG-12, ORG-15, ORG-22

Response

The Draft HCP's characterization of habitat conditions in the Crooked River is based on physical observations and measurements of the river by multiple parties over the past decade. Some of the comments challenging the HCP characterization were based on observed or assumed presence of individual fish rather than measurements of the habitat. Habitat assessments based solely on observations of animal presence are generally unreliable, particularly when presence is assumed but not documented.

Other comments referenced studies and/or recommendations developed more than 20 years ago, prior to more recent work that has been done to support the HCP and the use of Prineville Reservoir uncontracted storage for fish and wildlife. The collective understanding of current habitat conditions and future habitat potential of the Crooked River has advanced considerably over the past 20 years, and this understanding was the basis for the analyses of effects presented in the Draft and Final HCP.

Summer flow was long considered a significant contributing factor limiting salmonid fish production in the lower Crooked River, and this assumption is the basis for many of the comments received on the Draft HCP. Recent studies and hydrologic analyses, however, indicate that increasing summer flows would have only limited and localized benefit to salmonids because it would not result in a significant or consistent decrease in water temperature, which is more likely the limiting factor. More importantly, increasing flows during the summer would cause a corresponding decrease in flows during the fall, winter and spring, which are equally limiting for salmonid rearing in the Crooked River.

HCP-11.9 Fish Effects Analysis Methods

Commenters addressed specific details of the HCP's analyses of effects on Covered fish species.

Commenters

STATE-4, ORG-24, ORG-12

Response

The Services acknowledge all additional scientific information, analyses, and resources cited by commenters and will take that information into account—as well as information provided in the Final HCP and the Final EIS—in our ITP issuance decision documents and the corresponding HCP-specific BiOps required under ESA Section 7. Refer to HCP Handbook, Chapters 14 and 15 (identifying Services' responsibilities and required analyses to finalize the HCP and issue ITPs).

In addition, specific responses to some comments regarding the HCP's analyses of effects on Covered fish species are provided individually below.

Comment: *"The HabRate model for steelhead and spring Chinook spawning in the Crooked River says fair and poor, but good spawning near Opal Springs was identified (HCP Chapter 8.2.3.1). PGE has documented adult steelhead throughout the Crooked River and as far up as Big Bend Campground below Bowman Dam (Burchell et al. 2016). The bulk of our observations are using radio telemetry as it is very difficult to observe spawning behavior and redds due to turbidity issues during the spawning months."*

Response: Since 2012, annual returns of reintroduced steelhead to the Pelton Fish Trap have averaged fewer 58 adults, and only a small portion of these fish have subsequently returned to the Crooked River basin (Burchell 2018, 2019, 2020). Radio telemetry monitoring has revealed that of these adults, the majority remain in the lowest reaches of the Crooked River, primarily downstream of Highway 97 Bridge. Unfortunately, such low numbers have not warranted a full redd count program (PGE and CTWSRO 2020) and high turbidity limits the ability to observe spawning behavior of radio tagged adults (Burchell 2018), although Mt Hood Environmental only intermittently encountered prohibitive turbidity issues during studies done to evaluate the effects of the HCP. In the absence of actual fish observations, the HabRate modeling by Spateholts and Wymore (2017) represents the best available science on spawning habitat for steelhead in the Crooked River. Chinook salmon are no longer covered by the HCP.

Comment: *"PGE has concerns on how the Crooked River juvenile O. mykiss and Chinook salmon reach capacity/ flow relationships in the HCP were developed in the Mount Hood Environmental (MHE) reports and the conclusions that were derived as a result. Concerns include:*

1) The reach capacity estimates for the Crooked River were based on density estimates derived from snorkeling in a river that is 303(d) listed for turbidity, likely leading to underestimation of fish present and negatively biasing reach capacity estimates. In 2019, ODFW observed considerable numbers of O. mykiss in reaches that MHE sampling did not and that by criteria used in the HCP, should not have O. mykiss. (T. Porter, fish biologist, Prineville ODFW, pers. comm.).

2) Although the ODFW steelhead fry stocking locations were noted incompletely in Figure 1 (Blackman 2019), no consideration of how the clumped distribution of stocking locations could have impacted sampling results on which reach capacity estimates were based; The MHE report states "observations of yearling O. mykiss were rare in reaches C-2 and C-3 during both summer and winter. "(Blackman 2019). In fact, no O. mykiss were stocked by ODFW in reach C-2 or the lower two-thirds of reach C-3 in 2017 potentially severely influencing the MHE reach capacity estimates and ultimately the derived reach capacity/flow relationship upon which the HCP depends.

3) Mt. Hood Environmental's analysis of juvenile steelhead density predicts reach capacity based on a static salmonid population limited by reach MWATs. This methodology totally discounts the ability of O. mykiss to move seasonally and even daily within the Crooked River and its tributaries (Ochoco and McKay Creeks) to avoid suboptimal temperatures. The report includes "migratory behaviors" as a reason for the observation of age 1+ juvenile Chinook salmon between —RM 10 to Bowman Dam (Blackman 2019a, page 2) but does not include this attribute for possible explanation of O. mykiss densities. Evaluation of Crooked River Watershed Council water quality data does indeed show that higher than optimal temperatures occur in reaches of the Crooked River, but these temperatures can be transitory in nature and should not permanently "remove" affected stream reaches as potential juvenile habitat once conditions ameliorate. The Mt. Hood Environmental report and, subsequently, the HCP do not acknowledge this fact.

4) Calculation of Crooked River juvenile Chinook salmon reach capacities relied on literature values. No empirical data of Chinook salmon densities and habitat use could be collected in 2018 because chinook salmon fry were not stocked into the Crooked River subbasin by ODFW in 2017. As a result, "the calculated rearing habitat area is a conservative estimate due to the exclusion of any reach with average depths outside the suitable ranges" (Blackman 2019b, page 1). This conservative estimation *could severely underestimate the effects of flow on Chinook salmon rearing habitat and jeopardize consideration of the EIS alternatives."*

Response:

1) Visibility is an issue in the Crooked River during some weeks and in some locations throughout the year. However, snorkel surveys were only conducted when visibility met the standard criteria of 1.5 meters, as defined by the Columbia River Inter-tribal Fish Commission (White et al. 2012). Additionally, Mt. Hood Environmental (MHE) incorporated an observation probability into their N-mixture density model design to account for detection error from individual divers and passes (because they used a double observer method). Based on the MHE study in 2018 and subsequent site visits, it is their opinion that snorkeling is a viable method of fish observation in the Crooked River when visibility criteria are met. MHE's juvenile steelhead survey protocols for the Crooked River basin are available upon request.

Temperatures and other habitat parameters are linked to observed fish counts at the time of sampling. The MHE study took place in 2018 and therefore ODFW observations in 2019 are not applicable to the conditions in 2018. Given that this data collection occurred after the MHE study was completed, it was not possible for MHE to include it in their modeling. However, should this analysis be repeated in the future, it would be especially useful to combine MHE and T. Porter's datasets since there is a dearth of fish data relating juvenile density specifically to mesohabitat in the Crooked River basin.

2) Juvenile steelhead are highly mobile and will seek available habitat. It is extremely unlikely that ODFW-released fish would remain "clumped" in their stocking locations over the duration of this study. Nevertheless, MHE communicated with ODFW prior to surveying to choose study sites proximal to ODFW juvenile planting locations and increase the probability of observing juvenile steelhead. Although MHE's inference is limited to a single year, they surveyed fish throughout the basin and are confident that reaches were adequately represented. More generally, habitat features and summer temperatures in the C-2 and C-3 reaches were suboptimal for juvenile steelhead and it is unlikely, under the observed conditions, that these areas provide significant rearing habitat. Comprehensive spatial data for the 197 survey locations used in this analysis are available upon request.

3) The estimate of steelhead capacity uses a proportional relationship between habitat features and fish density from a distribution of observed densities across all reaches of the Crooked River. This distribution does not assume a static population, rather, it assumes that fish have access to the range of conditions throughout the basin and are not distributed uniformly. MHE surveyed areas across a wide range of temperatures habitat features including optimal thermal refugia in C-1 and suboptimal to lethal temperatures in C-2. This provided fish densities across a wide range of available habitat conditions to establish the relationship between habitat parameters and fish density. The assumption that fish are mobile and thus non-uniformly distributed across this range of conditions is inherent to the model. The covariates from that Crooked River basin-wide N-mix model were then applied to reach-specific habitat data (AIP) that was evaluated under different flow conditions.

For each HCP scenario, detailed flow and temperature predictions were made at nodes throughout the Crooked River (Berger et al. 2019) and the corresponding capacity was modeled through the basin. This approach was designed to capture the [basin wide fish distribution under the warmest summer temperatures, when rearing habitat is limited by temperature. Indeed the MWAT metric used in the model represents the warmest week, and, in several reaches this is the harshest thermal condition for fish. By using MWAT, MHE predicted capacity based on a worst-case scenario (warmest), which provides useful information for policy and management decisions on consequences of the proposed action. It is intentional that this method does not highlight ideal conditions, rather, the purpose is to identify when and where fish are most limited by habitat conditions under a proposed action and alternatives.

4) Chinook salmon is no longer a covered species in the Final HCP.

Comment*: "8.2.3.2 (Pages 8-80 - 86). Low summer and winter flows limit steelhead potential. Department sampling identifies a modest redband population below Willowdale bridge. This suggests there is production potential for steelhead if sufficient flow was maintained during migration and spawning. Similar to the Crooked, conservation measures could reduce irrigation demand and increase storage available for increased fish flows: 10 cfs October-April, 5 cfs May- September.*

ODFW Instream Flow Incremental Methodology (IFIM) studies recommend flows of 90-120 cfs to meet life history needs of steelhead and Chinook salmon in the Crooked River."

Response: The flows for Ochoco Creek and the Crooked River proposed and evaluated in the Final HCP are designed to minimize and mitigate the impacts of take from the covered activities to the maximum extent practicable.

Effects Analysis — Crooked River Flows

HCP-11.10 Uncontracted Storage Releases from Bowman Dam

One commenter stated that the Draft HCP's effects analysis does not adequately address the operation of Prineville Reservoir, the use and protection of uncontracted storage (fish and wildlife water) in Prineville Reservoir, and the diversions of water from the Crooked River by parties other than those covered by the HCP.

Commenters

ORG-15

Response

The operational and storage activities cited by the commenter are outside the control and responsibility of the applicants, and thus are not appropriate for inclusion in the HCP. Incidental take permits issued under Section 10 of ESA cover non-federal actions, and HCPs prepared in support of ITPs can only include conservation measures over which the non-federal applicants have control. The operation of Prineville Reservoir and the storage and release of uncontracted storage in the reservoir are federal actions under the jurisdiction of Reclamation. Any incidental take of Endangered Species Act-listed species associated with these federal actions must be addressed through consultation on Bowman Dam operations pursuant to Section 7 of the Endangered Services Act, which Reclamation and the Services are conducting, in coordination with but separately from, the Services' decisions on the HCP and ITP applications. Diversions of water from the Crooked River by non-federal parties other than the applicants cannot be covered in or controlled through the HCP.

Effects Analysis — Whychus Creek Flows

HCP-11.11 Effects of Covered Activities on Whychus Creek

Commenters stated that the Draft HCP's analyses of effects on Covered fish species relied on incorrect stream gauges in Whychus Creek which, when combined with a misinterpretation of channel seepage losses, resulted in underestimation of the HCP's effects on Whychus Creek. Other commenters predicted increases in irrigation diversions from Whychus Creek under the HCP or suggested confusion regarding the covered activities.

Commenters

ORG-16, ORG-21

Response

The Final HCP has been revised. Subsequent to public review of and comment on the Draft HCP, the Services and applicants worked with the Upper Deschutes Watershed Council and Deschutes River Conservancy to clarify the covered activities, correct errors in the analyses of effects, and revise the conservation measures for Whychus Creek. These changes are reflected in Final HCP Chapter 6, *Habitat Conservation*, and Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*.

Conclusions in Effects Analysis, Generally

HCP-11.12 Harm to Covered Species under Draft HCP

One commenter stated that the applicants would continue to cause harm to the covered species under the Draft HCP.

Commenters

ORG-12

Response

The applicants have applied for ITPs because they cannot avoid harm to listed species during the performance of their otherwise lawful activities. HCP applicants are not required to avoid all harm through an HCP, but rather to minimize and mitigate the impacts of take from covered activities to the maximum extent practicable. Before deciding whether to issue the ITPs, the Services will ensure that the conservation strategy in the Final HCP provides adequate conservation to minimize and mitigate the impacts of take from the covered activities, including harm to the covered species that rises to the level of take, to the maximum extent practicable.

HCP-11.13 Inconsistencies in the Analyses of Effects and Inadequacy of the Draft HCP

Commenters identified conclusions or analyses in the Draft HCP that they viewed as inconsistent with the descriptions of effects on covered species, including on fish, in other sections of the Draft HCP. Some commenters suggested that the Draft HCP does not provide adequate conservation benefits to the covered species, or recommended that the HCP mitigate impacts associated with past operations of reservoirs and diversions covered under the HCP.

Commenters

ORG-12, ORG-15, FLP-7

Response

In collaboration with the Services, the applicants have revised the HCP to remove any apparently conflicting statements. Before making final decisions on the ITP applications, the Services will ensure that the Final HCP provides sufficient mitigation to meet Endangered Species Act standards for the issuance of ITPs.

12 Other Comments on Effects Analysis

Effects on Beaver Activity

HCP-12.1 Impediments to Increased Beaver Activity

One commenter stated that the Draft HCP’s effects analysis did not adequately account for practical and legal impediments to increased beaver activity.

Commenters

GP-164

Response

The Services acknowledge the resources and analysis cited by the commenter. Some of the commenter’s recommendations are beyond the scope of the HCP. The Services recognize the ecological benefits that beaver provide on the landscape and agree that projects benefiting beaver would also benefit the covered species.

Effects on Bull Trout

HCP-12.2 Analysis of Effects on Bull Trout

Commenters stated that the HCP does not adequately analyze the effects of the covered activities or the HCP on bull trout.

Commenters

ORG-12, ORG-14

Response

The HCP is a habitat-based HCP and the effects of the covered activities are therefore described in terms of habitat. Final HCP Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*, identifies miles of bull trout habitat on the covered lands, as well as the effects of the covered activities on those habitats in terms of changes in flow and temperature.

HCP-12.3 Geographical Extent of Bull Trout

Commenters stated that the Draft HCP does not adequately account for the full geographical extent of areas where bull trout are likely to be present.

Commenters

ORG-12, ORG-14

Response

The HCP's assessment of bull trout presence on the covered lands is based on the best available scientific information provided by ODFW and others during development of the HCP. Overall, bull trout presence in the Deschutes basin is restricted by water temperatures and other limiting factors. However, the HCP does analyze the effects of the covered activities on bull trout in all occupied and future potentially occupied habitat. Nevertheless, the Deschutes basin has been identified as a stronghold for bull trout due to the cold and consistent flows in the Metolius River subbasin and the foraging opportunities in Lake Billy Chinook. The activities covered by the Final HCP would have immeasurable effects on the status of the Deschutes basin as a stronghold for bull trout.

HCP-12.4 Effects on Bull Trout in Whychus Creek

Commenters noted an inconsistency in the description of flows in Whychus Creek under the Draft HCP.

Commenters

ORG-12, ORG-16

Response

The Draft HCP has been revised to correct this inconsistency in Final HCP Chapter 6, *Habitat Conservation*, and Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*.

Effects on Steelhead

HCP-12.5 Analysis of Effects on Steelhead

Commenters stated that the HCP does not adequately analyze the effects of the covered activities on steelhead.

Commenters

STATE-4, TRIBE-1, ORG-12

Response

The HCP is habitat-based, and the effects of the covered activities are therefore described in terms of habitat. The miles of steelhead habitat on the covered lands are identified and the effects of the covered activities on those habitats are described in terms of changes in flow and temperature. This detailed evaluation of effects on steelhead is provided in Final HCP Section 8.2, *Steelhead Trout*.

HCP-12.6 Background Information on Steelhead

One commenter stated that the Draft HCP does not provide adequate detail regarding the habitat requirements of steelhead.

Commenters

ORG-12

Response

Final HCP Section 5.2, *Steelhead*, contains a summary of the habitat requirements of the species at a level of detail sufficient to support analysis of the effects of the covered activities and issuance of the ITPs. That summary is based on information provided by ODFW and other fisheries agencies participating in the HCP Working Group from 2009 through 2019. The HCP is not a recovery plan or reintroduction plan for steelhead in the Upper Deschutes basin, and as such need not provide the level of detail needed to support those larger efforts. Nevertheless, the information provided on steelhead in the Final HCP is accurate, up to date, and sufficient for the Services to make final determinations on the ITP applications.

HCP-12.7 Question Regarding Temperature Modeling for Steelhead

One commenter noted the recent application of the CE-QUAL-W2 water temperature model to the lower Crooked River and requested additional information on the results of the modeling effort.

Commenters

ORG-10

Response

The results of the CE-QUAL-W2 modeling by Portland State University are summarized in Final HCP Section 8.1.3, *Crooked River Subbasin.* That section also describes how the results of the modeling were incorporated into the Final HCP analyses of effects on bull trout and steelhead in the Crooked River.

HCP-12.8 Adequacy of Mitigation for Steelhead

Commenters raised questions or concerns regarding the adequacy of the proposed minimization and mitigation measures for steelhead in the Draft HCP and recommended alternative approaches.

Commenters

ORG-12, ORG-14

Response

Some commenters urged standards that are not supported by law. The HCP is not a comprehensive plan for the reintroduction or recovery of any species, including steelhead. The HCP cannot jeopardize the continued existence of the species and must be consistent with the issuance criteria set for in the ESA Section 10(a)(2)(B). The reintroduction of steelhead to the Upper Deschutes basin was initiated in 2008 based on NMFS's determination that the reintroduction could be successful, given the ongoing restoration work by conservation organizations, the Pelton Round Butte habitat and water conservation fund in support of local restoration, the ongoing water conservation projects by the Districts, and general broad support for the reintroduction. The Services will make our final ITP issuance decisions based on our analyses of the effects of the covered activities on steelhead in light of that historical information.

HCP-12.9 Effects on Steelhead in Whychus Creek

Commenters stated that the Draft HCP does not adequately analyze effects on steelhead of stream flows in Whychus Creek.

Commenters

ORG-12, ORG-14, ORG-16

Response

The Draft HCP has been revised. Subsequent to public review of and comment on the Draft HCP, the Services and applicants worked with the Upper Deschutes Watershed Council and Deschutes River Conservancy to clarify the covered activities, correct errors in the analyses of effects, and revise the conservation measures for Whychus Creek. These changes are reflected in Final HCP Chapter 6, *Habitat Conservation*.

Effects on Chinook Salmon

HCP-12.10 Comments on Analyses of Effects on Chinook Salmon

Commenters offered suggestions for or raised concerns regarding the analyses of effects on Chinook salmon presented in the Draft HCP.

Commenters

ORG-12, ORG-14, ORG-16

Response

The HCP has been revised. The applicants are no longer seeking ITP coverage for Chinook salmon, which is currently not an Endangered Species Act-listed species in the Deschutes basin. All references to Chinook salmon, including analyses of effects of the covered activities on Chinook salmon, have been removed from the Final HCP.

Effects on Oregon Spotted Frog

HCP-12.11 Background Information on Oregon Spotted Frog

Commenters requested additional background information in HCP Chapter 5 and offered views of the current status and biological requirements of the Oregon spotted frog different from those presented in Chapter 5.

Commenters

ORG-12, ORG-15

Response

FWS and the applicants have conducted extensive reviews of the biological requirements and current conditions of the Oregon spotted frog in the Upper Deschutes basin. By necessity, the information provided in Final HCP Chapter 5, *Current Conditions of the Covered Species*, is a summary of the available information for reference by the general public. Nevertheless, all pertinent and accurate information available to FWS and the applicants was considered in the development of the HCP, and FWS will also consider those documents during its preparation of the associated BiOp and Section 10 findings documents.

HCP-12.12 General Approach to Oregon Spotted Frog Effects Analyses

Commenters suggested the analyses of effects in Chapter 8 of the Draft HCP did not consider historical or current Oregon spotted frog populations and habitat conditions on the covered lands. Some commenters suggested that the analyses in the Draft HCP did not consider the quality of habitat to be provided under the HCP and that the analyses were not adequately detailed or site-specific.

Commenters

ORG-12, GP-33

Response

The quality of habitat to be provided under the HCP is described and evaluated in detail in Final HCP Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*. This analysis includes detailed assessment of inundation levels to be provided in Oregon spotted frog habitats based on RiverWare modeling. Forecasts of habitat conditions to be provided by future hydrology are based on the most recent research on Oregon spotted frogs in the Deschutes basin and habitat suitability models developed specifically for the Deschutes River. Unique aspects of Oregon spotted frog habitat in the Deschutes basin are thoroughly considered in the analyses to avoid inaccurate extrapolation of information gathered from other portions of the species' range with different climate, vegetation, and hydrology.

Some of the comments regarding the level of detail provided in the Draft HCP quote introductory summary statements from the document without acknowledging detailed discussions that follow. The Final HCP incorporates all available information on historical and current Oregon spotted frog populations and habitats on the covered lands and in the surrounding basin. FWS and the applicants relied heavily upon that information during the development of the conservation measures and the analyses of effects. FWS will further expand those analyses, as required, in its BiOp accompanying their final determination on the ITP applications. Where there are unavoidable gaps in the historical or current conditions, FWS and the applicants have been and will continue to be conservative (in favor of the species) in their assessment of effects.

HCP-12.13 Use of Habitat as a Surrogate for Assessing Impacts on Oregon Spotted Frog and Other Covered Species

One commenter questioned the use of habitat as a surrogate for the species when evaluating the impacts of the covered activities.

Commenters

ORG-12

Response

FWS used habitat as a surrogate in its Deschutes Project 2017 and 2019 BiOps and recognizes this as an appropriate method for analysis. The use of habitat as a surrogate for the species is a widely accepted, and often necessary, approach to the development of an assessment of an HCP. This is particularly true for evaluating take of an r-selected species such as the Oregon spotted frog, which has a high reproductive rate, a high natural mortality rate, and a secretive lifestyle that make accurate census of all life stages impossible. The application of habitat as a surrogate in the HCP's analyses of effects is based on the best available information on current habitat conditions and habitat use by the Oregon spotted frog specifically in the Deschutes basin. Any attempt to correlate the anticipated changes in habitat with a quantified population response would be speculative.

HCP-12.14 Rate of Anticipated Improvements in Oregon Spotted Frog Habitat

Commenters raised concerns regarding the timing of proposed increases in winter flows for Oregon spotted frogs in the Upper Deschutes River. Some commenters suggested that the winter flows proposed in the Draft HCP do not provide adequate conservation benefits. Some commenters recommended specific alternative conservation strategies targeting Oregon spotted frog.

Commenters

ORG-12, ORG-14, ORG-15, GP-33, GP-150

Response

The timing of proposed increases in winter flow in the Upper Deschutes River in the Draft HCP has been modified (accelerated) for Final HCP Chapter 6, *Habitat Conservation*. The accelerated timing required by the final conservation measures provides considerable improvement for Oregon spotted frog habitat, compared to the strategy initially proposed in the Draft HCP, while still reflecting the necessary balance between the biological goals of improving winter habitat conditions and avoiding impacts on summer habitats as wetlands along the Deschutes River adjust to the new lower summer flows. To coincide with increases in winter flows, the Final HCP now includes caps on summer flows to limit the adverse effects of unnaturally high flows. The Final HCP also includes the Upper Deschutes Basin Habitat Conservation Fund to support habitat restoration/enhancement along the

Upper Deschutes River. The effects (benefits) of the accelerated increases in winter flows and caps on summer flows are evaluated in Final HCP Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*. Improvements to the RiverWare model for the Upper Deschutes basin between the Draft HCP and Final HCP have also resulted in changes to predicted Deschutes River flows that are reflected in the Chapter 8 analyses of the Final HCP. Overall, those updated flow predictions indicated improved conditions for Oregon spotted frogs during all seasons.

HCP-12.15 Baseline Reference Condition for Analysis of Effects on Oregon Spotted Frog

One commenter questioned the use of historical flow conditions rather than natural flows as a baseline for evaluating the effects of the HCP on Oregon spotted frog.

Commenters

ORG-12

Response

The HCP analysis of effects compares future conditions under the HCP to both natural (unregulated) and historical (regulated) conditions. This approach and the supporting rationale are explained in Final HCP Section 6.1.1, *DBHCP Approach to Minimization and Mitigation*. The Final HCP includes extensive discussion and documentation of natural conditions on the covered lands, and it explains in detail why return to natural conditions in the Deschutes basin would likely not provide the habitat function that is most beneficial to the species that have adjusted in distribution to the past 70 years of water management. Nevertheless, an understanding of natural conditions is essential to a clear understanding of the effects of the HCP on the covered species. Natural conditions are therefore identified and described throughout the analyses in Final HCP Chapter 6, *Habitat Conservation*, and Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*.

HCP-12.16 Relationship Between HCP and Other Threats to Oregon Spotted Frog

One commenter suggested a number of causal relationships between the covered irrigation activities and other threats to the Oregon spotted frog such as non-native predators.

Commenters

ORG-14

Response

The Final HCP summarizes the threats to the Oregon spotted frog in the Upper Deschutes basin that have been identified by FWS, and describes the relationships between the covered activities and those threats at the current level of understanding. As required by Section 10 of ESA, the conservation measures in Final HCP Chapter 6, *Habitat Conservation*, are designed to minimize and maximize the impacts of take from the covered activities to the maximum extent practicable. The Final HCP includes funding for the Upper Deschutes Basin Habitat Conservation Fund, which will be used in part to reduce or eliminate threats to Oregon spotted frog in the basin, such as threats from non-native predators. FWS will provide additional and more comprehensive analysis of overall threats to the species in its BiOp in support of the FWS' final determination on the ITP application.

That analysis will identify, to the extent that is biologically defensible, the relationships between the covered activities and those threats.

Analysis of Impacts of Taking, Generally

HCP-12.17 Assessment of Impacts of Taking, Generally

Commenters stated that the Draft HCP does not adequately measure the impact of the taking resulting from the covered activities and that, as a result, the Services cannot issue the ITPs.

Commenters

ORG-12

Response

The Services released the Draft HCP and Draft EIS to solicit public review of and comments on both documents before making permit decisions on the ITP application. The Services agree that the Final HCP "must identify the impacts likely to result from the proposed incidental take." HCP Handbook, Section 8.2.2.

HCP-12.18 Quantification of Level of Take

Commenters stated that the Draft HCP does not adequately quantify the level of expected take resulting from the covered activities and does not describe its method for quantifying take. Commenters also stated that the HCP should quantify the level of expected take for each covered species.

Commenters

ORG-12, ORG-14

Response

HCP applicants must initially evaluate the types and amount of take "to help make better informed decisions during the development of the HCP's conservation program." HCP Handbook, Section 12.1. "Like many other aspects of the HCP planning process, determining the extent of take and development of the conservation program are a dynamic and iterative process." *Id.* "As the conservation program is developed, the applicant and the Services may find more ways to reduce take. Once the take has been minimized, the applicant can determine the final type and amount of anticipated take." *Id.* "This is the amount of take that they anticipate will occur from covered activities over the life of the permit after accounting for the minimization measures that they commit to implement." *Id.* "Take from implementation of conservation actions must be added to the total amount of take associated with the project." *Id.*

The Services agree that the Final HCP "must identify the impacts likely to result from the proposed incidental take" for each covered species. HCP Handbook, Section 8.2.2; see also id*.* at Section 12.2 A Final HCP can properly identify those impacts either through "defined units to quantify impacts in terms of taking a number of affected individual animals or acceptable habitat surrogate units within the plan area." *Id.* With technical assistance from the Services, the applicants have determined that, in this case, habitat surrogates are the appropriate measure of take, and this approach has been incorporated in the Final HCP. That approach will align the HCP impacts analysis with the Services' Section 7 analyses. *See id.* at Section 8.4. Final HCP Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*, includes additional detail quantifying impacts of the take in terms of habitat surrogates for each covered species.

HCP-12.19 Quantification of Level of Take Caused by Districts' Return Flows

One commenter stated that the HCP does not adequately quantify the level of expected take or habitat modification caused by the Districts' return flows and their impacts on water quality parameters, including temperature, pH, and E. coli.

Commenters

ORG-14

Response

As noted, the applicants have revised their request for ITP coverage to include only those water quality effects related to temperature, surface elevations, and rates and volumes of stream flow. For further discussion of the HCP's conservation strategy to address water quality impacts from the covered activities, refer to response to comment HCP-9.14, *Conservation Measures to Improve Water Quality Other than Temperature and Stream Flows*.

The applicants are not required to separately quantify the level of take expected to result from each individual covered activity or quantify the level of take for impacts on the covered species for which the applicants are not seeking ITP coverage. However, the Final HCP identifies the level of take expected to result from the covered activities collectively and analyzes the impacts of that take on the covered species, consistent with the requirements of ESA.

All covered return flows are described in Final HCP Chapter 3, *Scope of the DBHCP*, which includes the timing and rate of return for each return flow. The hydrologic effects of the returns are accounted for in the RiverWare modeling that was the basis for all analyses of flows in the Final HCP. The Final HCP also accounts for temperature effects of all covered return flows. In the Crooked River subbasin, the temperature effects of the return flows are incorporated into the CE-QUAL-W2 water temperature modeling that was conducted to support the analysis of effects on covered fish. The temperature effects of return flows in Trout Creek and Mud Springs Creek are described in detail in Final HCP Section 8.2.6, *Trout Creek and Mud Springs Creek*.

Reference Conditions for Impacts Analysis

HCP-12.20 Use of Historical Conditions as Baseline

Commenters stated that the Draft HCP improperly relied on historical conditions as the baseline for analyzing the impacts of the proposed incidental take and, therefore, underestimated the impacts of the take on the covered species and, in particular, anadromous fish. Commenters stated that the Draft HCP should have relied on natural, pre-development conditions as the baseline.

Commenters

ORG-12, ORG-14, ORG-15

Response

The analysis compares HCP conditions to both natural conditions and historical regulated conditions to provide the most comprehensive assessment of effects possible with the available information. The HCP is habitat based and, as such, the effects of the covered activities and the benefits of the conservation measures are described primarily in terms of habitat. The amount of habitat on the covered lands is quantified (primarily in acres and/or miles) and the effects on those habitats are quantified in detail as changes in wetted area, water depth, and/or water temperature. This extensive and detailed analysis of effects is provided in Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*, in the Draft and Final HCPs.

Conservation Targets

HCP-12.21 Biological Needs of Anadromous Fish

One commenter stated that the Draft HCP did not analyze the flows necessary to provide for adult migration, spawning, incubation, rearing and outmigration and appropriate temperatures for summer steelhead and Chinook salmon in the Lower Crooked River and Ochoco and McKay Creeks.

Commenters

ORG-12

Response

Final HCP Section 8.1.3, *Crooked River Subbasin*, includes an analysis of the relationship between flow and habitat quality for all life stages of bull trout in the Crooked River subbasin. Final HCP Section 8.2.3, *Crooked River Subbasin*, contains a similar analysis for steelhead, and Section 8.3.3 provides comparable information for sockeye salmon. In all three sections, the effects of the covered activities and the conservation measures on all life stages of the covered fish species are discussed in detail.

Temporal Scale of Impacts Analysis

HCP-12.22 Analysis Based on 30-Year Term

One commenter stated that the Draft HCP impacts analysis, based on a 30-year timeframe, underrepresents short-term impacts on the covered species.

Commenters

ORG-12

Response

The Draft HCP properly analyzed effects on covered species and the impacts of take of the covered species over 30 years, because the applicants have proposed to implement the HCP over 30 years. Refer to response to comment HCP-4.1, *Reduced HCP and ITP Term*, for further discussion of the applicants' decision to request a 30-year permit term.

"Like many other aspects of the HCP planning process, determining the extent of take and development of the conservation program are a dynamic and iterative process." HCP Handbook, Section 12.1. "As the conservation program is developed, the applicant and the Services may find more ways to reduce take. Once the take has been minimized the applicant can determine the final type and amount of anticipated take." *Id.* "*This is the amount of take that they anticipate will occur from covered activities over the life of the permit after accounting for the minimization measures that they commit to implement." Id.* (emphasis added). The Services have collaborated with the applicants to develop a Final HCP that accurately analyzes the extent of take and impacts of take expected to result from the HCP during the term of the Final HCP and ITPs.

13 Other Analyses

Climate Change

HCP-13.1 Climate Change Analysis

Commenters disagreed with specific details of the Draft HCP's analysis of future climate change conditions and recommended additional explanation regarding how the HCP considers climate change forecasts, particularly with respect to potential low summer flows.

Commenters

ORG-12, ORG-14

Response

Final HCP Section 4.9, *Climate Change*, includes additional information on the potential effects of climate change on the effectiveness of the conservation measures.

HCP-13.2 Flow Study

One commenter requested that a flow study be conducted to evaluate water levels through the Meadow Camp reach of the Deschutes River.

Commenters

GP-114

Response

The requested study is outside the scope of the HCP.

14 Changed and Unforeseen Circumstances

Changed and Unforeseen Circumstances, Generally

HCP-14.1 Specificity of Changed and Unforeseen Circumstances Provisions

One commenter recommended that the Draft HCP be revised to offer specific actions and additional commitments from the applicants to meet specific biological goals and objectives when changed circumstances occur.

Commenters

ORG-14

Response

Under the federal No Surprises Rule, "changed circumstances" are "changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and the [Services and that can be planned for (e.g., the listing of new species, or a fire or other natural catastrophic event in areas prone to such events)." 50 CFR § 17.3; 50 CFR § 222.102. Chapter 9, *Changed and Unforeseen Circumstances*, of the Draft HCP identifies changed circumstances that the applicants and the Services have reasonably anticipated and planned for, including the listing of new species and other changes in the federal status of species, habitat changes due to flooding, failure or impairment of dams or diversion structures, non-emergency maintenance and repairs of covered facilities, changes in the biological status of covered species due to factors unrelated to the covered activities, and climate change.

Chapter 9 of the Draft HCP identifies specific response actions designed to maintain the biological goals and objectives and conservation benefits of the Draft HCP. As explained in Chapter 9 of the Draft HCP, in some cases, the applicants proposed no additional response actions when changed circumstances occur, because the proposed conservation measures in the Draft HCP were designed to account for those changed circumstances and maintain adequate conservation benefits to minimize and mitigate the impact of the applicants' take to the maximum extent practicable, accounting for a variable hydrological system.

The applicants have revised the Draft HCP, and the Final HCP includes additional changed circumstances provisions. Refer to Final HCP Chapter 9, *Changed and Unforeseen Circumstances*.

HCP-14.2 Removal of Unforeseen Circumstances Provisions

Commenters recommended eliminating the Draft HCP's unforeseen circumstances provisions or clarifying the definition of unforeseen circumstances and the process to trigger the unforeseen circumstances provisions.

Commenters

ORG-20, GP-189

Response

Under the federal No Surprises Rule, “unforeseen circumstances” are “changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the [Services at the time of the conservation plan’s negotiation and development, and that result in a substantial and adverse change in the status of the covered species.” 50 CFR § 17.3; 50 CFR § 222.102. The No Surprises Rule requires that the HCP include “unforeseen circumstances” provisions. Final HCP Chapter 9, *Changed and Unforeseen Circumstances*, identifies the process through which the Services may identify and notify the applicants of an unforeseen circumstance, as well as the applicants’ responsibilities upon receiving that notice.

HCP-14.3 Changed Circumstances vs. Adaptive Management to Address Climate Change

One commenter cited to the HCP Handbook discussion of changed circumstances to address climate change and stated that the Draft HCP should have included adaptive management provisions to address climate change.

Commenters

ORG-12

Response

“Changed circumstances are circumstances that can be reasonably anticipated and specifically addressed in an HCP prior to permit issuance.” HCP Handbook at 9-38. “Adaptive management is a strategy for addressing uncertainty associated with an HCP’s conservation program, particularly uncertainty that poses a significant risk to the covered species.” *Id.* Applicants are required to consider the effects of changing climatic conditions when developing the list of changed circumstances. *Id.* at 9-44. However, the HCP Handbook does not guide applicants to develop adaptive management provisions specific to climate change. Chapter 9, *Changed and Unforeseen Circumstances*, of the Draft and Final HCP includes changed circumstances provisions to address climate change. For further discussion of those provisions, refer to response to comment HCP-10.2, *Adaptive Management Procedures to Address Climate Change*.

15 Costs and Funding

HCP Funding, Generally

HCP-15.1 Adequate Funding Assurances

One commenter stated that the Draft HCP does not contain adequate funding assurances that the HCP will be implemented. The commenter stated that the HCP should include an additional funding plan including the capital costs of implementing District piping projects.

Commenters

ORG-12

Response

Final HCP Chapter 10, *Costs and Funding of the Proposed Conservation Measures*, details the costs that each applicant expects to incur to implement the Final HCP and identifies the sources of funding on which each applicant expects to rely. If the Final HCP is approved, some applicants will pipe existing irrigation canals to conserve water so that they may continue to provide reliable water to their patrons during HCP implementation, but the piping is not necessary to implement the HCP. As further explained in Final HCP Section 9.9, *Inability of NUID to Secure Alternate Sources of Irrigation Water*, two factors outside of the applicants' control bear on the timing and financial feasibility of completing piping projects. The first is the availability of funding. The second is the potential for legal challenges to piping projects. Because of those external uncertainties, the applicants did not include planned piping projects within the scope of the HCP's conservation measures.

Nevertheless, Chapter 10 estimates the costs to each applicant of canal piping and other infrastructure improvements anticipated to avoid curtailment of water deliveries during HCP implementation. As detailed in Final HCP Chapter 10, *Costs and Funding of the Proposed Conservation Measures*, the applicants would rely on a combination of public and private funding, including public grant funds and assessments of irrigation district patrons to fund canal piping.

Public Funding for HCP Implementation

HCP-15.2 Disclosure of Public Funding Data

One commenter recommended that the Services require the applicants to disclose the amount of public funding that has been used or is proposed to be used to fund HCP implementation.

Commenters

ORG-12

Response

There is no prohibition on using public funding to implement the HCP, so long as the specific funding source does not provide contrary restrictions. As detailed in Final HCP Chapter 10, *Costs and Funding of the Proposed Conservation Measures*, the applicants would fund HCP implementation through both public and private sources. The applicants are not required to include in the HCP the amount of public funding that has been used or would be used to implement the HCP.

HCP-15.3 Opposition to Public Funding for Irrigation District Piping

Commenters opposed the applicants seeking federal and other public funding for District piping projects to implement the HCP. Commenters suggested that the Districts and their patrons should instead bear those costs.

Commenters

ORG-1, ORG-3, ORG-12

Response

If the Final HCP is approved, some applicants will pipe existing irrigation canals to conserve water so that they may continue to provide reliable water to their patrons during HCP implementation, but canal piping is not necessary to implement the HCP. As detailed in Final HCP Chapter 10, *Costs and Funding of the Proposed Conservation Measures*, the applicants would rely on a combination of public and private funding, including public grant funds and assessments of irrigation district patrons to fund canal piping. There is no prohibition on using public funding to implement the HCP, so long as the specific funding source does not provide contrary restrictions.

HCP-15.4 Support for Public Funding for Irrigation District Piping

Commenters supported public funding for District piping and other irrigation system modernization upgrades to implement the HCP.

Commenters

LOCAL-3, ORG-20

Response

The Services acknowledge this comment. As detailed in Final HCP Chapter 10, *Costs and Funding of the Proposed Conservation Measures*, the applicants would rely on a combination of public and private funding, including public grant funds and assessments of irrigation district patrons to fund canal piping.

HCP-15.5 Specific Sources of Public Funding for Irrigation District Piping

Commenters recommended that irrigation system piping be funded through local bond measures and fees from recreational river users.

Commenters

GP-24, GP-27, GP-28

Response

The Services acknowledge this comment. As detailed in Final HCP Chapter 10, *Costs and Funding of the Proposed Conservation Measures*, the applicants would rely on a combination of public and private funding, including public grant funds and assessments of irrigation district patrons to fund canal piping.

16 Alternatives to the Proposed Incidental Take

Alternatives Analysis, Generally

HCP-16.1 Consideration of Alternatives, Generally

Commenters stated that the Draft HCP did not provide a reasonable range of alternatives, fully consider practicable alternatives, evaluate how alternatives might better serve the needs of the covered species compared to the conservation measures proposed in the Draft HCP, or adequately explain the decision not to adopt viable alternatives. Some commenters identified alternative conservation approaches that they believed the HCP should have considered, including alternatives developed by FWS as part of the Draft EIS.

Commenters

ORG-3, ORG-12, ORG-14, ORG-15

Response

HCP Chapter 11, *Alternatives to the Proposed Incidental Take*, details the applicants' alternatives analysis.

To satisfy the legal standards for HCPs, HCP applicants must demonstrate that they reasonably considered alternatives to the proposed taking, including alternatives to avoid or reduce the take, and explain why they did not select each alternative. HCP Handbook, Section 5.6. The Endangered Species Act and its implementing regulations do not require that the HCP include a specific number of alternatives. HCPs typically, but do not always, include a "no-take" or "take avoidance" alternative. *See id.* HCP applicants are not required to justify impracticability of any alternative that they do not select, nor are they required to conduct a full alternatives or practicability analysis for other possible conservation strategies proposed by members of the public. For further discussion of the HCP practicability analysis, refer to response to comment HCP-17.2, *Practicability of Other Possible Conservation Approaches, Generally*.

The HCP alternatives analysis is distinct from the NEPA alternatives analysis. The NEPA alternatives that the Services must analyze are alternatives to the Federal action of issuing the ITP based on the HCP proposed by the applicants and including terms and conditions to comply with the HCP. HCP Handbook, Section 5.7. "These alternatives are not necessarily the same as the HCP's alternatives to the taking." *Id.* To satisfy legal standards for HCPs and ITP issuance, the applicants are not required to address in the HCP any alternatives developed separately through the NEPA process. To the extent that commenters intended to direct their remarks to the NEPA alternatives analysis, please refer to response to comment EIS-5.3 *Range of Alternatives.*

HCP-16.2 Consideration of No-Take Alternative

Commenters stated that the Draft HCP inappropriately dismissed a "no-take" or "take-avoidance" alternative. Commenters suggested that a "no-take" or "take-avoidance" alternative would be practicable.

Commenters

ORG-12, ORG-15

Response

As detailed in Final HCP Section 11.2,*Take Avoidance*, the applicants did not pursue a take-avoidance alternative, because it would be either economically impracticable or technically impossible to implement such an alternative. Section 10 of ESA provides a mechanism to authorize incidental take when non-federal entities find it technically or economically infeasible or undesirable to avoid take.

The Applicants have chosen to pursue that legally available option and have applied for incidental take coverage for take that the Applicants believe is technically or economically infeasible or undesirable to avoid.

HCP-16.3 Consideration of Alternatives to Reduce Take

One commenter stated that, for some geographic units within the covered lands and waters, the Draft HCP inappropriately dismissed alternatives that would result in less incidental take than the proposed conservation measures. Commenters suggested that alternative conservation measures to reduce take are available and practicable.

Commenters

ORG-12

Response

As detailed in Section 11.2, *Take Avoidance*, of the Draft and Final HCPs, the Applicants did not pursue a take-avoidance alternative, because it would be either economically impracticable or is currently considered technically impossible to implement such an alternative.

Comments on Specific Alternatives Analyses

HCP-16.4 Alternatives Analysis for Draft Conservation Measures for Upper Deschutes River

Commenters stated that alternative conservation measures are available and practicable to provide higher instream flows in the Upper Deschutes River than proposed in the Draft HCP. One commenter stated that neither the Draft HCP nor the Draft EIS adequately justified the decision not to implement those alternatives.

Commenters

ORG-3, ORG-12, ORG-14, ORG-15

Response

As detailed in Chapter 11, *Take Avoidance*, of the Draft and Final HCPs, the Applicants explained that the alternatives to draft conservation measure WR-1 would significantly strain North Unit ID's financial capabilities. Despite those constraints, the Applicants have committed to additional conservation measures for the Upper Deschutes River in the Final HCP, to provide the conservation benefits designed to minimize and mitigate the impacts of take from the Covered activities to the maximum extent practicable.

HCP-16.5 Alternatives Analysis for Draft Conservation Measures for Middle Deschutes River

One commenter stated that the Draft HCP's conservation approach for the Middle Deschutes River (proposed conservation measure DR-1) was "arbitrary and capricious" because alternative conservation measures, including market-based water management options, are available and practicable and would conserve more water for protected species.

Commenters

ORG-12

Response

HCPs are applicant-driven processes. Applicants draft the HCP with technical assistance provided by the Services. The Services do not choose the conservation measures that applicants propose, but they do provide guidance regarding the effectiveness of those measures to meet the biological goals and objectives detailed in the HCP. Therefore, reference to an “arbitrary and capricious” standard regarding the Applicants’ choices for conservation measures is not appropriate.

In order for the Services to issue an ITP the following criteria must be met: (1) the taking will be incidental to otherwise lawful activities; (2) an applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (3) the applicant will ensure that adequate funding for the plan will be provided; (4) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and (5) the applicant will carry out any other measures the Service requires as necessary or appropriate for the purposes of the plan. 50 CFR § 17.32(b)(2).

For further discussion of the required HCP alternatives analysis, refer to response to comment HCP-16.1, *Consideration of Alternatives, Generally*. For further discussion of the HCP practicability analysis, refer to response to comment HCP-17.2, *Practicability of Other Possible Conservation Approaches, Generally*.

HCP-16.6 Alternatives Analysis for Draft Conservation Measures for Whychus Creek

One commenter stated that alternative conservation measures are available and practicable to provide higher instream flows in Whychus Creek than proposed in the Draft HCP.

Commenters

ORG-12

Response

The Final HCP has been revised, and Final HCP Chapter 6, *Habitat Conservation*, includes additional conservation measures to improve flow and temperature in Whychus Creek. For further discussion of those conservation measures, refer to response to comment HCP-8.27, *Conservation Measures to Improve Flows and Temperatures in Whychus Creek*, and Final HCP Chapter 6.

Neither the Services nor the Applicants are required to evaluate the practicability of other possible conservation strategies proposed by members of the public to justify the Applicants’ decision not to incorporate those recommendations in the Final HCP. For further discussion of the required HCP alternatives analysis, refer to response to comment HCP-16.1, *Consideration of Alternatives, Generally*. For further discussion of the HCP practicability analysis, refer to response to comment HCP-17.2, *Practicability of Other Possible Conservation Approaches, Generally*.

HCP-16.7 Alternatives Analysis for Draft Conservation Measures for Crooked River Subbasin

Commenters stated that alternative conservation measures are available and practicable to provide higher instream flows or greater conservation benefits, generally, to the covered species in the Crooked River subbasin than proposed in the Draft HCP.

Commenters

ORG-3, ORG-12, ORG-14, ORG-15

Response

The Final HCP has been revised, and Final HCP Chapter 6, *Habitat Conservation*, includes additional commitments to provide higher instream flows and additional conservation benefits to the covered species in the Crooked River.

Neither the Services nor the Applicants are required to evaluate the practicability of other possible conservation strategies proposed by members of the public to justify the Applicants' decision not to incorporate those recommendations in the Final HCP. For further discussion of the required HCP alternatives analysis, refer to response to comment HCP-16.1, *Consideration of Alternatives, Generally*. For further discussion of the HCP practicability analysis, refer to response to comment HCP-17.2, *Practicability of Other Possible Conservation Approaches, Generally*.

HCP-16.8 Alternatives Analysis Specific to Climate Change

One commenter stated that the Draft HCP should have included an analysis of alternatives specific to climate change.

Commenters

ORG-15

Response

The Final HCP has been designed to ensure that the Applicants implement operational changes to minimize and mitigate the impacts of take from the covered activities to the maximum extent practicable and provide adequate conservation benefits to the covered species, primarily by ensuring higher stream flows throughout the HCP term and giving the covered species priority over irrigation for water in the event of climate change.

For further discussion of the required HCP alternatives analysis, refer to response to comment HCP-16.1, *Consideration of Alternatives, Generally*. For further discussion of the HCP practicability analysis, refer to response to comment HCP-17.2, *Practicability of Other Possible Conservation Approaches, Generally*.

17 Maximum Extent Practicable Standard

Maximum Extent Practicable Standard, Generally

HCP-17.1 Draft HCP Practicability Analysis, Generally

Commenters generally stated that the Draft HCP does not satisfy the "maximum extent practicable" standard or that the Services cannot issue ITPs on the basis of the information provided in the Draft HCP related to "practicability."

Commenters

ORG-3, ORG-12, ORG-14, ORG-15

Response

The Services released the Draft HCP and Draft EIS to solicit public review of and comment on both documents before making permit decisions on the ITP application. Those public comments have informed the completion of the final documents, and will inform the Services' subsequent permit decisions. The Services will complete findings and recommendations memoranda in conjunction with our decisions on the ITP applications pursuant to 16 U.S.C. § 1539(a)(2)(B), documenting how the Final HCP complies with the legal criteria for HCPs and ITPs under Section 10 of ESA. The Applicants have collaborated with the Services to develop a Final HCP designed to meet all legal requirements for ITP issuance, including attempting to demonstrate that the Final HCP will minimize and mitigate the impacts of take from the covered activities to the maximum extent practicable.

HCP-17.2 Practicability of Other Possible Conservation Approaches, Generally

Commenters stated that the Applicants could feasibly implement specific conservation measures to mitigate the impacts of the taking not adopted in the Draft HCP and, therefore, have not satisfied the "maximum extent practicable" standard. In some cases, commenters suggested that alternatives considered in either the Draft HCP or the Draft EIS would be practicable and, therefore, the alternatives analyses in the Draft HCP or Draft EIS were not adequate. In some cases, commenters suggested different alternatives not considered in the Draft HCP or the Draft EIS that the commenters believed would be practicable.

Commenters

ORG-3, ORG-12, ORG-14, ORG-15

Response

To satisfy the legal standards for ITP issuance, the Services must find that the proposed conservation strategy in the Final HCP will minimize and mitigate the impacts of the incidental take to the maximum extent practicable. 16 U.S.C. § 1539(2)(B)(ii). The Services may find that the final conservation strategy satisfies the maximum extent practicable standard because either (a) it fully offsets the impacts of the proposed incidental take, or (b) if the Applicants cannot fully offset the impacts of the taking, it is not practicable to carry out any additional minimization or mitigation.

HCP Handbook at 9-28–9-29. Where "fully offset" will not be achieved, the Services may find that additional conservation measures are not practicable, because either (a) there are insufficient implementation options or (b) financial constraints limit the applicants' ability to practicably do more. *Id.* at 9-33. If the Services find that the proposed conservation strategy in the Final HCP does not fully offset the impacts of the take, the Services must conduct an independent practicability analysis. The Services may properly base that independent analysis on information provided in the HCP as well as other sources of information cited by commenters.

The HCP is a voluntary, applicant-driven document. If the Final HCP meets legal standards for ITP issuance, including providing a conservation strategy that minimizes and mitigates the impacts of Applicants' incidental take to the maximum extent practicable, the Services will issue the ITPs. The Services cannot force the Applicants to adopt additional or different conservation measures, if the conservation measures in the Final HCP provide legally sufficient mitigation. Neither the Services nor the Applicants are required to evaluate the practicability of other possible conservation strategies proposed by members of the public to justify the Applicants' decision not to incorporate those recommendations in the Final HCP.

HCP-17.3 Relationship of Practicability Analysis to Quantification of Take

One commenter stated that the Draft HCP's practicability analysis is flawed because the Draft HCP does not quantify the level of take resulting from the covered activities.

Commenters

ORG-12

Response

The Services agree that the Final HCP must identify the type and amount of incidental take that could result from the Applicants' proposed activities. Because the HCP is habitat based, the quantification of take in the HCP is also habitat based. Final HCP Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*, quantifies the numbers of acres of habitat for the Covered species affected by the covered activities and the conservation measures in the HCP. The Services and the Applicants have collaborated on a final conservation strategy, incorporating recommendations from the public to provide adequate conservation benefits to the covered species designed to satisfy ITP issuance standards. The Final HCP quantifies the level of take expected to result from the covered activities, as modified by the final conservation strategy included in the Final HCP. Refer to Final HCP, Chapter 8, *Effects of the Proposed Incidental Take on the Covered Species*. The Services will base our ITP issuance findings, including those findings relating to the maximum extent practicable standard, on the Final HCP.

Comments on Information Related to Practicability in Draft HCP

HCP-17.4 Determination of Practicability Based on Information Provided in Draft HCP

Commenters raised multiple legal arguments and other comments pertaining to the Applicants' discussion of "practicability" in Section 11.8 and other parts of the Draft HCP.

Commenters

ORG-12, ORG-14, ORG-15

Response

As noted in Draft HCP Section 11.8.1, *General Considerations*, the Applicants provided information related to the feasibility or "practicability" of each Applicant implementing conservation measures additional to those proposed in the Draft HCP as "background" to the Draft HCP's alternatives analysis. The Applicants provided that information, in part, to explain the reasons that the Applicants did not ultimately adopt alternatives considered as part of the conservation strategy proposed in the Draft HCP. *See id.*

The Services agree with the commenters that, ultimately, the Services are responsible for determining that the Final HCP satisfies the maximum extent practicable standard. In order to issue the ITPs, the Services must find that the final conservation strategy in the Final HCP either (a) fully offsets the impacts of the proposed incidental take or (b) provides adequate mitigation to the maximum extent practicable. If the Services find that the final proposed conservation strategy in the Final HCP does not fully offset the impacts of the take, the Services will conduct an independent practicability analysis. The Services may properly base that independent analysis on information provided by the Applicants, including information on economic costs to the Applicants and other practical considerations provided in the Final HCP, as well as other sources of information cited by commenters.

Response to Comments on the Draft EIS

1 Process

Public Review and Comment Period

EIS-1.1 Length of Public Review and Comment Period Compared to Guidance

Commenters expressed that the 45-day public review and comment period did not meet the requirements defined in the Services' *Habitat Conservation Planning and Incidental Take Permit Processing Handbook* (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016), hereafter referred to as the HCP Handbook.

Commenters

ORG-3, ORG-12, ORG-15, TRIBE-1

Response

The formal public review and comment period for the Draft EIS and Draft HCP represents only one component of the public input process. The Draft HCP is the result of several years of collaboration among the applicants, the Services, and multiple stakeholders within the region. In recognition of the fact that most people within the basin are affected by the river, the applicants, and the Services took several steps to incorporate public input into the development of the Draft HCP. Governmental agencies and organized non-governmental groups with established interests in the Deschutes River were invited to participate in the HCP Working Group beginning in 2008. The HCP Working Group met up to four times a year throughout HCP preparation to help guide each step of the process, from the initiation of baseline studies, to selection of covered species, to the development and review of conservation measures. When specific technical issues were identified, Technical Working Groups were assembled from the members of the larger Working Group with specialized expertise to provide the applicants, and the Services with detailed input. In addition, a broader Stakeholder Group was created to keep the greater Central Oregon community apprised of HCP development and solicit their input. The Stakeholder Group, which has met eight times since 2008, is open to anyone within the Deschutes Basin with an interest in the effects of the HCP on biological, economic or social resources of the basin.

Aside from the HCP collaboration and working groups, a 60-day scoping period for the Draft EIS was also provided in 2017 between July 21, 2017 and September 22, 2017. During this period four public meetings were held in central Oregon and 52 written comments were received, which FWS considered in the development of the Draft EIS.

The Services published the draft *Deschutes River Basin Environmental Impact Statement* (Draft EIS) and Draft Deschutes Basin Habitat Conservation Plan (Draft HCP) in the *Federal Register* on October 4, 2019 (84 *Federal Register* 53164 and 53114), opening a 45-day public review and comment period. The Services' HCP Handbook guides the Services' staff when determining the required length of a public review and comment period for HCP and EIS Notices of Availability. However, the recommended public review and comment periods provided in the HCP Handbook are for guidance purposes only and are not mandatory.

A 45-day public review and comment period for the release of the Draft EIS and Draft HCP was initially selected in accordance with the public review and comment period requirements defined in the following.

- ESA Section 10(a)(C) (16 U.S.C. §§ 1531–1544), which requires a 30-day public review and comment period
- CEQ's NEPA implementing regulations (40 CFR §§ 1500–1508 and specifically found in § 1506.10(c)) which requires a public review and comment period of no less than 45 days
- U.S. Department of the Interior's (DOI's) NEPA regulations (43 CFR § 46 and specifically found in Subpart 46.415(c)), which require a public review and comment period of no less than 45 days.
- DOI Secretarial Order 3355, which implements Executive Order 13807, *Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects*.

Following the release of the Draft EIS and Draft HCP and in response to public requests, the Services granted a 15-day extension to the Draft EIS and Draft HCP public review and comment period (84 *Federal Register* 58169 and 61026). This increased the public review and comment period to the 60-day period reflected in the HCP Handbook.

In support of the Draft EIS and Draft HCP public review and comment period, public open house meetings were also held in October 2019 in Bend and Prineville, Oregon. These meetings provided further opportunities for the public to learn about the contents of the Draft EIS and Draft HCP, to speak directly to the authors and technical experts, and to submit official public comments.

Several commenters suggested that FWS should have extended the public review and comment period to allow for a 90-day public review and comment period, which the lead agency may do subject to their discretion. However, in this case, FWS determined that providing additional time for public review and comment, outside of the 60 days provided, was not necessary or practicable due to the many other opportunities for public comment that have been provided, and the need to complete the NEPA process and associated permit decision in a timely manner.

EIS-1.2 Length of Public Review and Comment Period

Some commenters expressed that the 45-day public review and comment period was not long enough to allow review of both the Draft HCP and Draft EIS given that the two documents were released simultaneously and were both lengthy and complex.

Commenters

TRIBE-1, ORG-3, ORG-10, ORG-12, ORG-15

Response

Complexity and Length

The development of an HCP is an applicant-driven process yet should reflect the requirements of the ESA regulations and guidance in the Services' HCP Handbook. As a result, the content and length of an HCP is not the responsibility of the Services. That said, the Services have worked with the applicants and provided technical assistance as required throughout the HCP development process to make sure that the HCP is fit for purpose.

With regard to the development of the Draft EIS, FWS recognized that given the technical and complex nature of the proposed action, no-action alternative and action alternatives and their associated analyses, the Draft EIS needed to be written and compiled in a manner that would facilitate understanding and ease of navigation, while meeting the informational requirements of the CEQ and DOI NEPA Implementing Regulations, and guidance in the Services' HCP Handbook.

To facilitate understanding, information in the Draft EIS and Draft HCP was presented in plain language and in a streamlined and easily navigable format. Emphasis was placed on summarizing relevant information that was useful to the public, agencies, and decision-makers. This included retaining focus on the proposed action, no-action alternative and action alternatives, environmental effects and impacts, and proposed conservation measures, as well as using technical appendices to avoid including highly technical analysis in the main body of the Draft HCP and Draft EIS. Both the Draft HCP and Draft EIS were accompanied by an executive summary that summarized the Draft EIS and Draft HCP to enable a reader to rapidly become acquainted with a large body of material without having to read the documents in their entirety.

To further support this approach, both the applicants and the Services involved, governmental agencies, tribal representatives, cooperating agencies, multiple stakeholders, and the public throughout the preparation of both the Draft HCP and Draft EIS. The purpose of this involvement was for these parties to assist the Services in the identification of significant environmental issues and alternatives deserving of study, to deemphasize insignificant issues, and to narrow the scope of the documents.

This approach balanced the need for technical information and readability of the documents and is fully consistent with the procedural and informational requirements of the, ESA regulations, the CEQ and DOI NEPA implementing regulations, and guidance in the Services' HCP Handbook.

Joint Release

Where an ITP requires NEPA analysis, the Services run these two public review and comment periods concurrently, so that all public comments on both documents can be considered in both the NEPA process and associated permit decision and that they can be completed efficiently and in a timely manner.

While the Draft EIS and Draft HCP are large, comprehensive documents containing a wealth of information on a variety of important topics, every effort was made to facilitate the ease of public review and comment. For instance, both documents were made available online, individuals seeking assistance in locating specific topics within the Draft HCP or the Draft EIS were able to contact staff directly with questions via phone or email, and hearing- or speech-impaired individuals could call the Federal Relay Service for assistance. In addition, public open house meetings were held in October 2019 in Bend and Prineville, Oregon during the public review and comment period. These meetings provided further opportunities for the public to learn about the contents of the documents, to speak directly to the authors and technical experts, and to submit official public comments.

The formal public review period for the Draft HCP and Draft EIS represents only one component of the public input process. The Draft HCP is the result of several years of collaboration between the applicants, the Services, and multiple stakeholders with the region. In recognition of the fact that most people within the basin are affected by the river, the applicants, and the Services took several steps to incorporate public input into the development of the Draft HCP. Governmental agencies, tribal representatives, and organized non-governmental groups with established interests in the Deschutes River were invited to participate in the HCP Working Group beginning in 2008. The Working Group met up to four times a year throughout HCP preparation to help guide each step of the process, from the initiation of baseline studies, to selection of covered species, to the development and review of conservation measures. When specific technical issues were identified, Technical Working Groups were assembled from the members of the larger Working Group with specialized expertise to provide the applicants, and the Services with detailed input. In addition, a broader Stakeholder Group was created to keep the greater Central Oregon community apprised of HCP development and solicit their input. The Stakeholder Group, which has met eight times since 2008, is open to anyone within the Deschutes Basin with an interest in the effects of the HCP on the biological, economic or social resources of the basin.

Aside from the Draft HCP collaboration and working groups, a 60-day scoping period for the Draft EIS was also provided in 2017 between July 21, 2017 and September 22, 2017 during which four public meetings were held in central Oregon and 52 written comments were received, which FWS considered during the development of the Draft EIS.

In conclusion, based on the approach taken to develop the Draft HCP and Draft EIS, both documents are fully consistent with the procedural and informational requirements of ESA regulations, CEQ and DOI NEPA implementing regulations, and guidance in the Services' HCP Handbook. In addition to this, the public comment and review period for the Draft EIS and Draft HCP was extended to 60 days (refer to the response to comment EIS-1.1, *Length of Public Review and Comment Period Compared to Guidance*). Given this, the Services determined that the length of the public review and comment period was sufficient to review the Draft EIS and Draft HCP.

EIS-1.3 Timing of Public Meetings

One commenter expressed concern that the public meetings were held less than two weeks after the public notice, Draft EIS, and Draft HCP were published, which was not enough time to provide fully considered, constructive, and actionable comments.

Commenters

ORG-3

Response

While public involvement is important to the Services and serves a critical role as part of the NEPA process, the CEQ and DOI NEPA implementing regulations do not contain specific timing requirements for open house public meetings. The open house public meeting dates were as follows.

- Bend, OR: Tuesday, October 15, 2019, from 6 a.m. to 8 p.m.
- Prineville, OR: Wednesday, October 16, 2019, from 6 a.m. to 8 p.m.

The open house public meeting dates were selected based on the original 45-day public review and comment period, which allowed for between 11 and 12 days of review of the Draft EIS and Draft HCP prior to the open house public meetings being held. The Services did not expect attendees to have completed their review of the documents prior to either of the meetings and the timing of the open house public meetings was specifically selected to enable reviewers to raise any initial comments or questions they may have had. In support of this, and as publicized, technical experts were also in attendance at the public meetings. Each technical topic had a separate table with experts available to discuss the Draft HCP and Draft EIS directly with those that had questions or required clarification. All materials from the open house public meetings were made available online.

Following the open house public meetings the public then had between 34 and 33 days to continue their review of the Draft EIS and Draft HCP and submit comments before the public review and comment period closed on November 18, 2019. The Services' decision to grant a 15-day extension to the Draft EIS and Draft HCP public review and comment period allowed additional time for public review of the materials, to raise any questions directly with the Services, and to submit comments. The extension meant that comments could still be submitted up to December 3, 2019.

EIS-1.4 Public Review and Comment Period for Final EIS and Final HCP

One commenter requested that, to ensure that a minimum amount of public involvement opportunities have been provided, that a formal public review and comment period on the Final EIS and Final HCP should be provided to help FWS draft the Final Section 10 Findings and Recommendations Memorandum.

Commenters

ORG-12

Response

When complete, the Final HCP and Final EIS including responses to substantive comments received on the Draft EIS and Draft HCP will be made available to the public. In accordance with the requirements of the CEQ implementing regulations (40 CFR § 1506.10(b)(2)) the Services will not make any decisions on the proposed federal actions for a minimum of 30 days following the release of the Final HCP and Final EIS. Although the Services do not solicit comments on the Final EIS or Final HCP and are not required to respond to any comments received during this period, the Services will consider them before making our final permit decisions. After conclusion of the 30 days, the Services will each independently prepare an ESA Section 10 findings document and an ESA Section 7 BiOp on the proposed ITP actions prior to issuing separate RODs.

Consistency with Laws and Policies

EIS-1.5 Definition and Consideration of Crooked River Act

Commenters expressed that the Draft EIS analysis failed to accurately define and take into consideration the legal requirements of the Crooked River Collaborative Water Security and Jobs Act of 2014 (Crooked River Act).

Commenters

TRIBE-1, ORG-15

Response

Water management in the Deschutes Basin. is performed by federal and non-federal entities. On the federal side, Reclamation approves water management contracts, performs dam safety inspections in the basin, stores and releases water at Bowman Dam on the Crooked River, and other related actions. Information on Reclamation underlying federal actions is presented in Draft EIS Chapter 2, *Proposed Action and Alternatives*. This information was included for the purpose of explaining how the federal and non-federal water management activities complement one another and to provide the public with the full description of water management activities in the Deschutes Basin.

The Draft EIS analysis is not inconsistent with the Crooked River Act. Rather, the conservation measures in the HCP are designed to be implemented together with the Crooked River Act. The Crooked River Act is a separate federal law that provides a framework for Reclamation to store, allocate, and release water from Bowman Dam on the Crooked River for downstream fish and wildlife purposes, among other things. Meanwhile, the conservation measures for the Crooked River subbasin provide for Ochoco ID to maintain a daily average flow of 50 cubic feet per second (cfs) below Bowman Dam outside the active irrigation season under certain conditions, among other measures.

As such, implementation of the Crooked River Act is a federal action, and subject to ESA Section 7 interagency consultation. Since many of these actions are closely related to and overlap with the actions in the HCP, they will be analyzed concurrently with the proposed issuance of the ITPs. The Services plan to issue BiOps that include both the HCP actions and Reclamation's actions prior to making final ITP decisions. The BiOps will be completed following publication of the Final EIS but prior to completion of the Services' respective RODs, and will be incorporated into those RODs.

Tribal Consultation

EIS-1.6 Tribal Consultation Compared to Guidance

One commenter expressed that tribal consultation for the Draft HCP had not been undertaken in accordance with the *U.S. Fish and Wildlife Service Tribal Consultation Handbook* (U.S. Fish and Wildlife Service 2018), updated October, 2018 and the National Oceanic and Atmospheric Administration's (NOAA's) *Procedures for Government-to-Government Consultation with Federally Recognized Indian Tribes and Alaska Native Corporations* (National Oceanic and Atmospheric Administration 2013) and was limited to staff-level consultation, which excluded formal government-to-government consultation at the leadership level and thereby omitted consultation with CTWS Warm Springs Reservation, whose reservation lies almost entirely with the Deschutes Basin.

Commenters

TRIBE-1

Response

Prior to the NEPA scoping process in September 2016, FWS initiated monthly two-hour staff level informal government-to-government consultation sessions with NMFS and staff from the CTWS. During this meeting, the Services requested tribal involvement, information, and review of materials relating to the HCP. Since that initial meeting, the Services and representatives of the CTWS have held approximately 27 HCP-specific consultation sessions. In addition, CTWS staff have also participated in an at least 12 water modeling-specific technical team meetings, six state, federal and tribal HCP coordination sessions, and three NEPA cooperators' meetings. Further to this and since the publication of the Draft HCP and Draft EIS, the Services and Reclamation have requested formal government-to-government consultation with the CTWS's Tribal Council. Representatives from the Services and Reclamation last met with the CTWS' Tribal Council on February 24, 2020. The Services respect, have implemented, and will continue to implement the necessary consultation processes with the CTWS.

EIS-1.7 Tribal Consultation Information Disclosure

One commenter expressed that the information disclosed in the Draft EIS regarding tribal consultation was insufficient.

Commenters

GP-176

Response

Section 1.7, *Tribal Consultation*, in the Final EIS has been updated to describe the consultation conducted with the CTWS.

NEPA Process

EIS-1.8 Public Comment Response

One commenter requested an elaboration on the NEPA requirement for responding to Draft EIS public comments.

Commenters

ORG-12

Response

As stated in Draft EIS Chapter 1, Section 1.8, *Draft EIS Comment Period*, the Draft EIS was released for public review in accordance with requirements set forth in NEPA (42 U.S.C. § 4321 et seq.) and its implementing regulations (40 CFR §§ 1500–1508) and comments received would be considered and addressed in the Final EIS. Responses to public comments provided in this appendix are consistent with the requirements defined in 40 CFR Section 1503.4.

EIS-1.9 Preferred and Environmentally Preferred Alternative

Commenters stated that FWS should have identified a preferred alternative and an environmentally preferred alternative in the Draft EIS, in accordance with the NEPA regulations 40 CFR Section 1502.14, and that FWS should now identify them and reopen the public review and comment period.

Commenters

ORG-3, GP-179

Response

Preferred Alternative

There is no need to reopen the public review and comment period on the Draft EIS because the CEQ implementing NEPA regulations (40 CFR § 1502.14(e)) only require a Draft EIS to identify the agency's preferred alternative if a preferred alternative exists. If the responsible federal official in fact has no preferred alternative at the Draft EIS stage, a preferred alternative need not be identified there. Additionally, although the DOI implementing NEPA regulations (43 CFR § 46.425) encourage the identification of the preferred alternative in the Draft EIS, this is not specifically required.

A preferred alternative will be identified in the Final EIS in accordance with Section 1502.14(e) of the CEQ implementing Regulations and Section 46.425(a) of the DOI implementing NEPA regulations.

Environmentally Preferred Alternative

The concept of the "agency's preferred alternative" is different from the "environmentally preferable alternative," although in some cases an alternative may be both. There is no need to reopen the public review and comment period on the Draft EIS to identify the environmentally preferred alternative as both the CEQ implementing NEPA regulations (40 CFR § 1502.14(e)) and the DOI implementing NEPA regulations (43 CFR § 46.450) only require that the environmentally preferable alternative(s) be identified in the ROD. It is not necessary that the environmentally preferable alternative(s) are selected in the ROD.

EIS-1.10 Alternative Selection using ESA Definition of Jeopardy

One commenter stated that the proposed action (i.e., Alternative 2) will not provide for the survival and recovery of Oregon spotted frog and does not meet the jeopardy standard under the ESA.

Commenters

ORG-15, GP-137

Response

The Services released the Draft HCP and Draft EIS to solicit public review of and comment on both documents before making permit decisions on the ITP application.

Under ESA Section 7, each federal agency must ensure that any actions authorized, funded, or carried out are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of areas determined to be critical habitat (16 U.S.C. § 536(a)(2)). Issuance of ITPs qualifies as an action authorized, funded or carried out by a federal agency. In accordance with this requirement a jeopardy analysis will be conducted independently by the Services after the Final EIS is published, but prior to deciding on whether to issue the ITPs.

When determining whether to issue the ITPs, the Services will evaluate information in the Final HCP, Final EIS, and supporting documentation to determine if the HCP meets issuance criteria under Section 10 of the ESA. These criteria include the requirement that the incidental taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild. The legislative history of the ESA establishes the intent of Congress that this issuance criteria be based on a finding of "not likely to jeopardize" under Section 7(a)(2). Before making a permit decision, the Services will each independently conduct a jeopardy analysis and prepare an ESA Section 10 findings document and ESA Section 7 BiOp. These documents will address whether the proposed action is likely to jeopardize the continued existence of listed species in the wild or to destroy or adversely modify designated critical habitat for listed species. If the BiOp makes a "no jeopardy" conclusion, the action can proceed as proposed consistent with the ITP. The BiOps will be completed following publication of the Final EIS but prior to completion of the RODs, and will be incorporated into those RODs.

EIS-1.11 Independent Verification

One commenter stated that FWS failed to independently verify the accuracy of any information submitted by the applicants to ensure the professional and scientific integrity of the Draft EIS discussions and analysis, as required by 40 CFR Section 1506.5 and therefore, FWS was in violation of its NEPA duties.

Commenters

ORG-12

Response

As allowed by both CEQ and DOI NEPA implementing regulations (40 CFR § 1506.5 and 43 CFR § 46.105) FWS hired an independent contractor to undertake the analysis and prepare the EIS that included the review and verification of information supplied by the applicants. Once the preliminary Draft EIS was completed, FWS and the cooperating agencies, as defined in Section 1.6, *NEPA Cooperating Agencies*, of the Draft EIS, had the opportunity to review and independently evaluate a preliminary Draft EIS prior to release to ensure its accuracy. Any comments raised by FWS and the cooperating agencies were addressed by the independent contractor, as required. The names of the persons responsible for the independent evaluation and development of the EIS are provided in Final EIS Chapter 6, *List of Preparers*. FWS has been and remains responsible for the preparation and adequacy of the environmental impact analyses and continues to independently evaluate all draft environmental documents after their completion.

EIS-1.12 Supplemental EIS or Revised Draft EIS

Commenters raised that without significant revisions to the Draft EIS, including revisions to the proposed action, a supplemental EIS or new revised Draft EIS would be required to be produced and circulated for comment.

Commenters

ORG-12

Response

As is the case in the preparation of almost all EISs, changes have been made between the Draft and Final EIS in response to comments received and more current or new data being available. However, FWS and the cooperating agencies consider the Draft EIS to have fulfilled and satisfied, to the fullest extent possible, the requirements established for final statements in Section 102(2)(C) of NEPA. Any amendments made between the Draft EIS and Final EIS neither constitute substantial changes nor represent significant new circumstances relevant to the proposed action, environmental concerns, or environmental impacts and therefore do not establish the need for a supplemental EIS to be produced and circulated. For a summary of changes made to the Draft EIS that are reflected in Final EIS, Section 1.9, *Changes to the EIS between Draft and Final*.

Agency Roles and Responsibility

EIS-1.13 NMFS NEPA Role and Responsibility

Commenters raised concern that NMFS had failed in its duty by not assuming joint lead status with FWS, in accordance with the CEQ NEPA implementing regulations per 40 CFR Section 1508.16, given that ITP requests have been made to both agencies, and therefore the NEPA process will not meet all NEPA requirements. Further, commenters stated that there was uncertainty regarding the role NMFS played in scoping, direct public involvement, and the Draft EIS, and will play in responding to comments and revising the Draft EIS.

Commenters

TRIBE-1, ORG-12

Response

Cooperating Agency Status

While the CEQ NEPA implementing regulations include provisions for a joint lead agency status to be formed between federal agencies such as the Services, the regulations do not mandate this (40 CFR § 1501.5(b)). The DOI NEPA implementing regulations, however, state a preference that "In most cases, the Responsible Official should designate one Federal agency as the lead with the remaining Federal, State, tribal governments, and local agencies assuming the role of cooperating agency. In this manner, the other Federal, State, and local agencies can work to ensure that the NEPA document will meet their needs for adoption and application to their related decision(s)" (refer to 43 CFR § 46.220(a)). This preference was followed for this EIS. This decision and the roles and responsibilities of the lead and cooperating agencies were documented in a series of letters issued by the Services in 2017 as required by 40 CFR Section 1501.5(c) of the CEQ NEPA implementing regulations. In line with the roles and responsibilities agreed upon, NMFS has been actively involved in interacting with FWS and the public and has been involved with scoping and the development of the Draft EIS prior to release.

Scoping, Engagement and Noticing

NMFS has taken an active role and collaborated for several years with the FWS, applicants, and multiple stakeholders in the region on the Draft HCP and Draft EIS. NMFS participated in the HCP Working Group beginning in 2008, which met up to four times a year throughout HCP preparation to help guide each step of the process, from the initiation of baseline studies, to selection of covered species, to the development and review of conservation measures. In addition to this and when specific technical issues were identified NMFS participated in the Technical Working Groups to provide detailed input.

FWS initiated the public scoping process for this EIS on behalf of itself and NMFS with publication of the NOI to prepare an EIS in the *Federal Register* on July 21, 2017 (82 *Federal Register* 6625). The NOI announced FWS' intent to prepare an EIS and that NMFS would be a cooperating agency in the Draft EIS process.

In its cooperating agency role, NMFS was actively involved in the development of the scoping report including providing special expertise with respect to the ESA-listed species under its jurisdiction, reviewing and commenting on the scoping report prior to release. In addition to this, NMFS attended the public scoping meetings held on August 14, 2017, in Madras, Oregon and August 15, 2017, in Bend, Oregon.

Involvement in Development of Draft EIS and Response to Comments

Following the conclusion of scoping, NMFS continued its involvement with the development of the Draft EIS, which included the following.

- Attending cooperating agency meetings on November 1, 2018, and September 11, 2019
- Supporting FWS at a stakeholder update meeting on December 13, 2018
- Responding to questions related to the EIS process and content at a Draft EIS public outreach meetings in October 2019

Once the preliminary Draft EIS was prepared, NMFS reviewed and commented on the Draft EIS prior to its release. Additionally, NMFS included information about the Draft EIS in its *Federal Register* notice regarding the availability of the Deschutes Draft HCP for public comment. Refer to 84 *Federal Register* 53114 (October 4, 2019) and 84 *Federal Register* 61026 (November 12, 2019).

Following the release of the Draft EIS, the Services used the same regulatory docket to receive comments on the Draft EIS and Draft HCP to ensure that both agencies received all public comments on the documents. NMFS has assisted FWS in responding to the comments submitted during the Draft EIS public review and comment period, particularly those comments directed at NMFS. NMFS has also helped FWS produce the Final EIS based on the comments received.

Adoption of the Final EIS

CEQ regulations state that an agency may adopt appropriate environmental documents prepared by another agency with the goal of eliminating excessive paperwork (50 CFR § 1500.3). CEQ regulations identify the standards and process an agency must follow to adopt an EIS prepared by another federal agency (50 CFR § 1506.3). CEQ provided further guidance on adoption of another agency's NEPA analyses (48 Fed. Reg. 34,263 (July 28, 1983), Question 30). The guidance explains that a cooperating agency with jurisdiction by law (e.g., an agency with independent legal responsibilities with respect to the proposal) has an independent legal obligation to comply with NEPA. If the cooperating agency concludes that its NEPA requirements and its comments and suggestions have been satisfied, that agency may adopt a lead agency's EIS without recirculating it. However, if the cooperating agency determines that the EIS is wrong or inadequate, it must prepare a supplement to the EIS, replacing or adding any needed information, and must circulate the supplement as a draft for public and agency review and comment. Neither the CEQ regulations nor guidance require an agency to include an explanation in an EIS about how another agency may adopt that document.

NMFS will follow the process described in the CEQ NEPA implementing regulations and NOAA NEPA policies and procedures (i.e., NOAA Administrative Order 216-6A and its companion manual *Policy and Procedures for Compliance with the National Environmental Policy Act and Related Authorities*) in determining whether to adopt and use the Final EIS in its ITP application determination. In the event that NMFS is satisfied that its comments and suggestions have been addressed and determines the Final EIS is sufficient for adoption, NMFS will make an independent decision as to whether to issue an ITP to the applicants, relying on the statutory and regulatory criteria for ITPs set forth in ESA and its implementing regulations. To support our final permit decisions, the Services will each independently prepare an ESA Section 10 findings document and an ESA Section 7 BiOp on the proposed ITP actions prior to issuing separate RODs.

EIS-1.14 NEPA Cooperating Agencies

One commenter requested removal of the CTWS from Chapter 1, Section 1.6, NEPA Cooperating Agencies.

Commenters

TRIBE-1

Response

FWS recognizes that the CTWS are a sovereign, federally recognized, Indian Tribe. Section 1.7, *Tribal Consultation*, in the Final EIS, has been updated to describe FWS' government-to-government consultation with the CTWS. In addition to government-to-government consultation, FWS engaged the CTWS in the communication and document review provided to other cooperating agencies (refer to response to comment EIS-1.11, *Independent Verification)*. The Final EIS reflects this clarification

2 Out of Scope

General Comments

EIS-2.1 Reference to Other Commenters

Commenters referred responders to other commenters' comments.

Commenters

ORG-15

Response

For commenters incorporating other commenter's comments by reference, please refer to Tables 2 through 9 in the *Indices of Commenters* section for the letter number assigned to each comment letter and refer to those comments which include the relevant comment letter under "Commenters."

EIS-2.2 General Suggestions

Commenters made general suggestions to minimize effects and suggested federal and state commitment to implement conservation measures.

Commenters

STATE-4, LOCAL-3, FLP-69

Response

Commenters' suggestions are appreciated but did not provide sufficient detail to consider for incorporation.

EIS-2.3 Background

Commenters provided background and supporting information.

Commenters

TRIBE-1, ORG-24, ORG-17, ORG-22, GP-27, GP-35, LOCAL-3

Response

Background information was considered when responding to substantive comments but did not require a response itself. Substantive comments are responded to in this document.

EIS-2.4 Attachments

Commenters provided attachments to support their comments.

Commenters

ORG-19, ORG-22, FED-2

Response

FWS identified, considered, and responded to information contained in attachments to a comment letter if the attachment commented on substantive issues related to the environmental analysis contained in the Draft EIS. However, as these attachments did not meet this criterion, the content of the attachments were not grouped, summarized, or responded to and instead were reviewed and circulated to authors for reference while responding to comments.

EIS-2.5 Current Conditions

Commenters provided narrative about the current conditions of the study area.

Commenters

ORG-1, GP-5, GP-6, FLP-22, FLP-63, FLP-54

Response

When applicable, a commenter's assessment of the current conditions was considered when responding to substantive comments.

EIS-2.6 Duplicate Comments

Commenters provided duplicate comments.

Commenters

FLP-25, FLP-27

Response

Comments are responded to once. Refer to responses to Commenter FLP-23.

EIS-2.7 Economics

Commenters expressed concern about the economic implications of the proposed action.

Commenters

FLP-69, GP-150

Response

Substantive comments on economic effects are addressed under Section 19, *Socioeconomics and Environmental Justice.*

EIS-2.8 Disagreement with a Perceived Preference for Irrigators

Commenters disagreed with what they perceived as a preference for irrigators in the Draft HCP and Draft EIS.

Commenters

GP-42, ORG-23, FLP-17, FLP-18, GP-111

Response

Refer to response to comment HCP-7.23, *HCP Criteria and Legal Standards for ITP Issuance*, regarding the legal adequacy of the HCP and requests by commenters for additional or different analyses and HCP-17.1, *Draft HCP Practicability Analysis, Generally*, regarding commenter's concerns about the HCP satisfying the "maximum extent practicable" standard. If approved, the Final HCP will minimize and mitigate impacts of take from covered activities to the maximum extent practicable.

Refer to response to comment EIS-5.3, *Range of Alternatives*, regarding FWS's evaluation of a reasonable range of alternatives.

EIS-2.9 General Statements

Commenters made various general statements about the HCP (proposed action), responsibilities of FWS, the study area and rivers, quality of life, and general opinions on the state of the Deschutes River.

Commenters

ORG-12, ORG-15, FED-2, ORG-4, ORG-5, ORG-7, ORG-14, ORG-17, ORG-19, ORG-20, ORG-21, GP-11, GP-12, GP-13, GP-15, GP-17, GP-19, GP-22, GP-24, GP-25, GP-29, GP-34, GP-37, GP-39, GP-40, GP-43, GP-49, GP-50, GP-51, GP-52, GP-53, GP-54, GP-55, GP-56, GP-57, GP-58, GP-59, GP-60, GP-61, GP-62, GP-63, GP-64, GP-65, GP-66, GP-67, GP-68, GP-69, GP-70, GP-71, GP-72, GP-74, GP-76, GP-77, GP-79, GP-80, GP-81, GP-84, GP-86, GP-88, GP-89, GP-91, GP-98, GP-102, GP-94, GP-103, GP-108, GP-110, GP-124, GP-126, GP-128, GP-131, GP-133, GP-137, GP-138, GP-140, GP-141, GP-143, GP-144, GP-146, GP-152, GP-158, GP-171, GP-182, FLP-2, FLP-4, FLP-7, FLP-8, FLP-15, FLP-16, FLP-17, FLP-30, FLP-22, FLP-23, FLP-25, FLP-28, FLP-31, FLP-32, FLP-36, FLP-37, FLP-39, FLP-40, FLP-42, FLP-47, FLP-50, FLP-51, FLP-52, FLP-58, FLP-59, FLP-60, FLP-67, FLP-68, FLP-69, FLP-70, GP-122, GP-139, GP-118, FLP-19, GP-87, FLP-18, GP-111, GP-92, FLP-20

Response

The CEQ recommends that agencies respond to all "substantive comments raising significant issues" on the Draft EIS. Refer to CEQ's *Forty Most Asked Questions Concerning CEQ's NEPA Regulations*, Question 14d (March 16, 1981); see also 40 CFR 1503.4(b). Only substantive comments are considered and responded to in this EIS and there are no responses provided to these non-substantive statements and opinions.

EIS-2.10 Hobby Farms

Commenters disagreed with the allocation of water to hobby farms and felt that hobby farms waste water.

Commenters

GP-101, GP-149, FLP-54

Response

Changes to existing water rights and water allocations are beyond the scope of this EIS.

EIS-2.11 Agriculture

Commenters provided their assessment of viable crops and agricultural production in the Deschutes Basin.

Commenters

LOCAL-3, ORG-1

Response

The crop makeup of the Deschutes Basin is outside the scope of NEPA and this EIS.

3 EIS Adequacy

Application of Comments

EIS-3.1 Comments on the HCP

One commenter requested that comments on the HCP be carried through to the Draft EIS.

Commenters

ORG-12

Response

For responses to comments on the HCP, please refer to the *Response to Comments on the HCP* section. Revisions and updates to the Draft HCP are reflected, as appropriate, in the Final EIS.

Baseline

EIS-3.2 Baselines

Commenters expressed concern that the baseline in the HCP used in development of conservation measures was inconsistent with the no-action alternative used as the basis for comparison in the EIS to characterize and evaluate environmental consequences.

Commenters

ORG-12, ORG-15

Response

Comparison should not be drawn between the HCP existing conditions and the no-action alternative as the no-action alternative is a term only applicable to the Draft EIS. The differences in baseline between the HCP and the EIS are a product of the differences between Endangered Species Act (ESA) and NEPA guidance on baseline. The HCP uses the environmental baseline as a means for determining impacts while NEPA uses the future conditions under the no-action alternative as a basis of comparison.

As defined in ESA Section 7 regulations (50 CFR § 402.02): “The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.”

The environmental baseline used for the HCP is not the same thing as the “no-action alternative” under NEPA. The current state of the resources affected serves as the baseline for predicting changes to the human environment that could occur if any of the alternatives under consideration, including the no-action alternative, are implemented.

The no-action alternative, which is used as the basis for comparison under NEPA, describes the specific actions that are assumed to occur in the absence of the proposed action. The no-action alternative is defined in EIS Chapter 2, Section 2.1.1, *Alternative 1: No Action,* as required by the CEQ regulations (40 CFR § 1502.14). The no-action alternative defines the future circumstances that are predicted to continue or occur without the proposed action and assumes the continuation of the existing management plan or program, such as the *Deschutes Project BiOp*. The no-action alternative is, therefore, the condition against which the proposed action and alternatives are judged, while the baseline in the HCP considers the historical and current conditions of covered lands, waters, species, and species habitat in establishing a baseline against which the effects of the proposed action are compared.

As described in the *Fish and Wildlife Service NEPA Reference Handbook*, the Environmental Consequences chapter (EIS Chapter 3, *Affected Environment and Environmental Consequences*) addresses the net difference between the environmental impact of the alternatives, including the proposed action, and the no-action alternative (U.S. Fish and Wildlife Service 2003).

Comparison of Alternatives

EIS-3.3 Comparison of Alternative 3 to the Proposed Action

One commenter stated that the effects analysis did not provide a comprehensive comparison of Alternative 3 to the proposed action.

Commenters

ORG-15

Response

The Draft EIS' *Executive Summary*, Table ES-1, *Summary of Potential Impacts*, provided a side-by-side summary of the conclusion for the no-action alternative and Alternatives 2, 3, and 4 for each resource topic and effect.

Refer to response to comment EIS-3.2, *Baselines,* for discussion of NEPA guidance for assessing environmental impacts and comparison of each alternative to the no-action alternative to determine effects.

Compliance with Laws and Policies

EIS-3.4 Regulatory Environment

One commenter stated that the EIS did not include or incorporate the regulatory environment into the effects analysis.

Commenters

ORG-12

Response

Draft EIS Appendix 3.1-A, *Regulatory Environment*, presented the regulations that apply to the proposed action and alternatives, by resource area. Regulations were considered and incorporated into the effects analysis for each resource area as appropriate. Implementation of the selected alternative will be consistent with all applicable laws, contractual obligations, and agreements.

EIS-3.5 Inclusion of Various Plans, Acts, Strategies, and Oregon State Statutes

Commenters asserted that the EIS should have specifically included a description of how the alternatives will meet the requirements of the *Middle Columbia River Steelhead Recovery Plan*; National Marine Fisheries Service *Ecosystem-based Fishery Management Plan for the West Coast Region*; Fish and Wildlife Coordination Act; U.S. Fish and Wildlife Service *Climate Change Strategy and Strategic Plan*; U.S. Department of Interior Order 3289: *Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources*; Oregon Department of Fish and Wildlife Conservation Strategy; National Fish, Wildlife, and Plants Conservation Strategy; Clean Water Act; Wild and Scenic Rivers Act; Crooked River Act; Treaty with the Tribes of Middle Oregon (1855) (1855 Treaty); Integrated Resources, Management Plan (IRMP); Tribal Water Code (Ordinance 80); Wild and Scenic River ordinance (Warm Springs Tribal Code Chapter 401); and Oregon State Statutes including Oregon's Fish Passage Statutes: ORS 509.585 et al., Oregon's Screening Statutes: ORS 498.306, Oregon's Instream Water Right Act: ORS 537.332–537.360, Oregon Additional Public Interest Standards for New Appropriations (Sensitive Stock Rules): OAR 690-33, and Oregon Administrative Rules on Waste and Efficiency: OAR 690-400-010(16); OAR 690-410-060.

Commenters

TRIBE-1, ORG-12, ORG-15

Response

The following Acts provided by the commenters are already captured in Draft EIS Appendix 3.1-A, *Regulatory Environment* and the no-action alternative.

- Fish and Wildlife Coordination Act
- Clean Water Act
- Wild and Scenic Rivers Act
- Crooked River Act
- 1855 Treaty

The remaining Acts/Plan/Strategies/Oregon State Statutes were reviewed and added to the Final EIS Appendix 3.1-A, *Regulatory Environment* as appropriate. Their addition required no changes to the no-action alternative description or the analysis of the effects of the action alternatives in the Final EIS.

Effect Thresholds

EIS-3.6 Reviewable Record

One commenter stated that FWS failed to provide and should provide a reviewable record of its threshold determination of significance.

Commenters

ORG-12

Response

For purposes of NEPA compliance, preparation of an EIS is required for actions that are expected or have the potential to significantly impact the human environment (per 40 CFR §§ 1500–1508). The FWS performed internal NEPA scoping for the Deschutes River Basin HCP–ITP action in close coordination with the NMFS as a cooperating agency. During that internal scoping process, the Services staff reviewed the proposed ITP action and the purpose and need for taking the action, and identified the environmental issues requiring detailed analysis as well as identified connected, similar, and cumulative actions. The internal scoping analysis concluded that the proposed ITP action entails the following

- Involves instream flow and habitat restoration decisions that significantly affect biodiversity and ecosystem functions across a large geographic area.
- Involves management decisions that are significantly controversial.
- Has highly uncertain effects or involve unique or unknown risks to biological, physical or other factors.
- Establishes precedents for future actions with significant effects.
- Will contribute to other individually insignificant but cumulatively significant impacts.
- Will have positive effects on wetlands, rivers, and ecologically critical areas but may have adverse effects on historical resources (i.e., canals) and farmlands.
- May affect some areas covered by the National Historic Preservation Act (NHPA).
- Will adversely affect endangered or threatened species, their critical habitat, or other non-target species.
- Will have social or economic impacts interrelated with significant natural or physical environmental effects.

As described further in the FWS' *Notice of Intent to Prepare a Draft Environmental Impact Statement for the Proposed Deschutes River Basin Habitat Conservation Plan in Oregon* (published July 24, 2017, 82 *Federal Register* 34326), the Services determined that the proposed Deschutes River Basin HCP-ITP action was of sufficient size and complexity to warrant an EIS; is similar to previous HCP's issued in the Pacific Northwest that likewise required the preparation of an EIS; and may have significant effects on the human environment. On that basis and in accordance with regulations at

40 CFR Sections 1501.4, 1507.3, and 1508.27, the FWS determined that preparation of an EIS was warranted.

Federal agencies can initially prepare an environmental assessment (EA) to analyze and document the potential for one or more significant impacts to occur from a proposed federal action. Agencies, however, need not initially prepare an EA for an action, but can proceed directly to the preparation of a Draft EIS. For example, the U.S. Department of the Interior's NEPA regulations instruct that an environmental assessment need not be prepared when "the bureau has already decided to prepare an environmental impact statement" (Refer to 43 CFR Section 46.300(a)(3)). Consistent with that exemption, FWS proceeded directly to the preparation of an EIS for the pending permit request.

EIS-3.7 Effect Determinations

One commenter requested that the EIS be reviewed to ensure consistent application of the threshold determinations in the effect conclusions.

Commenters

ORG-12

Response

The EIS has been reviewed and adjusted for consistency. Effect conclusion statements were missing from Impact WR-1: Change Reservoir Storage, and Impact WR-2: Change Water Supply for Irrigation Districts and Other Surface Water Users, as changes in water supply are not considered environmental effects in and of themselves; therefore, no thresholds are defined. Results from this analysis were used to assess effects on other resources such as agriculture and socioeconomics. The Final EIS has been revised appropriately.

EIS-3.8 Thresholds for Adverse Effect

Commenters felt that the parameters in the Draft EIS provided for agriculture are more protective than the parameters for species and habitat. Similarly, commenters felt that the thresholds were incomplete and set too high for an adverse effect finding for covered fish species.

Commenters

TRIBE-1, ORG-15

Response

The analyses in Draft EIS Chapter 3, *Affected Environment and Environmental Consequences*, provides effects thresholds that disclose some of the factors used to reach effects conclusions. An explanation of these thresholds is provided in Chapter 3, Section 3.1.2, *Effect Determinations*. Although not required by NEPA or its regulations, identifying effects thresholds can be useful in determining if potential effects rise to an adverse level. In all cases potential effects are evaluated considering the context and intensity of effects. While the effects thresholds were used to help guide the fish (and other) analyses, the analyses used to determine if an adverse effect could occur are fully disclosed for each effect identified.

Please note that the intent of the Draft EIS is to disclose a broad range of effects on the human environment, not just the biological effects for covered species, which are the focus of the Draft HCP. The Draft EIS discloses the potential effects on agricultural and other resources from implementing the Draft HCP to ensure the Services consider all of the potential consequences of issuing ITPs. In the case of the effect of the alternatives on agricultural resources, the Draft EIS concludes that the effect of converting agricultural land would not be adverse because Oregon law protects conversion of agricultural land (Section 3.5, *Land Use and Agricultural Resources*). The potential economic effects of fallowing agricultural land are addressed in Section 3.9, *Socioeconomics and Environmental Justice*. Similarly, the effects of implementing the Draft HCP on covered species is addressed in Section 3.4, *Biological Resources*. Many of these effects were determined to be not adverse or beneficial because the Draft HCP conservation strategy is projected to minimize and mitigate for incidental take of covered activities on covered species. The effects thresholds presented in this section address typical issues evaluated for effects on fish and aquatic resources.

Evaluate Exceptions to and Uncertainty of HCP Measures

EIS-3.9 Exceptions to Flow Measures in the Upper Deschutes River

One commenter expressed that the Draft EIS lacks an analysis of exceptions to flow measures in the Upper Deschutes River for Alternatives 2, 3, and 4.

Commenters

ORG-15

Response

The Draft EIS biological analyses did take into consideration the exceptions identified in Conservation Measure WR-1 and other conservation measures even if it was not possible to capture them in the RiverWare modeling results. In the case of the Oregon spotted frog analyses, Conservation Measure WR-1 by design includes a robust adaptive management component that describes the collaborative development of a variable flow tool as well as ongoing coordination between the applicants and FWS. For example, contacting FWS to discuss operational options that would minimize adverse effects on Oregon spotted frog would be triggered by certain events, such as “when North Unit Irrigation District anticipates the need to exceed 1,200 cubic feet per second (cfs) at WICO [Deschutes River below Wickiup Reservoir gauge] in year 13 and later…” as described under Conservation Measure WR-1. It would not be possible to assess the impacts of all scenarios that could occur in the future, or accurately model their incidence using the RiverWare model, but the conservation measure builds in this adaptive management approach to ensure that the applicants and FWS will work to find solutions to minimize direct and indirect adverse effects on the Oregon spotted frog based on the conditions as understood by the parties at the time. For a summary of changes to the Draft EIS that are reflected in the Final EIS, Section 1.9, *Changes to the EIS between Draft and Final*. Changes to the proposed action are detailed in Final EIS Chapter 2, Section 2.1.2.4, *Conservation Strategy*.

Mitigation

EIS-3.10 Mitigation Measures

Commenters stated that inclusion of specific and reasonable mitigation measures and an analysis of their effects on the proposed action and alternatives is required per NEPA and CEQ Guidance.

Commenters

TRIBE-1, ORG-12, ORG-14

Response

When an agency prepares an EIS, it must include mitigation measures (including measures not already included in the proposed action or alternatives) among the alternatives compared in the EIS (40 CFR § 1502.14). The proposed action and action alternatives were designed to incorporate conservation measures to meet the purpose and need for the action (refer to Draft EIS Chapter 1, *Purpose and Need*) while avoiding or minimizing adverse impacts on other aspects of the environment, where feasible. In some cases, adverse impacts could not be avoided or minimized and are therefore determined to be unavoidable. In the Draft EIS, FWS discusses a host of additional measures that are intended to mitigate adverse environmental consequences that are analyzed as elements of Alternatives 3 and 4. In Alternative 3, these include increasing fall and winter flows in the Deschutes River below Wickiup Dam sooner than under the proposed action, targeting higher minimum flows during above-normal and wet years, adding an Upper Deschutes River Conservation Fund, providing improved certainty of flows at North Unit ID's Crooked River pumping plant, and protecting uncontracted fish and wildlife storage releases on the Crooked River instream to Lake Billy Chinook. Alternative 4 further analyses additional measures including further accelerating the timing of fall and winter flow increases on the Deschutes River, and increasing releases of uncontracted storage on the Crooked River.

As required by NEPA, the Draft EIS analyzes the potential direct and indirect impacts of each alternative on each resource, including these additional measures not included in the proposed action. As described in Draft EIS Chapter 2, *Proposed Action and Alternatives*, the proposed action and action alternatives all require the implementation of conservation strategies that would ensure any adverse effects from the potential take of the covered species is offset consistent with ESA Section 10(a)(2)(B) issuance criteria. Therefore, the potential unavoidable adverse effects would be limited. The FWS determined that the suite of mitigation measures analyzed as elements of the alternatives are appropriate and sufficient to inform decision makers about reasonable measures that could improve the proposed action and to advance NEPA's purpose of ensuring informed and transparent environmental decision making.

Monitoring and Adaptive Management

EIS-3.11 Adaptive Management

One commenter expressed that the adaptive management plan as described in the Draft EIS does not provide sufficient detail regarding the incorporation of adaptive management into the effects analysis and is too general.

Commenters

ORG-12

Response

The analyses of effects of the proposed action and action alternatives described in the Draft EIS are primarily based on the results of the RiverWare modeling, which predicts hydrologic conditions over the permit term. The model is a representation and simplification of the water management paradigm and the natural system and, therefore, does not capture every aspect of the natural system. Additionally, the model follows a set of assumptions and logic in a manner that would likely differ from how decision-makers may (and currently do) make decisions in real time. However, the model is informed by existing data sets, water management regimes, and knowledge of the natural system.

As described in Draft EIS Section 3.4, *Biological Resources,* the proposed action includes effectiveness monitoring and adaptive management plans which contain provisions to monitor Oregon spotted frog and its habitat in the study area during the permit term. If conditions change (e.g., weather affects the timing of breeding), there are operational management actions prescribed to modify flow or reservoir storage and water elevation in response to those changes. A quantitative analysis of the effects of implementing these measures is not feasible for the EIS as they are based on changed conditions that cannot be predicted with any certainty at this time.

The monitoring, reporting, and adaptive management as described in the HCP will provide a mechanism for identifying uncertainties, implementing effectiveness monitoring to inform future water management within the parameters of the volumes provided. Additionally, during project implementation, additional information will be available as to the effects of the project, and adaptive management can be used to adjust the project to address these effects. Adaptive management can result in changes in operational criteria based on new information to avoid adverse effects.

Please refer to Final HCP, Chapter 7, *Monitoring, Reporting, and Adaptive Management*, for a detailed description of the multiple provisions the HCP includes for monitoring, reporting, and adaptive management of the conservation measures. Additional monitoring, reporting, and adaptive management elements were added since the draft publication. Refer to response to comment HCP-10.1, *HCP Monitoring and Adaptive Management Provisions*, for a detailed discussion of the revisions to the compliance and effectiveness monitoring and adaptive management provisions in Final HCP Chapter 7, *Monitoring, Reporting, and Adaptive Management*.

Additional Actions

EIS-3.12 Permanent Protection of Flows

One commenter expressed that the conservation measures should include permanent protection of flows proposed and discuss this in the effects analysis.

Commenters

ORG-15

Response

Refer to response to comment HCP-4.8, *Commitments to Acquire Instream Water Rights*, regarding the applicant's legal obligations and authorities regarding water rights.

Refer to response to comment HCP-8.8, *Permanent Instream Protection of Increased Flows in the Upper Deschutes River*, regarding permanent protection of flows in the Upper Deschutes River; HCP-8.27, *Conservation Measures to Improve Flows and Temperatures in Whychus Creek*, HCP-8.40, *Conservation Benefits of Increased Flows in Proposed Conservation Measure WC-1*, HCP-8.47, *Conservation Benefits of Proposed Conservation Measure WC-4*, and HCP-7.22, *Timing to Implement Conservation Measures Requiring Third-Party Cooperation* regarding permanent protection of flows in Whychus Creek; and HCP-8.50, *Instream Protection of Increased Flows in Lower Crooked River*, regarding permanent protection of flows in the Lower Crooked River. Revisions to conservation measures for Whychus Creek are reflected in the Final EIS effects analysis.

Take

EIS-3.13 No-Action Alternative Quantification of Take

Commenters stated that the Draft EIS analysis of the no-action alternative does not articulate the current level of take and/or whether that level would continue, increase, or decrease under the no-action alternative and expressed a request for disclosure of the level of take in the Draft EIS.

Commenters

ORG-15, ORG-12

Response

The EIS characterizes the current habitat conditions for covered species in Chapter 3, Section 3.4, *Biological Resources*. This section also provides an analysis of effect of the no-action alternative on biological resources at a level of detail that is adequate to estimate and disclose the potential for adverse biological effects to occur. The EIS analyses properly disclose the potential adverse effects to covered species using the best available information developed for the current BiOps (U.S. Fish and Wildlife Service 2017, 2019; National Marine Fisheries Service 2005), the proposed Deschutes Basin HCP, and other available sources. For NEPA biological resources analyses, an estimate of potential take can be a portion of the analyses if a take estimate is available or had been developed during an ESA compliance process; however, it is not required for NEPA and was not available for this analysis. In the current BiOps (U.S. Fish and Wildlife Service 2017, 2019; National Marine Fisheries Service 2005) and the Deschutes Basin HCP, the current covered species habitat conditions were used as a surrogate for take quantification because quantifying take of individuals in the permit area for covered species was not feasible. Most of the effects for vegetation, wildlife, Oregon spotted frog, fish, and mollusks in the Draft EIS noted the potential for some beneficial effects under the no-action alternative, but overall effects could be adverse because of ongoing habitat loss and the potential effects of climate change on the river system. Thus, even without a quantified estimate of take for species, the analysis fairly discloses the potential for ongoing biological effects if the no-action alternative were to occur.

Restoration of Fish Species

EIS-3.14 Comparison of Past Conditions

One commenter requested a comparison of past habitat loss and conditions to determine the amount of flow and habitat required to restore covered fish species.

Commenters

ORG-12

Response

The no-action alternative considers the existing condition, which is a result of the ongoing water management activities. The action alternatives were evaluated how each would perform compared to the existing condition. This EIS is a tool for making a decision on a pending permit request. An EIS outlines the status of the environment in the affected area and identifies the potential effects on that environment that would result from either implementing the proposed action or one of the alternatives.

Further, in the Services' BiOps that will analyze the HCP, the condition of the environmental baseline will be described, which includes the current degraded condition resulting from the historical water management practices.

HCPs consider the environmental baseline upon which the conservation strategy will be implemented. The Services will each make separate decisions on whether to issue ITPs relying on the criteria set forth in the ESA and its implementing regulations, including whether the conservation strategies will minimize and mitigate the effects of the incidental taking of the covered species to the maximum extent practicable, and whether the implementation of the HCP will appreciably reduce the likelihood of survival and recovery of the species in the wild.

Flows

EIS-3.15 Summer Flow Cap

Commenters raised concerns that without a summer flow cap the effects analysis is flawed as a decrease in summer flow is not guaranteed and that earlier breeding season ramp up, later summer ramp down and year-round flows needed for revegetation of the Upper Deschutes River channel should be included.

Commenters

ORG-15

Response

Conservation measure WR-1 in the Final HCP and Final EIS has been revised to include upper limits on allowable summer flows in the Upper Deschutes, beginning no later than Year 8 of HCP implementation (calendar year 2028). Final EIS Chapter 2, *Proposed Action and Alternatives,* has been updated to reflect this change to Conservation Measure WR-1 for the proposed action. The Final EIS analysis of the proposed action reflects this change.

Ramp up and ramp down rates for Oregon spotted frog on the Deschutes River in the proposed action and action alternatives were determined by considering Oregon spotted frog life stage and irrigation season needs. Similarly, seasonal flows proposed for the proposed action and action alternative were identified to help reduce seasonal flow fluctuations, provide habitat for Oregon spotted frog and other covered species while also meeting irrigation needs. While other possible scenarios could fall within the range of alternatives addressed in the EIS, year-round flow requirements were determined to not meet all of these needs adequately.

Temporal Scale

EIS-3.16 Clarification of Term

One commenter requested clarification on the timeframe of the term "sooner."

Commenters

ORG-12

Response

It is unclear exactly which instances of "sooner" the commenter is referring to. This response assumes it is in regard to timing of implementation of increased fall/winter flows below Wickiup Dam. Draft EIS Chapter 2, *Proposed Action and Alternatives*, describes the implementation schedule under each alternative. In the resource analyses in Draft EIS Chapter 3, *Affected Environment and Environmental Consequences*, and Chapter 4, *Cumulative Impacts*, the word "sooner" is used in reference to the earlier implementation of increased flows under Alternatives 3 and 4 compared to the proposed action. Draft EIS Chapter 3, Section 3.1, *Introduction*, Table 3.1-1 presents a comparison of implementation schedules under the alternatives. The resource analyses in Chapter 3, *Affected Environment and Environmental Consequences*, refer to this table when providing a qualitative comparison across alternatives.

EIS-3.17 Short- and Long-Term Effects

One commenter requested that FWS identify the short- and long-term effects of the alternatives with specific focus on the effect on the Oregon spotted frog during the time when the required minimum flow below Wickiup Dam in the winter increases from 100 cubic feet per second (cfs) in year 1 to 400 cfs in year 21.

Commenters

ORG-13

Response

The Draft EIS considered the short- and long-term effects of the proposed action and action alternatives on the human environment. Final EIS Chapter 3, Section 3.4 *Biological Resources,* provides a more detailed analysis of the interim effects on Oregon spotted frog during the early phases of implementation.

Proposed Corrections to the EIS

EIS-3.18 Use of Bolded and Italicized Text

One commenter asked why bolded and italicized text was used in the document for certain terms.

Commenters

ORG-12

Response

As stated in Footnote 1, Section 1.1, *Introduction*, terms in bold italics are defined more fully in Appendix 1-A, *Glossary*.

EIS-3.19 Glossary Placement

One commenter disagreed with the placement of the glossary in an appendix and requested it be included in the main body of the EIS.

Commenters

ORG-12

Response

The glossary is provided in an easily accessible appendix for readers' use.

EIS-3.20 Table of Contents

One commenter requested that the EIS provide a "road map" of the document chapters and include a table of contents at the beginning of each chapter.

Commenters

ORG-12

Response

As discussed in responses to commentEIS-3.21, *Detail Provided in the EIS*, the Table of Contents at the beginning of the EIS provides the reader with a detailed breakdown of chapters, sections, and subsections for reference when navigating the document.

EIS-3.21 Detail Provided in the EIS

One commenter requested more detail and elaboration of content in the EIS.

Commenters

ORG-12

Response

The Draft EIS is written and compiled in a manner that would facilitate understanding and ease of navigation while meeting the informational requirements of the CEQ, guidance in the Services' HCP Handbook, and other guidance.

To facilitate understanding, information in the Draft EIS and Draft HCP was presented in plain language and in a streamlined and easily navigable format. Emphasis was also placed on summarizing relevant information that was useful to the public, agencies, and decision-makers. The documents also retain focus on the proposed action, no-action alternative and action alternatives, environmental effects and impacts, and the proposed conservation measures, while also utilizing technical appendices to avoid including highly technical analysis in the main body of the Draft HCP and Draft EIS. Both the Draft HCP and Draft EIS were accompanied by an executive summary that summarized the Draft EIS and Draft HCP to enable a reader to rapidly become acquainted with a large body of material without having to read the documents in their entirety.

This approach balanced the need for technical information and readability of the documents and is fully consistent with the procedural and informational requirements of the ESA regulations and guidance in the Services' HCP Handbook.

EIS-3.22 Editorial, Grammatical, and Formatting Corrections

Commenters submitted editorial and grammatical corrections for FWS consideration as well as asserting that the EIS fails to properly incorporate by reference, formatting issues, lack of ease in cross referencing, incomplete or missing citations, incorrect subsection naming and numbering, inconsistent metrics, and other various document clarity issues.

Commenters

ORG-12, ORG-14, FED-2, STATE-1

Response

Comments have been reviewed and updates are reflected as appropriate in the Final EIS.

Climate Change

EIS-3.23 Effects of Climate Change

Commenters requested a more extensive description of the effects of climate change on the study area resources as well as an analysis of climate change effects for each alternative and conservation measure.

Commenters

TRIBE-1, ORG-12

Response

The potential effects of climate change on study area resources are addressed qualitatively over the analysis period under the no-action alternative. Effects are presented for the no-action alternative for each resource in Draft EIS Chapter 3, *Affected Environment and Environmental Consequences*. These effects would be the same under all alternatives. The potential for the proposed action and action alternatives to result in cumulative effects when combined with the effects of climate change and other cumulative actions is described in Draft EIS Chapter 4, *Cumulative Impacts*.

Please refer to response to comment EIS-3.2, *Baselines,* for discussion of NEPA guidance for assessing environmental impacts and baselines used to determine effects.

EIS-3.24 Sources

One commenter provided additional sources of climate change information for incorporation into the climate change analysis.

Commenters

ORG-12

Response

To quantify the potential effects from climate change, future climate-adjusted unregulated flows are needed for input in to the RiverWare model. Models that have been historically used to develop the unregulated flows, like a variable infiltration capacity model, do not capture the physical processes that occur in the Deschutes Basin because they are not designed to represent groundwater surface water interaction as it occurs in the Deschutes River. A promising model is under development by the U.S. Geological Survey called GSFlow, which will be able to generate future climate-adjusted unregulated flows in the Deschutes River, but it was not available in time for use in this study.

Final EIS Section 3.2, *Water Resources*, has been updated throughout to reflect updated climate change sources and information where appropriate.

EIS-3.25 Conservation Measures

One commenter stated that FWS failed to assess climate change under each alternative.

Commenters

ORG-15

Response

Climate change is a global phenomenon created by a myriad of greenhouse gas emissions. At present it is technically not feasible to attribute the extent to which a discrete action such as the proposed permit actions and alternatives are likely to exacerbate the effects of climate change on a specific geographic area. Draft EIS Chapter 4, *Cumulative Impacts*, considers how the effects of the proposed action and alternatives described in Chapter 3, *Affected Environment and Environmental Consequences*, when considered in the context of climate change and other cumulative actions, could have cumulative effects. Refer to response to comment EIS-3.23, *Effects of Climate Change,* for additional discussion of how climate change was incorporated into the analysis.

Refer to response to comment HCP-10.2, *Adaptive Management Procedures to Address Climate Change*, for discussion on adaptive management of climate change effects. Refer to response to comment HCP-14.1, *Specificity of Changed and Unforeseen Circumstances Provisions*, HCP-14.2, *Removal of Unforeseen Circumstances Provisions*, and HCP-14.3*, Changed Circumstances vs. Adaptive Management to Address Climate Change*, regarding changed circumstances and response actions included in the HCP as well as the consideration of the effects of changing climatic conditions.

Analysis of Cumulative Effects

EIS-3.26 Effects of Projects

Commenters stated that the Draft EIS provided no specific discussion or analysis of the effects of past, present, and reasonably foreseeable future projects in the area potentially affected by the proposed action and alternatives (i.e., the Deschutes River Basin). Commenters requested more specificity about the projects included in the cumulative effects analysis.

Commenters

ORG-12, ORG-14

Response

The types of actions relevant to the analysis of cumulative effects are described in Draft EIS Chapter 4, Section 4.2, *Cumulative Actions*. Appendix 2-B, *No-Action and Cumulative Scenarios*, presents additional information on specific projects considered in the cumulative effects analysis.

Past and present projects have contributed to existing environmental conditions, which are described for each resource area in Draft EIS Chapter 3, *Affected Environment and Environmental Consequences*. These conditions are the baseline considered in the analysis of the no-action alternative.

For the purposes of NEPA, the proposed action and alternatives are compared to the no-action alternative that captures existing conditions. The no-action alternative, as defined in the EIS, is considered the most predictable condition to assume for purposes of NEPA analysis given considerable uncertainty about what actions the applicants would take in the absence of the proposed action over the next 30 years.

The comments provide no information to demonstrate how effects of past, present, and future actions would combine with the proposed action to cause effects beyond those analyzed in Draft EIS Chapter 3, *Affected Environment and Environmental Consequences*, and Chapter 4, *Cumulative Impacts*.

Refer to response to comment EIS-3.36, *Additional Federal Projects,* and EIS-3.17, *Short- and Long-Term Effects,* regarding commenter requests for additional specificity in the cumulative effects analysis.

EIS-3.27 Reasonably Foreseeable Projects

Commenters requested that the cumulative effects analysis not be limited to projects that are currently approved and identified additional past, present, and reasonably foreseeable projects that they felt should have been included in the cumulative effects analysis.

Commenters

GP-137, ORG-14, ORG-12, TRIBE-1

Response

NEPA does not require the EIS to evaluate the impacts of the proposed action in combination with speculative future projects that are not advanced enough in the planning stage to provide for meaningful environmental review. The past, current, and future projects considered in the no-action and cumulative effects analyses were projects for which draft NEPA or other review has been completed or which are currently being permitted and were considered to be reasonably certain to be implemented. This is consistent with 43 CFR Section 46.30 (i.e., definition of "reasonably foreseeable future actions").

Reasonably foreseeable future projects considered in the cumulative effects analysis include numerous water conservation projects proposed by the applicants, as identified in Draft EIS Appendix 2-B, *No-Action and Cumulative Scenarios*. As noted in Appendix 2-B, the cumulative effects scenario includes projects that were not in included in the no-action alternative. The no-action alternative was limited to planned projects, while the cumulative effects analysis was broadened to include additional projects. These additional projects are denoted by an asterisk (*) in Appendix 2-B, *No-Action and Cumulative Scenarios*.

As noted in Draft EIS Chapter 3, Section 3.1.3, *Modeling*, the potential effects of water conservation on irrigation district water supply can be quantified at the point of diversion; therefore, the analysis of effects on agricultural resources (Draft EIS Chapter 3, Section 3.5, *Land Use and Agricultural Resources*) considered a range of potential water conservation projects (both district and on-farm). However, because effects on basin hydrology may be attenuated or concentrated during periods of low flow in different reaches of the Upper Deschutes Basin, depending on how water is conserved, hydrologic conditions, and other factors, the effects of these changes on resources were evaluated qualitatively in the cumulative effects analysis (Chapter 4, *Cumulative Impacts*).

The list of relevant activities/projects provided by commenters was reviewed against the EIS's criteria for inclusion in the no-action and the cumulative effect analyses, and projects have been added as appropriate.

EIS-3.28 Comprehensive Summary of Effects

One commenter requested a comprehensive summary of cumulative effects under each alternative.

Commenters

ORG-12

Response

The purpose of the cumulative impact analysis is to assess the impacts of a proposed action in combination with a group of actions or projects with similar or overlapping impacts. NEPA does not require that all impacts on all resources be combined and a finding be made about an overall impact on the environment. One of the purposes of NEPA documentation, though, is to provide decision makers and the public with enough information to adequately consider the combined impacts of the project. The cumulative effects assessment included in Draft EIS Chapter 4, *Cumulative Impacts*, is considered sufficient for this analysis.

EIS-3.29 Public Land Management and Agricultural Actions

One commenter stated that public land management and agricultural uses such as grazing practices, timber harvest, fuels, vegetation management, recreation, and resource protection and enhancement activities such as restoration projects or recreational opportunities, were not adequately addressed in Draft EIS Chapter 4, *Cumulative Impacts*.

Commenters

ORG-12

Response

Past and present projects related to the activities listed by the commenter were incorporated into the no-action alternative analysis. These activities were incorporated as appropriate into the cumulative effects analysis when their execution was reasonably foreseeable. While it is likely the actions presented by the commenter will occur in the future and will have a cumulatively considerable impact, the likelihood of these actions occurring is speculative unless they are advanced enough in the planning stage to provide for meaningful environmental review.

EIS-3.30 Climate Change

One commenter objected to climate change not being considered as a type of cumulative action.

Commenters

ORG-12

Response

Climate change is a reasonably foreseeable condition that was incorporated into the analysis in Draft EIS Chapter 4, Section 4.3, *Evaluation of Cumulative Effects.*

EIS-3.31 Aesthetics and Visual Resources Analysis

One commenter stated that there was no analysis of the proposed action or Alternatives 3 and 4 in the Draft EIS Chapter 4, Section 4.3.5, *Aesthetics and Visual Resources*, and that the analysis focused only on reasonably foreseeable future actions and their impact on the landscape within the study area.

Commenters

ORG-12

Response

As discussed in Draft EIS Chapter 4, Section 4.3.5, *Aesthetics and Visual Resources*, beneficial effects of the proposed action and action alternatives of improved visual quality related to improved wetland and riparian habitat along the Upper Deschutes River would be further enhanced by planned restoration actions in the area and water conservation projects that conserve water instream but could be offset by climate change effects described in Section 4.3.3.1, *Vegetation and Wildlife*. Adverse effects on visual quality in Wickiup Reservoir could result in a cumulative impact if climate changes effects result in longer and more frequent drawdowns of the reservoir.

EIS-3.32 Consistency in Analysis

One commenter expressed that the types of cumulative actions described in Draft EIS Chapter 4, Section 4.2, *Cumulative Actions*, were not analyzed consistently among the resource assessments and requested more clarity on the context, impacts, and conclusions.

Commenters

ORG-12

Response

Draft EIS Chapter 4, *Cumulative Impacts*, was reviewed and updated for completeness and consistency in the Final EIS.

EIS-3.33 Monitoring and Adaptive Management for Cumulative Effects

One commenter requested a discussion of adaptive management and monitoring activities in light of the uncertainties associated with long-term cumulative effects, as well as more quantification of these effects.

Commenters

ORG-12

Response

The proposed action and Alternatives 3 and4 include an adaptive management and monitoring program to ensure that it is achieving the intended benefits to the covered species. Adaptive management and monitoring would adapt to the cumulative impact on the covered species. Refer to discussion under responses to comments EIS-3.11, *Adaptive Management,* and EIS-3.10, *Mitigation Measures,* for additional detail about the monitoring, reporting, and adaptive management included in the HCP.

EIS-3.34 Short- and Long-Term Effects

One commenter stated that the Draft EIS failed to assess the short- and long-term effects in the cumulative impact analysis, and requested an evaluation of cumulative impacts through 2050 to coincide with the length of the permit term.

Commenters

ORG-12

Response

Draft EIS Appendix 2-B, *No-Action and Cumulative Scenarios*, summarizes the most relevant projects identified for this analysis and represents an attempt to focus analyses on the projects that could have effects similar to the proposed action and alternatives. Additional specificity of the impacts on the study area, as requested by the commenter, would not provide any more useful information beyond what is already presented and would not further ensure the goals of NEPA are met.

The cumulative effects analysis informs the significance of the effects of the proposed action and alternatives on the human environment. The analysis attempts to fairly characterize the potential cumulative conditions for all of the resource categories to disclose the type of information the Services will consider for HCP approval and the ITP application process.

The analysis of cumulative effects in the Draft EIS evaluates impacts through 2050.

EIS-3.35 Geographic Scope

One commenter requested that the Draft EIS extend the geographic scope of the cumulative effects assessment beyond the study area to consider upstream effects of simultaneous inter-regional development on migratory fish species.

Commenters

ORG-12

Response

The cumulative effects analysis considers the impact of the proposed action and alternatives combined with other past, present, and reasonably foreseeable future projects in the study area. The contributions of effects of upstream projects, programs, and conditions were considered when evaluating the effects in the study area. Refer to the response to comment EIS-3.27, *Reasonably Foreseeable Projects*, for discussion of reasonably foreseeable projects included in the cumulative effects analysis.

EIS-3.36 Additional Federal Projects

Commenters stated that while the Draft EIS acknowledges the "considerable influence" of U.S. Bureau of Land Management and U.S. Forest Service activities in the Basin, there is a lack of discussion of the cumulative impact of federal projects within the study area in the past, present, and future.

Commenters

ORG-12, ORG-14

Response

Considerable input was provided by FWS and other cooperating agencies related to potential projects that should be considered in the cumulative effects analysis. Draft EIS Appendix 2-B, *No-Action and Cumulative Scenarios*, summarizes of the most relevant projects identified for this analysis and represents an attempt to focus analyses on the projects that could have effects similar to the proposed action and alternatives. The summary table is based on more extensive information considered in the cumulative effects analysis. Additional detail on the projects and the impact within the study area, as requested by the commenter, would not provide any more useful information beyond what is already presented and would not further ensure the goals of NEPA are met.

The cumulative effects analyses attempt to synthesize the combined effects of the most relevant past, present, and reasonably foreseeable future projects and conditions (i.e., climate change) in the study area to inform the significance of the effects of the proposed action and alternatives on the human environment. The analyses attempt to fairly characterize the potential cumulative conditions for all of the resource categories to disclose the type of information the Services will consider for HCP approval and the ITP application process.

4 EIS Purpose and Need

EIS-4.1 Adequacy of the Purpose and Need Statement

Commenters asserted that the purpose and need statement, as described in Draft EIS Chapter 1, *Purpose and Need*, is not directly related to the proposed action and is unclear. The commenters indicated that the statement should be revised to better frame the purpose and need for the proposed action, assert FWS' role in the Deschutes Basin HCP planning and ITP processes, and provide additional detail and an expanded scope.

Commenters

ORG-12, ORG-14, ORG-15

Response

The purpose and need statement in the Draft EIS was developed through an extensive scoping process and was adopted by FWS to guide development of the proposed action and alternatives.

The purpose and need statement satisfies NEPA requirements because it is sufficiently broad enough to enable the evaluation of a reasonable range of alternatives for the proposed action. This approach was also consistent with the guidance provided in the HCP Handbook.

The range of alternatives evaluated in the Draft EIS is sufficient to foster informed decision-making and public participation. Although some commenters disagree with implementing the proposed action, this opposition does not mean that the purpose and need statement is inadequate to satisfy NEPA requirements. As the NEPA lead agency, FWS has exercised its discretion to define the purpose and need of the proposed action.

Under NEPA, an EIS must "briefly specify the underlying purpose and need to which the agency is responding in proposing alternatives, including the proposed action." (40 CFR § 1502.13). The lead agency has "considerable discretion" to define the purpose and need of the action per *Westlands Water Dist. v. U.S. Dept. of Interior*, 375 F.3d 853, 866 (9th Cir. 2004) (*Westlands*), citing *City of Angoon v. Hodel*, 803 F.2d 1016 (9th Cir. 1986). The courts will uphold the purpose and need statement as long as it is reasonable. Although a lead agency may not define the purpose and need of a proposed action in unreasonably narrow terms, the agency is not required to craft a statement so broad that it requires consideration of alternatives that are inconsistent with the overarching purpose of the proposal per *Northwest Ecosystem Alliance v. Rey*, 380 F.Supp. 2d 1175 (W.D. Wash. 2005). Furthermore, where an action is taken pursuant to a specific statute, the statutory objectives of the proposed action serve as a guide by which to determine the reasonableness of objectives outlined in the EIS per *Westlands*, supra, 375 F.3d at p. 866.

EIS-4.2 Statement of Objectives

A commenter requested that FWS add a statement of objectives to the Final EIS.

Commenters

ORG-14

Response

The purpose of the proposed action, as described in Draft EIS Chapter 1, *Purpose and Need*, serves as the objective of the federal action.

5 EIS Alternatives Screening

Alternatives Screening

EIS-5.1 Alternative 12 Screening

One commenter stated that the range of alternatives analyzed was inadequate due to the screening out of Alternative 12. The commenter asserted that Alternative 12 met the purpose and need, would better meet the biological needs of the covered species, would reduce the effects of HCP implementation, and meets all the criteria. Additionally, the commenter claimed that there was not enough rationale provided for elimination of Alternative 12 and disagreed that implementation of on-farm efficiencies (an element of Alternative 12) was impracticable.

Commenters

ORG-12

Response

As described in Draft EIS Appendix 2-A, *EIS Alternatives Screening Process*, and noted by the commenter, Alternative 12 was eliminated because fall/winter flows under this alternative were similar to those of Alternatives 2, 3, and 4 and could be captured within the range of those other alternatives. Alternative 12 differed from other alternatives only in the mechanism proposed for providing increased river fall/winter flows for covered species, focusing on on-farm conservation and demand management. Through the screening process, Alternative 12 was eliminated as it was deemed not different enough from another alternative to allow for clear decision-making. While Alternative 12 met the purpose and need and would presumably meet the biological needs of the species and project requirements, it was determined that Alternative 12 would not avoid or substantially lessen any of the significant environmental effects to a greater extent than the other alternatives in the range of alternatives evaluated. As set forth in NEPA regulations (40 CFR § 1502.14), an EIS analysis need not consider every possible alternative to a project, but rather a range of reasonable alternatives. Given the similarities between Alternative 12 and the alternatives evaluated, it was determined that disclosing effects of Alternative 12 would not contribute substantial additional information for the public and agency decision-makers.

On-farm efficiencies were also eliminated as an element in Alternatives 3 and 4 because the effectiveness of on-farm conservation and efficiency measures could be variable, and therefore including them as part of the analysis could render it overly speculative and would be required to be implemented extensively by DBBC patrons to meet the water savings required. As discussed in Draft EIS Chapter 3, Section 3.5.2.2, *Agricultural Resources*, on-farm efficiency improvements are outside the control of the irrigation districts and are voluntary measures that may be adopted by district patrons. This analysis assumes each irrigation district would conserve water in a manner consistent with their most recent written proposals.

EIS-5.2 Alternative 5 Screening

One commenter stated that Alternative 5 should not have been eliminated in the second-tier screen and the Draft EIS provided too little detail or rationale to explain its elimination.

Commenters

ORG-3

Response

As described in Appendix 2-A, *EIS Alternatives Screening Process*, Alternative 5 was considered only marginally feasible given the rapid water operations changes considered under this alternative and the potential negative effects on the covered species and water supply early in the permit term. When compared against Alternative 4 (i.e., enhancement of winter flows in the Upper Deschutes River of 300 cfs in years 1–5 and then 400–600 cfs in years 6–30) it was determined that Alternative 5 would not avoid or substantially lessen any of the significant environmental effects to a greater extent when compared to Alternative 4, and would be less feasible for applicants than Alternative 4. As Alternative 5 would have immediately provided minimum fall/winter flows in the Upper Deschutes River of up to 400 cfs during the winter for the entire permit term, it would not have provided more than 400 cfs of flow as provided for in Alternative 4. Therefore, Alternative 4 could be more protective for Oregon spotted frog than Alternative 5 by the end of the permit term. As a result, inclusion of Alternative 5 in the alternatives evaluated in detail in the Draft EIS was not necessary to adequately inform the public and agency decision-makers. FWS maintains that the Draft EIS includes a reasonable range of alternatives that were screened for their potential ability to meet the purpose and need for the action as described in Draft EIS Chapter 1, *Purpose and Need*. Please refer to the appropriate appendices for discussion of intermediate environmental benefits during the 20 years to reach full implementation.

EIS-5.3 Range of Alternatives

Commenters asserted that FWS did not analyze a reasonable range of alternatives and incorrectly screened out alternatives that maximize mitigation efforts. Further to this, commenters asserted that the alternatives analysis should be supplemented, improved and modified to address the competing biological needs of the multiple species and the trade-offs inherent to the proposed action.

Commenters

ORG-3, ORG-15, TRIBE-1, ORG-14, ORG-24

Response

As set forth in NEPA regulations (40 CFR § 1502.14), an EIS analysis need not consider every possible alternative to a project, but rather a range of reasonable alternatives. FWS maintains that the Draft EIS includes a reasonable range of alternatives that were screened for their potential ability to meet the purpose and need for the action as described in Draft EIS Chapter 1, *Purpose and Need*. An extensive range of alternatives was evaluated during analysis for the EIS. Draft EIS Appendix 2-A, *EIS Alternatives Screening Process*, provides an overview of the approach used to define and screen 15 separate alternatives to the proposed action. The screening process identified which alternatives to carry forward for detailed analysis in the EIS, and Appendix 2-A documents the various alternatives that were evaluated but eliminated from further consideration.

Refer to response to comment EIS-6.14, *Addressing Competing Biological Needs,* regarding alternatives to meet the biological needs of species.

EIS-5.4 Alternative to Minimize Effects to Fish Species

Commenters asserted that FWS only considered alternatives that would benefit Oregon spotted frog and failed to consider alternatives that would lessen the impact on fish in the Crooked River. Further to this commenters asserted that FWS did not identify a mechanism to protect the releases from the Bowen Dam, despite the releases being critical to the successful reintroduction of steelhead trout and Chinook salmon (*Oncorhynchus tshawytscha*) and that without protection uncontracted storage released from Bowman Dam will be available to other water users.

Commenters suggest that a new alternative that includes "key features" of Alternative 3 with additional Conservation Measures and enhanced adaptive management be analyzed.

Commenters

TRIBE-1, ORG-24, ORG-14, STATE-4

Response

The purpose of the federal action considered in the Final EIS is to fulfill the Services' Section 10(a)(2)(B) conservation authorities and obligations and to render decisions on the ITP applications requesting authorization of incidental take of three species listed as threatened under ESA (i.e., the Oregon spotted frog, Middle Columbia River steelhead trout, and bull trout) and one non-listed species (i.e., sockeye salmon). If the Services issue the ITPs, our HCP findings memorandum and Records of Decision will document how the conservation strategy for each covered species minimizes and mitigates the impacts of take to the maximum extent practicable.

Historical and current water management practices in the Upper Deschutes Basin have severely degraded the habitat for the Oregon spotted frog; therefore, the conservation measures needed to minimize and mitigate impacts of the covered activities on Oregon spotted frog are significant. However, FWS disagrees that the Draft EIS has not presented a reasonable range of alternatives that addresses issues for all the covered species. While improving fall and winter flows in the Upper Deschutes River and reducing spring and summer flows are expected to benefit Oregon spotted frog, these actions will also benefit other covered species in all of the basin rivers and creeks, including the Crooked River. The seasonal flow changes described for Alternatives 2, 3, and 4 on the Upper Deschutes River would likely have a corresponding effect on irrigation releases and flows in the Crooked River. For example, RiverWare modeling results show that as fall and winter flows increase for Alternative 4 and North Unit ID diversions from the Upper Deschutes River decrease, median flows on the Crooked River downstream of the North Unit ID pumps decline in a greater number of years. Therefore, the variation in fall and winter flows on the Upper Deschutes River provided by Alternatives 2, 3, and 4 will also likely result in a range of flows on the Crooked River during the irrigation season that will have variable effects and benefits for covered species depending on the alternatives selected.

The Draft EIS alternatives analyses identified that requirements and interpretation of the Crooked River Act, water rights law, and water management needs can restrict how water is released and used in the Crooked River. Real-time water management decisions, which are not fully captured by the RiverWare results, could have a substantial effect on flow and water temperature conditions in the river and these seasonal decisions would likely be made differently for each of the alternatives. As described in Draft EIS Chapter 2, *Proposed Action and Alternatives*, the action alternatives have assumed protection of uncontracted fish and wildlife flows below Bowman Dam to Lake Billy Chinook from diversion to ensure these flows are a benefit to fish and wildlife in the lower Crooked River. Protection of uncontracted flows would however require (1) mutual agreement with all Crooked River diverters or (2) Reclamation—who holds the storage right for this water—filing for and obtaining a secondary water right to protect the uncontracted flows from diversion. Neither of these items currently exist. Analysis of effects on covered fish species also indicate that Conservation Measures CR-4, CR-5, and CR-6 would benefit covered fish species and Alternative 2 has been modified to clarify minimum flows below North Unit ID pumps (i.e., Conservation Measure CR-6) and protection of pulse flows released from Bowman Dam for fish protection (i.e., Conservation Measure CR-7). These changes have not been made in other alternatives, further improving the range of alternatives evaluated in the EIS. The Services are currently engaged in ESA Section 7 interagency consultation with Reclamation regarding Reclamation's federal discretionary actions where the effects of the unprotected releases of the uncontracted fish and wildlife water will be assessed.

However, even with these improvements in the range of alternatives, it is probable that adverse summer water temperature effects in some reaches of the Crooked River will continue, reducing the potential for successful reintroduction of salmonids in some river reaches. The Services are not aware of any other feasible alternatives or conservation measures and enhanced adaptive management that could be implemented by the applicants to benefit covered fish species in the Crooked River that would not require substantial changes in water management by the applicants, the law, and water rights. As shown in Alternatives 3 and 4, even with assumed protection of uncontracted water from diversion (from Bowman Dam to Lake Billy Chinook), analysis results indicated that while some reaches would likely see flow and temperature improvements under Alternatives 3 and 4 downstream of the North Unit ID pumps to Osborne Canyon, in other reaches water temperature results were similar to the proposed action (without protection of uncontracted water) on the Crooked River (refer to Effect BIO-6 for Alternative 3).

It should be noted one water management factor outside the scope of the EIS alternatives has the potential to improve flow conditions on the Upper Deschutes and Crooked River: current and future water conservation projects (i.e., canal piping) that are proceeding under separate processes in the basin. These projects are intended to improve water conveyance efficiencies by reducing loss of irrigation water from canal seepage and evaporation that could result in flow improvements in the Upper Deschutes and Crooked Rivers by reducing the amount of water needed to meet seasonal irrigation demands.

EIS-5.5 HCP Alternatives to Conservation Measure CR-1

One commenter noted that the HCP included two alternatives to Conservation Measure CR-1, which were not included in the alternatives considered in the EIS.

Commenters

ORG-3

Response

The commenter is correct, the Draft HCP includes two alternatives to take that slightly affect Conservation Measure CR-1. One alternative would require minimum year-round flows in the Crooked River of 80 cfs. This alternative was rejected because it would have minimal benefit to covered fish species during the summer and it would reduce the water in Prineville Reservoir that could be released during the winter to benefit those same covered fish. The second alternative involves use of a portion of North Unit ID's 10,000 af (af) of rental water from the Prineville Reservoir for Crooked River flow. This action was rejected because reduction of the water available to North Unit ID's patrons was determined to be infeasible. Any reduction in North Unit ID's access to the 10,000 af of rental water from Prineville Reservoir for Crooked River flow, or modification in the timing of the release of the water from Prineville Reservoir, could have severe consequences for North Unit ID's patrons. Please refer also to Draft Deschutes Basin HCP Chapter 11, *Alternatives to the Proposed Incidental Take*.

EIS-5.6 No Take Alternative

Commenters disagreed with the elimination of a "no take" alternative and felt that an analysis of a no-take alternative would provide a better comparison to the proposed action. Commenters also felt that the Draft EIS did not provide enough support for the statement that a "no take" alternative would be infeasible.

Commenters

ORG-12, ORG-15

Response

As explained in Draft EIS Appendix 2-A, *EIS Alternatives Screening Process,* a no-take approach for the no-action alternative is not feasible for this EIS because no take of covered species, in the context of ongoing water facility operations, does not appear to be physically possible given the broad geography impacted by the current water management regime and the inability to simultaneously inundate Oregon spotted frog sites (to create suitable habitat) in the many wetland, oxbow, and riverine habitats that the Oregon spotted frog occupies. Sites have been highly degraded from decades of extreme high flows in the summer across this broad geography, resulting in scoured and incised reaches in the Upper Deschutes where the river is now cut deeper into the channel and further distanced from the wetland habitats that once lined the river. Further, these high flows in the summer prevent wetland and riparian vegetation growth by inundating potential habitat areas to depths that inhibit vegetation growth during the growing season. Riparian vegetation provides cover from predation and habitat structure necessary for the Oregon spotted frog to meet its life history needs. These historical impacts on the diversity of sites across this broad geography (as well as where Oregon spotted frog are present) make it extremely challenging, and likely not possible, to design a water management approach that could be implemented to prevent all take of the Oregon spotted frog and other covered species. For example, given the current location of Oregon spotted frog sites along the Upper Deschutes River and the extreme amounts of water that it would take to reach and benefit the degraded areas in which these sites occur, Upper Deschutes River water supplies would be quickly exhausted in any given year and then no water would be available to shape and manage for the benefit of Oregon spotted frog during its remaining life stages. In this scenario, Oregon spotted frog take would certainly occur, and likely at levels above the no-action alternative, the proposed action, and the action alternatives. In addition, attempts to achieve as close to no take as possible would likely involve substantial reduction, or perhaps near elimination, of Deschutes Basin water supply operations. Such a future condition is not considered feasible because of the probable economic and legal implications of such an action, as described further in Appendix 2-A, *EIS Alternatives Screening Process, of the Draft EIS.*

As described in the Draft Deschutes Basin HCP Chapter 11, Section 11.2, *Take Avoidance*, the applicants considered take avoidance, but they did not pursue it for the covered activities because it would be either economically impracticable or technically impossible. For additional detail on the practicability of take avoidance (otherwise referred to as a “no take” approach) refer to the Draft HCP Chapter 11, Section 11.2.

6 EIS Alternatives

Suggestions for Alternative Modifications

EIS-6.1 Wickiup Reservoir Operation Conservation Measure WR-1

One commenter requested that the Services analyze lower fall and winter minimum flows in the Deschutes River at full implementation (i.e., years 21–30) coupled with additional habitat improvement measures to maintain similar beneficial effects for the Oregon spotted frog as currently exists in the proposed action. Also, once completed, the Services should then use the additional Deschutes River water to bolster the North Unit ID’s water supply to offset its needs to use Crooked River water during the irrigation season, thereby making water available instream for the benefit of covered fish species.

Commenters

TRIBE-1

Response

The Services evaluated an extensive range of alternatives during analysis for the EIS. Draft EIS Appendix 2-A, *EIS Alternatives Screening Process*, provides an overview of the approach used to define and screen 15 separate alternatives to the proposed action. The screening process identified which alternatives to carry forward for detailed analysis in the EIS, and Appendix 2-A, *EIS Alternatives Screening Process*, documents the various alternatives that were evaluated but eliminated from further consideration.

A lower fall and winter minimum flow regime in the Upper Deschutes River at full implementation, coupled with habitat restoration, was not evaluated as it could not provide similar beneficial effects for the Oregon spotted frog, as these actions are mutually exclusive. Habitat modification due to water management was identified in the FWS' ESA listing rule as a primary factor impacting Oregon spotted frog in the Upper Deschutes River (50 CFR § 17; August 29, 2014, *Federal Register* 79, 168, 51, and 670). Therefore, physical habitat improvements alone, without adequate flow improvements, would not be sufficient to improve Oregon spotted frog habitat conditions because they cannot mitigate the effects of the proposed action as the current flow regime is out of sync with the life history needs of Oregon spotted frog. A detailed description of the baseline condition for and effects on the Oregon spotted frog due to storage and release of water from the reservoirs for irrigation is provided in the current FWS ESA Section 7 BiOp for the Upper Deschutes River (U.S. Fish and Wildlife Service 2017, 2019).

Additionally, while the concept of conserving irrigation storage in Wickiup Reservoir to help reduce North Unit ID diversions on the Crooked River was considered during development of the draft HCP and the alternatives development process, it was determined to be infeasible. The water stored in Wickiup Reservoir is the primary source of flows in the Upper Deschutes River that can address the impacts on the Oregon spotted frog, thereby meeting the purpose and need of the HCP. Conserving this water for irrigation purposes is therefore not feasible. Finally, the North Unit ID only has 10,000 af of rental water, from Prineville Reservoir, for use in the Crooked River. While further restrictions on the use of this water were considered, the temperature benefits provided were minimal. Additional conservation improvements may be realized through implementation of the Crooked River Act by Reclamation (currently engaged in ESA Section 7 consultation) where releases of the uncontracted (i.e., fish and wildlife water) could be managed to further address temperature concerns in the Crooked River.

EIS-6.2 Crooked River, Ochoco Creek, and McKay Creek Conservation Measures CR-1, CR-2, CR-3 and CR-4

One commenter requested that the Services analyze the Crooked River subbasin instream flows in light of our trust obligations to the CTWS and the 1855 Treaty reserved rights to have harvestable populations of fish above the Pelton Project and to an amount of water at least equal to what is required by the ESA for the covered species in the Draft EIS. In conjunction with modifications to Conservation Measure WR-1 described in comment summary *Wickiup Reservoir Operation Conservation Measure WR-1*, the commenter also requested that the Services analyze how to shape Crooked River instream flows in a manner consistent with our trust responsibility, the CTWS' treaty-reserved rights to fish and water, North Unit ID's Crooked River irrigation water rights, and the Crooked River Act to better minimize and mitigate the impacts of incidental take of covered fish species to the maximum extent practicable.

Commenters

TRIBE-1

Response

The Draft EIS evaluated the potential effects of implementing the proposed action and action alternatives on Spring Chinook salmon, sockeye salmon, and steelhead trout, which constitute a significant part of the traditional harvest of fish by the CTWS and remain an important fishery for tribal members. The potential effects on tribal trust assets that would result from the proposed action and alternatives are evaluated in Draft EIS Chapter 3, Section 3.8, *Tribal Resources*.

Following completion of the Draft EIS public review and comment period and the production of the Final EIS, the applicants have determined that Chinook salmon should not be considered a covered species because it is not listed as threatened or endangered under the ESA, and have removed it from the Final HCP. Despite this, the effects of the proposed action and action alternatives on Chinook salmon are still analyzed in this Final EIS.

The Draft EIS does evaluate the potential effects on tribal trust assets within Section 3.8. Effect TR-2 analyzes the proposed action and alternatives effects on reintroduction of salmon and steelhead trout upstream of the Pelton Project. While storage season effects on reintroduction were determined to be beneficial, potential irrigation season effects on the Crooked River were determined to be adverse because of modeled water temperatures during summer months and uncertainty about annual water management decisions that are difficult to capture in RiverWare modeling results.

Effect TR-3 in the Draft EIS analyzes the effects of the proposed action and alternatives on wildlife and plant species harvested by the CTWS and concludes the overall effect would be not adverse because the proposed action and alternatives would improve or not change wildlife and plant species populations in most of the Deschutes Basin.

Additional analyses provided for this Final EIS that reflect changes in HCP conservation measures provided slightly different modeling results, but the conclusions for Effects TR-2 and TR-3 remain the same as disclosed in the Draft EIS.

Throughout the development of the draft HCP, the Services strongly advocated for conservation measures related to tribal trust resources, however the HCP is a voluntary, applicant-driven document. The Services understand that the Tribe's 1997 settlement did not specifically address all the Tribe's possible off-reservation water rights claims, as the 1997 settlement only addressed on-reservation and off-reservation rights to water adjacent to the reservation, (i.e. Deschutes River, Pelton Lakes, and the Metolius River; refer to the 1997 Settlement, Art. VI.A.16). However, the Services acknowledge that the Tribe's claim (as set out in its comment) to off-reservation water rights in the Deschutes Basin, and that this claim includes the Crooked River within the Plan area, as well as its tributaries. Final EIS, Section 3.8.2.1, *Confederated Tribes of the Warm Springs Reservation of Oregon* has been revised to reflect this claim.

While the facts of the *Baley* decision (cited in the Tribe's comment) are specific to the operation of a Reclamation project and the various Indian reservations in the Klamath Basin, even if its holding were applicable here the Services will conduct intra-Service section 7 consultations prior to issuing the ITPs and the ITPs will not be issued unless the Services conclude that such actions will not violate section 7(a)(2) of the ESA.

The Services will ensure that Reclamation is aware of the Tribe's claims and concern regarding shaping of flows in the Crooked River. Since the storage and release of the uncontracted (fish and wildlife) water from Bowman Dam is a discretionary federal action, it will be evaluated during the ESA Section 7 consultation process with Reclamation.

The applicants' actions and Reclamation's storage and release of water from Bowman Dam both occur and overlap in the Crooked River. For this reason, those actions will be analyzed in one BiOp that covers both the Services' issuance of ITPs and Reclamation's operations of Bowman Dam on the Crooked River. Reclamation releases water from Bowman Dam for the benefits of fish and wildlife. Optimizing the utility of this water could address some of the concerns the CTWS identifies in its comments.

EIS-6.3 Upper Deschutes River and Crooked River Conservation Measures DR-2 and CR-4

One commenter requested that the Services analyze an alternative conservation funding strategy that better balances an allocation of resources among the covered areas and the covered species. The commenter felt that it was not reasonable to allocate $8,000 annually to the Crooked River subbasin in the context of the total capital investment associated with the HCP. They requested that the scope of the Services' analyses should include coordinating the HCP conservation funds with other sources of capital, such as the Pelton Fund, to maximize the efficiency of the HCP conservation funds. In addition to this, they recommend that the Services consider whether some of the resources currently allocated to canal piping could be better deployed to other conservation measures throughout the covered areas and among the covered species.

Commenters

TRIBE-1

Following the release of the Draft EIS for public review and comment, the proposed action was modified to include an annual $150,000 Upper Deschutes River conservation fund and an annual $10,000 conservation fund for Whychus Creek. Please refer to Deschutes Basin HCP Chapter 6, *Habitat Conservation,* Conservation Measures UD-1 and WC-6 for more information. Use of these funds will be governed by an implementation committee established with the entity holding the funds. The Services will be a member of the implementation committee. These conservation funds may be used for instream leasing, habitat restoration and/or enhancement projects, or other projects that benefit the covered species.

The Upper Deschutes Conservation Fund is designed to address impacts on the Oregon spotted frog. If there are projects funded via the Pelton fund that can contribute to Oregon spotted frog then the funds can be combined to further enhance Oregon spotted frog conservation needs. The Whychus Creek and Crooked River conservation fund s, which are designed to address many of the same species as the Pelton Fund, can be used for a variety of purposes, including to support larger projects funded by the Pelton Fund. Wherever possible there will be coordination to enhance and maximize the conservation utility of the conservation funds to ensure for habitat improvements in the Deschutes River system. However, because the applicants will be providing funding specifically to minimize and mitigate for the incidental take of covered species from their covered activities, HCP funding must be focused on those efforts.

Similarly, funding to pipe canals in the basin could contribute to HCP goals and other basin programs. However, funding for canal piping is provided by the U.S. Department of Agriculture's Natural Resources Conservation Service as well as well as potentially other sources, which are outside of the Services' control, and cannot be redirected to support HCP-related mitigation.

EIS-6.4 Modification of Adaptive Management Measure

One commenter requested that the Services analyze a comprehensive adaptive management alternative that allows for future adjustments to all conservation measures in the HCP to optimize the practicable minimization and mitigation of effects on all covered species across all covered lands during the permit term.

Commenters

TRIBE-1

Response

HCPs are by nature designed to provide certainty to applicants regarding future conservation commitments. Accordingly, adaptive management actions for an HCP cannot be so open ended that they result in full revision of all conservation measures as the commenter has requested. Rather, adaptive management for an HCP requires identifying a known area of uncertainty, studies to address that uncertainty, and parameters that would be modified in the conservation measures based on the study results.

As described in Draft HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*, the HCP includes multiple provisions for monitoring, reporting and adaptive management of the conservation measures for the proposed action, which are consistent with the requirements of ESA, and which have also been incorporated into the action alternatives (refer to Draft EIS Chapter 2, *Proposed Action and Alternatives*). Therefore, a stand-alone adaptive management and monitoring alternative, as described by the commenter, is not required. The Final HCP explains that compliance monitoring to ensure conservation measures are implemented as described, and effectiveness monitoring that addresses uncertainty about the results of a conservation measure, are included for specific conservation measures. Effectiveness monitoring would be applied to conservation measures affecting Crane Prairie Reservoir and Wickiup Reservoir and Upper Deschutes River Oregon spotted frog habitat. The results of these monitoring efforts would be subjected to an adaptive management process.

The Draft EIS effects analyses for Oregon spotted frog and other covered species takes into consideration the potential for adaptive management and monitoring to influence longer-term conditions for these species.

EIS-6.5 Water Storage Capacity Expansion

One commenter requested considering enlarging Haystack Reservoir or creating another reservoir closer to Culver to store water in the proposed action, cumulative effects analysis, and as an additional alternative for North Unit ID.

Commenters

GP-137

Response

The Services recognize the potential benefit that could result from the Upper Deschutes River Basin Study recommendations. Additional downstream storage and other Upper Deschutes River Basin Study recommendations were considered during development of the Draft HCP and Draft EIS but were not included as alternatives because substantial uncertainty exists about the feasibility of such an action. In addition, additional storage does not appear to meet the practicability requirements and funding assurances of an HCP. Similarly, recommendations for additional storage from the Upper Deschutes River Basin Study process was not considered a reasonably foreseeable future project that should be considered in the cumulative impacts analysis. This is because expansion of a reservoir or creation of a new downstream reservoir is highly uncertain, and because the project lacks a funding mechanism and has not been formally proposed.

EIS-6.6 Protection and Restoration of River Complexity and Habitat Complexity

One commenter claimed that the Services had ignored the habitat changes that have occurred over the history of irrigation use of the Upper Deschutes River and that protection and restoration of the river and habitat complexity should have been included in the analysis and alternatives.

Commenters

GP-179

Response

The Draft EIS analyses did take into consideration the effect that historically higher irrigation season flows and lower storage season flows has had on the Upper Deschutes River and its resources. The intent of the proposed action and action alternatives is to reduce some of the seasonal variability in flows that has resulted in channel and vegetation effects. The proposed action and action alternatives are intended to stabilize Crane Prairie Reservoir storage fluctuations, increase fall and winter releases into the Upper Deschutes River, and reduce summer releases to improve year-round habitat conditions for covered species. The FWS anticipates that flow adjustments will result in passive restoration of the Deschutes River channel over time and the will be used to implement additional active restoration activities that enhance Oregon spotted frog habitat. In some areas along the Deschutes River, these restoration activities for Oregon spotted frog will coincide with passive channel improvements that increase habitat complexity and function of the river ecosystem. These restoration actions will be timed in sequence with the flow requirements in Conservation Measure WR-1 to optimize the long-term functionality of the Deschutes River for Oregon spotted frog and other fish and wildlife. While it is recognized that implementing the proposed action or the action alternatives would not fully restore the river to pre-irrigation conditions, overall the conservation measures proposed would minimize and mitigate the effects to the Oregon spotted frog and other covered species and their habitat over the 30-year permit term, when compared to the no-action alternative

Alternative 3 Modifications

EIS-6.7 Conservation Fund

One commenter appears to recommend that Alternative 3 should be selected by the Services and modified to base conservation funds for the Deschutes River, Crooked River, and Whychus Creek on the costs of specific restoration activities, conservation of specific flow quantities, and water quality required for covered species.

Commenters

STATE-4

Response

As detailed in Draft EIS Chapter 2, *Proposed Action and Alternatives*, allocation of the Deschutes River, Crooked River, and Whychus Creek conservation funds would be administered by implementing committees to prioritize habitat restoration or enhancement projects and flow augmentation that would benefit covered species. These conservation funds are proposed for the proposed action and action alternatives to complement related actions in the basin, but not cover or replace them entirely. Use of the funds will be governed by implementation committees, of which the Services will be members. Decisions regarding the allocation of conservation funds to maximize conservation of covered species will need take into consideration the cost of specific restoration activities, the need for flow augmentation in specific reaches, and water quality required for covered species. Given this, the total future costs of specific restoration activities and conservation of specific flow quantities and water quality projects are not fully determined at this time and it would be speculative to do so at this stage. HCPs, while providing conservation for the covered species, also must provide a degree of certainty to the applicants regarding their future commitments including defining the limits of what commitments may be required of the applicants.

EIS-6.8 Water Right Trades and Mitigation Banking

One commenter appears to recommend that Alternative 3 should be selected and modified to provide a commitment to protect instream flows through a State-held secondary instream water right, which protects the water to Lake Billy Chinook. While other commenters recommend that the selected alternative must ensure against jeopardy and that mitigation banking and water right trades be included.

Commenters

STATE-4, ORG-15, GP-134

Response

Although Alternatives 3 and 4 assumed Reclamation applied for and obtained an in-stream water right on the uncontracted water that action would need to be taken by Reclamation, as they hold the storage right for such water. The applicants cannot effectuate this action. Further, the Services are engaged in ESA Section 7 interagency consultation with Reclamation regarding the storage and release of the uncontracted (fish and wildlife) water from Bowman Dam, where the effects of the unprotected releases of the uncontracted fish and wildlife water will be assessed.

EIS-6.9 Whychus Creek

One commenter appears to recommend that Alternative 3 should be selected and modified to develop measures for Whychus Creek to address Section 303(d) listing and low flows limiting steelhead trout, Chinook salmon, and bull trout rearing, migration, and spawning.

Commenters

STATE-4

Section 303(d) listings are Clean Water Act (CWA) designations that identify bodies of water that are impaired. Tools within the CWA are used to address these water quality impairments. The Services' issuance of an ITP is based on meeting issuance criteria under Section 10 of the ESA, including minimizing and mitigating the effect of the applicant's actions on the covered species to the maximum extent practicable. While the Services will also ensure that issuance of the ITPs and implementation of the Deschutes Basin HCP comply with other applicable federal laws, regulations, treaties, and applicable executive orders, including the CWA, they do not have the authority to require applicants to develop additional measures under the CWA.

EIS-6.10 Biological Effects

Commenters recommended that the proposed action or action alternatives should be modified by the applicants to address/include the negative biological effects of poor water quality and disease caused by return flows, tail water and effluent releases.

Commenters

STATE-4, ORG-15

Response

As set forth in NEPA regulations (40 CFR § 1502.14), an EIS analysis need not consider every possible alternative to a project, but rather a range of reasonable alternatives. The range of alternatives considered for an HCP must also take into consideration the applicant's means to implement potential alternatives (USFWS and NMFS 2016). The EIS alternatives screened and the proposed action and action alternatives analyzed within the EIS did not consider nor cannot be modified to address water quality within return flows, tail water and effluent releases because water quality impacts from these sources are outside the jurisdiction and control of the applicants. Based on the HCP, the applicants have no means to control many sources of water quality impairments throughout the basin, including sources of pollutants from return flows, tail water, and effluent releases.

Applicants' control related to return flows is limited to storage, releases, and diversions and associated effects on temperature, surface water elevations, and stream flows. The applicants have revised the Final HCP and associated request for ITP coverage to address incidental take only from those known water quality impacts under the applicants' jurisdiction (temperature, surface water elevations, and rates and volumes of stream flows). The conservation strategy in the final HCP defers to jurisdictional authority of the Oregon Department of Environmental Quality ("ODEQ") for the management and regulation of water quality discharges from return flows, tail water, and effluent releases throughout the Deschutes basin. Effects on water quality and associated biological resources due to changes in temperature, surface water elevations, and stream flows are discussed in the Final EIS, Section 3.2 *Water Resources*, Section 3.3 *Water Quality*, and Section 3.4 *Biological Resources*.

For agricultural pollutants, the source and quantities of such pollutants are the product of a complex array of factors and actions by others that are outside the jurisdiction and control of the applicants, including operational decisions made by individual agricultural operators. The proposed action would not create additional pesticide sources, pathways or otherwise alter the occurrence of pesticides. As described in the Deschutes Basin Draft HCP Chapter 3, Scope of the DBHCP, flow and diversion rate changes on the Crooked River—the primary surface water with notable issues related to return flows—are not expected to significantly change under any of the alternatives.

For effluent discharges, the proposed action would have no effect on discharges from the City of Prineville's wastewater treatment facility. Wastewater effluent pollutants are managed under a National Pollutant Discharge Elimination System (NPDES) that is independent from the proposed action. As described in the HCP and in Final EIS, Section 3.3, Water Quality, the existing National Pollutant Discharge Elimination system (NPDES) permit addresses biological effects and no further mitigation or modification of alternatives is required. In addition, as noted, the applicants have revised their request for ITP coverage to include only those water quality effects of the covered activities related to temperature, surface water elevations, and rates and volumes of stream flows.

Therefore, the alternatives have not be modified to mitigate chemical contaminants related to return flows, tail water and effluent releases.

EIS-6.11 Ochoco ID's Withdrawal

One commenter stated that Alternative 3 fails to identify Ochoco ID's withdrawal of its protest on the instream water right as a potential conservation measure.

Commenters

STATE-4

Response

The Ochoco ID's withdrawal action is noted and may be relevant to the HCP or ESA Section 7 processes. However, it has been considered as part of the NEPA baseline, within the Draft EIS, and is therefore not included as an HCP conservation measure, as suggested.

EIS-6.12 Date of Authorization

One commenter requested that, under Alternative 3, the start year for the HCP be defined as 2019 rather than "date of authorization by the Services" as the use of this term is vague and incorrect as in many cases is this work has already commenced.

Commenters

ORG-4

Response

While the HCP was prepared in 2019 to address incidental take of ESA-listed species likely to be caused by certain water management activities, the applicants' applications for ITPs need to be reviewed by the Services to determine if they meet ITP issuance criteria before the HCP can be implemented. Given this, defining the start year for the HCP as the date of authorization, e.g., issuance of the ITP by the Services, is accurate.

EIS-6.13 Wickiup Minimum Fall and Winter Flow Schedule Adjustments

One commenter requested that the Wickiup minimum fall and winter flow schedule defined in Conservation Measure WR-1, *Wickiup Reservoir Operation* for Alternative 3 be adjusted as follows:

- 1–5 years: 200 cfs
- 6–10 years: 300 cfs
- 11–15 years: 400 cfs
- 15–30 years: 500 cfs

Commenters

ORG-4

Response

The requested modification to Alternative 3 fall and winter flow targets under Conservation Measure WR-1 is consistent with the intent of the current Alternative 3 minimum flow schedule proposal, as defined in Final EIS Chapter 2, Table 2-5, which provides for the potential for winter flows to a vary between 400 and 500 cfs, between years 11 and 30, when hydrological conditions allow and annual flow decision-making concludes that sufficient storage exists in Wickiup Reservoir to achieve flows of up to 500 cfs. Early RiverWare modeling efforts indicated that requiring fall and winter minimum flows of 500 cfs or more in every year without considering the water year type, storage available in Wickiup Reservoir and precipitation forecasts would likely undermine the goal to maximize flow benefits for Oregon spotted frog. Therefore, fall and winter flows above 500 cfs were not considered further.

Following completion of the Draft EIS public review and comment period and the production of the Final HCP and Final EIS, the applicants have modified the proposed action to improve the flow conditions proposed. These revised fall and winter flows would allow for 100 cfs for years 1–7, 300 cfs for years 8–13, and 400–500 cfs for years 13–30, with application of a variable flow tool for annual decision-making to achieve flows in the 400 to 500 cfs. These changes combined with an annual $150,000 conservation fund for the Upper Deschutes River would facilitate improvements and the recovery of Oregon spotted frog.

EIS Alternatives Analysis

EIS-6.14 Addressing Competing Biological Needs

Commenters stated that the alternatives analysis failed to address the competing biological needs of the multiple species. The commenters also stated that the analysis of the Crooked River system failed to look at year-round minimum flows, or alternatives that were divorced from the Crooked River Act. Finally, commenters recommended that the Services engage stakeholders to identify solutions for balancing the needs of the entire Deschutes Basin and focus analysis on mechanisms and ecological processes leading to desired outcomes, rather than setting precise criteria for the entirety of the ITP term.

Commenters

TRIBE-1, ORG-15

Response

All the conservation measures included in the Final EIS for the proposed action and action alternatives are proposed to improve conditions for all covered species, including steelhead trout. The Services' issuance of ITPs is based on meeting issuance criteria under Section 10 of the ESA, including minimizing and mitigating the effect of the applicant's actions on the covered species to the maximum extent practicable. Given this, the alternatives evaluated in the EIS were focused on those that could meet the purpose and need for the federal action, improve habitat conditions, reduce take, and feasibly be implemented by the applicants to benefit multiple covered species. In addition to the Services issuance of ITPs (if issuance criteria are met), other ongoing and future actions in the watershed, such as ongoing habitat restoration, flow augmentation and leasing, improvements to the Pelton Project, and water conservation projects will also be needed to supplement and further improve species conditions in the Deschutes Basin watershed.

Further, the proposed action and action alternatives are based on goals and objectives and a biological rationale for proposed conservation measures. For the Crooked River, the HCP (i.e., proposed action) proposes conservation goals and objectives 1–3, which provide for maintaining an instream flow of 50 cfs in the Crooked River during the winter irrigation storage season, funding for habitat restoration, and screening diversions to reduce entrainment and aid fish migration. These goals and objectives and the proposed conservation measures are intended to provide a clear biological rationale for minimizing and mitigating the effect of the take of covered species to the maximum extent practicable. An approach that would primarily consider biological needs without considering practicability is not the intent of ESA Section 10a(1)(b) and is not appropriate for an HCP or EIS. However, Crooked River Goal 1 is clear that the intent of Conservation Measure CR-1 is to assist in the reintroduction of the covered anadromous salmonid species in the Crooked River subbasin by contributing to instream flows and its intent is to further improve flows when Prineville Reservoir does not fill.

The applicants and the Services have collaborated with stakeholders to develop a final conservation strategy that, if approved, will provide long-term benefits to the covered species based on their biological needs. Please refer to response to comment EIS-1.1, *Length of Public Review and Comment Period Compared to Guidance*, for additional information on how the Services have engage stakeholders, throughout the HCP and EIS process.

Finally, As described in Draft HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*, the HCP includes multiple provisions for monitoring, reporting and adaptive management of the conservation measures for the proposed action, which have also been incorporated into the action alternatives (refer to Draft EIS Chapter 2, *Proposed Action and Alternatives*). The HCP explains that compliance monitoring to ensure conservation measures are implemented as described, and effectiveness monitoring that addresses uncertainty about the results of a conservation measure, are included for specific conservation measures, meaning that criteria in the conservation measures can be modified, as required, over the lifetime of the ITP based on the study results.

No-Action Alternative

EIS-6.15 Analysis of Non-Issue of Incidental Take Permit

One commenter stated that the no-action alternative fails to adequately analyze take of Oregon spotted frog under the no-action alternative as the winter flow regimes proposed in the Draft EIS do not meet the winter flow recommendations (i.e., 200 cfs) made by the Services in the 2017 *Deschutes Project BiOp* to support Oregon spotted frog habitat and in the event that the irrigation districts do not receive ITPs.

Commenters

ORG-15

Response

The citing of a minimum winter flow of 200 cfs in the 2017 *Deschutes Project BiOp* was included as a conservation recommendation, to continue to increase flows toward the long-term goal of providing flows that support suitable habitat for the Oregon spotted frog, not a legal requirement (50 CFR 402.02 and 402.16(j)). As the no-action alternative assumes the continuation of the existing management plan or program, the Services believe that defining the no-action alternative to include continuation of the current minimum fall and winter flows of 100 cfs in the Upper Deschutes River is the most realistic condition that would occur in the absence of issuance of ITPs, assuming the continuation of existing management operations and programs, as defined in Draft EIS Chapter 2, Table 2-1.

EIS-6.16 No-Action Alternative Description and Analysis

Commenters expressed that information, including information relating to the NMFS 2005 BiOp, projects, plans, and programs, is omitted from the no-action alternative description and should be included to assist the public in its review, to inform the analyses, FWS' final decision, and subsequent NMFS adoption of the EIS.

Commenters

ORG-12

Response

The no-action alternative is described in Draft EIS Chapter 2, Section 2.1.1, *Alternative 1: No Action,* as required by the CEQ regulations (40 CFR § 1502.14). Consistent with NEPA's requirements, the no-action alternative defines the future circumstances that are predicted to continue or occur without the proposed action. The list of programs and projects in Chapter 2, Section 2.1.1, is the Services' best estimate of those programs, plans, and projects that would continue into the future whether or not the proposed action is approved. Information relating to the actions covered in the current NMFS BiOp for the Deschutes River Basin Projects to address take of Middle Columbia River steelhead trout (National Marine Fisheries Service 2005) was considered for the no-action alternative but were only referenced in the Draft EIS so as not to repeat lengthy and complex discussions. The analysis of the no-action alternative in Section 3.4, *Fish and Mollusks,* captures the effects of previous BiOps to the extent that the RiverWare model is able to estimate the no-action alternative flow conditions based on the historical hydrology in the river system and no-action alternative conditions.

EIS-6.17 No-Action Alternative Not a Realistic Scenario

One commenter stated that while the Draft EIS acknowledges that under the no-action alternative the Oregon spotted frog would be subject to take, the Draft EIS analysis does not analyze what would happen under Section 9 enforcement, instead asserting that the Services would "take no action." The commenter believes that this position is implausible given the history of litigation surrounding the take of the Oregon spotted frog and the guidance provided in the Services' HCP Handbook that the no-action alternative for an HCP Draft EIS should be a condition in which no take occurs.

Commenters

ORG-15

Response

The Final EIS Chapter 2, Section 2.1.1, has been modified to clarify that "take no action" was referring to taking no action on an ITP permit application. To address questions about the feasibility or potential to allow the no-action alternative conditions to occur, Final EIS Chapter 2, Section 2.1.1, now describes the following:

> For example, under the no-action alternative analyzed in this EIS, the Services would take no action on the permit application. No ITPs for the Deschutes Basin HCP would be issued, and the applicants would remain subject to the take prohibition for listed species under ESA (ESA). Ongoing applicant activities or future actions that may result in the incidental take of federally listed species would need to be authorized through ESA Section 7 where possible, as is the case now where a subset of the applicants are operating under a BiOp for ESA coverage, or through separate project-by-project ITP applications submitted by each applicant under Section 10. Specific potential actions that could be taken by the applicants under separate ITP applications are unknown, and a no-action alternative that assumes no take of covered species is not considered feasible (refer to Section 2.3, *Alternatives Considered but Eliminated from Further Consideration*, and Appendix 2-A).

This discussion clearly indicates that should no action occur, the applicants would still be subject to the requirements of the ESA. No Action means the Services would not take action on the permit application, not that no other action would occur. This No Action Alternative is appropriate because it describes what is likely to occur without an ITP without speculating about other potential actions.

EIS-6.18 Comparison between No-Action Alternative and Action Alternatives

One commenter believes that the presentation of the no-action alternative in the Draft EIS did not provide a sufficient basis by which to compare the action alternatives to the no-action alternative and that failure to provide this comparison prevented the public from comparing the status quo with the action alternatives to determine the magnitude of environmental effects of the action alternatives.

Commenters

ORG-12

Response

The no-action alternative and the action alternatives are defined in Draft EIS Chapter 2, *Proposed Action and Alternatives*. The no-action alternative defines the future circumstances that are predicted to continue or occur without the proposed action and assumes the continuation of the existing management plan or program, such as the *Deschutes Project BiOps*. The no-action alternative is, therefore, the condition against which the proposed action and action alternatives are judged and can be compared.

Draft EIS *Executive Summary*, Table ES-1, summarizes the impacts that could occur under the no-project alternative, proposed action and action alternatives for all environmental issues analyzed in the EIS. Draft EIS Chapter 3, provides a detailed analysis of potential effects and describes the approach to characterizing and evaluating each resource and the assessments methods used, the potentially affected environment for the resource, and an assessment of the environmental consequences of the no-action alternative, proposed action, and action alternatives.

EIS-6.19 No-Action Alternative Reliance on 2005 Biological Opinion Continuation and Consideration of the Crooked River Act

One commenter stated that the no-action alternative erroneously relies on the continuation of the February 17, 2005 BiOp between Reclamation and NMFS to address incidental take of steelhead trout from the activities covered by the 2005 BiOp and therefore fails to take into consideration that the adoption of the Crooked River Act was a changed circumstance which requires a new BiOp and what that means for fish flows and/or irrigation practices.

Commenters

ORG-15

Response

The 2005 NMFS BiOp represent current status and therefore are appropriate to include in the no-action alternative. The biological resources analysis in Draft EIS Chapter 3, *Affected Environment and Environmental Consequences*, do capture flow changes that occur under the Crooked River Act in the RiverWare modeling used to estimate potential effects on covered species. The Services are also engaged in ESA Section 7 consultation with Reclamation for their actions, in the Crooked River.

7 EIS Alternatives Preference

Opposition to the No-Action Alternative

EIS-7.1 Continued Degradation under No-Action Alternative

One commenter stated that the no-action alternative would result in continued degradation of the Deschutes River and dependent species and was therefore unacceptable.

Commenters

ORG-5

Response

NEPA requires an EIS to define and describe effects of a no-action alternative, which represents current and future human environment conditions that would occur in the absence of a proposed action or action alternative. The no-action alternative provides the basis for comparison of the proposed action and no-action alternatives' effects and is not an alternative that would be selected or approved by the Services. Rather, it is an estimate of what could occur if ITPs are not issued for the proposed action. Please refer to Draft EIS Chapter 2, Section 2.1.1, *Alternative 1: No Action*, for additional explanation.

Opposition to the Proposed Action

EIS-7.2 Flow Restoration

One commenter was opposed to the proposed action, stating that it would not restore flows in the Upper Deschutes' streams and rivers that have been severely affected by irrigation district infrastructure and activities for over 100 years, much to the detriment of native aquatic populations.

Commenters

ORG-2

Response

Both the proposed action and the action alternatives would improve flow conditions in basin creeks and rivers. In the Upper Deschutes River over the permit term, fall and winter flows would substantially increase under the proposed action and the action alternatives compared to the no-action alternative. The proposed action and the action alternatives would also provide for less variation of storage and irrigation season flows, which is expected to reduce bank erosion, stabilize streamside vegetation, and improve habitat conditions for covered species.

Opposition to the Proposed Action Alternatives

EIS-7.3 Impacts on Irrigation Districts, Farmers, and Agricultural Community

Commenters were opposed to analyzing additional mitigation beyond what is proposed in the Draft HCP (Draft EIS, proposed action), stating that the disproportionate impact and excessive mitigation on the North Unit ID, its farmers, and the local agriculture community relative to the broader central Oregon region threatens individual on-farm profitability while jeopardizing ongoing irrigation operations and improvements and conservation efforts in the Deschutes Basin.

Commenters

GP-156, GP-157

Response

When preparing an EIS, an agency must include alternatives to the proposed action for comparison (40 CFR § 1502.14). In line with this requirement, FWS presented a host of additional measures, intended to mitigate adverse environmental consequences, and analyzed them within the Draft EIS as components of the action alternatives. The analysis of these additional action alternatives are intended to inform decision makers about reasonable measures that could improve the proposed action and to advance NEPA's purpose of ensuring informed and transparent environmental decision making.

The potential effects of implementing the proposed action and action alternatives on North Unit ID and other basin districts were fully evaluated in the Draft EIS. Water supply effects are disclosed in Draft EIS Chapter 3, Section 3.2, *Water Resources*, and do conclude that the proposed action and the action alternatives would result in a reduction in North Unit ID water supply compared to the no-action alternative. Given this, the applicants have, through several years of collaboration, worked to develop a proposed action to protect their ability to supply irrigation water to their patrons. The proposed action is designed to maintain current Upper Deschutes River irrigation diversions at the beginning of the permit term to provide some time for North Unit ID and other districts to plan for and adjust to future lower Wickiup Reservoir storage conditions. Conservation Measure WR-1 is proposed to strike a balance between reduction of take of covered species and the viability of continued agricultural operations in the basin.. Further, the proposed action or the action alternatives and their associated conservation measures do not limit or impede the continuation or implementation of additional water conservation projects by the district or patrons to increase district conveyance efficiencies and on-farm irrigation efficiencies.

Draft EIS Chapter 3, Sections 3.5, *Land Use and Agricultural Resources*, and 3.9, *Socioeconomics and Environmental Justice,* present the effects of reduced water supply on water for crops and the associated effects on the agricultural and local economies. Please also refer response to comment EIS-19.4, *Negative Effects on North Unit ID Farmers and Local Economy*, which provides additional information on this matter.

While it is recognized that some of the conservation benefits under the action alternatives would more greatly affect North Unit ID, inclusion of these measures in the EIS analysis ensures that a reasonable range of alternatives are being analyzed.

EIS-7.4 General Opposition

Commenters expressed general disagreement with the adequacy of the Draft HCP and Draft EIS, the proposed action, use of tax dollars, the effects analysis, tourism on the Deschutes River, farming practices, the need for the project, and various other concerns.

Commenters

ORG-15, ORG-22, GP-1, GP-2, GP-8, GP-9, GP-10, GP-14, GP-21, GP-28, GP-30, GP-32, GP-38, GP-40, GP-45, GP-73, GP-75, GP-78, GP-82, GP-90, GP-91, GP-92, GP-122, GP-125, GP-134, GP-135, GP-139, GP-159, GP-170, GP-173, GP-180, FLP-2, FLP-5, FLP-12, FLP-21, FLP-23, FLP-24, FLP-29, FLP-30, FLP-31, FLP-35, FLP-46, FLP-56, FLP-61, FLP-62, FLP-65, GP-93, GP-42, ORG-1, ORG-23, FLP-17, ORG-2, GP-29, GP-34, GP-172, GP-190, GP-191, GP-124

Response

Comments were reviewed for substantive issues on the EIS as required by NEPA guidelines and were found to be non-substantive and without sufficient detail for consideration. Substantive comments are responded to throughout this appendix.

Support for the Proposed Action and Action Alternatives

EIS-7.5 General Support

Several commenters confirmed their support for the proposed action as it is based on best available science and is the only realistic long-term alternative, striking a balance for all stakeholders between the recovery of listed species, water flows, irrigation requirements, timelines, and impacts on the local agricultural economy.

Commenters

LOCAL-1, ORG-18, GP-136, GP-146, GP-150, GP-153, GP-154, GP-156, GP-157, GP-160, GP-162, GP-186, ORG-5, ORG-9, ORG-10, ORG-13, ORG-17, ORG-19, GP-121, GP-133, GP-142, GP-167, FLP-12

Response

The Services acknowledge commenters' support for the proposed action. The commenters should note, however, that updates to the proposed action conservation measures have been made since the release of the Draft EIS. Final EIS Chapter 2, *Proposed Action and Alternatives*, has been revised to reflect these updates, which include: expedited implementation of fall and winter flows enhancements, inclusion of the Upper Deschutes Conservation Fund, and other changes aimed at increasing its conservation effects. These updates to the proposed action have been made to improve the conservation effect of the proposed action on covered species. Most of these changes reflect elements of Alternative 3 that were analyzed in the Draft EIS. Final EIS Chapter 3, *Affected Environment and Environmental Consequences*, presents updated analyses to reflect these changes. No new or more significant impacts were identified as a result of these updates.

Support for Alternative 3

EIS-7.6 General Support

A number of commenters confirmed their support for the selection of Alternative 3 because it includes expedited implementation of fall and winter flow enhancements, the establishment of conservation funds and the protection of uncontracted storage releases from Bowman Dam, and the best balance between hydrological beneficial and adverse effects downstream of Wickiup Dam. As a result, commenters felt that Alternative 3 would help support the mitigation and restoration of covered species and bring the greatest benefit to the river, fish, and wildlife in a shorter time period.

Commenters

FED-1, STATE-4, LOCAL-1, ORG-4, GP-176

Response

The Services acknowledge commenters' support for Alternative 3. The commenters should note, however, that Final EIS Chapter 2, *Proposed Action and Alternatives*, describes updates to the proposed action. Refer response to comment EIS-7.5, *General Support*.

Support for Alternative 4

EIS-7.7 General Support

Several commenters supported the selection of Alternative 4, stating that it balances the present needs of the river and its inhabitants with that of the agricultural community and restoration needs. Commenters were in support of the inclusion of the flow regimes, shorter incidental permit term, and increased conservation measures included in Alternative 4 because they believed that they would more rapidly restore water quality, improve habitat, and offer a greater level of relief and protection for endangered species, when compared to the other alternatives.

Commenters

ORG-3, ORG-5, ORG-12, ORG-18, GP-2, GP-6, GP-45, GP-88, GP-91, GP-92, GP-99, GP-80, GP-103, GP-110, GP-137, GP-145, GP-158, GP-165, FLP-69, GP-181, FL-1, FLP-64, FLP-66, FLP-70

Response

The Services acknowledge commenters' support for Alternative 4. The commenters should note, however, that Final EIS Chapter 2, *Proposed Action and Alternatives*, describes updates to the proposed action, which have been made since the release of the Draft EIS. Please refer response to comment EIS-7.5, *General Support*.

EIS-7.8 Support for North Unit ID Mitigation

One commenter supported Alternative 4, but only on the understanding that harm to North Unit ID will be addressed and mitigated and that in critical low water years flexibility may be needed.

Commenters

ORG-5

Response

The Services acknowledge the commenter's support for Alternative 4. NEPA requires comparative evaluation of a reasonable range of alternatives that are technically and economically practicable and feasible, that avoid or reduce environmental effects, and that meet the purpose and need for the federal action as described in Draft EIS Chapter 1, *Purpose and Need*. The purpose of Alternative 4 would be to implement the HCP as described in the proposed action, but with a 20-year permit term, and modifications to the conservation strategy to address accelerating flow modifications and the uncertainty about covered species responses to flow modifications. A 20-year permit term would allow for adjusting the conservation strategy sooner than under a 30-year permit term for the proposed action and Alternative 3. While it is recognized that the conservation benefits under Alternative 4 would more greatly affect North Unit ID, its inclusion in the EIS analysis ensures that a reasonable range of alternatives are being analyzed.

Further, the commenter should note that Final EIS Chapter 2, *Proposed Action and Alternatives*, describes updates to the proposed action, which have been made since the release Draft EIS. Please refer response to comment EIS-7.5, *General Support*.

Support for Alternative 3 and Alternative 4

EIS-7.9 Preference for the Action Alternatives

A number of commenters stated their preference for the action alternatives over the proposed action because the action alternatives have expedited timelines for increasing and stabilizing flows, provide protection of Crooked River water and flows released from Bowman Dam, are more responsive to climate change pressures, include provision for a conservation fund, and would offer improved conditions and/or significant benefits for Oregon spotted frog, steelhead trout, and Chinook salmon while also protecting important agriculture needs.

Commenters

STATE-2, ORG-5, ORG-14, ORG-19, GP-104, GP-106, GP-134, GP-137, GP-148

Response

The Services acknowledge commenters' support for Alternatives 3 and 4. The commenters should note, however, that Final EIS Chapter 2, *Proposed Action and Alternatives*, describes updates to the proposed action, which have been made since the release of the Draft EIS. Please refer response to comment EIS-7.5, *General Support*.

8 Water Resources—Water Users and Water Rights

Request for Clarification

EIS-8.1 Tribal Water Rights

One commenter noted that the CTWS was not identified as a water user in Draft EIS Section 3.2, *Water Resources*, and that the Tribe holds reserved water rights per the Tribe's WRSA in the Deschutes and Metolius Rivers.

Commenters

TRIBE-1

Response

The study area for changes in water supply in the Draft EIS Chapter 3, Section 3.2, and Appendix 3.2-A, *Water Resources Technical Supplement*, includes the Deschutes River and Crooked River and hydraulically connected surface water tributaries above Lake Billy Chinook where the proposed action and action alternatives were considered to have the potential to affect water supply. The Lower Deschutes and Metolius Rivers were not included in the study area because the proposed action and action alternatives have no potential to affect water supply in these rivers. Therefore, water users with water rights in the Lower Deschutes and Metolius Rivers, including the CTWS, were not identified as a water user in Draft EIS Chapter 3, Section 3.2, or Appendix 3.2-A.

Draft EIS Chapter 3, Section 3.8, *Tribal Resources*, does consider the potential for the proposed action and action alternatives to affect the ability of the CTWS to exercise this reserved water right.

Assumptions

EIS-8.2 Crooked River Water Users

The commenter posits that only North Unit and Ochoco IDs can be affected by the proposed action and alternatives; the assertion that other water users in the Crooked River could be affected by the proposed action is evidence that those irrigators are diverting uncontracted storage releases.

Commenters

ORG-15

Response

As described in Draft EIS Chapter 3, Section 3.2.3.2, *Alternative 2: Proposed Action*, Effect WR-2: *Change Water Supply for Irrigation Districts and Other Surface Water Users*, the "other Crooked River water users" include small irrigation districts, private irrigators using shared conveyance systems, and private irrigators with individual diversion (refer to Draft EIS Appendix 3.2-A, *Water Resources Technical Supplement*, Table 3). As shown in Table 3, the irrigators in this category include Prineville Reservoir contract holders. Furthermore, the terms of the HCP affecting Ochoco and North Unit IDs influence the manner in which the water users utilize available water supply, which in turn affects other water right holders on the Crooked River, regardless of whether their water rights are for natural flow or storage.

Adequacy of Analysis

EIS-8.3 Results of Protection of Flows Instream on the Crooked River

One commenter asserted that if protection of uncontracted storage releases in Prineville Reservoir from diversion sources would result in higher minimum flows throughout Prineville Valley, and not just below the North Unit ID pumps, the reservoir should stay at the same level.

Commenters

ORG-15

Response

The primary driver of the increase in effects on Prineville Reservoir under the proposed action and action alternatives is that implementation of Alternatives 3 and 4 would have a greater effect on Wickiup Reservoir storage. This, combined with increased winter minimum flows in the Crooked River (Conservation Measure CR-1), causes an increase in the frequency and volume that North Unit ID calls for from Prineville Reservoir, decreasing the frequency of filling Prineville Reservoir, and thus the volume of water available for release for fish and wildlife purposes. Additionally, increasing bypass flows in McKay Creek and Ochoco Creek and protecting stored water under temporary instream leases for Ochoco ID patrons (Conservation Measures CR-2, CR-3, and CR-4) may contribute to a decline in Prineville Reservoir storage by increasing Ochoco ID stored water releases in years that Prineville Reservoir does not fill. In addition, and while somewhat counter-intuitive, protection of uncontracted flows under Alternatives 3 and 4 from diversion would result in more water released from Prineville Reservoir and therefore decreased reservoir storage, compared to the proposed action. Finally, the minimum winter release of 80 cfs under Alternative 4 (compared to 50 cfs under the proposed action and Alternative 3), decreases the likelihood of filling Prineville Reservoir and, therefore, the volume of water available to the uncontracted account because this account fills last. This effect was most pronounced during dry and very dry years.

Please also refer to response to comment EIS-8.2, *Crooked River Water Users*.

EIS-8.4 Crooked River Water Users Live Flow Water Rights

One commenter stated that Appendix 3.2-A, *Water Resources Technical Supplement,* Table 3 does not provide a complete list of all live flow water rights on the Crooked River.

Commenters

ORG-15

Response

A detailed list of water rights for natural flow of the mainstem Crooked River and stored water from Bowman Dam to Lake Billy Chinook has been added as Table 4 in Final EIS Appendix 3.2-A, *Water Resources Technical Supplement.*

Water Conservation Projects—Request for Clarification

EIS-8.5 Amount of Water Conserved Instream

One commenter noted that Oregon law allows for a portion of water conserved through piping to be allocated to out-of-stream water users and therefore not all conserved water is required to be protected in stream.

Commenters

FED-2

Response

Table 5 of Draft EIS Appendix 3.2-A, *Water Resources Technical Supplement*, Table 5 presents the amount of water conserved instream by the Swalley and Tumalo ID projects based on IDs' approved watershed plans; these values represent 75% of water conserved instream for Swalley ID and 100% for Tumalo ID.

EIS-8.6 Projects Included in the No-Action Analysis

One commenter noted that the criteria used and applied for considering whether a project is a reasonably foreseeable future action under the no-action alternative was not consistently applied.

Commenters

ORG-15

Response

Appendix 2-B, *No-Action and Cumulative Scenarios*, was reviewed and updated in the Final EIS as appropriate to ensure that projects reflect the criteria for inclusion. Analysis in Final EIS Chapter 4, *Cumulative Impacts*, was revised in line with the updates in Appendix 2-B, as required.

Request for Additional Information or Analysis

EIS-8.7 Water Conservation Assumptions

Commenters noted that the Draft EIS does not anticipate water conservation through piping projects beyond Tumalo and Swalley IDs to include Central Oregon, Lone Pine, North Unit, Arnold, and Ochoco IDs, and thus may overestimate irrigation shortages.

Commenters

ORG-15

Response

Draft EIS Chapter 3, Section 3.1, *Introduction*, explains which past, current, and future water conservation projects were incorporated into the RiverWare model and which were incorporated outside of the model in the Chapter 3 analyses.

The effects of other planned water conservation projects on reservoir storage and streamflows also are not captured in in the modeling results. These future projects would improve water supply efficiency and streamflow conditions; however, they were not included as assumptions in the RiverWare model because of uncertainty about where these future projects would be located and timing of their implementation. These factors are essential in determining the extent and timing of their potential effects on basin hydrology in relation to the HCP and associated flow targets. The potential effects of water conservation on irrigation district water supply can be quantified at the point of diversion. Therefore, the analysis in Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*, considered a range of potential water conservation projects (both district and on-farm) and their effects. This analysis is reflected in Draft EIS Chapter 3, Sections 3.5, *Land Use and Agricultural Resources*, and 3.9, *Socioeconomics and Environmental Justice*. However, because it can be assumed that these projects occur in the foreseeable future and effects on basin hydrology may be attenuated or concentrated during periods of low flow in different reaches of the Upper Deschutes Basin (depending on how water is conserved, hydrologic conditions, and other factors), the effects of these changes on resources were evaluated qualitatively in the cumulative analysis (Draft EIS Chapter 4, *Cumulative Impacts*).

Final EIS Chapter 3, Section 3.1, *Introduction*, describes the Central Oregon ID project that was incorporated into the updated RiverWare modeling used for the Final EIS analysis. As of August 1, 2020, the other irrigation districts identified in the comment (i.e., the Lone Pine, North Unit, Arnold, and Ochoco IDs) have not completed draft watershed plans as required by Public Law (PL)-566. In the absence of information about the IDs' intended use of water saved through piping, the effects of water conservation on water supply and instream flow cannot be quantitatively evaluated.

Potential piping projects likely to occur over the analysis period that could not be quantitatively evaluated in Chapter 3 beyond the analyses are identified in Draft EIS Appendix 2-B, *No-Action and Cumulative Scenarios*, and were addressed in Draft EIS Chapter 4, *Cumulative Impacts*.

EIS-8.8 Water Year Types

One commenter requested information about how water year types were determined and what data were used to identify water years as one type or another.

Commenters

ORG-15

Response

The methodology for assigning water year types is described in Draft EIS Chapter 3, Section 3.2.1, *Methods*. Examples of years meeting the criteria are provided also provided in Draft EIS Chapter 3, Section 3.2.1, in Table 3.2-1. These methods have been added in Final EIS Appendix 3.2-A, *Water Resources Technical Supplement*.

9 Water Resources—Water Storage and Supply

Request for Additional Information or Analysis

EIS-9.1 Existing Water Supply Conditions

One commenter stated that Draft EIS Chapter 3, Section 3.2.2.1, *Affected Environment, Water Supply*, should describe how the covered activities and facilities have contributed to the degraded baseline conditions. In addition, the commenter states that cross-references to the appendix or HCP are not sufficient replacements for including the EIS section.

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section 3.2.2.1, *Affected Environment, Water Supply*, succinctly describes the portions of the existing water rights and associated storage, conveyance, and diversion of water that would be affected by the proposed action and alternatives as the current baseline condition. Section 3.2.2.1 states "Changes in timing and volume of releases from the study area reservoirs under the proposed action and alternatives would affect the amount of water stored in the reservoirs and consequently the amount of water supply." Additional descriptions of the history and background of how the water rights and associated activities contributed to the current/baseline conditions is beyond "succinctly describing" the environment. Some of this historical context can be found in HCP Chapter 2, *Introduction and Background*, and Chapter 4, *Current Conditions of Covered Lands and Waters*. Draft EIS Chapter 2, *Proposed Action and Alternatives,* summarizes the covered actions in the study area.

Supporting information for water resources is also provided in Draft EIS Appendix 3.2-A, *Water Resources Technical Supplement*. This information is synthesized in the body of the EIS to improve readability and of analyses and conclusions. Refer to response to comment EIS-1.2, *Length of Public Review and Comment Period*, for additional discussion regarding the length and complexity of the Draft EIS and Draft HCP.

EIS-9.2 No-Action Alternative Water Supply Conditions

One commenter stated that the Draft EIS should analyze potential impacts on existing or future water rights under the no-action alternative.

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section 3.2, *Water Resources,* describes water rights for storage and diversion of water as part of the affected environment to provide a basis for the discussion of water supply impacts on water user with water rights. Potential forfeiture for non-use or changes to State of Oregon rules that would constitute effects on existing water rights independent of water supply are not contemplated nor are such effects reasonably foreseeable as a result of the proposed action or action alternatives. Changes to state rules and statute that could occur under future conditions without the proposed action are beyond the scope of this EIS.

EIS-9.3 No-Action Alternative Reservoirs

One commenter stated that the Draft EIS should provide additional information under the no-action alternative related to effects on reservoirs and water supply.

Commenters

ORG-12

Response

As stated in Draft EIS Chapter 3, Section 3.2.3.1, *Alternative 1: No Action*, continuation of existing water management operations under the no-action alternative would result in no changes in water resources compared to existing conditions.

Draft EIS Chapter 3, Section 3.2.3.2, *Alternative 2: Proposed Action*, and Appendix 3.2-A, *Water Resources Technical Supplement*, present modeled reservoir elevations and water supply under the proposed action and no-action alternative.

EIS-9.4 Municipal Water Supply

One commenter noted that the Draft EIS does not include specific consideration of municipal water supply needs or the connection between mitigation for groundwater pumping and planned water conservation projects.

Commenters

ORG-13

Response

Conversion of irrigation district water rights to mitigation credits under the Deschutes Basin Mitigation Program for use by municipal suppliers has occurred sporadically since the inception of the Mitigation Program in 2002. However, it is not clear how planned water conservation projects would generate mitigation credits, nor are any such projects proposed. Therefore, the creation of mitigation credits cannot be deemed reasonably foreseeable over the analysis period and the potential effects of future mitigation credit supplies are not evaluated in the EIS.

Request for Clarification

EIS-9.5 Connection of Analysis of WR-2 Effects under the Proposed Action to Existing Conditions

One commenter stated that the structure of the analysis of effects on water supply (WR-2) under the proposed action does not correspond clearly to how the existing conditions for water supply are presented in the affected environment section.

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section 3.2.2.1, *Affected Environment,* describes the current water resources conditions against which the no-action alternative effects are judged. Draft EIS Chapter 3, Section 3.2.3*, Environmental Consequences,* compares effects of the proposed action and action alternatives to the no-action alternative effects. Tables and figures in this section and the referenced appendix present modeled results for all alternatives. Draft EIS *Executive Summary,* Table ES-1 also summarizes and compares the effects of the no-action alternative and alternatives.

EIS-9.6 Effect of Winter Releases from Wickiup Reservoir on Water Supply

The commenter notes that the statement in the Draft EIS that Wickiup Reservoir storage would decline starting in year 6 is inconsistent with historical gauge records that show Wickiup Reservoir can fill even with higher winter flow releases from Wickiup Reservoir.

Commenters

ORG-15

Response

Final EIS Chapter 3, Section 3.2.3.2, *Alternative 2: Proposed Action*, clarifies that reductions in Wickiup Reservoir storage starting in year 6 would only occur during normal, dry, or very dry years.

EIS-9.7 Wickiup Reservoir Storage

The commenter inquires as to the reason why data provided in the appendix do not show that Wickiup Reservoir storage ever reaches 200,000 af.

Commenters

FED-2

Response

The Draft EIS water resources analysis is based on RiverWare modeling results. While Wickiup Reservoir does reach 200,000 af of water in the modeling, it only reaches this volume in a couple of years. Because the graphs present the 20 to 80% range, they do not show these maximum volumes. Please refer to Draft EIS Appendix 3.1-B, *RiverWare Model Technical Memorandum: Hydrologic Evaluation of Alternatives for the Deschutes Basin HCP*, for additional information.

10 Water Resources—Groundwater

Adequacy of Analysis

EIS-10.1 Recharge Effects Downstream of Sunriver under the No-Action Alternative

One commenter stated that effects on groundwater under the proposed action and action alternatives cannot be compared to the no-action alternative because effects under the no-action alternative are not described.

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section 3.2.3.1, *Alternative 1: No-Action Alternative*, states that the continuation of existing water management operations under the no-action alternative would result in no changes in water resources compared to existing conditions. Existing groundwater conditions are described in Draft EIS Chapter 3, Section 3.2.2.3, *Groundwater*, under the affected environment.

EIS-10.2 Recharge Effects Downstream of Sunriver under Existing Conditions

One commenter stated that the river segment downstream of Sunriver was not described in the affected environment section and therefore impacts cannot be adequately compared to the baseline conditions.

Commenters

ORG-12

Response

Existing groundwater conditions associated with river segments downstream of Sunriver are described in Draft EIS Chapter 3, Section 3.2.2.3, *Groundwater*, under affected environment for groundwater. The section states the only significant losing reach of the Deschutes River occurs between Sunriver and Bend. This relationship is then further described in the Appendix 3.2-A, *Water Resources Technical Supplement*, *(River–Groundwater System Interactions)*.

Requests for Additional Information or Analysis

EIS-10.3 Effects of Water Conservation Projects

Commenters requested that impacts of previous piping projects be acknowledged, and that the EIS evaluate all future piping projects and their impacts on springs and the corresponding impacts on the cold water fish refugia.

Commenters

ORG-12, ORG-14

Response

Refer to response to comment EIS-8.7, *Water Conservation Assumptions*, for an explanation of how past, current, and future water conservation projects were addressed in the Draft EIS and updates to the Final EIS.

Regarding effects on groundwater, Draft EIS Chapter 4, Section 4.3.1, *Evaluation of Cumulative Effects*, *Water Resources*, states that as the canal seepages are reduced the resulting groundwater discharge would return to a more natural state. The Final EIS analysis of groundwater effects reflects the incorporation of Central Oregon Irrigation ID's Smith Rock-King Way Infrastructure Modernization project. As described in Final EIS Chapter 3, Section 3.2.3.1, *Alternative 1: No-Action*, a cumulative reduction of canal leakage equal to about 10% of the total estimated current annual leakage (in 2013) would result in an eventual reduction in spring flows.

11 Water Resources—Seasonal Flows

Request for Additional Information or Analysis

EIS-11.1 Drivers of Reservoir Levels

The commenter noted that reservoir water surface elevations are also influenced by reservoir releases.

Commenters

STATE-1

Response

Final EIS Chapter 3, Section 3.2, *Water Resources*, has been updated to include reservoir releases as a component that affects reservoir water surface elevations.

EIS-11.2 Geographic References

The commenter noted a lack of discussion regarding the geographic location of Benham Falls.

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section 3.2, Figure 3.2-1, is the study area map and includes Benham Falls as a labeled geographic feature.

EIS-11.3 Flow Effects on Crooked River Reach

The commenter noted the Impact WR-4 (Change Seasonal River and Creek Flows) analysis does not include a flow analysis for Osborne Canyon on the lower Crooked River.

Commenters

ORG-12

Response

The Osborne Canyon gauge (COBO) was not included as a RiverWare node. The Draft EIS includes the Crooked River at Smith Rock State Park near Terrebonne, Oregon, gauge station (CRSO) operated by the Oregon Water Resources Department. The CRSO gauge is located downstream from the North Unit ID pumps and the gauge is representative of stream flow entering Osborne Canyon. There are spring inputs between the CRSO gauge and Osborne Canyon, but the CRSO gauge was determined to be representative of flows in Osborne Canyon.

EIS-11.4 Flooding Characteristics on Deschutes River

One commenter provided details on flooding characteristics on the Deschutes River and requested that the Deschutes River flood flow description characterize the reach-specific and seasonal flood effects in more detail.

Commenters

FED-2

Response

Final EIS Chapter 3, Section 3.2.2.2, *Surface Water*, includes a more detailed description of seasonal flooding locations, timing, and avoidance measures. Final EIS Section 3.2.2.2, *Surface Water*, and Section 3.2.3, *Environmental Consequences*, include more detailed descriptions of seasonal flooding locations, timing, and avoidance measures.

EIS-11.5 Flood Characteristics of Little Deschutes River

The commenter requested additional detail regarding flooding on the Little Deschutes River in relation to flows on the mainstem Deschutes River.

Commenters

FED-2

Response

Final EIS Chapter 3, Section 3.2.3, *Environmental Consequences*, includes a more detailed description of seasonal flooding locations, timing, and avoidance measures.

EIS-11.6 Elevated Flood Risk Levels

One commenter stated that a source was not provided to support the use of 90% reservoir storage capacity as the threshold for identify elevated flood risk.

Commenter

ORG-12

Response

The 90% of capacity threshold is intended to serve as an indicator to determine if reservoir storage under the proposed action and action alternatives would approach maximum storage capacity more often compared to the no-action alternative, and therefore serves as a useful indicator for determining if there may be increased potential for flooding. In cases when this indicator shows that reservoir storage would increase compared to the no-action alternative it can be useful to conduct more rigorous analyses to determine the magnitude of the risk. Because the proposed action and action alternatives generally show reductions in reservoir storage this additional analysis was not required.

EIS-11.7 Flow Variability

The commenter noted that additional discussion should be added about flow variability.

Commenters

FED-2

Response

Final EIS Chapter 3, Section 3.2.3, *Environmental Consequences*, includes additional discussion on seasonal flow variability related to water use and basin hydrology.

EIS-11.8 Water Resources Figure

The commenter requested improving geographic references for features and locations described in the narrative, but did not cite any specific information.

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section 3.2, Figure 3.2-1, depicted the water resources study area and includes geographic features referenced in the text. The text has been reviewed and additions to geographic features added as appropriate in the Final EIS, Chapter 3, Section 3.2, *Water Resources*.

EIS-11.9 Flood Effects in Prone Areas

The commenter noted the flood analysis does not connect reservoir flood risk with the four identified flood-prone areas downstream from Wickiup Dam in Draft EIS Chapter 3, Section 3.2.3.2, *Alternative 2: Proposed Action*.

Commenters

ORG-12

Response

The Draft EIS Chapter 3, Section 3.2.2.2, *Surface Water*, includes information on flood control risks and management. The Final EIS, Chapter 3, Section 3.2.3.2, *Alternative 2: Proposed Action*, has been updated to include a discussion of reservoir flood storage capacity and effects of the proposed action on reservoir storage and potential flooding in river reaches downstream of Wickiup Dam and Bowman Dam.

EIS-11.10 Proposed Action Alternative Flood Effects

The commenter states that there is no discussion of flood flow conditions on the Crooked River under the no-action alternative.

Commenters

ORG-12

Response

The text describing effects on Crooked River Flood Flows under Impact WR-4 (Change Seasonal River and Creek Flows) in Final EIS, Chapter 3, Section 3.2.3, *Environmental Consequences*, has been updated to include references to figures showing modeled flows under both alternatives presented in Appendix 3.2-A, *Water Resources Technical Supplement.*

EIS-11.11 No-Action Alternative Flood Risk

The commenter states that there is no discussion of flood risk associated with the no-action alternative.

Commenters

ORG-12

Response

Existing flood conditions associated with the reservoirs were described in Draft EIS Chapter 3, Section 3.2.2, *Affected Environment*, while flood risks associated with the no-action alternative were discussed in the Draft EIS, Chapter 3, Section 3.2.3.1, *Alternative 1: No-Action*. Information in the Final EIS, Chapter 3, Section 3.2.3.1, *Alternative 1: No-Action* has, however, been updated to provide additional information to support the conclusions drawn.

EIS-11.12 No-Action Alternative Flow Effects

The commenter asserts that there is not sufficient analysis of the anticipated effects on flow patterns under the no-action alternative to support the analysis of effects of the proposed action in Impact WR-4, (Change Seasonal River and Creek Flows).

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section 3.2.3.2, *Alternative 2: Proposed Action under* Impact WR-4, *Change Seasonal River and Creek Flows*, describes changes in flows under the proposed action compared to the no-action alternative. The discussion includes references to modeled flows provided in Appendix 3.2-A, *Water Resources Technical Supplement.* Presented data include the aggregated hydrograph in years 1–7 and years 13–30, normal year and dry year hydrographs, and summary data tables illustrating no-action versus proposed action difference for storage and irrigation seasons over the phases of the permit term and water year types.

EIS-11.13 No-Action Alternative Flow and Reservoir Effects

One Commenter asserted that while information had been provided on surface and seasonal flows, reservoir effects, sediment/permeability and small tributary influences on flow downstream in Draft EIS, Chapter 3, Section 3.2.2.1, *Water Supply, No Action Alternative*, the corresponding analysis appeared to be missing several tributaries to the Deschutes River, the Middle Deschutes River, and the effects of Crooked River reservoirs on the Crooked River, Ochoco Creek, and McKay Creek for the no-action alternative.

Commenters

ORG-12

Response

As stated in Draft EIS, Chapter 3, Section 3.2.3.1, *Alternative 1: No Action*, continuation of existing water management operations under the no-action alternative, described in Draft EIS Chapter 2, *Proposed Action and Alternatives*, would result in no changes in water resources compared to existing conditions.

Draft EIS, Chapter 3, Section 3.2.3.2, *Alternative 2: Proposed Action*, and Appendix 3.2-A, *Water Resources Technical Supplement*, included analyses for the waterbodies noted by the commenter based on modeled flows and reservoir elevation under the proposed action and the no-action alternative.

EIS-11.14 Affected Environment for Reservoirs

The commenter asked what Crooked River reservoirs were analyzed.

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section 3.2, *Water Resources*, Table 3.2-2, list each reservoir analyzed, along with its capacity, authorized water supply storage, and water rights.

Adequacy of Analysis

EIS-11.15 Flood Storage Water Rights

The commenter notes there are no water rights associated with flood water storage in Crane Prairie Reservoir or Wickiup Reservoir.

Commenters

FED-2

Response

As stated in Draft EIS Chapter 3, Section 3.2.2, *Affected Environment*, the primary water right associated with the reservoirs is to store water; the secondary water right is to use the stored water. Flood control is a temporary containment of water that is not used for a beneficial use. The State of Oregon does not require a primary water right to operate an existing storage facility specifically for flood control. The reservoirs in the Deschutes system may unofficially manage flood flows but the reservoirs are held within the capacity of their existing primary water storage rights and, therefore, do not require any further authorization.

12 Water Resources—Water Quality

Adequacy of Analysis

EIS-12.1 Analysis of Water Quality Parameters

One commenter asserted that the analysis of effects on water quality should be more robust for water quality parameters such as dissolved oxygen, pH, sedimentation, turbidity, nitrogen, phosphorus, and chlorophyll a.

Commenters

ORG-14

Response

As described in Draft EIS, Chapter 3, Section 3.3.1, *Methods (Water Quality)*, conclusions made regarding water quality are based on a combination of quantitative and qualitative methods, including RiverWare flow modeling described in Appendix 3.1-B, *RiverWare Model Technical*

Memorandum, and water quality and temperature models described in Appendix 3.4-C, *Fish and Mollusks Technical Supplement*.

Conclusions regarding the degree to which covered activities were anticipated to affect water quality were based on projected water management regimes. As described in the Draft EIS, Chapter 3, Section 3.3, *Water Quality*, quantitative predictions of water quality indicators were not possible in many cases due to the lack of adequate models and data and the highly complex water quality dynamics within the Deschutes River Basin. As such, for some parameters and waterbodies, effects on water quality were qualitatively assessed as likely trends under certain conditions (e.g., during dry years or wet years or during particular seasons), including the location, timing, and magnitude of such effects in the context of existing conditions and the no-action alternative.

EIS-12.2 Effect Thresholds Adequacy

Several commenters asserted that the effect thresholds considered in the water quality analysis and the comparison of the proposed action to degraded conditions under the no-action alternative resulted in overly positive effect conclusions. One commenter asserted that the water quality thresholds should be tied to effects on species. Commenters also expressed concern that comparing the proposed action to the no-action alternative and not considering the existing ongoing effects of the covered activities results in not addressing the effect of current activities.

Commenters

ORG-3, ORG-15

Response

NEPA requires that EISs present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by decision makers (40 CFR §§ 1502.14 and 1502.16).

As such, the EIS compares effects of the proposed action and action alternatives against the effects of taking no action, rather than against optimal environmental conditions. As described in Draft EIS Chapter 2, *Proposed Action and Alternatives*, the no-action alternative is assumed to be the continuation of existing water management operations, including those covered in the current ESA Section 7 BiOp for the Upper Deschutes River to address take of Oregon spotted frog (U.S. Fish and Wildlife Service 2017, 2019) referred to in this EIS as the *Deschutes Project BiOp*.

The EIS analyses consider an improvement in a specific environmental factor compared to the no-action alternative to be beneficial, even if the resulting resource conditions remain impaired.

Water quality thresholds were defined based on water quality standards established by ODEQ, with emphasis on standards related to listing of impaired waters under Section 303(d) of the Clean Water Act. These standards include water quality parameters that affect species as well as other water uses and benefits. Thresholds specific to species are defined in Draft EIS Chapter 3, Section 3.4, *Biological Resources*, and water quality effects on specific species were considered as part of the effects analysis for biological resources.

EIS-12.3 Effect Thresholds Application

Commenters requested a clear nexus between the thresholds and effects analysis.

Commenters

ORG-12

Response

Final EIS Chapter 3, Section 3.3, *Water Quality*, has been revised, as appropriate, to clarify connections between the effect thresholds described in Section 3.3.1, *Methods*, and the effect conclusions described in Section 3.3.3, *Environmental Consequences.*

EIS-12.4 Linking Effects Analysis to Affected Environment

Two commenters noted where additional information was needed to better connect the description of effects in the environmental consequences section to the description of existing conditions in the affected environment section.

Commenters

ORG-12, ORG-24

Response

Final EIS Chapter 3, Section 3.3, *Water Quality*, has been revised to clarify links between the affected environment and environmental consequences. Because the effects analysis considers the net change in effects compared to the no-action alternative, some factors regarding the affected environment are identified in the environmental consequences section to describe the context of the effect.

EIS-12.5 Proposed Action Effects on Odell Lake and Crane Prairie/Wickiup Reservoir

One commenter stated that potential effects of the proposed action on Odell Lake and on Crane Prairie management that may affect Wickiup Reservoir were not addressed.

Commenters

ORG-12

Response

Odell Lake is not in the study area because it does not have the potential to be affected by the proposed action or action alternatives.

Draft EIS Chapter 3, Section 3.3, *Water Quality*, describes how changes in Crane Prairie management under the proposed action could affect water quality conditions in Wickiup Reservoir (Impact WR-1, Affected Water Quality in Deschutes River Subbasin).

EIS-12.6 Proposed Action Effects on Whychus Creek, Little Deschutes River, Tumalo Creek, Crescent Lake Reservoir, and Crescent Creek

One commenter stated that effects on Whychus Creek, Little Deschutes River, Tumalo Creek, Crescent Lake Reservoir, and Crescent Creek could not be stated for the first time in the effect conclusion.

Commenters

ORG-12

Response

Effects on these water bodies are described in the first sentence of Impact WQ-1, (Affected Water Quality in Deschutes River Subbasin) in Draft EIS Chapter 3, Section 3.3, *Water Quality*. Because there would be no change to modeled flows in Whychus Creek or Tumalo Creek and only minor changes in water elevation in Crescent Lake Reservoir and associated changes in flows in Crescent Creek and the Little Deschutes River compared to the no-action alternative, these waterbodies would not experience measurable changes in water quality conditions.

EIS-12.7 Return Flows

Commenters requested additional analysis of return flows on water quality parameters and the covered species.

Commenters

ORG-14, ORG-15, GP-137

Response

While return flows (including “tailwater”) are known to contain pollutants and otherwise alter water quality, no indication of a likely significant increase in return flow water quality effects was found during the analysis of water quality effects. Final EIS Chapter 3, Section 3.3, *Water Quality*, has been revised to explain why the proposed action and action alternatives are not expected to result in a discernable change in return flows or related pollution levels.

EIS-12.8 Study Area

Commenters asserted the Draft EIS should have provided an analysis of effects on water quality in the Lower Deschutes River downstream of the Pelton Round Butte Hydroelectric Project.

Commenters

ORG-14, ORG-15, FLP-38

Response

As described in Draft EIS, Chapter 3, Section 3.3.1, *Methods (Water Quality)*, the Lower Deschutes River was not included in the study area because the changes in water operations under the proposed action and action alternatives were determined to have no potential for discernable effects in these waters. In response to public comments, Final EIS, Chapter 3, Section 3.3.1, *Methods (Water Quality)*, has been revised to include the Lower Deschutes River in the study area, although the conclusion that effects in this reach would be not adverse remains unchanged.

Request for Additional Information or Analysis

EIS-12.9 Impacts from Maintenance Activities

One commenter recommended adding analysis of effects from maintenance of covered facilities.

Commenters

FED-1

Response

As described in Draft EIS, Chapter 2, Section 2.1.2.2, *Covered Activities*, operations and maintenance activities evaluated in the EIS focus on diversions and storage operations by applicants. Maintenance of related facilities is not expected to result in adverse effects on the environment and, therefore, were not addressed in the Draft EIS.

Final EIS Chapter 3, Section 3.1, *Introduction*, has been revised to explain why maintenance activities are not expected to adversely affect the environment.

EIS-12.10 Magnitude of Effects of Climate Change versus Restoration

One commenter stated that the magnitude of existing water quality degradation and effects of climate change and drought versus planned projects should be clarified.

Commenters

ORG-14

Response

Final EIS Chapter 4, *Cumulative Impacts*, has been reviewed and updated as appropriate to clarify the magnitude and trend of cumulative actions and climate change.

EIS-12.11 Tribal Regulations

One commenter requested the EIS address water quality effects based on the CTWS' adopted standards because the Warm Springs Reservation is within the covered lands and waters.

Commenters

TRIBE-1

Response

The Warm Springs Reservation is located downstream of the Pelton-Round Butte Hydroelectric Project, which was excluded from the study area for water quality in the Draft EIS. This reach has been added to the study area for the Final EIS, Chapter 3, Section 3.3, *Water Quality.* As noted in the section, it is not technically feasible to attribute water quality effects in the lower river to changes in water management operations in the Upper Deschutes and Crooked River subbasins at this time.

Request for Clarification

EIS-12.12 Water Quality Parameters of Concern in the Study Area

One commenter requested clarification about the water quality parameter information provided in the affected environment.

Commenters

ORG-12

Response

Final EIS, Chapter 3, Section 3.3, *Water Quality*, Table 3.3-1, has been revised to clarify information relevant to the water quality parameters of concern assessed in the study area.

EIS-12.13 Existing Increased Temperatures and Nutrient Discharges

One commenter requested clarification on the cause of increased temperatures and nutrient discharges discussed in Draft EIS Chapter 4, Section 4.3.2, *Water Quality*.

Commenters

ORG-12

Response

As described in Draft EIS Chapter 4, Section 4.3.2, *Water Quality*, increased river temperatures have been caused by releasing impounded waters that have been warmed by solar radiation, a decrease in summer streamflows in some river reaches resulting in longer travel times and greater solar warming, and discharge of warm irrigation return flows back to the rivers.

13 Biological Resources—Vegetation and Wildlife

Adequacy of Analysis

EIS-13.1 Effect Thresholds

One commenter stated that the Draft EIS asserts that the effects of the proposed action and alternatives would be adverse only if they result in permanent reductions in the quality and function of critical habitat.

Commenters

TRIBE-1

Response

The thresholds used in the analysis of effects on biological resources are presented in Draft EIS Chapter 3, Section 3.4.1.1, *Vegetation and Wildlife*. These effect thresholds consist of seven circumstances under which adverse effects on biological resources could occur, and are therefore not limited to a permanent reduction in the quality and function of critical habitat. Vegetation resources includes other resources than critical habitat, such as habitat for game and nongame species, and providing ecological structure and function that are important to a wide variety of species. The threshold applicable to effects on critical habitat concerns any change that would "permanently reduce the quality and function of habitats," which includes, but is not limited to, designated **critical habitat**.

EIS-13. 2 Flows for Revegetation

One commenter stated that the findings of effects on vegetation are flawed because without enforcing a summer flow cap or identifying flows necessary for revegetation, there is uncertainty whether and when revegetation will occur and whether the needs of species will be addressed. Another commenter asserted that upper Deschutes River summer flow rates under the HCP would be nearly identical to flows under the no-action alternative.

Commenters

ORG-15

Response

A summer flow cap is incorporated in the Final HCP. Refer to response to comment EIS-13.5, *Flow Analysis for Revegetation*, and EIS-3.15, *Summer Flow Cap*, for additional discussion on the addition of a summer flow cap. The projected flow changes would have varied effects on vegetation; refer to Draft EIS Chapter 3, Section 3.4, *Biological Resources*, Table 3.4-6, for an explanation of how changes under the proposed action would affect each analysis reach of the river. As stated, after year 7 of the permit term, summer flows would diminish and winter flows would increase by an appreciable amount. The vegetation analysis in Final EIS Chapter 3, Section 3.4.3, *Environmental Consequences*, has been updated to reflect this.

EIS-13.3 Changes in Vegetation under the Proposed Action

One commenter asserted that the Draft EIS is incorrect in its statements that changes in vegetation under the proposed action would be minor through year 5 and increase substantially thereafter (Chapter 3, Section 3.4, *Biological Resources*, Table 3.4-6). The commenter also stated that the first 20 years of the proposed action would do little to help the vegetation regrowth needed for Oregon spotted frog habitat.

Commenters

ORG-15

Response

The methods used in the vegetation effects analysis is described in Draft EIS Chapter 3, Section 3.4.1.1, *Vegetation and Wildlife*. Briefly, that analysis relies upon hydrologic modeling (RiverWare) of stream system response to a range of historical flow data as potentially modified by management activities. The flow model, for the first 7 years of the proposed action, closely tracks recent instrumental records of flow but is not identical, thus it is reasonable to expect (refer to Final EIS Chapter 3, Section 3.4, *Biological Resources*, Table 3.4-6) possible minor changes. There have been minor changes in the past, and minor change on a short timescale is the norm. The forecast changes after year 7 are considered substantial. The full RiverWare model results, showing percentage changes in both mean and standard deviation of flow for each month, for each study reach, for each time period of flow modification, for each alternative, are available in Table 6 of Appendix 3.4-A, *Plant and Wildlife Technical Supplement*, in the Final EIS. These model outputs show that for some reaches, and for some months, changes would be quite considerable. This was interpreted, for some reaches, as potentially resulting in a vegetation change.

The Final HCP includes modifications to the proposed action to provide conservation measures (e.g., Conservation Measures CC-1 and CP-1) that could be used to adaptively manage flow to improve Oregon spotted frog habitat conditions even during the initial phase of the proposed action. The proposed action also includes a cap on summer flows in the Upper Deschutes River during years 8–30 of the permit term (per Conservation Measure WR-1 [G and H] for the proposed action). Refer to response to comments EIS-13.5, *Flow Analysis for Revegetation*, and EIS-3.15, *Summer Flow Cap*, for additional discussion on the on the addition of a summer flow cap and Oregon spotted frog habitat.

Analysis in the Draft EIS considered all reaches, all management scenarios, and all years of available flow data.

EIS-13.4 Comparison of Alternative 3 to the Proposed Action

One commenter asserted that the effects analysis pertaining to revegetation in the Upper Deschutes River channel does not accurately compare the effects of higher flows under Alternative 3 with the effects of the proposed action on the restoration of vegetation to the Upper Deschutes River channel.

Commenters

ORG-15

Response

Modeled flow values presented for the proposed action and Alternative 3 in the Draft EIS at their respective full implementation flow targets (i.e., 400 cfs and 400–500 cfs) were the same, as described in Draft EIS Chapter 3, Section 3.1, *Introduction*. Accordingly, the Draft EIS description of effects under Alternative 3 references the proposed action for impacts related to model changes in water management and focuses discussion on how impacts would differ from the proposed action in response to the accelerated implementation schedule and additional conservation measures.

With the changes to the proposed action and refinements to the RiverWare model since the Draft EIS, the modeled flow values under Alternative 3 now differ from the proposed action. The Final EIS has been updated to reflect these changes.

EIS-13.5 Flow Analysis for Revegetation

One commenter felt that the Draft EIS does not adequately analyze flow levels required to support re-emergent vegetation. The commenter points to resources supporting the idea that stabilized flows held within certain ranges of volume are an important driver of revegetation success. The commenter also requested an alternative that would support wetland and riparian revegetation of the Upper Deschutes channel.

Commenters

ORG-15

Response

The NEPA analysis relied on the best available science to consider expected changes to the system over time under the new flow regimes. Hydrologically, each of the analyzed alternatives would reduce growing season flows when compared to the no-action alternative in the Upper Deschutes reaches. This would be expected to result in changes to the distribution of wetland vegetation. For example, lower flows during the summer growing season would be expected to result in the migration of emergent vegetation downslope in the slough habitats, with the vegetation recolonizing areas to meet the new lower elevation where inundation occurs at a specific location.

In addition, the Final HCP has been updated to include a cap on summer flows in the Upper Deschutes River during years 8–30 of the permit term. Final EIS Chapter 2, *Proposed Action and Alternatives*, has been updated to reflect this change to Conservation Measure WR-1 (G and H) for the proposed action. The Final EIS analyses of the proposed action reflects this change, but this cap is expected to provide stability to summer flows in the system during the vegetation growing season which will improve habitat conditions for Oregon spotted frogs as vegetation migrates to areas along the Deschutes River and connected sloughs that would remain wetted during the growing season at lower elevations than currently observed.

Refer to response to comment EIS-14.7, *Genetic Diversity of Oregon Spotted Frog*, regarding the range of alternatives analyzed in the Draft EIS.

14 Biological Resources—Oregon Spotted Frog

Request for Additional Information or Analysis

EIS-14.1 Minimum Flows for Restoration

One commenter requested the collection of additional information on the minimum winter flows required for winter habitat and suggested that more analysis is needed to inform effective restoration.

Commenters

ORG-16

Response

The additional information requested by the commenter is outside the scope of this NEPA analysis. However, it should be noted that the Conservation Measure UD-1, Upper Deschutes River Conservation Fund, which is now included in the proposed action as well as Alternatives 3 and 4 in the Final EIS, is to be used "to improve or enhance habitat in the Upper Deschutes Basin for the Oregon spotted frog and other aquatic species, or otherwise address conditions in the Upper Deschutes Basin that affect the conservation and recovery of the Oregon spotted frog in the wild." Therefore, funding could be allocated from Conservation Measure UD-1 to implement habitat restoration actions at specific sites to address and improve site-specific functionality during implementation of the flow regime under the proposed action.

EIS-14.2 Baseline Conditions

One commenter asserted that the analysis of effects on the Oregon spotted frog does not adequately consider ongoing conditions currently contributing to declining species population.

Commenters

ORG-15

Response

The NEPA analysis presented in the Draft EIS considered a range of alternatives, including the proposed action, in comparison to the no-action alternative. The current baseline under the no-action alternative does not constitute ideal conditions for the Oregon spotted frog and it appropriately reflects the degraded habitat conditions present in the action area. In the Final EIS, conservation measures are included in the proposed action that are intended to improve the habitat conditions from the current baseline for Oregon spotted frog. Specifically, the Final EIS includes modifications to the proposed action to provide conservation measures (e.g., Conservation Measures CC-1, CP-1, and UD-1) that could be used to improve habitat conditions even during the initial phase of the proposed action. Changes to the proposed action are detailed in Final EIS Chapter 2, Section 2.1.2.4, *Conservation Strategy*. These changes to the proposed action are analyzed in the Final EIS; effects to the Oregon spotted frog are detailed in Appendix 3.4-B, *Oregon Spotted Frog Technical Supplement*.

EIS-14.3 Temporal Analysis

One commenter asserted that the Draft EIS should provide effects analyses for impacts on the Oregon spotted frog at intermediate time intervals throughout implementation in addition to analysis of effects to the species at full implementation.

Commenters

ORG-15

Response

The Draft EIS analysis considered the time required to reach full implementation when evaluating the action alternatives against the no-action alternative. Interim effects during implementation were described for each alternative by life history period and presented in the analysis for each reach and for selected sites in the Draft EIS technical appendix for the Oregon spotted frog (Draft EIS, Appendix 3.4-B, *Oregon Spotted Frog Technical Supplement*). Based on the results of the Draft EIS assessment, the proposed action was modified to more effectively address the impacts of the time step to full implementation, including such changes as shortening the implementation phases, and improving or adding new conservation measures to improve conditions for the Oregon spotted frog more quickly over the term of the HCP. The Final EIS includes modifications to the proposed action to provide conservation measures (e.g., Conservation Measures CC-1, CP-1, and UD-1) that could be used to improve habitat conditions even during the initial phase of the proposed action. Changes to the proposed action are detailed in Final EIS Chapter 2, Section 2.1.2.4, *Conservation Strategy*. These changes to the proposed action are analyzed in the Final EIS; effects to the Oregon spotted frog are detailed in Appendix 3.4-B, *Oregon Spotted Frog Technical Supplement*.

EIS-14.4 Effects on Wickiup Reservoir

One commenter asserted that an analysis of impacts on Wickiup summer habitat during multiple time frames throughout implementation should be included in the effects analysis, as opposed to only including effects at full implementation. The commenter also stated that there are not sufficient data for the specific effects on Wickiup Reservoir.

Commenters

ORG-14

Response

Although Oregon spotted frogs are occasionally found within Wickiup Reservoir and it is designated **critical habitat**, there is a limited ability to support and sustain spotted frog populations within the reservoir due to the abrupt and extreme changes in water level resulting from water releases for irrigation. Storage releases from Wickiup Reservoir are essential to maintaining the viability and distribution of several Oregon spotted frog populations along the Deschutes River between the reservoir dam and Bend, OR. Wickiup Reservoir is not anticipated to provide significant habitat for the spotted frog in the future under any of the alternatives considered. For these reasons, Wickiup Reservoir ranks low as a conservation priority for Oregon spotted frog.

Draft EIS Appendix 3.4-B, *Oregon Spotted Frog Technical Supplement* does not include a box plot representation of the results for Wickiup Reservoir, as in other reaches, because the analysis for reservoir impacts was based on differences in water storage elevation and volume forecast by the RiverWare modeling rather than the number of days when a threshold flow was achieved. Tables 6 and 7 in Appendix 3.4-B of the Draft EIS present the results of the comparative analysis for Wickiup.

The analysis of effects to frog habitat during each life history period is provided for the Wickiup reach in Appendix 3.4-B of the Draft EIS. The analysis also considered the time required to reach full implementation when evaluating the alternatives against the no-action alternative (Appendix 3.4-B). The Final EIS Appendix 3.4-B provides detail on the interim timesteps of the proposed action and Alternatives 3 and 4 with the comparison among the alternatives at intermediate time steps depicted in Figure 4; however, because of its intended role as a flow regulator, interim effects on frog habitat within the reservoir itself are not considered in detail in the Final EIS.

EIS-14.5 Effects of Flow Patterns on Oregon Spotted Frog

One commenter asserts that the analysis requires additional discussion and analysis of the effects of flow patterns on the Oregon spotted frog at various stages of the life cycle.

Commenters

ORG-15

Response

The Oregon spotted frog effects analysis is based on comparing the action alternatives to the no-action alternative using known inundation (or other) thresholds that correspond to habitat functionality during each life history period. These thresholds allow FWS to make the link between the RiverWare model outputs and functionality of habitat. Methods for analysis are described in the Draft EIS starting in Chapter 3, Section 3.4.1.2, *Oregon Spotted Frog*, and are updated in the Final EIS in Chapter 3, Section 3.4.1.2.

EIS-14.6 Additional Parameters for Effects Analysis

One commenter suggests that a more comprehensive assessment of life history impacts is necessary to determine effects to the Oregon spotted frog.

Commenters

ORG-15

Response

The effects analysis presented in the Draft EIS focused on physical characteristics of the system that are indicative of habitat quality for Oregon spotted frog (e.g. flows known to inundate wetland vegetation). This level of analysis was sufficient to inform decision makers about reasonable measures that could improve the proposed action and to advance NEPA's purpose of ensuring informed and transparent environmental decision making. The Final EIS (Section 3.4.3, *Environmental Consequences*) presents an updated analysis of the alternatives, including several improvements made to the proposed action based on the results of the analysis presented in the Draft EIS. The results of the Oregon spotted frog are detailed in Final EIS Appendix 3.4-B, *Oregon Spotted Frog Technical Supplement.*

EIS-14.7 Genetic Diversity of Oregon Spotted Frog

One commenter asserts that the Oregon spotted frog's low genetic diversity necessitates facilitation of a wider range for the species to populate. The commenter states that the Draft EIS does not adequately discuss this parameter in its analysis.

Commenters

ORG-15

Response

The Draft EIS analyzed a range of alternatives that were screened for their potential ability to meet the need and purpose for the action. The Draft EIS also includes a discussion of alternatives that were considered but not analyzed in detail. FWS determined that the range of alternatives analyzed in the Draft EIS was appropriate and sufficient to inform decision makers about reasonable measures that could improve the proposed action and to advance NEPA's purpose of ensuring informed and transparent environmental decision making. The proposed action and alternatives do take into consideration improving Oregon spotted frog genetic diversity in the Upper Deschutes River because improved genetic diversity would be expected to result from improved habitat conditions and in particular, greater connectivity. The proposed action, in the long term, is likely to improve connectivity between populations of Oregon spotted frog. The *Oregon Spotted Frog Recovery Plan and Implementation Strategy*, which are currently being developed by FWS, will further explore this issue. It should be noted that with Conservation Measure UD-1, which is now included in the proposed action, funding could be allocated from Conservation Measure UD-1 to fill data gaps regarding genetic challenges to the species.

General Comments on Alternatives Analyzed

EIS-14.8 Comparison of Current Condition with Proposed Action

One commenter indicates that the Draft EIS should include a comparison of flows under the current conditions with flows under the proposed action.

Commenters

ORG-15

Response

The no-action alternative is defined in Draft EIS Chapter 2, Section 2.1.1, as required by the Council on Environmental Quality regulations (40 CFR § 1502.14). The no-action alternative defines the future circumstances that are predicted to continue or occur without the proposed action and assumes the continuation of the existing management plan or program, such as the actions analyzed in the Deschutes Project BiOp (U.S. Fish and Wildlife Service 2017, 2019). The no-action alternative is, therefore, the condition against which the proposed action and alternatives are judged. Refer to response to comment EIS-3.2, *Baselines,* for additional discussion on the comparison of the action alternatives with the no-action alternative.

Adverse Effect Threshold

EIS-14.9 Effect Thresholds

One commenter states that population decline is an inappropriate threshold for determining adverse effects and that even if populations/range are held steady, the effect would be adverse because of an increased risk of extirpation over time.

Commenters

ORG-15

Response

The NEPA thresholds were developed based on current understanding of the system and the best available data. The HCP monitoring program and associated adaptive management actions would be expected to provide the permittee and FWS with a capability to respond to an increase in the risk of extirpation.

EIS-14.10 Baseline

One commenter requests a comparison between the alternatives and a baseline of ideal habitat conditions for Oregon spotted frog.

Commenters

ORG-15

Response

Refer to response to comment EIS-3.2, *Baselines,* for additional discussion on the comparison of the action alternatives with the no-action alternative. The no-action alternative defines the future circumstances that are predicted to continue or occur without the proposed action and assumes the continuation of the existing management plan or program, such as the actions analyzed in the Deschutes Project BiOp. The no-action alternative also includes continuation of detrimental conditions. Effects, including those resulting from ongoing detrimental conditions, are contemplated in the Final EIS analysis and are included in the effects conclusions for Oregon spotted frog (refer to Final EIS Chapter 3 Section 3.4.3, *Environmental Consequences*).

Accuracy of Effects Analysis

EIS-14.11 Conservation Fund Triggers

One commenter asserts that the HCP-proposed monitoring program (HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*) will be insufficient to track changes in the Oregon spotted frog populations and would be an ineffective trigger for using the Conservation Fund (Conservation Measure UD-1) funds to maintain the population.

Commenters

ORG-15

Response

The NEPA analysis did not consider the specific actions that would be used to recover the species. Conservation Measure DR-2, Upper Deschutes River Conservation Fund, is now referred to as Conservation Measure UD-1 in the Final HCP and Final EIS. This Conservation Fund would be used to support restoration and habitat maintenance and improvement activities to benefit the Oregon spotted frog and other aquatic species within the Upper Deschutes Basin. The funds could be used to address conditions that affect the conservation and recovery of Oregon spotted frogs, such as actions to respond to monitoring data that indicate a negative trend in population size.

HCP effectiveness monitoring, detailed in Final Deschutes Basin HCP, Chapter 7, *Monitoring, Reporting, and Adaptive Management*, is part of the proposed action, but the monitoring program itself was not specifically assessed as part of this NEPA process. Please refer to Final HCP Chapter 7, *Monitoring, Reporting and Adaptive Management*, for more details. All action alternatives have access to the Conservation Fund provided under Conservation Measure UD-1 and FWS will have control over how those funds are used to affect the recovery and conservation of Oregon spotted frogs.

EIS-14.12 Importance of Effects on Rearing

One commenter states that impacts on rearing habitat are less important to species success than impacts on breeding and overwintering habitat. The commenter also suggested the implementation of a cap on summer flows.

Commenters

ORG-15

Response

The Final EIS recognizes the relative importance of breeding and overwintering habitat when compared to rearing habitat in the "Comparing the Alternatives" section of Appendix 3.4-B.

Refer to EIS-3.15, *Summer Flow Cap,* for additional discussion on implementation of a cap on summer flows.

EIS-14.13 Effects of the Proposed Action

One commenter asserted that the characteristics of the proposed action, and in particular the management of flows under 900 cfs in the upper reaches of the Deschutes River, would result in continued habitat destruction and heightened vulnerability of the Oregon spotted frog.

Commenters

ORG-15

Response

The NEPA analysis is not focused on ongoing take of the species or species recovery, but rather an assessment of the proposed action and other reasonable alternatives as compared to the no-action alternative. The alternative selection process is described in the Draft EIS, Chapter 2, *Proposed Action and Alternatives*, which explains how FWS arrived at the three action alternatives advanced for comparison to the no-action alternative. FWS will prepare a BiOp that will assess any take of the species expected to occur under the alternative that is selected at the end of this process.

The 900 cfs threshold for wetland vegetation inundation is based on observations made by FWS under recent conditions in the Upper Deschutes River downstream of the WICO gauge. Although that threshold, as well as others used for reaches lower in the system, is helpful when assessing impacts on the current condition of habitat in the reaches, it is based on the current flow regime, and is not intended as a future flow target. Final EIS Appendix 3.4-B considers this to be a dynamic system and over the long term the proposed action is likely to result in a lower flow threshold to support wetland vegetation, This is because wetland vegetation is expected to react to lower flows by migrating down-elevation topographically where site conditions would support establishment in the channel sloughs. Furthermore, the proposed action includes Conservation Measure UD-1, which is intended to address river and habitat degradation that may influence Oregon spotted frog population viability. The Final EIS also considers the potentially negative effects to Oregon spotted frogs resulting from a lack of flows sufficient to inundate wetland vegetation (e.g., increased predation, egg mass stranding).

15 Biological Resources—Fish and Mollusks

Adequacy of Analysis

EIS-15.1 Water Quality Effects on Fish

One commenter asserted that the Draft EIS should have considered water quality effects on fish beyond temperature, including algae, chlorophyll, pH, and dissolved oxygen.

Commenters

ORG-3, ORG-14

Response

Final EIS Chapter 3, Section, 3.4.3 *Environmental Consequences Fish and Mollusks*, has been reviewed and revised as necessary to include water quality impacts related to algae, chlorophyll, pH, and dissolved oxygen that could affect fish habitats under the proposed action and alternatives. Water temperature modeling was available for much of the Crooked River and was used to evaluate impacts in that portion of the study area.

EIS-15.2 Effect of Conservation Measure CR-6

One commenter asserted that a stated benefit of the proposed action is already provided by ongoing efforts to protect water rights and maintain flow.

Commenters

ORG-10

Response

Draft EIS Chapter 2, Table 2-4, *Proposed Action Conservation Measures, Conservation Measure CR-6*, describes terms and conditions for implementing the North Unit ID-Deschutes River Conservancy Agreement under the HCP. The effects of implementing these terms and conditions—both beneficial and adverse—are considered as effects resulting from the proposed action, even though they are based on previous agreements.

As stated in Draft EIS Chapter 3, Section, 3.4.3, *Environmental Consequences Fish and Mollusks, t*he commitment to maintain minimum flows below the North Unit ID pump between the North Unit ID and the Deschutes River Conservancy is voluntary. While both parties have every intention of continuing the agreement into the foreseeable future, incorporation of the agreement into the HCP and Conservation Measure CR-6 will provide the added assurance that flow improvements that have been in place since 2012 will continue for the term of the Deschutes Basin HCP. Final EIS Chapter 3, Section, 3.4.3, *Environmental Consequences Fish and Mollusks,* has been revised to clarify that Conservation Measure CR-6 provides added assurance for this commitment.

EIS-15.3 Effects on Bull Trout

One commenter asserted that the Draft EIS did not adequately identify the effects of the proposed action on bull trout (*Salvelinus confluentus*), noting the species' narrow habitat requirements and the lack of existing resources allotted to this species, and that the basis for the overall effect conclusion was unclear.

Commenters

ORG-14

Response

Draft EIS Chapter 3, Section 3.4.3, *Environmental Consequences Fish and Mollusks*, included an analysis of streamflow by reach and effects on bull trout habitat. A detailed water temperature model was available for the Crooked River, which was used to evaluate narrow water temperature requirements of bull trout in that portion of the study area. The Draft EIS reported an adverse effect of water management on water temperatures and bull trout life stage requirements in the Crooked River in some years depending on water management.

The analysis concluded an overall not adverse effect because effects in the Crooked River were weighed against a mixture of effects for the reaches used by bull trout in the study area. That included reaches in the Lower Deschutes River, Middle Deschutes River, Lake Billy Chinook, Whychus Creek, and Lower Crooked River downstream of approximately river mile (RM) 7.0. Effects in these areas were either beneficial or no effect.

Final EIS Chapter 3, Section, 3.4.3 *Environmental Consequences Fish and Mollusks,* and Appendix 3.4-C was reviewed and revised to further clarify the basis for the overall conclusions.

EIS-15.4 Effects of Climate Change

One commenter stated that the Draft EIS does not sufficiently support its conclusions that impacts of the proposed action on fish would not be adverse in light of climate change effects.

Commenters

ORG-14

Response

Draft EIS Chapter 3, Section 3.4.3.1, *Alternative 1: No Action*, explains the impacts of climate changes on fish. Draft EIS Chapter 4, *Cumulative Impacts*, considers the potential for the proposed action and action alternatives to have the potential for adverse effects on fish when considered in the context of climate change. The analysis in Final EIS Chapter 4, *Cumulative Impacts*, concludes that reasonably foreseeable climate changes could result in cumulative adverse effects on the quality, quantity, and distribution of riparian and aquatic habitats in the study area causing reduced abundance, productivity, and distribution of fish and mollusk species under the proposed action and action alternatives. Final EIS Chapter 4, *Cumulative Impacts*, has been revised to further explain the impacts of climate change on fish habitats across the study area.

EIS-15.5 Effects of Conservation Measure CR-4

One commenter asserted that the Draft EIS assumed benefits on streamflows and habitats related to Conservation Measure CR-4.

Commenters

ORG-15

Response

The Crooked River Fund (Conservation Measure CR-4) was considered a contributing factor, but was not a determining factor for the effect determination. The measure provides $8,000 annually for the Crooked River Conservation Fund to support conservation measures and benefit covered species in the Crooked River subbasin. This may include temporary instream water purchases to support targeted species and life stages in years when conditions may be adverse.

EIS-15.6 Effects in Crooked River Reach from Ochoco ID Pumps to North Unit ID Pumps

One commenter asserted that the analysis of effects on fish should have more thoroughly addressed the Crooked River reach from Ochoco ID pumps to North Unit ID pumps, given its tendency for low summer flows and importance to fish species.

Commenters

ORG-15

Response

The portion of Crooked River between the Ochoco ID diversion at RM 55.9 and the North Unit ID pump diversion at RM 22.4 includes reaches Cro-9 through Cro-3. Water temperature predictions were analyzed for each of these reaches with respect to species and life stage requirements and are detailed in Draft EIS Appendix 3.4-C, *Fish/Mollusks Technical Supplement*. Effects of the proposed action and Alternatives 3 and 4 on streamflows and fish habitat were analyzed based on the CAPO RiverWare node at RM 46.7. Water management under the proposed action and action alternatives could have an adverse effect on habitat conditions in the upper portion of this reach as described in the Draft EIS Appendix 3.4-C, *Fish/Mollusks Technical Supplement*. The lower reaches are warm during the summer under the no-action alternative and conditions do not change substantially under the proposed action. Protection of fish and wildlife releases under Alternatives 3 and 4 would benefit habitats in the Crooked River.

Final EIS Chapter 3, Section 3.4.3, *Environmental Consequences*, has been reviewed to clarify, as needed, effects and benefits of measures in the Crooked River between the Ochoco Diversion on the Crooked River (Crooked River Diversion Dam at RM 55.9) and the North Unit ID pump diversion at RM 22.4.

EIS-15.7 Consistency of Effects Determinations

One commenter asserted that Draft EIS Chapter 3, Section 3.4, *Biological Resources, Fish/Mollusks*, makes conflicting statements regarding effects on Crooked River flows.

Commenters

ORG-15

Response

The commenter refers to conclusions for the no-action alternative and improvements to streamflows described in the Crooked River Collaborative Water Security and Jobs Act of 2014 (Crooked River Act). This conclusion was made relative to conditions prior to implementation of existing water management rules and agreed minimum streamflow requirements on the Crooked River. The overall effect conclusion in the Final EIS, Chapter 3, Section 3.4.3.1, *Alterative 1: No Action*, has been revised to remove conflicting statements and acknowledge the benefits of implementation water management agreements.

EIS-15.8 Monitoring and Adaptive Management for Fish

One commenter asserted that the Draft EIS provided no details on monitoring and adaptive management for fish.

Commenters

ORG-22

Response

The commenter is correct that the Draft EIS did not provide details on monitoring and adaptive management for fish. This information is not included in the Draft EIS as the Draft HCP only includes compliance monitoring for covered fish species. In contrast to compliance monitoring, effectiveness monitoring and adaptive management are not appropriate or required for every conservation measure. The applicants, with input from the Services, have determined that effectiveness monitoring and adaptive management measures are not necessary for those conservation measures where their effectiveness is not scientifically uncertain and where adaptive management would not be useful or appropriate to respond to scientific uncertainty.

In lieu of adaptive management for steelhead, the Final HCP includes a changed circumstances provision that will be triggered in the event that the HCP's biological objectives for Whychus Creek are not met.

EIS-15.9 Effects of North Unit ID Pumping on Streamflows

One commenter asserted that statements in the Draft EIS that increased pumping by North Unit ID would decrease flows below the pumps from May through October conflict with statements that North Unit ID will use their 10,000 af of rental water early in the season under the proposed action and action alternatives.

Commenters

ORG-15

Response

Final EIS Chapter 3, Section 3.4.3, *Environmental Consequences,* has been revised to clarify when North Unit ID pumps may affect flows downstream of the North Unit ID pump diversion. The North Unit ID pump diversion may divert live streamflows in addition to the 10,000 af of rental water requested by the North Unit ID from Prineville Reservoir, as described in Appendix 3.1-B*, RiverWare Model Technical Memorandum* (Section 2.3). RiverWare modeling of shortages in deliveries from the Upper Deschutes under the proposed action show that North Unit ID would divert more water from the Crooked River under the proposed action alternative compared to the no-action alternative. This scenario would result in decreased streamflows between the North Unit ID pump diversion and Osborne Canyon compared to the no-action alternative.

EIS-15.10 Importance of Summer Flows

One commenter stated that the Draft EIS did not acknowledge the importance of increased summer flows on the Crooked River or that uncontracted water released for fish in the summer under the proposed action would not be protected by secondary water rights.

Commenters

ORG-15

Response

The analysis examined differences in streamflow between the no-action alternative and proposed action. Draft EIS Chapter 3, Section 3.4.3, *Environmental Consequences Fish and Mollusks*, summarized months and reaches when the proposed action resulted in lower summer flows affecting fish habitat. The analysis of water temperature conditions in the Crooked River also accounted for effects of reduced summer streamflows on water temperature thresholds for fish species and life stages. Alternatives 3 and 4 include protection of release of uncontracted water for fish. Although, uncontracted release was not explicitly analyzed for habitat or water temperatures because such releases would be based on an annual decision, the analysis did consider qualitatively benefits of protection of uncontracted releases. In particular, downstream of the North Unit ID pump diversion.

Final EIS Chapter 3, Section 3.4.3, *Environmental Consequences Fish and Mollusks*, was reviewed and revised as necessary to clarify the importance of summer flows to fish species, including within the Crooked River.

Request for Additional Information or Analysis

EIS-15.11 Middle Columbia River Steelhead Reintroduction and Opal Springs Dam Fish Passage

One commenter asserted that recent progress in Middle Columbia River Steelhead *(Oncorhynchus mykiss*) recovery, the Pelton Round Butte Hydroelectric Project Federal Energy Regulatory

Commission license requirements and the state and local plans and policies should be considered in the baseline information used to support the effects analysis in the Draft EIS.

Commenters

TRIBE-1, ORG-24

Response

Draft EIS Chapter 3, Section 3.4.3.1, *Alternative 1: No Action,* acknowledges past and ongoing actions to support reintroduction through habitat enhancement projects and fish passage at Opal Springs Dam. Final HCP Section 5.2, *Steelhead Trout*, and Section 5.3, *Chinook Salmon*, contain a summary of ongoing reintroduction efforts to establish salmon and steelhead populations upstream of the Pelton-Round Butte complex for these species.

Final EIS Chapter 3, Sections, 3.4.2 *Affected Environment,* and 3.4.3.1, *Alternative 1: No Action,* have been updated to acknowledge reintroduction of species in the Upper Deschutes Basin and recent achievement of volitional fish passage at Opal Springs in the species baseline. The Final EIS has also been revised to describe how habitat restoration and water management could support reintroduction.

EIS-15.12 Effect on Middle Columbia River Steelhead Recovery

Commenters stated that the Draft EIS does not adequately assess the proposed action's impact on Middle Columbia River steelhead recovery, which is being facilitated by a reintroduction program or that the Middle Columbia River's status, as a nonessential experimental population, expires prior to the expiration of the proposed 30-year term of the ITPs.

Commenters

TRIBE-1, ORG-24

Response

The intent of the EIS is to compare effects on fish, including Middle Columbia River steelhead, under the proposed action compared to the no-action alternative. Steelhead recovery is therefore an ongoing action under all alternatives.

While reintroduction is a significant recovery effort, it is not considered to be key to whether recovery can be achieved for the Middle Columbia River steelhead Distinct Population Segment (DPS). Successful implementation of restoration efforts across all major population groups in the DPS could reduce risks and improve viability leading to recovery determination even if reintroduction does not occur above the Pelton Round Butte Project, thus its designation as a non-essential population. The designation will end in 2025, at which time steelhead populations above the Pelton-Round Butte complex will be covered by the same Endangered Species Act (ESA) protections as other populations in the Middle Columbia River DPS.

EIS-15.13 Baseline Data and Threshold Criteria Identified in Plans, Policies, and Regulations

One commenter asserted that the description of the affected environment for fish was not adequate to support the analysis of effects. The commenter identified additional areas of baseline data and information for fish that they thought should have been included, based on existing plans, policies, and regulations. The commenter also stated that the effect analysis should have considered additional threshold criteria from existing plans, policies, and regulations.

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section 3.4, *Biological Resources*, refers to Appendix 3.4-C, *Fish and Mollusks Technical Supplement*, for a description of the extent and life history of each fish and mollusk species and the Deschutes Basin HCP Chapter 5, *Covered Species*, for additional covered species baseline information. Additional references were reviewed regarding relevance to baseline condition and have been added to Final EIS Chapter 3, Section, 3.4.3 *Environmental Consequences Fish and Mollusks*.

Conditions for determining effects in the Draft EIS Chapter 3, Section 3.4.1., *Methods (Fish and Mollusks)*, were developed to enable the evaluation of effects of water management on fish and mollusk habitats and effects on populations. The use of additional threshold criteria from existing plans, policies, and regulations is not always appropriate as they would either evaluate effects against recovery criteria, which is not the purpose of the EIS, or evaluate conditions for policies not relevant to the HCP, such as Magnuson-Stevens Act essential fish habitat. Where appropriate, Final EIS Chapter 3, Section 3.4.1., *Methods (Fish and Mollusks)*, has been reviewed and revised to include consideration of applicable state and federal and regional plans and policies, as requested by the commenter, for the baseline and conditions for evaluating the alternatives.

EIS-15.14 Additional information

One commenter asserted that the Draft EIS does not adequately discuss past impacts on fish species from dams and altered flows and temperature regimes. The commenter suggested that additional variables should be considered in the effects analysis.

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section, 3.4.3 *Environmental Consequences*, describes effects of the proposed action and action alternatives on fish species compared to the no-action alternative.

The no-action alternative defines the future circumstances that are predicted to continue to occur without the proposed action and assumes the continuation of the existing management plan or program, as analyzed in the current ESA Section 7 BiOp (U.S. Fish and Wildlife Service 2017, 2019).

The no-action alternative is, therefore, the condition against which the proposed action and alternatives are judged. The HCP considers the historical and current conditions of covered, land, waters and species and their habitat in establishing a baseline against which the effects of the proposed action are compared. Please refer to response to comment EIS-3.2, *Baselines*, for additional information.

The focus is on effects that can be shown to be caused by water management under the proposed action, rather than an analysis of all stressors faced by fish species from past and current activities.

As described in the Draft EIS Chapter 1, Section 1.1. *Introduction*, the Services will each independently prepare an ESA Section 7 BiOp on the proposed ITP actions prior to issuing separate RODs. The BiOps will evaluate the environmental baseline and the condition of the listed species or its designated critical habitat in the action area. The BiOps will be completed following publication of the Final EIS but prior to completion of the RODs, and will be incorporated into the RODs.

EIS-15.15 Reliance on RiverWare Model

One commenter asserted that the Draft EIS fish analysis relied entirely on the RiverWare model results and not previous studies that have documented impacts of changes in river hydrology and how it has impacted covered and listed species.

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section 3.4, *Biological Resources*, evaluated changes in the seasonal timing and amount of flows as the primary pathway by which the proposed action and action alternatives may affect fish and mollusk habitats compared to the no-action alternative.

The no-action alternative defines the future circumstances that are predicted to continue to occur without the proposed action and assumes the continuation of the existing management plan or program, such as the actions analyzed in the current BiOps for the Deschutes River Basin Projects (NMFS 2005 and U.S. Fish and Wildlife Service 2017, 2019) The no-action alternative is, therefore, the condition against which the proposed action and alternatives are judged. The HCP considers the historical and current conditions of covered, land, waters and species and their habitat in establishing a baseline against which the effects of the proposed action are compared. Please refer to response to comment EIS-3.2, *Baselines*, for additional information.

As described in Draft EIS Chapter 3, Section 3.4.1, *Methods (Fish and Mollusks)*, the RiverWare model outputs for timing and amount of flows by reach, and reservoir volume and elevation were used to assess environmental conditions relevant to habitat requirements of fish and mollusk species and life stages. Changes in amount of streamflow and timing by reach influences habitat availability, habitat connectivity, and water quality attributes affecting species survival. RiverWare results provided the basis for comparison and evaluating how the proposed action and action alternatives may affect these attributes for fish and mollusks.

EIS-15.16 Effects on Steelhead versus Effects on Reintroduction

One commenter asserted that the Draft EIS is contradictory because the effect conclusion for Impact TR- 2 (Affect Reintroduction of Salmon and Steelhead into Habitats Upstream of the Pelton-Round Butte Complex) and Impact BIO-6 (Affect Steelhead Trout Habitat) are not the same.

Commenters

ORG-12

Response

Effect conclusions for TR-2 and BIO-6 should not be directly compared, as Draft EIS Chapter 3, Section 3.8, *Tribal Resources*, describes TR-2: *Affect Reintroduction of Salmon and Steelhead into Habitats Upstream of the Pelton-Round Butte Complex* as evaluating effects of the proposed action and action alternatives on habitat requirements for reintroduced fish species and effects on reintroduction. The Crooked River is a key watershed for reintroduction of steelhead and water management effects may impede reintroduction with adverse conditions in some years as discussed in the EIS. While BIO-6 in Draft EIS Chapter 3, Section 3.4, *Biological Resources*, evaluates steelhead habitat across the entire study area (i.e., habitats upstream of Pelton-Round Butte and Lower Deschutes River). The conclusions drawn are different; while BIO-6 describes adverse effects on habitat in the Crooked River, it weighs this effect across the entire study area and a mixture of beneficial and no effect conclusions leading to an overall conclusion of not adverse.

EIS-15.17 Steelhead Recovery Plan

One commenter asserted that the discussion of effects on fish should incorporate the guidance included in the *Mid-Columbia Steelhead Recovery Plan*.

Commenters

TRIBE-1, ORG-12

Response

The *Mid-Columbia Steelhead Recovery Plan* is described in Draft EIS Appendix 3.4-C, *Fish/Mollusks Technical Supplement*. Final EIS Chapter 3, Section 3.4.3, *Environmental Consequences,* has been reviewed and revised to reference the *Mid-Columbia Steelhead Recovery Plan* tributary management strategies and actions.

Please refer to response to comment EIS-15.12, *Effect on Middle Columbia River Steelhead Recovery*, for additional information on how the relationship of reintroduction to recovery of Middle Columbia River steelhead has been assessed.

EIS-15.18 Effects of Canal Piping

One commenter asserted that the EIS should include an analysis of the effects of planned district canal piping projects on coldwater refugia for fish in the Middle Deschutes River.

Commenters

ORG-12

Response

Effects of future piping projects on groundwater and coldwater refugia springs are described in Draft EIS Chapter 4, *Cumulative Impacts*.

EIS-15.19 Water Quality Effects from Return Flows

One commenter asserted that the Draft EIS does not adequately analyze the water quality effects of return flows under the proposed action on steelhead in the Crooked River and Trout Creek and that the basis for the overall effect conclusion was unclear.

Commenters

ORG-14

Response

The applicants' control related to return flows is limited to storage, releases, and diversions and associated effects on temperature, surface water elevations, and stream flows. The applicants have revised the Final HCP and associated request for ITP coverage to address incidental take only from those known water quality impacts under the applicants' jurisdiction (temperature, surface water elevations, and rates and volumes of stream flows). The conservation strategy in the Final Deschutes Basin HCP defers to jurisdictional authority of the ODEQ for the management and regulation of water quality discharges from return flows, tail water, and effluent releases throughout the Deschutes Basin.

For agricultural pollutants, the source and quantities of such pollutants are the product of a complex array of factors and actions by others that are outside the jurisdiction and control of the applicants, including operational decisions made by individual agricultural operators. The proposed action would not create additional pesticide sources, pathways or otherwise alter the occurrence of pesticides. As described in Deschutes Basin HCP Chapter 3, *Scope of the DBHCP*, flow and diversion rate changes on the Crooked River—the primary surface water with notable issues related to return flows—are not expected to significantly change under any of the alternatives.

For effluent discharges, the proposed action would have no effect on discharges from the City of Prineville's wastewater treatment facility. Wastewater effluent pollutants are managed under an NPDES permit that is independent from the proposed action. As described in the HCP and in Final EIS, Chapter 3, Section 3.3, *Water Quality*, the existing NPDES permit is adequately addressing biological effects and no further mitigation or modification of alternatives is required. In addition, as noted, the applicants have revised their request for ITP coverage to include only those water quality effects of the covered activities related to temperature, surface water elevations, and rates and volumes of stream flows

In line with this the Draft EIS did not analyze water quality within return flows, tail water and effluent releases because water quality impacts from these sources are outside the jurisdiction and control of the applicants. Based on the HCP, the applicants have no means to control many sources of water quality impairments throughout the basin, including sources of pollutants from return flows, tail water, and effluent releases. Effects on water quality, and associated biological resources due to changes in temperature, surface water elevations, and stream flows, which the applicants do have control of, are discussed in Final EIS, Chapter 3, Sections 3.2, *Water Resources*, 3.3 *Water Quality*, and 3.4 *Biological Resources*.

EIS-15.20 Climate Change Effects on Steelhead

One commenter asserted that the Draft EIS does not adequately account for climate change impacts on steelhead given that they rear in freshwater for longer periods.

Commenters

ORG-14

Response

Draft EIS Chapter 4, *Cumulative Impacts*, included a discussion of the potential effects of the proposed action and action alternatives on fish species when considered in the context of climate change and cumulative actions. Final EIS Chapter 4, Section 4.3.3, *Biological Resources*, has been revised to expand discussion of climate change specific to fish species.

EIS-15.21 Effect Conclusions

Commenters asserted that the basis or threshold criteria for the overall effect conclusion for fish, including steelhead and spring Chinook, were unclear in the Draft EIS.

Commenters

ORG-12, ORG-14

Response

Overall effect conclusions for fish were based on life stages affected, the magnitude of effect, and amount of affected habitat used by the species in the study area. The study area for steelhead and spring Chinook includes the Deschutes River downstream of the Pelton-Round Butte Complex and portions of the upper Deschutes Basin available to these species. Crooked River adverse effects are limited to summer months affecting juvenile life stages for both species, adult migration and holding for spring Chinook, and limited to water management in a subset of years. A not adverse conclusion for BIO-4 through BIO–9 reflect adverse effects in the Crooked River, but a majority of the habitat used by the species was either no effect or a beneficial effect.

Final EIS Chapter 3, Section 3.4.3, *Environmental Consequences*, has been revised to provide clarity, where required, that an overall conclusion of not adverse is based on weighing a mixture of beneficial effect, no effect, or adverse effect on steelhead and spring Chinook habitat across the entire study area.

EIS-15.22 Mitigation for Redband Trout

One commenter asserted that the Draft EIS should have identified mitigation for adverse effects on redband trout (*Oncorhynchus mykiss gairdneri*).

Commenters

ORG-14

Response

Refer to response to comment EIS-3.10, *Mitigation Measures*, regarding inclusion of mitigation measures in the EIS.

The Draft EIS evaluated a set of conditions based on streamflows and reservoir elevations predicted by the RiverWare model. The effects analysis for the Final EIS has been revised based on an updated RiverWare model. The updated model includes refinements in response to public comments to better reflect water management. Further information on the refinements made are provided in Appendix 3.1-B, *RiverWare Model Technical Memorandum*

A rule adjustment has been made in the Final EIS RiverWare analysis to better represent North Unit ID Deschutes River demand in dry years. This rule looks at Wickiup Reservoir storage on April 1, which is the estimated date the reservoir would be full, and reduces North Unit ID's demand from the Deschutes River. The effect of this adjustment resulted in the elimination of large fluctuations in spring streamflows when stored supply cannot meet irrigation demand. Based on the updated analysis presented in Final EIS Chapter 3, Section 3.4.3, *Environmental Consequences*, impacts of the proposed action and action alternatives on redband trout in the Upper Deschutes River would be beneficial. Adverse effects are, however, described for Wickiup Reservoir and Crooked River under the proposed alternative and action alternatives.

EIS-15.23 Protection of Flows on the Crooked–Other Crooked River Diverters

One commenter asserted that the effects analysis does not adequately analyze the effects on fish species of instream flow protection proposed in Alternatives 3 and 4. The commenter asserted that instream flow protection would result in a beneficial impact on fish species.

Commenters

ORG-15

Response

Draft EIS Chapter 3, Sections 3.4.3.3, *Alternative 3: Enhanced Variable Streamflow*, and 3.4.3.4, *Alternative 4: Enhanced and Accelerated Variable Streamflow*, acknowledge and discuss the benefits of instream protection of uncontracted fish and wildlife releases from Bowman Dam to Lake Billy Chinook under Alternatives 3 and 4. This benefit means adverse effects discussed in detail for the proposed action (Draft EIS Chapter 3, Section 3.4, *Biological Resources*, Section 3.4.3.2, *Alternative 2: Proposed Action*) would not be as severe. However, timing of irrigation season release of North Unit ID rental storage for the North Unit ID diversion at RM 22.4 has a substantial impact on water temperatures in the Crooked River. As discussed in Section 3.4.3.2, *Alternative 2: Proposed Action,* and in Appendix 3.4-C, *Fish and Mollusks Technical Supplement,* shifts in timing of this release that would typically occur mid- to late summer may occur in May and June under the proposed action and action alternatives, resulting in longer periods of warm water in July and August compared to the no-action alternative. Analysis overall concluded an adverse finding for fish habitat on the Crooked River.

Final EIS Chapter 3, Section, 3.4.3 *Environmental Consequences Fish and Mollusks,* has been reviewed and revised as necessary to clarify this finding.

EIS-15.24 Temperature and Flow Benefits of Restoration

One commenter requested that the EIS describe specifics on the locations of wetland and riparian shade restoration projects and estimate the temperature and flow benefits of these projects.

Commenters

STATE-4

Response

Wetland and riparian restoration is acknowledged in the qualitative assessment of cumulative impacts for fish. Restoration projects considered reasonably foreseeable and analyzed in Draft EIS Chapter 4, *Cumulative Impacts*, are described in Appendix 2-B, *No-Action and Cumulative Action Scenarios*. The benefits of wetland and riparian restoration on temperature and streamflows discussed in Draft EIS Chapter 4, *Cumulative Impacts*, could not be quantified because locations and extent of these activities were uncertain.

EIS-15.25 Identification of Flows and Habitat Needed to Restore Covered Fish Species

One commenter asserted that the Draft EIS did not assess harm to or take of the covered species (i.e., habitat loss/degradation) from implementation of proposed action and did not identify flows and habitat needed to restore the species.

Commenters

ORG-12, ORG-24

Response

The Deschutes Basin HCP is designed to minimize and mitigate the impacts of take caused by the operational activities (covered activities) of eight irrigation districts and the City of Prineville (the applicants). The covered activities modify the timing and magnitude of flow in the Deschutes River and a number of its tributaries through the storage, release, diversion, and return of irrigation water. FWS acknowledges the Deschutes Basin is a highly altered, complex hydrological system, and changes in surface hydrology caused by the covered activities alter the quantity and/or quality of aquatic habitats for listed species in both positive and negative ways. Furthermore, other numerous human and non-human activities influence the status of the covered species and their habitat in the Deschutes Basin, including urban and rural land use practices and climate change. Those activities are beyond the applicants' control and responsibility to mitigate and are, therefore, beyond the scope of the HCP.

Draft EIS Chapter 3, Section 3.4.3, *Environmental Consequences Fish and Mollusks,* evaluated changes in the seasonal timing and amount of flows as the primary pathway by which the proposed action and action alternatives may affect fish and mollusk habitats.

As described in Section 3.4.3, *Methods*, the RiverWare model outputs for timing and amount of flows by reach, and reservoir volume and elevation were used to characterize environmental conditions relevant to habitat requirements of fish and mollusk species and life stages. Changes in amount of streamflow and timing by reach influences habitat availability, habitat connectivity, and water quality attributes affecting species survival. RiverWare model results provided the basis for evaluating how the alternatives may affect these attributes essential for fish and mollusks.

Draft EIS Chapter 4, *Cumulative Impacts*, considers the potential for the proposed action and action alternatives to result in cumulative effects when considered in the context of other impacts from past, present, and reasonably foreseeable cumulative actions.

As described in Draft EIS Chapter 1, Section 1.1. *Introduction*, the Services will each independently prepare an ESA Section 7 BiOp on the proposed ITP actions prior to issuing separate RODs. The BiOps will evaluate the environmental baseline and the condition of the listed species or its designated critical habitat in the action area. The BiOps will be completed following publication of the Final EIS but prior to completion of the RODs, and will be incorporated into the RODs.

Impact Concern

EIS-15.26 Steelhead Reintroduction

One commenter asserted that if the proposed action impedes reintroduction success, it is contradictory to the purpose of the 2013 nonessential experimental population designation for Middle Columbia River steelhead.

Commenters

ORG-24

Response

As noted by the commenter, Draft EIS Chapter 3, Section, 3.4.3, *Environmental Consequences*, discloses impacts on reintroduction of Middle Columbia River steelhead in the Crooked River as an adverse impact.

As described in Draft EIS Chapter 1, Section 1.1, *Introduction*, the Services will each independently prepare an ESA Section 7 BiOp on the proposed ITP actions prior to issuing separate RODs. The BiOps will evaluate the environmental baseline, the condition of the listed species or its designated critical habitat in the action area. The BiOps will be completed prior to completion of the RODs that will be prepared following publication of the Final EIS and will be incorporated within the RODs.

Please refer to response to comment EIS-15.12, *Effect on Middle Columbia River Steelhead Recovery,* for additional information on how the relationship of reintroduction to recovery of Middle Columbia River steelhead has been assessed.

16 Land Use and Agricultural Resources

Adequacy of Analysis

EIS-16.1 Water Conservation Assumptions

One commenter asserted that the analysis of effects on water available for irrigation presented in Draft EIS Chapter 3, Section 3.5, *Land Use and Agricultural Resources*, ignores the potential for districts water conservation projects to offset these effects by reducing demand.

Commenters

ORG-15

Response

The analysis presented in Draft EIS Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*, and summarized in Chapter 3, Section 3.5, *Land Use and Agricultural Resources*, accounts for a reasonable range of potential future increased conveyance and on-farm efficiencies by applying low and higher water conservation scenarios. The low conservation scenario assumes only limited future piping occurs to increase district conveyance efficiencies, and there is limited additional on-farm irrigation efficiency improvement. The high conservation scenario assumes nearly all district piping projects (as outlined in current district planning documents) proceed and higher on-farm irrigation efficiencies are achieved over a realistic timeframe. Refer to Draft EIS Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*. These water conservation projects may occur under all alternatives, including no-action. Even in the high conservation scenario, less total water available for crop irrigation is projected under the proposed action and other action alternatives compared to the no-action alternative.

EIS-16.2 Focus on Forage and Grain Crops

One commenter asserted that the analysis underestimates total farm productivity by focusing on forage and grain crops.

Commenters

GP-156

Response

Draft EIS Chapter 3, Section 3.9.3, *Environmental Consequences*, Impact SOC-1, Affect Economic Opportunity, acknowledges and discusses the methods and assumptions that may result in overestimating or underestimating economic impacts related to reduced irrigation water, and the effect of these assumptions on estimated impacts. While there may be some impacts on specialty crops, the analysis found that the impacts would likely be limited.

EIS-16.3 Potential for Longer-Term Impact of Seasonal Water-Stressed Crops

One commenter asserted that the Draft EIS underestimates the economic risk to irrigated agriculture by ignoring the longer-term impact of seasonal water-stressed crops and the irreversible nature of cropping decisions.

Commenters

GP-156

Response

As described in Draft EIS Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*, in the section titled Agricultural Production Value and Economic Contribution, Methods, Key Assumptions, Data Sources, estimated impacts on agricultural production value assumed that once an acre ceases to receive irrigation water, the forage or grain crop goes dormant and does not provide additional cuttings/production for the rest of the season. Draft EIS Chapter 3, Section 3.9.3, Impact SOC-1, *Affect Economic Opportunity*, acknowledges that no multi-year impacts, such as impacts on subsequent year yields, are estimated which may understate costs to producers. To the extent that producers have multiple stands of different ages, they could limit multi-year effects on productivity by deficit irrigating their oldest stand.

EIS-16.4 Economic and Agronomic Cost of "Dormant" Cropland

One commenter asserted that the Draft EIS underestimates the economic risk to irrigated agriculture by not accounting for the economic and agronomic cost of "dormant" cropland.

Commenters

GP-156

Response

Draft EIS Chapter 3, Section 3.9.3, Impact SOC-8, *Affect Social Values Associated with Community Character and Way of Life*, and SOC-1, *Affect Economic Opportunity*, acknowledge that farmers facing reduced forage/grain yields would face decreased profits, increased livestock feed costs through purchase of hay to replace reduced forage production, and likely other costs associated with maintaining dormant hay or fallow fields such as weed control. The section also describes the potential longer-term effects of these costs.

EIS-16.5 Financial Costs of Water Shortages

One commenter asserted that the financial costs of water shortages could be higher and of longer duration than estimated in the Draft EIS.

Commenters

GP-156

Response

Wheat tends to be the most responsive crop to water shortages, as a relatively low-value annual crop. The Draft EIS combines wheat and all forage crops, which account for a much larger share of all acreage and production value than wheat alone in Jefferson County (and therefore, for a given water shortage, the percent change in forage/wheat production would be much lower than the percent change in wheat alone).

As described in Draft EIS Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*, in the section titled *Farm Response to Crop Water Shortages: Change in Acreage*, farmers can respond by either fallowing lands or deficit irrigating. Because growers tend to deficit irrigate rather than fallow/abandon fields, the total production impact is usually greater than the impact on acreage. However, importantly, while the acreage impact may be different, the total production impact is not expected to be much different between deficit irrigation or fallowing. As noted in the appendix, for a given water supply reduction, fallowing and deficit irrigation have similar effects on the total value of agricultural production. For the reasons stated in the appendix, the analysis assumes all acreage is fallowed rather than deficit irrigated.

In Draft EIS Chapter 3, Section 3.9.3, Impact SOC-1, *Affect Economic Opportunity*, acknowledges that no multi-year impacts, such as impacts on subsequent year yields, are estimated that may understate costs to producers. To the extent that producers have multiple stands of different ages, they could limit multi-year effects on productivity by deficit irrigating their oldest stand.

Impact Concern

EIS-16.6 Future

One commenter expressed concern that increased winter flows under the proposed action would further negatively affect existing irrigation water shortages and reduce the amount and type of crops produced in Jefferson County.

Commenters

LOCAL-3

Response

Draft EIS Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*, and Chapter 3, Section 3.5, *Land Use and Agricultural Resources*, present the analysis of effects on agriculture of the proposed action and alternatives that increase winter flows compared to the no-action alternative over the permit term, incorporating the effects of the alternatives on water storage and water for irrigation in the context of ongoing district and on-farm water conservation projects to reduce demand. The analysis concluded that increased winter flows would reduce water supply under the proposed action and estimated the increased fallowing or deficit irrigation of forage and grain cropland in dry years in Lone Pine ID and North Unit ID. This information can be used to inform local responses and planning regarding future agricultural irrigation conditions.

Request for Clarification

EIS-16.7 Reduction in Water Supply

One commenter asked for an explanation of how the statement of Arnold ID water supply reductions in Draft EIS Chapter 3, Section 3.5, *Land Use and Agricultural Resources*, compares to the percentages in Draft EIS Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*, Table 7. The commenter also wanted clarification on the relationship between the data in Table 3.5-6 Draft EIS Chapter 3, Section 3.5, *Land Use and Agricultural Resources* and the data in Table 7 of the Draft EIS Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*.

Commenters

STATE-1

Response

Statements of changes in water available for diversion in the Arnold ID in the Draft EIS Chapter 3, Section 3.5, *Land Use and Agricultural Resources* match with the data on water diversions presented in Draft EIS Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*. In the Final EIS Chapter 3, Section 3.5, *Land Use and Agricultural Resources,* there are no data on water diversions presented, as these data are already presented in the Appendix 3.5-A. Also, regarding Table 3.5-6, this presents different data than presented in Table 7 in the Draft EIS Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*. Specifically, in the appendix, Table 7 compares water available for diversion under the proposed action to the no-action alternative. In contrast, the data in Table 3.5-6 and associated text compare changes in acre-equivalents under the no-action alternative compared to the proposed action. In sum, Table 3.5-6 presents change in acreage and Table 7 in the Appendix presents change in water available for diversion.

EIS-16.8 Effects in Median or Dry Years

One commenter asked why affected equivalent acreage for Arnold ID would be affected by available water during the median or dry years given that the district relies on natural flows in all years but the very driest.

Commenters

STATE-1

Response

Draft EIS Chapter 3, Section 3.5, *Land Use and Agricultural Resources*, identifies the acreage that may be affected during the irrigation season based on RiverWare results regarding changes in water available for diversion. Water supply and acreage effects on Arnold ID have been updated in the Final EIS to reflect refinements to the RiverWare modeling, with notable reductions in effects on Arnold ID. The Final EIS analysis now concludes in Chapter 3, Section 3.5, *Land Use and Agricultural Resources*, that the Arnold ID will only be affected in dry years.

17 Recreation

EIS-17.1 Site-Specific Effects of Flows for Recreation

Several commenters identified specific reaches where river recreation would be affected, with particular concerns for lower summer flows in the Upper Deschutes River reaches.

Commenters

STATE-1, ORG-7, GP-44, GP-48, GP-83, GP-114, GP-133, GP-175, FLP-53

Response

Final EIS Chapter 3, Section 3.7, *Recreation*, has been revised to include additional information regarding existing conditions and projected effects on the specific river reaches, including several reaches in the Upper Deschutes River and other reaches, as noted in public comments on the Draft EIS.

EIS-17.2 Recreation Flow Study

Several commenters called for a recreational flow study to address impacts on recreation.

Commenters

ORG-7, GP-46, GP-83, GP-133, GP-175

Response

Potential effects on whitewater rafting were evaluated based on the surface water analysis in Section 3.2, *Water Resources*, and the detailed flow levels projected by RiverWare (Appendix 3.1-B, *RiverWare Model Technical Memorandum*, and Appendix 3.2-A, *Water Resources Technical Supplement*). A separate recreational flow study was not required as the flow level modeling provided sufficient information to identify reasonably foreseeable significant adverse impacts on recreational river uses to ultimately inform a reasoned choice among alternatives. Final EIS Chapter 3, Section 3.7, *Recreation*, includes additional information regarding existing conditions and projected effects on the specific river reaches, including those noted by commenters.

EIS-17.3 Local Knowledge

Several commenters requested that FWS consult people that know the river to incorporate local knowledge into the impact assessment.

Commenters

ORG-7, GP-95, GP-112

Response

Numerous recreational stakeholders provided valuable information regarding recreational uses within the study area as part of public scoping for the Draft EIS. This information was included in the Draft EIS. Final EIS Chapter 3, Section 3.7, *Recreation*, has been revised to include additional information regarding existing conditions and projected effects on the specific river reaches, including those noted in public comments.

EIS-17.4 State Scenic Waterways

Two commenters noted that state Scenic Waterway Flows adopted by the Oregon Water Resources Commission need to be applied to the analysis of effects on recreation.

Commenters

STATE-1, ORG-15

Response

As described in the Final EIS Chapter 3, Section 3.7, *Recreation*, minimum flow levels adopted by the Oregon Water Resource Commission and associated regulations (ORS chapters 390.932, 390.815 and 390.836) only apply to new water rights, which are not proposed under any of the alternatives. As described in Draft EIS Chapter 3, Section 3.6, *Aesthetics and Visual Resources*, Oregon State Scenic Waterways include portions of the Upper and Lower Deschutes Rivers and the Metolius River. The Final EIS Chapter 3, Section 3.7, *Recreation*, analysis has been updated to assess the potential effects on designated State Scenic Waterways. Under REC-2, *Conflict with Existing and Future Wild and Scenic and State Scenic Waterway Designations*, the proposed action and action alternatives would reduce whitewater opportunities, would improve vegetation, shorelines, aesthetics and related recreational opportunities. Therefore, the overall effect of the proposed action and action alternatives on designated State Scenic Waterways reaches would be not adverse compared to the no-action alternative.

Impact Concern

EIS-17.5 River Recreational Safety

Several commenters expressed concerns that lower summer flows in Upper Deschutes River reaches under the proposed action would create hazardous conditions.

Commenters

ORG-7, GP-83, GP-114, GP-175

Response

Final EIS Chapter 3, Section 3.7, *Recreation*, has been revised to include potential effects on whitewater safety.

EIS-17.6 Harm to Recreational Economy

Many commenters voiced concerns that the proposed action would harm the recreational economy of the Deschutes Basin.

Commenters

GP-46, GP-48, GP-114, GP-124, GP-133, GP-175, FLP-48, FLP-53

Response

Draft EIS Chapter 3, Section 3.9, *Socioeconomics and Environmental Justice,* describes potential effects on the recreational economy.

Final EIS Section 3.9, *Socioeconomics and Environmental Justice*, has been revised to include effects of summer flow reductions on the recreation economy, including effects on whitewater opportunities in the Upper Deschutes, which are important to the local economy.

EIS-17.7 Recreational Fishing Economy

One commenter voiced concern that the proposed action would harm regionally significant fishing destinations of the Deschutes Basin.

Commenters

GP-95

Response

Adverse effects on recreational fishing are described in Draft EIS Chapter 3, Section 3.7, *Recreation.* Based on the analysis presented in the Draft EIS, Chapter 3, Section 3.4, *Biological Resources*, and on an evaluation of the degree of changes to flow levels and associated "fishability," the proposed action is not anticipated to adversely affect fish populations or associated fishing opportunities and experiences.

EIS-17.8 General Recreation

Commenters voiced general concerns regarding the impacts on recreation.

Commenters

GP-107, GP-109, GP-133, GP-175

Response

The importance of recreation in the plan area is described in Draft EIS, Chapter 3, Section 3.7.2, *Recreation Affected Environment*. Adverse effects on recreational fishing are described in Draft EIS Chapter 3, Section 3.7.3, *Environmental Consequences.*

EIS-17.9 Wild and Scenic River Designations

One commenter noted that the Upper and Lower Deschutes River are designated and protected under the Wild and Scenic River Act and that in the Comprehensive Management Plan, recreation is identified as an Outstandingly Remarkable Value in all three designated segments of the Upper Deschutes to be protected and enhanced.

Commenters

ORG-7

Response

Effects on designated Wild and Scenic Rivers, including consistency with relevant management plans, are described in Draft EIS, Chapter 3, Section 3.7.3, *Recreation,* REC-2*.*

Modification to Proposed Action

EIS-17.10 Retain Higher Summer Flows for Recreation

Several commenters requested that the proposed action include higher summer flows on the Upper Deschutes River for recreational paddlers.

Commenters

GP-47, GP-48, GP-113, GP-133, GP-175, FLP-53

Response

As described in Draft EIS, Chapter 3, Section 3.7, *Recreation*, the proposed action would reduce summer flows in some reaches that are important to whitewater recreation. Such reductions in summer flows would be unavoidable if the project's purpose and need were to be met, as more level flows are needed to minimize and mitigate for adverse effects on covered species, particularly Oregon spotted frog.

18 Tribal Resources

Request for Additional Information or Analysis

EIS 18.1 Inadequate Support for Adverse Effect Determination under TR-2

The commenter asserts that the Draft EIS' adverse effects conclusion under TR-2, *Affect Reintroduction of Salmon and Steelhead into Habitats Upstream of the Pelton-Round Butte Complex*, is unsubstantiated as Alternatives 3 and 4 provide protection and uncontracted fish and wildlife flows, benefiting Chinook salmon and steelhead trout.

Commenters

STATE-4

Response

Draft EIS Chapter 3, Section 3.8, Section 3.8.4.2 under TR-2, *Affect Reintroduction of Salmon and Steelhead into Habitats Upstream of the Pelton-Round Butte Complex*, concludes that overall the proposed action would have an adverse effect on spring Chinook salmon and steelhead trout reintroduction into the Crooked River compared to the no-action alternative and beneficial effects elsewhere. Overall, the effects would be adverse considering the importance of the Crooked River to reintroduction over the permit term, despite small beneficial effects in the Middle Deschutes River, Whychus Creek, Ochoco Creek, and McKay Creek.

In Draft EIS Chapter 3, Section 3.8, *Tribal Resources*, Sections 3.8.4.3 and 3.8.4.4, effects on reintroduction of salmon and steelhead under Alternative 3 and Alternative 4 are also discussed under TR-2. Within these sections it is acknowledged that, when compared to the no-action alternative, the effects would be the same as described for the proposed action, with the exception that under Alternative 3 adverse effects in the Crooked River would be of slightly lesser magnitude due to instream protection of uncontracted fish and wildlife releases, but effects would occur earlier in the permit term and therefore would be over a longer duration under Alternative 3 than described for the proposed action. While under Alternative 4 beneficial and adverse effects on the Crooked River would be of slightly greater magnitude, as described in Draft EIS Section 3.4.3.4 (Impacts BIO-6 through BIO-9[2]) for the reasons described for Alternative 4. Effects would occur earlier in the permit term under Alternative 4, but effects of the full implementation would be of a shorter duration. Greater beneficial effects would be higher storage season streamflows under Alternative 4 under Conservation Measure CR-1 (i.e., 80 cfs), but adverse irrigation season effects in reaches of the Crooked River described for the proposed action at full implementation would also occur. Given this, overall, it was concluded that both Alternative 3 and 4 would have an adverse effect on Chinook and steelhead reintroduction compared to the no-action alternative for the reasons described for the proposed action.

The Final EIS Chapter 3, Section, 3.8.3 *Environmental Consequences* was reviewed and revised as necessary to clarify this finding.

EIS-18.2 Reservation Boundaries

The commenter asserts that the Draft EIS fails to state that the covered lands include tribal trust lands outside the Warm Springs Reservation, which are located at Sherars Falls on the lower Deschutes River and hold significant cultural importance. Further, the commenter states that the Services' failure to accurately describe CTWS' lands and waters affected by the HCP have resulted in an incomplete analysis for purposes of NEPA. Finally, the commenter also points to 40 CFR Section 1503.4. as an additional resource for this section.

Commenters

TRIBE-1

[2] The effect conclusion for Impact TR-2 should not be directly compared to the effect conclusions for Impacts BIO-6 through BIO-9 in Section 3.4, *Biological Resources*. Impact TR-2 evaluates effects of the proposed action and action alternatives on habitat requirements for reintroduced fish species and effects on reintroduction. The adverse effects of water management in some reaches of the Crooked River in some years, as discussed in Impacts BIO-6 through BIO-9, are considered an adverse effect on Impact TR-2 because of the importance of the Crooked River watershed for reintroduction (Oregon Department of Fish and Wildlife and Confederated Tribes of the Warm Springs 2008). Impacts BIO-6 through BIO-9 evaluate effects on steelhead and spring Chinook salmon habitat and migratory life stages across the entire study area (i.e., Crooked River habitats upstream of Pelton-Round Butte and Lower Deschutes River habitats); therefore, adverse effects on habitat in some Crooked River reaches in some years along with a mixture of not adverse, no effect, and beneficial effects in other water bodies occupied by the species resulted in an overall conclusion of not adverse.

Response

Final EIS Chapter 3, Section, 3.8.2 *Affected Environment* has been revised to acknowledge that the reservation boundaries extend to middle of Deschutes River channel. The Warm Springs Reservation boundary is now described as follows:

> The Warm Springs Reservation in Central Oregon encompasses 640,000 acres between the middle of the Deschutes River and the crest of the Cascade mountain range; and the Metolius River and Deschutes River are streams running within and bordering the Reservation.

In addition to this, within the Final EIS Chapter 3, Section, 3.8.2, has also been updated to reference the off-reservation Sherars Falls and Bridge fishing sites on the Deschutes River at RM 44 and to acknowledge the sites' significant cultural, historic, and economic significance to the CTWS.

Finally, while the commenter points to 40 CFR Section 1503.4 as an additional resource for this section, it relates to providing responses to comments. Therefore, FWS determines this is not relevant to the Draft or Final EIS Chapter 3, Section 3.8, *Tribal Resources*.

EIS-18.3 Tribal Rights to Fish

One commenter asserts that the Draft EIS does not adequately analyze the proposed action and alternatives' effects on Tribal rights to fish above the Pelton Project, stating that government consultation is needed to address this effect.

Commenters

TRIBE-1

Response

Draft EIS Chapter 3, Section 3.4.3, *Environmental Consequences,* disclosed effects of the proposed action and alternatives on habitats for reintroduction of fish above the Pelton-Round Butte project.

Final EIS Chapter 3, Section 3.8.3 text has been reviewed and revised as necessary to clarify the Tribe's goal of restoring fish above the project to levels that would allow harvest on populations upstream of the Pelton-Round Butte project.

Since publication of the Draft HCP and Draft EIS, the Services and Reclamation requested formal government-to-government consultation with the CTWS Tribal Council. Representatives from the Services and Reclamation met with the CTWS Tribal Council on February 24, 2020. The Services respect, have implemented, and will continue to implement the necessary consultation processes with the CTWS.

EIS-18.4 Reintroduction of Salmon/Middle Columbia River Steelhead

The commenter asserts that the reintroduction of salmon and Middle Columbia River steelhead into habitats upstream of the Pelton-Round Butte Complex should be analyzed beyond the context of this action's effects on tribal resources to include the effects to existing federal and state fisheries plans.

Commenters

TRIBE-1

Response

Final EIS Chapter 3, Section 3.8.3, *Environmental Consequences*, has been revised to acknowledge that, although reintroduction is discussed in Final EIS Chapter 3, Section 3.8, it is included in federal and state fisheries plans and is a requirement of the 2005 License for the Federal Energy Regulatory Commission Pelton-Round Butte Project, which is co-managed by Portland General Electric and the CTWS.

Final EIS Chapter 3, Section 3.4.3, *Environmental Responses*, was revised to discuss effects of the proposed action and alternatives on reintroduction consistent with federal and state plans for reintroduction and recovery of Middle Columbia steelhead by reference to Final EIS Section 3.8, *Tribal Resources*.

EIS-18.5 Discussion of Water Rights

The commenter asserts that the Draft EIS does not adequately discuss tribal water rights outside of the Warm Springs Reservations, citing *U.S. v. Washington*, 853 F.3d 946 and *Baley v. United States*, 2019 WL 5995861 (Nov. 14, 2019).

Commenters

TRIBE-1

Response

The Services understand that the Tribe's 1997 settlement did not specifically address all of the Tribe's possible off-reservation water rights claims, as the 1997 settlement only addressed on-reservation and off-reservation rights to water adjacent to the reservation (i.e., Deschutes River, Pelton Lakes, and the Metolius River; refer to the 1997 Settlement, Art. VI.A.16). However, the Services acknowledge that the Tribe's claim (as set out in its comment) on off-reservation water rights in the Deschutes Basin, and that this claim includes the Crooked River within the Plan area, as well as its tributaries. Final EIS, Section 3.8.2.1, *Confederated Tribes of the Warm Springs Reservation of Oregon*, has been revised to reflect this claim.

While the facts of the *Baley* decision are specific to the operation of a Reclamation project and the various Indian reservations in the Klamath Basin, even if its holding were applicable here, the Services will conduct intra-Service Section 7 consultations prior to issuing the ITPs and the ITPs will not be issued unless the Services conclude that such actions will not violate Section 7(a)(2) of the ESA.

EIS-18.6 Determination of Water Right Effect

One commenter asserts that the Draft EIS does not substantiate the determination that the HCP would not have an adverse effect on tribal off-reservation water rights.

Commenters

TRIBE-1

Response

Final EIS Chapter 3, Section 3.8.3, *Environmental Consequences*, under TR-4, *Affect Warm Springs Tribes' Reservation Reserved Water Rights*, has been reviewed and revised as necessary to clarify that the analysis relates to the reservation water rights defined by the 1997 settlement agreement, and is the basis for the finding of no effect on water rights, which includes the incorporation of water quality impacts, relating to the proposed action into the analysis.

The Services understand that the CTWS' 1997 settlement did not specifically address all the Tribe's possible off-reservation claims, as the 1997 settlement only addressed on reservation and off-reservation rights to water adjacent to the reservation (i.e., Deschutes River, Pelton Lakes, and the Metolius River; refer to 1997 Settlement, Art. VI.A.16). However, the Services acknowledge that the CTWS claim (as set out in its comment) off-reservation water rights in the Deschutes Basin, and that this claim includes the Crooked River within the Plan area, as well as its tributaries. However, since these claims have not been adjudicated or otherwise quantified, they are not amenable to the type of analysis that was conducted under TR-4, *Affect Warm Springs Tribes' Reservation Reserved Water Right,* in Draft EIS, Section 3.8, *Tribal Resources*. However, impacts from the HCP and alternatives to the resources that any such off-reservation water rights claims would seek to protect, namely, fish, vegetation, and wildlife, and the tribal fishery, were presented in the Draft EIS at Section 3.8.

EIS-18.7 Tribal Decision Making

One commenter stated that the CTWS typically frame decisions on water resources by weighing the effects for seven generations into the future.

Commenters

GP-189

Response

The EIS analysis has been limited to evaluating effects to 30 years to correspond with the length of the permit term. Although the analysis period was 30 years, resource impacts consider longer goals, (e.g., reestablishing harvestable salmon and steelhead populations upstream of the Pelton-Round Butte Complex). However, in acknowledgement of the longer tribal decision-making time frames, the Final EIS Chapter 3, Section 3.8.1, *Methods,* has been revised to state that the affected tribes may frame decisions on water resources by weighing the effects for seven generations into the future.

EIS-18.8 Tribal Effects from Water Quality Changes

The commenter asserts that the EIS should analyze water quality issues from a tribal lens due to the effects of water quality on fish populations.

Commenters

TRIBE-1

Response

Final EIS Chapter 3, Section 3.8 was reviewed and revised as necessary to encompass a broader view of the resources. The broader view with regard to water quality as a resource has been incorporated by including references to other resources sections in the Final EIS Chapter 3, Section 3.8, *Tribal Resources*, where beneficial. A broader view was also incorporated into the analysis of effects of the proposed action on water quality in the Deschutes River under TR-4, *Affect Warm Springs Tribes' Reserved Water Right*.

EIS-18.9 Categorization of Resources

The commenter states that tribal cultural resources should be identified and discussed in conjunction with the natural tribal resources identified in the Draft EIS. Additionally, the commenter states that tribal cultural resources should be discussed separately from other, non-tribal cultural resources.

Commenters

TRIBE-1

Response

The Final EIS has been revised to reference Final EIS Chapter 3, Section 3.10, *Cultural Resources* in Section 36.8, *Tribal Resources*, for more information about the CTWS's cultural connection in the study area and cultural resources.

Impact Concern

EIS-18.10 Harvest and Fish Reintroduction

The commenter asserts that the Draft EIS contains an inaccurate determination of effects to tribal fish resources above the Pelton Project. The commenter states that the reason CTWS members do not focus fishing efforts there is because fish have been extirpated by the Pelton Project, not because these areas do not hold tribal significance.

Commenters

TRIBE-1

Response

Final EIS Chapter 3, Section, 3.8, *Tribal Resources,* has been reviewed and revised to acknowledge that, while current harvest practices are in the lower river and on lower river populations, CTWS members at one time harvested populations returning above the Pelton-Round Butte project and that a goal of reintroduction is for future harvest of fish returning to above the project.

However, it should be noted that the no-action alternative defines the future circumstances that are predicted to continue to occur without the proposed action, and assumes continuation of existing harvest activities, management plan, or program. The no-action alternative is, therefore, the condition against which the proposed action and alternatives are judged. The HCP considers the historical and current conditions of covered, land, waters and species and their habitat in establishing a baseline against which the effects of the proposed action are compared. Please refer to response to comment EIS-3.2, *Baselines*, for additional information.

Tribal Liability Concern

EIS-18.11 Reintroduction Effects

The commenter states that the Draft EIS should evaluate the effects of the proposed action on salmon and steelhead reintroduction efforts, asserting that these effects would disproportionately burden Portland General Electric and the CTWS.

Commenters

TRIBE-1

Response

Draft EIS Chapter 3, Section 3.8.3, *Environmental Consequences*, discloses impacts on reintroduction of steelhead, spring Chinook and sockeye salmon above the Pelton-Round Butte complex.

Please also refer to the responses to comments EIS-15.11, *Middle Columbia River Steelhead Reintroduction and Opal Springs Dam Fish Passage*, EIS-15.12, *Effect on Middle Columbia River Steelhead Recovery* and EIS-15.26, *Steelhead Reintroduction*.

EIS-18.12 Water Rights

The commenter expresses concern that the Draft EIS does not adequately address the full scope of tribal water rights, including effects to water quality in the Crooked River and subsequent impacts on water quality in Lake Billy Chinook and the Lower Deschutes River (per the 1997 Confederated Tribes of The Warm Springs Reservation Water Rights Settlement Agreement) and that this constitutes a violation of tribal water rights.

Commenters

TRIBE-1

Response

Final EIS Chapter 3, Section 3.8, *Tribal Resources*, has been reviewed and revised to evaluate effects of the proposed action and alternatives on water quality in Lake Billy Chinook and the Lower Deschutes River that may impact the CTWS' ability to exercise this water right.

Administrative Record

EIS-18.13 Suggested Additions to Administrative Record

The commenter provided a list of resources that are recommended for inclusion in the EIS administrative record.

Commenters

TRIBE-1

Response

Final EIS Appendix 3.1-A, *Regulatory Environment*, has been reviewed and revised to include cited material applicable to the proposed action and alternatives.

19 Socioeconomics and Environmental Justice

Request for Clarification

EIS-19.1 Table Heading

One commenter requested clarification about the title and column headings for Draft EIS Chapter 3, Section 3.9, *Socioeconomics and Environmental Justice*, Table 3.9-4.

Commenters

ORG-12

Response

Draft EIS Chapter 3, Section 3.9, *Socioeconomics and Environmental Justice*, Table 3.9-4 concerns the percentages are of farm operators in the study area. The Final EIS title and column headings have been clarified.

EIS-19.2 Table Headings and Definitions

One commenter requested clarification about the title, row, and column headings and definitions for Draft EIS Chapter 3, Section 3.9, *Socioeconomics and Environmental Justice*, Table 3.9-5.

Commenters

ORG-12

Response

The caption for Table 3.9-5 in the Final EIS Chapter 3, Section 3.9, *Socioeconomics and Environmental Justice*, has been modified to "Selected Farmworker Socioeconomic Characteristics (Earnings, Days Hired, and Proportion Migrant) in the Study Area" to provide additional clarity about the information the table presents. In addition, the row and column headings have been revised to provide clarity. As identified in Draft EIS Section 3.9, and now clarified in the row and column headings of Table 3.9-5, the table presents the percentage of farmworkers who are hired for less than 150 days, the percentage of farmworkers who are migrant, and the average annual hired farmworker earnings per job in the study area.

Request for Additional Information or Analysis

EIS-19.3 Total Economic Contribution of Agriculture

Several commenters stated that Draft EIS Chapter 3, Section 3.9, *Socioeconomics and Environmental Justice*, does not present information on the importance of the total economic contribution of agriculture (particularly the importance of carrot seed) to the local economy, and the associated importance of adequate irrigation water supplies.

Commenters

ORG-18, GP-151

Response

Information on the total economic contribution of agriculture to the local economy has been added to Final EIS Chapter 3, Section 3.9.2.3, *Employment and Income*, and information on the importance of the carrot seed industry specifically has been added to the discussion of Impact SOC-1 (Affect Economic Opportunity) in Final EIS Chapter 3, Section 3.9.3, *Environmental Consequences*.

Adequacy of Analysis

EIS-19.4 Negative Effects on North Unit ID Farmers and Local Economy

Several commenters stated that the Draft EIS underestimates (particularly in extreme water scarce years or in the case of recurring years of water shortages) the negative effects (i.e., decreased net farm income, farm viability, tax revenues, farmland value, local economy) of reductions in irrigation deliveries and water conservation costs on farm families and communities.

Commenters

GP-151, GP-156, ORG-18, GP-156

Response

Draft EIS Chapter 3, Section 3.9.3, Impacts SOC-1 (Affect Economic Opportunity), SOC-7 (Change Local Government Fiscal Conditions), and SOC-8 (Affect Social Values Associated with Community Character and Way of Life) present the quantitative analysis of the effects of reduced irrigation supplies on agriculture, farm families, and agricultural communities in dry, median, and wet years, but do not quantitatively assess effects in extreme water scarce years. Draft EIS Chapter 3, Section 3.9.3, *Environmental Consequences*, Impact SOC-1 (Affect Economic Opportunity), acknowledges and discusses the methods and assumptions that may result in overestimating or underestimating economic impacts related to reduced irrigation water, and the effect of these assumptions on estimated impacts. Draft EIS Section 3.9, *Socioeconomics and Environmental Justice*, presents the cumulatively projected magnitude and frequency of water shortages in Tables 3.9-9, 3.9-11, and 3.9-12 (final column). These tables represent annual average impact in all water year types. Impact SOC-1 (Affect Economic Opportunity), acknowledges that no multiyear impacts are evaluated, which may understate the effects in the case of back-to-back dry water years. The Final EIS includes a statement, under Impact SOC-1 (Affect Economic Opportunity), on the potential magnitude difference in adverse effects in extreme dry years.

EIS-19.5 Total Agricultural Water Demand

One commenter asserted that the Draft EIS should acknowledge and avoid potential unintended consequences of reduced water supplies to North Unit ID that could undermine environmental objectives. The commenter specifically noted that an unintended consequence could be increased water use in irrigation districts that have lower water use efficiency (to meet regional hay demand and offset decreased forage production in the more water efficient North Unit ID).

Commenters

GP-156

Response

Total water demand and use in each irrigation district is limited by the water rights and allocation of water to each district. Each district is already diverting most, if not all, of their allocated water rights. Consequently, water use cannot increase by much in other districts to respond to a local hay shortage resulting from reduced agricultural production in the North Unit ID. Further, the region currently exports hay, so the area can likely absorb a reduction in total hay production while still meeting local demand. Additionally, to the extent that a basin-wide water market is implemented, as the most efficient, high value area (and thus the area likely most able and willing to purchase water from other areas), the effects on North Unit ID would be more limited.

Effect Concern

EIS-19.6 Negative Effects on North Unit ID Farmers and Local Economy

Commenters expressed concern that the HCP would disproportionately affect North Unit ID farmers and the local economy and labor force and that the EIS should account for these effects.

Commenters

GP-156, GP-162, LOCAL-2, GP-157

Response

The Draft EIS does analyze how the HCP (i.e., the proposed action) would disproportionately affect North Unit ID farmers and the local economy and labor force.

Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement,* analyzes how each Deschutes Basin irrigation district, including the North Unit ID, may respond to changes in the water supply available for irrigation diversion, and how these responses may change the value of agricultural production and the economic contribution of agricultural production. The appendix and the Draft EIS, Chapter 3, Section 3.9.3, Impact SOC-1 (Affect Economic Opportunity), also discusses potential effects on agricultural production and value in each district. Draft EIS Chapter 3, Section 3.9.3, Impacts SOC-1 (Affect Economic Opportunity), SOC-7 (Change Local Government Fiscal Conditions), and SOC-8 (Affect Social Values Associated with Community Character and Way of Life) present the quantitative analysis of the effects of reduced irrigation supplies on agriculture, farm families, and agricultural communities. Effects on economic opportunity, taxes, and way of life in these sections of the Draft EIS are presented at the county level as these effects extend past the district and farm boundaries to affect socioeconomic conditions at the county level.

Draft EIS Chapter 3, Section 3.9.3, SOC-1 (Affect Economic Opportunity), also acknowledges and discusses the methods and assumptions that may result in overestimating or underestimating economic impacts related to reduced irrigation water, particularly related to the potential for specialty crops to be affected in North Unit ID, and the effect of these assumptions on estimated impacts.

EIS-19.7 Potential for Agricultural Land Conversion

Commenters expressed concern that reduced water supplies in North Unit ID may reduce the viability of commercial agriculture and increase conversion of farmland into hobby farms and rural residences, which are not as productive or water efficient. Farms provide environmental benefits not provided by urban/suburban land uses.

Commenters

GP-156, GP-162, ORG-18, GP-122

Response

As discussed in Draft EIS Chapter 3, Section 3.5, *Land Use and Agricultural Resources*, reduced water supplies are expected to lead to land fallowing and associated reduction in agricultural productivity. As discussed in Draft EIS Chapter 3, Section 2.1, *Land Use and Agricultural Resources,* land use laws restrict conversion of agricultural land to urban/suburban uses. To the extent allowable by land use laws, reduced water availability may increase the potential for some commercial agricultural lands to become hobby agricultural lands, which tend not to be as productive or water efficient (i.e., land produces less crop for a given level of water diverted). However, regardless of whether there is a shift toward hobby farms, the total amount of water diverted is not likely to change as it is expected that North Unit ID will divert the maximum water flow allowable per their water right under for agricultural production regardless of whether it is for hobby farms or commercial farms. Whether lands are fallowed or become hobby farms, the estimated reduction in productivity is presented in Draft EIS Section 3.5 and Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*. As the analysis is structured to estimate the maximum acreage that would be fallowed in any given water year (while leaving all other acreage with the same water supply available under the no-action alternative), the dry year estimate of affected acreage represents the maximum acreage and associated production affected by the proposed action and alternatives.

Request for Additional Information or Analysis

EIS-19.8 Environmental Justice

Commenters noted that Jefferson County has a diverse and economically stressed population and requested that the environmental justice analysis clearly identify the environmental justice populations of concern. Commenters also requested the EIS analyze the CEQ threshold criteria to consistently determine adverse effects under all alternatives and be clear on what the effects would be on vulnerable populations, how effects would affect cultural and economic values, and when the effects would occur.

Commenters

GP-138, LOCAL-1, ORG-11

Response

Final EIS Chapter 3, Section 3.9.2.2, *Environmental Justice Populations*, more clearly states that tribe members and farmworkers are potentially affected environmental justice populations. The effects analysis in Final EIS Section 3.9.3, *Environmental Consequences*, Impact SOC-9 (Affect Environmental Justice Populations) is revised to clearly use CEQ threshold criteria for environmental justice effects for consistent comparison across alternatives and to clearly identify the type and timing of effects on environmental justice populations.

EIS-19.9 Farmworkers and Local Economy

Commenters noted that employment impacts are concentrated on a vulnerable population and asserted that farm employment effects would have larger and broader economic and socioeconomic impacts than captured in the Draft EIS. Commenters requested that the EIS consider how changes in employment for a migrant farm labor force may have greater indirect/induced effects.

Commenters

GP-156, GP-146

Response

Draft EIS Chapter 3, Section 3.9, *Socioeconomics and Environmental Justice*, includes estimates of the change in the local economy with reductions in farm income and jobs, including all ripple effects related to farmworker spending. These effects would not be higher even if farmworkers were no longer residents in the community. The Final EIS reflects the addition of a description of how economic effects could be more long-term or permanent if decreases in farm employment led to migrant farmworkers or others to relocate from the area. The Final EIS Chapter 3, Section 3.9.3, *Environmental Consequences*, also includes consideration of how local government spending to meet local social service demand may be affected.

EIS-19.10 Hydropower

One commenter stated that the Draft EIS should assess how the proposed action would affect costs to CTWS of environmental compliance at the Pelton Hydroelectric Project.

Commenters

TRIBE-1

Response

Under Impacts SOC-6 (Affect Hydropower Production and Energy Costs) and SOC-9 (Affect Environmental Justice Populations), the Final EIS Chapter 3, Section 3.9, *Socioeconomics and Environmental Justice,* provides information on the potential for fish reintroduction costs (as required by the Project license) to increase in the Crooked River, and confirms that these increased costs are expected to be borne partially by the CTWS (i.e., an environmental justice population as analyzed in SOC-9) and Portland General Electric, the co-owners of the facility.

EIS-19.11 Tribal Values

One commenter stated that Draft EIS Chapter 3, Section 3.9, *Socioeconomics and Environmental Justice*, should assess the cultural and economic value to the CTWS of reintroduction of salmon and Middle Columbia River steelhead trout above the Pelton Project and the HCP's risk to the success of reintroduction.

Commenters

TRIBE-1

Response

As noted in the Final EIS Section 3.8, *Tribal Resources,* the proposed action and action alternatives would have an adverse effect on spring Chinook salmon and steelhead trout reintroduction in the Crooked River compared to the no-action alternative and beneficial effects elsewhere. Final EIS Chapter 3, Section 3.9, *Socioeconomics and Environmental Justice* under SOC-3 (Affect Habitat and Species-Related Cultural and Economic Values) now includes reference to potential adverse effects on socioeconomic values associated with adverse effects on fish reintroduction in the Crooked River.

EIS-19.12 Water Conservation/Efficiency

Two commenters stated the socioeconomic and land use effects analyses should be broadened to include analysis of more streamflow restoration tools (other than piping), and Draft EIS Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*, should provide more information on the barriers to a water market and why it was not analyzed.

Commenters

ORG-9, ORG-14

Response

Draft EIS Appendix 3.5-A, *Agricultural Uses and Agricultural Economics Technical Supplement*, identifies the likely future investments in district and on-farm water use efficiency (refer to *Agricultural Water Use Efficiency*). In *Key Assumptions*, in assumption 4, the appendix notes that legal barriers currently exist to water markets, but that these legal barriers may be removed in the future. Assumption 4 describes why water marketing is not directly analyzed: the timing and certainty of water market development are not known, and acreage affected by water shortages is assumed to be grain and forage crops (i.e., hay, alfalfa, pasture) in all districts. These uncertainties limit the difference in value of water across all districts, and reduce the economic effect of a water market. In other words, by assuming grain and forage crops are only affected by changes in water supply, analysis results are similar to those from a water market. Final EIS Chapter 3, Section 3.9, Impact SOC-1 (Affect Economic Opportunity) now reflects additional language that a water market in the basin could shift the location of impact (i.e., away from North Unit ID toward other areas of the basin).

20 Cultural Resources

Adequacy of Analysis

EIS-20.1 Link between EIS Analysis and Section 106

One commenter pointed out that although FWS and the National Marine Fisheries Service (NMFS) (collectively, the Services) had not initiated the Section 106 process prior to preparation of the Draft EIS, the Draft EIS defines "cultural resources" by reference to the National Historic Preservation Act (NHPA) and presents thresholds for "adverse effects" to those that are within the purview of the NHPA.

Commenters

TRIBE-1

Response

FWS formally began the NHPA Section 106 compliance process with the Oregon State Historic Preservation Office (SHPO), the U.S. Forest Service, NMFS, Reclamation, and three affected Indian Tribes in November 2019. This included written correspondence and in-person meetings describing and mapping the undertaking and area of potential effect (APE). FWS has initiated and is continuing to consult on historic property identification in the direct and indirect APE (i.e., the Wickiup Reservoir and adjacent environs) using advice from the Oregon SHPO, U.S. Forest Service, Reclamation, and the Confederated Tribes of the Warm Springs (CTWS) Tribal Historic Preservation Officer. As a result, resources identified through ongoing consultation are not included in this analysis but will be considered as part of a Section 106 compliance effort. Identified historic properties and information obtained through consultation will be used in the development of a cultural resource overview and historical context document that provides information on cultural resource protection and management in and near the APE. The overview will serve as a baseline from which FWS will draft and execute a Section 106 agreement document with the consulting parties that identifies cultural resource surveys, protections and mitigations during implementation of the HCP over the life of the permit.

In anticipation of potential impacts and in support of FWS's Section 106 consultation efforts the Final EIS Chapter 3, Section 3.10, *Cultural Resources*, describes effects of the proposed action and alternatives on known cultural resources, including those anticipated to be considered historic properties. Final EIS Chapter 3, Section 3.8, *Tribal Resources*, describes effects on other tribal cultural resources, namely traditionally important plants and animals. Section 3.8 reflects revisions to the description of the full range of cultural resource types that were considered and to include relevant information from the on-going NHPA Section 106 process.

EIS-20.2 Limited Study Area

Commenters expressed concern that the analysis of effects on cultural resources was limited to Wickiup Reservoir. One commenter disagreed with the rationale for limiting the study area based on the extent of water level fluctuations, stating that smaller changes in water level can affect archaeological sites, and the accuracy of the RiverWare model's predictions for these changes.

Commenters

TRIBE-1, ORG-12

Response

Final EIS Chapter 3, Section 3.10, *Cultural Resources* has been revised to reflect that all of the reservoirs were considered in the analysis, and presents information relating to how the proposed action and alternatives would affect cultural resources relative to the no-action alternative. Downstream of the reservoirs, the proposed action and action alternatives would result in reduced flood intensity and duration relative to the no-action alternative. As a result, impacts that could differentially affect cultural resources relative to the no-action alternative are not anticipated, and the cultural resources study area was limited to the reservoirs.

For the purposes of this NEPA analysis, the study area for cultural resources is defined as the areas where changes in storage and release of water under the proposed action and alternatives could affect cultural resources as a result of changes in resource exposure, erosion, or inundation as a result of water level fluctuations. This is because the erosion, exposure, or inundation of a cultural resource can both impact a resources ability to convey its cultural importance and change the way in which people can access the resource—both negatively (i.e., erosion, looting, loss of access to a traditional gathering place) and positively (i.e., protection from looting, burial and protection from erosion). These factors are already occurring under existing conditions throughout the covered lands and waters and would continue to occur under the no-action alternative. As a result, the specific issue explored in the analysis is the extent to which these factors would vary under the proposed action and Alternatives 3 and 4 (action alternatives) relative to the no-action alternative.

Finally, river-reservoir models, such as RiverWare, are designed to explore potential future conditions and give an indication of how changes in the system compare to current conditions. They are based on the best available data and information, and for this study, their operating rules and assumptions were vetted and discussed by many experts. No model will perfectly represent future conditions, nor should it be expected to do so. Additionally, the results were not used as though they would perfectly represent the future. Rather, the models were used to consider relative changes and possible improvements to the system given historical hydrology. Real-time conditions may require operations to adjust and adapt differently than the model results, depending on changing weather and hydrologic conditions.

EIS-20.3 Section 106 Review Process

Commenters expressed concern that the Section 106 review process was incomplete and that the CTWS has not yet been consulted. As a result, the reviewer did not consider the information currently presented in the document to reflect the full range of historic properties as defined under Section 106 of the NHPA. Therefore, in concert with other concerns posed by the reviewer, the reviewer considered the cultural resources review to be inadequate. Commenter also notes that “In addition, cultural monitoring, inadvertent discovery and mitigation measures will need to be in place for the affected areas in the event the HCP is implemented.”

Commenters

TRIBE-1

Response

FWS formally began the NHPA Section 106 compliance process with the Oregon SHPO, the U.S. Forest Service, NMFS, Reclamation, and three affected Indian Tribes in November 2019. This included written correspondence and in-person meetings describing and mapping the undertaking and APE. FWS has initiated and is continuing to consult on historic property identification in the direct and indirect APE (i.e., the Wickiup Reservoir and adjacent environs) using advice from the Oregon SHPO, U.S. Forest Service, Reclamation, and the CTWS Tribal Historic Preservation Officer. As a result, resources identified through ongoing consultation are not included in this analysis but will be considered as part of a Section 106 compliance effort. Identified historic properties and information obtained through consultation will be used in the development of a cultural resource overview and historical context document that provides information on cultural resource protection and management in and near the APE. The overview will serve as a baseline from which FWS will draft and execute a Section 106 agreement document with the consulting parties that identifies cultural resource surveys, protections and mitigations during implementation of the HCP over the life of the permit.

Section 3.10, *Cultural Resources*, addresses all of the potential cultural and historic property resources that could be affected by the proposed action and alternatives, as directed in NEPA Regulations. While the NHPA Section 106 process is not yet complete, this Final EIS incorporates directly and by reference the relevant information from that process to address NEPA Regulations Section 1502.25, requiring integration of related laws, including the NHPA. FWS has made a good faith effort to consult and solicit input from the CTWS during monthly meetings throughout the HCP and EIS process. FWS also held four scoping meetings, two cooperating agency meetings (in which the CTWS participated), and numerous project development meetings that CTWS representatives attended. CTWS was also provided opportunity to review the preliminary EIS outline, effect thresholds, and administrative draft analysis sections.

21 Upper Deschutes Conservation Fund

Request for Additional Information or Analysis

EIS-21.1 Establishment of Biological Metrics, Funding Guidelines, and Estimates

One commenter requested that additional analysis be undertaken and included in the Final HCP and Final EIS. The additional analysis should be conducted to facilitate the establishment of specific biological metrics/goals for all applicable species that the fund seeks to support so that the magnitude or scale of improvements that could be achieved on an annual basis and over the 30-year permit term can be determined. Once established, the commenter recommended that this information, alongside public input, be used to develop funding estimates and guidelines.

Commenters

ORG-14

Response

The conservation measure in the HCP requires the applicants to provide $150,000 per year for the Upper Deschutes Conservation Fund. Because the applicants are not Oregon spotted frog or river restoration experts, the conservation commitment would be to provide the necessary funding so that Oregon spotted frog and river restoration experts can restore Oregon spotted frog habitat in the Upper Deschutes River. Projects to be funded will be ranked and recommended by a technical committee and funding decisions would be made by the fund's Advisory Committee, which includes FWS, the Oregon Department of Fish and Wildlife, and the U.S. Forest Service. FWS is in the process of developing a draft *Oregon Spotted Frog Recovery Plan and Implementation Strategy* for the range of the species. This plan and strategy will inform the conservation priorities for projects funded under this element. In the early years, the fund would be used to treat invasive animal and plants, such as bullfrog (*Lithobates catesbeianus*) and reed canarygrass (*Phalaris arundinacea*), that have been identified as threats to Oregon spotted frog. Site-scale habitat improvements such as vegetation encroachment also will be implemented using the fund. Reducing threats to Oregon spotted frog and its habitat is essential to facilitating Oregon spotted frog recovery. Long-term restoration projects that support Oregon spotted frog will be developed and moved through the necessary permitting processes. Given this, additional analysis does not need to be undertaken for the Final HCP or Final EIS. The Final EIS and Final HCP outline the vision for the fund and the proposed implementation timelines.

EIS-21.2 Funding Determinations

One commenter requested additional information on which entity would make funding determinations and how funding decisions would be prioritized. The commenter also recommended that funding decisions be made by an independent entity with experience in grant-making and that input be sought from the public.

Commenters

ORG-14

Response

The purpose of the Upper Deschutes Conservation Fund is to fund projects that would complement the actions in the Deschutes HCP to address adverse impacts on the Oregon spotted frog. The fund would be used to minimize and mitigate effects of take on Oregon spotted frog by improving habitat and reducing threats to the species. Funding for projects would be prioritized in the short term and in the long term to increase connectivity between disjunct populations, expand population distribution, and increase population viability and abundance of the species. Conservation projects would tier to recovery actions identified in the FWS draft *Oregon Spotted Frog Recovery Plan and Implementation Strategy* (anticipated in December 2020) and other restoration plans for the Upper Deschutes River that support Oregon spotted frog conservation.

At this time, it is anticipated that the fund would be held by the Oregon Community Foundation, a 501(c)(3) organization. A small technical committee composed of Oregon spotted frog and river restoration experts will rank projects for funding, and funding decisions would be made by the fund's Advisory Committee, which includes FWS, Oregon Department of Fish and Wildlife, and the U.S. Forest Service.

EIS-21.3 Funding Monitoring

One commenter requested additional information on how funded projects would be monitored and evaluated for effectiveness and potential adaptive management changes.

Commenters

ORG-14

Response

Projects to be funded through the Upper Deschutes Conservation Fund would include monitoring to assess effectiveness. This monitoring, in addition to the required monitoring in the Deschutes Basin HCP, would inform the funding for future projects.

Conversation Fund Actions

EIS-21.4 Use of Beaver Dam Analog at Dead Slough

One commenter requested that FWS use beavers to create a beaver dam at Dead Slough to mitigate head-cut formation and maintain winter water at high elevations, rather than a beaver dam analog. The commenter stated that beavers provide a multitude of benefits to rivers and wetlands, including creating habitat for the Oregon spotted frog, and the use of beavers rather than a beaver dam analog would provide safe stretches of rivers for beavers and help the beaver population rebound.

Commenters

ORG-19

Response

FWS agrees that healthy beaver populations are important to maintaining aquatic habitats for Oregon spotted frog. Beaver activity is evident throughout the Deschutes River wetlands downstream of Wickiup Dam and at the Dead Slough. Natural dam-building by beavers is preferred over an engineered structure. The use of a beaver dam analog to retain water with the Dead Slough is a concept of an action that could be taken to improve year-round hydrological conditions in this area. Implementation of this action would require interdisciplinary expertise from multiple agencies and organizations. This concept would require further evaluation and would not be implemented without coordination among experts.

EIS-21.5 Funding for Upper Deschutes Conservation Fund

One commenter recommended that funding for the Upper Deschutes Conservation Fund be expanded beyond the applicants and FWS, to cover all water users/stakeholders so they can share the costs for improving the health of the Deschutes River.

Commenters

ORG-5

Response

The purpose of the Upper Deschutes River Conservation Fund is to mitigate impacts on Oregon spotted frog and designated critical habitat for the species. Actions funded via this fund would tier to recovery actions identified by FWS for conservation of the species. River restoration projects that support enhancing or creating Oregon spotted frog habitat are likely to benefit the Deschutes River restoration goal. At this time, it is anticipated that the fund will be held by the Oregon Community Foundation, a 501(c)(3) organization. Contributions from other sources will be accepted by the fund; however, the prime goal of the fund is to mitigate for Oregon spotted frog impacts by the applicants.

22 RiverWare Appendix (Draft EIS Appendix 3.1-B)

Request for Clarification

EIS-22.1 Use of 365 Days in Irrigation Season Release Formula

One commenter asked if using 365 days for the irrigation season in the formula for Irrigation Season Release in Section 2.3, *Crooked River Operation*, was an error, or if intentional, what the consequences were for model outputs.

Commenters

ORG-14

Response

The formula did not have an error. The formula is designed to reserve a portion of the water in the uncontracted account to be released in the winter, with the rest divided evenly over the remainder of the year. That amount is added to the reserved amount for the winter.

EIS-22.2 Same or Similar Graphs for the Proposed Action and Alternative 3

One commenter asked why graphs for Alternatives 2 and 3 were the same or very similar.

Commenters

ORG-14

Response

Draft EIS Chapter 3, Section 3.1.3, *Modeling*, described why modeled results for these alternatives were the same despite the fact that Alternative 3 targeted a higher minimum fall/winter flow downstream of Wickiup Dam in above-normal and wet years, than the proposed action. The model inputs have been refined for the Final EIS to better reflect proposed management under the alternatives. The analyses of Alternative 3 in Draft EIS Chapter 3, *Affected Environment and Environmental Consequences*, refer to the proposed action for discussions of impacts related to model changes in water management and discusses how impacts would differ in response to the accelerated implementation schedule and additional conservation measures.

EIS-22.3 Presentation in Section 4.2

The commenter queried if the text in Section 4.2, *Alternative 2: Districts' Proposal*, stating that only locations that experienced a change from the no-action alternative are shown, was accurate.

Commenters

ORG-14

Response

It is accurate that only the locations showing a difference were presented. Although there were also differences in the earlier stage of the referenced alternative, only the final stage of implementation was shown in the Draft EIS appendix. The Final EIS appendix has been updated to present all stages of implementation.

23 RiverWare

Request for Clarification

EIS-23.1 Little Deschutes Gauge

One commenter noted that the modeled flow increases showing up at gauge 14063000 on the Little Deschutes River under the proposed action should be consistent with other modeled gauges below Crescent Lake.

Commenters

STATE-1

Response

The flow changes at the Little Deschutes River gauge are similar to the flow changes at Crescent, though it may not always appear that way in the summary graphs due to inconsistent timing of flow timing at the two locations.

The flow changes at the Little Deschutes River gauge are similar to the flow changes at Crescent, though it may not always appear that way in the summary graphs due to inconsistent timing of flow timing at the two locations.

EIS-23.2 Patron Diversions

One commenter requested clarification on how DBBC patron diversions are modeled in RiverWare.

Commenters

TRIBE-1

Response

DBBC diversions are simulated in RiverWare as the recent historical average diversions from the Deschutes River at the point of diversion (or headworks) of the canal systems. The delivery of water along smaller canals and laterals is not simulated, but estimates of losses are routed back to the river as groundwater where appropriate. Section 2.1, *Irrigation Demand Pattern in Final EIS,* Appendix 3.1-B, *RiverWare Model Technical Memorandum*, describes the daily demand pattern and annual volume assumed for each irrigation district.

EIS-23.3 Early Summer Releases for North Unit ID

One commenter requested clarification about why the RiverWare model showed more water released on the Crooked River in early summer for the North Unit ID in dry years.

Commenters

ORG-15

Response

The RiverWare model is designed to reflect real-world conditions where, if there is not enough water to supply North Unit ID from the Deschutes River, it will try to satisfy its demand from the Crooked River. In drier years, Wickiup Reservoir has less water to provide to the North Unit ID, so the water goes to the Crooked River to satisfy its demand. This causes flow from the North Unit ID rental account on Prineville to be used earlier in the season than under the no-action alternative, which would cause reduced flows later in the season. Between the Draft EIS and Final EIS, the team refined the logic to determine how winter flows from Wickiup Reservoir would be calculated and better represent North Unit ID Deschutes River demand in dry years. The Final EIS reflects updated modeling.

Incorporation of Relevant Policies, Agreements, and Protocols

EIS-23.4 Prediction of Future Conditions

One commenter stated that the RiverWare model fails to reliably predict likely future conditions and requested that the Services describe how decision-making protocols affect the model outputs. The commenter also requested that the Services allow CTWS to help make sure that the RiverWare model incorporates as many relevant policies, agreements, and protocols as possible.

Commenters

TRIBE-1

Response

The RiverWare model simulates legal and policy constraints on the Deschutes River system, where possible, and provides the statistical likelihood of future conditions assuming historical hydrology. It is true that the model cannot predict all future conditions given that hydrology depends on weather and other conditions that are unknown at this time. In some cases, decisions and operations would be made in real time. All assumptions and input for the model are described in Final EIS, Appendix 3.1-B, *RiverWare Model Technical Memorandum.*

The CTWS is a member of the RiverWare technical team and has had opportunities to ensure all relevant information that can be incorporated into the model assumptions has been appropriately incorporated.

EIS-23.5 Total Maximum Daily Load Standards

One commenter asked if the RiverWare model addressed ODEQ's imperative to promulgate total maximum daily load standards for the Deschutes Basin.

Commenters

TRIBE-1

Response

While the RiverWare model does not simulate water quality parameters the QUAL2Kw model was used to model effects on water quality parameters in the Upper Deschutes River between Wickiup Dam and Tumalo. QUAL2Kw is a one-dimensional water quality model developed by the U.S. Environmental Protection Agency and is available in the public domain (Pelletier et al. 2006). The model was modified to use input data from various sources, including ODEQ. Please refer to the Final EIS, Chapter 3, Section 3.3, *Water Quality*, for additional information on the model and the data sets used. Additionally, water temperature modeling developed for the Deschutes Basin HCP by Portland State University (Berger et al. 2019) for the Crooked River from the City of Prineville to the gauging station at Smith Rock was considered in the fish and water quality analyses. Refer to the Methods section of Final EIS, Appendix 3.4-C, *Fish and Mollusks Technical Supplement*, for a description.

Accuracy of Model

EIS-23.6 Interconnectedness of System

One commenter stated that the RiverWare model fails to consider the interconnectedness of the Deschutes Basin, including how water management in the Upper and Middle Deschutes River affect the Crooked River (specifically how implementation of Conservation Measure WR-1 affects the North Unit ID's reliance on its Crooked River water supply).

Commenters

TRIBE-1

Response

The model does simulate the interaction between the Deschutes and Crooked River supplies for North Unit ID. Please refer to the last paragraph of Final EIS, Section 2.3, *Crooked River Operations* of Appendix 3.1-B, *RiverWare Model Technical Memorandum: Hydrologic Evaluation of Alternatives for the Deschutes Basin HCP, for additional information* for an explanation.

EIS-23.7 Model Outputs below North Unit ID Pumps

One commenter expressed concern that the RiverWare model outputs for the Crooked River below the North Unit ID pumps under the proposed action showing lower flows mid-June through July than the no-action alternative, and less flow all the way through August and September (refer to Final EIS, Appendix 3.1-B, *RiverWare Model Technical Memorandum: Hydrologic Evaluation of Alternatives for the Deschutes Basin HCP*, Figure 50) were not accurate.

Commenters

ORG-10

Response

The results reflect the increased demand on the Crooked River due to lower water availability for the North Unit ID on the Upper Deschutes River and are accurate. The flow past the North Unit ID pumps is often the minimum requirement defined in Final EIS, Appendix 3.1-B, *RiverWare Model Technical Memorandum: Hydrologic Evaluation of Alternatives for the Deschutes Basin HCP*, Table 4, whereas there was more live flow under the no-action alternative than was able to flow past the pumps.

EIS-23.8 Overstatement of Wickiup Winter Releases

Several commenters pointed out that the assumption or formula used in the RiverWare model for fall/winter releases from Wickiup Reservoir under the no-action alternative and proposed action during above-normal water years were too high or inaccurate. The commenters noted that this resulted in unrealistically low water storage available for the subsequent irrigation season, which overstated agricultural effects and related economic effects and skewed other effects. One commenter also presented an alternative approach.

Commenters

ORG-12, ORG-14, ORG-15, ORG-10

Response

Unfortunately, there is no specific formula that would represent releases from Wickiup Reservoir. The river-reservoir models are designed to explore potential future conditions and give an indication of how changes in the system compare to current conditions. They are based on the best available data and information, and for this study, their operating rules and assumptions were vetted and discussed by many experts. No model or formula will perfectly represent future conditions nor should it be expected to do so. Additionally, the results were not used as though they would perfectly represent the future. Rather, the models were used to consider relative changes and possible improvements to the system given historical hydrology. Real-time conditions may require operations to adjust and adapt differently than the model results, depending on changing weather and hydrologic conditions.

The intent of the rule in the Draft EIS was to observe storage contents on November 1 and determine a minimum release value for the upcoming winter. This was designed by the RiverWare modeling team to mimic how real-time operators might make that decision based on historical experience and new constraints and objectives proposed in the scenario. Between the Draft EIS and Final EIS, the team refined the logic to determine how winter flows would be calculated; this equation is not used in the Final EIS.

One other adjustment was made in the Final EIS to better represent North Unit ID Deschutes River demand in dry years. This rule again looks at Wickiup storage on April 1, the estimated date that the reservoir would be full, and reduces North Unit ID's demand from the Deschutes River. The North Unit ID requested that the total shortage still be compared to the full demand for calculation purposes.

For the no-action alternative in the Draft EIS, the variable outflow equation was used so that the results could be more easily compared to the proposed action and alternatives. Recognizing that this led to higher winter flows than what would occur under the BiOp, this was revised for the Final EIS so that the minimum was 100 cfs unless more water needed to be released to prevent the reservoir from overtopping.

The Final EIS analyses are based on updated RiverWare model outputs that reflect these refined assumptions.

EIS-23.9 Irrigation Demand

Commenters stated that use of a constant irrigation demand pattern in the RiverWare model does not accurately reflect water use that accounts for variation in annual hydrology.

Commenters

ORG-10, ORG-12, ORG-15

Response

River-reservoir models are designed to explore potential future conditions and give an indication of how changes in the system compare to current conditions. They are based on the best available data and information and for this study, their operating rules and assumptions were vetted and discussed by many experts. No model will perfectly represent future conditions, nor should it be expected to do so. Additionally, the results were not used as though they would perfectly represent the future. Rather, the models were used to consider relative changes and possible improvements to the system given historical hydrology. Real-time conditions may require operations to adjust and adapt differently than the model results, depending on changing weather and hydrologic conditions.

It is common practice to select a single pattern of irrigation demand for use in a modeling analysis. The demand patterns were generated from measured data from the years 2010 through 2017 and were chosen as a reasonable estimate of demand because many conservation activities had occurred prior to those years, making them overestimates of current conditions. Demands will continue to change as various conservation projects are implemented, so the shortages expressed in this EIS should be used as relative comparisons from one alternative to the next. Shortages are also therefore likely overstated since expected conservation projects will further reduce demand in the future, but are useful here for analysis purposes.

EIS-23.10 Disclosure of Winter Stock Water Diversions

One commenter stated that the Draft EIS did not include all stock watering diversions.

Commenters

ORG-15

Response

The Draft EIS considered stock watering as it occurred in the average of the measured diversions from 2010 to 2018.

EIS-23.11 Modeled Whychus Creek Flows

One commenter stated that modeled Whychus Creek flows presented in Draft HCP Chapter 6 (Figure 6-53) and Draft EIS Appendix 3.2-A, *Water Resources Technical Supplement*, Figure 44, appear to be higher than the actual flows that would be required instream under the proposed action.

Commenters

ORG-16

Response

The flows in Whychus Creek are the historical flows measured at the Whychus Creek gauge near Three Sisters minus average daily historical diversions for Three Sisters, Sokol, Edgington, and Plainview IDs. They are higher because the diversions did not request more water than what was in the stream; therefore, both the diversion and a higher flow could be maintained.

EIS-23.12 Agency Verification of Data

One commenter requested that the modeling data be vetted, and assumptions validated by FWS and Oregon Water Resources Department.

Commenters

GP-189

Response

The modeling data and assumptions have undergone extensive review by the Services, FWS contractors, Oregon Water Resources Department, U.S. Forest Service, CTWS and DBBC contractors. The assumptions used in modeling the alternatives for the Draft EIS were discussed and vetted at length by members of this group. The final product will undergo a peer review and the results will be posted on Reclamation’s peer review website.

EIS-23.13 Incorporation of Canal Piping and Other Management Options

Commenters stated that the RiverWare projections are too conservative (e.g., they do not include future planned construction of piped canals, other management options, and agreements and overestimate irrigation shortages).

Commenters

ORG-5, ORG-10

Response

In general, the effects of district water conservation projects (i.e., canal piping or lining) completed prior to 2014 on streamflow and irrigation diversions were reflected in the RiverWare model outputs (Appendix 2-B, *No-Action and Cumulative Scenarios*, Table 1) used in the Draft EIS. Water conservation projects for which final NEPA review was completed were assumed to be included under the no-action alternative, as described in Draft EIS Chapter 2, *Proposed Action and Alternatives*, but are not included in the RiverWare model. The effects of these projects on streamflows, however, were quantified in the Final EIS analysis outside of the RiverWare model. Following the publication of the Draft EIS, the Central Oregon ID Watershed Plan Environmental Assessment for the Smith Rock-King Way Infrastructure Modernization Project was approved. The effects of this project have now been incorporated into RiverWare for all alternatives, as described in Final EIS, Section 2.4, *Special Diversion Operations*, of Appendix 3.1 B, *RiverWare Model Technical Memorandum*.

The effects of other planned water conservation projects on reservoir storage and streamflows also are not captured in the modeling results. These future projects would improve water supply efficiency and streamflow conditions; however, they were not included as assumptions in the RiverWare model because of uncertainty about where these future projects would be located and timing of their implementation. These factors are essential in determining the extent and timing of their potential effects on basin hydrology in relation to the HCP and associated flow targets. The potential effects of water conservation on irrigation district water supply can be quantified at the point of diversion; therefore, the analysis of effects on agricultural resources (Draft EIS Chapter 3, Section 3.5, *Land Use and Agricultural Resources*) considered a range of potential water conservation, both district and on-farm. However, because it can be assumed that these projects occur in the foreseeable future and effects on basin hydrology may be attenuated or concentrated during periods of low flow in different reaches of the Upper Deschutes Basin (depending on how water is conserved, hydrologic conditions, and other factors), the effects of these changes on resources were evaluated qualitatively in the cumulative analysis (Draft EIS Chapter 4, *Cumulative Impacts*).

Request for Additional Information or Analysis

EIS-23.14 Extended Period of Dry Years

One commenter expressed concern that the RiverWare model did not examine extended dry year periods. The commenter noted extended dry years are of particular concern in the Crooked River where fish species are vulnerable during the irrigation season, especially during the later stages of the permit term during normal and dry years and with increasing likelihood with climate change.

Commenters

ORG-14

Response

The model considered historical hydrology from 1980 to 2009 in the Draft EIS and from 1980 to 2018 in the Final EIS, which did not have many dry year sequences on the Crooked River, though it did have one in the early 1990s. The results from this particular dry period were used to better refine the logic for use and carryover of the FWS uncontracted water.

EIS-23.15 Model Simulation Period

Commenters stated that the model should have included a longer simulation period to better reflect median hydrologic/meteorological and operational conditions.

Commenters

ORG-15

Response

River-reservoir models are designed to explore potential future conditions and give an indication of how changes in the system compare to current conditions. They are based on the best available data and information and for this study, their operating rules and assumptions were vetted and discussed by many experts. No model will perfectly represent future conditions, nor should it be expected to do so. Additionally, the results were not used as though they would perfectly represent the future. Rather, the models were used to consider relative changes and possible improvements to the system given historical hydrology. Real-time conditions may require operations to adjust and adapt differently than the model results, depending on changing weather and hydrologic conditions.

Daily measured data prior to the 1980s has limited availability and is less complete and therefore has more uncertainty. For the Draft EIS, the run period was 1980 through 2009; the 1984 through 2009 period was used for calibrating initial reservoir rules, which has since been edited to reflect more current conditions in the basin and potential conditions under the proposed action and alternatives. The run period was extended to 1980 through 2018 for the Final EIS model runs. The run period used in the simulation, therefore, has a fair degree of climate variability and wet/dry climate cycles.

It is common practice to select a single pattern of irrigation demand for use in modeling analysis. The most recent 10 years was chosen as a reasonable estimate of demand because many conservation activities had occurred prior to those years, making them overestimates of current conditions. Demands will continue to change as various conservation projects are implemented, so the shortages expressed in this EIS should be used as relative comparisons from one alternative to the next.

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Appendix 2-A

EIS Alternatives Screening Process

Appendix 2-A
EIS Alternatives Screening Process

Introduction

This appendix presents the approach used to define and screen alternatives to the Deschutes Basin Habitat Conservation Plan (HCP) that may be included for detailed evaluation in the Deschutes Basin HCP Draft Environmental Impact Statement (EIS). The goal of the screening process is to identify a reasonable range of alternatives and alternative components that may be evaluated in the EIS, consistent with Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations and guidance from the 2016 HCP Handbook.

This appendix consists of a brief overview of NEPA guidance for alternatives, a general description of the screening process and criteria, the selected purpose and need statement, a summary of the no-action alternative and HCP (proposed action), ideas for action alternative components, and a three-phase screening process. The screening process is used to identify alternatives to carry forward for detailed analysis in the EIS and documents alternatives that were evaluated but eliminated from further consideration in the EIS.

NEPA Guidance for Alternatives

Alternatives have long been considered the heart of the EIS. Evaluating alternatives is guided by the "rule of reason" that requires a lead agency to consider a reasonable range of alternatives that could meet a defined purpose and need. According to the CEQ NEPA regulations (40 Code of Federal Regulations [CFR] 1502.14) the alternatives discussion disclosed in an EIS must meet the following requirements:

- Rigorously explore and objectively evaluate all reasonable alternatives.
- Include reasonable alternatives not within the lead agencies jurisdiction, if applicable.
- Include a no-action alternative.
- Evaluate the comparative merits of alternatives.
- Identify the lead agency's preferred alternative.
- Present alternatives that were eliminated from detailed study and describe the reasons for elimination.

The NEPA alternatives for an HCP should meet the purpose and need of the action, which generally is to authorize take incidental to otherwise lawful covered activities while minimizing and mitigating the impacts on take to the maximum extent practicable. The range of alternatives included in an EIS typically includes the proposed action, no action, and one or more variations of the proposed action.

The U.S. Fish and Wildlife Service (FWS) may confer with the applicant to ensure that the NEPA alternatives are reasonable but determining which alternatives to analyze in an EIS is ultimately FWS's decision.

The following are considerations to determine a reasonable range of alternatives to an HCP:

- Alternatives that include covered activities and impacts different from those in the proposed HCP. For example, different amounts or types of covered activities that could reduce effects on the human environment, including those to covered species.
- Alternatives that include an HCP conservation strategy that achieves higher or lower conservation than what is proposed (e.g., more or less protective of the covered species).
- An alternative that includes the same conservation strategy but with a different permit duration, either substantially more or less.
- Other reasonable courses of action necessary or appropriate for purposes of the HCP, and that meet Endangered Species Act (ESA) requirements. FWS could modify or develop other alternative components of the applicant's HCP, such as alternative covered lands, alternative covered species, or alternative permittees. Varying these components of the HCP may be difficult to justify because the HCP has already defined what FWS believes is the best approach.
- Other reasonable courses of action necessary or appropriate for purposes of the HCP that cause the least damage to the environment and best protects, preserves, and enhances the human environment. This environmentally preferable alternative (43 CFR 46.30) would also include any potential mitigation measures not already included in the proposed action or other alternatives.

For the Deschutes Basin HCP EIS it is logical to start alternatives development by considering variations to the conservation measures and the alternatives to take currently presented in the Deschutes Basin HCP document. However, because NEPA's directive to reduce effects on the human environment is broader than that of ESA, an EIS should also consider alternatives that could reduce other effects of HCP implementation while reasonably meeting the purpose and need for the action. The following purpose and need statement was developed during the May 9, 2018, Alternatives Screening Workshop. The purpose and need statement was developed with input from FWS, National Marine Fisheries Service (NMFS), and Deschutes Basin Board of Control representatives, considering a number of options to include purpose statements that are defined more broadly and more narrowly for alternatives screening purposes.

Purpose and Need

FWS's purpose and need is distinct from the HCP applicants' purpose and need (43 CFR 46.420). The proposed federal action being evaluated in this EIS is the issuance of incidental take permits (ITPs) under Section 10(a)(1)(B) of ESA by FWS and NMFS (the Services) in response to the ITP applications from the DBBC and the City of Prineville. The ITPs would authorize incidental take of the covered species that could result from covered activities in the plan area over the 30-year term of the ITPs.

The purpose and need statement is important because it establishes the basis for determining whether viable alternatives to issuing ITPs for the proposed HCP may meet the intended purpose and reduce potential effects from implementing the proposed HCP. Therefore, the definition of the purpose for the federal action is important in determining the range of alternatives that are considered during development of an EIS. As stated in the HCP Handbook, the purposes of the Services' action include:

- Fulfilling the Services' authority and conservation obligations under ESA Section 10(a)(1)(B);
- Complying with related laws and regulations, Executive Orders, and agency directives and policies; and
- Ensuring that implementation of the HCP will help to achieve long-term species and ecosystem conservation objectives.

The Services' underlying need is to respond to the applicants' submittal of their proposed HCP and ITP applications. The Service's need is therefore based on:

- The directive to the Services by ESA to issue an ITP to a non-federal entity if that permit application and HCP satisfy all permit issuance criteria;
- Compliance by the applicant and Services with ESA, NEPA, and other applicable federal laws and regulations; and
- The ITP application received and what the ITP would authorize, if approved.

Based on the guidance above and input during the May 9, 2018, Alternatives Screening Workshop, the following purpose and need statement is presented in Chapter 1, *Purpose and Need*, of this EIS and used in this alternatives screening process.

The purpose of the federal action considered in this EIS is to fulfill the Services' Section 10(a)(1)(B) conservation authorities and obligations and to render decisions on the ITP applications requesting authorization of take of three species listed as threatened under ESA—Oregon spotted frog, Middle Columbia River steelhead, and bull trout—and two nonlisted species—spring Middle Columbia River Chinook salmon and sockeye salmon.

The need for the federal action is to respond to the applicant's request for ITPs for the covered species and covered activities as described in the HCP. The Services will review the ITP applications to determine if they meet permit issuance criteria. The Services will also ensure that issuance of the ITPs and implementation of the Deschutes Basin HCP comply with other applicable federal laws, regulations, treaties and applicable Executive Orders, as appropriate.

Summary of Alternatives Options

Identification of potential alternatives to evaluate in the EIS has its foundations in the HCP development process and the alternatives to take presented in the Deschutes Basin HCP. These alternatives include:

- The proposed HCP (i.e., the EIS proposed action)
- Alternatives for the Upper Deschutes River at Wickiup Reservoir (e.g., increased minimum flows)
- An alternative for the Middle Deschutes River (e.g., increased minimum flows)
- An alternative for Crescent Creek (e.g., increased minimum flows)

- An alternative for Whychus Creek (e.g., increased flows from conservation)
- Alternatives for the Crooked River, Ochoco Creek and McKay Creek

In addition, a number of other alternative components could be modified and incorporated into alternatives considered for the EIS. Table 1, *Summary of Alternatives Options for the Deschutes Basin EIS*, provides an overview of the alternative components that could be combined to create alternative options for consideration during the alternatives screening process. Table 1 is intended to confirm assumptions for the NEPA no-action alternative and proposed action and to develop a robust list of potential alternative components to be considered for alternatives screening. Suggestions in scoping comments and ideas identified during the project initiation meeting, alternatives screening workshop and coordination meetings are also considered. Based on the alternative components presented in Table 1, a total of 15 alternatives were formulated and considered for detailed analysis in the Draft EIS, including the following:

Alternative 1. Accelerated Increases in Upper Deschutes River Fall/Winter Minimum Flows

Alternative 1 would reduce the time to increase flow in the Upper Deschutes River compared to the proposed action by providing a minimum fall/winter (September 16–March 31) flow as follows:

- 0 to 2 years: 100 cubic feet per second (cfs)
- 3 to 5 years: 200 cfs
- 6 to 10 years: 300 cfs
- 11 to 30 years: 400 cfs

Alternative 2. Enhanced Increases in Upper Deschutes River Fall/Winter Minimum Flows and 50-Year Permit Term

Alternative 2 would increase the permit term to 50 years and provide a minimum fall/winter flow of 500 cfs from year 31 to year 40 and 600 cfs from year 41 to year 50. This alternative is the same as the “Wickiup Alternative to Take 2” provided in the HCP (Deschutes Basin HCP, Chapter 11).

Alternative 3. Enhanced Upper Deschutes River Winter Flows

Alternative 3 would enhance flows in the Upper Deschutes River sooner than under Proposed Action as follows:

- 0 to 5 years: 200 cfs
- 6 to 10 years: 300 cfs
- 11 to 15 years: 400 cfs
- 16 to 30 years: 500 cfs

Alternative 4. Accelerated and Enhanced Upper Deschutes River Winter Flows

Alternative 4 would accelerate the schedule of enhancement of minimum winter flows in the Upper Deschutes River compared to Alternative 1 and increase the enhancement at each time period compared to Alternative 1 as follows.

- 0 to 5 years: 300 cfs
- 6 to 10 years: 400 cfs
- 11 to 15 years: 500 cfs
- 16 to 20 years: 600 cfs

Alternative 5. Modified Upper Deschutes River Fall/Winter Minimum Flows

Alternative 5 would increase minimum winter flows in the Upper Deschutes River to 400 cfs for the entire permit term (0–30 years). This alternative immediately provides the greatest minimum winter flow enhancement proposed under the proposed action.

Alternative 6. Enhanced Variable Upper Deschutes River Fall/Winter Minimum Flows

Alternative 6 would base fall and winter flows on available annual surplus fall storage in Crane Prairie and Wickiup Reservoirs and precipitation forecasts, providing greater than minimum flows during above-normal and wet years and allowing less than minimum flow during below-normal and drought years.

Alternative 7. Variable Deschutes River Fall/Winter Minimum Flows with Reduced Permit Term

Alternative 7 would base Deschutes River fall/winter flows on available surplus fall storage and precipitation forecasts and reduce the permit term to 20 years to account for uncertainties about species response. This alternative is the same as Alternative 6 but with a shorter permit term.

Alternative 8. Reduced Covered Species

Alternative 8 would provide ITPs only for species currently listed, dropping sockeye and Chinook salmon. This alternative would consider reservoir and river flow enhancement for Oregon spotted frog, bull trout, and steelhead only.

Alternative 9. Limit Covered Activities to Deschutes River

Alternative 9 would limit covered activities to the Upper and Middle Deschutes River and exclude all covered activities on the Crooked River, Ochoco and McKay Creeks, and City of Prineville groundwater pumping.

Alternative 10. Continuation of 2017/2018 Fall/Winter Flows on the Upper Deschutes River

Alternative 10 would enhance minimum Deschutes River fall/winter flows to 200 cfs and eliminate flow enhancements offered for the proposed action. This alternative would essentially be a continuation of the recent Deschutes River flows that occurred in fall/winter 2017/18 but without other flow enhancements in the proposed action.

Alternative 11. Deschutes River Flow and Restoration/Enhancement

Alternative 11 would combine fall/winter flow enhancement at 400 cfs with targeted restoration/enhancement actions at Slough Camp, Ryan Ranch, and other Upper Deschutes River sites. This alternative would provide the same fall/winter flows in the Upper Deschutes River as proposed at year 21 for the proposed action and would implement targeted restoration actions for covered species. Restoration projects would be partially funded by a restoration fund for water leasing and habitat restoration actions in the Upper Deschutes River.

Alternative 12. Flow Enhancement through Conservation, Demand Management, and On-Farm Efficiencies

Alternative 12 would provide increased fall/winter and Oregon spotted frog breeding season minimum flows of 600 cfs through irrigation district water conservation, demand management, and water use efficiencies beyond current canal piping projects. This alternative would require on-farm water delivery and use efficiencies primarily for the Central Oregon Irrigation District and North Unit Irrigation District to improve water supply use efficiency in the Deschutes Basin.

Alternative 13. Reduced Permit Term

Alternative 13 would reduce the permit term to 20 years for the proposed action. This alternative would reduce the time ITPs are in place for covered species to address uncertainties about the feasibility and effectiveness of the conservation strategy.

Alternative 14. Preliminary Injunction Alternative

Alternative 14 would attempt to maintain stable water levels in Crane Prairie and Wickiup Reservoirs year round.[1] This alternative would provide Oregon spotted frog minimum breeding season/rearing flows of 770 cfs in the Upper Deschutes River by March 15 to September 15 and 600 cfs during over-wintering months. This alternative would increase flows for Oregon spotted frog breeding earlier and more than under the proposed action and would require greater fall/winter period flows than the proposed action.

Alternative 15. No Take Alternative

Alternative 15 would modify current operation and maintenance of covered activities to completely avoid take of covered species. Under this alternative form of no action, the Services would not issue ITPs because take would not occur.

[1] The plaintiffs preliminary injunction is addressed in injunction declaration filings for the Deschutes Basin HCP. This alternative is adapted from the alternative concepts in those documents (U.S. District Court, District of Oregon, Eugene Division 2016).

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Table 1. Summary of Alternatives Options for Deschutes Basin HCP EIS

Alternative Component	Alternative 1: No Action	Alternative 2: Proposed HCP	Ideas for Action Alternatives	Scoping Comment or Other Inputs
Permit Mechanism	No programmatic or project HCPs and no incidental take permits. Separate and smaller HCPs are infeasible because of the inter-connectedness of the system and the inability of individual irrigation districts to adequately mitigate their activities on their own.	Two programmatic incidental take permits, one from FWS and one from NMFS, issued jointly to all permittees.	• Permits issued to all participating entities separately from FWS and NMFS, for a total of 18 incidental take permits.	Comments received indicating patron activities should be addressed.
Covered Species	N/A	Five proposed covered species: Oregon spotted frog, bull trout, steelhead trout, sockeye salmon, chinook salmon (spring run)	• Discussed Cascade frog as potential covered species in past but only occurs in small corner of Tumalo Creek upstream of Tumalo ID diversion. • No alternatives available: Report prepared by HCP consultant clearly documents rationale for selection of proposed covered species	Comments received indicating that redband trout and native species should be addressed.
Covered Activities	Actions as currently required by the 2017 and 2019 Biological Opinion are assumed to continue and apply to the activities covered by that BiOp. Assume decreased future diversions due to reduced water demand from ongoing slow retirement of water rights to development and to increased water use efficiency	Operations and maintenance activities of nine private and federal dams in the Deschutes Basin that are operated by local irrigation districts; operation and maintenance of diversions, pumps, and intakes by the participating irrigation districts and the City of Prineville; operation and maintenance of water conveyance and delivery systems; water diversions and return flows by the participants; and HCP conservation measures.	• Limit covered activities to just Upper and Middle Deschutes Basin (no Crooked River). • Include operations and maintenance activities of Round Butte Dam/Lake Billy Chinook and Pelton Dam/Lake Simtustus (dams and reservoirs owned and operated by Reclamation). • If HCP limits water conveyance covered activity to the point of <u>diversion</u>, an alternative would be to add water conveyance to the point of <u>delivery.</u>	Comments were received that covered activities should include piping of water supply canals and patron laterals. Comments were received that the EIS should address the effects of on stream patron diversions.
Plan Area	N/A. BiOp actions would apply in same area as proposed HCP.	The Deschutes Basin watershed, in which all covered activities and conservation measures would occur	• Plan area excludes Crooked River system if covered activities exclude Crooked River.	Comments were received to make sure the distinction between the Plan Area and the Permit Area are clearly defined and to be clear what rivers and creeks are included.
Permit Area	N/A since no permits issued	Permits are limited to narrow corridors of covered river and stream segments, covered reservoirs, and covered diversion structures and canals.	• If covered activities are narrower than the proposed HCP, permit area would exclude the river segments and facilities no longer covered (e.g., Crooked River and facilities there). • Others?	Same as above.
Permit Term	N/A since no permits issued. BiOp is assumed to be renewed every 5–10 years.	30 years	• 20-year permit term • 40–50-year permit term	Comments were received that the permit term considered should range from 5–40 years and that shorter permit terms should be considered given uncertainties about species responses to the conservation strategy.

Alternative Component	Alternative 1: No Action	Alternative 2: Proposed HCP	Ideas for Action Alternatives	Scoping Comment or Other Inputs

Conservation Strategy	Includes actions in the 2017 and 2019 BiOp and 2005 Steelhead BiOp Incorporates effects of climate change.	Regulate water surface elevations and flow from Crane Prairie and Wickiup Reservoirs to minimize fluctuations during OSF breeding, rearing/foraging and overwintering
		
		Upper Deschutes minimum 600 cfs flow 4/1–9/15 subject to inflow and storage. 800 cfs flow limit 4/1–30.
		
		Upper Deschutes winter flow schedule to improve OSF habitat during winter up to 400 cfs by year 21
		
		Stock pond diversion coordination to prevent middle Deschutes from dropping below 250 cfs
		
		Crescent Creek minimum flow, 20 cfs and limit ramping rates
		
		Whychus Creek increased flows (31.18 cfs) after 5 years for salmonids
		
		Crooked River, Ochoco and McKay Creek flow increases, monitoring, conservation fund, and diversion structure requirements
			• No Crane Prairie Alternatives
			• Upper Deschutes flow increase to 500 cfs during winter by year 31
			• Upper Deschutes flow increase to 600 cfs during winter by year 41
			• Less flow in Upper Deschutes than proposed (550 or 600 cfs minimum)?
			• Variable flow in the Upper Deschutes depending on reservoir storage and forecasts (600 cfs)
			• More flow in Crescent Creek (30 cfs, 3/15 – 11/30)
			• Less flow in Crooked River than proposed
			• More flow in Crooked River than proposed
			• Greater summer flows in Upper Deschutes to benefit fish instead of OSF (see earlier public draft of HCP)
			• Flow regime in Upper Deschutes that benefits OSF over fish (what would this be?)
			• Combination Alternatives:
			  ○ Less flow in Upper Deschutes and Crooked River than proposed
			  ○ More flow in Upper Deschutes and Crooked River than proposed
			• Demand management, conservation and on-farm efficiencies
			• Market-based conservation incentives
			• Habitat restoration, enhancement and protection for OSF and salmonids
			• Piping patron canal laterals
			• Screen on- stream patron diversions
				Many comments were received about specific river and creek flows that should be required to improve covered species habitat conditions.
				
				Comments were received that the conservation strategy considered should fully account for potential effects on the local economy and reduce flow requirements to minimize social and economic effects.
				
				A comment was received that the EIS should evaluate a Recovery Alternative against which the proposed conservation strategy is compared.

Alternatives Screening

The goal of alternatives screening is to identify a reasonable range of alternatives to be considered in the EIS and to provide a structure for explaining and documenting the reasons why some alternatives were considered but not carried forward for detailed analysis in the EIS based on technical, economic and environmental considerations.

The screening process starts with a clear statement of purpose and need. If an alternative or alternative component can be clearly shown to not meet the purpose of the federal action it should be dismissed from further review. The lead agency should also develop a list of feasibility factors based on technology, environmental, economic, social, cost or legal factors. Alternatives that pass through the purpose and need screen are progressively narrowed at each level of the screening process.

For this EIS, a three phase screening process was used as described below and summarized in Tables 2, 3 and 4. Answers to screening questions are yes, maybe or no. Alternatives receiving yes or maybe responses were carried forward to the next screening level. Each progressive screening level from first to third applies increasingly stringent criteria to narrow the range of alternatives. In the first screening level, alternatives have been passed through the purpose and need screening criteria if most of the purpose and need is met. This approach is taken to ensure that a robust number of alternatives are considered for detailed review in the EIS and that the purpose and need statement does not unfairly eliminate alternatives from consideration in the EIS.

First Tier Screening Criteria

Is or does the potential alternative:

- Meet the purpose and need of the lead agency?
- Realistic and reasonable?
- Address a relevant issue identified or unresolved conflicts concerning project impacts, mitigation plans, or alternative uses of available resources?
- Provide for a streamlined endangered species permitting process?
- Provide a means to implement covered activities in a manner compliant with applicable state and federal fish and wildlife protection laws?
- Coordinate and standardize mitigation and compensation requirements in laws and regulations related to biological and natural resources in the plan area?

Second Tier Screening Criteria

- Does the alternative avoid or substantially lessen any of the significant environmental effects of, or potentially address one or more significant issues related to, the proposed action?
- Is the alternative different enough from other alternatives to allow for clear decision-making?

Third Tier Screening Criteria

- Are costs of the alternative marginal compared to those of the proposed action such that a reasonably prudent public agency would proceed with, or it would be practicable to proceed with, the potential alternative?
- Would implementation time compared with that of the proposed action result in the potential alternative meeting the project purpose within an acceptable time frame?
- Would technology or physical components required by the alternative be technically feasible?
- Would construction, operation, and/or maintenance of the potential alternative not violate any federal or state statutes or regulations?
- Would outcomes of the alternative be clearly desirable by the lead agency from a policy standpoint?

Alternatives Screening Conclusions

First Tier Screen

The first tier alternatives screening is summarized in Table 2. Of the 15 alternatives considered in the first tier screening, four alternatives were eliminated from consideration in the Draft EIS. Alternatives 8 and 9, which would restrict the covered species considered and covered activities on the Crooked River system, respectively, were eliminated because both alternatives would not meet the purpose and need to issue ITPs for the specified covered species requested by the applicants and Alternative 9 would likely not provide a means to implement covered actions outside the Deschutes River. Alternative 14, Preliminary Injunction Alternative, was eliminated from further review because the level of spring and winter flows suggested in this alternative has been shown to be unsustainable from a water storage/supply perspective and suggested flow levels could have unintended consequences for covered species (U.S. Fish and Wildlife Service 2017, 2019). As described in the Environmental Baseline (U.S. Fish and Wildlife Service 2017: 30–130), while the winter benefits appear beneficial, there are potential immediate negative impacts on summer habitats. Alternative 15, No Take Alternative, was eliminated from further consideration because although it has the potential to meet the purpose and need for issuing ITPs for covered species, implementing such an alternative would likely be infeasible and unrealistic. Historical operations have resulted in such significant modification to the physical structure of the river and the current location of listed species related to the covered activities that no currently known flow regime could be implemented that would result in no take. Further, operation and maintenance of covered activities would need to be severely restricted without certainty of preventing take. Further discussion of a no-take alternative is provided below.

All of the other remaining 11 alternatives were passed through to the second tier alternatives screening.

Second Tier Screen

The second tier alternatives screening is summarized in Table 3. Of the 11 alternatives considered in the second tier screening, five alternatives were eliminated from further consideration in the Draft

EIS. Alternatives 1, 5, and 12 were eliminated because flows under these alternatives were similar to those of Alternatives 2, 3, and 4 and could be captured within the range of those other alternatives. Alternatives 2, 3, and 4 were considered preferable based on the potential to achieve benefits for covered species. Alternative 5 was also considered to be marginally feasible given the potentially detrimental consequences to the Oregon spotted frog with rapid water operations changes considered under this alternative and the potential negative effects on water supply early in the permit term. Alternative 12 differed from other alternatives only in the mechanism for providing increased river flows for covered species, focusing on on-farm conservation and demand management, which are potential responses that could occur under many of the alternatives. Alternative 10 was eliminated from further consideration because the level of flows provided during the winter months is not thought to benefit Oregon spotted frog habitat areas on the Deschutes River and because the alternative is similar to the no-action alternative. Alternative 13 was eliminated because it is the same as the proposed action except that it has a shorter permit term—20 years versus 30 years. It was decided that the shorter permit term could be incorporated into another alternative.

The remaining 6 alternatives were passed through to the third tier alternatives screening.

Third Tier Screen

The third tier alternatives screening is summarized in Table 4. Of the 6 alternatives considered in the third tier screening, 2 alternatives were eliminated from further consideration in the Draft EIS and two alternatives were incorporated into the two remaining alternatives. Alternative 2, Enhanced Upper Deschutes River Flows and 50 Year Permit Term, was eliminated from further review because the length of the permit term was considered infeasible given some of the uncertainties about covered species' response to proposed conservation measures and practical considerations about issuing ITPs for an extended permit term. Scoping comments were also received requesting shorter permit terms to offset perceived uncertainty about species responses to the conservation strategy (see scoping comments). Alternative 11, Deschutes River Flow and Restoration/Enhancement, was eliminated from further consideration, because it could add substantial cost to the current conservation strategy and such habitat restoration and enhancement actions are already being implemented by the U.S. Forest Service, Upper Deschutes Watershed Council, and other local entities in the Deschutes River Basin. Further, restoration alone cannot address the impacts on Oregon spotted frog habitat; water management operational changes are needed.. However, rejecting this alternative does not preclude including restoration funding for future projects that may improve conditions for covered species.

Alternative 6, Enhanced Variable Upper Deschutes River Flows, passed all of the screens and the concept of variable streamflow was incorporated into Alternative 3. Similarly, Alternative 7, Variable Deschutes River Flows with Reduce Permit Term, passed all of the screens and variable streamflow and a shortened 20-year permit term were incorporated into Alternative 4. Combining these alternatives is beneficial because it preserves a robust range of alternatives and incorporates important differences across the alternatives when compared to the no-action alternative.

Consideration of No-Action Alternative Options

In an HCP EIS, the no-action alternative may be described as the future circumstances without the proposed action. It can include predictable actions by persons or entities other than the federal agencies involved in a project acting in accordance with current management direction or level of management intensity. When a proposed action involves updating an adopted management plan or program, the no-action alternative assumes the continuation of the existing management plan or program. This represents a scenario in which there is "no change" from the current management direction or level of management intensity (43 CFR 46.30).

The purpose of a no-action alternative in an EIS is to establish a reasonable point of comparison for other action alternatives (46 Federal Register [FR] 18026 [March 23, 1981]) and to describe a predictable future without the proposed action. It provides information to a decision-maker about what could happen in the future if an action is not approved. It is not intended to dictate to applicants a particular course of action if an ITP is not approved.

Using this logic, the Services have chosen to describe the no-action alternative as continuation of existing water management operations as provided under the ESA Section 7 Biological Opinion for the Upper Deschutes River (Deschutes Project BiOp) (U.S. Fish and Wildlife Service 2017, 2019), and continuation of the NOAA 2005 BiOp requirements and other current programs and projects that would occur without implementation of the proposed action or alternatives. Although no party intends for these actions to continue for the 30-year period of analysis that this EIS covers, FWS considers it reasonable to assume continuation of the Deschutes Project BiOp under the no-action alternative because the applicants are currently operating under these conditions, and they provide a known and reasonable baseline against which to compare the proposed action and alternatives for purposes of the NEPA analyses.[2]

The 2016 HCP Handbook guidance provides:

> If the project does not involve development, but rather some operation or maintenance regime, no action generally means the applicant will continue to operate in a way that avoids take. Examples of this version of "no action" include timber harvesting in a manner that avoids take, parkland operation and maintenance that avoids take, utility operation and maintenance that avoids take, operation of wind turbines in a way that avoids take, etc. (Section 13.3.2.1, page 13-7).

This guidance contemplates operations and maintenance in the context of timber harvest plans, parks, utilities and wind turbine development, which would involve avoiding operating and maintaining facilities in portions of a plan area to avoid taking species. Although this no-take approach for the no-action alternative can be feasible for projects involving terrestrial species that occur in specific or localized habitats, it is less than practical for ongoing water supply facility operations and maintenance activities. In the Deschutes Basin, historical operations have resulted in such significant modification to the physical structure of the river, and the current location of listed species, resulting from the covered activities that it is unclear what flow regime, if any, could be implemented that would result in no take. No take of covered species in the context of ongoing water facility operations does not appear to be physically possible given the broad geography affected by the current water management regime and the inability to simultaneously inundate Oregon spotted frog sites (to create suitable habitat) in the many wetland, oxbow, and riverine habitats that the Oregon spotted frog occupies. The historical impacts on the diversity of sites across this broad geography make it challenging, and likely not possible, to design a water management approach that could be implemented to prevent all take of Oregon spotted frog and other covered species. Further, a no-take scenario would likely involve severe restrictions to water supply

[2] The current BiOp will also expire on December 31, 2020, at which time it is expected that the EIS and Deschutes Basin HCP will be completed.

operations that may preclude the applicants from effectively delivering irrigation water and would likely conflict with existing state and federal law, including basin water rights.

Therefore, alternatives, including the no-action alternative, that require no take of the covered species were considered to be not realistic, reasonable, or feasible because implementing a no-take alternative would not resolve covered species conflicts with water supply delivery and would require severe restriction or substantial reduction of agricultural water supply in the basin without certainty of preventing take.

Scoping comments received indicated that the no-action alternative to the Deschutes Basin HCP should reflect the Services' recommendation for species protection actions in the absence of issuance of an ITP. In other words, what would the Services require or recommend of applicants in the absence of the proposed action and incidental take coverage? The Deschutes Project BiOp provides guidance in the Conservation Recommendations section that identifies several additional actions and recommendations for the draft HCP. For the reasons mentioned above, these measures alone would also not prevent take; however, they would further reduce it. Elements from these recommendations were used in the development of alternatives and currently are represented in Alternative 4.

Selected EIS Alternatives

Based on the three-tiered screening process, described above and summarized in Tables 2, 3 and 4, the following alternatives were identified as those to be analyzed in the Draft EIS.

- Alternative 1, No Action
- Alternative 2, Proposed Action (Deschutes Basin HCP)
- Alternative 3, Enhanced Variable Streamflow
- Alternative 4, Enhanced and Accelerated Variable Streamflow

Alternatives 3 and 4 evaluated in the Draft EIS were modified related to the timing and amount of winter streamflow based on an iterative RiverWare modeling exercise to optimize streamflow for Oregon spotted frog and fish.

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Table 2. First Screen of Alternatives

Alternative Screening: First Screen Criteria	Alternative 1: Accelerated Upper Deschutes River Winter Flows	Alternative 2: Enhanced Upper Deschutes River Winter Flows and 50 year permit	Alternative 3: Enhanced Upper Deschutes River Winter Flows	Alternative 4: Accelerated and Enhanced Upper Deschutes River Winter Flows	Alternative 5: Modified Upper Deschutes River Winter Flows	Alternative 6: Enhanced Variable Upper Deschutes River Flows	Alternative 7: Variable Deschutes River Flows with Reduced Permit Term	Alternative 8: Reduced Covered Species	Alternative 9: Limit Covered Activities to Deschutes River	Alternative 10: Continuation of Current Voluntary Flows	Alternative 11: Deschutes River Flow and Restoration/Enhancement	Alternative 12: Flow Enhancement through Conservation	Alternative 13: Reduced Permit Term	Alternative 14: Preliminary Injunction Alternative	Alternative 15: No Take Alternative
Meet the purpose and need of FWS?	Yes.	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Maybe	Yes	Yes	Yes	Maybe	Maybe
Is the alternative realistic and reasonable?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Maybe	Maybe	Maybe	No	maybe	Yes	No	No
Address a relevant issue identified or unresolved conflicts concerning project impacts, mitigation plans, or alternative uses of available resources?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No
Provide for a streamlined endangered species permitting process?	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	No	Maybe	Maybe	Maybe	Yes
Provide a means to implement covered activities in a manner compliant with applicable state and federal fish and wildlife protection laws?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Maybe	Yes	Yes	Yes	Maybe	No
First Screen Summary	This alternative is carried forward to second tier screening	This alternative is carried forward to second tier screening	This alternative is carried forward to second tier screening	This alternative is carried forward to second tier screening	This alternative is carried forward to second tier screening	This alternative is carried forward to second tier screening	This alternative is carried forward to second tier screening	This alternative has been eliminated from detailed consideration in the EIS.	This alternative has been eliminated from detailed consideration in the EIS.	This alternative is carried forward to second tier screening	This alternative is carried forward to second tier screening	This alternative is carried forward to second tier screening	This alternative is carried forward to second tier screening	This alternative has been eliminated from detailed consideration in the EIS.	This alternative has been eliminated from detailed consideration in the EIS.

Table 3. Second Screen of Alternatives

Alternative Screening: Second Screen Criteria	Alternative 1: Accelerated Upper Deschutes River Winter Flows	Alternative 2: Enhanced Upper Deschutes River Winter Flows and 50 year permit	Alternative 3: Enhanced Upper Deschutes River Winter Flows	Alternative 4: Accelerated and Enhanced Upper Deschutes River Winter Flows	Alternative 5: Modified Upper Deschutes River Winter Flows	Alternative 6: Enhanced Variable Upper Deschutes River Flows	Alternative 7: Variable Deschutes River Flows with Reduced Permit Term	Alternative 10: Continuation of Current Voluntary Flows	Alternative 11: Deschutes River Flow and Restoration/Enhancement	Alternative 12: Flow Enhancement through Conservation	Alternative 13: Reduced Permit Term
Avoid or substantially lessen any of the significant environmental effects of, or potentially address one or more significant issues related to, the Proposed Action?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Different enough from another alternative to allow for clear decision-making?	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	No	No
Second Screen Summary	This alternative has been eliminated from detailed consideration in the EIS.	This alternative is carried forward to third tier screening	This alternative is carried forward to third tier screening	This alternative is carried forward to third tier screening	This alternative has been eliminated from detailed consideration in the EIS.	This alternative is carried forward to third tier screening	This alternative is carried forward to third tier screening	This alternative has been eliminated from detailed consideration in the EIS.	This alternative is carried forward to third tier screening	This alternative has been eliminated from detailed consideration in the EIS.	This alternative has been eliminated from detailed consideration in the EIS.

Table 4. Third Screen of Alternatives

Alternative Screening: Third Screen Criteria	Alternative 2: Enhanced Upper Deschutes River Winter Flows and 50 year permit	Alternative 3: Enhanced Upper Deschutes River Winter Flows	Alternative 4: Accelerated and Enhanced Upper Deschutes River Winter Flows	Alternative 6: Enhanced Variable Upper Deschutes River Flows	Alternative 7: Variable Deschutes River Flows with Reduced Permit Term	Alternative 11: Deschutes River Flow and Restoration/Enhancement
Costs are marginal compared to those of the proposed action such that a reasonably prudent public agency would proceed with, or it would be practicable to proceed with, the potential alternative?	Yes	Yes	Yes	Yes	Yes	No
Implementation time compared with that of the proposed action would result in the potential alternative meeting the project purpose within an acceptable time frame?	No	Yes	Yes	Yes	Yes	Maybe
Technology or physical components required would be clearly technically feasible?	Yes	Yes	Yes	Yes	Yes	Yes
Construction, operation, and/or maintenance of the potential alternative would not violate any federal or state statutes or regulations?	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe
Outcomes could be clearly desirable from a policy standpoint?	Maybe	Yes	Yes	Yes	Yes	No
Third Screen Summary	This alternative has been eliminated from detailed consideration in the EIS.	This alternative is carried forward for analysis in the Draft EIS	This alternative is carried forward for analysis in the Draft EIS	This alternative concept has been incorporated into Alternative 3 carried forward to the Draft EIS.	This alternative concept has been incorporated into Alternative 4 carried forward to the Draft EIS.	This alternative has been eliminated from detailed consideration in the EIS.

References Cited

U.S. Fish and Wildlife Service. 2017. *Declaration of Bridget Nolan Moran, U.S. Fish and Wildlife Service, in support of Federal Defendant's Opposition to Plaintiff's Motion for Preliminary Injunction. United States District Court, District of Oregon, Eugene Division, Center for Biological Diversity et al. v. U.S. Bureau of Reclamation, et al. and Arnold Irrigation District, et al.*

U.S. Fish and Wildlife Service. 2019. *Reinitiation of Formal Consultation on Bureau of Reclamation Approval of Contract Changes to the 1938 Inter-District Agreement for the Operation of Crane Prairie and Wickiup Dams, and Implementation of the Review of Operations and Maintenance (ROM) and Safety Evaluation of Existing Dams (SEED) Programs at Crane Prairie and Wickiup Dams, Deschutes Project, Oregon (2017–2019).* July 26. Bend, OR.

Appendix 2-B
No-Action and Cumulative Scenarios

Appendix 2-B
No-Action and Cumulative Scenarios

Tables 1 and 2 present information on the past, current, and future projects considered in the no-action and cumulative analyses. In some instances, projects or their outcomes were less certain and were therefore considered only in the cumulative scenario. These projects are denoted with an asterisk (*) in the tables.

Table 1. Past and Current Projects

Project	Description
Water Conservation Projects	
Tumalo ID	Allocation of Conserved Water projects implemented by Tumalo ID through 2013 resulted in instream water rights of 17.67 cfs in Tumalo Creek and 331.5 af of water released from Crescent Lake Reservoir. Similar projects from 2014 through 2018 have resulted in instream water rights of about 2.45 cfs for Tumalo Creek and 51.6 af for Crescent Lake Reservoir (Vaughn pers. comm. [a]).
Three Sisters ID	Allocation of Conserved Water projects implemented by Three Sisters ID have resulted in instream water rights of about 31.18 cfs in Whychus Creek (Vaughn pers. comm. [b]).
Central Oregon ID	Allocation of Conserved Water projects and permanent instream water right transfers implemented by Central Oregon ID between 2006 and 2013 have resulted in instream water rights of about 25 cfs in the Deschutes River and 4 cfs in the Crooked River (Vaughn pers. comm. [a]).
Swalley ID	Allocation of Conserved Water projects implemented by Swalley ID between 2006 and 2013 resulted in instream water rights of about 35 cfs in the Deschutes River (Vaughn pers. comm. [a]).
North Unit ID	Allocation of Conserved Water projects implemented by North Unit ID between 2006 and 2013 have resulted in instream water rights of about 1 cfs in the Deschutes River and 23 cfs in the Crooked River (Vaughn pers. comm. [a]).
Resource Protection and Enhancement Projects	
Opal Springs Fish Passage	This Crooked River Watershed Council project constructed a fish ladder at Opal Springs Dam to restore access to approximately 130 miles of habitat in the Lower Crooked River, including McKay and Ochoco Creeks. The fish ladder began operations in November 2019.
City of Prineville Wastewater Treatment Wetlands	The City of Prineville's Crooked River Wetland Complex, which was completed in 2016, improved 2 miles of riparian corridor along the Crooked River and constructed over 120 acres of wetlands, benefitting many species of fish and wildlife, and lowering river temperatures.
Crooked River Stream Habitat Restoration	This Crooked River Watershed Council project addressed passage and screening at 13 of 17 sites considered to be significant barriers to fish on the Crooked River.

Project	Description
Camp Polk Meadow Preserve	This Deschutes River Conservancy project protects 151 acres of the Camp Polk Meadow Preserve, which contains approximately 1.4 miles of Whychus Creek with wetlands, meadows, aspen groves and ponderosa pine stands.
Tumalo Creek Bridge to Bridge Restoration	This USFS project, completed in 2007, restored channel stability, fish and wildlife habitat, and riparian vegetation to 2.2 miles of Tumalo Creek damaged in the 1979 Bridge Creek Fire.
Whychus Creek Floodplain Restoration and Dam Removal Project	This USFS project addressed the loss of floodplain and flood channel connection to the creek that resulted from berm construction following the 1964 flood.
Whychus Creek Restoration	This project is led by the Deschutes Partnership, a consortium of the Deschutes Land Trust, Deschutes River Conservancy, and the Upper Deschutes Watershed Council, procured land along Whychus Creek for restoration, increased streamflow on Whychus Creek during the low flow summer months, and completed riparian habitat restoration and fish passage projects.
Three Sisters Irrigation Diversion Dam and Fish Passage Restoration	This Three Sisters ID project, completed in 2011, restored fish passage and habitat for resident and anadromous fish above the Three Sisters irrigation diversion dam.
Vandervert Ranch Fish Habitat	This project, led by Upper Deschutes River Watershed Council and the Oregon Watershed Enhancement Board, would accelerate the process of creating undercut banks, providing improved environments for trout in the Little Deschutes River.
Deschutes River Spawning Enhancement	This USFS project restored approximately 100 cubic yards of spawning gravel to the Deschutes River immediately below Wickiup Dam.
Ryan Ranch Wetland Restoration	This USFS and Upper Deschutes River Watershed Council project restored 0.3 mile of riverbank along the Upper Deschutes River, including the natural hydrological function of a historic slough floodplain.
Horse Heaven Watershed Restoration	The Horse Heaven Creek restoration project is located on private lands in the upland habitats of the Horse Heaven Creek subbasin, which flows into the Crooked River above Bowman Dam in Crook County. This landscape-scale project focused on the removal of encroaching Western juniper on sage steppe habitats on private lands directly adjacent to the Ochoco National Forest.
Releases of anadromous fish in the Upper Deschutes Basin Reintroduction and Conservation Plan for Anadromous Fish in the Upper Deschutes River Subbasin, Oregon	These releases of anadromous fish, including steelhead, spring Chinook, and sockeye salmon, have been and continue to be implemented in the Upper Deschutes Basin to support reestablishment of populations.

Project	Description
Hydroelectric Projects	
Portland General Electric and Confederated Tribes of the Warm Springs Reservation of Oregon Pelton Round Butte Co-Management Project	The Pelton–Round Butte Project is a hydroelectric project along a 20-mile stretch in the Deschutes River Canyon. The project, co-owned by Portland General Electric and the Confederated Tribes of Warm Springs, consists of three dams: Reregulating Dam, Pelton Dam forming Lake Simtustus, and Round Butte Dam forming Lake Billy Chinook. It is a near run-of-river project with little active storage available. The Reregulating Dam and Pelton Dam were completed in 1958 and Round Butte Dam was completed in 1964.

af = acre-feet; cfs = cubic feet per second; ID = Irrigation District; USFS = U.S. Forest Service.

Table 2. Reasonably Foreseeable Future Projects

Project	Description
Water Conservation Projects	
Tumalo Irrigation District Irrigation Modernization Project	This canal piping project, which began in October 2018 and has an anticipated 12-year timeline, would protect conserved water instream under Oregon's Allocation of Conserved Water process and thereby increase instream flow below irrigation diversions in the Middle Deschutes River and Tumalo Creek. Flows would increase incrementally over the first 10 years of the analysis period as projects are completed (Farmers Conservation Alliance 2018a).
Swalley Irrigation District Irrigation Modernization Project	This canal piping project, which is planned to begin in 2019 and has an 8- to 9-year timeline, would protect conserved water instream under Oregon's Allocation of Conserved Water process and thereby increase instream flow below irrigation diversions in the Middle Deschutes River and Tumalo Creek. Flows would increase incrementally over the first 10 years of the analysis period as projects are completed (Farmers Conservation Alliance 2018b).
Central Oregon Irrigation District Smith Rock–King Way Infrastructure Modernization Project	This canal piping project, which is to begin in October 2020, would pipe approximately 7.9 miles of Central Oregon ID's Pilot Butte Canal over an estimated 4 years. Seepage loss would be reduced by an estimated 29.4 cfs during the irrigation season (an estimated volume of 9,392 af). This water would be conveyed to North Unit ID via the spill weir from the Pilot Butte Canal to the North Unit Main Canal near Smith Rock. North Unit ID would then release and protect an equivalent volume (estimated 30.3 cfs) for instream uses during the non-irrigation season in addition to the 100 cfs to be protected under the no-action alternative. However, the estimated 30.3 cfs of releases during the non-irrigation season would not be additive to flows of 200 or more cfs under the proposed action, Alternative 3, and Alternative 4. Reductions in irrigation demand for Central Oregon ID and North Unit ID have been incorporated into the RiverWare model. Central Oregon ID's diversion would remain the same, while North Unit ID's demand will be reduced by 30 cfs during the time period that water is spilled from Central Oregon ID to North Unit ID (Farmers Conservation Alliance 2020).

Project	Description
Other Central Oregon Irrigation District projects*	According to Central Oregon ID's *Preliminary Investigative Report for the Central Oregon Irrigation District Irrigation Modernization Project* (Farmers Conservation Alliance 2017), Central Oregon ID would pipe up to 75 miles of canals and laterals delivering approximately 5 cfs or greater. The project would reduce canal seepage losses by up to 156 cfs (Farmers Conservation Alliance 2017:27). The Smith Rock King–Way Infrastructure Modernization Project is already anticipated under the no action and other alternatives. Therefore, the remaining water savings is estimated to be approximately 126 cfs.
Lone Pine Irrigation District projects*	According to Lone Pine ID's *Preliminary Investigative Report for the Lone Pine Irrigation District Irrigation Modernization Project* (Farmers Conservation Alliance 2018c), Lone Pine ID would replace up to 15 miles of Lone Pine ID's existing canal system with approximately 11.3 miles of pipe, reducing the length of pipe required through realignment of the existing conveyance system. The project would reduce canal seepage by up to 8.8 cfs (Farmers Conservation Alliance 2018c:37).
Ochoco Irrigation District projects*	According to Ochoco ID's *Preliminary Investigative Report for the Ochoco Irrigation District Infrastructure Modernization Project* (Farmers Conservation Alliance 2019a), Ochoco ID would pipe high priority canals and laterals in the district, install new pump stations and include activities to implement the McKay Creek Water Rights Switch (Farmers Conservation Alliance 2019a:12).
Arnold Irrigation District projects*	According to Arnold ID's *Preliminary Investigative Report for the Arnold Irrigation District Infrastructure Modernization Project* (Farmers Conservation Alliance 2019b), Arnold ID would pipe up to 31.5 miles of canals and laterals, 13 miles of aerial flume and open Arnold Canal and 18.5 miles of open laterals. The project would reduce canal seepage losses by up to 45.1 cfs (Farmers Conservation Alliance 2019b:33)
McKay Creek Water Rights Switch	This Deschutes River Conservancy project would restore up to 11.2 cfs and eliminate all direct creek withdrawals from river miles 6 through 12 by exchanging McKay Creek water rights with Ochoco Irrigation District water rights from the larger Crooked River system and permanently transferring the McKay rights instream.
Resource Protection and Enhancement Projects	
Deschutes River Trail Restoration	This USFS project would restore sections of the Deschutes River Trail between Benham and the forest boundary (Meadow trailhead to Sunriver) to the natural character and would also restore riparian zones.
Upper Deschutes Riparian Habitat Conservation Area Restoration	This USFS project would restore riparian areas along the Upper Deschutes River, downstream of the Wickiup Dam to Burgess Road that have been affected by heavy dispersed recreation to the natural character through subsoiling, seeding, and planting native species.

Project	Description
Upper Little Deschutes Restoration Project	This USFS project would restore two areas totaling 6,286 acres along the Little Deschutes River beginning in 2020 to increase shallow groundwater retention and improved hyporheic flow, in support of Oregon spotted frogs (*Rana pretiosa*) (Wilcox pers. comm.).
Farewell Bend Park Riparian Restoration	This project, led by the Upper Deschutes River Watershed Council and Bend Park and Recreation District, completed an inventory and assessment of riverbank conditions on 10.5 miles of district-owned property, summarized conditions at 13 locations, and identified opportunities for restoration and improved river access. The first potential project is located between the Bill Healy Bridge and the Farewell Bend footbridge.
Whychus Canyon Restoration	Deschutes River Conservancy plans to restore 6 miles of Whychus Creek, 3.6 miles of which will consist of restored meadow habitat, and its associated floodplain to provide high quality spawning and rearing habitat as well as wetland and riparian habitat for resident and migratory wildlife. The project would restore the key functions and values of the historic wet meadows and associated in-stream and riparian habitats.
2018 Pre-Commercial Thin	This ongoing USFS project will continue implementing approximately 4,300 acres of pre-commercial thinning. Activities overlap with the study area in Little Deschutes River and Crescent Creek. Vegetation management will be oriented toward enhancement of scenic and wildlife values and is consistent with the management for these Wild and Scenic Rivers, which are designated as Recreation Rivers (Wilcox pers. comm.).
North Unit Irrigation District Water and Energy Conservation Initiative	Deschutes River Conservancy supports water quality and fish habitat improvements in the Crooked River through a water banking agreement allocated from Central Oregon ID. The project would improve water management and increase hydropower generation at two existing facilities, generating 318,638 kilowatt hours of renewable energy annually in perpetuity. The project would enhance irrigation conveyance efficiencies, generate 1,300 af of new Deschutes River water supply for farmers in North Unit ID, 1,300 af of new instream water rights in the lower Crooked River, address limiting factors of low flow and temperature, and facilitate the reallocation of water from an agricultural water use to an environmental water use.
Deschutes River Water Leasing Program	Deschutes River Conservancy manages this program to lease water rights that are not currently being used with districts and landowners. Leases enhance flows in the Deschutes River, Whychus Creek, Tumalo Creek, Lower Crooked River, and Little Deschutes River.
Deschutes River Water Right Transfers	Deschutes River Conservancy manages this program to acquire and transfer water rights for dedication to permanent instream use. Instream transfers may be for restoration or mitigation purposes, serving to meet instream flow targets and the needs of farmers, cities, and other new groundwater uses.

Project	Description
Crooked River Stream Habitat Restoration*	The Crooked River Watershed Council expects to complete an additional 20 miles of stream restoration projects in the mainstem Crooked River, Ochoco Creek, and McKay Creek within the next 10 years. The primary focus is on a 17-mile reach of the Crooked River downstream of Prineville in which the Crooked River Watershed Council has already completed a detailed physical habitat assessment and inventory of resource needs (Sanders pers. comm.).

af = acre-feet; cfs = cubic feet per second; ID = Irrigation District.
* Denotes project is only considered under the cumulative scenario.

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Appendix 2-C

Implementation of UD-1: Oregon Spotted Frog Conservation Fund

September 2020

Implementation of UD-1: Oregon Spotted Frog Conservation Fund

The U.S. Fish and Wildlife Service (USFWS) is drafting a Recovery Plan and Recovery Implementation Strategy for the Oregon spotted frog and a final plan is anticipated in August 2022. The Recovery Plan will aim to improve the viability of OSF within each of the 15 sub-basins where the species occurs in Oregon and Washington.

Oregon spotted frogs in all subbasins across the range are subject to more than one stressor (i.e., threats). Many OSF breeding sites are small and isolated from each other. Because of OSF's fidelity to breeding locations, fluctuating water levels in the embryonic and tadpole life stages, combined with risk of predation and low overwinter survival, may result in the species being vulnerable to rapid population declines. Changing climate has the potential to exacerbate these stressors through changes in timing and availability of snow and rain events that sustain wetland habitat or creating temperature more favorable to non-native predators, competitors, or disease.

Oregon spotted frogs occur throughout the Upper Deschutes River Basin and within the area affected by water management covered by the Deschutes Basin HCP (HCP). Covered lands within the HCP include approximately 35 percent of the geographic area designated as OSF critical habitat within the species' range that are deemed essential for the conservation of the species. Threats to OSF within the geographic area covered by the HCP, identified in the 2014 ESA listing (79 FR 51658) and USFWS's Deschutes Project Biological Opinions (USFWS 2017, 2019), include not only hydrological changes due to water management, but continued wetland habitat loss due to a lack of natural disturbance processes (e.g., floods, fire, beaver activity). Open water areas within wetlands are being encroached upon by lodgepole pine, cattails, and shrubs. Reed canarygrass is present within a number of OSF sites and renders these habitats less suitable for OSF as it spreads. Introduced predators, such as bullfrogs and nonnative fish, are also present within a number of OSF sites and active management is necessary to reduce predation on spotted frogs.

In general, a conservation strategy for OSF in the Upper Deschutes River Basin will include the following biological goals:

- Expand the overall distribution of populations and increase population viability and abundance of OSF to contribute to the regional recovery of the species.
- Reduce threats to existing populations of OSF.
- Increase the number of individuals in all age classes at known sites.
- Increase connectivity between disjunct populations.

Oregon spotted frog conservation measures outlined in the HCP have aimed to adjust the timing and volume of water storage and release to improve hydrological conditions within OSF habitat at key times during the species' lifecycle. The improvements to habitat via implementation of these conservation measures vary geographically. The proposed conservation measures in the HCP will occur over time as the HCP permit is expected to span 30 years. Therefore, the anticipated benefits to OSF habitat from hydrological changes will vary spatially and temporally within the Upper Deschutes River Basin.

In the Deschutes River downstream of Wickiup Dam, the HCP conservation measures that increase winter flows are not sufficient to independently improve hydrological conditions that support OSF habitat for a number of years post implementation. Even at full implementation (i.e., 400–500 cfs), restoration actions will be necessary to enhance the function and condition of the river and wetland sloughs adjacent to it that support OSF. Furthermore, passive and active habitat restoration of the river and OSF habitat is not feasible in some areas until hydrological improvements are achieved (e.g., winter flow increases in the Deschutes River and summer flow decreases). Habitat maintenance work at OSF sites will be necessary to reduce existing threats to OSF and maintain population viability currently and into the future as flows are restored to the Deschutes River. HCP Conservation Measure UD-1 provides funding to implement site specific actions to improve habitat conditions for OSF that complement enhanced flows in the Deschutes River.

Restoring Spotted Frog Habitat in the Upper Deschutes River Basin

This document outlines some of the OSF conservation actions proposed to be implemented spatially and temporally within the Upper Deschutes River Basin for OSF within the context of the HCP. Some of these conservation actions could be implemented in the short-term, prior to and concurrent with hydrological adjustments to storage and release from reservoirs as identified in the HCP. As USFWS develops a Recovery Plan for OSF, actions that promote recovery will be further identified in an Implementation Strategy for the Upper Deschutes River Basin. However, USFWS knows enough at this time to identify the types of conservation actions that will benefit OSF in the Upper Deschutes River Basin and which can be funded in whole or in part through the conservation fund . Continued monitoring of riverine and wetland habitats that support OSF will inform studies and projects to be conducted and funded in the future.

Crane Prairie Reservoir

Early conservation measures developed for the HCP have modified storage and release operations at Crane Prairie that appear, in the short-term, to be improving survival of OSF. However, invasive species are among the existing threats to OSF at Crane Prairie Reservoir that must be managed to sustain the high-quality wetland habitats in Crane Prairie Reservoir that support OSF and reduce predation of OSF. Efforts are underway by the U.S. Forest Service to inventory and control invasive aquatic weeds in Crane Prairie. However, resources are needed to treat reed canarygrass to prevent spread into OSF breeding sites. Another invasive species, the brown bullhead, may pose a long-term threat to OSF. The Oregon Department of Fish and Wildlife has conducted some management to assess and reduce the abundance of brown bullheads within Crane Prairie. Funds provided through the Conservation Measure UD-1 may be used to continue these invasive species control efforts now and into in the future.

Wickiup Reservoir

The feasibility of habitat enhancement for OSF within Wickiup Reservoir will likely be dependent upon future management of the reservoir and the fluctuation of water storage volumes. Given that springs feed the reservoir, there may be opportunities for site-specific enhancements that create habitat for OSF. However, habitat work that supports OSF in Wickiup Reservoir is not a current conservation priority given the highly degraded OSF habitat condition.

Deschutes River and Adjacent Wetlands Below Wickiup Reservoir

Restoration of the functioning condition of the Deschutes River is a key path to restoring OSF habitat and improving connectivity between OSF populations between Wickiup Dam and Bend, Oregon. Restoration in this segment of the Deschutes River is primarily dependent upon improvement of flows (increased winter flows and reduced summer flows), coupled with some site-specific physical river channel habitat improvements that convey water into oxbows and wetland habitats where OSF occur.

Within the regulated water management regime on the Deschutes River, two factors influence the ecological function of the river and wetlands inhabited by OSF: (1) the physical configuration of the river and (2) the variation in the timing and duration of flow volumes within the river's channel (described in terms of cubic feet per second [cfs]). In its current condition, the Deschutes River channel is wider by approximately 20 percent than it was historically, as a result of storage and release operations from Wickiup Dam (USFS 1996). The widened river channel affects the way water is distributed spatially onto the floodplain and into wetlands. Essentially, higher than historical flows are currently (and in the short-term) needed to reach and support the ecological function of floodplain wetland habitats where OSF occur.

Wetland habitats have shifted in distribution, due to the high summer flows for irrigation, and the hydroperiod (i.e., seasonal timing and duration of water) within wetlands has also changed under the regulated water management regime. The vegetative characteristics of wetland and riparian areas are influenced by duration that water is present and the volume of water. High irrigation season flows result in deep inundation of riverine slough habitats, inhibiting the growth of emergent wetland vegetation in many areas. During the irrigation storage season when flows in the Deschutes River are lowest, large unvegetated areas within the wetlands are without water. Although wetland habitat may extend further onto the Deschutes River floodplain due to high summer flows, the existing condition of wetlands is degraded due to water storage and release operations such that OSF may not successfully complete its lifecycle (USFWS 2017, 2019).

In this regulated system, hydrograph modification with the purpose of restoring physical and ecological function to the Deschutes River and wetlands should trend toward a more natural flow regime. In a hypothetically restored condition, flows from Wickiup Dam could range from approximately 500 cfs in winter to approximately 1,200 cfs during the summer season.[1] However, improving the ecological function of the river and wetland habitat for OSF will require both passive and active restoration.

The HCP will increase winter flows in the Deschutes River up to 300 cfs by year 8 and 400 to 500 cfs by year 13 of the permit term, respectively. The effect of increases in winter flows results in lower summer flows. Prior to and concurrent with increases in winter flows that are anticipated via HCP implementation, OSF conservation actions that improve habitat function and reduce threats to OSF at the site scale are needed. Examples of potential conservation and restoration actions for OSF and its habitat are bulleted below. We anticipate that continued monitoring of OSF sites will inform additional actions necessary to support OSF conservation and recovery.

Deschutes River winter flows between 100 and 300

Winter flows between 100 and 300 cfs will allow for localized and site-specific restoration activities to mitigate risk to existing OSF populations. When these flows are being achieved, the types of restoration and conservation actions that provide benefits to OSF and its habitat include, but are not limited to:

- Reed canary grass treatment at existing OSF sites and within critical habitat.
- Bull frog removal in Sunriver and wherever they are detected.
- Treatment of encroaching vegetation (cattails, lodgepole, etc.) in Sunriver, Slough Camp, and LSA Marsh and other habitats that support OSF.
- Potential beaver dam analog at Dead Slough to mitigate headcut formation and maintain winter water at higher elevations.

Deschutes River Winter Flows at 400 and 500 Cubic Feet per Second

Winter flows of 400 to 500 cfs will result in lower summer flows in the Deschutes River and passive restoration of the river channel is likely to occur. Active restoration activities to improve habitat and channel function and mitigate risk to existing OSF populations will be localized and site-specific at these winter flows. In general, higher winter flows in the range of 400 to 500 cfs are likely to improve connectivity between seasonal habitats (i.e., overwintering and breeding) for OSF.

Based on observations of flows and corresponding floodplain inundation in past studies (USFS 1996; USFWS 2017, 2019), winter flows of at least 500 cfs in the Deschutes River downstream of Wickiup Dam will support riparian vegetation. Inundation of the root systems of riparian plants through winter along the river corridor will facilitate bank stabilization and lessen the impact of erosion and sedimentation to the river as flow releases from the Wickiup Dam increase during spring and summer. Therefore, winter flows of 500 cfs are likely maximize the potential for passive and active, physical habitat restoration of the Deschutes River channel that influences

[1] This is a hypothetical flow scenario to illustrate a range in flows that could support physical and ecological function of the river while providing optimum passive and active restoration opportunities.

the ecological function of the river and adjacent wetlands for OSF. Improved base flow in the winter increases the opportunity to intercept groundwater within floodplain wetlands.

Winter flows of 400 cfs will provide similar opportunities for restoration but channel restoration activities may be more limited and spatially explicit at these winter flows.

The types of restoration and conservation actions that provide benefits to OSF and its habitat at winter flows of 400 cfs include, but are not limited to:

- Site-specific riparian planting as passive restoration occurs.
- Reed canarygrass treatment at existing OSF sites.
- Bull frog removal in Sunriver and anywhere that bullfrogs are detected in proximity to OSF sites.
- Treatment of encroaching vegetation (cattails, lodgepole pine, etc.) in Sunriver, Slough Camp, and LSA Marsh.
- Potential beaver dam analog at Dead Slough to mitigate headcut formation and maintain winter water at higher elevations.

Winter flows of 500 cfs could support the following types of restoration and conservation actions, in addition to those stated above for winter flows of 400 cfs, in order to provide benefits to OSF and its habitat:

- Bank restoration and planting riparian vegetation.
- Wood placement within the river channel to improve depositional aggradation, which will reduce the cross-sectional area of the channel and thus improving floodplain/wetland connectivity to the channel.
- Beaver dam analogs in oxbows, side channels, and wetlands to moderate the effects of flow fluctuations.
- Excavation of existing wetlands within the river channel to intercept base flow to provide new habitats for OSF.
- Excavation of oxbows on floodplain to intercept groundwater.
- Physical habitat modifications at site scale to benefit specific life stages of OSF.

Little Deschutes River Basin (including Crescent)

Within the Little Deschutes River and Crescent Creek there are potential opportunities to conduct conservation actions for OSF on Federal and private lands under the current and future flow regime. Approximately 5,204 acres of critical habitat for OSF are within the area influenced by storage and release operations at Crescent Dam. Approximately 70 percent of the lands adjacent to the Little Deschutes River and Crescent Creek are in private ownership. Therefore, private lands are important to conservation and recovery of OSF.

Addressing the ongoing threats to OSF from habitat loss and predation are essential for conservation and recovery. The following types of conservation and restoration activities may be conducted within the Little Deschutes River sub-basin to support OSF conservation:

- Installation of beaver dam analogs and wood structures within channel to increase duration and spatial extent of water on the floodplain and within oxbow habitats to support OSF life cycles and habitat connectivity.
- Riverbank restoration.
- Reed canary grass treatment along the river and at OSF sites.
- Bull frog removal to reduce predation on OSF.
- Excavation of oxbows on floodplain to intercept groundwater.

Bullfrogs occur throughout the Little Deschutes River between the confluence with Crescent Creek and the outlet near Sunriver. Current plans are underway to implement bullfrog control within OSF habitat on private lands in the lower reaches of the Little Deschutes River. A team of volunteers and consultants, with help from federal and state agencies, are developing a strategy to control bullfrogs and reduce threats to OSF. The Conservation Fund could be used to support these efforts now and into the future.

Conservation of Oregon Spotted Frog outside of HCP Covered Lands

Approximately half of all known OSF sites and 55 percent of the acres of designated critical habitat in the Upper Deschutes River Basin occur outside of the area influenced by the HCP. Improving the function of these sites and critical habitat, via the conservation actions described above, is essential to OSF conservation. Conservation funds provided through Conservation Measure UD-1 will be used to conduct maintenance and restoration of OSF habitat within all areas that currently support OSF to maintain and improve connectivity between seasonal habitats and reduce threats to OSF.

In some cases, OSF populations outside of the area influenced by storage and release operations covered by the HCP provide demographic support to populations affected by water management. For example, OSF occur in several drainages upstream of Crane Prairie Reservoir. These populations of OSF are important in maintaining the geographic distribution of the species and sustaining genetic diversity of OSF in Crane Prairie. The Dilman population of OSF may provide a source for future establishment of OSF directly downstream of Wickiup Dam (e.g., Bull Bend area). The Dilman site needs periodic maintenance that reduces encroachment of vegetation into open water areas needed to support OSF breeding, rearing and dispersal. Habitat maintenance and enhancement of these populations are important in a recovery strategy for the areas that are anticipated to become functional OSF habitat in the long-term implementation of the HCP.

The upper reaches of the Little Deschutes River that are outside of the area affected by water management provide similar demographic support for OSF. Habitat enhancement work in these areas is important to the broad recovery strategy for OSF. Currently, bullfrogs are not known to occur in these areas but channel function has been impacted by historical ditching and diversion structures. The recent implementation of the Upper Little Deschutes River Restoration Project provides an example of how hydrological restoration may be conducted to increase the duration that water remains on the floodplain. The removal of ditches and installation of beaver dam analogs can greatly improve the function of critical habitat for OSF.

OSF habitat in other areas such as Long Prairie slough within the Little Deschutes River sub-basin have been impacted by ditching and diversions. OSF currently inhabit several areas throughout Long Prairie and there may be opportunities to enhance these habitats and connectivity between these sites. Conservation actions in this area fit into the broad context of maintaining the distribution and genetic diversity of OSF.

As USFWS develops the Recovery Plan and Implementation strategy for OSF, key actions to improve population resiliency and manage site specific threats in the Upper Deschutes River Basin will be identified. We anticipate the Conservation Fund established through the Deschutes Basin HCP will be implemented strategically to enhance survival and recovery of OSF.

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Appendix 3.1-A
Regulatory Environment

Appendix 3.1-A
Regulatory Environment

Following are the laws and regulations that apply to the activities analyzed in this EIS. This information will assist the U.S. Fish and Wildlife Service and National Marine Fisheries Service (the Services) in making sure the incidental take arises from otherwise lawful activities. Items are organized by the resources analyzed.

Water Resources

Law, Regulation, or Program	Description
Federal	
Interior Department Appropriation Act, 1955 (68 Statute 361, Public Law 83-465)	Authorized the emergency rehabilitation of Crescent Lake Dam on July 1, 1954.
Emergency Relief Appropriation Act of 1935	Initiated the Deschutes Project and approved construction of Crane Prairie Dam to replace an existing dam.
Section 4 of the Act of June 25, 1910 (36 Stat. 836) and Subsection B of Section 4 of the Act of December 5, 1924 (43 Statute 702)	Found the North Unit of the Deschutes Project to be feasible by Secretary of the Interior on September 24, 1937, and subsequently approved by the President on November 1, 1937.
Act of August 6, 1956	Authorized the Crooked River Project.
Crooked River Collaborative Water Security and Jobs Act of 2014	• Authorizes the release of 5,100 af of stored water from Prineville Reservoir to serve as mitigation for the City of Prineville groundwater pumping. • Authorizes the use of 2,740 af of uncontracted, stored water to replace some of the agricultural water supply that previously has been diverted out of McKay Creek. • Increases the amount of uncontracted, stored water that is authorized for release to benefit downstream fish and wildlife (previously limited to 10 cfs), while providing non-discretionary protection for the priority of certain water contracts. All such releases will be pursuant to an annual release schedule to be developed by Reclamation. • The first fill protection is subject to compliance with USACE's flood curve requirements and the original 10 cfs release to benefit fish and wildlife. The annual first fill protection extends to the following. ○ 68,273 af of water to fulfill 16 existing Bureau of Reclamation water supply contracts. ○ 2,740 af of water to supply certain McKay Creek lands. ○ 10,000 af of water made available to North Unit ID (or certain other Bureau of Reclamation contractors) under temporary water service contracts. ○ 5,100 af of water made available to the City of Prineville.

Law, Regulation, or Program	Description
State	
Water Rights Act, ORS 537.010 et. seq.	Provides that all water within the state belongs to the public and establishes state regulation of appropriation of water for beneficial use consistent with the act.
Ground Water Act of 1955	Provides for state regulation of groundwater.
Deschutes Basin Ground Water Mitigation Rules, OAR 690-505-0600–690-505-0630 (authorized by ORS 537.746)	Establishes the mitigation process for groundwater permit applications in the Deschutes Ground Water Study Area.
Water Distribution Rules, OAR Chapter 690, Division250	Guides the administration of Oregon water laws related to regulatory actions.

af = acre-feet; Bureau of Reclamation = U.S. Department of the Interior Bureau of Reclamation; cfs = cubic feet per second; ID = Irrigation District; OAR = Oregon Administrative Rule; ORS = Oregon Revised Statute; USACE = U.S. Army Corps of Engineers

Water Quality

Law, Regulation, or Program	Description
Federal	
Section 303, Clean Water Act	Applies to required water quality standards.
Section 10, Rivers and Harbors Act of 1899, 33 U.S.C. 403	Applies to activities that could affect navigable waters of the United States.
Section 404, Clean Water Act, 33 U.S.C. 1344	Discharge of dredged or fill-material into waters of the United States, including wetlands. Permits are issued following public interest review and analyses according to USEPA's Section 404(b)(1) guidelines.
State	
ORS 196.795-990	Removal/fill permits.
ORS 568.900 to 568.933; ORS 561.191	Oregon Department of Agriculture authority for water quality.
ORS Chapter 527	Oregon Department of Forestry authority for water quality.
ORS 468B.030,468B.035	Oregon has primacy for implementing the National Pollutant Discharge Elimination Program under the Clean Water Act.

ORS = Oregon Revised Statute; U.S.C. = United States Code; USEPA = U.S. Environmental Protection Agency

Biological Resources

Law, Regulation, or Program	Description
Federal	
Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1801 et seq.	Requires an *essential fish habitat* consultation between the NMFS and the federal lead agency to document potential harm to essential habitats used by fish species that are managed under federal fisheries management plans, measures for avoiding and minimizing adverse effects, and any conservation measures used to offset these effects.

Law, Regulation, or Program	Description
Bald and Golden Eagle Protection Act, 16 U.S.C. 668–668c	Provides protection for bald and golden eagles.
Migratory Bird Treaty Act, 16 U.S.C. 703–712	Makes it illegal to take any migratory bird.
Fish and Wildlife Coordination Act, 16 U.S.C. 661–666	Applies to water resource activities affecting general fish and wildlife resources.
Endangered Species Act, 16 U.S.C. 1531 et seq.	Protects species listed as threatened or endangered. Section 7 requires federal agencies to avoid taking actions that jeopardize listed species or that destroy or adversely modify their critical habitat. Section 10 lays out the standards for obtaining incidental take permits in conjunction with habitat conservation plans for listed species.
Section 10, Rivers and Harbors Act of 1899, 33 U.S.C. 403	Regulates via a permitting program activities that could affect navigable waters of the United States.
Plant Protection Act of 2000, 7 U.S.C. 7701 et seq.	Addresses protection of native plants and sets forth quarantine requirements for foreign plant species in the United States, including noxious weeds.
Treaty with the Tribes of Middle Oregon (1855)	Set aside reservation land and reserve fishing, gathering and hunting for the Confederated Tribes of Warm Springs.
United States v. Winans, 198 U.S. 371 (1905)	U.S. Supreme Court held that the Treaty with the Yakama of 1855, and similar treaties, protects tribal access rights to fishing, hunting, and other privileges on off-reservation lands.
United States v. Oregon, 302 F. Supp. 899 (D. Or. 1969)	Ongoing federal court case that protects and implements the reserved fishing rights of Columbia River treaty tribes. The federal court continues to oversee the management of the Columbia River through the *United States v. Oregon* proceedings. Fisheries in the Columbia River and its tributaries are co-managed by the states of Washington, Oregon, and Idaho as well as four treaty tribes and other tribe's traditional fishing areas.
Section 404, Clean Water Act, 33 U.S.C. 1344	Regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Provides for the issuance of permits for such discharge under certain circumstances following a public interest review and analyses according to the USEPA's Clean Water Act Section 404(b)(1) guidelines.
Treaty with the Tribes of Middle Oregon (1855)	Treaty with Confederated Tribes of Warm Springs; establishes the reservation and ceded lands. Reserve fishing, hunting, gathering roots and berries, and pasturing their stock in ceded lands and usual and accustomed stations on unclaimed lands.
Secretarial Order 3206 (1997)	Clarifies the responsibilities of the Department of the Interior and Department of Commerce to ensure that Indian tribes do not bear a disproportionate burden for the conservation of listed species.

Law, Regulation, or Program	Description
State	
Oregon Endangered Species Act, ORS 496.002–496.192	Triggers internal state consultations when activities taken by state agencies on state lands may affect state-listed threatened or endangered species. Such consultations are typically completed in conjunction with federal agency consultation under Section 7 of the federal Endangered Species Act, as appropriate.
Oregon Removal-Fill Permit, ORS 196.795–900	Requires parties who plan to remove or fill material in wetlands or waterways to obtain a permit from the Department of State Lands.
ORS Chapter 569–Weed Control	Gives the Oregon Department of Agriculture authority to regulate noxious weeds and to require any landowner to implement noxious weed control measures.
ORS Chapter 570–Plant Pest and Disease Control; Invasive Species	Allows agricultural inspectors to impose quarantines, establish control areas, and otherwise regulate management of plant pests, including noxious weeds.
OAR 603–052–1200—Quarantine; Noxious Weeds	Designates plants that are noxious weeds and provides requirements for control measures.
OAR 603–073, "Plants: wildflowers and endangered, threatened, and candidate species"	Defines and lists candidate, threatened, and endangered plants in Oregon and places prohibitions on harvest or collection of such plants.
Oregon Policy to Recovery and Sustain Native Stocks	Sets policy to achieve goals to achieve recovery and sustainability of native stocks of salmon and trout.
Oregon Fish Passage Statutes: ORS Chapter 509	State of Oregon policy to provide for upstream and downstream passage at artificial barriers for native migratory fish.
Oregon Screening Statutes: ORS 498.306	State of Oregon policy for water diversions; to install, operate and maintain screening or by-pass devices screening water diversions to protect fish populations present at the water diversion.

NMFS = National Marine Fisheries Service; OAR = Oregon Administrative Rule; ORS = Oregon Revised Statute; U.S.C. = United States Code; USEPA = U.S. Environmental Protection Agency

Land Use and Agricultural Resources

Law, Regulation, or Program	Description
Federal	
Farmland Protection Policy Act, 7 U.S.C. 4201	Preserves farmland; prohibits unnecessary conversion of farmland for non-agricultural use. Makes provisions for restoring, maintaining, and improving the quantity and quality of farmland. Farmland governed under the act includes prime farmland, unique farmland, and land of statewide or local importance; also includes forestland, pastureland, cropland, or other land, but not water or urban built-up land.
Upper Deschutes Resource Management Plan (Bureau of Land Management 2005)	Provides management direction and guides future actions on lands administered by the Bureau of Land Management.

Law, Regulation, or Program	Description
Lower Deschutes River Management Plan, Record of Decision (Bureau of Land Management 1993)	Provides management direction and guides future actions on lands administered by the Bureau of Land Management.
Supplement to the Lower Deschutes River Management Plan, Lower Deschutes River Allocation System, Final Decision (Bureau of Land Management 1997)	Provides updated management direction and guides future actions on lands administered by the Bureau of Land Management.
Shoreline Management Plan, Pelton Round Butte Project, FERC Project Number 2030 (Portland General Electric Company and the Confederated Tribes of the Warm Springs Reservation of Oregon 2011)	Guides new development and resource protection on the shorelines of Lake Billy Chinook and Lake Simtustus to achieve a balance of the interests of the Licensees and private and commercial property owners and recreational users, while allowing the Licensees to efficiently manage the Project's power generating facilities and fulfill the Project purposes.
Prineville Reservoir Resource Management Plan (Bureau of Reclamation 2003)	Provides management direction and guides future actions for Prineville Reservoir.
Forest Plan: Deschutes National Forest (U.S. Forest Service 1990)	Provides national forest–wide and area-specific standards and guidelines for recreation and other uses of U.S. Forest Service lands.
State	
Statewide Planning Goals and Guidelines, Goal 3: Agricultural Lands, OAR 660-015-0000(3)	Preserves and maintains agricultural lands for farm use, consistent with existing and future needs for agricultural products, forest, and open space.
State Agricultural Land Use Policy, ORS 215.243	Declares that open land used for agricultural use is an efficient means of conserving natural resources and should be preserved to maintain the state's agricultural economy.
Regional/Local	
Crook County Comprehensive Plan (Crook County 2003)	Preserves agricultural lands, protects agriculture as an economic enterprise, balances economic and environmental considerations, limits non-agricultural development, maintains a "low" population density, and maintains a high level of livability in Crook County.
Deschutes County Comprehensive Plan (Deschutes County 2011)	Preserves and maintains agricultural lands and the agricultural industry; retains agricultural lands through Exclusive Farm Use zoning.
Jefferson County Comprehensive Plan (Jefferson County 2013)	Preserves, protects, and maintains agricultural and rangeland that is presently under production, or has the potential to be productive. Recognizes the importance of irrigation for crop production.
Klamath County Comprehensive Plan (Klamath County 2010)	Economically stabilize the agricultural community in Klamath County, including the designation of agricultural lands as "Exclusive Farm Use" that are subject to the regulations of Exclusive Farm Use zones.
Wasco County Comprehensive Plan (Wasco County 2010)	Protect agriculture as an important part of the economy of Wasco County.

OAR = Oregon Administrative Rule; ORS = Oregon Revised Statute; U.S.C. = United States Code

Aesthetics and Visual Resources

Law, Regulation, or Program	Description
Federal	
National Scenic Byways (Federal Highway Administration 1995)	Designates roadways as National Scenic Byways or All-American Roads based on six criteria of scenic, historic, recreational, cultural, archaeological, and/or natural intrinsic qualities.
National Wild and Scenic Rivers Act (16 U.S.C. §§ 1271–1287)	Establishes a National Wild and Scenic Rivers System for the protection of certain rivers as designated as wild, scenic, or recreational.
Deschutes National Forest Land and Resource Management Plan (Deschutes National Forest 1990)	Identifies protections for Wild and Scenic Rivers (WS and M17) and scenic views (M9).
Cascade Lakes National Scenic Byway Corridor Management and Interpretive Plan 2011 (Deschutes National Forest 2011; 11–13)	Establishes strategies for management and protection of the scenic corridor.
Newberry National Volcanic Monument Comprehensive Management Plan (Deschutes National Forest 1994; 22, 34, 39, 51–55, 65–66)	Establishes strategies for management and protection of the National Monument.
Big Marsh Creek Little Deschutes River Wild and Scenic Rivers Management Plan (Deschutes National Forest 2001; 13-16)	Defines standards and guidelines for recreation and other uses on U.S. Forest Service lands associated with the Big Marsh Creek Little Deschutes River area.
Metolius River Wild and Scenic River Management Plan (Deschutes National Forest 1997; 3, 7)	Establishes strategies for management and protection of the Wild and Scenic River.
Upper Deschutes River Wild and Scenic Rivers and State Scenic Waterway Comprehensive Management Plan (Deschutes National Forest 1996; 30, 32–34, 37–38)	Establishes strategies for management and protection of the Wild and Scenic River and State Scenic Waterway.
Whychus Creek Wild and Scenic River Management Plan (Deschutes National Forest 2010; 35)	Establishes strategies for management and protection of the Wild and Scenic River.
Ochoco National Forest Land and Resource Management Plan (Ochoco National Forest 1989; 4-180, 4-182, 4-194, 4-241)	Identifies protections for Dispersed Recreation (MA-F14), Riparian (MA-F15), General Forest Winter Range (MA-F21), and General Forest (MA-F22), in addition to forest-wide protections for scenery management.
State	
Oregon Scenic Waterways Act (ORS §§ 390.805–390.940, State of Oregon 2018a, 2018b)	Designates state scenic rivers that are free-flowing, provide scenic quality as viewed from the river, and offer sustainable natural and recreational resources.

Law, Regulation, or Program	Description
Oregon Scenic Byways and Bikeways (Oregon Tourism Commission and Oregon Department of Transportation 2018)	Designates scenic byways and bikeways that meet key criteria.
Regional/Local	
Integrated Resources Management Plan for the Forested Area and Rangelands, IRMP2012 (Confederated Tribes of the Warm Springs Reservation of Oregon, Branch of Natural Resources 2011; 35, 69, 71-72, 125, 145)	Establishes roads with visual corridors and designated travel ways and provides goals and objectives for managing natural resources along visual corridors to maintain, protect, enhance, or restore the visual quality along the routes. Promotes the development and maintenance of an inventory based on a visual quality index for areas most frequented by tribal members.
Comprehensive Plans for Crook, Deschutes, Jefferson, Klamath, Sherman, and Wasco Counties and for the Cities of Maupin, Madras, Sisters, Redmond, Bend, La Pine, Prineville	Provide goals and objectives for aesthetics and visual resources and other uses on unincorporated private lands within the planning area.

MA = management area

Recreation

Law, Regulation, or Program	Description
Federal	
National Wild and Scenic Rivers Act (16 U.S.C. §§ 1271–1287)	Established in 1968 to balance development with preservation of rivers possessing outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, in free-flowing condition, and to protect their immediate environments for the benefit and enjoyment of present and future generations.
Upper Deschutes Wild and Scenic River Management Plan, Record of Decision and Final Environmental Impact Statement (U.S. Forest Service 1996)	Defines standards and guidelines for recreation and other uses on U.S. Forest Service lands associated with the Upper Deschutes River Wild and Scenic River area.
Upper Deschutes Resource Management Plan (Bureau of Land Management 2005)	Provides management direction and guides future actions on lands administered by the Bureau of Land Management.
Lower Deschutes River Management Plan, Record of Decision (Bureau of Land Management 1993)	Provides management direction and guides future actions on lands administered by the Bureau of Land Management.
Supplement to the Lower Deschutes River Management Plan, Lower Deschutes River Allocation System, Final Decision (Bureau of Land Management 1997)	Provides updated management direction and guides future actions on lands administered by the Bureau of Land Management.

Law, Regulation, or Program	Description
Lower Crooked River, Chimney Rock Segment, Middle Deschutes/Lower Crooked Wild and Scenic Rivers' Management Plan (Bureau of Land Management 1992)	Provides management direction and guides future actions on lands administered by the Bureau of Land Management.
Whychus Creek Wild and Scenic River Management Plan (U.S. Forest Service 2010)	Defines desired future conditions, consistent and inconsistent uses, and standards and guidelines for management of Whychus Creek Wild and Scenic River (formerly Squaw Creek).
Big Marsh Creek Little Deschutes River Wild and Scenic Rivers Management Plan (U.S. Forest Service 2001)	Defines standards and guidelines for recreation and other uses on U.S. Forest Service lands associated with the Big Marsh Creek Little Deschutes River area.
Shoreline Management Plan, Pelton Round Butte Project, FERC Project Number 2030 (Portland General Electric Company and the Confederated Tribes of the Warm Springs Reservation of Oregon 2011)	Guides new development and resource protection on the shorelines of Lake Billy Chinook and Lake Simtustus to achieve a balance of the interests of the Licensees and private and commercial property owners and recreational users, while allowing the Licensees to efficiently manage the Project's power generating facilities and fulfill the Project purposes.
Prineville Reservoir Resource Management Plan (Bureau of Reclamation 2003)	Provides management direction and guides future actions for Prineville Reservoir.
Forest Plan: Deschutes National Forest (U.S. Forest Service 1990)	Provides national forest–wide and area-specific standards and guidelines for recreation and other uses of U.S. Forest Service lands.
State	
Oregon Scenic Waterways Act (ORS 390.805–390.925)	Established in 1970 and specifies that all fill and removal in a State Scenic Waterway requires an individual removal-fill permit from the Department of State Lands. Protects free-flowing character of designated rivers, protects and enhances scenic and natural values, and promotes expansion of the scenic waterways system.
Regional/Local	
Comprehensive Plans for Crook, Deschutes, Jefferson, Klamath, Sherman, and Wasco Counties	Provide goals and objectives for recreation and other uses on unincorporated private lands within the planning area.

Tribal Resources

Law, Regulation, or Program	Description
Federal	
Treaty with the Tribes of Middle Oregon (1855)	Treaty with Confederated Tribes of Warm Springs; establishes the reservation and ceded lands. Reserve fishing, hunting, gathering roots and berries, and pasturing their stock in ceded lands and usual and accustomed stations on unclaimed lands.
The Klamath Tribes Treaty of 1864	Set aside reservation land and reserved fishing, gathering, and hunting for the Klamath Tribes on reservation lands.
United States v. Winans, 198 U.S. 371 (1905)	U.S. Supreme Court held that the Treaty with the Yakama of 1855, and similar treaties, protects tribal access rights to fishing, hunting, and other privileges on off-reservation lands.
United States v. Oregon, 302 F. Supp. 899 (D. Or. 1969) "Sohappy v. Smith"	Ongoing federal court case that protects and implements the reserved fishing rights of Columbia River treaty tribes. The federal court continues to oversee the management of the Columbia River through the United States v. Oregon proceedings. Fisheries in the Columbia River and its tributaries are co-managed by the states of Washington, Oregon, and Idaho as well as four treaty tribes, Warm Springs, Yakama, Umatilla and Nez Perce tribes.
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.)	NMFS is responsible for managing, conserving, and protecting ESA-listed marine and anadromous species. All state fisheries are subject to review by NOAA Fisheries.
United States v. Washington, 384 F. Supp. 312 (W.D. Wash. 1974) "Boldt Decision"	Federal district court interpreted the rights of treaty tribes to take fish in their "usual and accustomed places in common with all citizens" to mean that treaty tribes have a treaty-reserved right to harvest 50% of the harvestable portion of fish.
Executive Order 12875; Enhancing the Intergovernmental Partnership (1993)	Establish regular and meaningful consultation and collaboration with state, local, and tribal governments.
Secretarial Order 3206 (1997)	Clarifies the responsibilities of the Department of the Interior and Department of Commerce to ensure that Indian tribes do not bear a disproportionate burden for the conservation of listed species.
Confederated Tribes of The Warm Springs Reservation Water Rights Settlement Agreement (1997)	The Confederated Tribes of the Warm Springs Reservation entered into a water rights settlement agreement with the State of Oregon and U.S. government on November 17, 1997. Settles the tribes water rights boarding the reservation and on reservation.
Executive Order 13175; Consultation and Coordination with Indian Tribal Governments (2000)	Establishes regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications.
Commerce Department Administrative Order (DAO 218-8) (2012)	Implements Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, and describes the actions to be followed by the Department of Commerce concerning tribal self-government, trust resources, treaty, and other rights.

Law, Regulation, or Program	Description
Secretarial Order 3317 (2011)	Update, expand, and clarify Department of Interior policies on consultation with tribes and provisions for conducting consultation in compliance with EO 13175.
Secretarial Order 3335 (2014)	Reaffirmation of the Federal Trust Responsibility to Federally Recognized Indian Tribes and Individual Indian Beneficiaries.
National Historic Preservation Act Section 106, 36 CFR Part 800	Requires federal agencies to take into account the effects of their undertakings on historic properties and to provide the ACHP with a reasonable opportunity to comment. Federal agencies are required to consult on the Section 106 process with SHPOs, THPOs, Indian Tribes to include Alaska Natives, and NHOs.
State	
Executive Order EO-96-30; State/Tribal Government to Government relations	Establish formal government-to-government relationships between Oregon's Indian tribes and Oregon State is to establish a process which can assist in resolving potential conflicts, maximize key intergovernmental relations and enhance an exchange of ideas and resources.
Relationship of State Agencies with Indian Tribes, ORS 182.162 to 182.168	Oregon state agencies to develop and implement policy on relationship with tribes; cooperation with tribes.
Regional/Local	
Confederated Tribes of Warm Springs Integrated Resources Management Plan	A management plan to provide management direction for the protection and/or restoration of natural resources within forested areas and rangeland of the reservation. The *Integrated Resources Management Plan* includes goals, objectives, standards and best management practices relating to water, fish, wildlife, and other resource topics.
Confederated Tribes of Warm Springs Tribal Water Code (Ordinance 80)	Ordinance 80 implements provisions of the Warm Springs Water Management plan. Sets water quality standards, identifies beneficial uses and water treatment criteria for Warm Springs Reservation water resources.
Confederated Tribes of Warm Springs Tribal Code Chapter 401—Wild and Scenic Rivers Act	Tribal Code which designates the Deschutes River and adjacent land as a component of the Warm Springs Wild and Scenic Rivers System and establishes river-protected areas, off-reservation rights and interests, forest and range management guidelines, and Tribal responsibilities.

ACHP = Advisory Council on Historic Preservation; EO = Executive Order; ESA = Endangered Species Act; NHA = Native Hawaiian Organization; NMFS = National marine Fisheries Service; ORS = Oregon Revised Statute; SHPO = state historic preservation office; THPO = tribal historic preservation office

Socioeconomics and Environmental Justice

Law, Regulation, or Program	Description
Federal	
Executive Order 12898	Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to identify and address the disproportionately high and adverse environmental effects (including human health, economic, and social effects) of their actions on minority and low income populations. The order promotes access for minority and low-income communities to public information and public participation.
State	
Oregon Environmental Justice Task Force	The Oregon Environmental Justice Task Force was created by the Legislature in 2007 (Senate Bill 420) to help protect Oregonians from disproportionate environmental impacts on minority and low-income populations. The task force encourages state agencies to give all people knowledge and access to improve decisions that affect environment and the health of all Oregonians.

Cultural Resources

Law, Regulation, or Program	Description
Federal	
36 CFR 800	Implementing regulations of Section 106 of the National Historic Preservation Act.
National Historic Preservation Act	Legislation requiring consideration of cultural resources where projects include federal money, permitting, or land. The National Historic Preservation Act outlines a process for consideration that includes consultation, identification, evaluation, and mitigation of adverse effects of projects on significant cultural resources.
National Environmental Policy Act	Legislation requiring environmental review of projects with federal involvement. Environmental review includes consideration of cultural resources although no process for such consideration is outlined in NEPA.
State	
ORS 358.653	Oregon state legislation requiring consideration of project impacts on cultural resources including consultation with the state historic preservation office. This law is superseded by Section 106 if a project has a federal nexus.
Oregon’s Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces	To protect natural resources and conserve scenic and historic areas and open spaces.

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Water Resources

None

Water Quality

None

Biological Resources

None

Land Use and Agricultural Resources

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Tribal Resources

None

Socioeconomics and Environmental Justice

None

Cultural Resources

None

Appendix 3.1-B

RiverWare Model Technical Memorandum

Technical Memorandum

Hydrologic Evaluation of Alternatives for the Deschutes Basin Habitat Conservation Plan

Deschutes Project, Oregon
Columbia Pacific Northwest Region

U.S. Department of the Interior September 2020

Mission Statements

The Department of the Interior conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Acronyms and Abbreviations

Acronym or Abbreviation	Definition
AF	acre-feet
AID	Arnold Irrigation District
cfs	cubic feet per second
COID	Central Oregon Irrigation District
DRC	Deschutes River Conservancy
DBHCP	Deschutes Basin Habitat Conservation Plan
EIS	Environmental Impact Statement
LPID	Lone Pine Irrigation District
MWRV	Minimum Winter Release Volume
NCAO	North Canal (part of COID)
NEPA	National Environmental Policy Act
NUID	North Unit Irrigation District
OID	Ochoco Irrigation District
OSF	Oregon Spotted Frog
SID	Swalley Irrigation District
TID	Tumalo Irrigation District
TSID	Three Sisters Irrigation District
OWRD	Oregon Water Resources Department
Reclamation	Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service

Preface

The Draft Environmental Impact Statement (EIS) relied on model assumptions and results published in a technical memorandum published in August 2019. This preface describes changes that were made to the model assumptions between the Draft EIS and the Final EIS based on public comment; the table also indicates the sections in this report where details about the new assumptions can be found.

Location	Alternative	Assumption Change	Section
Wickiup	All	Change to minimum flow calculation so that minimums are set based on Wickiup storage triggers rather than equation used in DEIS.	2.2.2 3.2.2
Wickiup	Alternative 2	A maximum flow rate was set for irrigation season outflow.	3.2.2
Wickiup	Alternative 2	Limitations were placed on the rate of outflow change in April and September.	3.2.2
Crescent	Alternative 2	Minimum outflow set to 10 cfs and a volume of water was reserved and used to augment spring outflows and reduce the rate of decrease in the fall.	3.2.3
Crescent	All	The 1911 storage right was allowed to fill a new 35,000 acre-feet each year rather than counting existing storage toward that right.	2.2.3
NUID	All	Added planned Central Oregon Irrigation District (COID) conservation where 29.4 cfs diverted under COID's existing water rights will be diverted at the Pilot Butte canal and delivered to North Unit Canal via pipeline. North Unit Irrigation District's (NUID's) diversion is reduced by 29.4 cfs.	2.4
NUID	All	Daily Wickiup storage demand request was adjusted to reflect real time operations. Demand request was reduced based on April 1 storage in Wickiup.	2.4
Prineville	No Action, Alternative 2, and Alternative 3	Summer outflows from the uncontracted account were capped at 50 cfs.	2.3 3.3
Prineville	Alternative 4	Summer outflows from the uncontracted account were capped at 80 cfs.	3.4
All	All	Dataset extended to include inflows through September 30, 2018.	2.0

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1. Introduction

The Bureau of Reclamation (Reclamation) is cooperating with the U.S. Fish and Wildlife Service (USFWS) on the Environmental Impact Statement (EIS) for the Deschutes Basin Habitat Conservation Plan (DBHCP) on the Deschutes River in central Oregon. As part of that study, Reclamation used a RiverWare model of the river, distribution, and reservoir system to simulate the alternatives for the EIS. This technical memorandum documents the model representation of the alternatives and summarizes a selection of the results.

2. Reference RiverWare Model

The water resources modeling for the DBHCP EIS was conducted using a daily time-step RiverWare (Zagona et al. 2001) model of the Deschutes Basin above the Pelton Round Butte reservoir complex. A short summary of the model is presented here. The model development is described in-depth in a separate document (Reclamation 2017a).

Unregulated hydrology is input to the model and represents river flows, stream gains (springs or small tributaries), and losses without reservoir operations or diversions. The model then applies rules to operate the system with different configurations of logic and instream and consumptive demands. The unregulated hydrology is mean daily flows from water years 1981 to 2018 (October 1980 through September 2018). Additional Reclamation reports (Reclamation 2017c and 2020) document how these data were developed.

The RiverWare model represents the Upper Deschutes River (excluding Crescent Creek, Little Deschutes River, Tumalo Creek, Whychus Creek, Crooked River, and Ochoco Creek). Figure 1 shows a map of the Deschutes River and Crooked River basins, along with the included tributaries.

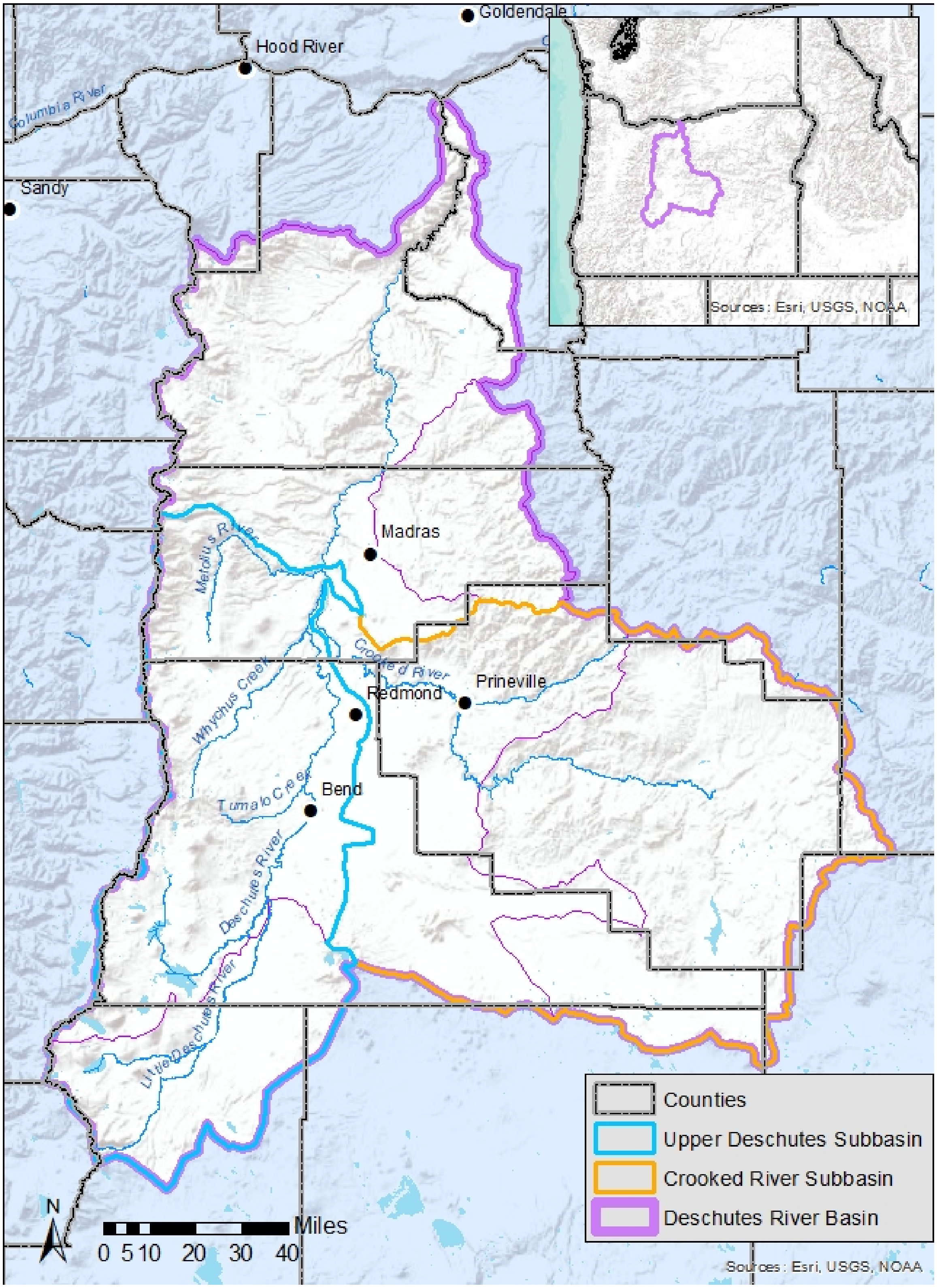


Figure 1. Deschutes River and Crooked River basins

RiverWare is a general rules-based modeling platform that requires full definition of the physical layout of a river system and logic to define operation of the system. The model is constructed using RiverWare objects that define reservoirs, diversions, river reaches, control points (which monitor instream flow locations), and river gages. Figure 2 and Figure 3 diagram the layout of the RiverWare model for the Upper Deschutes and the Crooked River subbasins, respectively. The red circles indicate water users (representing diversions) and are labeled with the acronym for the irrigation district or other water user group that they serve. The yellow boxes indicate stream gages and are named with their four-letter acronym from the Hydromet program (https://www.usbr.gov/pn/hydromet/), with the exception of the Highway 126 gage on the Crooked River. The green triangles represent locations where gains and losses are input into the model. The blue diamonds represent control points (i.e., locations where flow is monitored in the model to ensure minimum flow criteria are maintained). While the model itself has more detail than these schematics, the figures illustrate the most relevant features of the model.

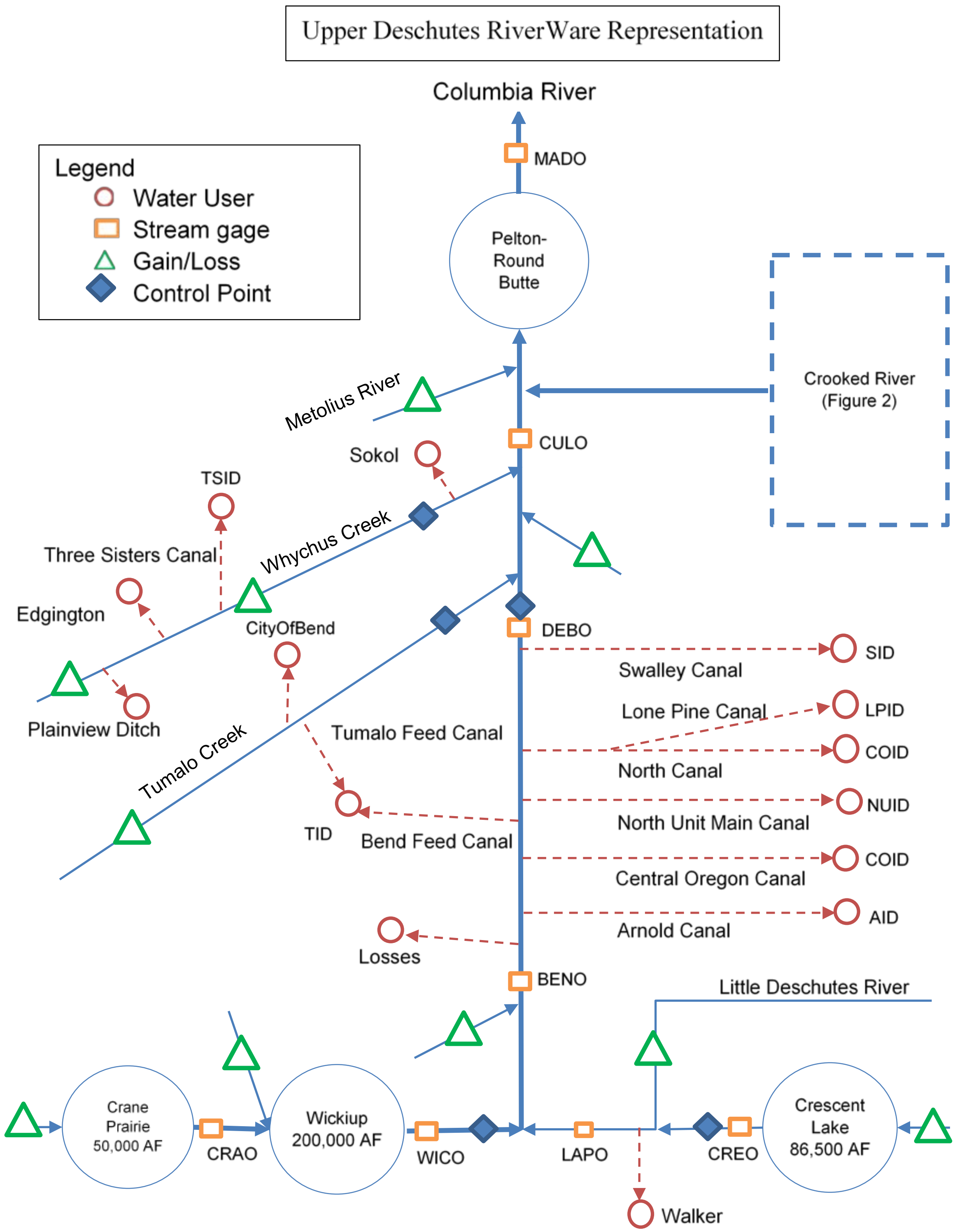


Figure 2. Schematic of RiverWare representation of Upper Deschutes River

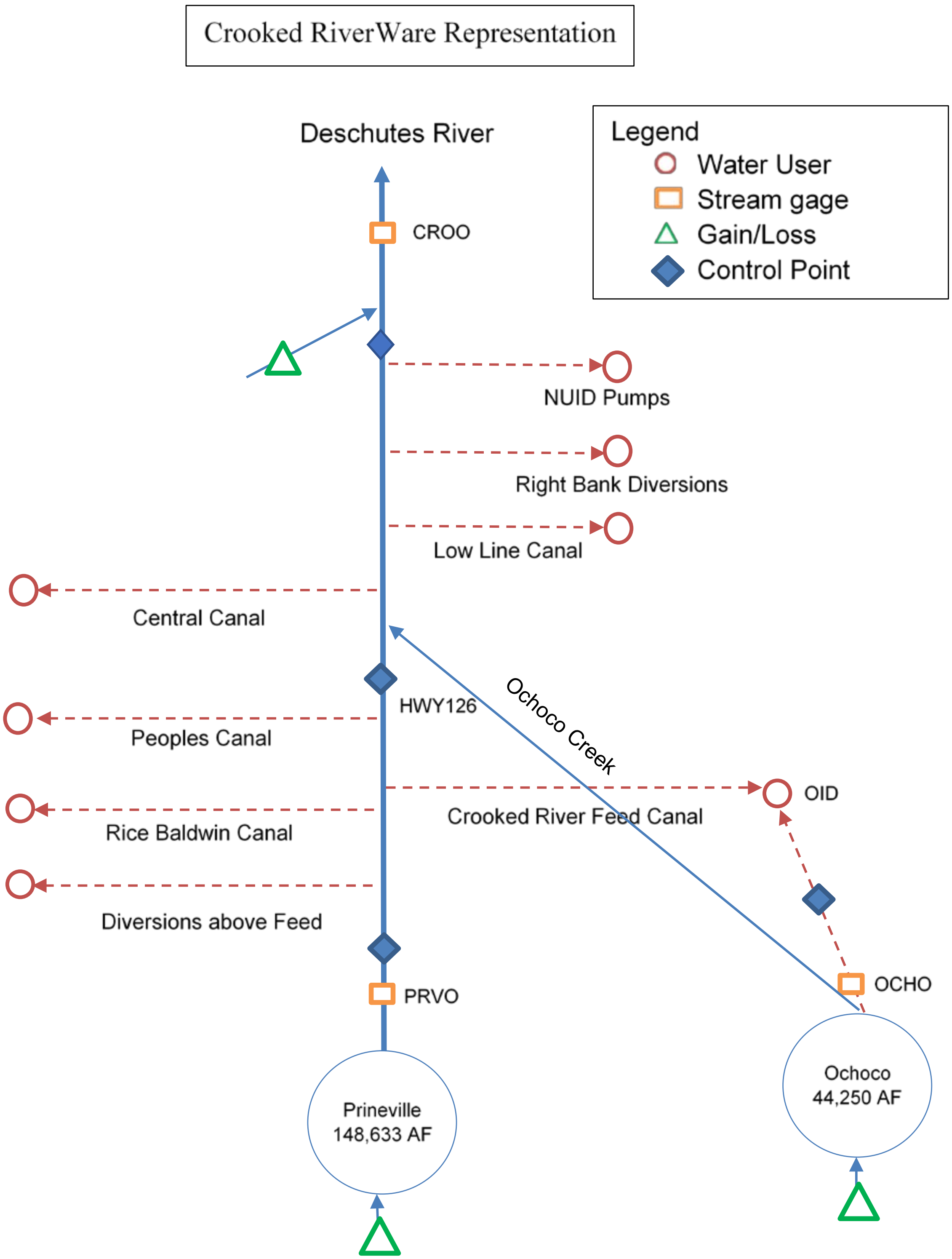


Figure 3. Schematic of RiverWare representation of Crooked River

Operating rule logic was first developed to simulate historical operations from 1984 through 2009[1], the years in which measured data could be compared to model output to ensure proper operation. The model used water rights, diversion patterns, and inflow hydrology representative of the time period. Detailed information about the inputs and calibration quality is described in Reclamation 2017a. The operating logic was then updated to incorporate recent changes in the basin, including the Oregon Spotted Frog (OSF) Biological Assessment (Reclamation 2017b) and the Crooked River Collaborative Water Security and Jobs Act of 2014. The details of those operations are described in Section 2.2 and Section 2.3.

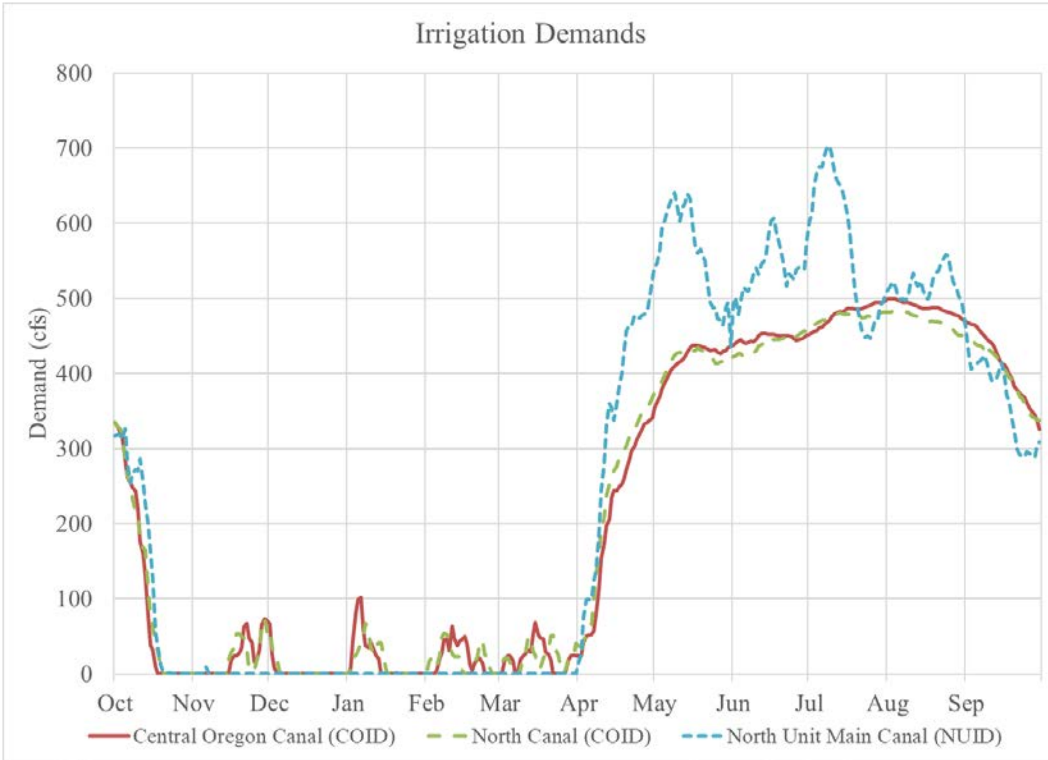
It is important to recognize that there are many assumptions and simplifications that are required when developing a model. The data and operating logic attempt to simulate realistic conditions and water management as closely as possible, but it is likely there will be some operations that are handled differently in real time. The operations described in this report are relatively new and are still undergoing changes as real-time experience informs operations.

Some of the operations described in this report were developed based on the best available information and assumptions about how they would be implemented in real time. It is possible that these will be adaptively changed through time within the constraints of the National Environmental Policy Act (NEPA).

2.1. Irrigation Demand Pattern

For scenario-based studies, it is common to develop a version of the model that simulates current conditions (baseline model). This model is meant to indicate the response of a system, using the current operation definition, to historical inflow hydrology. For the baseline model, diversions were changed from the historical daily time series (that varies from year to year) to a single daily pattern that repeats annually (representing average irrigation diversions calculated from measured data for recent years). By using a single year pattern for diversion, the effects of management changes can be examined more easily because they are not combined with the effects of changing demands. Figure 4 shows the daily diversion pattern that is repeated every year for the model simulation period for the eight DBHCP applicant irrigation districts. Table 1 shows the year ranges and total average annual volume for each district.

[1] Measured data were available for most locations in the basin starting in 1984. Model development began shortly after 2010, so 2009 was used as the end year for calibration.



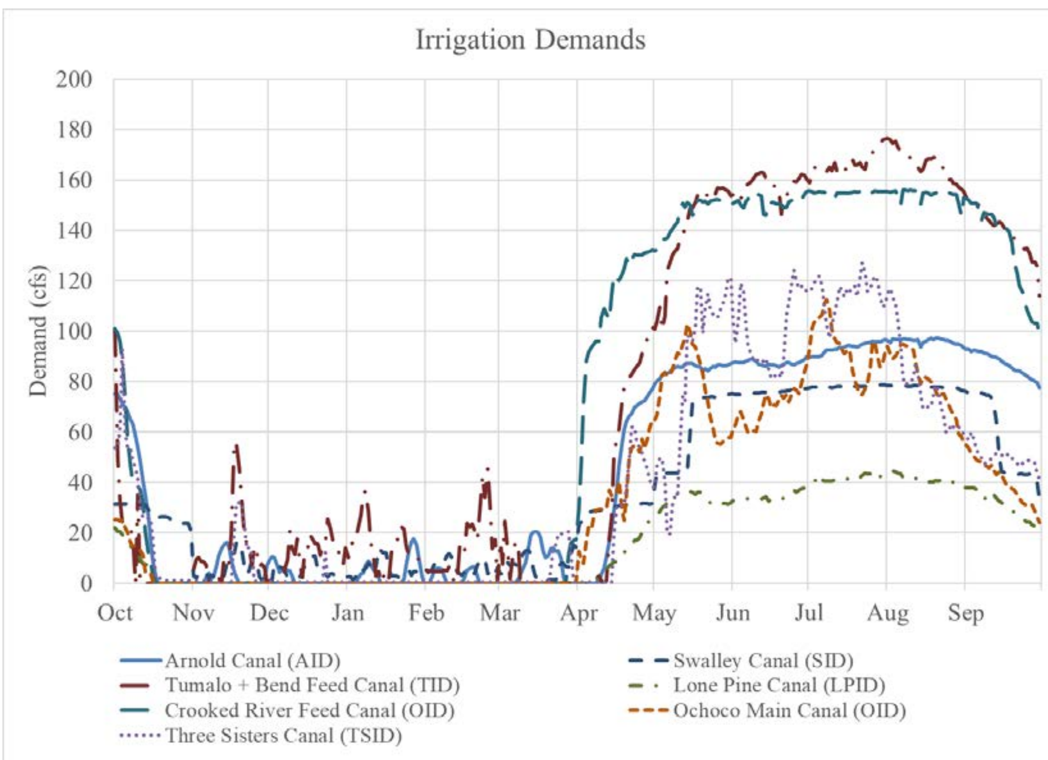


Figure 4. Daily diversion pattern that is repeated for every year in the model simulations; the top plot is for larger diversions for COID and NUID and the bottom plot is for smaller diversions for remaining districts

Table 1. Total annual demand used in modeling and years used to calculate demand[2]

District*	Years Used in Average	Total Annual Demand (acre-feet)
AID	2010-2017	32,266
COID	2010-2017	303,703
LPID	2010-2017	16,017
NUID	2010-2017	196,788
OID	2010-2017	77,824
SID	2013-2017	26,372
TSID	2011-2016, with manual adjustments for recent operational changes outside the irrigation season	35,004
TID	2009, 2010, 2011, 2013, 2014	53,517

*AID = Arnold Irrigation District; COID = Central Oregon Irrigation District; LPID = Lone Pine Irrigation District; NUID = North Unit Irrigation District; OID = Ochoco Irrigation District; SID = Swalley Irrigation District; TSID = Three Sisters Irrigation District; TID = Tumalo Irrigation District.

2.2. Baseline Upper Deschutes River Operation

Baseline operating rules for the Upper Deschutes River reflect the operating criteria in the Oregon Spotted Frog Biological Assessment (Reclamation 2017b). Generally, the operation is intended to minimize elevation changes in Crane Prairie Reservoir and set a minimum outflow from Wickiup Reservoir. In addition, winter outflows from Crane Prairie Reservoir, Wickiup Reservoir, and Crescent Lake were all larger than historical releases to enhance habitat conditions in the downgradient stream network.

2.2.1. Crane Prairie Reservoir

Crane Prairie Reservoir is operated to minimize elevation changes throughout the year to maximize habitat for the OSF. The reservoir is operated between 35,000 acre-feet and 50,000 acre-feet. In the model, this is accomplished by including a storage account that is dedicated to the OSF with a senior priority date of August 30, 1899, which is one day earlier than the most senior water right on the system (Swalley). This approach ensures that the highest priority in the model is to maintain 35,000 acre-feet of storage in Crane Prairie Reservoir. Three other storage accounts represent 5,000 acre-feet of storage

[2] The total demand for COID was slightly larger in the modeling because the LPID diversion was not subtracted from the NCAO [North Canal (part of COID)] diversion. This will be updated in later versions.

each for Arnold Irrigation District (AID), Central Oregon Irrigation District (COID), and Lone Pine Irrigation District (LPID).

Because of the senior priority date of the OSF account (35,000 acre-feet), it is kept full unless evaporation or seepage reduce its volume and the reduction cannot be made up with inflows. The 15,000 acre-foot operating range is used to meet seasonal OSF habitat and irrigation needs according to the schedule outlined below.

- January 1 to March 15: Crane Prairie Reservoir begins to store water, if available, until the reservoir reaches 45,000 acre-feet.
- March 16 to May 1: Crane Prairie Reservoir passes inflow to hold the storage volume achieved on March 15. Ideally, this volume would be 45,000 acre-feet.
- May 2 to May 15: Crane Prairie Reservoir stores water up to 1.1 feet above the elevation achieved on March 15. Ideally, this volume would be 50,000 acre-feet.
- May 16 to July 15: Crane Prairie Reservoir passes inflow to hold the storage volume achieved on May 15.
- July 15 to October 1: Crane Prairie Reservoir releases water in the irrigation district's accounts to reduce the reservoir back down to 35,000 acre-feet.
- October 2 to December 30: Crane Prairie Reservoir passes inflow to maintain 35,000 acre-feet.

Outflows from Crane Prairie Reservoir are generally managed to release a maximum of 400 cubic feet per second (cfs) throughout the year. The minimum release varies depending on the time of the year, with 100 cfs released from December 1 through August 30 and 75 cfs released the remainder of the year. These flow criteria are considered less important than reaching and maintaining the elevations in Crane Prairie Reservoir. Therefore, there are times when the minimum outflow is allowed to decrease down to a minimum of 30 cfs in support of the higher priority criteria. Outflows are allowed to increase above 400 cfs when there is an elevation restriction and inflows exceed 400 cfs minus seepage.

Although the location and timing of returns from Crane Prairie Reservoir seepage is not fully understood, it is generally believed that seepage losses return to the stream network upstream of Wickiup Reservoir. This is based on physical observations and geological knowledge of the area, including: (1) the proximity of a major groundwater discharge area (approximately 300 cfs to Sheep Springs), (2) the change in the underlying geology to low-permeability sedimentary deposits of the La Pine sub-basin, (3) the location of a fault at Sheep Springs (a likely impediment to groundwater flow), and (4) the groundwater head gradient. All of these point to Wickiup Reservoir (Sheep Springs) being the location of returns from Crane Prairie Reservoir seepage (LaMarche 2018).

For the calibration/historical model, it was assumed that any returns from Crane Prairie Reservoir seepage would be captured in the gains between Crane Prairie Reservoir and Wickiup Reservoir. However, since the seepage is dependent on elevation, it is expected that seepage from the No Action operation would be different than historical. So, the change in potential seepage was calculated by taking historical seepage calculation and subtracting it from a new seepage calculation using the new reservoir elevations. Based on conversations with the Oregon Department of Water Resources, a 3-month lag time was assumed to route the change in seepage back to the reach above Wickiup Reservoir. This addition to the model was done with equations that use the current Crane Prairie Reservoir elevation as input, so any new changes to Crane Prairie Reservoir elevation would adjust the seepage return.

2.2.2. Wickiup Reservoir

Outflows from Wickiup Reservoir are managed to maintain a minimum of 100 cfs between September 16 and March 30. Between March 31 and September 15, a minimum outflow of 600 cfs is used, if possible. Once irrigation releases begin, outflows from Wickiup Reservoir often exceed 600 cfs to meet downstream irrigation demand. If required releases exceed 600 cfs prior to April 30, the outflow is not allowed to decrease more than 30 cfs in a single flow adjustment or cumulatively over the course of multiple flow adjustments. Maximum non-irrigation season outflows are kept below 800 cfs until April 15 unless the reservoir needs to make flood releases.

2.2.3. Crescent Lake

As long as there is enough inflow and stored water, outflows from Crescent Lake are managed to maintain minimum flows of 30 cfs from March 15 through November 30 and 20 cfs from December 1 through March 14. If the reservoir storage drops below 7,000 acre-feet, outflows are reduced to 6 cfs. Crescent Lake has two storage rights, a right for 35,000 acre-feet with a January 1, 1911 priority date and a right for 51,050 acre-feet with a priority date of January 1, 1961. Regardless of the storage in Crescent Lake, it is allowed to accrue a new 35,000 acre-feet each year under the January 1, 1911 priority date, not to exceed to the total storage capacity in the reservoir.

2.3. Crooked River Operation

Operating rules on the Crooked River, particularly at Prineville Reservoir, reflect changes that were made in the Crooked River Collaborative Water Security and Jobs Act of 2014 (also called Crooked River Legislation). Changes are still being made to the operations as real time implications are observed and discussed. As additional experience is gained, the model logic will continue to be refined, but, for the purpose of this study, the logic used is as described below.

Prineville Reservoir has seven storage accounts that fill in priority by the dates shown in Table 2. All of the accounts, except for the uncontracted account, fill in proportion to their space with equal priority. The uncontracted space fills last and is used to augment flows seasonally for fishery purposes as coordinated by USFWS and Reclamation.

Table 2. Prineville Reservoir storage rights from Crooked River legislation

Model Water Right Name	Priority Date	Maximum Storage Volume
CityOfPrineville	4/8/1914	5,100 acre-feet
LowLine	4/8/1914	330 acre-feet
Ochoco	4/8/1914	60,640 acre-feet
Others	4/8/1914	6,527 acre-feet
Peoples	4/8/1914	3,497 acre-feet
RentalNUID	4/8/1914	10,000 acre-feet
Uncontracted	4/9/1914	65,520 acre-feet
Total	--	***151,614 acre-feet***

Releases from the uncontracted account (also known as the fish and wildlife account) are calculated for the irrigation season (April 1 to October 15) and the non-irrigation season (October 16 to March 31) using the storage in the account on April 1. To calculate the irrigation season, the model first reserves a volume of water for the non-irrigation season equal to 50 cfs released each day from October 16 to March 30 or the volume of water in the uncontracted account on April 1, whichever is greater (Minimum Winter Release Volume [MWRV]). The remaining volume is then divided equally among the 365 days and that value is released each day (Irrigation Season Release) with a maximum release of 50 cfs. This approach intentionally reserves water for winter releases.

$$\text{MWRV} = \text{Max}\begin{cases} V * \frac{50\ \text{cfs} * 1.98\ \text{AF/d}}{\text{cfs}} \\ \text{UV} \end{cases}$$ where

MWRV = Minimum Winter Release Volume

V = Number of days between and October 15 current year and April 1 next year

UV = Storage in the uncontracted Account on April 1

$$\text{Irrigation Season Release} = \text{Min}\begin{cases} (\text{UV} - \text{MWRV}^{3})/(365\ \text{d} * \frac{1.98\frac{\text{AF}}{\text{d}}}{\text{cfs}}) \\ 50\ \text{cfs} \end{cases}$$

For the non-irrigation season, the irrigation season release flow rate is added to the minimum winter release flow rate and is released from the uncontracted account.

Non-Irrigation Season Release = Irrigation Season Release + MWRV

[3] This equation is limited to a positive result in the model.

Table 3 shows example irrigation season and non-irrigation season releases from the uncontracted account given April 1 storage volumes in the uncontracted account. These releases are added to irrigation season storage releases, runoff season flood releases, and other minimum flow requirements described below.

Table 3. Calculated irrigation and non-irrigation season releases based on April 1 uncontracted volume in Prineville Reservoir

Total Storage Prineville Reservoir (acre-feet)	Uncontracted Volume April 1 (acre-feet)	Irrigation Season Release (cfs)	Non-irrigation Season Release (cfs)
148,633	62,520	50	113
118,000	36,987	21	71
88,000	6,987	0	6
78,000	0	0	0

Other minimum releases include a 10 cfs release maintained from Bowman Dam and a 7 cfs release from the City of Prineville mitigation account. These releases are executed in the model using the following logic described below.

If releases from Bowman Dam are less than 10 cfs, then:

1. The first 7 cfs will be released from the City of Prineville mitigation account, if available. If the City of Prineville mitigation account did not fill, the release will be the amount of storage in the account on April 1 divided by 365 days.
2. The remainder will be made up with water from the uncontracted/fish and wildlife account.
3. If the uncontracted/fish and wildlife account is empty, the remainder will be made up with live flow.
4. If there is insufficient live flow, the remainder will be made up with stored water from the first fill accounts in proportion to their storage.

2.4. Special Diversion Operations

TID, OID, and NUID divert water from multiple streams to satisfy demand for their districts. All three of these diversions require unique model constructs and rules to ensure the correct amount of water is diverted from the appropriate tributary.

TID diverts water from Tumalo Creek and supplements with water from Crescent Lake via the Upper Deschutes. It also has a live flow of 9.5 cfs directly from the Deschutes. TID first tries to satisfy its demand using natural flow rights, the majority of which are on Tumalo Creek. If there is still shortage, TID will request stored water from Crescent Lake via the Upper Deschutes.

OID diverts from both the Crooked River and Ochoco Creek and first tries to satisfy the demand based on recent historical diversion rates from each tributary, Crooked River and Ochoco Creek, using both natural flow and stored water rights. If there is still a shortage, OID will divert additional water from Prineville Reservoir.

NUID diverts water from both the Upper Deschutes River and the Crooked River. On the Upper Deschutes, NUID can divert water under its 1913 live flow water right and can request stored water from Wickiup Reservoir. On the Crooked River, it can divert under its 1955 live flow right and request rental water from Prineville Reservoir [4]. When the model is running, it will first try to satisfy the total demand for the district using historical diversion rates for each tributary. If it is a year when Wickiup did not fill, the initial request from the Upper Deschutes at the North Unit Main Canal [NUID.divReq] is reduced from its historical daily average [NUID.divReqHistAvg] using an equation that scales the demand to storage in Wickiup [Wic.Storage] on April 1. 20,000 acre-feet is added to the numerator to estimate the diversions from live flow. This equation is intended to replicate the behavior of NUID demand in drier years.

$$NUID.divReq = NUID.divReqHistAvg * \frac{Wic.Storage[April\ 1, current\ year] + 20{,}000\ AF}{150{,}000\ AF}$$

If there are shortages when compared to the NUID.divReqHistAvg, additional water will be diverted from the Crooked River to satisfy the demand limited by the pump capacity, the amount of water in the rental account on Prineville Reservoir, and the requirement to leave live flow instream per an agreement between Deschutes River Conservancy and NUID (called the DRC agreement [OWRD 2013]). This agreement, signed in 2013, requires that NUID allow flow to bypass its pumps; however, NUID is not required to release stored water to meet this minimum flow requirement. The amount of flow varies depending on water year conditions and month (Table 4). A dry year is defined if the storage in Prineville Reservoir is less than 135,000 acre-feet after March 30, or if the outflow from the reservoir is less than 75 cfs for the previous 30 days.

Lastly, a conservation option was implemented in the model where COID will line a portion of their canal and transfer the savings (approximately 29.4 cfs or 9,388 acre-feet, annually) during the irrigation seasons from the North Canal (also sometimes referred to as the Pilot Butte Canal) to the North Unit Main Canal via a pipeline. When the model is running, the North Canal diversion request remains the same and the first 29.4 cfs diverted is transferred to satisfy NUID's total diversion request. NUID's diversion request is reduced by 29.4 cfs since they will be getting that water via the pipeline rather than from the river.

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[4] NUID also has a 1968 priority water right that it does exercise in some years. However, the maximum diversion rate for the 1955 water right is 200 cfs, which is the maximum physical pump capacity. For simplicity, the model only simulates the 1955 right since there is no case when the other right would be used for the purposes of this model.

Table 4. Deschutes River Conservancy bypass flows for dry and non-dry years[5]

Month	Dry Year (flow in cfs)	Non-Dry Year (flow in cfs)
Jan	0	0
Feb	0	0
Mar	0	0
Apr	120.617	181.417
May	50	95.598
Jun	54.381	86.081
Jul	51.451	61.451
Aug	56.846	68.146
Sep	57.599	114.219
Oct	121.874	151.574
Nov	0	0
Dec	0	0

3. Scenario Descriptions

The RiverWare model assumptions were adjusted for each of the four alternatives evaluated for the DBHCP EIS.

3.1. Alternative 1: No Action

The No Action model is the baseline model described in Section 2. No additional changes were made to the model for the No Action alternative.

[5] For May in dry years, the agreement allowed flows to drop to 43.798 cfs. Negotiations between NUID and FWS have made 50 cfs the minimum flow past the pumps. This was modeled in No Action and the Alternatives, though it is not a required action in No Action. This resulted in similar shortages to NUID in No Action and Alternative 2A; in reality, the shortages in No Action would be lower.

3.2. Alternative 2 (Preferred): Districts' DBHCP Proposal

The Alternative 2 model includes the assumptions defined in the Districts' DBHCP proposal. Alternative 2 starts with all of the assumptions in Alternative 1 and then adds to them. The primary changes include changes to Crane Prairie, Wickiup, Crescent, and Crooked River operations. Three versions of this alternative were run to simulate implementation through time: Alternative 2A represents the first 7 years of implementation, Alternative 2B represents years 8 through 12, and Alternative 2C represents years 13 through 30.

3.2.1. Crane Prairie Reservoir

Crane Prairie Reservoir is operated to minimize elevation changes throughout the year to maximize habitat for the OSF and the operations are the same for all three implementation phases. The reservoir is operated between 38,000 acre-feet and 48,000 acre-feet, which is different from the No Action operating range of 35,000 to 50,000 acre-feet. In the model, this is accomplished by including a storage account that is dedicated to the OSF with a senior priority date of August 30, 1899; this date is one day earlier than the most senior water right on the Deschutes River downstream of Crane Prairie Reservoir, which belongs to Swalley Irrigation District. This ensures that the highest priority in the model is to maintain 38,000 acre-feet of storage in Crane Prairie. Three other storage accounts represent 10,000 acre-feet of storage for AID (3,500 acre-feet), COID (3,000 acre-feet), and LPID (3,500 acre-feet)[6].

Due to the senior priority date of the OSF account, it is kept full unless evaporation or seepage reduce its volume and it cannot be made up with inflows. The 10,000 acre-feet of active storage that results from operation of the reservoir for OWF is utilized as summarized below.

- November 1 to March 14: Crane Prairie Reservoir begins to store water, if available, until the reservoir reaches 48,000 acre-feet.
- March 15 to July 15: Crane Prairie Reservoir passes inflow to hold the storage volume achieved on March 15. Ideally, this volume would be between 46,800 and 48,000 acre-feet.
- July 16 to July 31: Crane Prairie Reservoir storage is reduced at a maximum rate of 225 acre-feet per day.
- July 31 to October 31: Crane Prairie Reservoir storage is reduced at a maximum rate of 450 acre-feet per day until storage in Crane Prairie is 38,000 acre-feet, then 38,000 acre-feet is maintained until November 1.

Outflows from Crane Prairie Reservoir are generally managed to maintain a minimum release of 75 cfs, if possible. If flows cannot be maintained at 75 cfs, the model will allow flows to drop to a minimum of 30 cfs.

[6] The distribution of the accounts is still being negotiated; these were the distributions used for modeling purposes.

3.2.2. Wickiup Reservoir

Minimum outflow requirements will change as Alternative 2 is implemented through time. Outflows from Wickiup Reservoir are managed to maintain a minimum between September 16 and March 30 as shown in Table 5. Between March 30 and September 15, a minimum outflow of 600 cfs is used, if possible. Once irrigation releases begin, outflows from Wickiup Reservoir often exceed 600 cfs to meet downstream irrigation demand. If required releases exceed 600 cfs prior to April 30, the outflows cannot subsequently decrease more than 30 cfs in a single flow adjustment or cumulatively over the course of multiple flow adjustments. Maximum non-irrigation season outflows are kept below 800 cfs until April 15 unless the reservoir needs to make flood releases. Maximum irrigation season outflows are shown in Table 5; these outflow limitations are applied just to the outflow, not the downstream demand request. NUID, being the junior user on the system and the primary user of Wickiup outflow, is therefore the most affected by this outflow reduction.

Table 5. Non-irrigation season minimum and irrigation season maximum Wickiup outflows based on implementation years

Alternative	Implementation Years	Non-Irrigation Season Minimum	Irrigation Season Maximum
2A	First 7 years	100 cfs	Amount needed to satisfy downstream demand (as much as 1,800 cfs)
2B	Years 8 through 12	300 cfs	1,400 cfs
2C	Years 13 to 30	400 cfs and will increase to 500 cfs if Wickiup has more than 100,000 acre-feet on November 1 each year.	1,200 cfs

3.2.3. Crescent Lake

TID is setting aside a volume of water in Crescent Lake to be used for minimum flows as they reduce demand through conservation in their district. They intend to increase the size of the volume and the minimum outflows through time as they implement conservation. The timing of their implementation is not exactly aligned with the year ranges defined in Alternatives 2A, 2B, and 2C, so an approximation of the volumes and minimum flows was used in the model (Table 6). The volumes are determined based on April 1 storage in Crescent Lake and (like Wickiup) the volumes and minimum outflow will change through time as Alternative 2 is implemented. Crescent Lake is operated to ensure minimum outflows as shown in Table 6. The minimum outflows from Crescent Lake are lower than for No Action because it was determined that it was more important to shape the outflows at critical times of the year for the species than to maintain a higher flow throughout the winter storage season.

Table 6. Non-irrigation season minimum outflows from Crescent for each alternative version

Alternative	Non-Irrigation Season Minimum	Volume Reserved for Minimum Flows based on Crescent Storage on April 1		
		Crescent below 45,000 acre-feet on April 1	Crescent between 45,000 and 75,000 acre-feet on April 1	Crescent above 75,000 acre-feet on April 1
2A	10 cfs	5,264 acre-feet	7,264 acre-feet	8,764 acre-feet
2B	10 cfs	6,464 acre-feet	8,464 acre-feet	9,964 acre-feet
2C	12 cfs	8,864 acre-feet	10,864 acre-feet	12,364 acre-feet

In real time, a portion of this reserved volume will be used to provide a buffer during the fall when irrigation deliveries are turning off and to augment flows in the spring. Both of these operations will be managed in real time based on weather and flow conditions in critical habitat locations and may result in different flows. In order to understand how this operation might work, the model simulates a fall reduction in flows starting on October 1 and a spring increase in flows starting on April 20. It should be noted that typical irrigation season releases start around July 1; however, flows were simulated to start earlier to demonstrate an example of releases to assist OSF life history needs. If October 1 outflows are greater than 50 cfs, they are reduced by 10 cfs a day down to 50 cfs and held at 50 cfs through October 15. After October 15, outflows are reduced 10 cfs a day down to the minimum and held through the winter. If outflows are less than 50 cfs on October 1, they are reduced by 10 cfs a day down to the minimum and held through the winter. On April 20, flows begin increasing in even increments to a spring minimum that starts on May 1. The May 1 minimum is calculated by dividing the volume remaining for minimums on March 31 by 61 days. The volume on March 31 is used because it represents the remaining volume after the fall reduction and winter minimums are used before the volume is adjusted on April 1 to account for the volume to be used in the upcoming year.

3.2.4. Crooked River

OID will supplement winter flows on the Crooked River up to 50 cfs if outflows from Prineville Reservoir are less than 50 cfs. Water from the City of Prineville Mitigation Account will be released only in the months of December and January, and the daily release quantity will be the volume on November 30 divided by 61 days. This operation is the same for all three implementation phases.

3.3. Alternative 3

The Alternative 3 model is the same as the No Action and Alternative 2 model, except that it uses different non-irrigation season minimum and irrigation season maximum outflows from Wickiup, and that the outflow from the uncontracted account in Prineville Reservoir is protected from being diverted. Three versions of this alternative were run to simulate implementation through time: Alternative 3A represents the first 5 years of implementation, Alternative 3B represents years 6 through 10, and Alternative 3C represents after years 11 through 30. Results are shown only for Alternative 3C.

3.3.1. Wickiup Reservoir

Wickiup releases are the same as described in Alternative 2 with the exception of the non-irrigation season minimums and the irrigation season maximums. In Alternative 3C, the non-irrigation season minimum outflows are determined using the storage in Wickiup on October 1 and December 1 as summarized below.

- If October 1 Wickiup storage is less than 75,000 acre-feet, minimum outflow is 400 cfs.
- If October 1 Wickiup storage is greater than 75,000 acre-feet, minimum outflow is 500 cfs.
- If December 1 Wickiup storage is greater than 75,000 acre-feet, minimum outflow can increase by 100 cfs, up to 500 cfs.

3.3.2. Crescent Lake

Crescent Lake is operated to ensure minimum outflows are 20 cfs throughout the year. In July through September, the minimums are kept to 50 cfs if there is enough water in the reservoir.

3.3.3. Crooked River

The Crooked River has a difference in operations because uncontracted releases are assumed to be bypassed by the NUID pumps in this alternative (in other words, the water is “protected” from diversion). Specifically, the NUID pumps were modeled to bypass the larger of minimum requirements from the DRC agreement or the release from the uncontracted account. The maximum irrigation season release from the uncontracted account is 80 cfs.

3.4. Alternative 4

The Alternative 4 model is the same as Alternative 3 except that the variable outflow requirements were modified slightly for Wickiup Reservoir and the minimum winter requirement from the uncontracted account on Prineville Reservoir was increased to 80 cfs. Two versions of this alternative were run to simulate implementation through time: Alternative 4A represents the first 5 years of implementation and Alternative 4B represents years 6 through 30. Results are shown only for Alternative 4B.

3.4.1. Wickiup Reservoir

Wickiup releases are the same as described in Alternative 3 with the exception of the non-irrigation season minimums. In Alternative 4B, the non-irrigation season minimum outflows are determined using the storage in Wickiup on October 1 and December 1 as summarized below.

- If October 1 Wickiup storage is less than 75,000 acre-feet, minimum outflow is 400 cfs.
- If October 1 Wickiup storage is greater than 75,000 acre-feet but less than 125,000 acre-feet, minimum outflow is 500 cfs.
- If October 1 Wickiup storage is greater than 125,000 acre-feet, minimum outflow is 600 cfs.
- If December 1 Wickiup storage is greater than 75,000 acre-feet, minimum outflow can increase by 100 cfs, up to 600 cfs.

3.4.2. Crooked River

Releases from the uncontracted account (also known as the fish and wildlife account) are calculated for the irrigation season (April 1 to October 15) and the non-irrigation season (October 16 to March 30) using the storage in the account on April 1. To calculate the irrigation season, the model first reserves a volume of water for the non-irrigation season equal to 80 cfs released each day from October 16 to March 30 or the volume of water in the uncontracted account on April 1, whichever is greater (Minimum Winter Release Volume). The remaining volume is then divided equally among the 365 days and that value is released each day (Irrigation Season Release). This approach intentionally reserves water for the winter.

$$\mathrm{MWRV} = \mathrm{Max}\begin{cases} V * \dfrac{80\ \mathrm{cfs} * 1.98\ \mathrm{AF/d}}{cfs} \\ \mathrm{UV} \end{cases} \quad \text{where}$$

M = Minimum Winter Release Volume

V = Number of days between April 1 next year and October 15 current year

UV = Storage in the uncontracted account on April 1

$$\text{Irrigation Season Release} = \mathrm{M}in\begin{cases} (\mathrm{UV} - \mathrm{MWRV}^{7})/(365\ \mathrm{d} * \dfrac{1.98\frac{\mathrm{AF}}{\mathrm{d}}}{\mathrm{cfs}}) \\ 80\ \mathrm{cfs} \end{cases}$$

For the non-irrigation season, the irrigation season release flow rate is added to the minimum winter release flow rate and is released from the uncontracted account.

Non- Irrigation Season Release = Irrigation Season Release + MWRV

The uncontracted releases are assumed to be bypassed by NUID in this alternative. Specifically, the NUID pumps were modeled to bypass the larger of the minimum requirements from the DRC agreement or the release from the uncontracted account.

[7] This equation is limited to a positive result in the model.

4. Scenario Results

The RiverWare model produces many different types of output that can be used to interpret the implications of the alternatives, including reservoir storage, flow at gages, and water delivered to water users. The reservoir storage and flow at gages were primarily used to determine if the model was performing as expected under the defined scenario. Shortages were calculated by subtracting the amount of water delivered to water users from the amount of water that was requested. In the years where NUID's irrigation request from Wickiup was reduced to reflect real-world operations, the shortage was still calculated with respect to the total demand. The shortages were used to determine the potential impacts of the various scenarios and to determine the volume of water that would be required to satisfy all of the objectives in the scenario.

Alternative results are displayed in a number of formats. Summary hydrographs are used to show the potential range of reservoir storage, reservoir outflow, and flow at gages. The summary hydrographs show the median value (the daily flow or storage value achieved in 50 percent of the years) as a colored line and include a shaded area showing the daily range of 20 to 80 percent exceedance.[8] Reservoir storage and outflow are shown together so that the relationship between storage and outflow can be observed. Irrigation deliveries are shown as annual exceedance graphs where total annual irrigation volumes are sorted in order of largest to smallest to indicate the frequency of delivering a particular volume. The ability to meet instream and out-of-stream model flow objectives is shown using shortage graphs, where the shortage represents the difference between a model objective and the modeled output. Shortages are summed annually and shown in exceedance graphs similar to irrigation deliveries.

4.1. Alternative 1: No Action

Results for No Action are displayed to establish a baseline against which to compare the other alternatives. Only the locations that experience a change in the alternatives are shown in the No Action section.

4.1.1. Upper Deschutes

Figure 5 shows summary hydrographs of the simulated storage (top) and outflow (bottom) from Crane Prairie Reservoir for No Action (Alternative 1). The storage graph shows the summary of the 20 to 80 percent range of storage for the scenario. The intended operation at Crane Prairie Reservoir was as shown below.

1. To be at or above 35,000 acre-feet for the entire year.

[8] The 20% exceedance value shows the value where only 20% of the values are larger; the 80% exceedance value shows the value where 80% of the values are larger. For example, the 20% exceedance storage in Crane Prairie Reservoir on June 1 is 49,000 acre-feet and the 80% exceedance storage is 47,500 acre-feet.

2. Increase from 35,000 acre-feet to 45,000 acre-feet by March 15.
3. Maintain 45,000 acre-feet from March 15 through May 1.
4. Increase from 45,000 to 50,000 acre-feet from May 1 to May 15, if possible.
5. Maintain the storage achieved on May 15 through July 15.
6. Release storage down to 35,000 acre-feet by November 1.

Figure 5 shows that these operational objectives can be achieved. The relationship between changes in storage and outflow can also be seen in these graphs. For example, on January 1, outflows decrease to fill Crane Prairie Reservoir to 45,000 acre-feet by February 15. The model shows abrupt changes in outflows because storage objectives are prioritized in the model. Real-time operations may be different than the model output because the model logic is based on rules that may turn on and off suddenly as conditions change, whereas real time operations may be able to smooth out the operational changes.

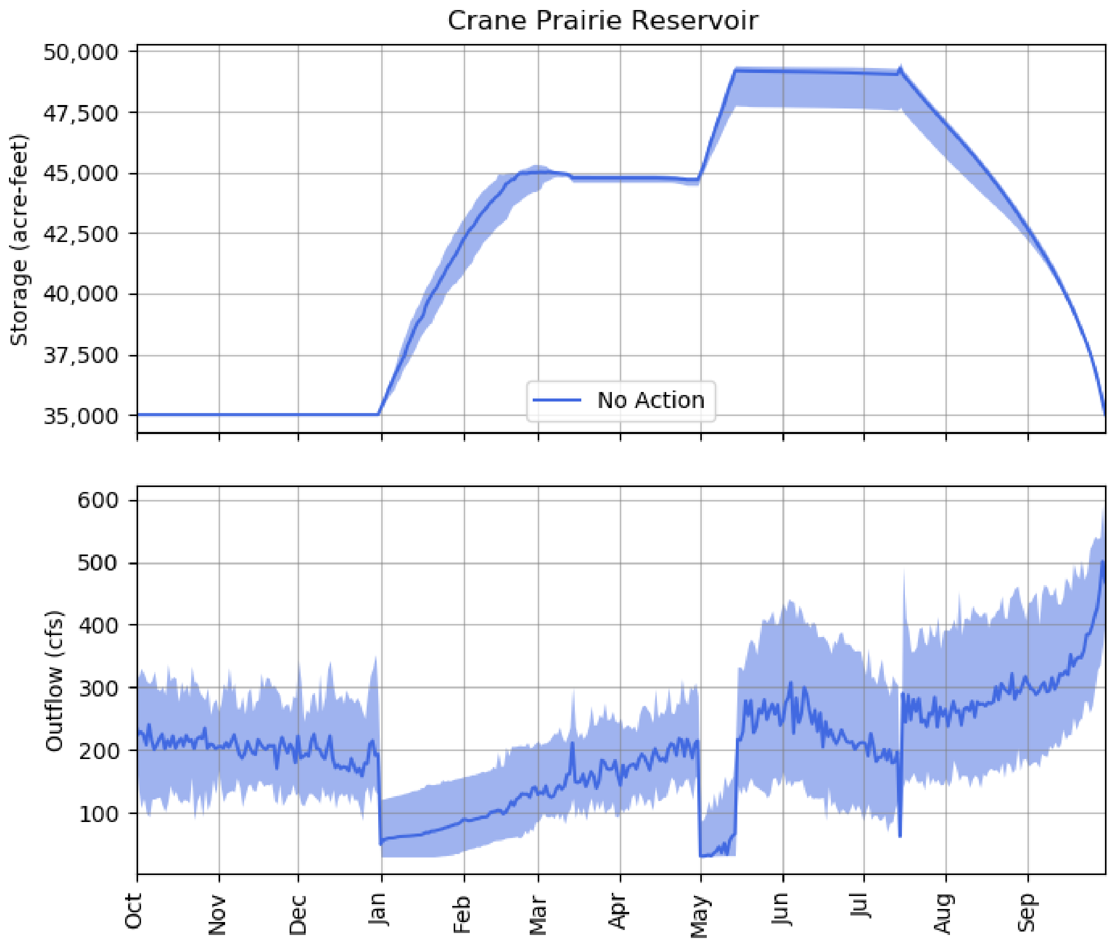


Figure 5. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crane Prairie Reservoir for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 6 shows summary hydrographs of the simulated storage and outflow from Wickiup Reservoir for No Action. Recall that the intended operation at Wickiup Reservoir was to maintain a minimum of 100 cfs outflow year-round and to meet downstream irrigation requests. From this graph, it can be seen that the model objectives were met. In addition, the figure shows the storage in Wickiup Reservoir that results from the upstream operation at Crane Prairie Reservoir and the outflow requirements. The summertime outflow pattern reflects Wickiup Reservoir releases to meet downstream irrigation demands, particularly for the NUID.

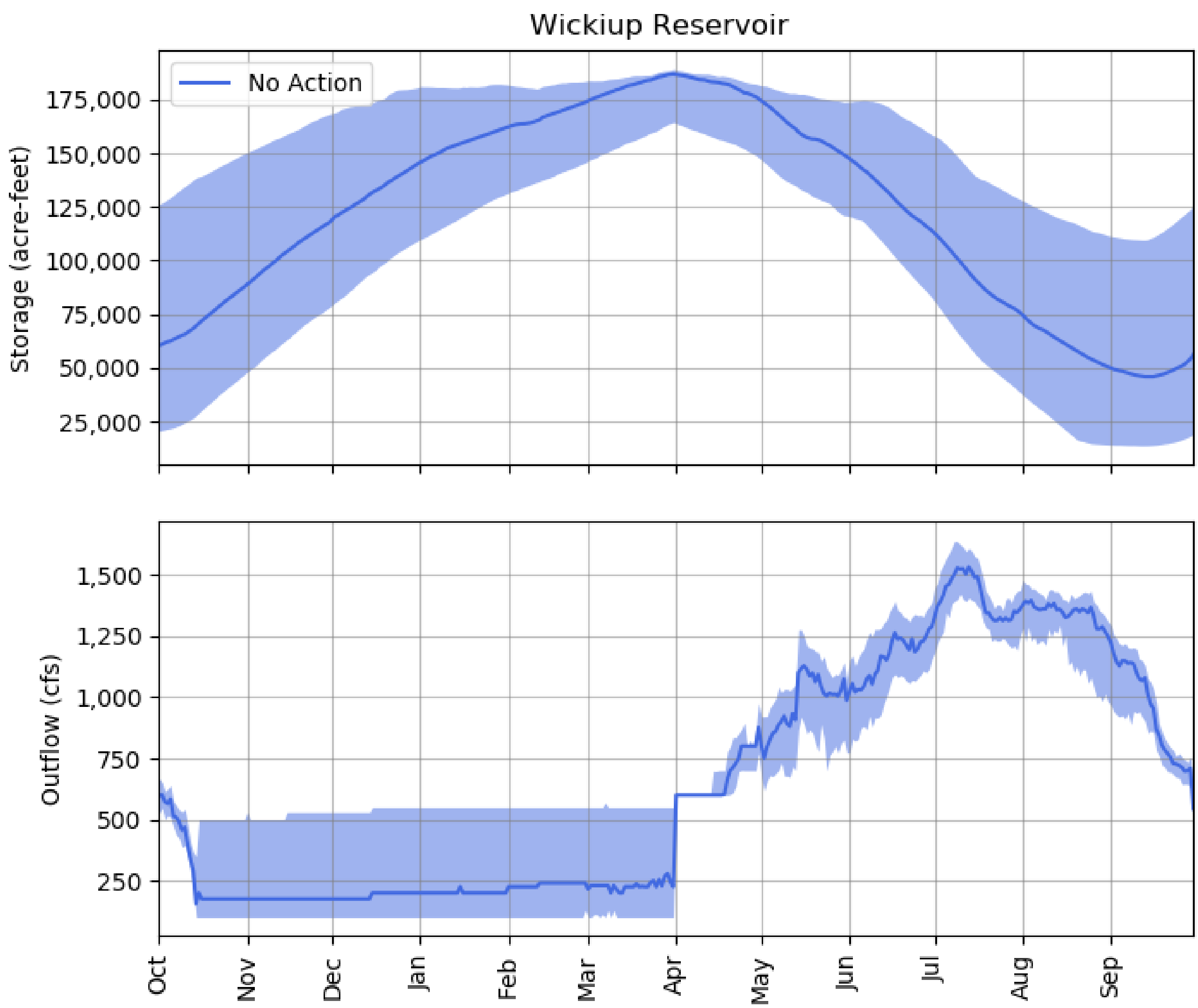


Figure 6. Summary hydrographs of simulated storage (top) and outflow (bottom) from Wickiup Reservoir for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 7 shows summary hydrographs for the storage and outflow from Crescent Lake for No Action. Recall that the intended operation for Crescent Lake was to maintain a minimum outflow of 30 cfs from March 15 to November 30 and 20 cfs from December 1 to March 14. The outflow graph shows that this operation is achievable in all years above the 80 percent flow exceedance, and the storage graph shows the statistical range of storage on any given day during the year for the simulation period. While mode summary hydrographs generally show the annual pattern of storage or flow, that is not the case for Crescent Lake storage. This is because the reservoir capacity exceeds the typical annual inflows to the reservoir, so the reservoir can store water for multiple irrigation seasons. As a result, the annual storage pattern can be very different from year to year. The increased outflow in the higher flow years in February are due to flood releases required to prevent the reservoir from overtopping.

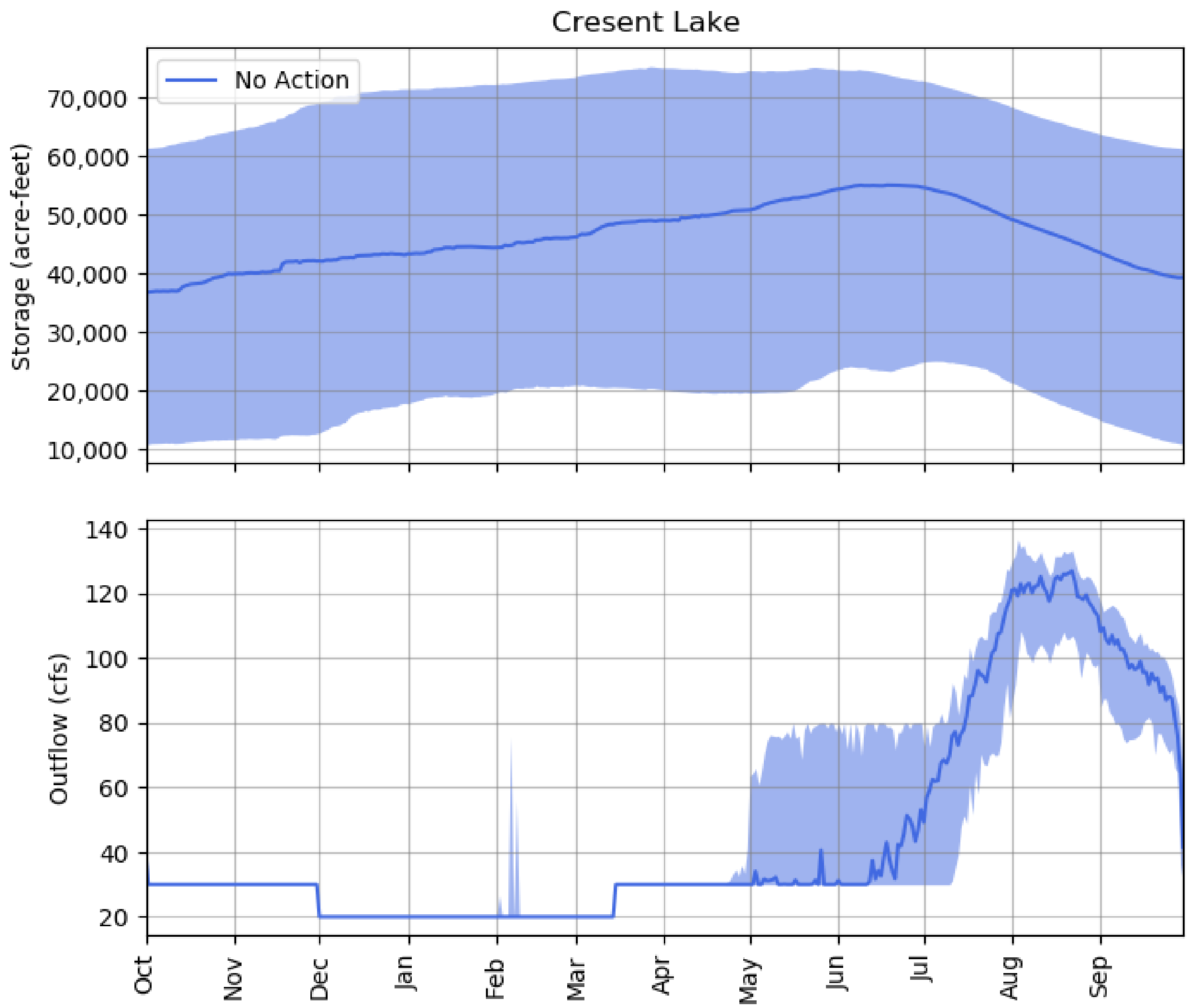


Figure 7. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crescent Lake for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 8 shows a summary hydrograph of the simulated flow in Little Deschutes River at La Pine for the No Action Alternative. The flow at this gage is largely unregulated, with only a small contribution from Crescent Creek and Crescent Lake in the spring but a larger contribution in the summer and fall.

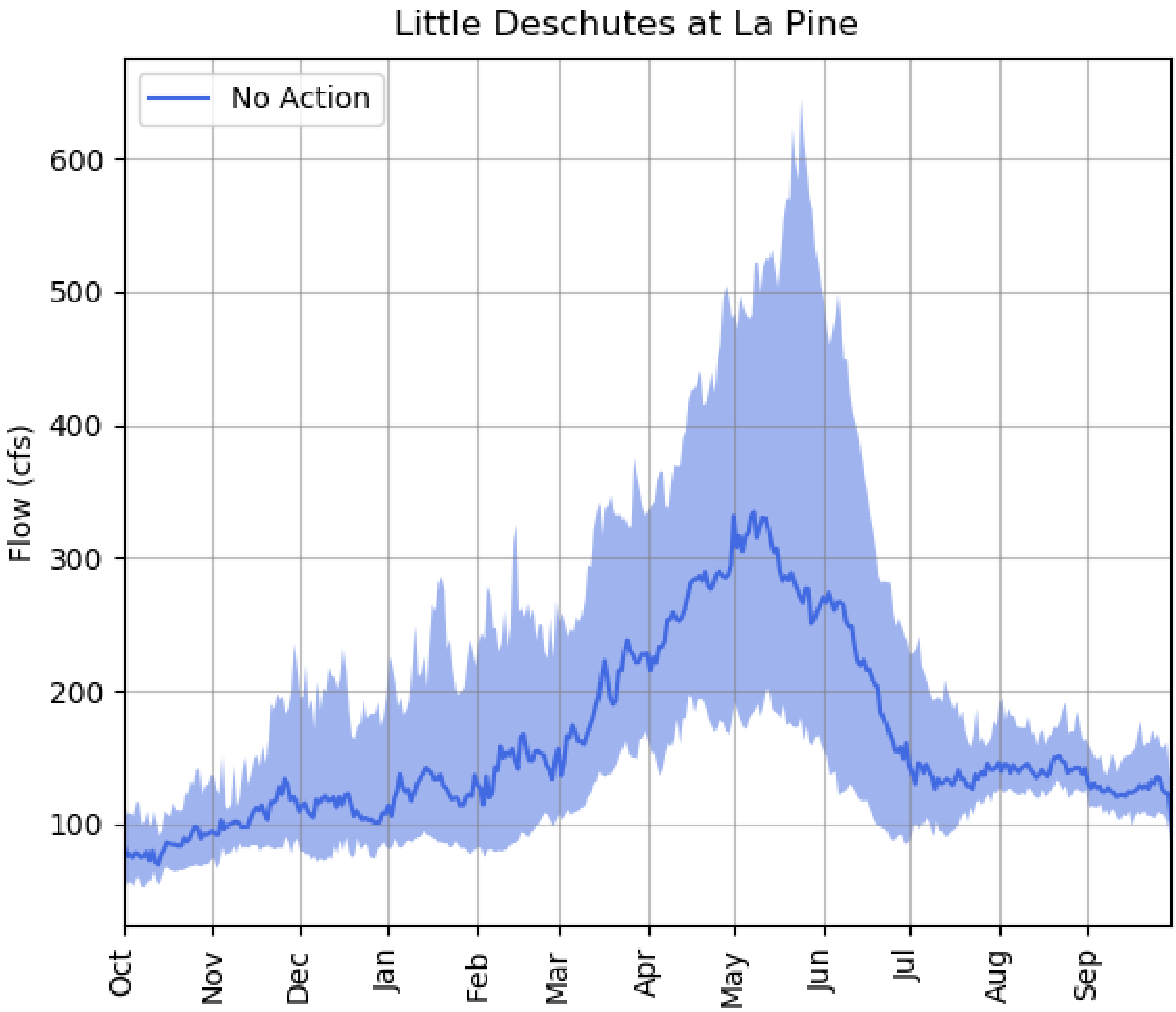


Figure 8. Summary hydrograph of simulated flow in the Little Deschutes River at La Pine for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 9 shows a summary hydrograph of the simulated flow in the Deschutes River at Benham Falls for No Action. This gage is upstream of the major diversions but downstream of the reservoirs. It is heavily influenced by the outflow from Wickiup Reservoir and the flow from the Little Deschutes.

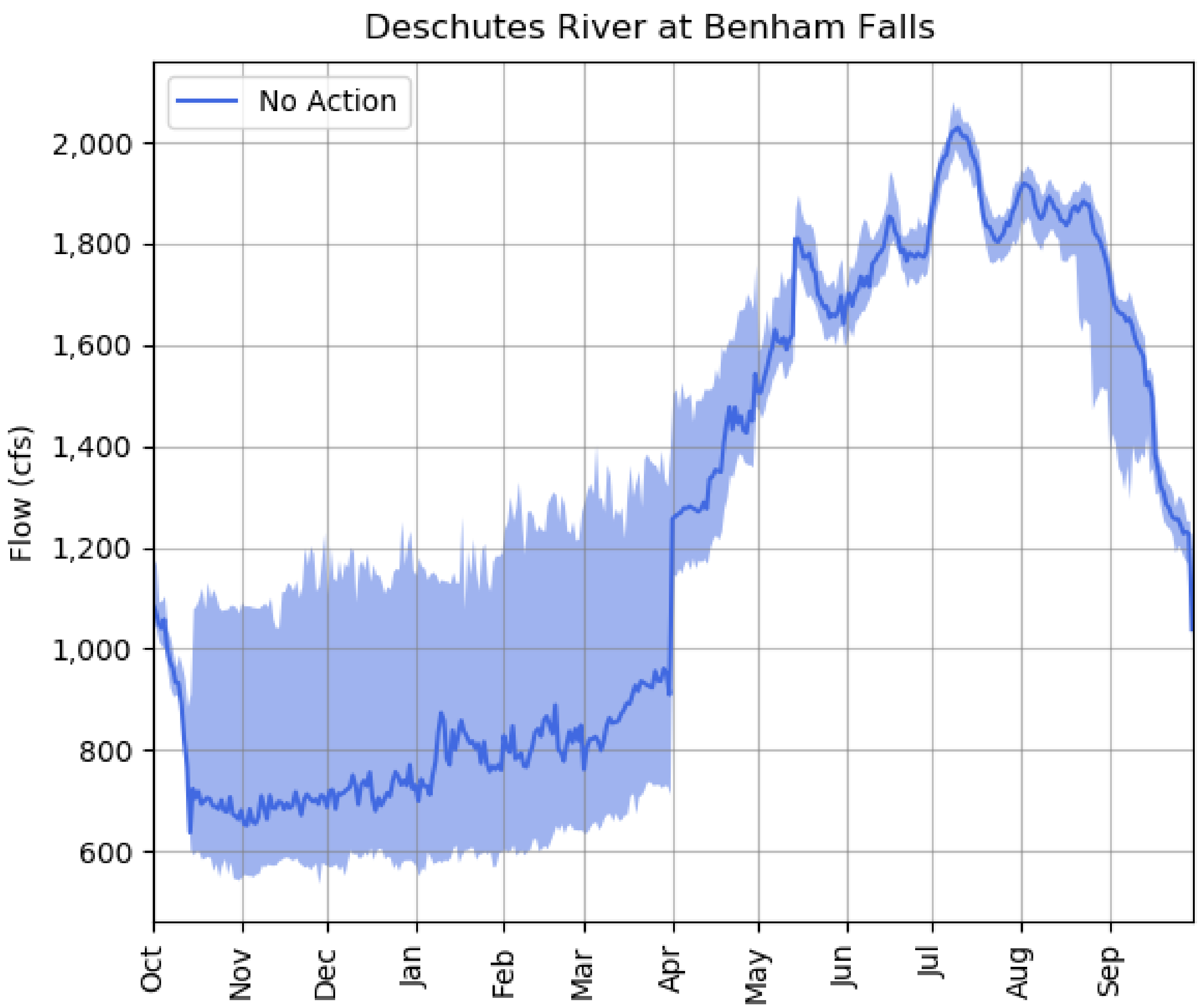


Figure 9. Summary hydrograph of simulated flow in the Deschutes River at Benham Falls for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 10 shows a summary hydrograph of the simulated flow in the Deschutes River below Bend for No Action. The gage is located downstream of all of the major irrigation diversions; therefore, it is representative of the lowest flow between Bend and the Pelton-Round Butte dam complex.

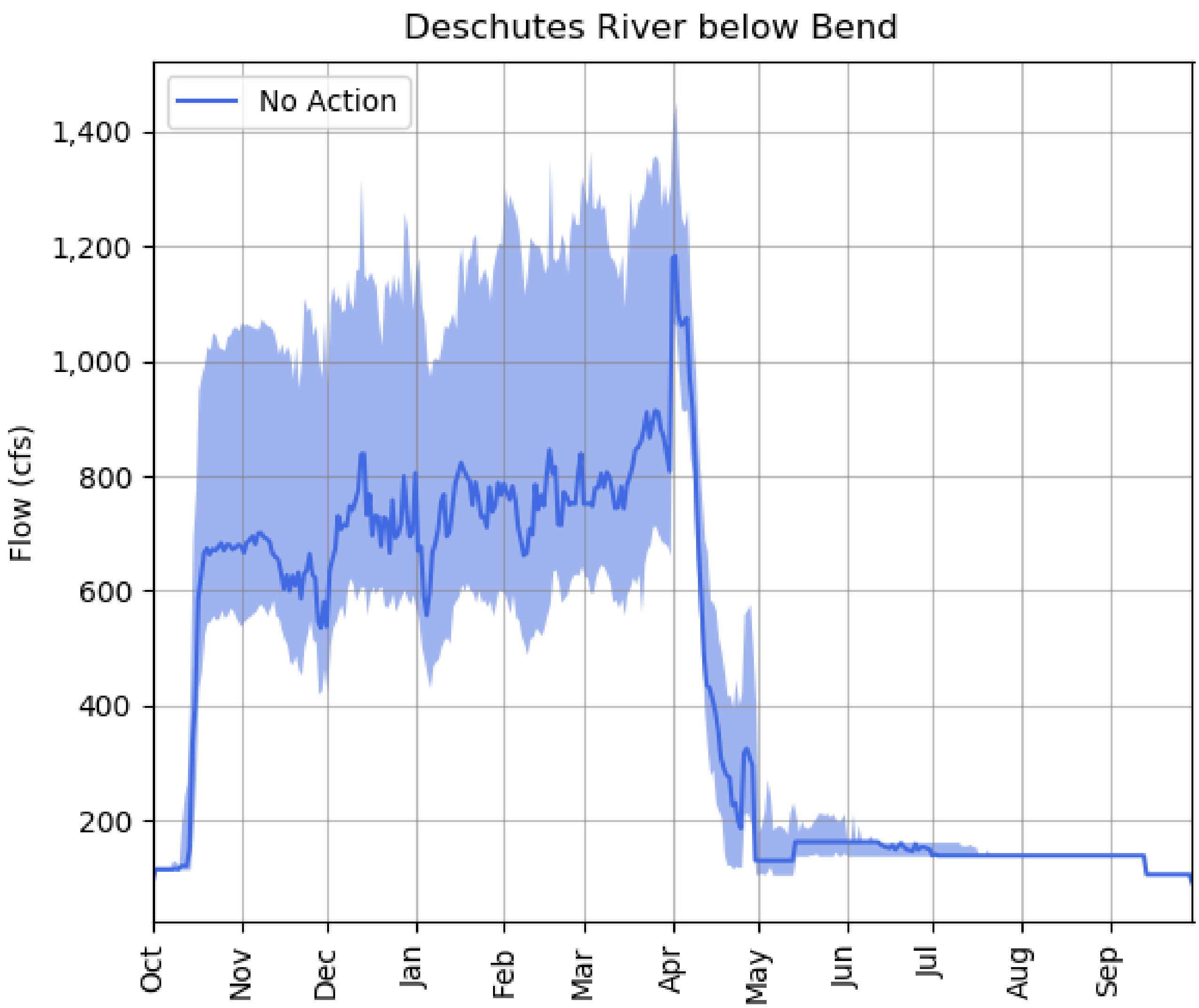


Figure 10. Summary hydrograph of simulated flow in the Deschutes River below Bend for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

4.1.2. Tumalo Creek

Figure 11 shows a summary hydrograph of the simulated flow in Tumalo Creek below the TID diversion for the No Action alternative. Tumalo Creek is a tributary to the Upper Deschutes; it does not have any on-channel storage and supplies water for the City of Bend and TID. The hydrograph represents the lowest flow on the creek below all diversions.

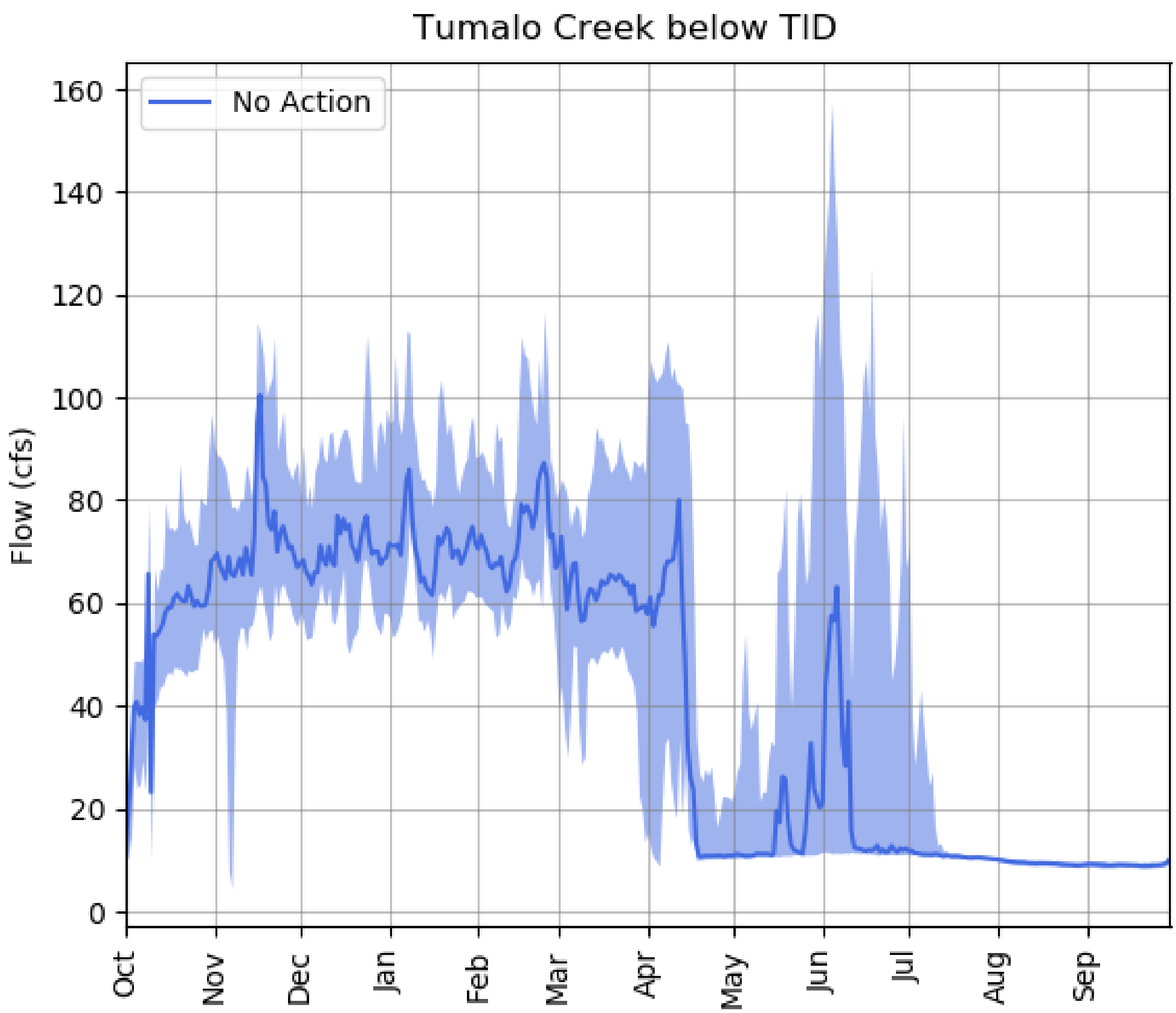


Figure 11. Summary hydrograph of simulated flow in Tumalo Creek below the TID diversion for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

4.1.3. Whychus Creek

Figure 12 shows a summary hydrograph of the simulated flow in Whychus Creek at Sisters for the No Action alternative. Whychus Creek is a tributary to the Upper Deschutes River; it does not have any on-channel storage and supplies water for three small irrigation districts (Edgington, Sokol, and Plainview), along with the much larger Three Sisters Irrigation District (TSID). Output at this control point represents the lowest flow on the creek.

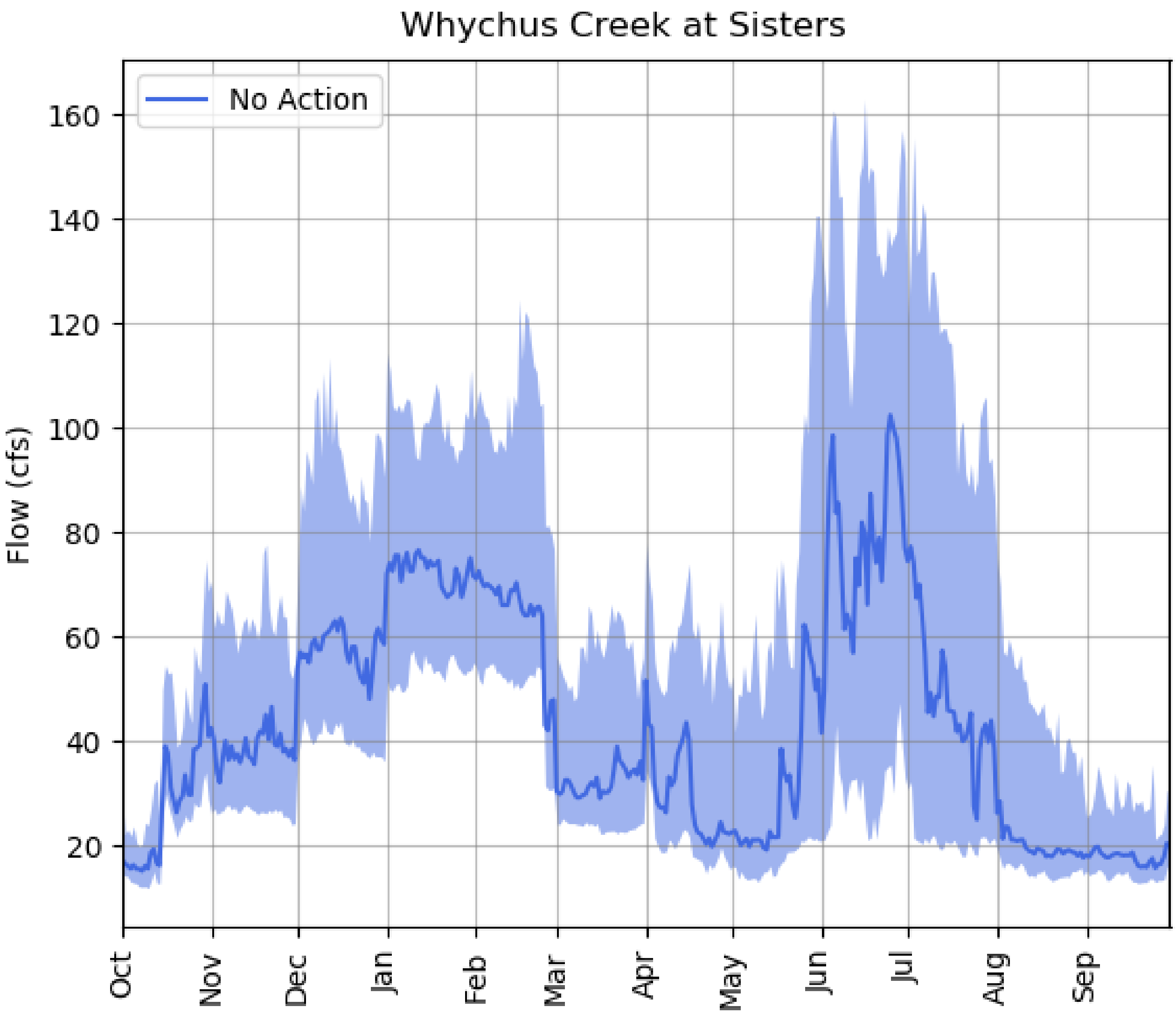


Figure 12. Summary hydrograph of simulated flow in Whychus Creek at Sisters for the No Action Alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

4.1.4. Crooked River

Figure 13 shows summary hydrographs for simulated storage and outflow from Prineville Reservoir for No Action. Prineville Reservoir typically reaches its peak storage volume between April and June and releases water throughout the irrigation season to meet downstream demand and ecological flow objectives, all of which were met in this scenario. During the fall and winter, it releases water as necessary to make space in the reservoir to capture spring runoff and prevent flooding downstream of the dam. In the winter, it releases flows based on the uncontracted flow equations described in Section 2.3. The release pattern in November, December, and January for higher outflows is a result of the model attempting to maintain storage at or below the flood rule curve, which is adjusted on a monthly basis.

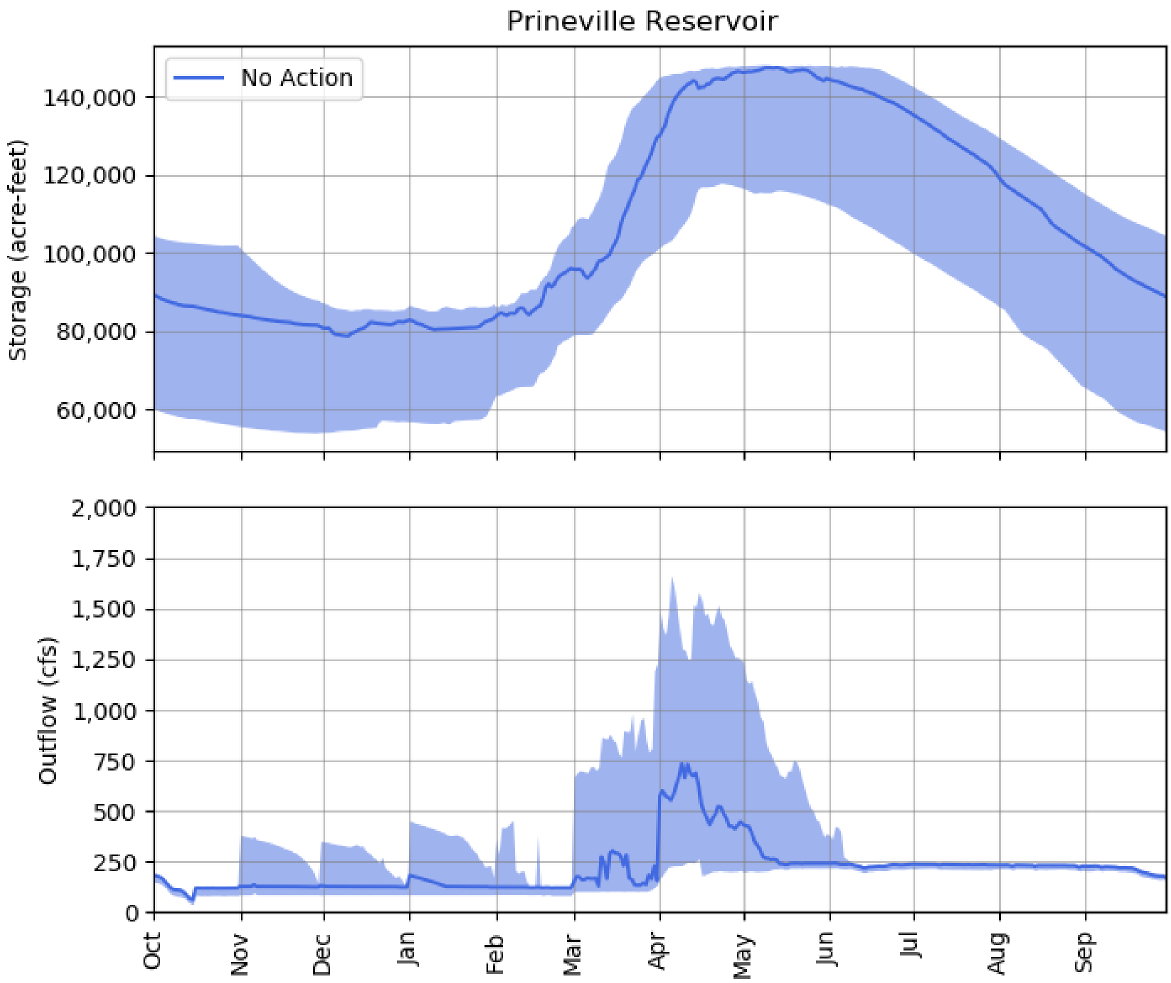


Figure 13. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 14 shows summary hydrographs for simulated storage and outflow from Ochoco Reservoir for No Action. Like Prineville Reservoir, Ochoco Reservoir typically reaches its peak storage volume between April and June and releases water throughout the irrigation season to meet downstream demand and ecological flow objectives. During the fall and winter, water is released to make space in the reservoir as necessary to capture spring runoff and prevent flooding downstream of the dam. During the winter, enough water is released to maintain 5 cfs in the creek.

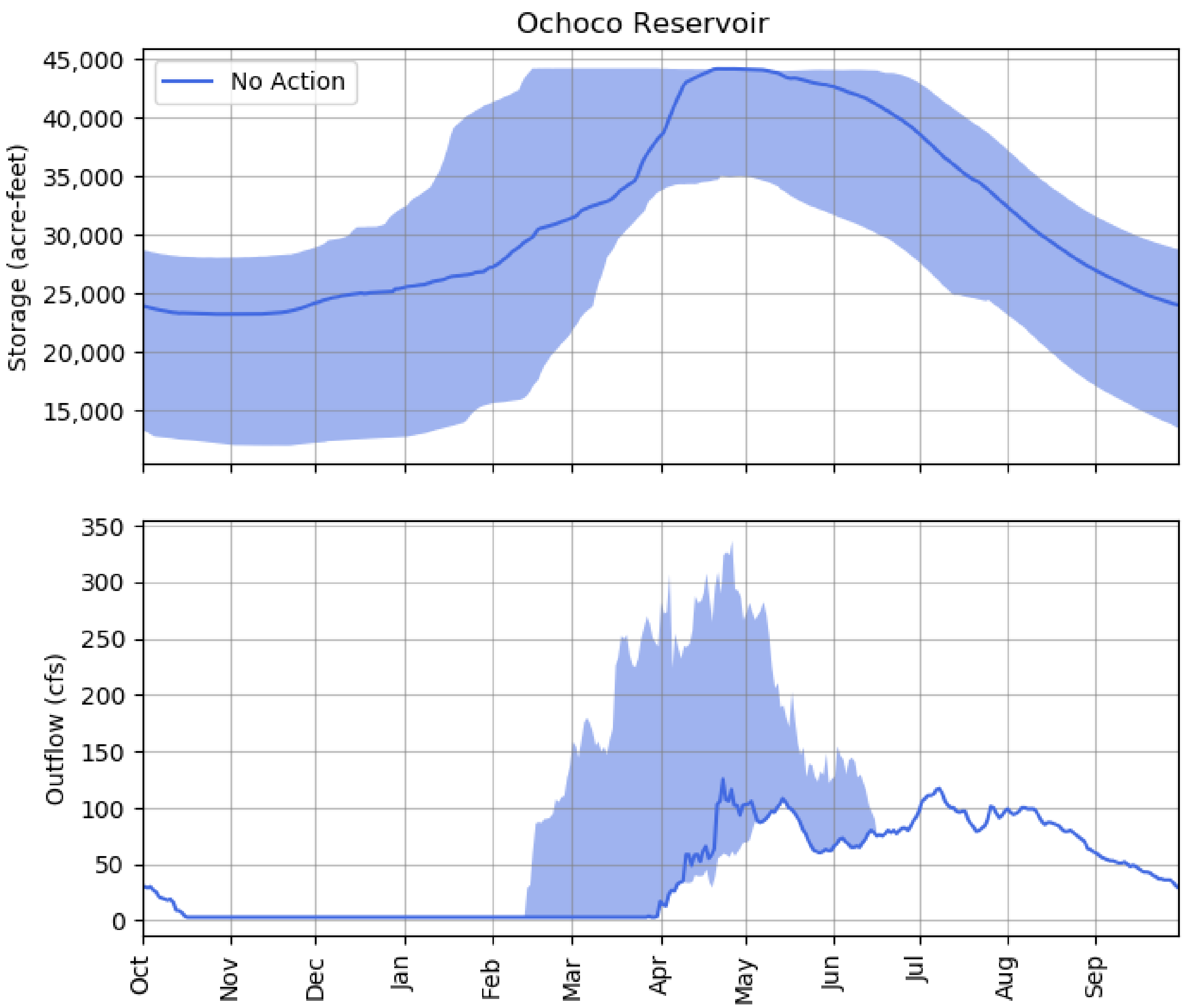


Figure 14. Summary hydrographs of simulated storage (top) and outflow (bottom) from Ochoco Reservoir for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 15 shows a summary hydrograph of the simulated flow in the Crooked River at Highway 126 for No Action. The flow at this gage generally represents a low flow point in the river below some of the major diversions and above most return flows; the minimum flow requirements at this gage were met with this scenario. It is largely influenced by the outflow from Prineville Reservoir in the winter and by the upstream diversions and contracted reservoir releases in the summer.

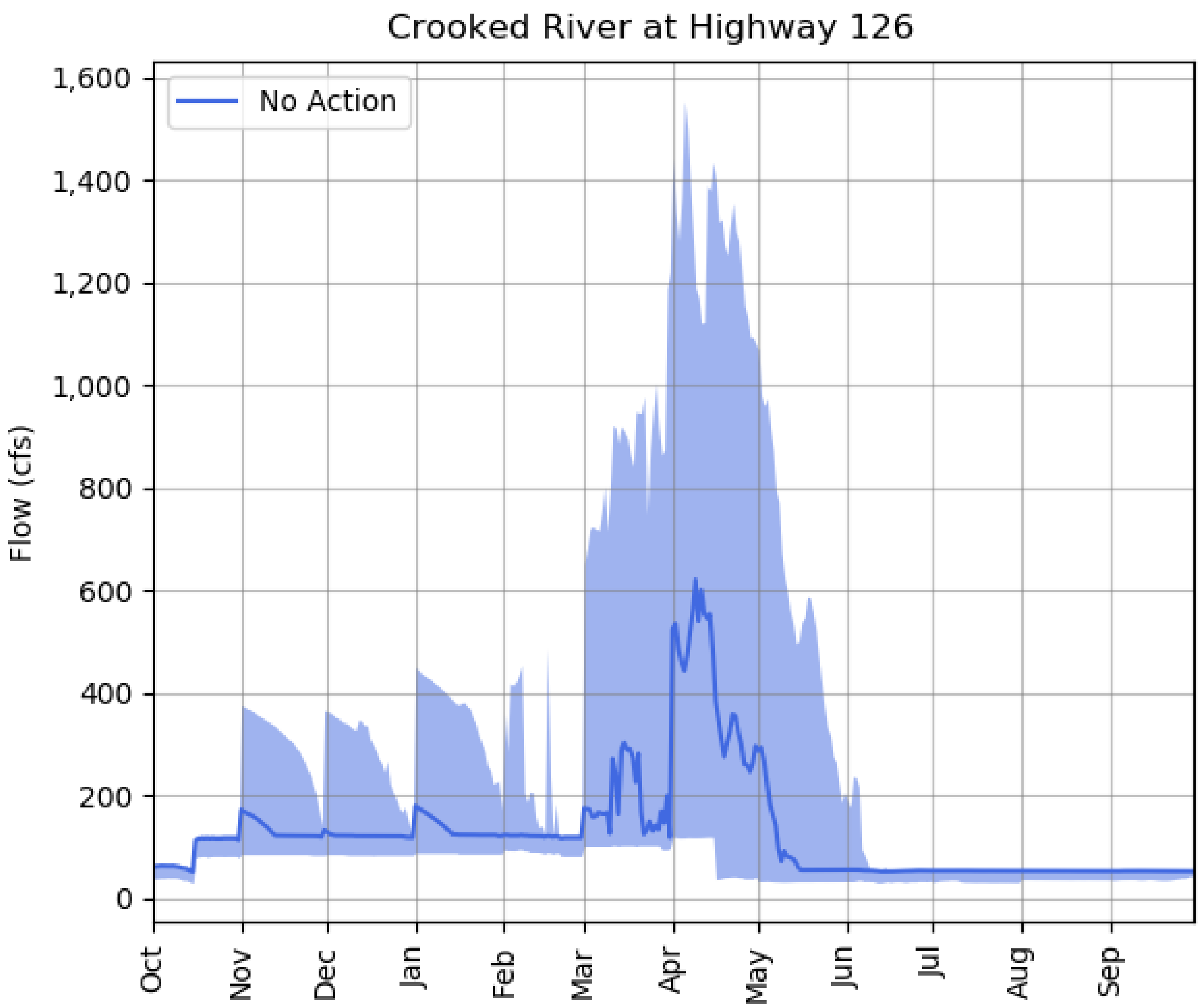


Figure 15. Summary hydrograph of simulated flow in the Crooked River at Highway 126 for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 16 shows a summary hydrograph of the simulated flow in the Crooked River below the NUID pumps for No Action. The flow at this gage generally represents another low flow point in the river below major diversions and above irrigation return flows. It is largely influenced by the outflow from Prineville Reservoir in the winter and by the upstream diversions in the summer. The minimum flows as described in the Deschutes River Conservancy Bypass Flow agreement were met in all years (note that the lowest modeled bypass flow was 50 cfs, though the agreement allows for a lower value, 43.798 cfs, in May in dry years).

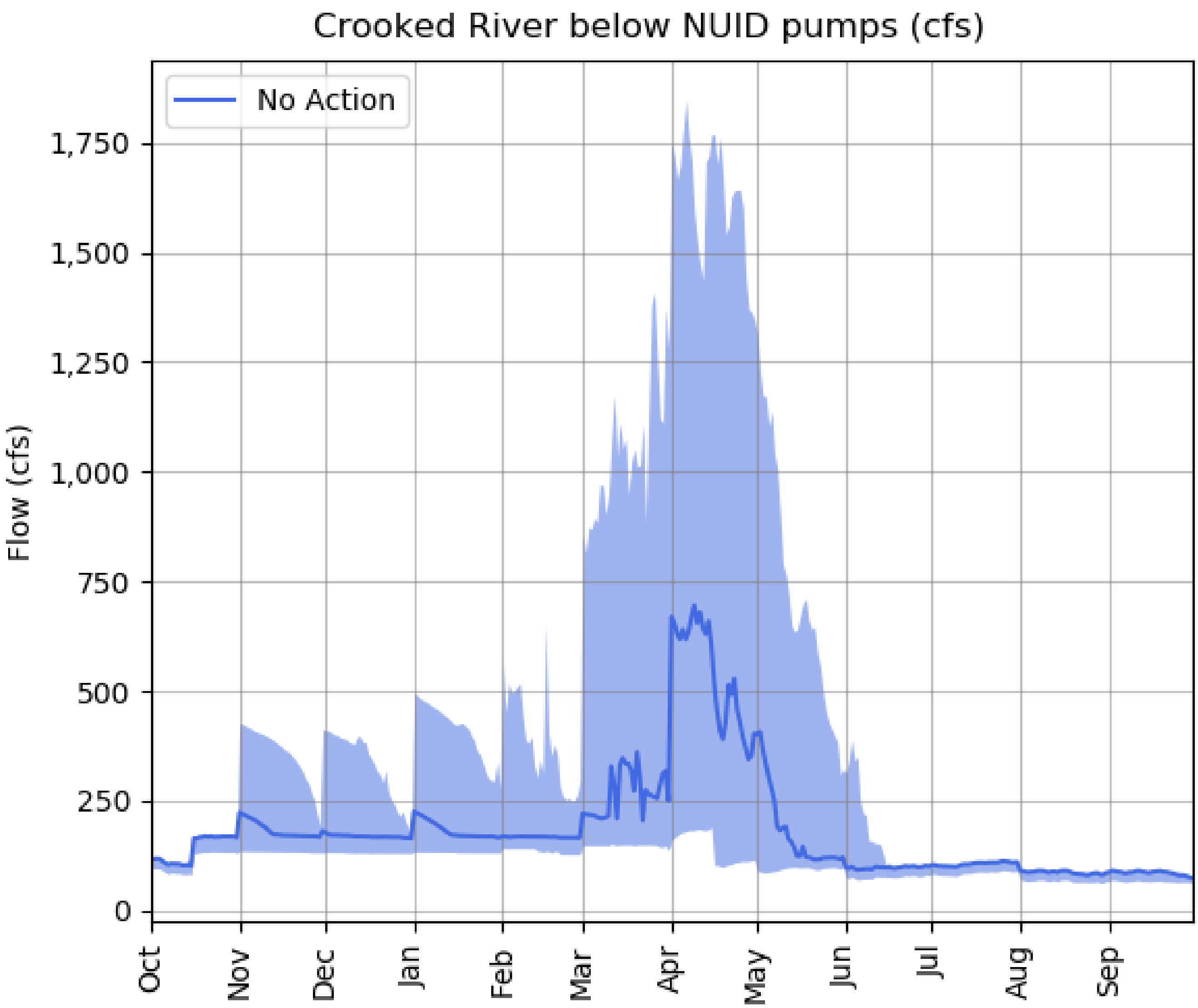


Figure 16. Summary hydrograph of simulated flow in the Crooked River below the NUID pumps for the No Action alternative. The dark blue line represents the median and the shaded blue area represents the 20 to 80 percent exceedance.

4.1.5. Irrigation Shortages

Irrigation shortages are calculated every model year and are the difference between the requested demand and the amount of water delivered to each district. The total annual shortages for the No Action alternative are ranked and shown in Figure 17. NUID has the largest shortage in the No Action alternative because it is the junior water user on the system.

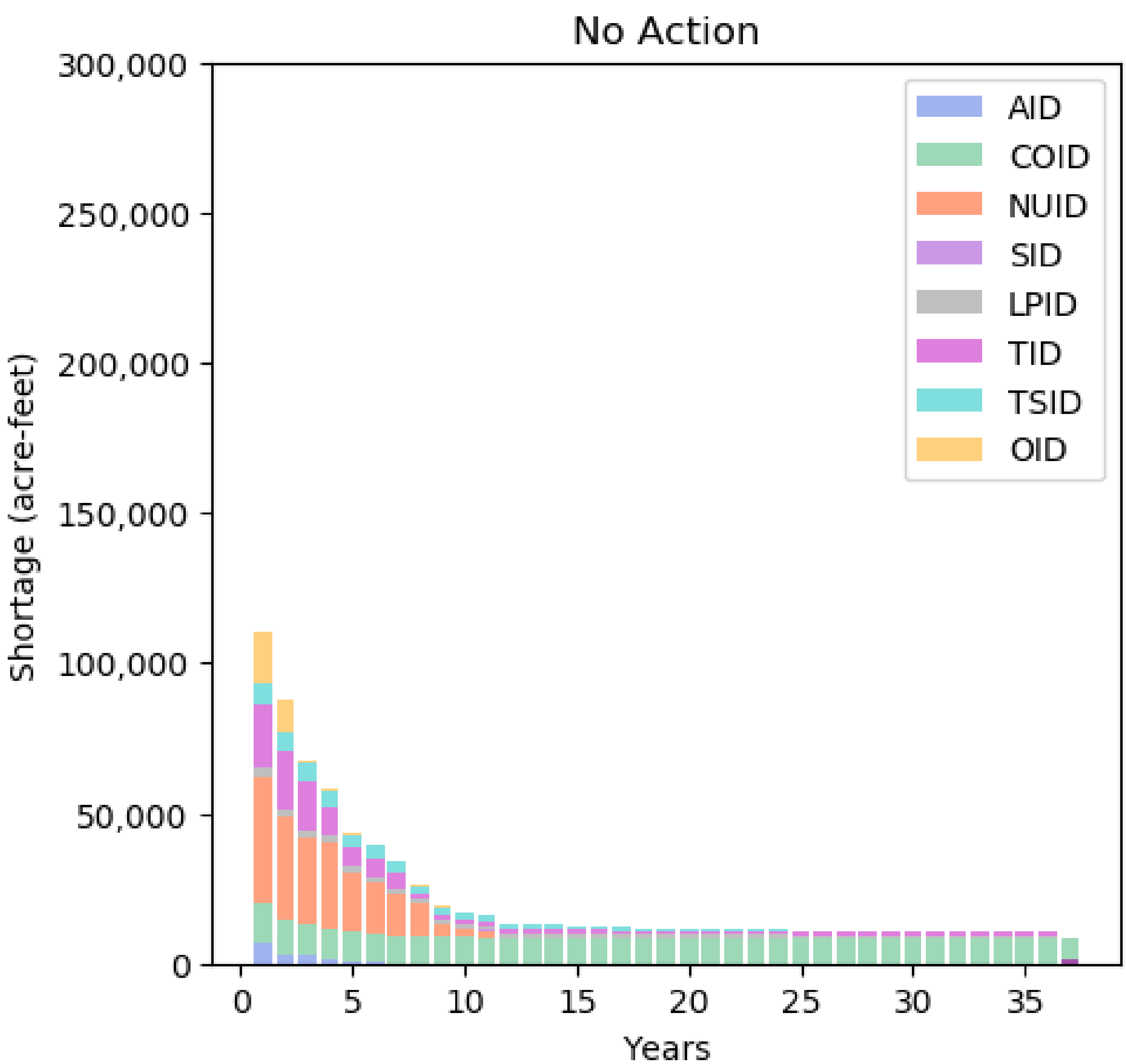


Figure 17. Irrigation shortages for the eight major districts in the basin for No Action

Table 7 shows the minimum, median, and maximum shortages from the total annual diversion for No Action. These are also shown as percent of total demand for each entity in order to illustrate the significance of the shortage.

Table 7. Minimum, median, and maximum shortages for No Action, reported both in volume (acre-feet) and as percent of total annual demand

District	No Action Alternative					
	Minimum		Median		Maximum	
	acre-feet	percent	acre-feet	percent	acre-feet	percent
AID	-	0%	-	0%	6,800	21%
COID	6,000	0.4%	6,200	0.4%	10,700	1%
NUID	-	0%	-	0%	42,100	21%
SID	-	0%	-	0%	-	0%
LPID	300	2%	1,300	8%	2,900	18%
TID	1,500	3%	1,500	3%	20,800	39%
TSID	-	0%	1,000	3%	6,400	18%
OID	-	0%	-	0%	15,600	20%

4.2. Alternative 2: Districts' DBHCP Proposal

The Alternative 2 results are displayed along with the No Action results for comparison. Only the locations that experienced a change from the No Action results are shown in this section. The DBHCP will be implemented in three major phases over time and the results shown reflect those time periods where Alternative 2A is years 0 to 7, Alternative 2B is years 8 to 12, and Alternative 2C is years 13 to 30.

4.2.1. Upper Deschutes

Figure 18 shows summary hydrographs of the simulated storage (top) and outflow (bottom) from Crane Prairie Reservoir for No Action Alternative (blue) compared to Alternative 2 (green). Recall that the intended operation for Crane Prairie Alternative 2 was as described below.

1. Store water from November 1 to March 14 to reach 48,000 acre-feet.
2. Pass inflow from March 15 to July 15 to maintain between 46,800 and 48,000 acre-feet.
3. Release storage at a maximum rate of 225 acre-feet per day from July 16 to July 31.
4. From July 31 to October 31, release up to 450 acre-feet per day until 38,000 acre-feet and then maintain 38,000 acre-feet until October 31.
5. Outflows are managed to maintain a minimum release of 75 cfs, if possible, and an absolute minimum of 30 cfs.

Figure 18 shows that this operation can be maintained through all three implementation phases. The difference between the Alternative 2 operation and the No Action operation is primarily due to the change in operating rules. However, the fill period between November 1 and March 14 also varies due to changes in inflow to the reservoir. Outflows from the reservoir are generally more consistent using the operation in Alternative 2 and show less dramatic changes than for No Action.

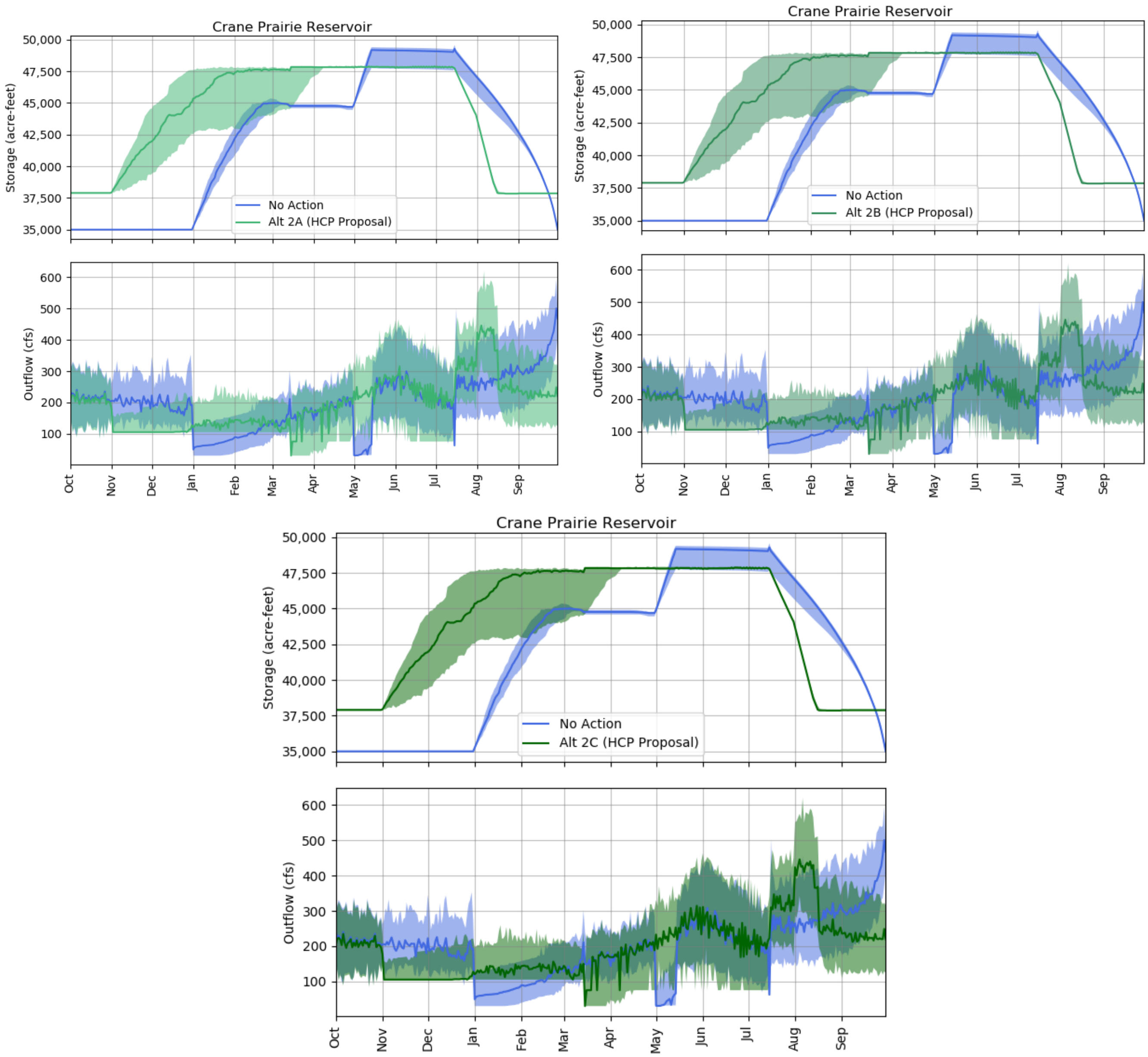


Figure 18. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crane Prairie Reservoir for No Action (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom. The dark blue or green line represents the median and the shaded blue or green areas represent the 20 to 80 percent exceedance.

Figure 19 shows summary hydrographs of the simulated storage and outflow from Wickiup Reservoir for No Action (blue) compared to Alternative 2 (green) with the three implementation phases. For all three implementation phases, Wickiup was able to meet the outflow objectives of Alternative 2; however, the reservoir has lower storage volumes than No Action, particularly in the later implementation phases, due to the higher outflows. For Alternative 2A, Wickiup maintains a minimum of 100 cfs in all years and does not have a maximum irrigation season outflow. This outflow results in similar storage to No Action. For Alternative 2B, Wickiup maintains a minimum storage season outflow of 300 cfs in all years and a maximum irrigation season outflow of 1,400 cfs. Storage in Wickiup is lower than No Action primarily due to the increase in winter flows. For Alternative 2C, Wickiup maintains a minimum storage season outflow of 400 cfs and a maximum irrigation season outflow of 1,200 cfs in all years.

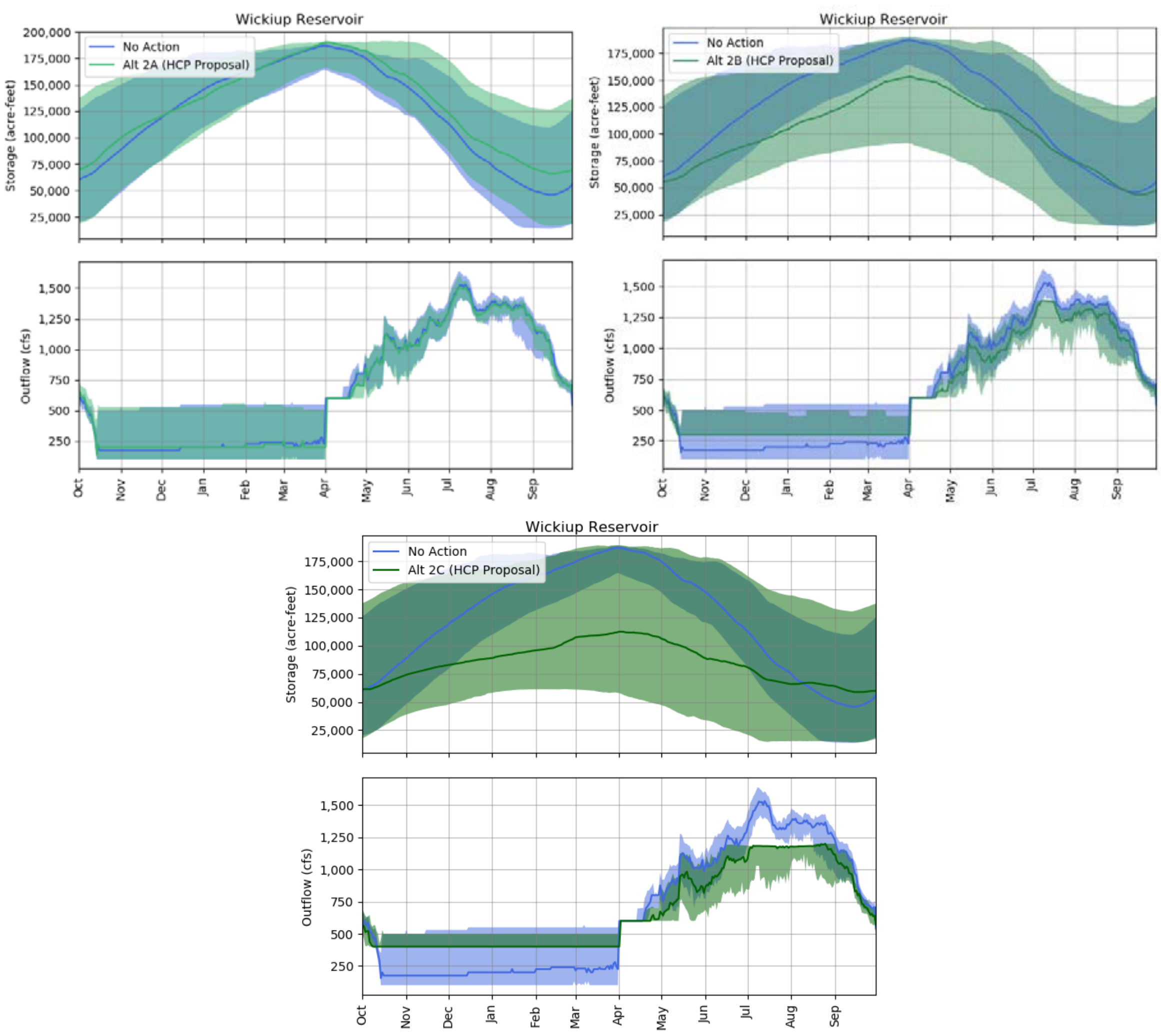


Figure 19. Summary hydrographs of simulated storage (top) and outflow (bottom) from Wickiup Reservoir for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom. The dark blue or green line represents the median and the shaded blue or green areas represent the 20 to 80 percent exceedance.

Figure 20 shows summary hydrographs for the storage and outflow from Crescent Lake for No Action (blue) compared to Alternative 2 (green) for all three implementation phases. Recall that the intended operation for Crescent Lake in Alternative 2 was to maintain a minimum of 10 cfs in the non-irrigation season (increased to 11 cfs in Alternative 2C), and then use a reserved portion of stored water to increase spring flows and reduce flows more slowly at the end of the irrigation season. These graphs indicate that the minimum can be maintained in all years and provide an example of how the spring and fall operation may occur, though this will be managed in real time based on weather and flow conditions in critical habitat locations which may result in flows that look different from these graphs. As noted in the scenario description, the minimum outflows from Crescent are lower than No Action because it was determined to be more important to shape the outflows at critical times of the year for the species than to maintain a higher flow throughout the year.

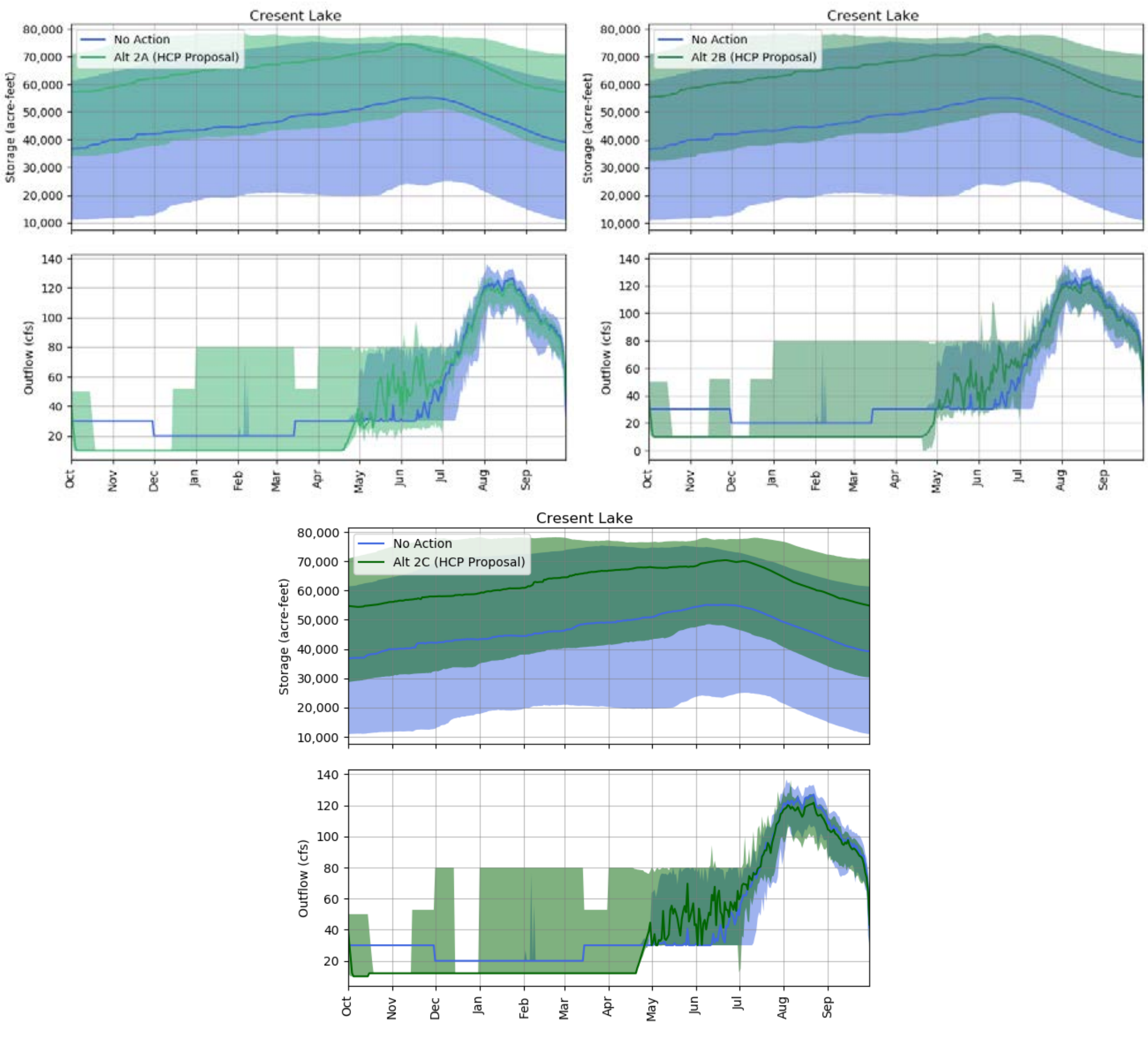


Figure 20. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crescent Lake for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B is shown at the top right, and 2C at the bottom. The dark blue or green line represents the median and the shaded blue or green areas represent the 20 to 80 percent exceedance.

Figure 21 shows a summary hydrograph of the simulated flow in the Little Deschutes River at La Pine for No Action (blue) compared to Alternative 2 (green) for all three implementation phases. As mentioned previously, the flow at this gage is largely unregulated, with a small contribution from Crescent Creek and Crescent Lake in the spring and a larger contribution in the summer and fall. The changes in the releases from Crescent Lake can be seen primarily in the fall months, but, overall, the flow is relatively similar at this gage for both alternatives.

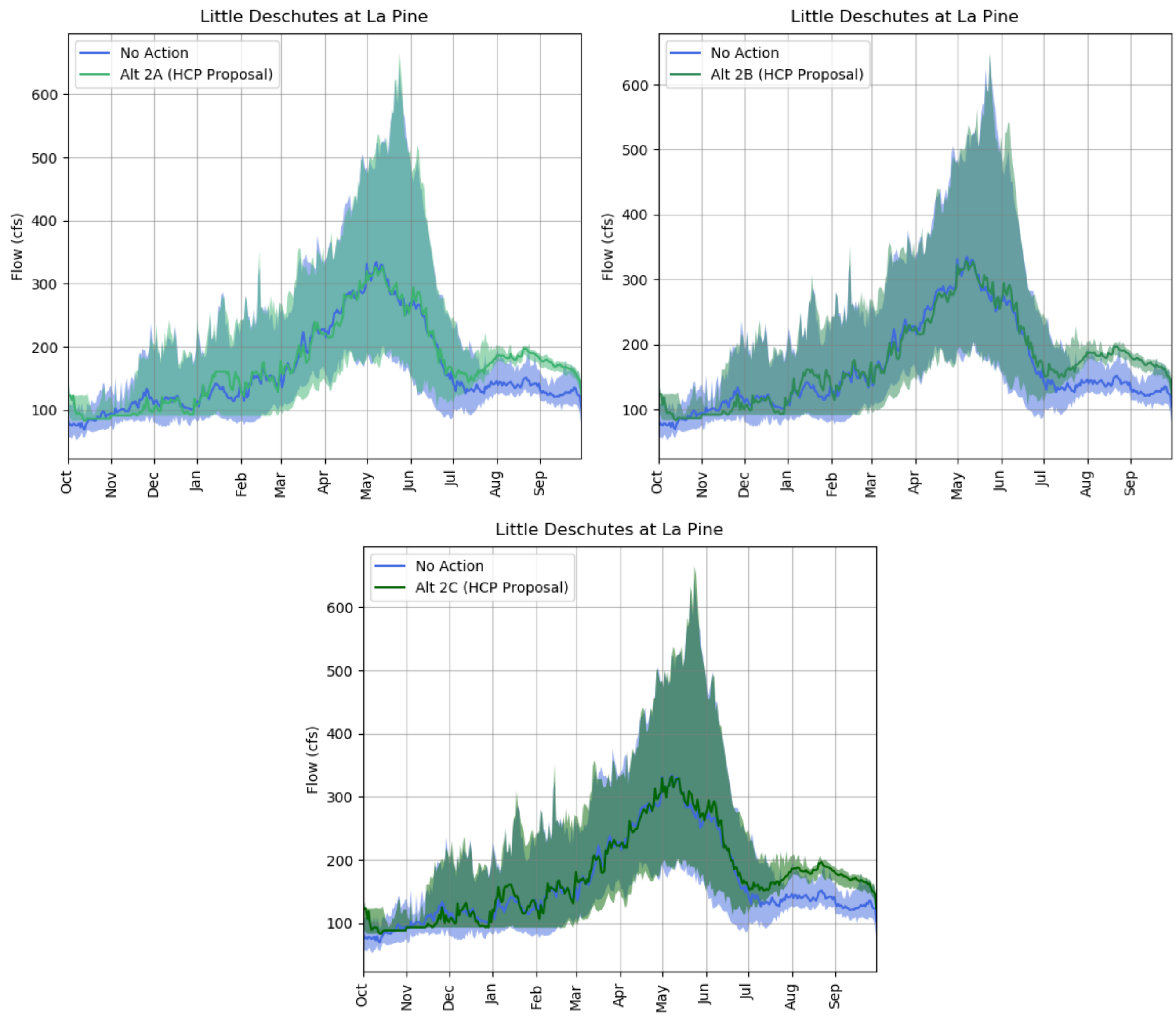


Figure 21. Summary hydrograph of simulated flow in the Little Deschutes River at La Pine for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left), 2B at the top right, and 2C at the bottom. The dark blue and green lines represent the median and the shaded area represents the 20 to 80 percent exceedance.

Figure 22 shows a summary hydrograph of the simulated flow in the Deschutes River at Benham Falls for No Action (blue) compared to Alternative 2 (green) for all three implementation phases. This gage is heavily influenced by the outflow from Wickiup Reservoir. Consequently, the changes from No Action mimic the changes at Wickiup Reservoir.

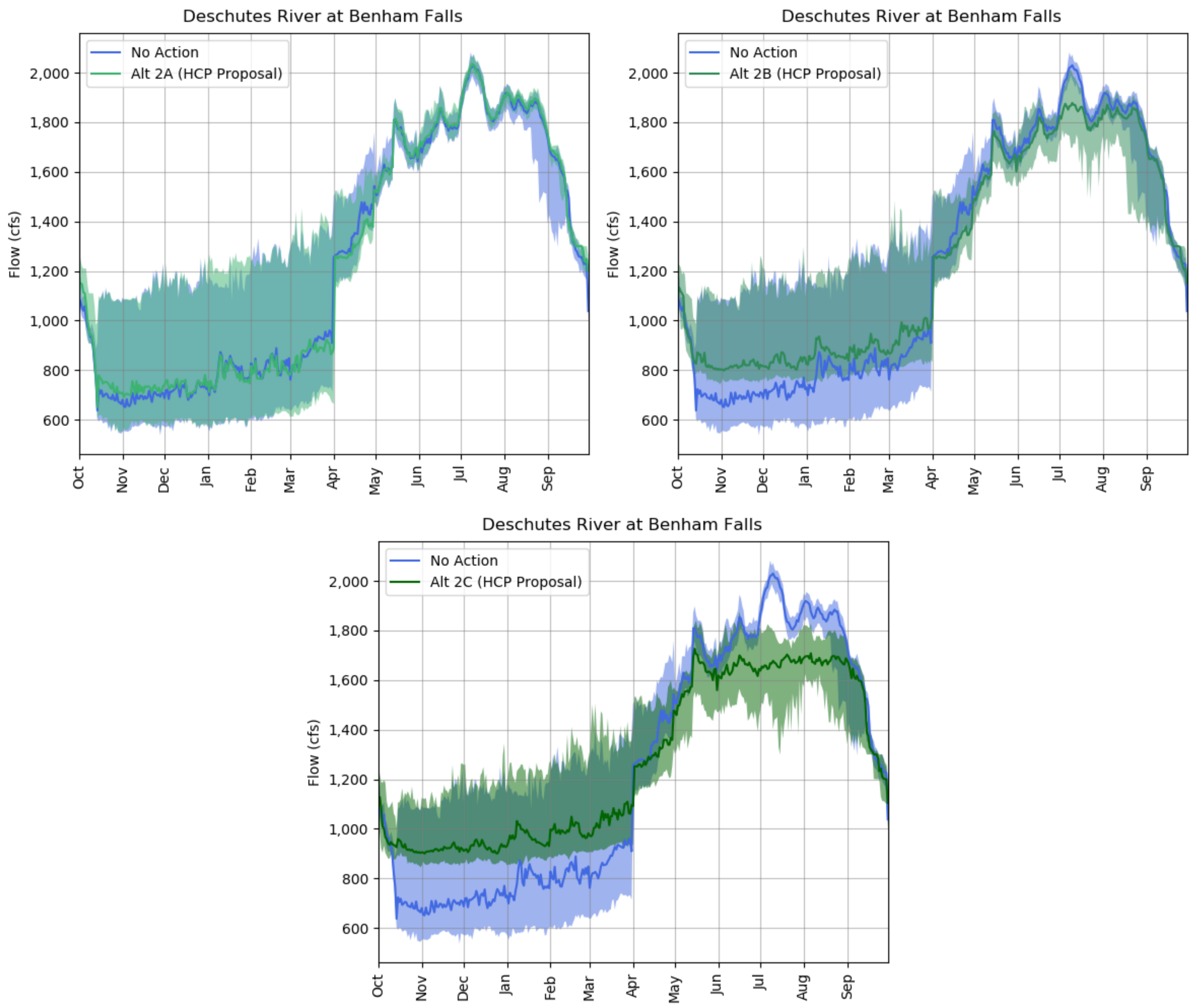


Figure 22. Summary hydrograph of simulated flow in the Deschutes River at Benham Falls for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom). The dark blue and green lines represent the median and the shaded area represents the 20 to 80 percent exceedance.

Figure 23 shows a summary hydrograph of the simulated flow in the Deschutes River below Bend for the No Action alternative (blue) compared to Alternative 2 (green) for all three implementation phases. The minimum flow targets are able to be met in all implementation phases. The effects of the increased releases from Wickiup Reservoir can be seen in the winter months when the range and median of flow is incrementally larger than for No Action. The summer flows at this location are similar for both alternatives. The effects of the minimum outflow requirements below Wickiup Reservoir in April and the rate of outflow reduction at the end of the irrigation season can be seen in these graphs, which show there is flow passing Bend that is not being diverted for irrigation. These additional releases are over and above irrigation demand but could be diverted in real time if the districts had a need for the water.

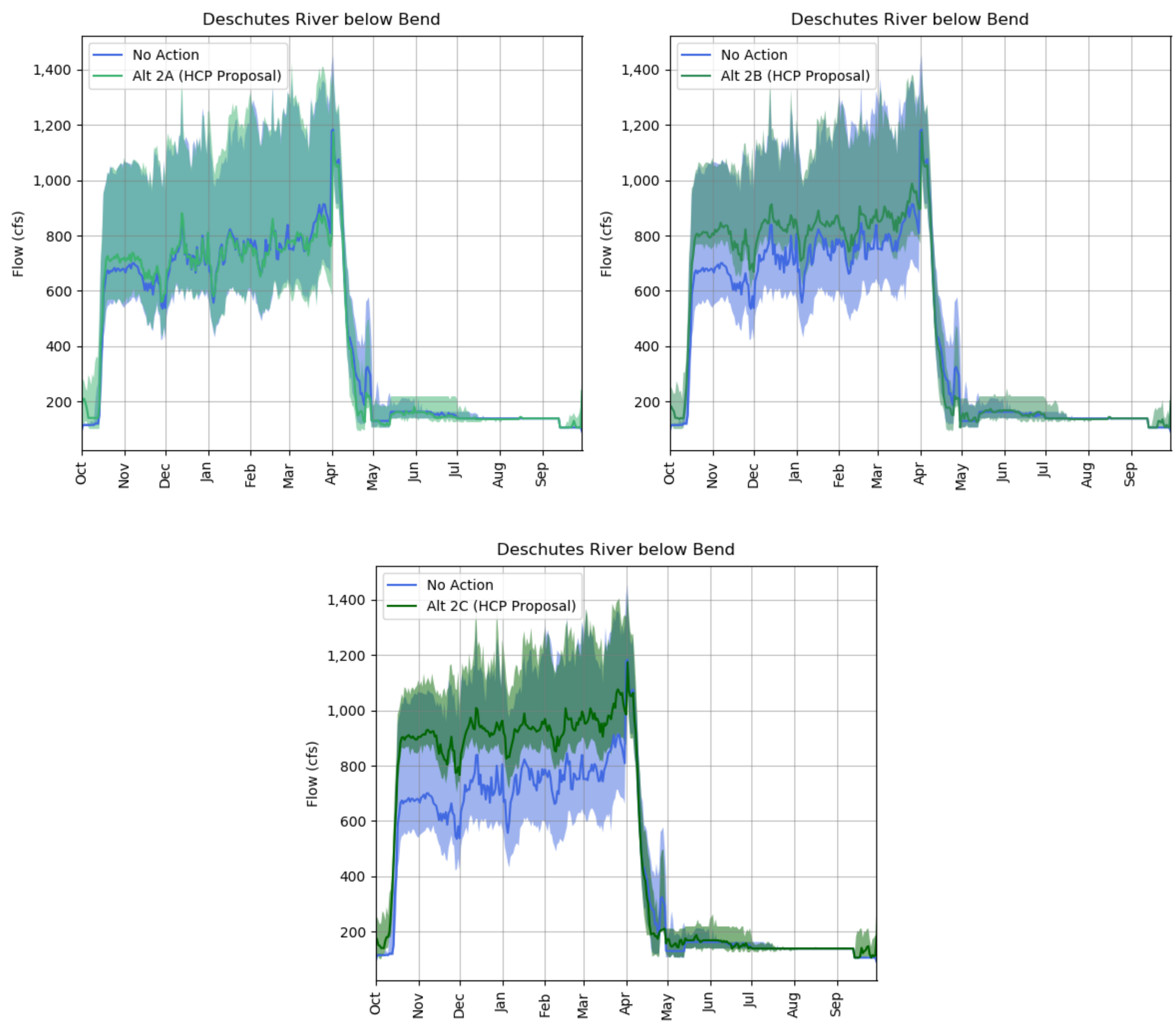


Figure 23. Summary hydrograph of simulated flow in the Deschutes River below Bend for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left), 2B at the top right, and 2C at the bottom. The dark blue or green lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.2.2. Tumalo Creek

There are no changes in Tumalo Creek flows from No Action to Alternative 2.

4.2.3. Whychus Creek

There are no changes in Whychus Creek flows from No Action to Alternative 2.

4.2.4. Crooked River

Figure 24 shows summary hydrographs for simulated storage and outflow from Prineville Reservoir for No Action (blue) compared to Alternative 2 (green) for all three implementation phases. Prineville Reservoir's operation in Alternative 2 reflects the changes in the Upper Deschutes. As more water is released from Wickiup Reservoir for minimum flows, there is less available for NUID during the irrigation season. This causes Prineville Reservoir to release more water from NUID's rental account, resulting in higher outflows and lower reservoir storage.

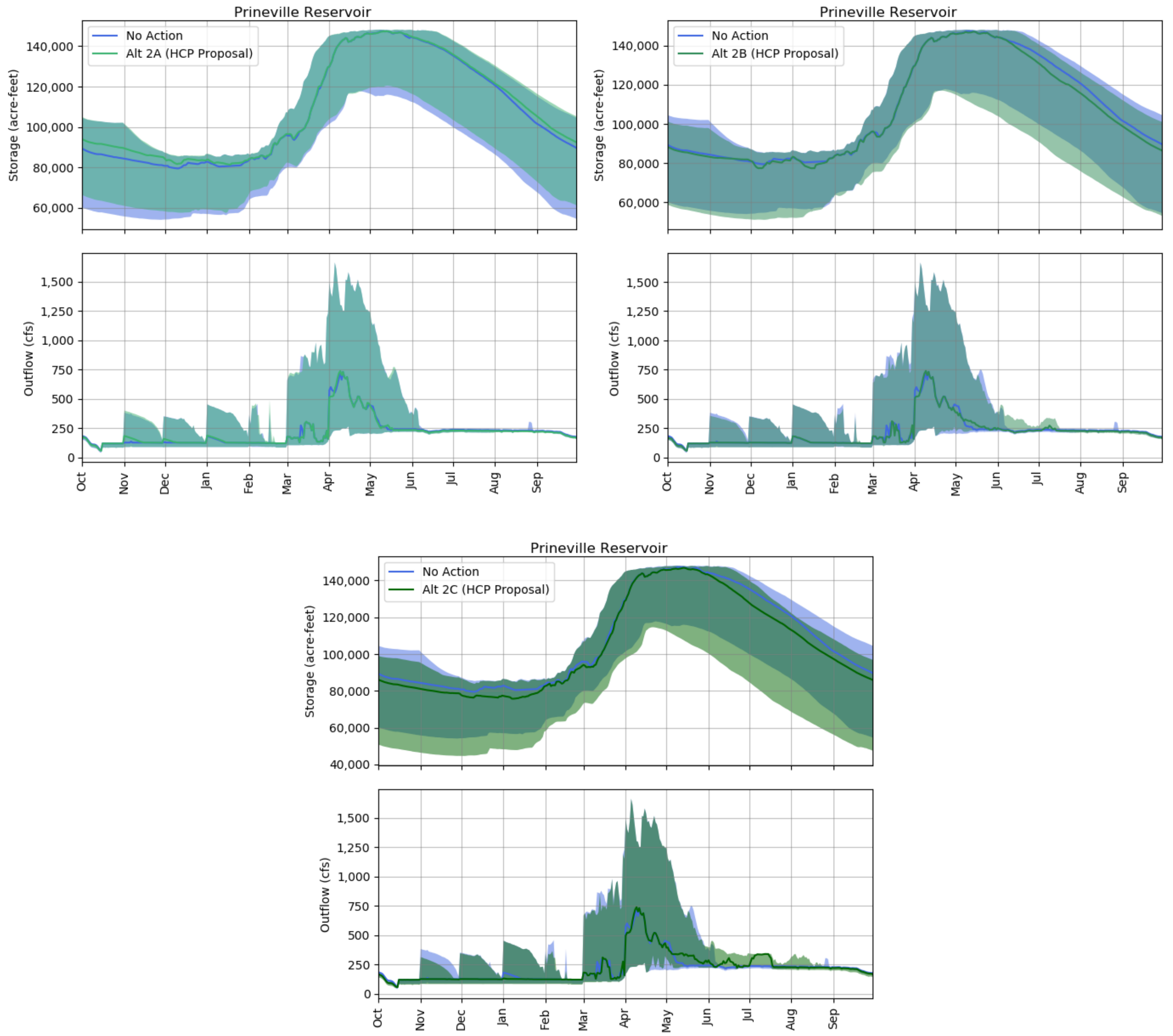


Figure 24. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom. The dark blue or green line represents the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 25 shows a summary hydrograph of the simulated flow in the Crooked River at Highway 126 for No Action (blue) compared to Alternative 2 (green). The effects of the change in Prineville Reservoir releases can be seen at this location, where the minimum flow objectives are able to be met in all years.

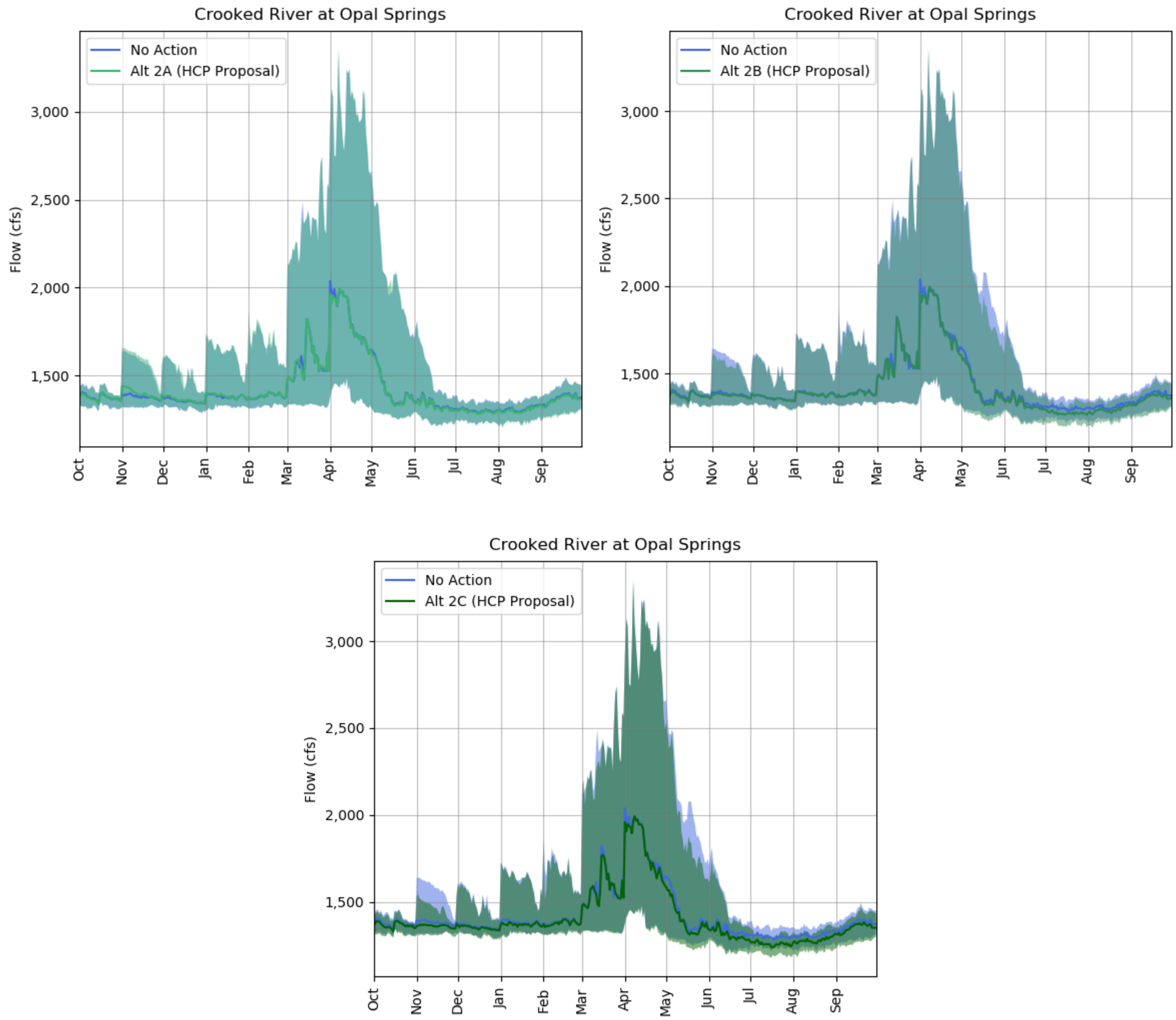


Figure 25. Summary hydrograph of simulated flow in the Crooked River at Highway 126 for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom. The dark blue or green lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 26 shows a summary hydrograph of the simulated flow in the Crooked River below the NUID pumps for No Action (blue) compared to Alternative 2 (green). The effects of the change in Prineville Reservoir releases can be seen at this location. The minimum flows as described in the Deschutes River Conservancy Bypass Flow agreement were met in all years.

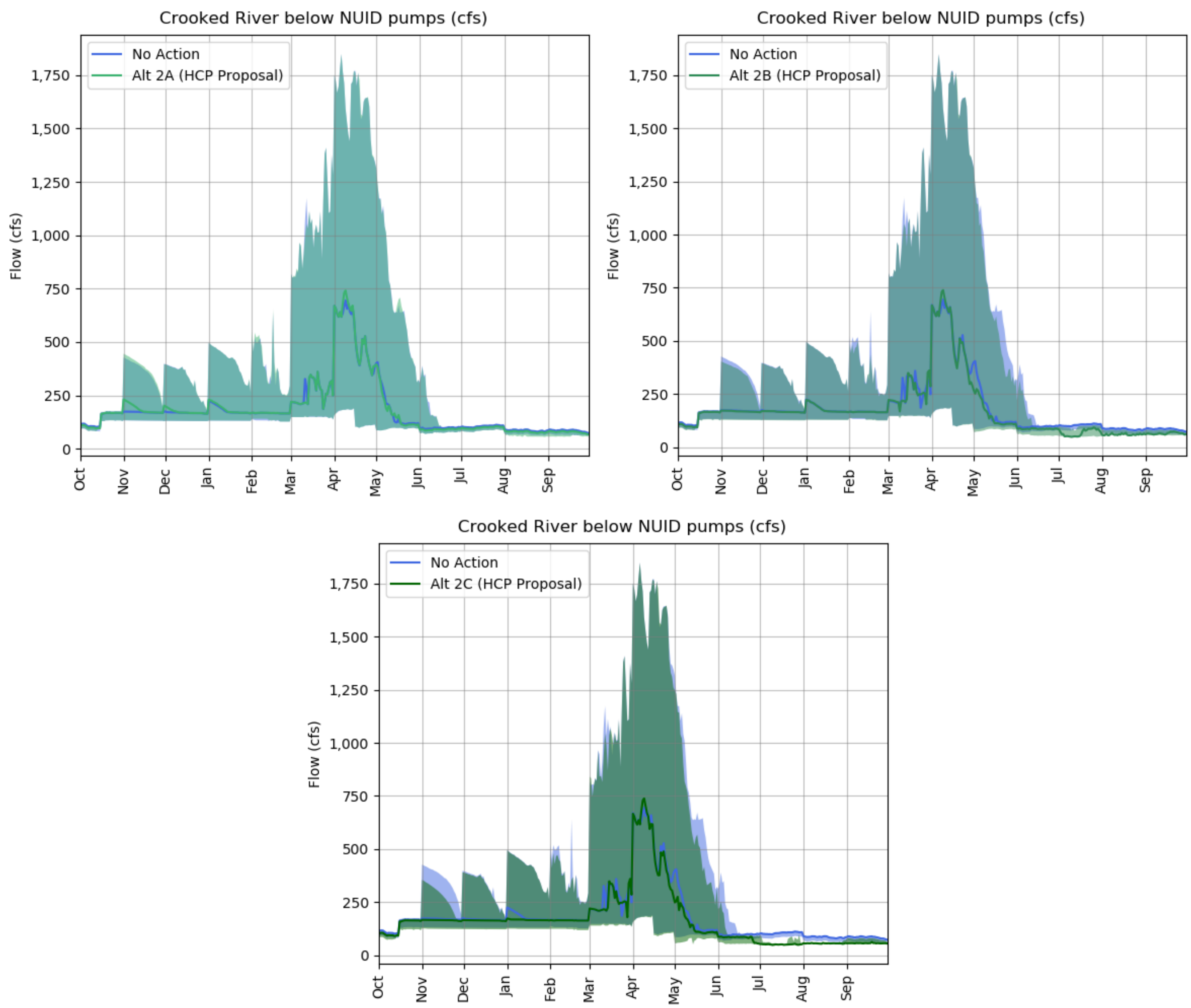


Figure 26. Summary hydrograph of simulated flow in the Crooked River below NUID pumps for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left), 2B at the top right, and 2C at the bottom. The dark blue or green lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.2.5. Irrigation Shortages

Irrigation shortages are calculated every model year and are the difference between the requested demand[9] and the amount of water delivered to each district through the implementation phases. Even though there are three implementation phases with different lengths, each phase is modeled for the entire model run period (1980 through 2018) to get the best assessment of potential effects under different hydrologic conditions. The years indicated on the graphs are the years of the run period, not the years of the implementation phase.

The total annual shortages for Alternatives 2A, 2B, and 2C are ranked and shown in Figure 27. NUID has the largest shortage in Alternative 2 because it is the junior water user on the system. This shortage increases as Alternative 2 is implemented because the increased non-irrigation season flows out of Wickiup Reservoir reduce the amount of stored water available for NUID. Other districts also experience increased shortage because of the increased non-irrigation season flow requirement, and, in the case of LPID and AID, because their storage allocation in Crane Prairie was smaller than for No Action.

Table 8 shows the minimum, median, and maximum shortages from the total annual diversion for No Action, Alternative 2A, Alternative 2B, and Alternative 2C. The shortages are also shown as percent of total demand for each entity to illustrate the significance of the shortage.

[9] Even if model demand was reduced to respond to hydrologic conditions, the total shortage was still calculated using the full, non-reduced annual demand.

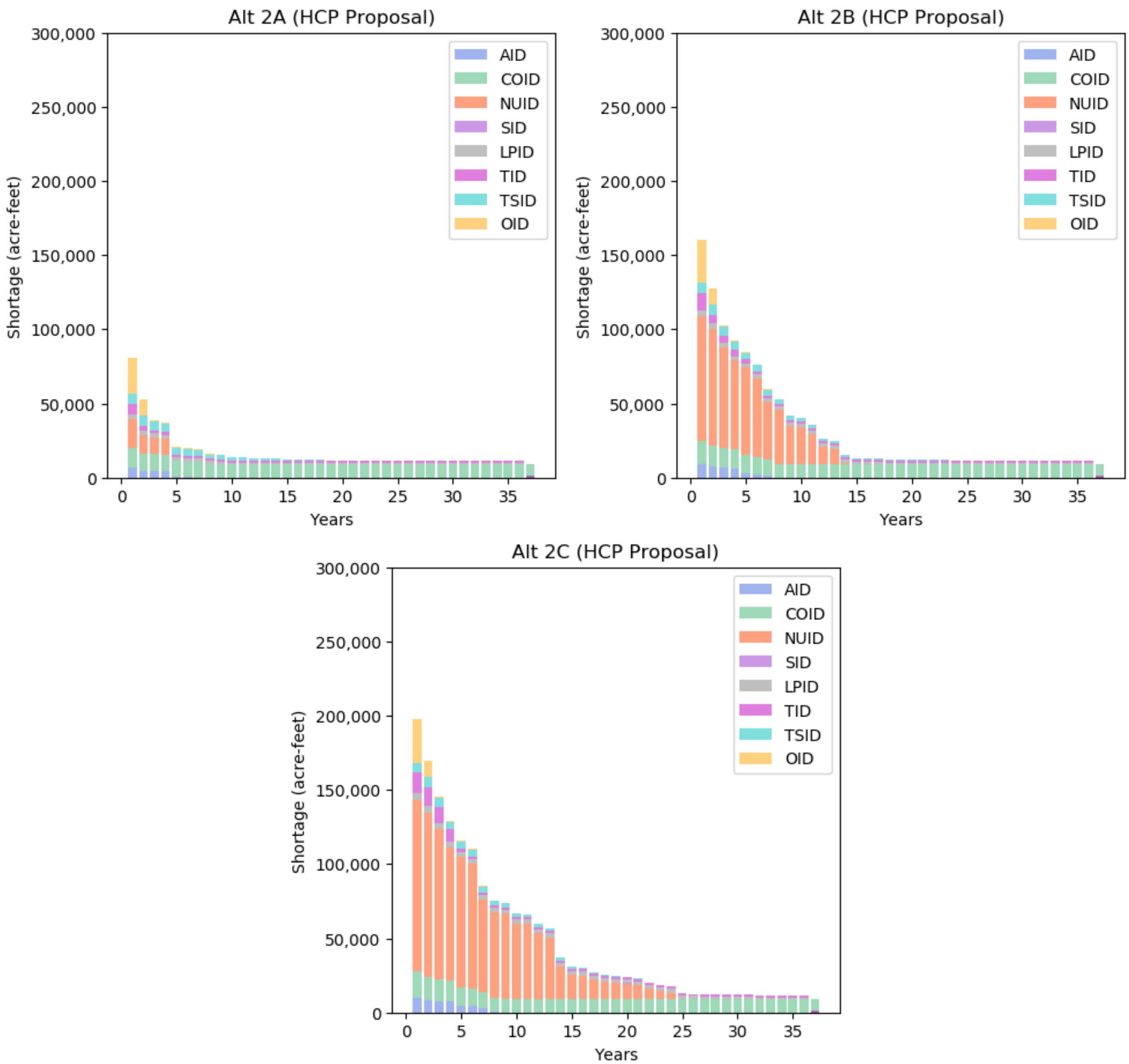


Figure 27. Irrigation shortages for the eight major irrigation districts for Alternative 2

Table 8. Minimum, median, and maximum shortages for No Action, Alternative 2A, Alternative 2B, and Alternative 2C, reported both in volume (acre-feet) and as percent of total annual demand

Alternative	District	Minimum Shortage		Median Shortage		Maximum Shortage	
		Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent
No Action	AID	-	0%	-	0%	6,800	21%
	COID	6,000	0.4%	6,200	0.4%	10,700	1%
	NUID	-	0%	-	0%	42,100	21%
	SID	-	0%	-	0%	-	0%
	LPID	300	2%	1,300	8%	2,900	18%
	TID	1,500	3%	1,500	3%	20,800	39%
	TSID	-	0%	1,000	3%	6,400	18%
	OID	-	0%	-	0%	15,600	20%
Alternative 2A	AID	-	0%	-	0%	7,000	22%
	COID	5,200	0.4%	6,600	0.5%	10,000	1%
	NUID	-	0%	-	0%	29,000	15%
	SID	-	0%	-	0%	-	0%
	LPID	200	1%	900	6%	3,100	19%
	TID	1,500	3%	1,500	3%	7,500	14%
	TSID	-	0%	1,000	3%	6,400	18%
	OID	-	0%	-	0%	23,100	30%
Alternative 2B	AID	-	0%	-	0%	9,300	29%
	COID	5,300	0.4%	6,600	0.5%	12,300	1%
	NUID	-	0%	3,600	2%	92,900	47%
	SID	-	0%	-	0%	-	0%
	LPID	900	6%	1,400	9%	3,900	25%
	TID	1,500	3%	1,500	3%	11,400	21%
	TSID	-	0%	1,000	3%	6,400	18%
	OID	-	0%	-	0%	27,900	36%
Alternative 2C	AID	-	0%	-	0%	10,300	32%
	COID	5,700	0.4%	6,600	0.5%	13,900	1%
	NUID	-	0%	21,300	11%	123,400	63%
	SID	-	0%	-	0%	-	0%
	LPID	900	6%	2,600	16%	4,700	29%
	TID	1,500	3%	1,500	3%	13,700	26%
	TSID	-	0%	1,000	3%	6,400	18%
	OID	-	0%	-	0%	28,000	36%

As a consequence of using more Wickiup flows for winter releases, there is less water available during the irrigation season for NUID; therefore, there is more reliance on flow from the Crooked River. Table 9 shows the percent of NUID deliveries that are from the Crooked River in the various stages of the alternative.

Table 9. Maximum, median, and minimum percent contributions of the Crooked River to NUID total delivery

Percent Contribution	Alternative			
	No Action	Alternative 2A	Alternative 2B	Alternative 2C
Minimum	7%	7%	7%	7%
Median	7%	7%	9%	16%
Maximum	14%	14%	32%	44%

4.3. Alternative 3

This section presents results for Alternative 3, along with the results for No Action and Alternative 2C for comparison. Only the locations that experienced a change from the No Action alternative are shown, and results are shown only for the final phase of Alternative 3, i.e., Alternative 3C.

4.3.1. Upper Deschutes

Figure 28 shows summary hydrographs of the simulated storage and outflow from Wickiup Reservoir for No Action (blue) compared to Alternative 3C (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). The graphs show the results of the scenario where minimums between 400 and 500 cfs were maintained and defined by November 1 Wickiup Reservoir storage contents, as compared to the No Action alternative where minimum outflows were 100 cfs and to Alternative 2C where outflows ranged from 400 to 500 cfs. The graphs show that the ranges of flows are achievable for each of the alternatives. However, Wickiup Reservoir storage for Alternative 3C is lower than for both No Action and Alternative 2C.

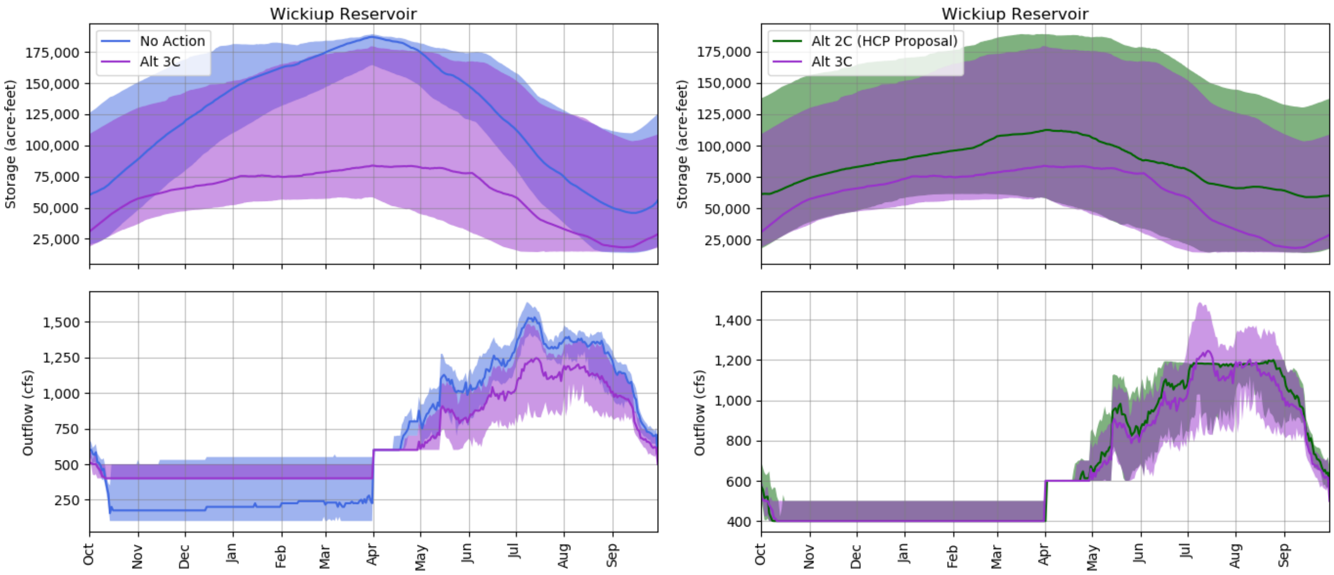


Figure 28. Summary hydrographs of simulated storage (top) and outflow (bottom) from Wickiup Reservoir. The graph on the left shows No Action (blue) compared to Alternative 3 (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 29 shows summary hydrographs for the storage and outflow from Crescent Lake for No Action (blue) compared to Alternative 3 (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). Recall that the intended operation for Crescent Lake in Alternative 3 was to maintain a minimum of 20 cfs throughout the year and 50 cfs from July 1 through September 30, if there is enough water in the lake; this operation was able to be achieved in all modeled years. The storage in Crescent Lake is slightly higher than for No Action because the outflow requirements are lower in Alternative 3C, which is largely due to the reduced minimum outflow requirements from Alternative 3C compared to No Action. When compared to Alternative 2C, Alternative 3C storage is lower because the minimum outflow requirement for Alternative 3C is higher than Alternative 2C.

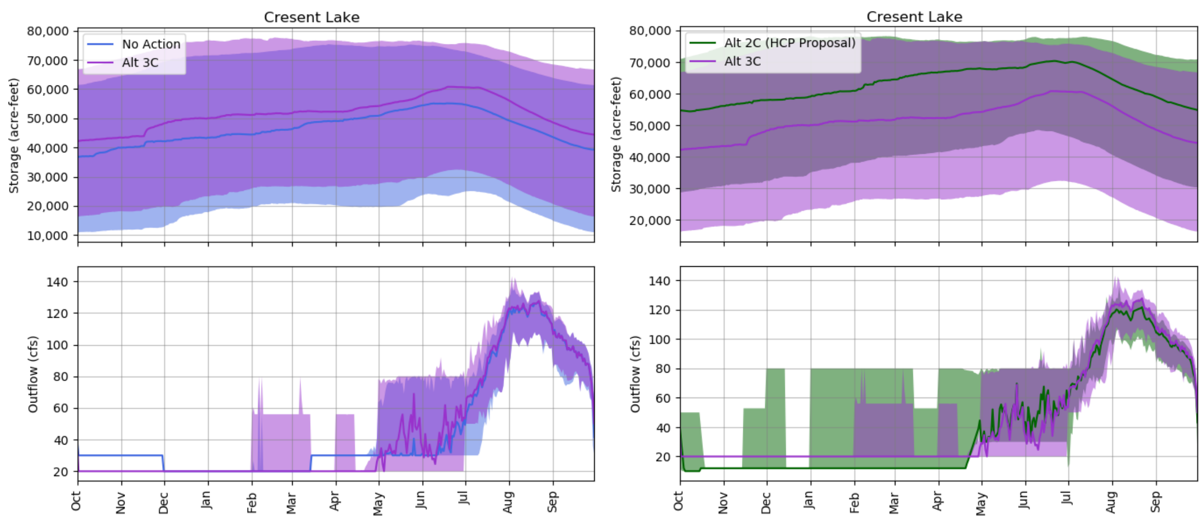


Figure 29. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crescent Lake. The graph on the left shows the No Action alternative (blue) compared to Alternative 3C (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 30 shows summary hydrographs of the simulated flow in the Little Deschutes River at La Pine for No Action (blue) compared to Alternative 3C (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). As mentioned previously, the flow at this gage is largely unregulated, with a small contribution from Crescent Creek and Crescent Lake in the spring and larger contributions in the summer and fall. The changes in the releases from Crescent Lake can be seen primarily in the summer months, but, overall, the flow is relatively similar at this gage for both alternatives. Note that the flow changes between Alternatives 2C and 3C are small relative to the total flow.

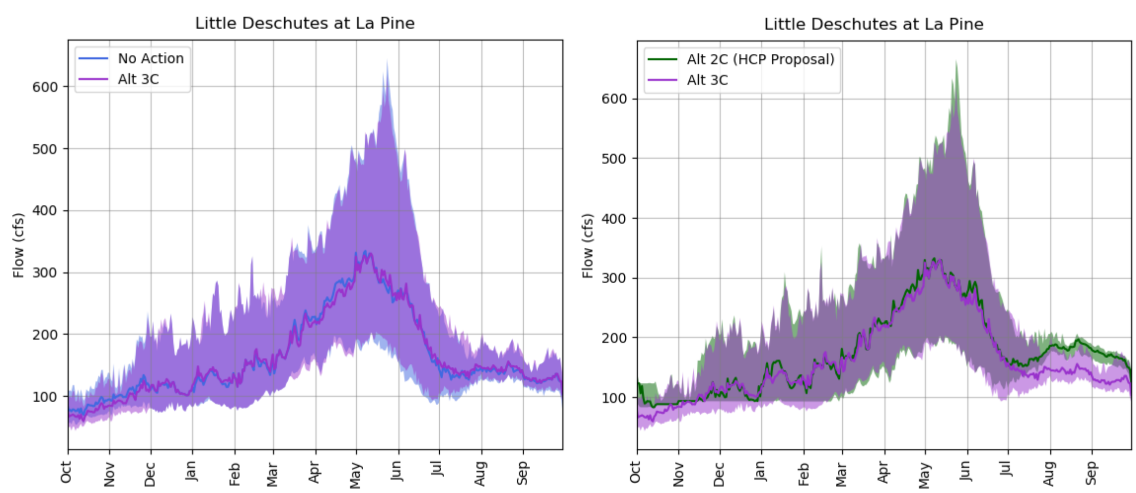


Figure 30. Summary hydrographs of simulated flow in the Little Deschutes at La Pine pumps. The graph on the left shows the No Action Alternative (blue) compared to Alternative 3C (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 31 shows summary hydrographs of the simulated flow in the Deschutes River at Benham Falls for No Action (blue) compared to Alternative 3C (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). This gage is heavily influenced by the outflow from Wickiup Reservoir, so the changes from No Action mimic those changes at Wickiup Reservoir. Note that the differences between Alternative 2C and Alternative 3C are small, except for the irrigation season outflow limit from Wickiup that can be seen at Benham Falls.

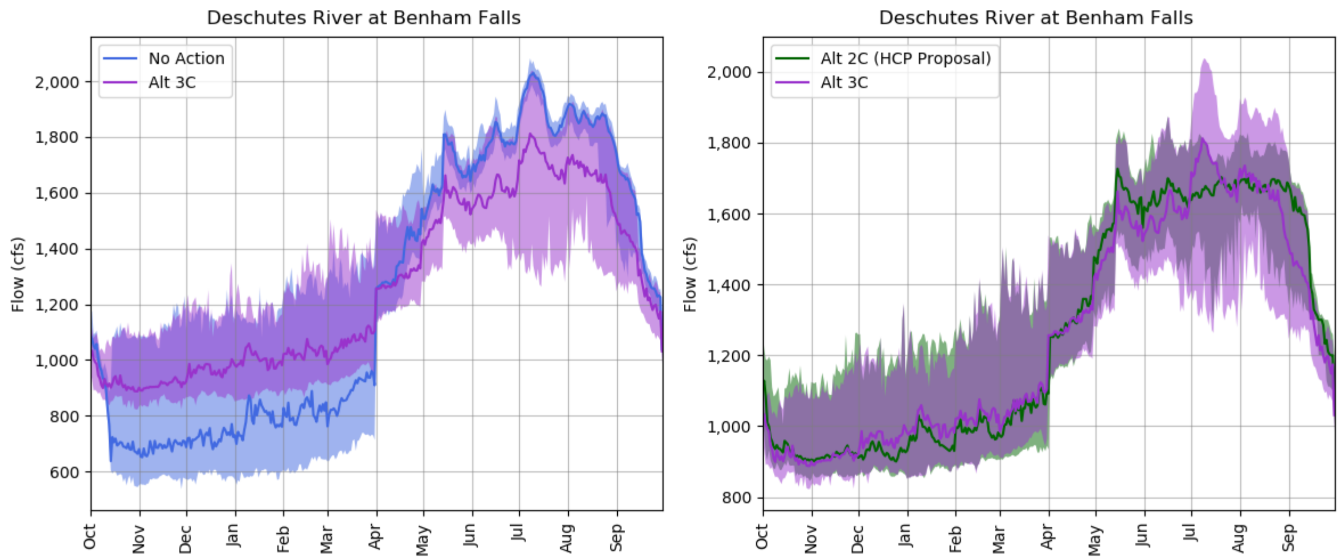


Figure 31. Summary hydrographs of simulated flow in the Deschutes River at Benham Falls. The graph on the left shows No Action (blue) compared to Alternative 3C (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 32 shows summary hydrographs of the simulated flow in the Deschutes River below Bend for No Action (blue) compared to Alternative 3C (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). The effects of the increased release from Wickiup Reservoir can be seen in the winter months when the range and median of flow is larger than for No Action. The summer flows are similar for all three alternatives.

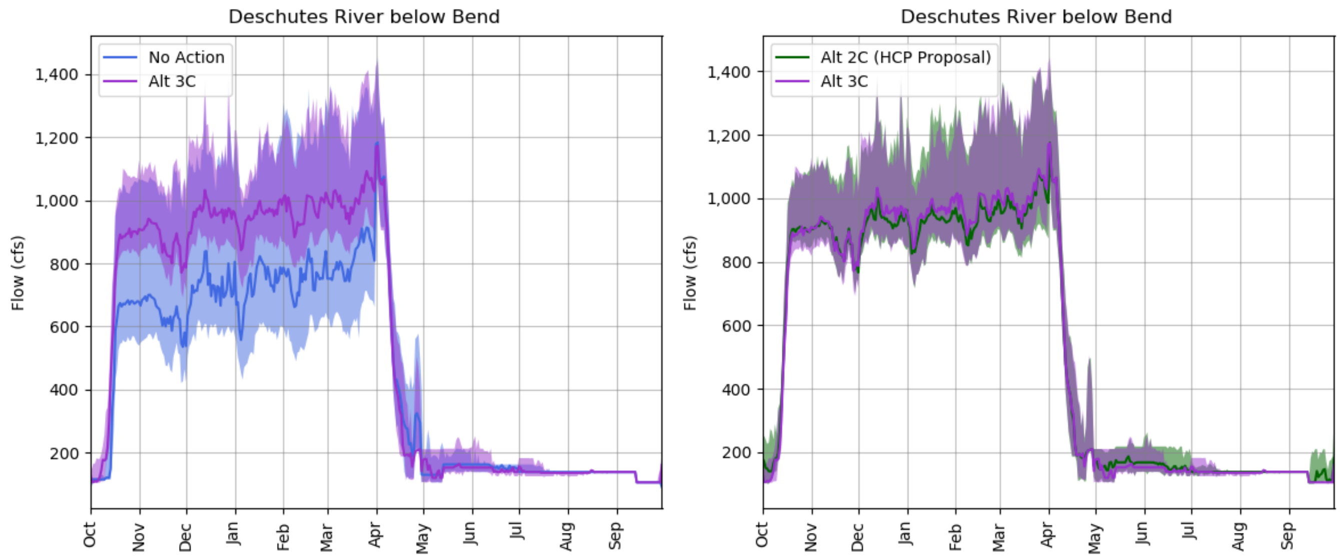


Figure 32. Summary hydrographs of simulated flow in the Deschutes River below Bend. The graph on the left shows No Action (blue) compared to Alternative 3C (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.3.2. Tumalo Creek

There are no changes in Tumalo Creek flows from No Action to Alternative 3.

4.3.3. Whychus Creek

There are no changes in Whychus Creek flows from No Action to Alternative 3.

4.3.4. Crooked River

The Crooked River has a difference in operation because the uncontracted releases are assumed to be bypassed by NUID in this Alternative (in other words, the water is "protected" from diversion). This is modeled by requiring NUID to bypass either the minimum flows required by the DRC agreement or the releases out of the uncontracted account, whichever is larger.

Figure 33 shows the storage and outflow from Prineville Reservoir for No Action compared to Alternative 3C (left), and for Alternative 2C compared to Alternative 3C (right). In Alternative 2, NUID could divert any uncontracted water over and above the DRC agreement flows. Under Alternative 3, they can no longer divert as much water in the river because they need to bypass the larger of the uncontracted release or the DRC agreement. To make up the difference, they request more from their rental account. This causes Prineville Reservoir storage to be slightly lower at the end of the irrigation season and, in some years, reduces storage on April 1. Since the uncontracted account is last to fill, it takes the shortage when Prineville Reservoir does not fill; this affects the amount it can release the following year. The overall effects are slightly different outflows and lower reservoir storage in Alternative 3.

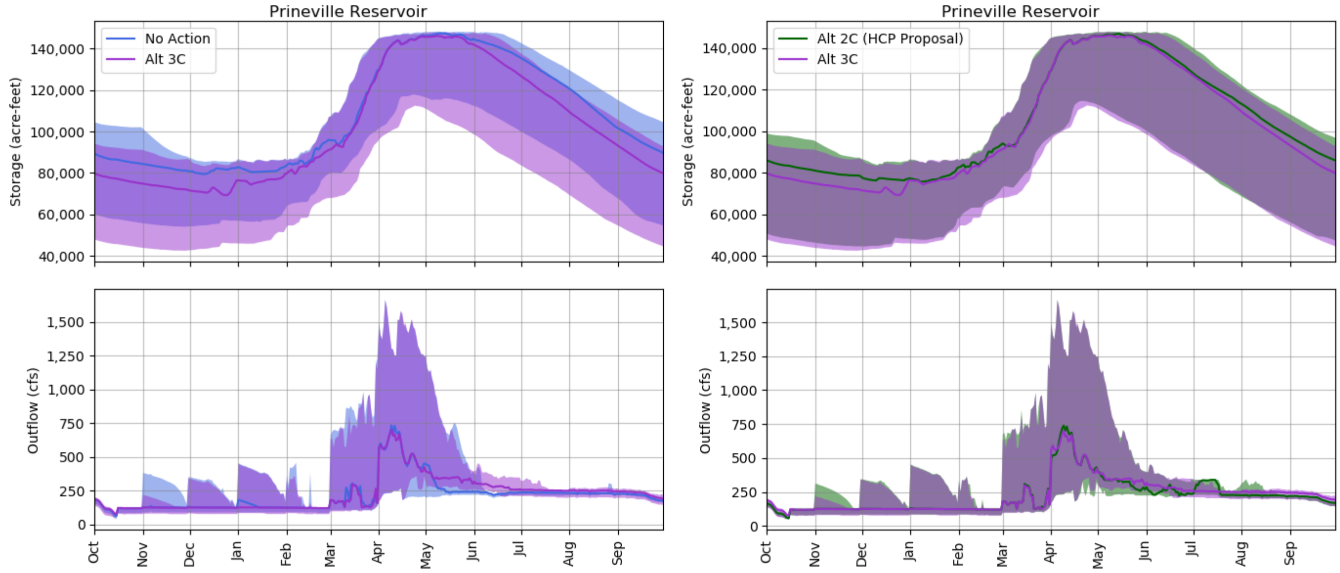


Figure 33. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir. The graphs on the left show No Action (blue) compared to Alternative 3C (purple). The graphs on the right show Alternative 2C (green) compared to Alternative 3C (purple). In all graphs, the colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

In the most extreme years from the simulation period, NUID used approximately 3,500 acre-feet more water from its rental account in Alternative 3C versus Alternative 2C. The effect on the uncontracted account was a reduction in storage of 3,400 acre-feet. This ultimately results in lower outflows from the uncontracted account.

Figure 34 shows summary hydrographs of the simulated flow in the Crooked River at Highway 126 for No Action (blue) compared to Alternative 3C (purple) (left), and for Alternative 2C (green) compared to Alternative 3C (purple) (right). The effects of the change in Prineville Reservoir releases can be seen at this location, where the minimum flows could be maintained in all model years.

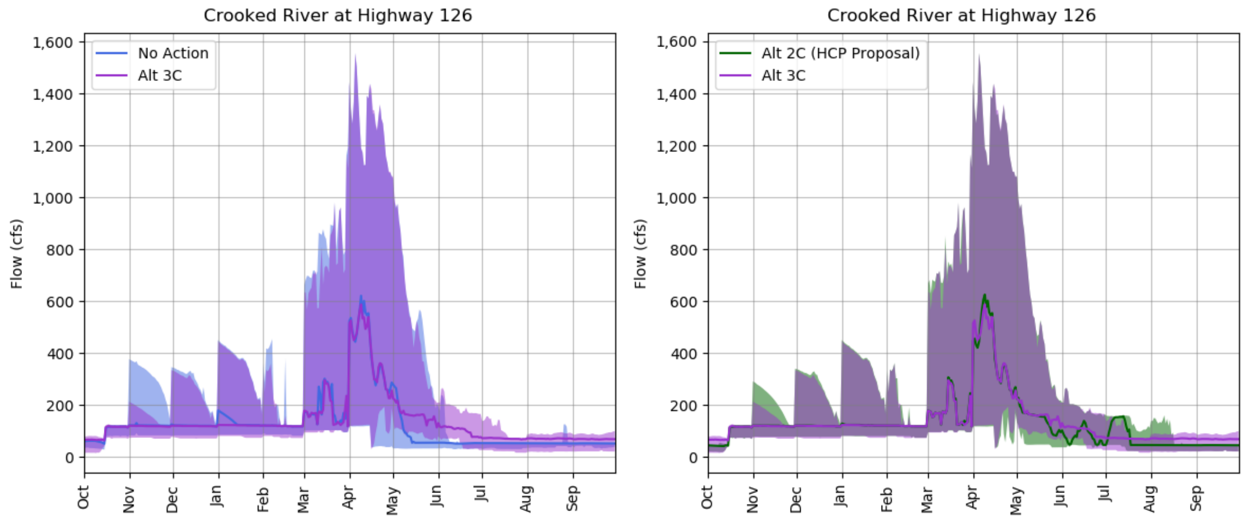


Figure 34. Summary hydrographs of simulated flow in the Crooked River at Highway 126. The graph on the left shows No Action (blue) compared to Alternative 3C (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 35 shows summary hydrographs of the simulated flow in the Crooked River below the NUID pumps for No Action (blue) compared to Alternative 3C (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). Note that Alternative 3C shows slightly higher median flows than Alternative 2C in the summer. The effects of the change in Prineville Reservoir releases can be seen at this location, where the minimum flows as described in the Deschutes River Conservancy Bypass Flow agreement were met in all years with additional water supplied from the uncontracted account.

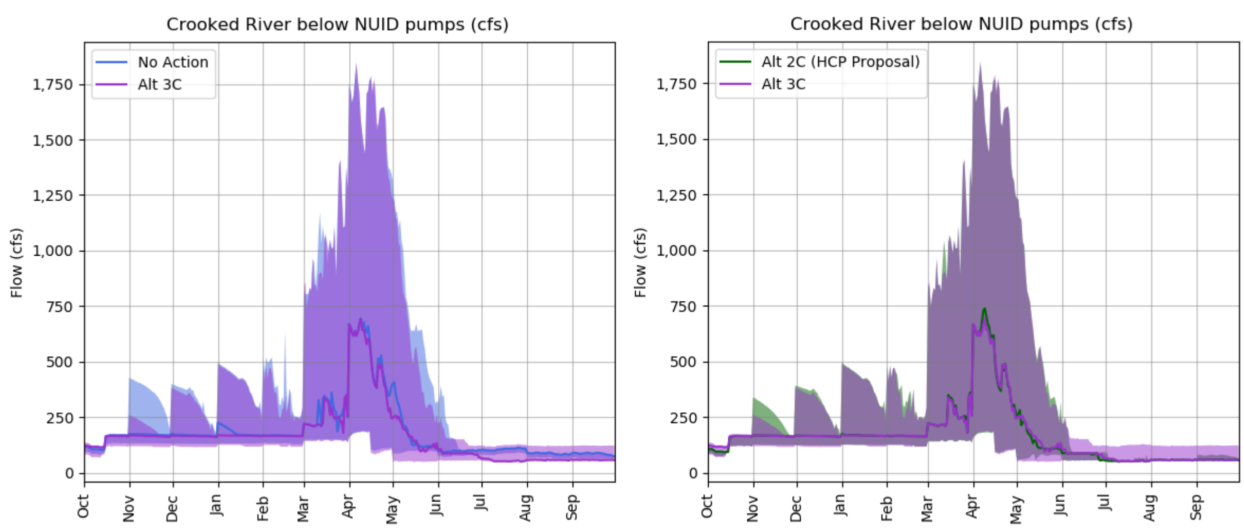


Figure 35. Summary hydrographs of simulated flow in the Crooked River below NUID pumps. The graph on the left shows the No Action Alternative (blue) compared to Alternative 3C (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.3.5. Irrigation Shortages

Irrigation shortages are calculated every model year and are the difference between the requested demand[10] and the amount of water delivered to each district. Even though there are three implementation phases with different lengths, each phase is modeled for the entire model run period (1980 through 2018) to get the best assessment of potential effects under different hydrologic conditions. The years indicated on the graphs are the years of the run period, not the years of the implementation phase.

The total annual shortages for Alternative 3C are ranked and shown in Figure 36. NUID has the largest shortage in Alternative 3C because it is the junior water user on the system. This shortage is slightly larger than Alternative 2C in the median years because the uncontracted water out of Prineville Reservoir is bypassed the NUID pumps. Other districts also experience increased shortage because of the increased non-irrigation season flow requirement, and, in the case of LPID and AID, because their storage allocation in Crane Prairie was smaller than for No Action.

[10] Even if model demand was reduced to respond to hydrologic conditions, the total shortage was still calculated using the full non-reduced annual demand.

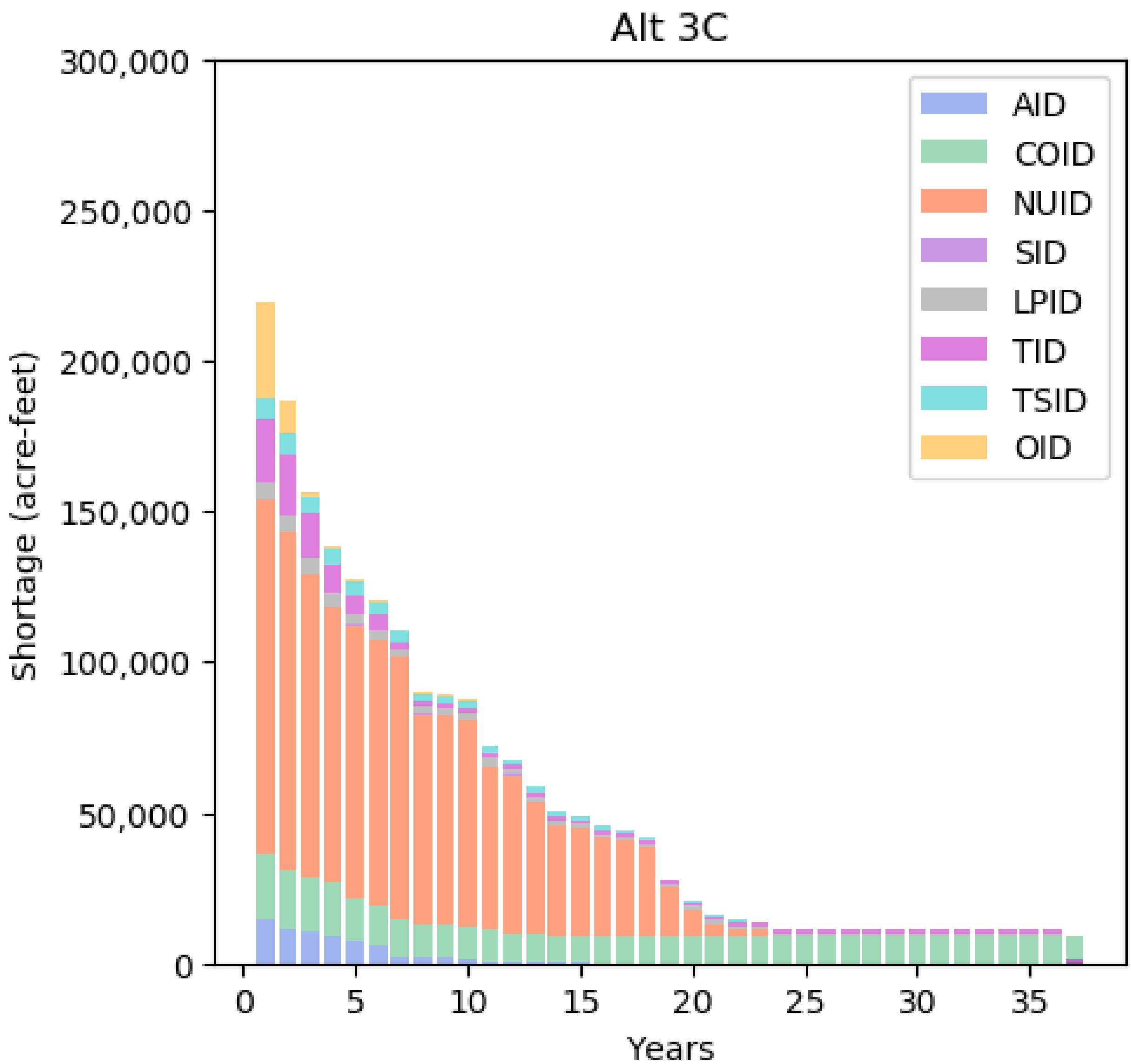


Figure 36. Irrigation shortages for the eight major irrigation districts for Alternative 3.

Table 10 shows the minimum, median, and maximum shortages from the total annual diversion for No Action and for Alternative 3C. The shortages are also shown as percent of total demand for each entity in order to indicate in the significance of the shortage.

Table 10. Minimum, median, and maximum shortages for No Action and Alternative 3C, reported both in volume (acre-feet) and as percent of total annual demand

District	No Action Alternative						Alternative 3C					
	Minimum		Median		Maximum		Minimum		Median		Maximum	
	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent
AID	-	0%	-	0%	6,800	21%	-	0%	-	0%	14,500	45%
COID	6,000	0.4%	6,200	0.4%	10,700	1%	6,600	0.5%	6,600	0.5%	17,100	1%
NUID	-	0%	-	0%	42,100	21%	-	0%	33,200	17%	126,000	64%
SID	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
LPID	300	2%	1,300	8%	2,900	18%	700	5%	900	6%	5,400	34%
TID	1,500	3%	1,500	3%	20,800	39%	1,500	3%	1,500	3%	20,700	39%
TSID	-	0%	1,000	3%	6,400	18%	-	0%	1,000	3%	6,400	18%
OID	-	0%	-	0%	15,600	20%	-	0%	-	0%	31,100	40%

A consequence of using more Wickiup flows for winter releases is there is less water available during the irrigation season for NUID; therefore, there is more reliance on flow from the Crooked River. Table 11 shows the percent of NUID deliveries that are from the Crooked River in the various stages of the alternative.

Table 11. Maximum, median, and minimum percent contributions of the Crooked River to NUID total delivery

Percent Contribution	Alternative	
	No Action	Alternative 3C
Minimum	7%	7%
Median	7%	18%
Maximum	14%	47%

4.4. Alternative 4

Alternative 4B results are displayed in this section, along with results from the No Action alternative and Alternative 2C for comparison. Only the locations that experienced a change from the No Action results are shown, and results are shown only for the final phase of Alternative 4 (Alternative 4B).

4.4.1. Upper Deschutes

Figure 37 shows summary hydrographs of the simulated storage and outflow from Wickiup Reservoir for the No Action alternative (blue) compared to Alternative 4B (orange-red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). The graphs show the results of the scenario where minimums between 400 and 600 cfs were maintained and defined by November 1 Wickiup Reservoir storage contents, as compared to No Action (where minimum outflows were 100 cfs) and Alternative 2C (where outflows ranged from 400 to 500 cfs). The graphs show that the ranges of flows are achievable for each of the alternatives. However, Wickiup Reservoir storage in Alternative 4B is lower than both No Action and Alternative 2C.

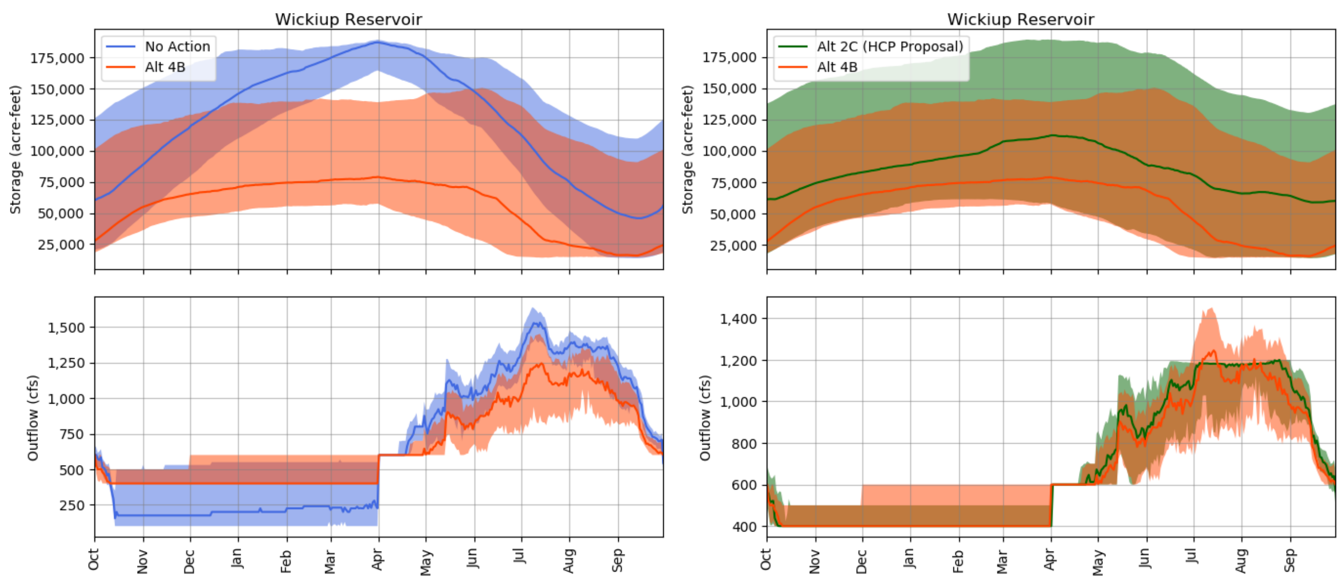


Figure 37. Summary hydrographs of simulated storage (top) and outflow (bottom) from Wickiup Reservoir. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (orange-red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 38 shows summary hydrographs for the storage and outflow from Crescent Lake for No Action (blue) compared to Alternative 4 (orange-red), and for Alternative 2 (green) compared to Alternative 4B (orange-red). Recall that the intended operation for Crescent Lake in Alternative 4 was to maintain a minimum of 20 cfs throughout the year and 50 cfs from July 1 through September 30, if there is enough water in the lake. The storage in Crescent Lake is slightly higher than for No Action because the outflow requirements are lower in Alternative 4B, largely due to the reduced minimum outflow requirement for Alternative 4B when compared to No Action. When compared to Alternative 2C, Alternative 4B storage is lower also because the minimum outflow requirement for 4B is higher than Alternative 2C, resulting in lower storage in Alternative 4B.

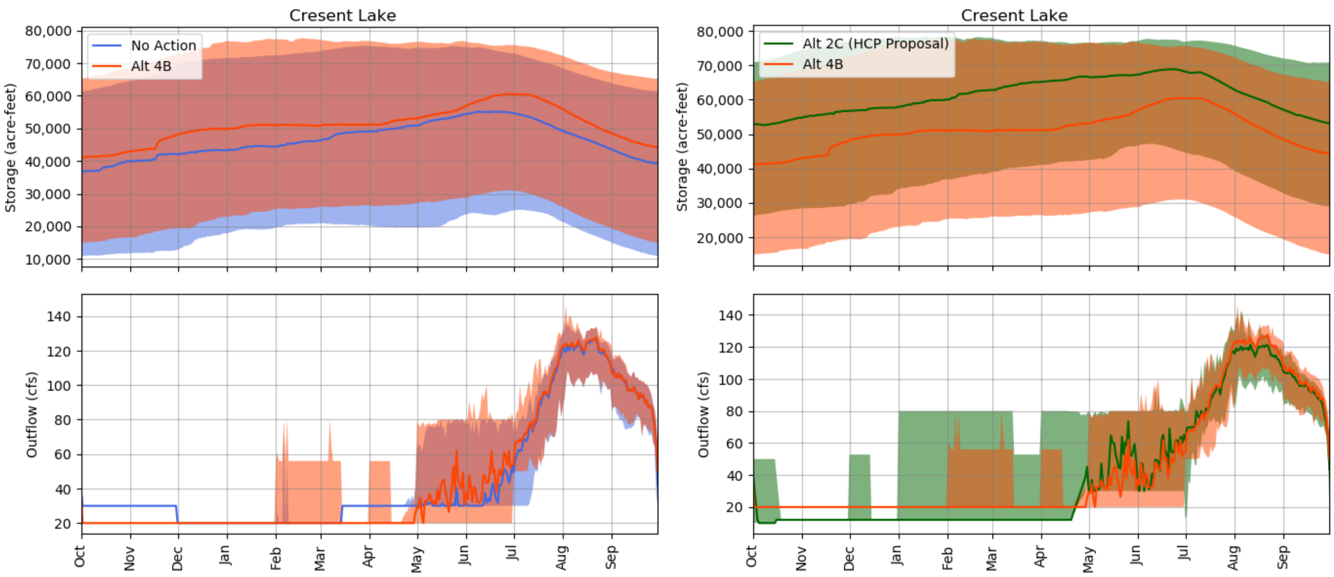


Figure 38. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crescent Lake. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (orange-red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 39 shows summary hydrographs of the simulated flow in the Little Deschutes River at La Pine for the No Action alternative (blue) compared to Alternative 4B (orange-red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). As mentioned previously, the flow at this gage is largely unregulated, with a small contribution from Crescent Creek and Crescent Lake in the spring and a larger contribution in the summer and fall. The changes in the releases from Crescent Lake can be seen primarily in the summer months, but, overall, the flow is relatively similar at this gage for both alternatives. Note that the flow changes between Alternatives 2C and 4B are small relative to the total flow.

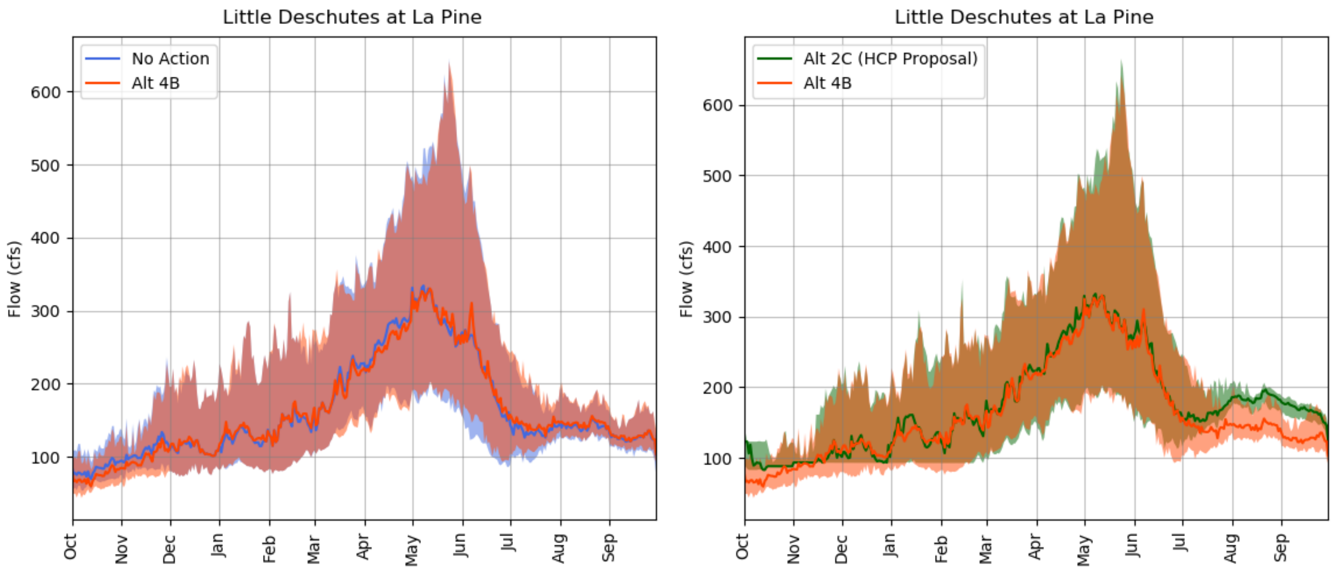


Figure 39. Summary hydrographs of simulated flow in the Little Deschutes at La Pine pumps. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (orange-red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 40 shows summary hydrographs of the simulated flow in the Deschutes River at Benham Falls for the No Action alternative (blue) compared to Alternative 4B (orange-red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). This gage is heavily influenced by the outflow from Wickiup Reservoir, so the changes from No Action mimic those changes at Wickiup Reservoir. Note that the differences between Alternative 2C and Alternative 4B are small.

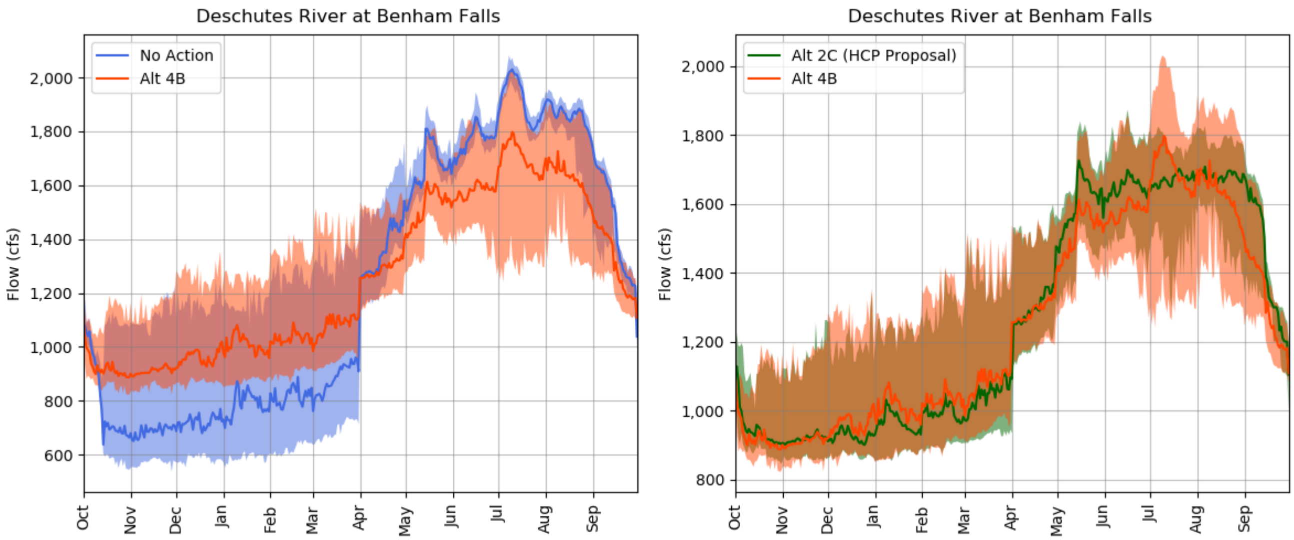


Figure 40. Summary hydrographs of simulated flow in the Deschutes River at Benham Falls. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 41 shows summary hydrographs of the simulated flow in the Deschutes River below Bend for No Action (blue) compared to Alternative 4B (orange-red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). The effects of the increased release from Wickiup Reservoir can be seen in the winter months, when the range and median of flow is larger than for No Action. The summer flows are similar for all three alternatives.

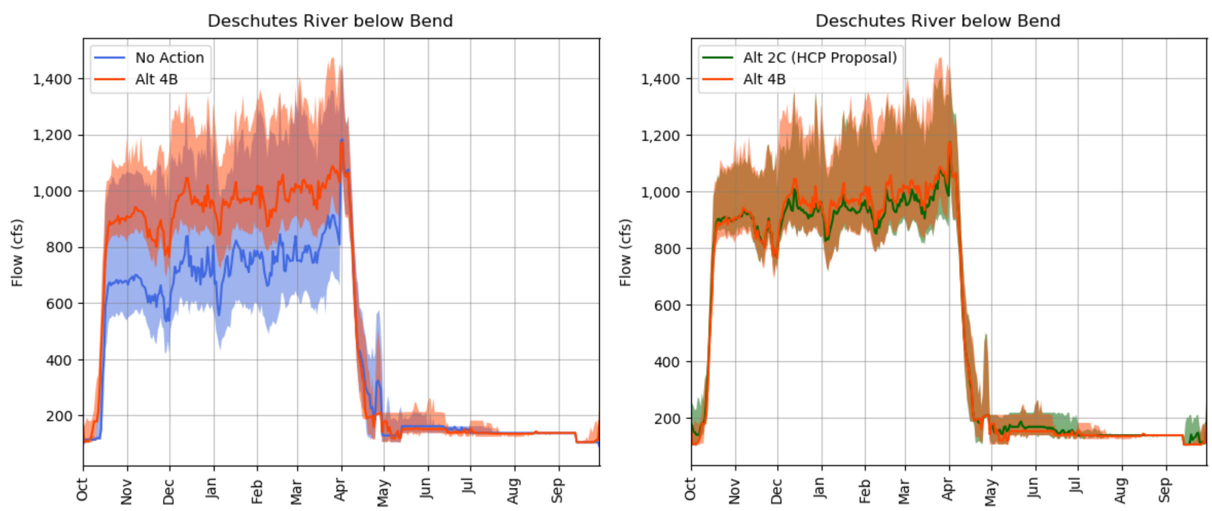


Figure 41. Summary hydrographs of simulated flow in the Deschutes River below Bend. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.4.2. Tumalo Creek

There are no changes in Tumalo Creek flows from No Action to Alternative 4.

4.4.3. Whychus Creek

There are no changes in Whychus Creek flows from No Action to Alternative 4.

4.4.4. Crooked River

The Crooked River has a difference in operations because the uncontracted releases from Prineville Reservoir are protected from diversion for irrigation. This is modeled by requiring NUID to bypass the larger of the minimum flows required by the DRC agreement and the releases out of the uncontracted account. In addition, the Crooked River is affected by the changes in Wickiup Reservoir outflow.

Figure 42 shows the storage and outflow from Prineville Reservoir for No Action and Alternative 4B. In Alternative 4B, the uncontracted flows are assumed to be bypassed by the NUID pumps, similar to Alternative 3C. In addition, higher winter outflows from Wickiup Reservoir reduce the Upper Deschutes supply to NUID, so the district requests additional rental water from Prineville Reservoir. Overall, the effect is slightly different outflows and lower reservoir storage in Alternative 4B.

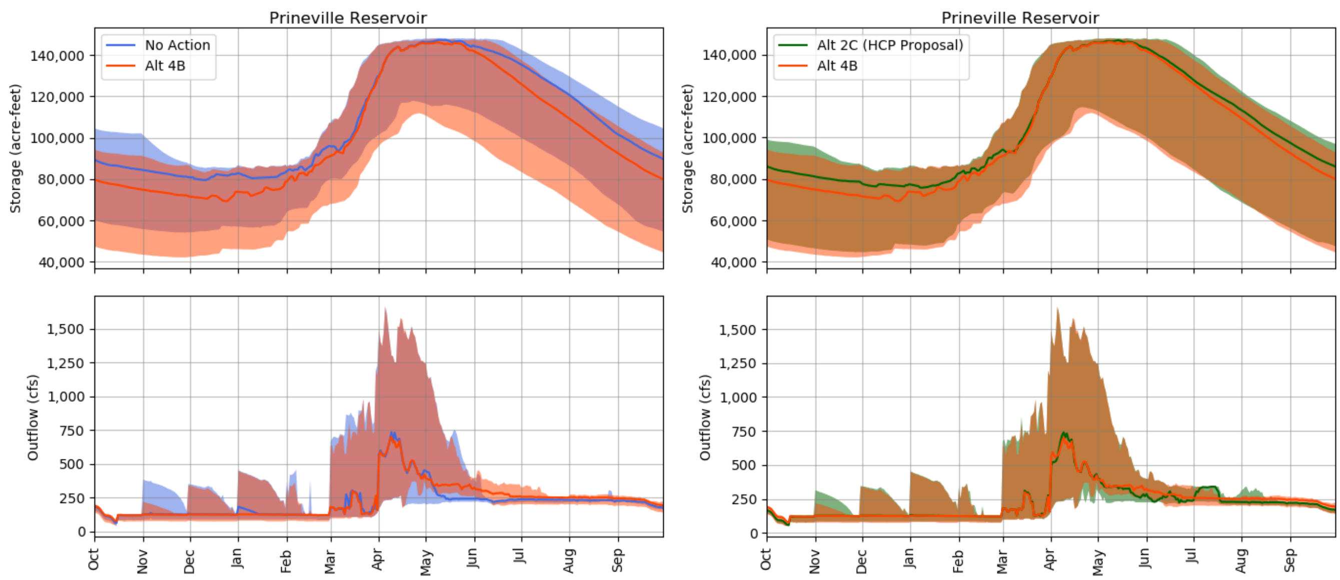


Figure 42. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (orange-red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

The change in Wickiup Reservoir outflows has a much larger effect on NUID shortages in Alterative 4B than in Alternative 3C; in the most extreme years, it uses almost the entire 10,000 acre-feet in the account. The effect on the uncontracted account is a reduction in storage by 28,000 acre-feet, which results in lower outflows from the uncontracted account.

Figure 43 shows summary hydrographs of the simulated flow in the Crooked River at Highway 126 for the No Action alternative (blue) compared to Alternative 4B (red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). The effects of the change in Prineville Reservoir releases can be seen at this location, where minimum flows can be achieved in all modeled years.

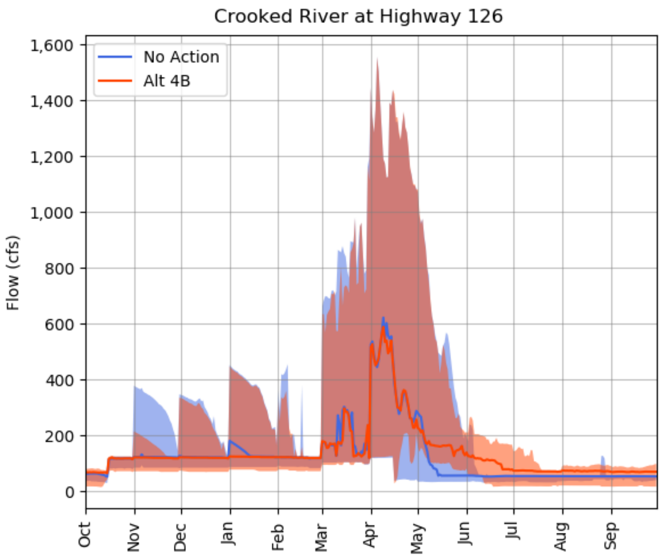


Figure 43. Summary hydrographs of simulated flow in the Crooked River at Highway 126. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 44 shows summary hydrographs of the simulated flow in the Crooked River below NUID pumps for No Action (blue) compared to Alternative 4B (orange-red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). The effects of the change in Prineville Reservoir releases can be seen at this location, where the minimum flows as described in the Deschutes River Conservancy Bypass Flow agreement were met in all years with additional water supplied from the uncontracted account.

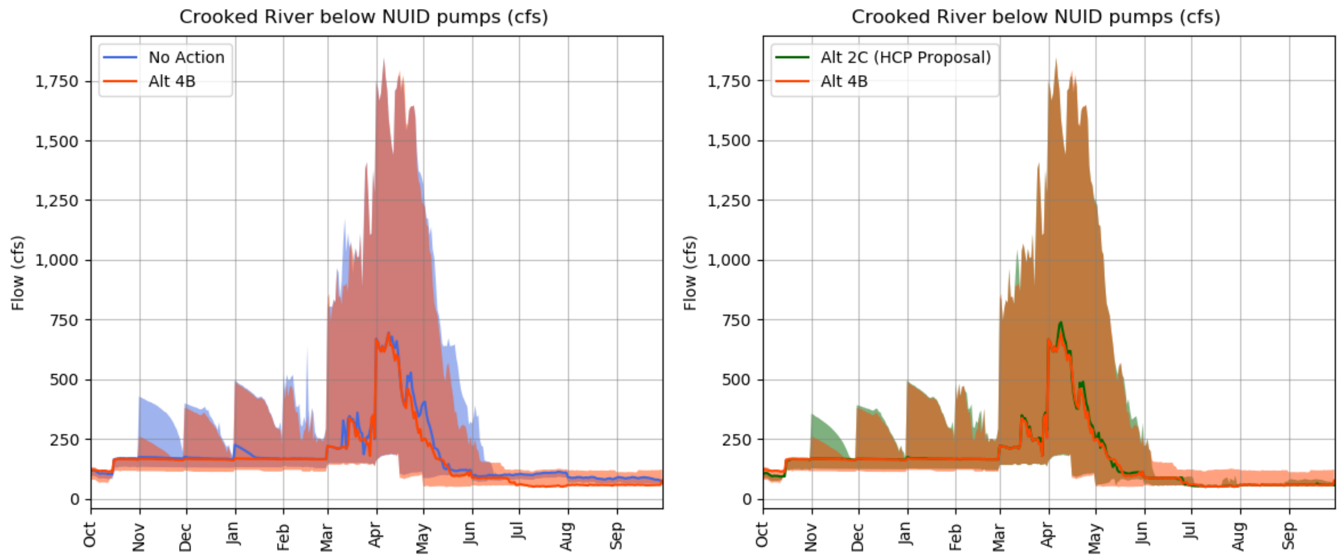


Figure 44. Summary hydrographs of simulated flow in the Crooked River below NUID pumps. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.4.5. Irrigation Shortages

Irrigation shortages are calculated every model year and are the difference between the requested demand[11] and the amount of water delivered to each district. Even though there are three implementation phases with different lengths, each phase is modeled for the entire model run period (1980 through 2018) to get the best assessment of potential effects under different hydrologic conditions. The years indicated on the graphs are the years of the run period, not the years of the implementation phase.

The total annual shortages for Alternative 4B are ranked and shown in Figure 45. As for the No Action alternative, NUID has the largest shortage in Alternative 4B because it is the junior water user on the system. This shortage is increased because the non-irrigation season flows out of Wickiup Reservoir reduce the amount of stored water available for NUID. Other districts also experience increased shortages because of the increased non-irrigation season flow requirement, and, in the case of LPID and AID, because their storage allocation in Crane Prairie was smaller than for No Action.

[11] Even if model demand was reduced to respond to hydrologic conditions, the total shortage was still calculated using the full non-reduced annual demand.

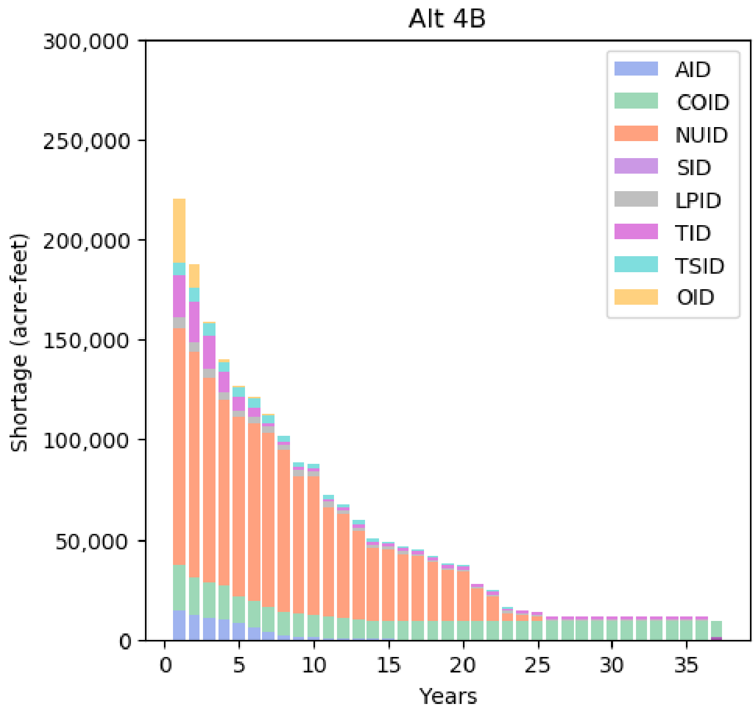


Figure 45. Irrigation shortages for the eight major irrigation districts for Alternative 4

Table 12 shows the minimum, median, and maximum shortages from the total annual diversion for No Action and Alternative 4B. These are also shown as percent of total demand for each entity to illustrate the significance of the shortage.

Table 12. Minimum, median, and maximum shortages for No Action and Alternative 4B, reported both in volume (acre-feet) and as percent of total annual demand

District	No Action Alternative						Alternative 4B					
	Minimum		Median		Maximum		Minimum		Median		Maximum	
	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent
AID	-	0%	-	0%	6,800	21%	-	0%	-	0%	14,600	45%
COID	6,000	0.4%	6,200	0.4%	10,700	1%	6,600	0.5%	6600	0.5%	17,500	1%
NUID	-	0%	-	0%	42,100	21%	-	0%	37,500	19%	126,000	64%
SID	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
LPID	300	2%	1,300	8%	2,900	18%	900	6%	900	6%	5,400	34%
TID	1,500	3%	1,500	3%	20,800	39%	1,500	3%	1,500	3%	20,700	39%
TSID	-	0%	1,000	3%	6,400	18%	-	0%	1,000	3%	6,400	18%
OID	-	0%	-	0%	15,600	20%	-	0%	-	0%	31,100	40%

A consequence of using more Wickiup flows for winter releases is there is less water available during the irrigation season for NUID, and therefore, there is more reliance on flow from the Crooked River. Table 13 shows the percent of NUID deliveries that are from the Crooked River in the various stages of the alternative.

Table 13. Maximum, median, and minimum percent contributions of the Crooked River to NUID total delivery

Percent Contribution	No Action	Alternative 3C
Minimum	7%	7%
Median	7%	21%
Maximum	14%	46%

5. Limitations and Uncertainty

River-reservoir models, such as the one used in this study, are designed to replicate current operating criteria along with potential future operating criteria to test potential changes in operations. They use assumptions and simplifications that are required to develop repeatable logic and a suitable test environment for potential future conditions. They are not intended to be predictive in nature, nor are they intended to exactly replicate future operations on a day-to-day basis. Rather, they are intended to be used to understand trends and effects from plausible operations using a range of historical inflow hydrology. Therefore, selecting individual years, months, or days for analysis is not recommended. In addition, statistics from the model output should be used as a guideline for potential future conditions, but it should be recognized that changes to future inflow hydrology or variations in real time operations could affect the performance of those statistics in the future.

The output from the models presented in this analysis show the effects of specific operating criteria on key metrics such as reservoir outflow and storage, irrigation deliveries, and gage flows. The uncertainty in the results is captured in a range of outputs presented in the hydrographs and tables.

Due to the adaptive nature of some of the measures in the EIS, some of the operations described and modeled for this study represent the best assessment of the implementation of those measures. However, as more information is learned through implementation, the real-time operations may be different than the information presented in this report. The operations will be continuously monitored to ensure they remain within the constraints defined in the NEPA analysis.

6. Summary

Four alternatives were simulated for the DBHCP EIS using RiverWare. The major results from all of the alternatives are summarized below.

- Crane Prairie Reservoir can achieve the storage requirements in most years.
- Crescent Lake can achieve minimum flow requirements, resulting in:
  - Higher storage when compared to No Action.
- Higher winter outflows from Wickiup Reservoir can be achieved, resulting in:
  - Higher winter flows below Wickiup Reservoir, at Benham Falls, below Bend, and at Madras. The increase in flows depends on the flow range defined in the scenario.
  - Decreased winter storage in Wickiup Reservoir. This leads to less water available for irrigation releases in the summer.
  - Lower summer flows below Wickiup Reservoir and at Benham Falls, but not below Bend or at Madras. Lower summer flows below Wickiup Reservoir and at Benham Falls are also due to irrigation season maximum outflow limits.
  - Decreased storage in Crescent Lake due to additional live flow needed for downstream diversion.
  - Increased irrigation shortages, with NUID being the most impacted. Since NUID can also receive water from the Crooked River, storage in Prineville Reservoir is also affected.
- The combination of increasing fish and wildlife (uncontracted) releases from Prineville Reservoir during the irrigation season and bypassing the water by the NUID pumps (in other words, "protecting" the water from diversion) results in:
  - Increased use of NUID's rental account. The amount of water needed is dependent on minimum releases from Wickiup Reservoir.
  - Increased shortage to NUID.
  - Decreased uncontracted water in some years. This results in lower releases in the following year.

7. Literature Cited

Parenthetical Reference	Bibliographic Citation
LaMarche 2018	LaMarche, J. 2018., personal communication. Conversation and emails between Jonathan LaMarche, Hydrologist (Oregon Water Resources Department, Salem, Oregon) and Jennifer Johnson, Hydraulic Engineer, (U.S. Bureau of Reclamation, Boise, Idaho). Subject: The seepage processes between Crane Prairie and Wickiup Reservoirs. August 2018.
OWRD 2013	Oregon Department of Water Resources (OWRD). 2013. Agreement between North Unit Irrigation District and Deschutes River Conservancy regarding minimum stream flows in the Crooked River. Attachment 3 to Conserved Water Application CW-75. Signed September 18, 2013.
Reclamation 2017a	Bureau of Reclamation. 2017a. *Development of a Daily Water Management Model of the Deschutes River, Oregon, using RiverWare*. March 2017.
Reclamation 2017b	Bureau of Reclamation. 2017b. *Hydrologic Evaluation of Baseline and Proposed Management of the Deschutes Project for Oregon Spotted Frog (OSF Proposal)*. January 2017.
Reclamation 2017c	Bureau of Reclamation. 2017c. *Unregulated Flows in the Upper Deschutes Basin, Oregon*. October 2017.
Reclamation 2020	Bureau of Reclamation. 2020. DRAFT *Development of 2020 Level Modified Flows for the Deschutes River Basin*. June 2020.
Zagona et al. 2001	Zagona, E.A., T.J. Fulp, R. Shane, T.M. Magee, H.M. Goranflo. 2001. *RiverWare: A Generalized Tool for Complex Reservoir System Modeling*. Journal of the American Water Resources Association, 37(4), 913-929.

8. Appendix – Logarithmic Graphs of Crooked River Flows

Since a large emphasis is placed on the low flows in the Crooked River, logarithmic graphs were developed to better portray the model output.

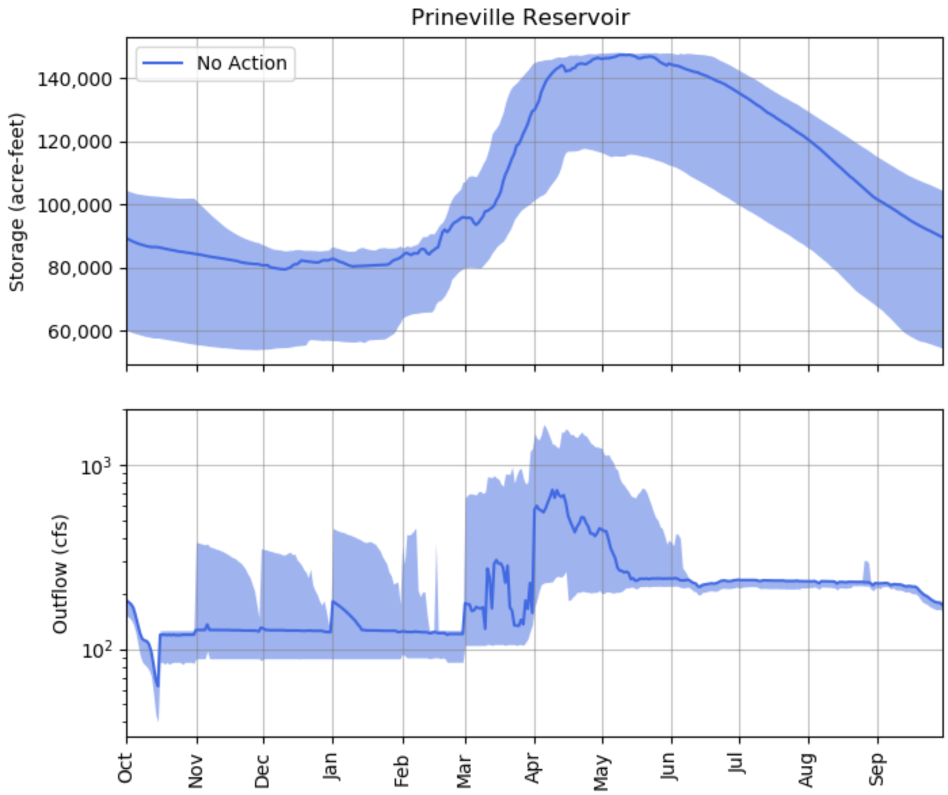


Figure 46. Summary hydrograph of simulated storage (top) and outflow (bottom) from Prineville Reservoir showing the No Action alternative. The dark blue line represents the median and the shaded blue area represents the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

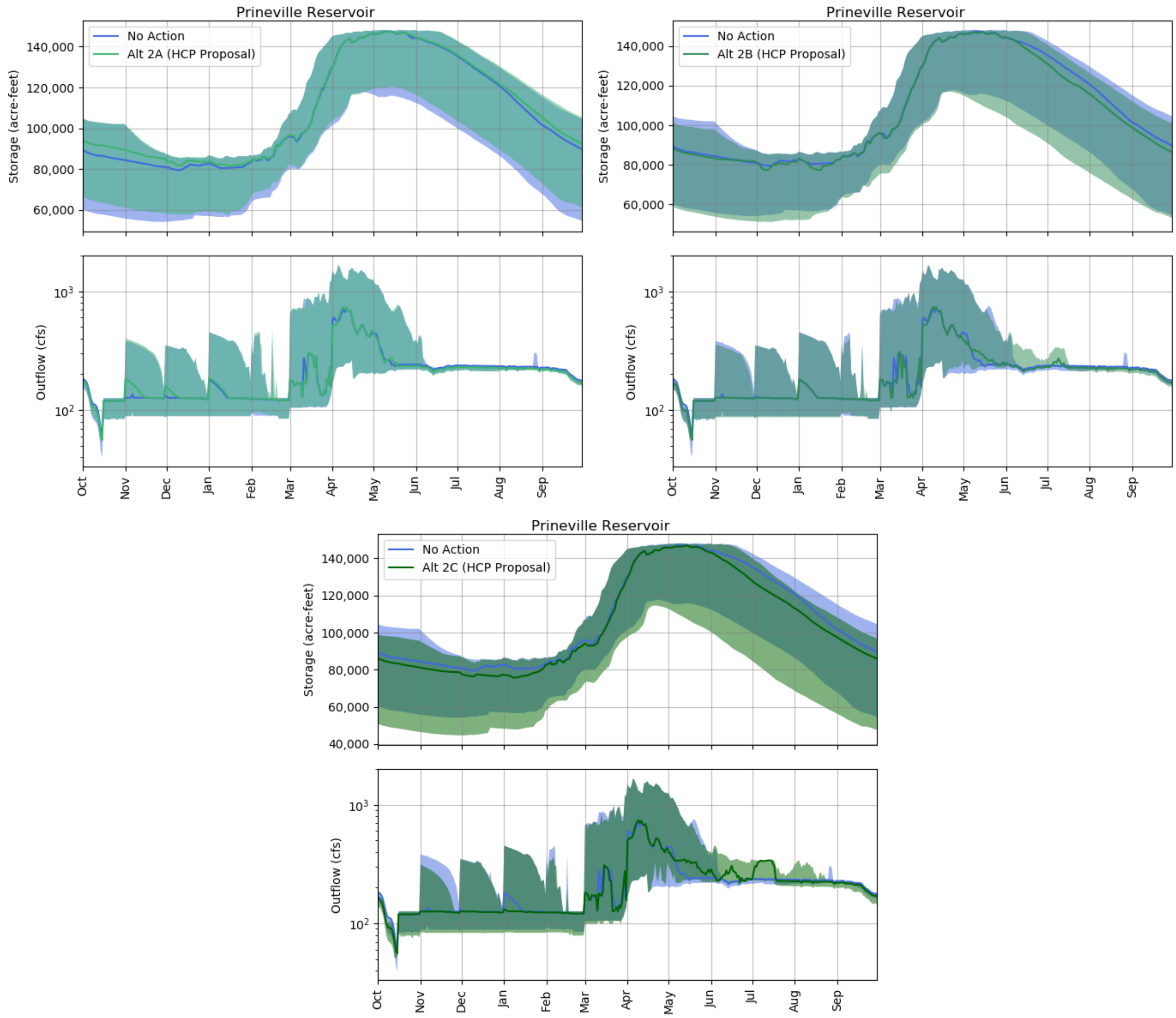


Figure 47. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir. The graphs show the No Action alternative (blue) compared to Alternative 2 (green); Alternative 2A is shown in the top left, 2B in the top right, and 2C at the bottom. The dark blue or green line represents the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

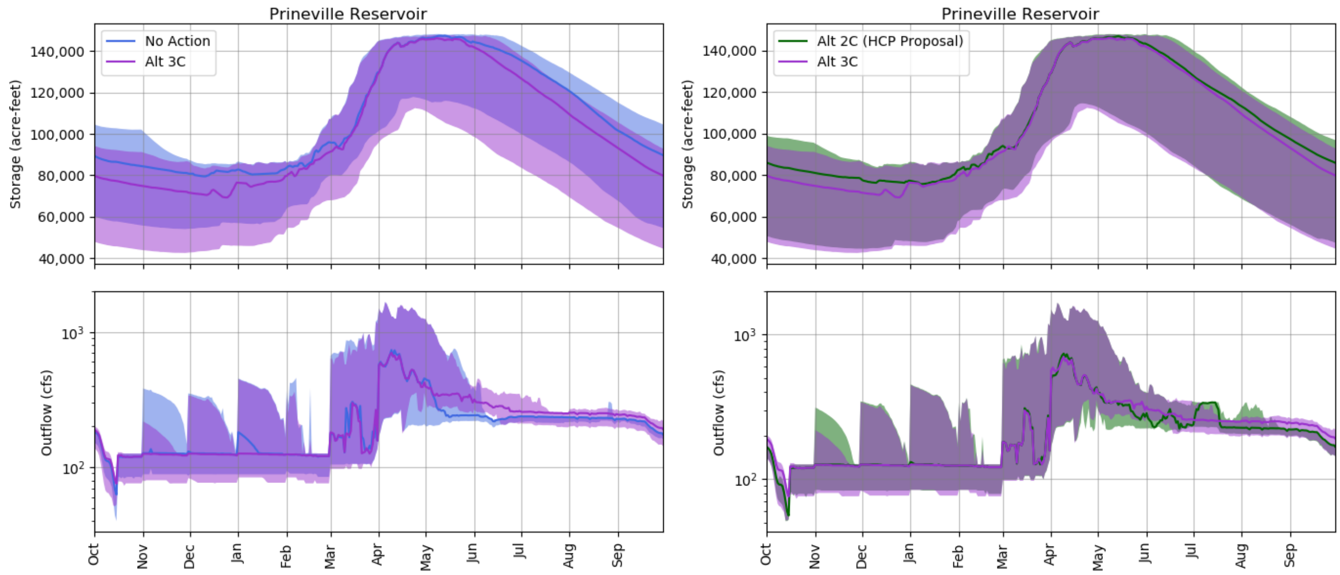


Figure 48. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir. The graphs on the left show the No Action alternative (blue) compared to Alternative 3 (purple). The graphs on the right show Alternative 2 (green) compared to Alternative 3 (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

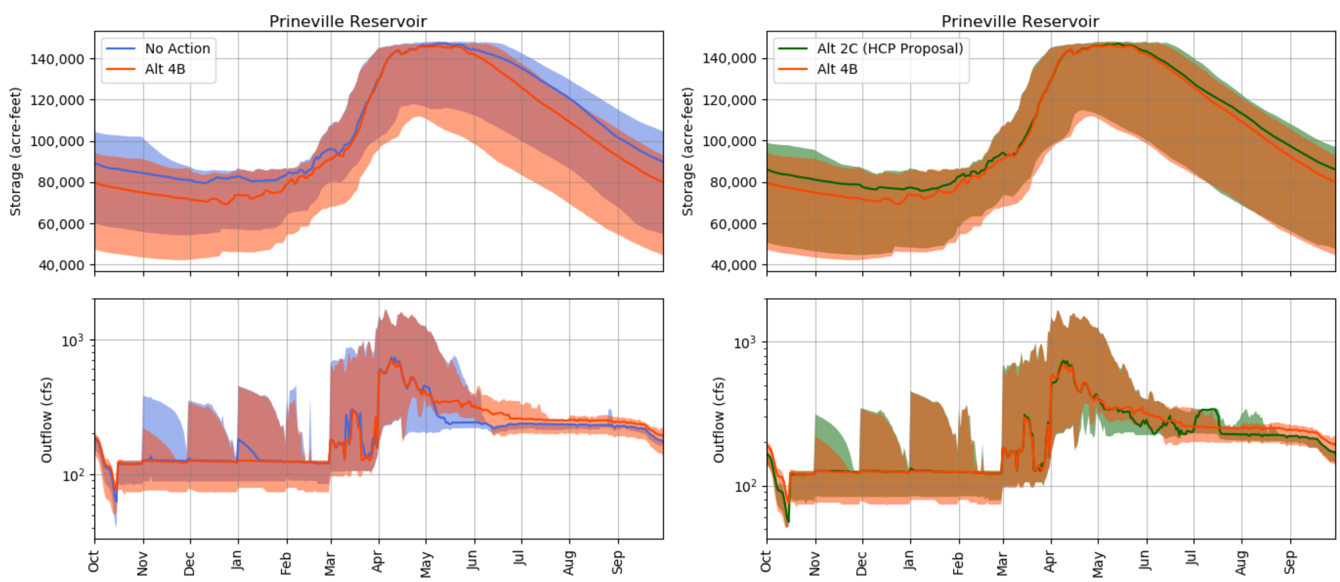


Figure 49. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir. The graphs on the left show the No Action alternative (blue) compared to Alternative 4 (orange-red). The graphs on the right show Alternative 2 (green) compared to Alternative 4 (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

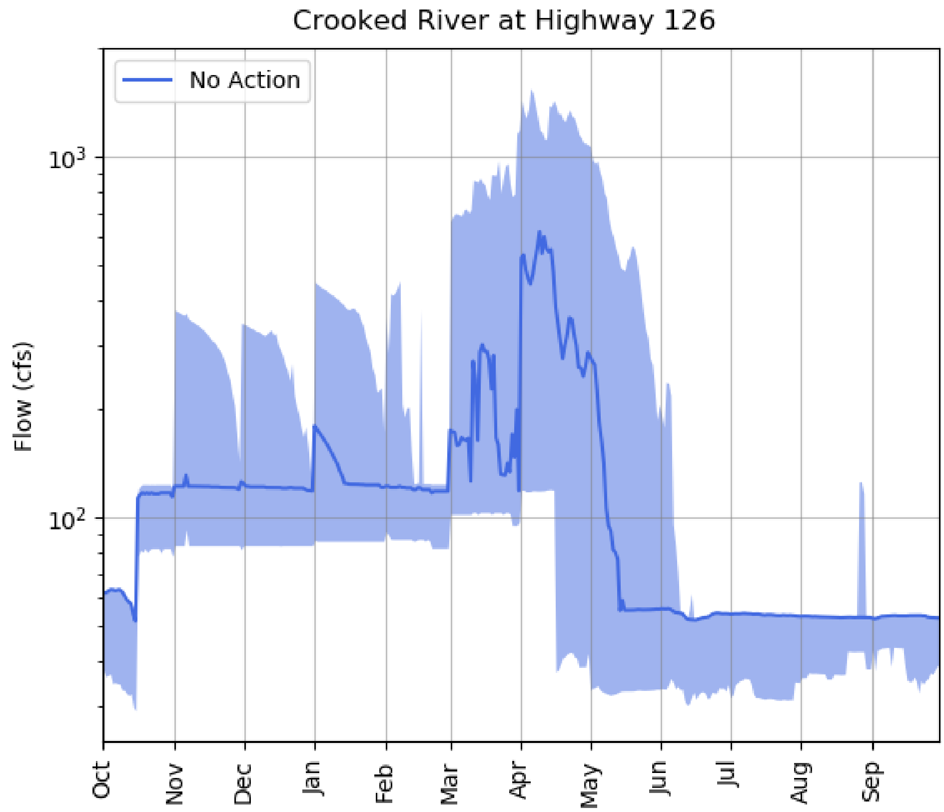


Figure 50. Summary hydrograph of simulated flow in the Crooked River at Highway 126 showing the No Action alternative. The dark blue line represents the median and the shaded blue area represents the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

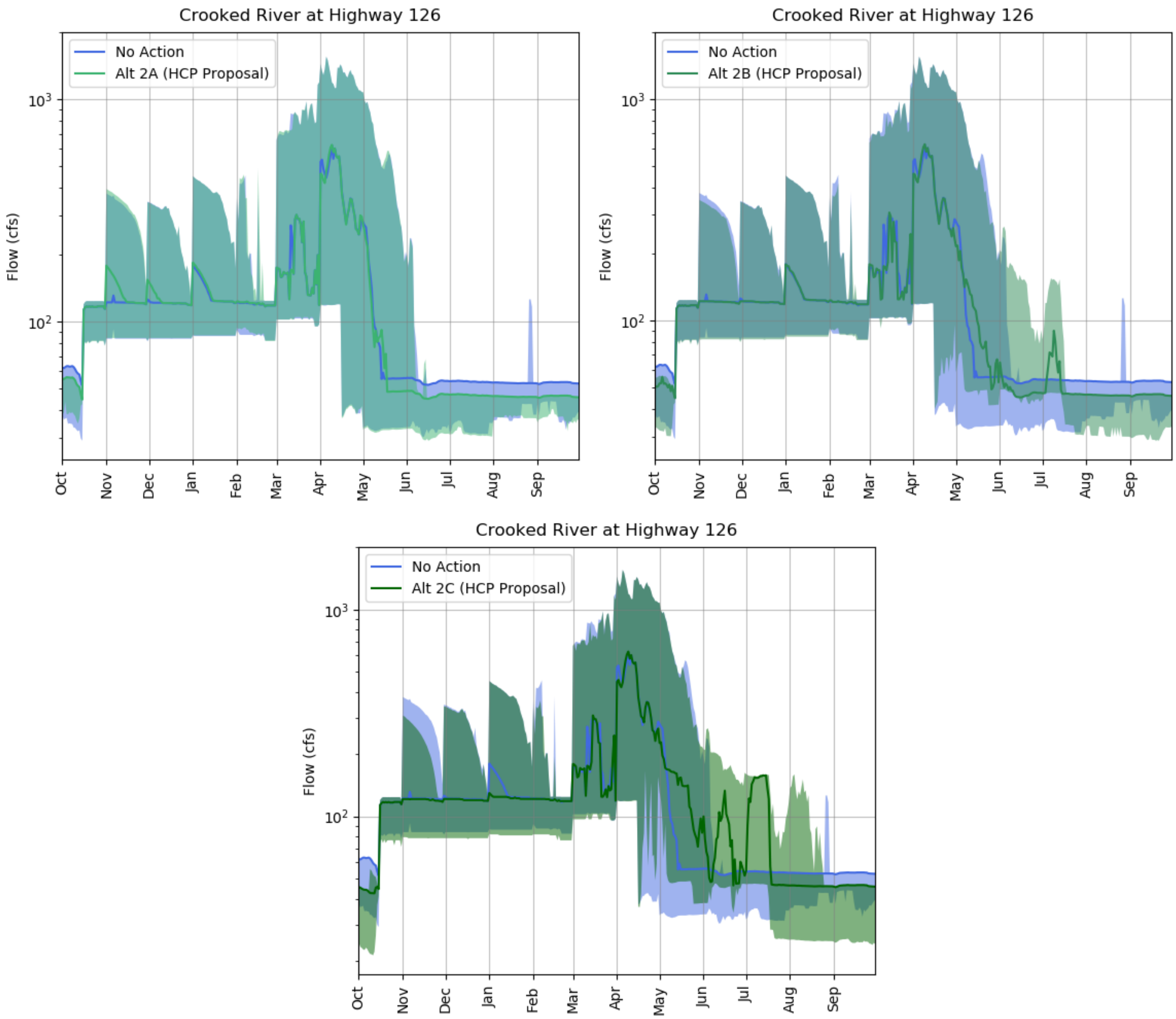


Figure 51. Summary hydrograph of simulated flow in the Crooked River at Highway 126. The graph shows the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom). The dark lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

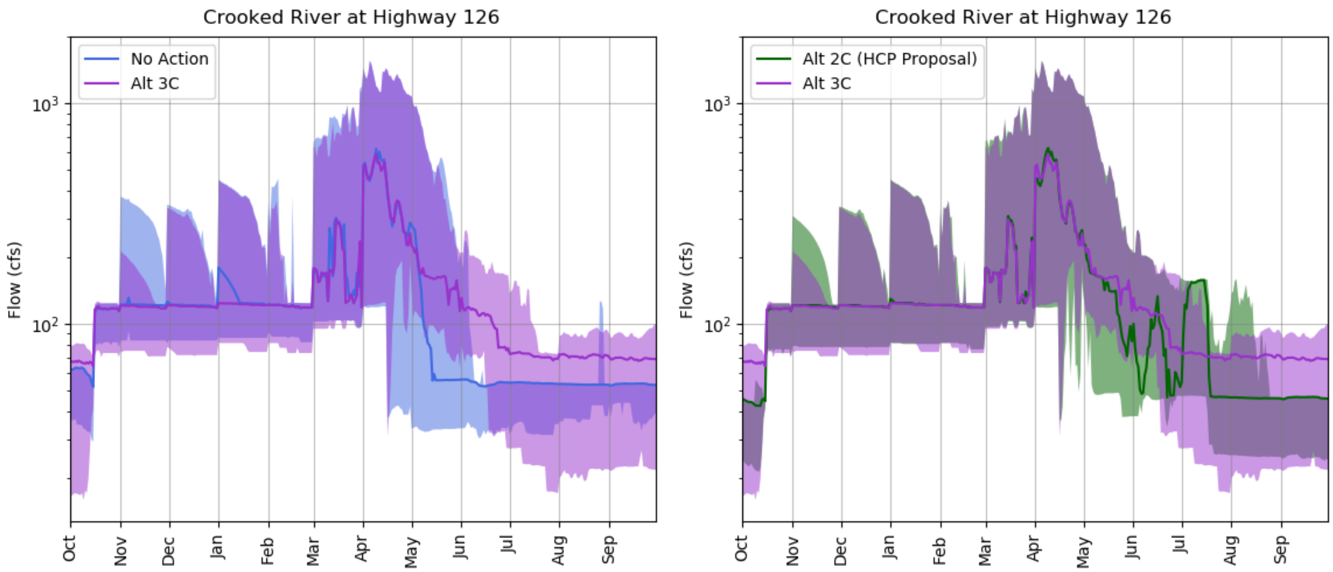


Figure 52. Summary hydrographs of simulated flow in the Crooked River at Highway 126. The graph on the left shows the No Action alternative (blue) compared to Alternative 3 (purple). The graph on the right shows Alternative 2 (green) compared to Alternative 3 (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

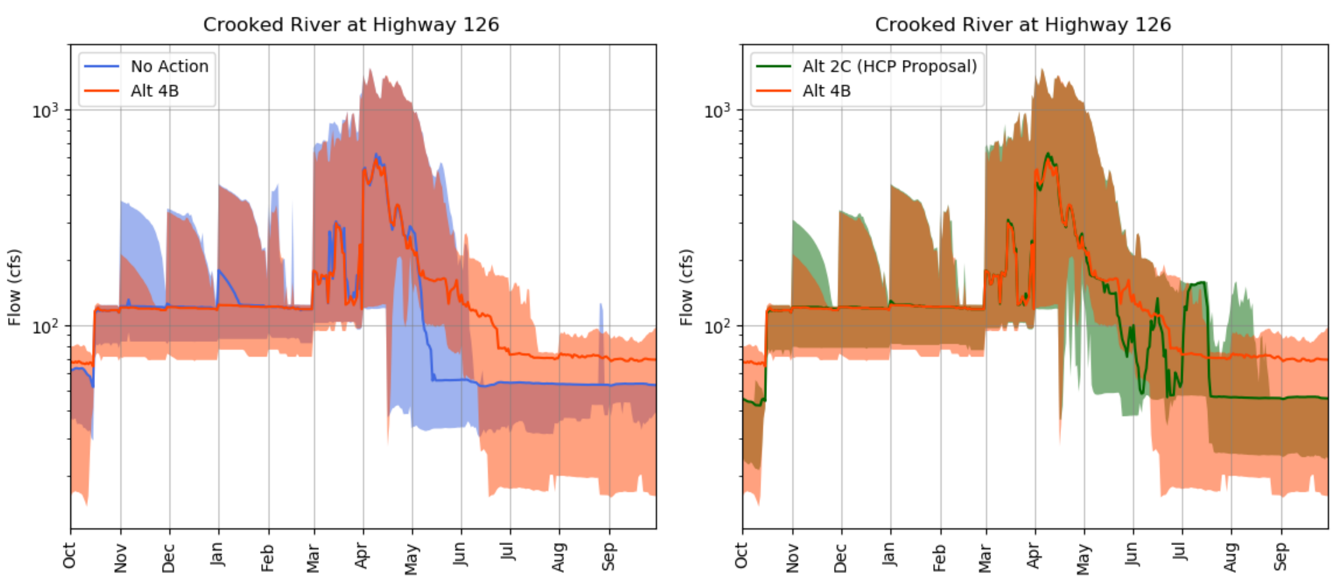


Figure 53. Summary hydrographs of simulated flow in the Crooked River at Highway 126. The graph on the left shows the No Action alternative (blue) compared to Alternative 4 (red). The graph on the right shows Alternative 2 (green) compared to Alternative 4 (red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

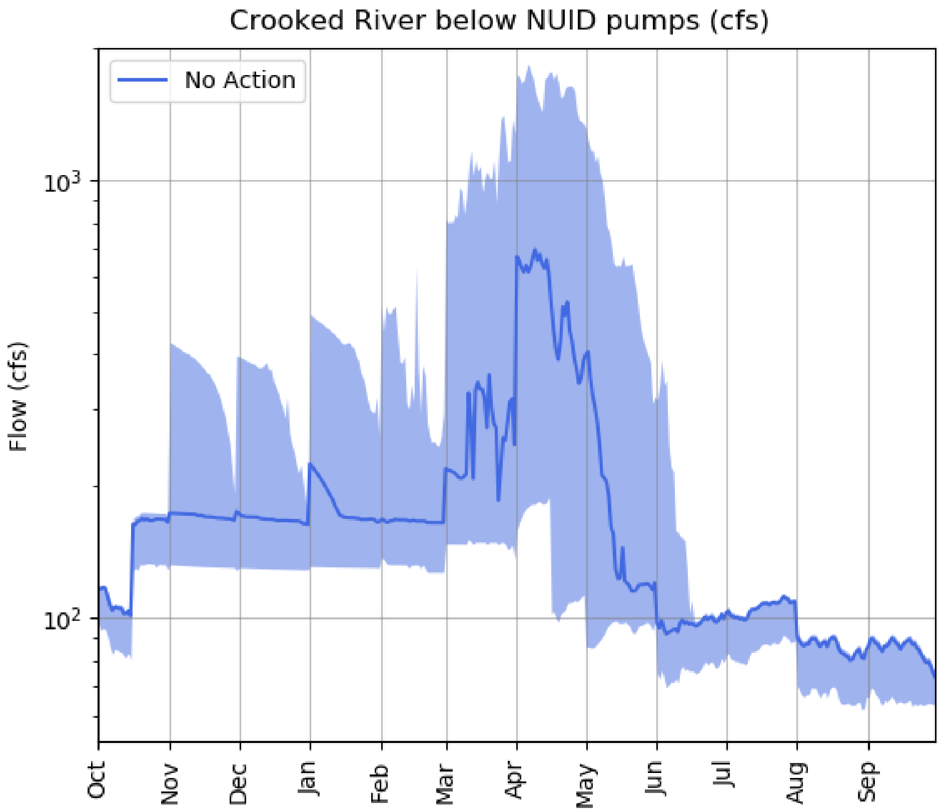


Figure 54. Summary hydrograph of simulated flow in the Crooked River below the NUID pumps showing the No Action alternative. The dark blue line represents the median and the shaded blue area represents the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

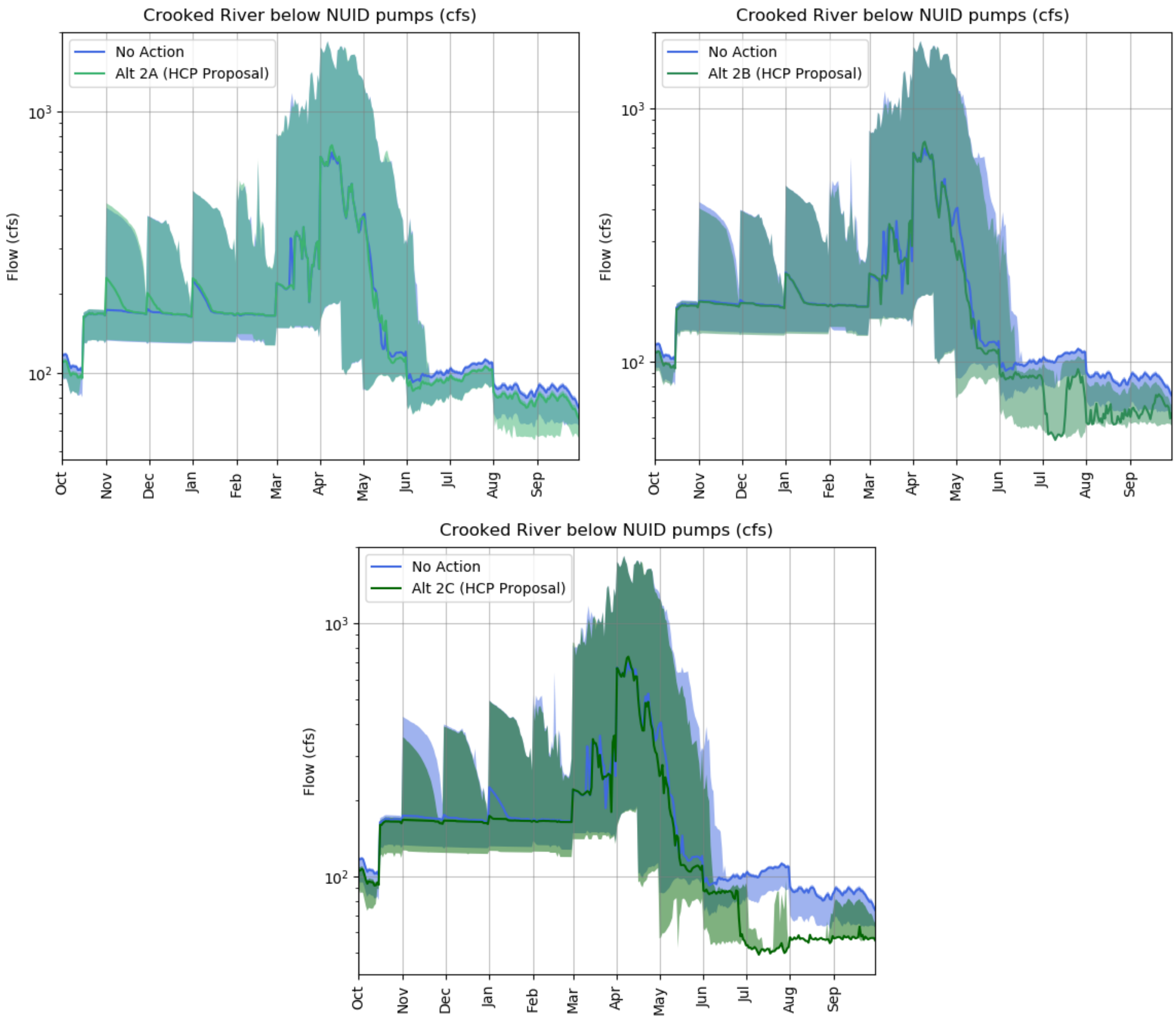


Figure 55. Summary hydrograph of simulated flow in the Crooked River below NUID pumps. The graph shows the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom. The dark blue and green lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

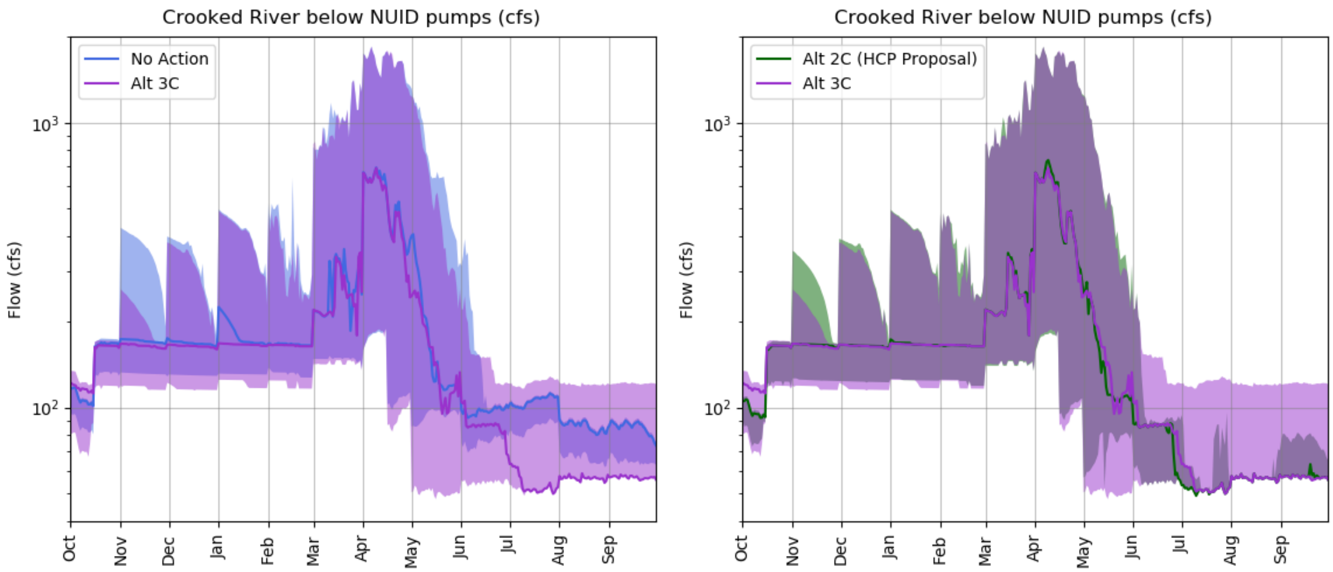


Figure 56. Summary hydrographs of simulated flow in the Crooked River below NUID pumps. The graph on the left shows the No Action alternative (blue) compared to Alternative 3 (purple). The graph on the right shows Alternative 2 (green) compared to Alternative 3 (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

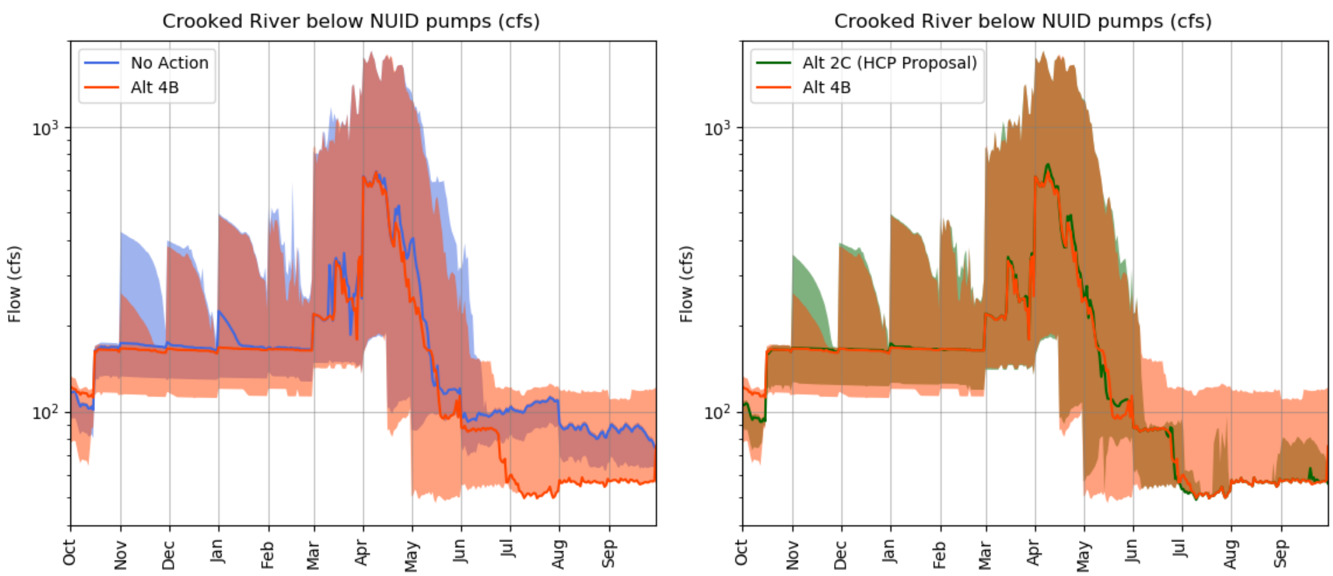


Figure 57. Summary hydrographs of simulated flow in the Crooked River below NUID pumps. The graph on the left shows the No Action alternative (blue) compared to Alternative 4 (red). The graph on the right shows Alternative 2 (green) compared to Alternative 4 (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

Appendix 3.1-C

Analysis of RiverWare Model Version 18 Outputs and Implications for Final EIS

Memorandum

To:	Bridget Moran, FWS Deschutes Basin Field Supervisor
From:	Deb Bartley and Steve Centerwall, ICF
Date:	October 16, 2020
Re:	**Analysis of RiverWare Model Version 18 Outputs and Implications for Final EIS**

Introduction

The Deschutes Basin Habitat Conservation Plan (HCP) Environmental Impact Statement (EIS) relies on estimates of how the EIS alternatives could change reservoir storage and surface water elevation and seasonal stream flows and variability in the study area provided in the RiverWare model developed for the HCP and EIS. This model is considered the best available tool to provide comparative estimates of hydrologic changes that would occur under each alternative. The Final EIS analyses submitted to FWS on October 7, 2020, relied on version 17 RiverWare model results for resource analyses and NEPA conclusions.

The Bureau of Reclamation (Reclamation) identified an error in the model for the proposed action (Alternative 2, HCP) at the LAPO gauge representing the Little Deschutes River.[1] The error was discovered during peer review of Reclamation's technical memorandum supporting the model just prior to publication of the Final EIS (Appendix 3.1-B of the Final EIS). The error involved accidentally assigning gains—groundwater flows supplementing surface water flows—at the LAPO gauge that would not be there, which resulted in increased live flow July through September that would not be expected to occur. The unintentional presence of this water at the LAPO gauge had implications at other gauges and internodes in the system, namely the BENO (Upper Deschutes below Behnam Falls) and DEBO (Upper Deschutes through Bend) gauges. Final EIS Appendix 3-1.B, *RiverWare Technical Memorandum*, documents the model representation of the alternatives and summarizes a selection of the version 17 results.

Reclamation corrected the error in the model for the proposed action, removing the gains at this location, and produced version 18 outputs. Version 18 outputs show less live flow in the Little Deschutes River in these months, with flows similar to the outputs for the no-action alternative as

[1] The error was limited to the proposed action model only; it did not affect the other alternatives.

well as Alternatives 3 and 4. Attachment I to this memorandum documents the same model representation depicted in Appendix 3.1-B of the Final EIS but for the version 18 results.

The purpose of this memorandum is to disclose how the version 18 outputs for the proposed action could change the effects presented in the Final EIS. NEPA requires that an EIS take a "hard look" at alternatives and present the context and intensity of effects. All of the EIS resource topics were assessed to determine if the version 18 outputs would result in changes to the Final EIS effect conclusions. Based on this review, there would be no changes to effect conclusions for land use, agricultural resources, recreation, aesthetics, cultural resources, or tribal resources. Where the review identified that the difference between the two model outputs would alter the effects presented in the Final EIS for the remaining resource topics—vegetation, wildlife, fish, Oregon spotted frog, water quality, and socioeconomics—excerpts of the Final EIS text are presented in underline/strikeout in the following sections. Although there are some reach-specific changes for biological resources and water quality, none would result in a not adverse or beneficial effect becoming an adverse effect and none would result in a change to an overall effect conclusion for a resource impact presented in the Final EIS. Similarly, although there are some district-level changes to the economic effects related to water available for irrigation, none would result in changes to the overall effect conclusions presented in the Final EIS. The following summarizes effect conclusions addressed below by EIS section:

- Section 3.4, *Biological Resources*, Impact BIO-1: Vegetation effects in reaches of the Little Deschutes River (CLD-1, CLD-2 and CLD -3) would change from beneficial to not adverse; overall effects on vegetation in the study area would remain beneficial.
- Section 3.4, *Biological Resources*, Impact BIO-2: Wildlife effects in the Little Deschutes River would change from beneficial to not adverse; overall effects on wildlife in the study area would remain beneficial.
- Section 3.4, *Biological Resources*, Impact BIO-3: The description of effects on Oregon spotted frog would change slightly relative to the LAPO, BENO, and WICO gauges, but overall effect conclusions for Oregon spotted frog would remain unchanged.
- Section 3.4, *Biological Resources*, Impacts BIO-12, 13, 16, 17: Effects on redband trout, nonnative resident trout habitat, and native non-trout and non-game species fish habitat would change from beneficial to not adverse in the Little Deschutes River; overall effects on these species in the study area would remain not adverse.
- Section 3.4, *Biological Resources*, Impact BIO-17: Effects on Crater Lake tightcoil and evening field slug in the Little Deschutes River would change from beneficial to no effect; overall effects on freshwater mollusks would be unchanged.
- Section 3.3, *Water Quality*, Impact WQ-1: Effects on water quality in the Little Deschutes River would change from beneficial to no effect; overall effects on water quality in the Upper Deschutes Subbasin would remain not adverse.
- Section 3.9, *Socioeconomics*, Impact SOC-1, SOC-2, and SOC-9: The description of effects on employment and income, urban/suburban water supply availability and costs, and

environmental justice populations would change slightly but overall effects would be unchanged.

Changes to the Final EIS Analyses based on the Version 18 RiverWare Outputs

Biological Resources

Vegetation

Table 1 summarizes the differences between the RiverWare version 17 and version 18 results for the proposed action for each of the study reaches named in Final EIS Table 3.4-6. The change identified in the table is the mean monthly flow from RiverWare version 18 minus mean monthly flow from RiverWare version 17 divided by the average of the two outputs. Therefore, positive numbers indicate more water in version 18, and negative numbers indicate less water.

Little Deschutes River. Mean monthly flows were up to 25% lower in version 18 than version 17 for the LAPO gauge, which represents the Little Deschutes River (reaches CLD-1, CLD-2, and CLD-3). Final EIS Impact BIO-1 (Change Vegetation Communities) assessed the increased flows during the growing season at the LAPO gauge in the version 17 outputs as likely to have beneficial effects on riparian and wetland vegetation. Based on the version 18 outputs, flows in the Little Deschutes River would be similar to the no-action alternative (Alternative 1) , and the proposed action would have no effect on riparian and wetland vegetation in the Little Deschutes River (reaches CLD-1, CLD-2, and CLD-3), as opposed to beneficial effects. Table 2 shows how the text of Final EIS Table 3.4-6 would change for each of these reaches. Impact BIO-2, which evaluates impacts on wildlife, would show the same change: anticipated beneficial effects in reaches CLD-1, CLD-2, and CLD-3 shown in version 17 would no longer occur in version 18, and there would instead be no effect relative to the no-action alternative.

Crescent Creek. Similarly, mean monthly flows showed variability up to 9% higher and lower in version 18 than version 17, which represents Crescent Creek below the reservoir (reaches CLD-4, CLD-5, and CLD-6). Impact BIO-1 in the Final EIS assessed the flow changes based on version 17 outputs to be insufficient to result in effects on vegetation at these locations. Based on the version 18 outputs, that determination would be unchanged for reaches CLD-5 and CLD-6. In CLD-4, some very minor increases in flow occur in the version 18 results during the growing season. These flow increases could have minor beneficial effects on vegetation but not to a degree that would alter the effect conclusion. Table 2 illustrates how the text of Final EIS Table 3.4-6 would change for each of these reaches based on the version 18 outputs.

Modeled changes between RiverWare version 17 and version 18 in all other reaches would not result in changes to effects.

Table 1. Summary of changes in mean monthly flows, by river reach, based on RiverWare Version 18 Outputs Compared to Version 17 Outputs

Reach	Range of Changes[1]
CLD-1	-1 to -25%
CLD-2	-1 to -25%
CLD-3	-1 to -24%
CLD-4	-9 to 9%
CLD-5, -6	-9 to 9%
CLD-7	1 to 2%
Cro-3	0 to 2%
Cro-4	-3 to 1%
Cro-9	-9 to 1%
Cro-10	-2 to 1%
Cro-11, 12, 13	0 to 1%
Des-1	0 to 1%
Des-5	-3 to 4%
Des-7, -8	0 to 3%
Des-8a	0 to 3%
Des-9	0 to 3%
Des-10	0 to 3%
Des-10a	0 to 3%
Des-11	0 to 6%
Des-12	-3 to 4%
Des-12a	-3 to 4%
Des-13	0 to 7%
Des-14	0%
Des-15	0%
Och-1, -2, -3	0%
Och-4	0%
Why-5	0%

[1] "Change" is the RiverWare version 18 mean monthly flow, minus the RiverWare version 17 mean monthly flow, so positive numbers indicate more water under version 18. It is calculated as the difference between version 17 and version 18, divided by the average of version 17 and version 18. Shaded values described below.

Table 2. Revisions to Reach-Level Effect Descriptions in Final EIS Table 3.4-6[2]

CLD-6 CLD-5 ~~CLD-4~~ (Upper Crescent Creek)	Throughout the permit term there would be some moderate October-November flow reductions. Otherwise, all changes would be very small. These changes are primarily outside of the growing season and have little potential to affect vegetation. No effects on vegetation are expected. ~~In the first 7 years of the permit term there would be some moderate winter flow reductions. Thereafter, changes in flows and flow variability in these reaches would be minor (maximum changes of -8 to +13% in any month, with a general pattern of small winter increases and small summer decreases). Flow variability would increase substantially, rising 27–131% from October to April, but with some decreased variability from July to September. These changes are primarily outside of the growing season and have little potential to affect vegetation. No effects on vegetation are expected.~~
CLD-4 (Middle Crescent Creek)	Throughout the permit term there would be some minor (7-12%) October-November flow reductions, minor (8-16%) March-April flow reductions and minor (7-19%) May to July flow increases, with substantial (36-136%) increases in October to April flow variability. These changes are primarily outside of the growing season and have little potential to affect vegetation, although the May to July increases could somewhat extend the cover of wetlands and riparian vegetation. Effects on vegetation would be very slightly beneficial.
CLD-3 CLD-2 CLD-1 (Sunriver to above Walker Basin)	These reaches moderate (15–32%) July-to-October flow increases in the first 7 years of the permit term. Thereafter, those changes cease on CLD-2 and CLD-3 but persist on CLD-1. In all reaches, flow variability drops moderately from July to September, but is otherwise unchanged. These changes would increase the depth and duration of summer inundation of riparian and wetland vegetation, while also decreasing year-to-year variability; these changes would tend to increase the extent and resilience of that vegetation a beneficial effect.~~ There would be minor (6-12%) flow reductions in October and November, outside the growing season. These changes are outside of the growing season and have little potential to affect vegetation. No effects on vegetation are expected.~~

These changes alter the stated description of effects on vegetation discussed under Impact BIO-1 in the lower three reaches of the Crescent Creek–Little Deschutes River system as shown below:

> Crescent Lake Reservoir would experience increased average water depths and reduced year-to-year variability, both of which would benefit the extent and stability of the few patches of wetland and riparian vegetation found around the reservoir. Lower Crescent Creek would experience small but persistent May-July flow increases, with similarly small beneficial outcomes for associated wetland and riparian vegetation. No effects on vegetation are expected o~~O~~n the lower three reaches of the Crescent Creek–Little Deschutes River system (i.e., on the Little Deschutes River~~, there would similarly be some increases in flow accompanied by reduced year-to-year flow variability during the growing season, which would benefit the extent and stability of wetland and riparian vegetation in these reaches~~.

These changes alter the stated effect conclusions of Impact BIO-1 as shown below:

Chapter 3, Section 3.4.3.2, p. 3.4-27:

> **Effect Conclusion:** The proposed action would have no effect on riparian and wetland vegetation in Tumalo Creek, the Little Deschutes River, upper Crescent Creek, the Deschutes River between

[2] These changes would apply to Table 6 in Appendix 3.4-A as well.

> Wickiup and Crane Prairie Reservoirs (reach Des-14), the Lower Deschutes River including Lake Billy Chinook and Lake Simtustus (reaches Des-1 and Des-2), and Prineville and Ochoco Reservoirs. Effects in Crane Prairie Reservoir, Crescent Lake Reservoir, the Upper Deschutes River, Ochoco Creek, McKay Creek, Whychus Creek, middle Crescent Creek, and ~~the~~ lower Crescent Creek~~Little Deschutes River system~~ would be beneficial. Effects in the Middle Deschutes River (reaches Des-3 to Des-6), and the Crooked River would be not adverse. Effects in Wickiup Reservoir would be adverse. Overall, the effect of the proposed action would be beneficial compared to the no-action alternative because beneficial effects would improve habitat conditions over a large portion of the study area, while adverse localized vegetation impairments would be limited to Wickiup Reservoir.

The overall effect conclusion for Impact BIO-1 would not change; overall effects on vegetation in the study area would remain beneficial.

Wildlife

Crescent Creek. Under Impact BIO-2 (Change Habitat for Wildlife Species), slightly beneficial effects anticipated for reaches CLD-5 and CLD-6 would no longer be expected, but those benefits remain in reach CLD-4.

These changes alter the stated conclusions of Impact BIO-2 as shown here:

Chapter 3, Section 3.4.3.2, p. 3.4-33:

> **Effect Conclusion:** The proposed action would have no effect on wildlife in Tumalo Creek, the Little Deschutes River, upper Crescent Creek, the Upper Deschutes River between Crane Prairie and Wickiup Reservoirs (reach Des-14), the Lower Deschutes River including Lake Billy Chinook and Lake Simtustus, and Prineville and Ochoco Reservoirs. Effects in Crane Prairie and Crescent Lake Reservoirs; the Upper Deschutes River; Ochoco, McKay, and Whychus Creeks; and ~~the~~ lower Crescent Creek~~–Little Deschutes River system~~ would be beneficial. Effects in the Middle Deschutes River (reaches Des-3 to Des-6), and the Crooked River would be not adverse. Effects in Wickiup Reservoir would be adverse. Overall, the effects of the proposed action would be beneficial compared to the no-action alternative because beneficial effects would improve habitat conditions over a large portion of the study area, while adverse localized vegetation impairments would be limited to Wickiup Reservoir.

The overall effect conclusion for Impact BIO-2 would not change; overall effects on wildlife in the study area would remain beneficial.

Oregon Spotted Frog

The analysis completed for the Oregon spotted frog relied on several qualitative and quantitative components including the day count data derived from RiverWare; hydrographs produced by RiverWare; and a qualitative assessment of impacts on emergent vegetation, impacts on invasive species, consideration of time length of implementation phases, and access to conservation measures such as the OSF storage account (Conservation Measure CC-1) and the conservation fund (Conservation Measure UD-1). To understand the potential impact of the error on the Oregon spotted frog analysis, we compared the version 18 and version 17 hydrographs for each of the gages and internodes representing the Oregon spotted frog study reaches depicted in Figure 3.4-2 of Final EIS Chapter 3, Section 3.4, *Biological Resources*. Elevation and volume plots were also compared between the two RiverWare versions for Wickiup Reservoir and Crane Prairie Reservoir (Table 3). Where differences were noted between the version 17 and 18 hydrographs, we completed an updated day count analysis (where applicable) and reviewed the effects analysis presented in the Final EIS Appendix 3.4-B, *Oregon Spotted Frog Technical Supplement*, and the conclusions presented in Final EIS Chapter 3, Section 3.4, to determine if the differences between would affect the description of effects or the effect conclusions.

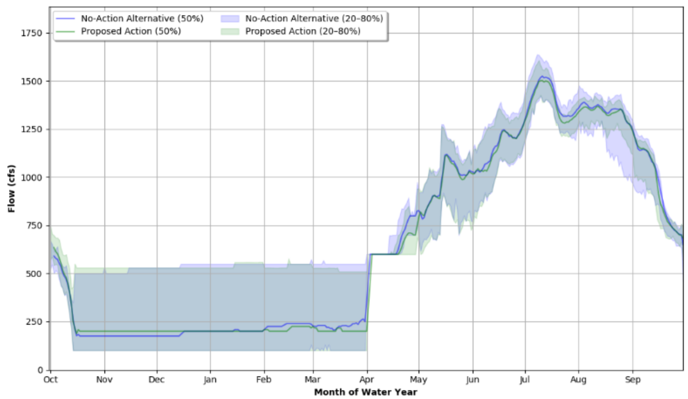
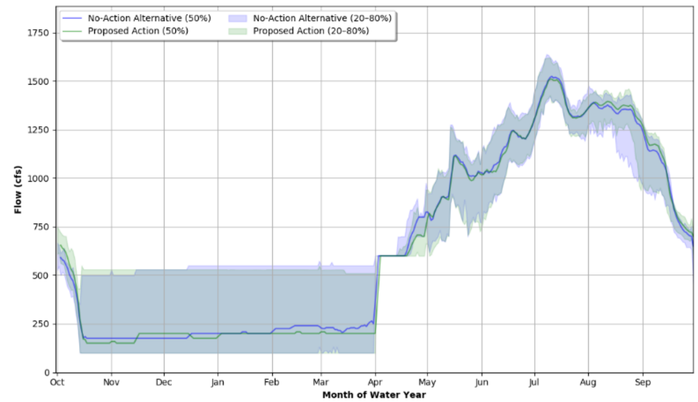
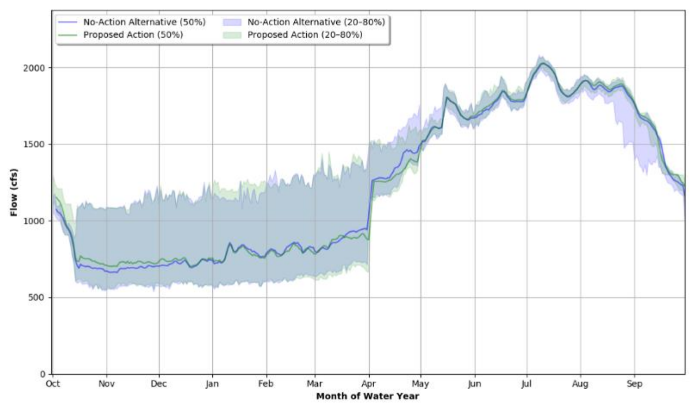
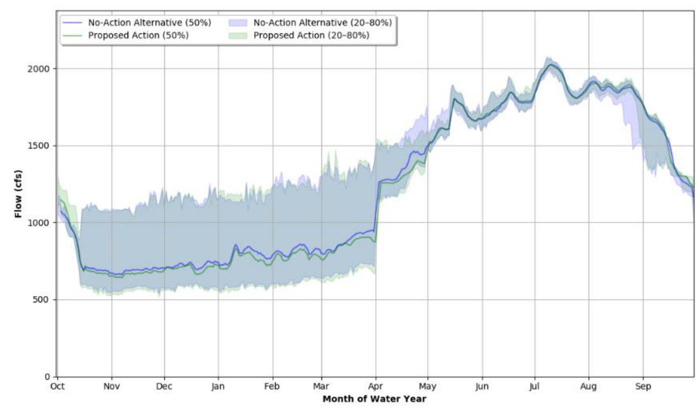
RiverWare Hydrograph Comparison

Table 3 presents the gauge and internodes used in the Oregon spotted frog analysis and identifies which changes between the two model runs.

Table 3. RiverWare Version 17 and Version 18 Gauge and Internode Hydrograph Comparison

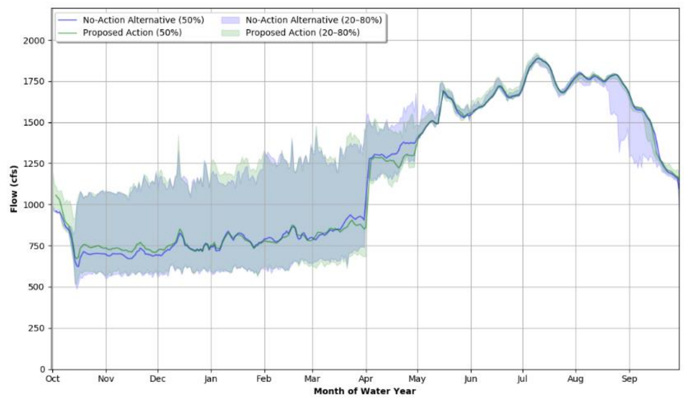
Reach Names	Study Reaches	RiverWare Gage or Internode	Difference Observed
Little Deschutes River	CLD-1, CLD-2	LAPO	Yes
Crescent Creek	CLD-3, CLD-4, CLD-5, CLD-6	CREO	Yes
Upper Deschutes River —Central Oregon Diversion to Colorado Street	Des-8a	Siphon2COIDOutflow	Yes
Upper Deschutes River —Lava Island Falls to Central Oregon Diversion	Des-9	Siphon2COIDInflow	Yes
Upper Deschutes River —Behnam Falls to Lava Island Falls	Des-10, Des-10a	BENO	Yes
Upper Deschutes River —Wickiup Dam to Benham Falls	Des-11, Des-12, Des-12a	WICO	Yes
Wickiup Reservoir	Des-13	WIC	Yes
Deschutes River between reservoirs	Des-14	CRAO	No
Crane Prairie Reservoir	Des-15	CRA	No

The hydrographs below indicate observed differences between RiverWare version 17 (left) and RiverWare version 18 (right). Modeled changes in the hydrographs were only noted during phase 1 of the proposed action (years 1 through 7 of the permit term) at all gages and internodes except CREO and LAPO. Modeled changes between RiverWare version 17 and 18 for all other phases of the proposed action for the gauges and internodes presented below and at all other analyzed gages or internodes were negligible.

<table>
<tr><th>Reach(es)</th><th>Gauge or Node</th><th>RiverWare 17</th><th>RiverWare 18</th></tr>
<tr><td>Upper Deschutes River — Wickiup Dam to Benham Falls (Des-11, Des-12, Des-12a)</td><td>WICO</td><td>Years 1–7

</td><td>Years 1–7

</td></tr>
<tr><td>Upper Deschutes River—Behnam Falls to Lava Island Falls (Des-10, Des-10a)</td><td>BENO</td><td>Years 1–7

</td><td>Years 1–7

</td></tr>
</table>

<table>
<tr><th>Reach(es)</th><th>Gauge or Node</th><th>RiverWare 17</th><th>RiverWare 18</th></tr>
<tr><td>Upper Deschutes River —Lava Island Falls to Central Oregon Diversion (Des-9)</td><td>Siphon 2COID. Inflow</td><td>

Years 1–7

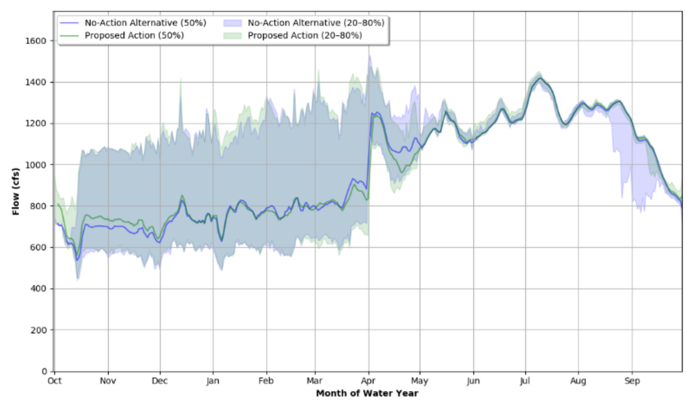


</td><td>

Years 1–7

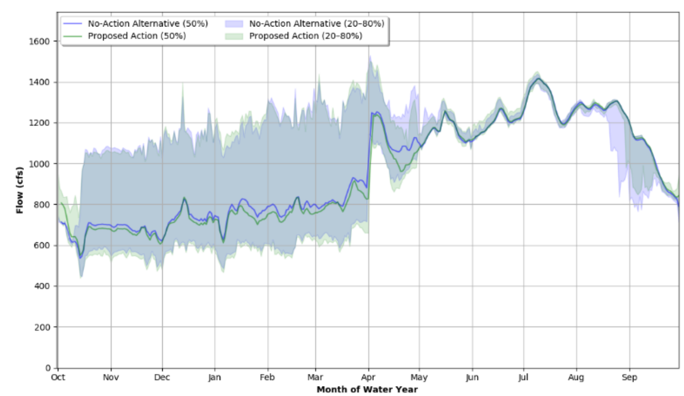
</td></tr>
<tr><td>Upper Deschutes River — Central Oregon Diversion to Colorado Street (Des-8a)</td><td>Siphon 2COID. Outflow</td><td>

Years 1–7

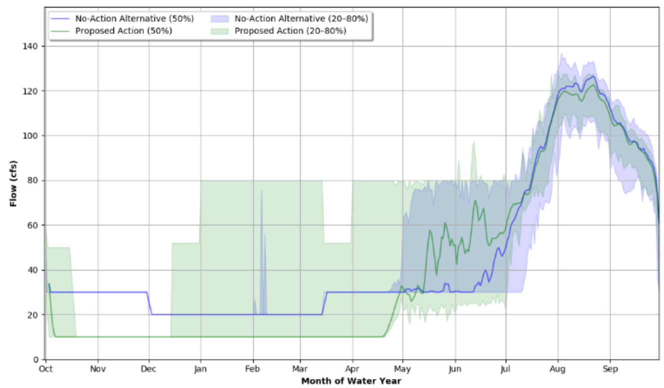
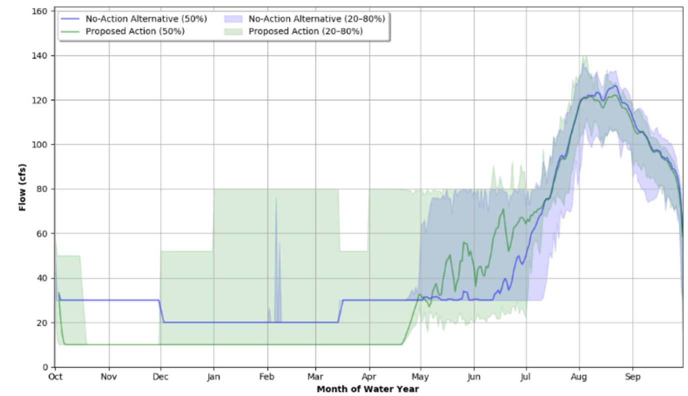
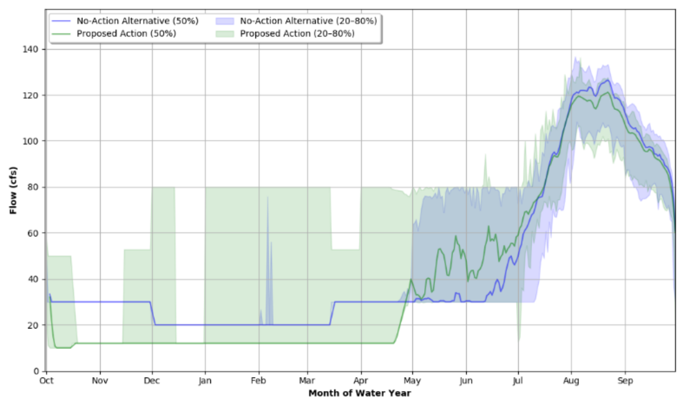
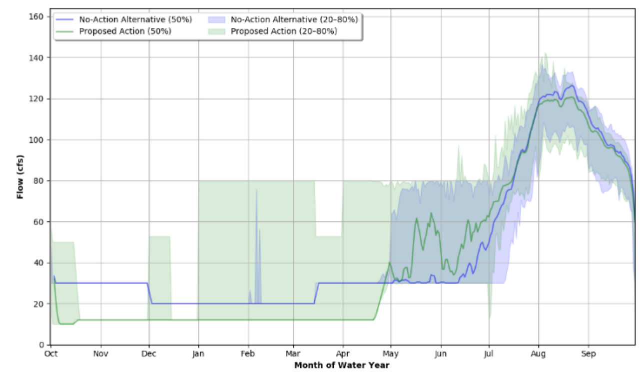


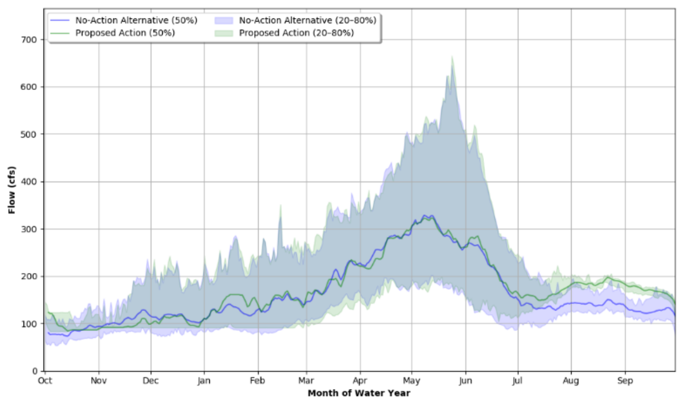
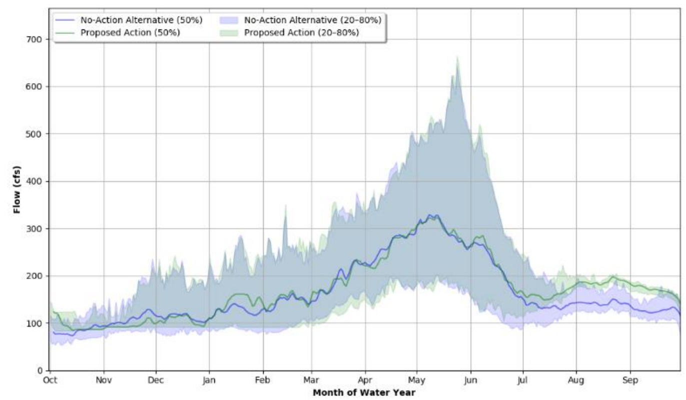
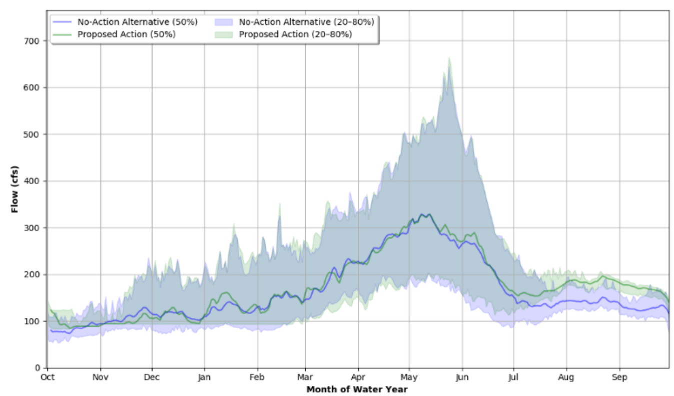
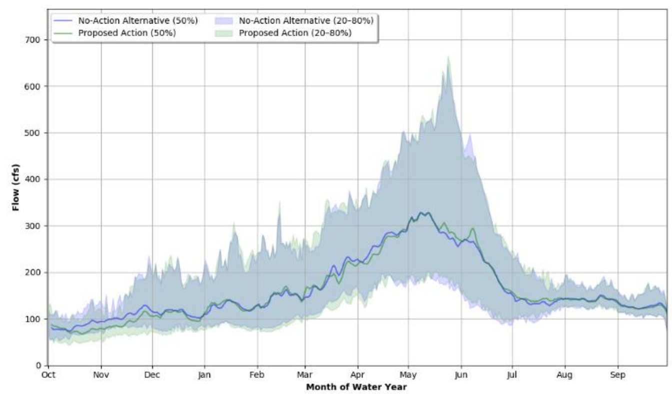
</td><td>

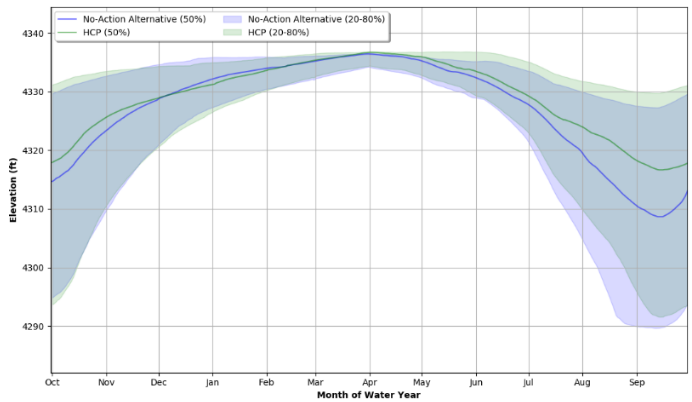
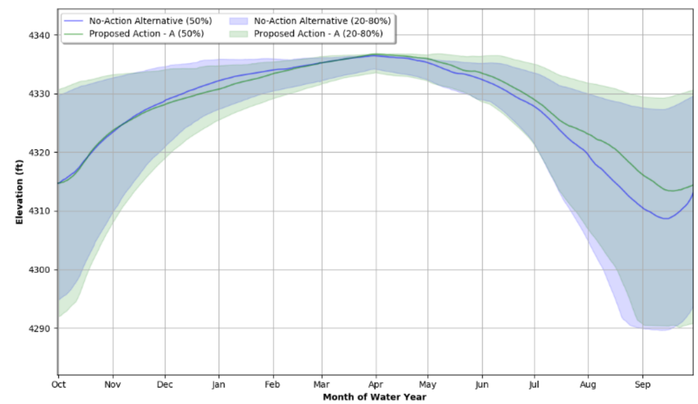
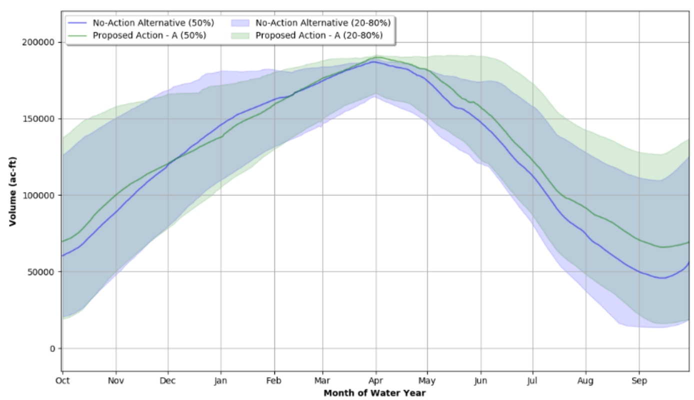
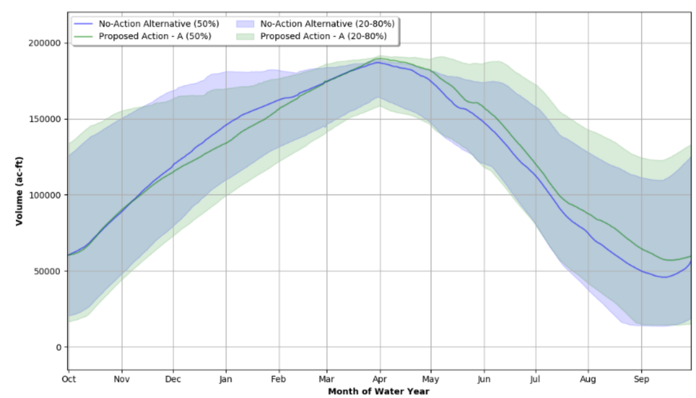
Years 1–7



</td></tr>
</table>

<table>
<tr><th>Reach(es)</th><th>Gauge or Node</th><th>RiverWare 17</th><th>RiverWare 18</th></tr>
<tr><td>Crescent Creek (CLD-3, CLD-4, CLD-5, CLD-6)</td><td>CREO</td><td>Years 1–7

</td><td>Years 1-7

</td></tr>
<tr><td>Crescent Creek (CLD-3, CLD-4, CLD-5, CLD-6)</td><td>CREO</td><td>Years 13–30

</td><td>Years 13-30

</td></tr>
</table>

Reach(es)	Gauge or Node	RiverWare 17	RiverWare 18
Little Deschutes River (CLD-1, CLD-2)	LAPO	Years 1–7 	Years 1–7 
Little Deschutes River (CLD-1, CLD-2)	LAPO	Years 13–30 	Years 13–30 

Reach(es)	Gauge or Node	RiverWare 17	RiverWare 18
Wickiup Reservoir Elevation	WIC	Years 1–7  	Years 1–7 
Wickiup Reservoir Volume	WIC	Years 1–7  	Years 1–7 

Day Counts

The effect analysis for Oregon spotted frog relied in part on day counts for three of the RiverWare nodes (gauge or internode locations) where we noted a difference in the hydrographs between version 17 and version 18: WICO, BENO, and Siphon2COID.Outflow. We repeated the day count analysis at each of these nodes for the life history periods where there was a difference in the two hydrographs (Table 5).

Table 4. Comparison of Day Count Data for the Proposed Action using RiverWare Version 17 and 18

Gage or Internode	Life History Period	Threshold	RW 17 Day Count (mean)	RW 18 Day Count (mean)	Difference (mean days)	Percent of available days
	pre-winter	900	13.84	14.74	0.9	2%
		300	54.21	54.16	-0.05	0%
WICO	overwinter	500	34.45	33.76	-0.69	-1%
		1200	30.97	30.87	-0.1	0%
		1300	21.79	20.97	-0.82	-2%
	pre-winter	1600	11.11	10.32	-0.79	-2%
		1200	28.18	26.13	-2.05	-1%
		1300	22.03	21.5	-0.53	0%
BENO	overwinter	1600	6.66	6.47	-0.19	0%
	pre-winter	900	21.32	20.32	-1	-2%
		500	131.32	126.79	-4.53	-3%
Siphon2COID.Outflow	overwinter	900	54.82	53.45	-1.37	-1%

For the three nodes, the difference in mean count of days exceeding the mean daily flow thresholds between the version 17 and 18 outputs ranged from 0.9 to -4.53 days. The two life history periods assessed here cover different lengths of time. Pre-winter extends from September 1 through October 15, a period of 45 days, while overwinter extends from October 16 through March 1, a period of 137 days. The percentage of available days (in the period) that would be affected by the difference in the model outputs are shown in the column on the right. The differences between version 17 and 18 range in magnitude from 0 to 3% of the number of days available in the period.

Conclusions

For model nodes where changes were observed in the hydrographs and in the day counts (where applicable), we conclude the following:

WICO

- Changes would alter the stated pre-winter assessment summary of the day count data in Final EIS Appendix 3.4-B (p. 37) as shown below:

> The no-action alternative provides slightly fewer ~~more~~ days of wetland vegetation inundation above 900 cfs compared to phases 1, 2 and 3 of the proposed action and more

> days of wetland inundation compared to all phases of Alternative 3 and Alternative 4 (Figure 12).

- There would be no change to the overwinter assessment of the day count data in the Final EIS Appendix 3.4-B (p. 37).
- The differences observed in the hydrographs for WICO between RiverWare version 17 and version 18 would not result in changes to the description of effects for pre-wintering or overwintering based on the hydrographs presented in Final EIS Appendix 3.4-B, pg. 37.
- There would be no change to the conclusions stated in the Final EIS for Impact BIO-3.

BENO

- There would be no change to the pre-winter assessment of the day count data in the Final EIS Appendix 3.4-B (p.53).
- Changes would alter the stated overwinter assessment summary of the day count data in Final EIS Appendix 3.4-B (p. 54) as show below:

> Flows reach the 1,200 cfs threshold rarely under any alternative, but slightly more often under phase 1 of the proposed action, the fully implemented proposed action, phases 2 and 3 of Alternative 3, and all phases of Alternative 4 than under the no-action alternative (Figure 27).

- The differences observed in the hydrographs for BENO between RiverWare version 17 and version 18 would not result in changes to the description of effects for pre-wintering or overwintering based on the hydrographs presented in Final EIS Appendix 3.4-B, pg. 53.
- There would be no change to the conclusions stated in the Final EIS for BIO-3.

Siphon2COID.Inflow

- The differences observed in the hydrographs for Siphon2COID.Inflow between RiverWare version 17 and version 18 would not result in changes to the description of effects for pre-wintering or overwintering based on the hydrographs presented in Final EIS Appendix 3.4-B, pg. 60.
- There would be no change to the conclusions stated in the Final EIS for BIO-3.

Siphon2COID.Outflow

- There would be no change to the pre-winter or overwinter assessments of the day count data in the Final EIS Appendix 3.4-B (p. 72 and 73).
- The differences observed in the hydrographs for Siphon2COID.Outflow between RiverWare version 17 and version 18 would not result in changes to the description of effects for pre-wintering or overwintering based on the hydrographs presented in Final EIS Appendix 3.4-B, pg. 72.
- There would be no change to the conclusions stated in the Final EIS for BIO-3.

CREO

- The differences in the hydrographs for CREO between RiverWare version 17 and version 18 occur during the rearing period for phase 1 and phase 3 (full implementation) of the proposed action. The beneficial effect from increased water during rearing remains but is lower in magnitude.

- There would be no change to the conclusions stated in the Final EIS for BIO-3.

LAPO

- At the LAPO gage, RiverWare version 18 models less water under the proposed action during late rearing and pre-winter than assessed under RiverWare version 17. Changes would alter the stated emergent vegetation assessment in the Final EIS Appendix 3.4-B (p. 87) as shown below:
    - Inundation patterns during the growing season are similar among the no-action alternative, the proposed action, Alternative 3, and Alternative 4~~, but flows would remain slightly higher under the proposed action later in the growing season~~ (Figure 40 [hydrographs]). ~~The slight differences in flow among the alternatives would not be expected to result in extensive changes to the distribution of emergent vegetation.~~

  There would be no change to the conclusions stated in the Final EIS for BIO-3 for the pre-winter period. This is because the proposed action would retain access to the OSF storage volume which can influence flows in the Little Deschutes during low water years (a beneficial effect).

WIC

- The differences observed in the hydrographs for WIC between RiverWare version 17 and version 18 would not result in changes to the description of effects based on the hydrographs presented in Final EIS Appendix 3.4-B, p. 23.
- The quantitative evaluation (presented in Tables 6 and 7in Final EIS Appendix 3.4-B) could change but would not be expected to result in a change of effect direction or conclusion as described in the bullets in the effects section (Final EIS Appendix 3.4-B, p. 23). This is because Wickiup Reservoir would primarily be used as a flow regulator to support Oregon spotted frog habitat downstream from the reservoir.
- There would be no change to the conclusions stated in the Final EIS for BIO-3.

Fish and Mollusks

Table 6 summarizes the differences between RiverWare version 17 and 18 outputs for nodes used to characterize geographic regions described in Final EIS Section 3.4, *Biological Resources*, Table 3.4.1 with meaningful differences in Years 13 to 30 of the permit term.

The analysis of effects on fish and mollusks is based on differences in monthly median streamflow under the proposed action compared to the no-action alternative for different water year types. This provides an understanding of streamflow variability across the RiverWare simulation years and how the alternatives differ by water year. The percentage changes in monthly median streamflow presented in Table 6 are the calculated as follows:

$$\%Diff = \frac{(PA\ Month\ Median\ Flow - NA\ Month\ Median\ Flow)}{NA\ Month\ Median\ Flow} * 100$$

Years with median streamflow that were higher or lower under the proposed action relative to the no-action alternative were summarized separately in Table 6 for version 17 and version 18.

Upper Deschutes River (WICO and BENO nodes): Monthly median streamflows for version 17 and 18 results differed slightly in nearly all months evaluated. However, the pattern of higher winter storage season streamflows and lower summer irrigation season streamflows was the same for both RiverWare versions. The slight differences do not alter the interpretation of the biological effects on fish and mollusk habitats in the Upper Deschutes River presented in the Final EIS.

Middle Deschutes River (BENO): Similar to the Upper Deschutes River, monthly median streamflows differed slightly in nearly all months for RiverWare versions 17 and 18. There were more years with a decrease in streamflows in version 18 (8 years compared to 2 years in version 17). However, the pattern of higher winter storage season streamflows and no difference in summer irrigation season streamflows in a majority of years was the same for both RiverWare versions. These slight differences do not alter the interpretation of the biological effects on fish and mollusk habitats in the Middle Deschutes River presented in the Final EIS.

Crescent Creek (CREO): A similar pattern of increase and decrease in monthly median streamflows is present in both RiverWare versions. The percentage increase across years tended to be slightly higher in June and slightly lower in July and August under RiverWare version 18 compared to version 17. However, in both versions, streamflows either did not change or decreased in most years. Thus, the lower median streamflow results under version 18 were minor compared to version 17. These slight result differences do not alter the interpretation of the biological effects on fish and mollusk habitats in Crescent Creek presented in the Final EIS.

Little Deschutes River (LAPO): Differences between RiverWare versions 17 and 18 results were most prevalent in the Little Deschutes River at the LAPO node. The differences include fewer years with an increase in median streamflow under version 18 compared to version 17 and more years with a decrease in median streamflows under version 18 compared to version 17. Streamflows in June through September were lower under version 18 compared to version 17 in a majority of years. During the same months streamflows did not change under version 18 compared to version 17.

The differences in summer streamflows under version 18 would alter the interpretation of the biological effects on fish and mollusk habitats in the Little Deschutes River. The differences would result in changes to the reach-specific conclusions for the four species or species groups below but would not change the overall effect conclusions for any species or species group.

These changes alter the stated description of effects on redband trout discussed under Impact BIO-12 (Affect Redband Trout Habitat) in the Little Deschutes River as shown here:

Chapter 3, Section 3.4.3.2, p. 3.4-52:[3]

> **Little Deschutes River.** There would be ~~beneficial~~ <u>minimal</u> changes in streamflows in the Little Deschutes River~~with higher summer streamflows under the proposed action~~. Therefore, the proposed action would have ~~a beneficial~~ <u>no</u> effect on redband trout habitat in the Little Deschutes River.

These changes alter the stated effect conclusion for Impact BIO-12 (Affect Redband Trout Habitat) as shown here:

[3] These changes would apply to corresponding description on p. 110 of Appendix 3.4-C as well.

Chapter 3, Section 3.4.3.2, p. 3.4-55:

> **Effect Conclusion:** The proposed action would have no effect on redband trout habitat in Tumalo Creek, the Little Deschutes River, the Lower Deschutes River, Lake Billy Chinook, Lake Simtustus, and Prineville Reservoir. Overall, there would be no effect on redband trout in Crane Prairie Reservoir and the Upper Deschutes River between Crane Prairie Reservoir and Wickiup Reservoir, and a not adverse effect in Crescent Creek. There would be a beneficial effect in the Upper and Middle Deschutes River, ~~Little Deschutes River,~~ Crescent Lake Reservoir, and Whychus, Ochoco, and McKay Creeks. There would be adverse effects on redband trout habitat in Wickiup Reservoir and the Crooked River. Adverse effects in the Crooked River would be limited to summer months when existing conditions were less favorable to redband trout because of water temperatures. Overall, across the entire study area the proposed action would have a beneficial effect on redband trout habitat compared to the no-action alternative because of the extent of area where beneficial effects would occur.

These changes alter the stated effect conclusion of Impact BIO-13 (Affect Nonnative Resident Trout Habitat) as shown here:

Chapter 3, Section 3.4.3.2, p. 3.4-56:[4]

> **Effect Conclusion:** There would be no effect in several reaches, and there would be beneficial effects in the Upper Deschutes River; Middle Deschutes River; ~~Little Deschutes River,~~ and Whychus, Ochoco, and McKay Creeks. There would be an adverse effect in Wickiup Reservoir as described for redband trout (Impact BIO-12). Overall, the effect of the proposed action would be not adverse on nonnative trout habitat compared to the no-action alternative.

These changes alter the stated effect conclusion of Impact BIO-16 (Affect Native Non-Trout and Non-Game Species Fish Habitat) as shown here:

Chapter 3, Section 3.4.3.2, p. 3.4-58:[5]

> **Effect Conclusion:** The proposed action would have an adverse effect on non-game native species occurring in Wickiup Reservoir due to the variation in reservoir elevation and volume, seasonal differences, and water quality effects as described for redband trout (Impact BIO-12) and the Crooked River due to more days with warmer temperature as described for steelhead trout (Impact BIO-6). Effects in the Upper Deschutes River downstream of Wickiup Reservoir would be not adverse because of the beneficial effect during winter to all species. There would be beneficial effects in the Middle Deschutes River during storage season, ~~beneficial effects in the Little Deschutes River~~, small beneficial effects in Ochoco and McKay Creeks, no effect in other areas occupied by these species. Overall, effects of the proposed action on non-game native species would be not adverse compared to the no-action alternative.

These changes alter the stated description of effects for Crater Lake tightcoil and evening field slug under Impact BIO-17 (Affect Freshwater Mollusk Habitat) in the Little Deschutes River, as shown below, but do not change the overall effect conclusion for freshwater mollusks.

Chapter 3, Section 3.4.3.2, p. 3.4-59:[6]

[4] These changes would apply to corresponding description on p. 114 of Appendix 3.4-C as well.

[5] These changes would apply to corresponding description on p. 116 of Appendix 3.4-C as well.

[6] These changes would apply to corresponding description on p. 117 of Appendix 3.4-C as well.

Little Deschutes River. Minimal c~~C~~hanges in streamflows would ~~be beneficial~~ have no effect across an annual cycle, resulting in no additional or improved habitat (perennially moist areas) for Crater Lake tightcoil and evening field slug. Therefore, there would be no effect on these species ~~would be beneficial~~.

Crooked River—Prineville Reservoir Outlet (PRVO), Crooked River (CAPO) and Crooked River below North Unit ID pumps (NUID.Outflow). There are slight differences in streamflows at all locations in the Crooked River under RiverWare version 18 compared to version 17 suggesting a carry-over from the Upper Deschutes River water availability and a slightly different use of Crooked River water by North Unit ID. However, the slight differences do not alter the interpretation of the biological effects on fish and mollusk habitats in the Crooked River.

The overall effect conclusions for Impacts BIO-12, BIO-13, BIO-16, and BIO-17 would be unchanged.

Table 5. Summary of RiverWare Changes in Monthly Median Streamflow in Version 18 Compared to Version 17, by RiverWare node

Metric	RiverWare Version	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Reach (Gauge/Node): Upper Deschutes - Wickiup Reservoir Outlet (WICO) Monthly Median Flow: No Action vs Proposed Action, Years 13 -30													
# Yrs No Difference in Median Streamflow	V17	3	4	5	6	8	3	27	16	10	4	3	5
	V18	3	4	5	5	8	5	25	14	10	4	3	8
# Years Increase in median streamflow	V17	31	28	26	28	27	31	1	1	2	1	1	5
	V18	31	28	26	28	27	29	1	1	2	1	1	6
Median % increase in years with increase	V17	167%	300%	300%	233%	220%	152%	17%	54%	20%	6%	7%	18%
	V18	167%	300%	300%	233%	220%	167%	17%	48%	19%	6%	8%	13%
# Years decrease in median streamflow	V17	4	6	7	4	3	4	10	21	26	33	34	28
	V18	4	6	7	5	3	4	12	23	26	33	34	24
Median % decrease in years with decrease	V17	-18%	-18%	-13%	-17%	-24%	-19%	-13%	-20%	-19%	-21%	-14%	-15%
	V18	-18%	-18%	-13%	-17%	-24%	-19%	-11%	-19%	-19%	-20%	-14%	-13%
Reach (Gauge/Node): Upper Deschutes - Beno Node (BENO) Monthly Median Flow: No Action vs Proposed Action, Years 13 -30													
# Yrs No Difference in Median Streamflow	V17	5	8	8	6	9	8	29	19	14	5	11	8
	V18	7	9	11	8	9	10	28	18	11	5	8	9
# Years Increase in median streamflow	V17	29	24	27	29	26	28	1	0	1	0	0	8
	V18	27	23	24	27	26	26	1	0	1	0	0	7
Median % increase in years with increase	V17	36%	49%	43%	39%	37%	30%	8%	NA	6%	NA	NA	10%
	V18	37%	47%	44%	40%	36%	32%	8%	NA	7%	NA	NA	9%
# Years decrease in median streamflow	V17	4	6	3	3	3	2	8	19	23	33	27	22
	V18	4	6	3	3	3	2	9	20	26	33	30	22
Median % decrease in years with decrease	V17	-8%	-10%	-12%	-8%	-12%	-19%	-7%	-12%	-13%	-13%	-10%	-8%
	V18	-9%	-10%	-15%	-12%	-12%	-19%	-7%	-12%	-13%	-15%	-11%	-8%
Reach (Gauge/Node): Middle Deschutes - DEBO Node (DEBO) Monthly Median Flow: No Action vs Proposed Action, Years 13 -30													
# Yrs No Difference in Median Streamflow	V17	5	9	9	7	9	7	13	17	23	27	35	3
	V18	8	9	9	7	8	8	12	17	24	26	30	3
# Years Increase in median streamflow	V17	29	23	26	29	26	29	4	11	7	4	1	34
	V18	26	23	26	28	27	28	5	11	7	4	0	34
Median % increase in years with increase	V17	88%	52%	47%	43%	40%	33%	10%	35%	35%	24%	5%	31%
	V18	82%	48%	44%	42%	38%	34%	13%	35%	35%	24%	NA	31%

Metric	RiverWare Version	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
# Years decrease in median streamflow	V17	4	6	3	2	3	2	21	10	8	7	2	1
	V18	4	6	3	3	3	2	21	10	7	8	8	1
Median % decrease in years with decrease	V17	-14%	-9%	-14%	-17%	-13%	-18%	-18%	-10%	-14%	-10%	-10%	-38%
	V18	-14%	-10%	-16%	-12%	-13%	-20%	-17%	-10%	-15%	-10%	-10%	-37%
Reach (Gauge/Node): Crescent/Little Deschutes - Crescent Lake Outlet (CREO) Monthly Median Flow: No Action vs Proposed Action, Years 13 -30													
# Yrs No Difference in Median Streamflow	V17	1	4	3	5	6	5	4	15	14	14	21	11
	V18	1	4	3	5	6	4	5	15	16	8	23	12
# Years Increase in median streamflow	V17	14	5	5	6	6	4	9	10	12	12	4	6
	V18	14	4	5	5	6	4	7	11	11	19	5	6
Median % increase in years with increase	V17	33%	167%	300%	300%	130%	167%	82%	159%	79%	28%	62%	138%
	V18	33%	167%	300%	300%	215%	167%	167%	166%	104%	17%	27%	138%
# Years decrease in median streamflow	V17	23	29	30	27	26	29	25	13	12	12	13	21
	V18	23	30	30	28	26	30	26	12	11	11	10	20
Median % decrease in years with decrease	V17	-60%	-60%	-40%	-40%	-40%	-60%	-60%	-15%	-35%	-7%	-6%	-6%
	V18	-60%	-60%	-40%	-40%	-40%	-60%	-60%	-27%	-39%	-7%	-6%	-6%
Reach (Gauge/Node): Crescent/Little Deschutes - LAPO Node (LAPO) Monthly Median Flow: No Action vs Proposed Action - Years 13 -30													
# Yrs No Difference in Median Streamflow	V17	5	7	12	12	18	9	16	25	16	8	8	6
	V18	2	2	8	10	15	9	14	25	19	21	31	27
# Years Increase in median streamflow	V17	27	13	14	16	12	9	6	11	18	25	29	32
	V18	12	5	5	8	6	7	7	11	13	10	3	5
Median % increase in years with increase	V17	39%	21%	29%	19%	18%	12%	12%	10%	16%	26%	29%	32%
	V18	13%	18%	37%	14%	22%	10%	17%	10%	13%	23%	7%	60%
# Years decrease in median streamflow	V17	6	18	12	10	8	20	16	2	4	5	1	0
	V18	24	31	25	20	17	22	17	2	6	7	4	6
Median % decrease in years with decrease	V17	-15%	-14%	-7%	-7%	-6%	-8%	-8%	-30%	-17%	-8%	-27%	NA
	V18	-22%	-17%	-9%	-8%	-9%	-9%	-8%	-30%	-14%	-8%	-16%	-15%
Reach (Gauge/Node): Crooked River - Prineville Reservoir Outlet (PRVO) Monthly Median Flow: No Action vs Proposed Action, Years 13 -30													
# Yrs No Difference in Median Streamflow	V17	29	18	26	28	28	26	31	27	16	13	18	30
	V18	29	17	26	27	28	26	31	26	16	16	20	29
	V17	3	4	4	3	3	3	5	8	19	22	10	0

Metric	RiverWare Version	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
# Years Increase in median streamflow	V18	3	4	4	3	3	3	4	9	18	19	8	0
Median % increase in years with increase	V17	63%	145%	145%	226%	226%	63%	22%	30%	42%	43%	27%	NA
	V18	63%	145%	145%	226%	226%	63%	25%	25%	46%	44%	35%	NA
# Years decrease in median streamflow	V17	6	16	8	7	7	9	2	3	3	3	10	8
	V18	6	17	8	8	7	9	3	3	4	3	10	9
Median % decrease in years with decrease	V17	-10%	-29%	-10%	-15%	-15%	-10%	-35%	-14%	-5%	-6%	-29%	-18%
	V18	-10%	-31%	-10%	-14%	-18%	-10%	-10%	-16%	-6%	-7%	-29%	-16%
Reach (Gauge/Node): Crooked River - CAPO Node (CAPO) Monthly Median Flow: No Action vs Proposed Action - Years 13 -30													
# Yrs No Difference in Median Streamflow	V17	29	18	26	28	28	27	24	14	3	1	3	2
	V18	29	17	26	27	28	27	23	14	3	2	3	1
# Years Increase in median streamflow	V17	3	4	4	3	3	2	5	10	19	23	11	0
	V18	3	4	4	3	3	2	5	10	19	19	8	0
Median % increase in years with increase	V17	119%	202%	202%	268%	268%	194%	33%	76%	237%	190%	109%	NA
	V18	119%	202%	202%	268%	268%	194%	28%	87%	239%	190%	151%	NA
# Years decrease in median streamflow	V17	6	16	8	7	7	9	9	14	16	14	24	36
	V18	6	17	8	8	7	9	10	14	16	17	27	37
Median % decrease in years with decrease	V17	-14%	-30%	-10%	-15%	-15%	-10%	-8%	-19%	-13%	-13%	-14%	-13%
	V18	-14%	-31%	-11%	-14%	-18%	-10%	-9%	-21%	-13%	-13%	-13%	-13%
Reach (Gauge/Node): Crooked River - NUID Pumps Internodal (NUID.Outflow) Monthly Median Flow: No Action vs Proposed Action, Years 13 -30													
# Yrs No Difference in Median Streamflow	V17	27	17	26	28	28	27	24	9	3	0	0	0
	V18	25	16	25	27	28	27	24	9	3	0	0	0
# Years Increase in median streamflow	V17	3	4	4	3	3	2	0	1	0	0	0	0
	V18	3	4	4	3	3	2	0	1	0	0	0	0
Median % increase in years with increase	V17	24%	39%	41%	56%	57%	43%	NA	36%	NA	NA	NA	NA
	V18	23%	39%	40%	56%	57%	43%	NA	36%	NA	NA	NA	NA
# Years decrease in median streamflow	V17	8	17	8	7	7	9	14	28	35	38	38	38
	V18	10	18	9	8	7	9	14	28	35	38	38	38
Median % decrease in years with decrease	V17	-9%	-23%	-9%	-12%	-12%	-9%	-9%	-26%	-12%	-45%	-34%	-12%
	V18	-8%	-26%	-9%	-11%	-14%	-9%	-11%	-26%	-12%	-45%	-35%	-13%

Water Quality

As described in the Final EIS, the proposed action affects water quality primarily through changes in reservoir elevations and stream and river flows. As shown in Table 1, changes in RiverWare version 18 outputs compared to version 17 outputs were greatest in the Little Deschutes River and Crescent Creek. Changes in these reaches would alter the stated effects under Impact WQ-1 (Affect Water Quality in Deschutes River Subbasin) of the Final EIS, as shown below, but would not change the overall effect conclusion for Impact WQ-1. Changes in other surface waters would not alter the effects described the Final EIS.

Little Deschutes River. The version 17 model projected that flows in the Little Deschutes River would increase during the irrigation season, resulting in a minor benefit through reduced water temperatures, but otherwise, water quality parameters were expected to remain similar to the no-action alternative. In the version 18 outputs, the potential minor benefits to temperature due to increased flows would not occur. Overall effects under Impact WQ-1 would remain not adverse compared to the no-action alternative.

These changes alter the stated description of effects on water quality in the Little Deschutes River as shown below:

Chapter 3, Section 3.3.3.2, p. 3.3-14:

> **Tumalo and Whychus Creeks and Little Deschutes River.** The proposed action would have no effect on flows and associated water quality conditions in Tumalo Creek. Potential small, unquantifiable effects on flows in Whychus Creek would have small beneficial effects on water quality. ~~Increased irrigation season flows~~ Effects of minor flow changes in the Little Deschutes River ~~could reduce stream temperatures, resulting in a minor beneficial effects~~ on water quality would be negligible and therefore not adverse.

Crescent Creek. The version 17 model projected that starting in year 8, changes in flows and flow variability in Crescent Creek would be minor with a general pattern of small winter increases and small summer decreases, and associate potential for summer temperature increases. The level of increase was determined to not be sufficient to exacerbate any water quality stressors to the extent that water quality standards would be exceeded. Therefore, overall effects were found to be not adverse. Based on the version 18 outputs, that determination would remain unchanged except for some minor potential beneficial effects on stream temperature due to minor increases in flow occur during the irrigation season. Overall effects for the version 18 flow levels effects would remain not adverse.

These changes alter the stated description of effects on water quality in Crescent Creek as shown below:

Chapter 3, Section 3.3.3.2, p. 3.3-14:

> **Crescent Creek.** Starting in year 8, changes in flows and flow variability in Crescent Creek would be minor with a general pattern of small ~~winter~~ increases ~~and small~~ throughout the year. ~~summer decreases.~~ As described above, water quality of input water from Crescent Lake Reservoir is not likely to be impaired by the proposed action. ~~Reduced~~ Small increases in summer flows could ~~result in increased~~ improve water temperature conditions~~, but~~ and would not exacerbate any water quality

stressors to the extent that water quality standards would be exceeded, so overall effects would be not adverse.

These changes alter the stated effect conclusion for Impact WQ-1 as shown below:

Chapter 3, Section 3.3.3.2, p. 3.3-14 and 3.3-15:

Effect Conclusion: The proposed action would result in adverse effects on water quality in Wickiup Reservoir due to earlier and more extended drawdowns in the summer. Lower surface water levels in Wickiup would decrease oxygen levels and increase phosphorous levels, which in turn could increase intensity and duration of algae and cyanobacteria blooms in the reservoir during the summer and into early fall. Reduced water quality in Wickiup would also affect the Upper Deschutes River below Wickiup Dam, including increased turbidity from organic matter and increased levels of cyanobacteria. However, the degree of this effect would be somewhat offset by a higher percentage of flow from springs and groundwater input. In addition, a reduction in peak flows and overall more stable river levels would be expected to reduce streambank erosion along the Upper Deschutes River and associated turbidity. Therefore, overall effects on water quality in the Upper Deschutes River are expected to be not adverse. There would be no effect on water quality in Tumalo Creek, not adverse effects in the Little Deschutes River, and potential minor beneficial effects in ~~the Little Deschutes River and~~ Whychus Creek. Changes in seasonal water regimes in other reservoirs, rivers, and streams in the Upper Deschutes Subbasin would be minor and water quality effects would be not adverse. Overall, effects on water quality in the Upper Deschutes Subbasin under the proposed action would be adverse because of adverse effects in Wickiup Reservoir due to further degradation of water quality in late summer and fall.

The overall effect conclusion for Impact WQ-1 would not change; effects would remain not adverse.

Socioeconomics

Table 7 summarizes the differences between RiverWare version 17 and version 18 for water available for diversion for each irrigation district under the proposed action for both median and dry water years. As shown in the table, North Unit Irrigation District (ID), Arnold ID, and Lone Pine ID are the primary districts affected by the change, with all other districts experiencing a 1% or less change in water supply. While this reduced water supply could reduce the acreage irrigated, an analysis of each of the three districts indicates that the changes would not affect the socioeconomic conclusions in the Final EIS. The effects on North Unit ID, Arnold ID, and Lone Pine relative to the findings in the Final EIS are discussed in further detail below.

Table 6. Percentage Change in Annual Water Available (acre-feet) for Diversion by District, under the Proposed Action RiverWare Version 18 Compared to RiverWare Version 17, Median and Dry Water Years

District	Years 1–7		Years 8–12		Years 13–30	
	Median	Dry	Median	Dry	Median	Dry
Arnold	0%	-2%	0%	-3%	0%	-8%
Central Oregon	0%	0%	0%	-1%	0%	-1%
Lone Pine	0%	-2%	-2%	0%	0%	-3%
North Unit	0%	-4%	-3%	-3%	-3%	-6%
Ochoco	0%	0%	0%	0%	0%	0%
Swalley	0%	0%	0%	0%	0%	0%
Three Sisters	0%	0%	0%	0%	0%	0%
Other Irrigated Lands	0%	0%	0%	0%	0%	0%
Total	**0%**	**-1%**	**-1%**	**-1%**	**-1%**	**-2%**

For North Unit ID, there is a potential slight reduction in acres irrigated (100 acres or less than 1% of acreage) at the end of the irrigation season in median years under the low conservation scenario around Year 2040. No other years are affected in North Unit ID in median water years. For dry water years, effects on North Unit ID are still limited to the low water conservation scenario.

- In years 1 through 7 of the permit term, North Unit ID would have more water available for diversion than under the no-action alternative, but the increased water supply and associated economic benefit would be less than presented in Final EIS Chapter 3, Section 3.9, *Socioeconomics and Environmental Justice*.
- In years 8 through 30 under the low conservation scenario, there would be a greater reduction in acreage irrigated throughout the irrigation season than shown in the Final EIS, with greater associated economic impacts than shown in Final EIS Section 3.9.
- The greatest impacts of the proposed action relative to the no action alternative under version 18 would occur around Year 2030 (in years 8-12 of the permit term) consistent with version 17. However, the total change in county income and employment would be approximately $1.2 million and 50 jobs (compared to $0.8 million and 30 jobs as shown in the Final EIS), an effect of less than 0.5% at the county level.

In terms of potential effects on specialty crops in North Unit ID in very dry years, the reduction in available diversions from RiverWare version 17 to RiverWare version 18 is 4% or less throughout the permit term. The Final EIS conclusions that reductions in water supply are not expected to affect specialty crop production are still valid. As such, the no adverse effect conclusion for Impact SOC-1 (Economic Opportunity) relative to Jefferson County would remain unchanged.

For Arnold ID and Lone Pine ID, effects on irrigated acreage and agricultural socioeconomic value would be limited to a dry year at the beginning of the permit term. These effects would be limited to approximately 100 acres in each district, or 3 to 4% of acreage, and no impact thereafter (so equal to or less than the impact estimated for Alternative 3). As such, the effect conclusion for Impact SOC-1 (Economic Opportunity) would remain not adverse for Deschutes County and Crook County.

Although Arnold ID suburban water users in the low conservation scenario may face a slight reduction in available water early in the permit term in dry years, the not adverse effect conclusion for Impact SOC-5 in the Final EIS would be unchanged based on changes from the version 17 outputs.

Due to the limited percentage change in agricultural production and associated economic value related to the RiverWare version 18 changes, all other conclusions related to the socioeconomic effects of agriculture remain the same as presented in the Final EIS (although specific values, such as those presented in Table 3.9-9 and 3.9-10 would change). Further, the same types and relative magnitude of effects on environmental justice populations, as described in Impact SOC-9 would be unchanged, although effects in Jefferson County may persist through 2049.

While the effect conclusions would not change based on RiverWare version 18 results, text would change for Impacts SOC-1 (Affect Economic Opportunity), SOC-5 (Affect Urban/Suburban Water Supply Availability and Costs), and SOC-9 (Affect Environmental Justice Populations), as follows:

Changes would alter the description of effects in Impact SOC-1, paragraphs 2, 3, 4, as shown below:

Chapter 3, Section 3.9.3.2, p. 3.9-17:

> Estimated changes in economic opportunity generated by agriculture are summarized in Table 3.9-9. The potential change in annual jobs and income (direct, indirect, and induced) supported by forage/grain production are estimated for the same water year type, conservation scenario, and permit year. No effects are projected for ~~wet water years, and less than 1% of forage/grain-related employment and income supported by North Unit ID would be affected in~~ median and wet water years ~~(and only in the low-conservation scenario at the beginning of the permit period)~~.
>
> In dry water years, agricultural production and associated economic contribution would remain stable in Deschutes and Crook Counties but would decline in Jefferson County. In Jefferson County, forage/grain-related employment and income supported by North Unit ID would be fairly stable until around year 2030, when there could be a reduction of up to ~~9%~~7% in the low conservation scenario,[7] but no reduction in the high conservation scenario. Potential dry year reductions in Jefferson County jobs and income are expected to be minimal in the initial years of the permit period, peak in 2030, and then decline to zero by 2049. In addition to effects on North Unit ID, there may also be slight effects on agricultural production values and associated employment/income in dry years in Lone Pine ID in Crook County ~~and Arnold ID in Deschutes County~~, but these effects represent 0% of county-level employment and income and are only for the first few years of the permit term (see Appendix 3.5-A for detailed results by district).[8, 9]
>
> Across all water year types, total jobs and income supported by grain/forage production are expected to remain stable in Crook and Deschutes Counties, and decline by up to ~~3%~~2% in Jefferson

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[7] As a proportion of all farm jobs in Jefferson County (not just those related to forage and grain), the maximum expected dry year impact is expected to be ~~4.2%~~2.5% of farm employment.

[8] Water supply modeling indicates that Ochoco ID would experience effects in very dry years. Central Oregon ID is also projected to experience minor effects; however, the district anticipates that operational improvements would fully address these effects (Horrell pers. comm.). Also, subsequent to the impact analysis conducted for Lone Pine ID, Lone Pine increased the proportion of conserved water from a district piping project that would be retained for district use (thereby increasing water supplies to the district). As such, effects in Crook County may be slightly less than estimated.

[9] These changes would apply to corresponding description on p. 96 of Appendix 3.5-A as well.

> County. As a proportion of all farm employment and income (grain/forage and other crop production), impacts of the proposed action in Jefferson County across all water year types are expected to be less than 1%.

Changes would alter the description of effects in paragraph 2 of Impact SOC-5, as shown below:

Chapter 3, Section 3.9.3.2, p. 3.9-23:

> Reductions in irrigation water diversions would be unlikely to affect urban/suburban uses in median and dry years, as districts providing urban/suburban water such as Arnold ID, Swalley ID, Central Oregon ID, and Ochoco ID are not expected to experience ~~little to no~~ a change in water supplies. In very dry water years, water supplies ~~are expected to be more~~ may be reduced in Arnold ID and Ochoco ID compared to the no-action alternative, which may affect urban/suburban users.

Changes would alter the description of effects in paragraph 2 of Impact SOC-9, as shown below:

Chapter 3, Section 3.9.3.2, p. 3.9-26:

> Potential decreases in farm employment and income opportunities in North Unit ID would affect farm operators and farm workers in Jefferson County. These effects (up to ~~4.2%~~ 2.5% of farm employment) would occur in dry years, and are expected to be minimal in the initial years of the permit term, peak in 2030, and ~~persist to some degree through~~ decline to zero by 2049. While farm operators are mostly white, farm workers are mostly minority. Adverse effects on the farm economy under the proposed action compared to the no-action alternative would likely result in adverse socioeconomic effects on the environmental justice farmworker populations, as effects on this environmental justice population would likely appreciably exceed effects on the general population.

The effect conclusions for Impacts SOC-1, SOC-5, and SOC-9 would be unchanged.

Attachment I

Hydrologic Evaluation of Alternatives for the Deschutes Basin Habitat Conservation Plan

BUREAU OF RECLAMATION

Technical Memorandum

Hydrologic Evaluation of Alternatives for the Deschutes Basin Habitat Conservation Plan

Deschutes Project, Oregon
Columbia Pacific Northwest Region

U.S. Department of the Interior

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Mission Statements

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The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Acronyms and Abbreviations

Acronym or Abbreviation	Definition
AF	acre-feet
AID	Arnold Irrigation District
cfs	cubic feet per second
COID	Central Oregon Irrigation District
DRC	Deschutes River Conservancy
DBHCP	Deschutes Basin Habitat Conservation Plan
EIS	Environmental Impact Statement
LPID	Lone Pine Irrigation District
MWRV	Minimum Winter Release Volume
NCAO	North Canal (part of COID)
NEPA	National Environmental Policy Act
NUID	North Unit Irrigation District
OID	Ochoco Irrigation District
OSF	Oregon Spotted Frog
SID	Swalley Irrigation District
TID	Tumalo Irrigation District
TSID	Three Sisters Irrigation District
OWRD	Oregon Water Resources Department
Reclamation	Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service

Preface

The Draft Environmental Impact Statement (EIS) relied on model assumptions and results published in a technical memorandum published in August 2019. This preface describes changes that were made to the model assumptions between the Draft EIS and the Final EIS based on public comment; the table also indicates the sections in this report where details about the new assumptions can be found.

Location	Alternative	Assumption Change	Section
Wickiup	All	Change to minimum flow calculation so that minimums are set based on Wickiup storage triggers rather than equation used in DEIS.	2.2.2 3.2.2
Wickiup	Alternative 2	A maximum flow rate was set for irrigation season outflow.	3.2.2
Wickiup	Alternative 2	Limitations were placed on the rate of outflow change in April and September.	3.2.2
Crescent	Alternative 2	Minimum outflow set to 10 cfs and a volume of water was reserved and used to augment spring outflows and reduce the rate of decrease in the fall.	3.2.3
Crescent	All	The 1911 storage right was allowed to fill a new 35,000 acre-feet each year rather than counting existing storage toward that right.	2.2.3
NUID	All	Added planned Central Oregon Irrigation District (COID) conservation where 29.4 cfs diverted under COID's existing water rights will be diverted at the Pilot Butte canal and delivered to North Unit Canal via pipeline. North Unit Irrigation District's (NUID's) diversion is reduced by 29.4 cfs.	2.4
NUID	All	Daily Wickiup storage demand request was adjusted to reflect real time operations. Demand request was reduced based on April 1 storage in Wickiup.	2.4
Prineville	No Action, Alternative 2, and Alternative 3	Summer outflows from the uncontracted account were capped at 50 cfs.	2.3 3.3
Prineville	Alternative 4	Summer outflows from the uncontracted account were capped at 80 cfs.	3.4
All	All	Dataset extended to include inflows through September 30, 2018.	2.0

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1. Introduction

The Bureau of Reclamation (Reclamation) is cooperating with the U.S. Fish and Wildlife Service (USFWS) on the Environmental Impact Statement (EIS) for the Deschutes Basin Habitat Conservation Plan (DBHCP) on the Deschutes River in central Oregon. As part of that study, Reclamation used a RiverWare model of the river, distribution, and reservoir system to simulate the alternatives for the EIS. This technical memorandum documents the model representation of the alternatives and summarizes a selection of the results.

2. Reference RiverWare Model

The water resources modeling for the DBHCP EIS was conducted using a daily time-step RiverWare® ver. 7.5 model of the Deschutes Basin above the Pelton Round Butte reservoir complex. A short summary of the model is presented here. The model development is described in-depth in a separate document (Reclamation 2017a).

Unregulated hydrology is input to the model and represents river flows, stream gains (springs or small tributaries), and losses without reservoir operations or diversions. The model then applies rules to operate the system with different configurations of logic and instream and consumptive demands. The unregulated hydrology is mean daily flows from water years 1981 to 2018 (October 1980 through September 2018). Additional Reclamation reports (Reclamation 2017c and 2020) document how these data were developed.

The RiverWare model represents the Upper Deschutes River (excluding Crescent Creek, Little Deschutes River, Tumalo Creek, Whychus Creek, Crooked River, and Ochoco Creek). Figure 1 shows a map of the Deschutes River and Crooked River basins, along with the included tributaries.

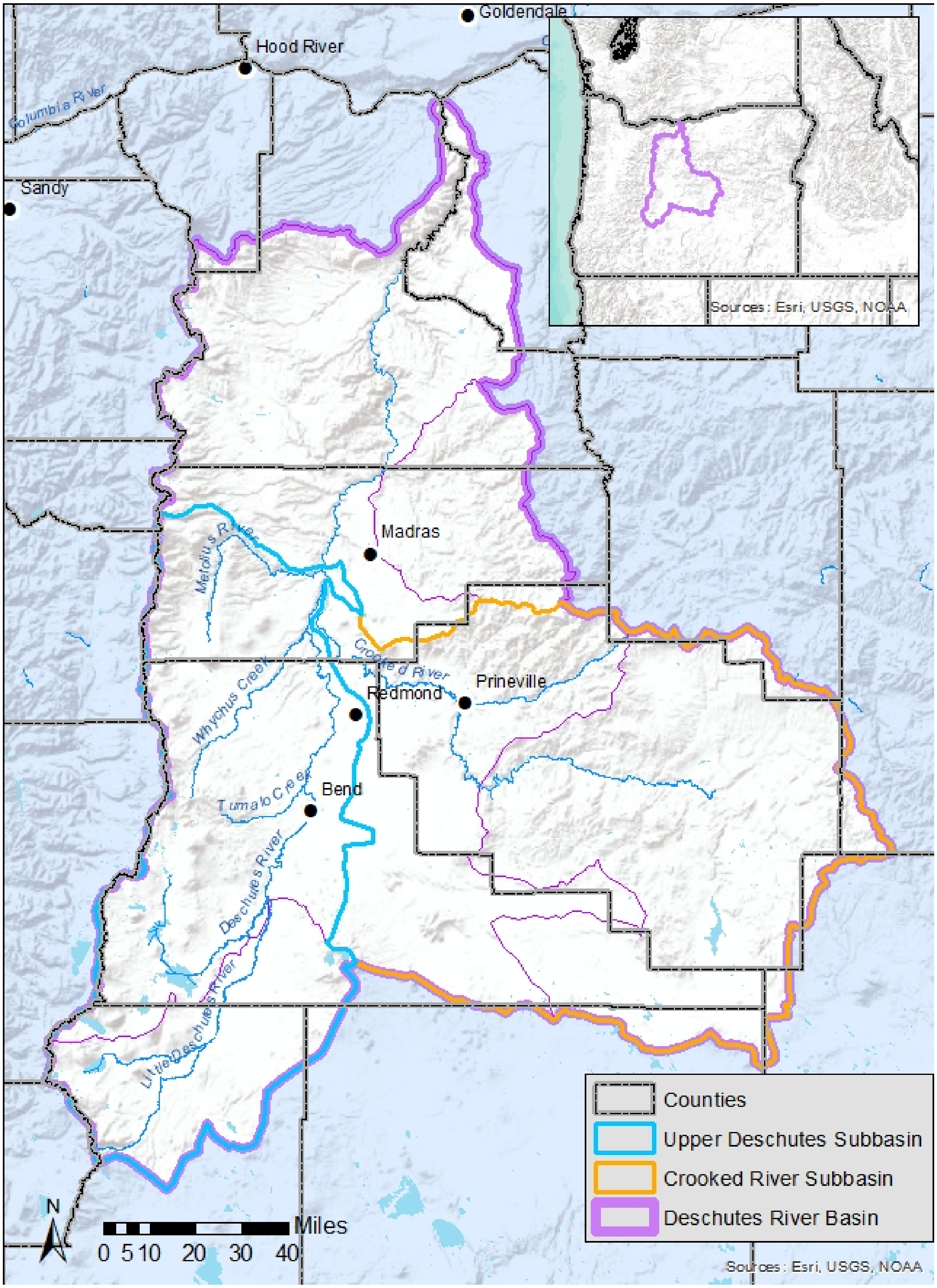

Figure 1. Deschutes River and Crooked River basins

RiverWare is a general rules-based modeling platform that requires full definition of the physical layout of a river system and logic to define operation of the system. The model is constructed using RiverWare objects that define reservoirs, diversions, river reaches, control points (which monitor instream flow locations), and river gages. Figure 2 and Figure 3 diagram the layout of the RiverWare model for the Upper Deschutes and the Crooked River subbasins, respectively. The red circles indicate water users (representing diversions) and are labeled with the acronym for the irrigation district or other water user group that they serve. The yellow boxes indicate stream gages and are named with their four-letter acronym from the Hydromet program (https://www.usbr.gov/pn/hydromet/), with the exception of the Highway 126 gage on the Crooked River. The green triangles represent locations where gains and losses are input into the model. The blue diamonds represent control points (i.e., locations where flow is monitored in the model to ensure minimum flow criteria are maintained). While the model itself has more detail than these schematics, the figures illustrate the most relevant features of the model.

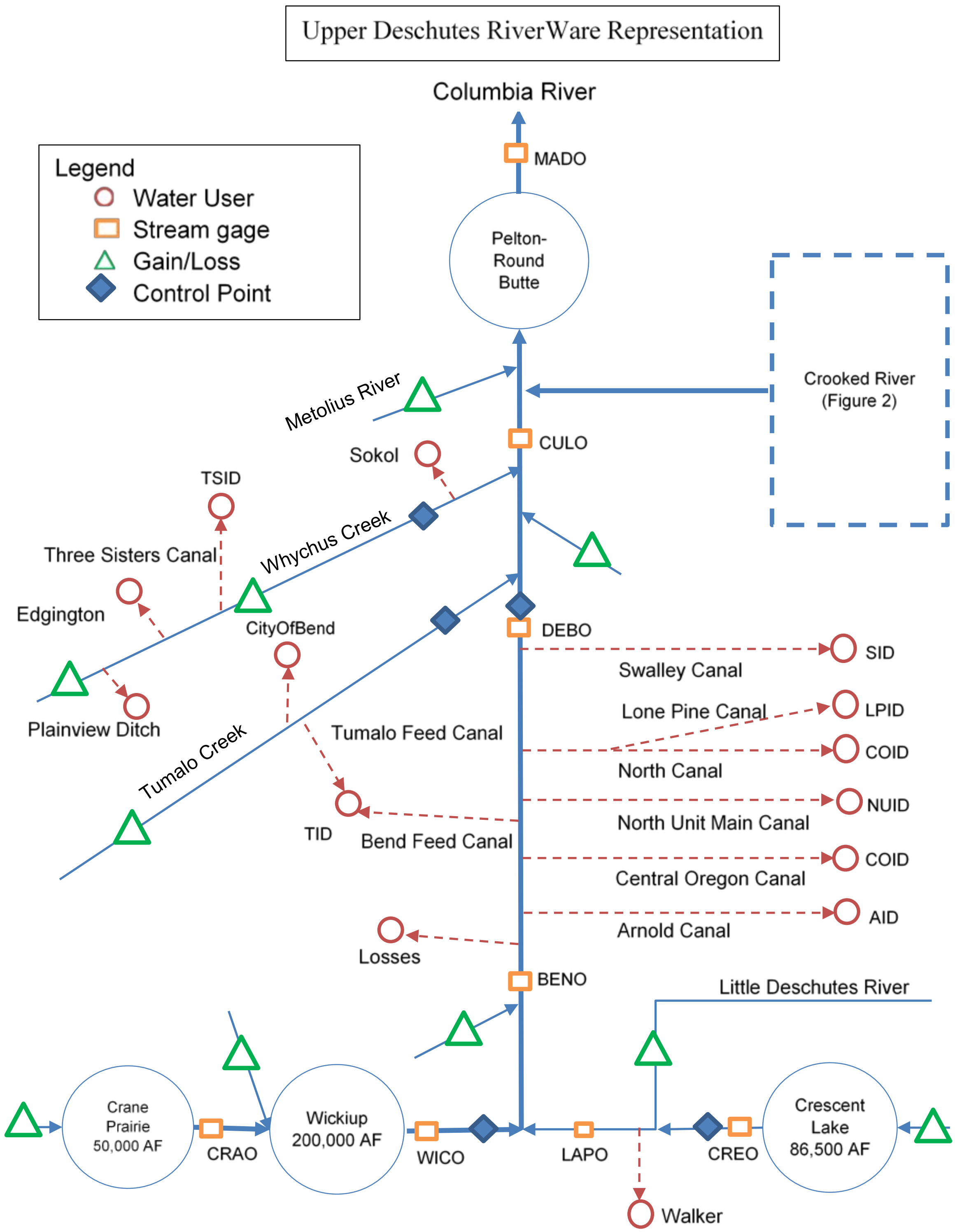

Figure 2. Schematic of RiverWare representation of Upper Deschutes River

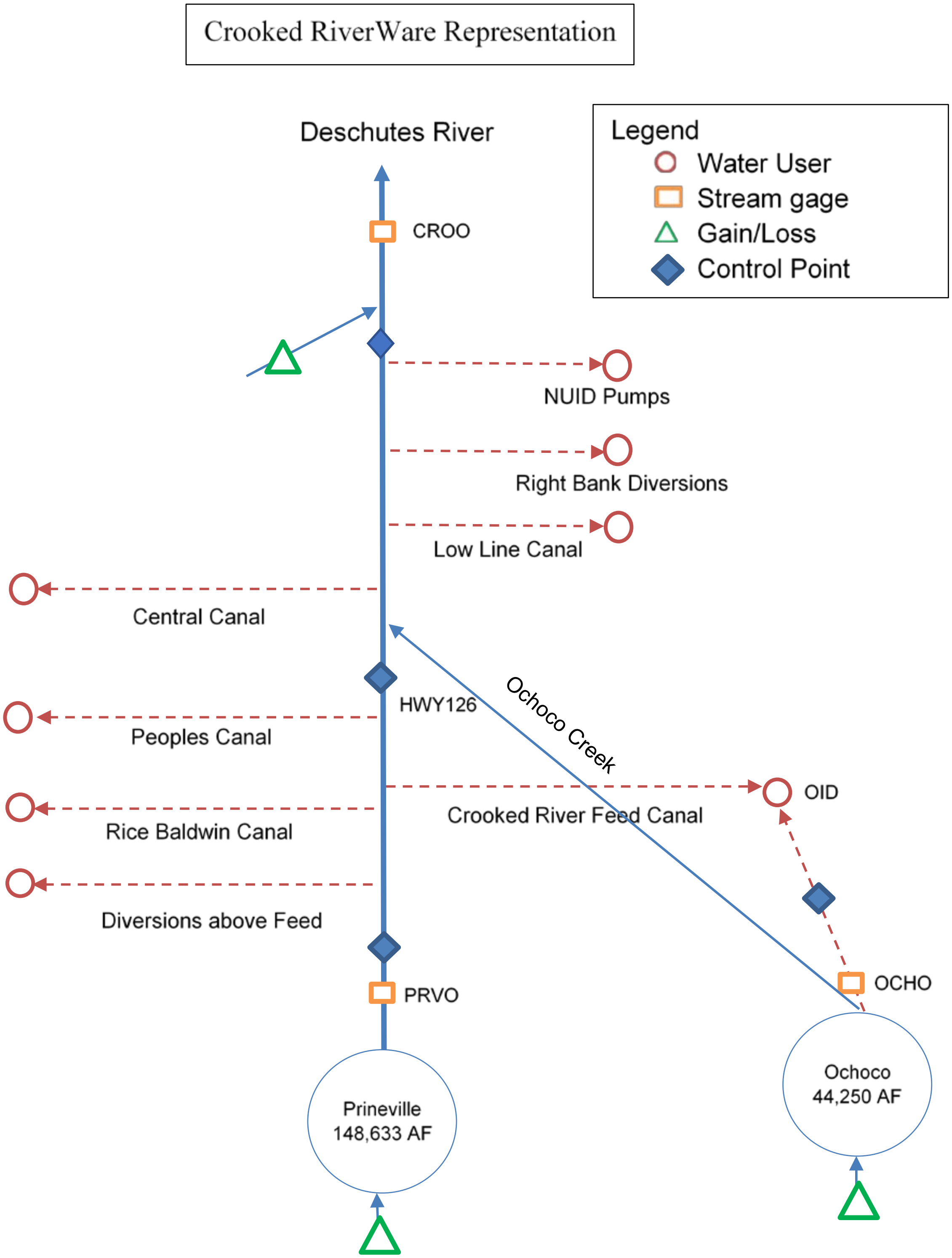

Figure 3. Schematic of RiverWare representation of Crooked River

Operating rule logic was first developed to simulate historical operations from 1984 through 2009[1], the years in which measured data could be compared to model output to ensure proper operation. The model used water rights, diversion patterns, and inflow hydrology representative of the time period. Detailed information about the inputs and calibration quality is described in Reclamation 2017a. The operating logic was then updated to incorporate recent changes in the basin, including the Oregon Spotted Frog (OSF) Biological Assessment (Reclamation 2017b) and the Crooked River Collaborative Water Security and Jobs Act of 2014. The details of those operations are described in Section 2.2 and Section 2.3.

It is important to recognize that there are many assumptions and simplifications that are required when developing a model. The data and operating logic attempt to simulate realistic conditions and water management as closely as possible, but it is likely there will be some operations that are handled differently in real time. The operations described in this report are relatively new and are still undergoing changes as real-time experience informs operations.

Some of the operations described in this report were developed based on the best available information and assumptions about how they would be implemented in real time. It is possible that these will be adaptively changed through time within the constraints of the National Environmental Policy Act (NEPA).

2.1. Irrigation Demand Pattern

For scenario-based studies, it is common to develop a version of the model that simulates current conditions (baseline model). This model is meant to indicate the response of a system, using the current operation definition, to historical inflow hydrology. For the baseline model, diversions were changed from the historical daily time series (that varies from year to year) to a single daily pattern that repeats annually (representing average irrigation diversions calculated from measured data for recent years). By using a single year pattern for diversion, the effects of management changes can be examined more easily because they are not combined with the effects of changing demands. Figure 4 shows the daily diversion pattern that is repeated every year for the model simulation period for the eight DBHCP applicant irrigation districts. Table 1 shows the year ranges and total average annual volume for each district.

[1] Measured data were available for most locations in the basin starting in 1984. Model development began shortly after 2010, so 2009 was used as the end year for calibration.

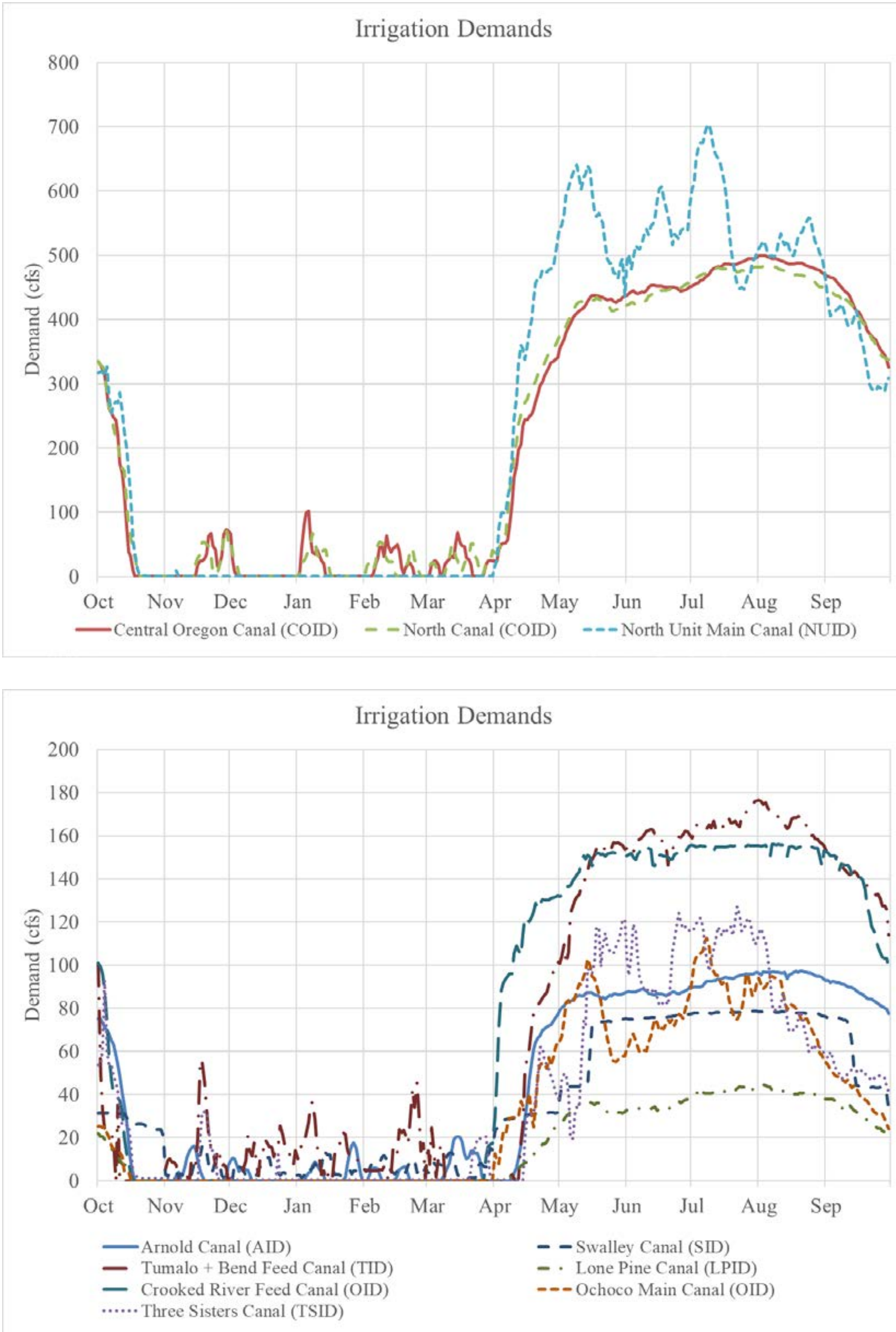

Figure 4. Daily diversion pattern that is repeated for every year in the model simulations; the top plot is for larger diversions for COID and NUID and the bottom plot is for smaller diversions for remaining districts

Table 1. Total annual demand used in modeling and years used to calculate demand[2]

District*	Years Used in Average	Total Annual Demand (acre-feet)
AID	2010-2017	32,266
COID	2010-2017	303,703
LPID	2010-2017	16,017
NUID	2010-2017	196,788
OID	2010-2017	77,824
SID	2013-2017	26,372
TSID	2011-2016, with manual adjustments for recent operational changes outside the irrigation season	35,004
TID	2009, 2010, 2011, 2013, 2014	53,517

*AID = Arnold Irrigation District; COID = Central Oregon Irrigation District; LPID = Lone Pine Irrigation District; NUID = North Unit Irrigation District; OID = Ochoco Irrigation District; SID = Swalley Irrigation District; TSID = Three Sisters Irrigation District; TID = Tumalo Irrigation District.

2.2. Baseline Upper Deschutes River Operation

Baseline operating rules for the Upper Deschutes River reflect the operating criteria in the Oregon Spotted Frog Biological Assessment (Reclamation 2017b). Generally, the operation is intended to minimize elevation changes in Crane Prairie Reservoir and set a minimum outflow from Wickiup Reservoir. In addition, winter outflows from Crane Prairie Reservoir, Wickiup Reservoir, and Crescent Lake were all larger than historical releases to enhance habitat conditions in the downgradient stream network.

2.2.1. Crane Prairie Reservoir

Crane Prairie Reservoir is operated to minimize elevation changes throughout the year to maximize habitat for the OSF. The reservoir is operated between 35,000 acre-feet and 50,000 acre-feet. In the model, this is accomplished by including a storage account that is dedicated to the OSF with a senior priority date of August 30, 1899, which is one day earlier than the most senior water right on the system (Swalley). This approach ensures that the highest priority in the model is to maintain 35,000 acre-feet of storage in Crane Prairie Reservoir. Three other storage accounts represent 5,000 acre-feet of storage

[2] The total demand for COID was slightly larger in the modeling because the LPID diversion was not subtracted from the NCAO [North Canal (part of COID)] diversion. This will be updated in later versions.

each for Arnold Irrigation District (AID), Central Oregon Irrigation District (COID), and Lone Pine Irrigation District (LPID).

Because of the senior priority date of the OSF account (35,000 acre-feet), it is kept full unless evaporation or seepage reduce its volume and the reduction cannot be made up with inflows. The 15,000 acre-foot operating range is used to meet seasonal OSF habitat and irrigation needs according to the schedule outlined below.

- January 1 to March 15: Crane Prairie Reservoir begins to store water, if available, until the reservoir reaches 45,000 acre-feet.
- March 16 to May 1: Crane Prairie Reservoir passes inflow to hold the storage volume achieved on March 15. Ideally, this volume would be 45,000 acre-feet.
- May 2 to May 15: Crane Prairie Reservoir stores water up to 1.1 feet above the elevation achieved on March 15. Ideally, this volume would be 50,000 acre-feet.
- May 16 to July 15: Crane Prairie Reservoir passes inflow to hold the storage volume achieved on May 15.
- July 15 to October 1: Crane Prairie Reservoir releases water in the irrigation district’s accounts to reduce the reservoir back down to 35,000 acre-feet.
- October 2 to December 30: Crane Prairie Reservoir passes inflow to maintain 35,000 acre-feet.

Outflows from Crane Prairie Reservoir are generally managed to release a maximum of 400 cubic feet per second (cfs) throughout the year. The minimum release varies depending on the time of the year, with 100 cfs released from December 1 through August 30 and 75 cfs released the remainder of the year. These flow criteria are considered less important than reaching and maintaining the elevations in Crane Prairie Reservoir. Therefore, there are times when the minimum outflow is allowed to decrease down to a minimum of 30 cfs in support of the higher priority criteria. Outflows are allowed to increase above 400 cfs when there is an elevation restriction and inflows exceed 400 cfs minus seepage.

Although the location and timing of returns from Crane Prairie Reservoir seepage is not fully understood, it is generally believed that seepage losses return to the stream network upstream of Wickiup Reservoir. This is based on physical observations and geological knowledge of the area, including: (1) the proximity of a major groundwater discharge area (approximately 300 cfs to Sheep Springs), (2) the change in the underlying geology to low-permeability sedimentary deposits of the La Pine sub-basin, (3) the location of a fault at Sheep Springs (a likely impediment to groundwater flow), and (4) the groundwater head gradient. All of these point to Wickiup Reservoir (Sheep Springs) being the location of returns from Crane Prairie Reservoir seepage (LaMarche 2018).

For the calibration/historical model, it was assumed that any returns from Crane Prairie Reservoir seepage would be captured in the gains between Crane Prairie Reservoir and Wickiup Reservoir. However, since the seepage is dependent on elevation, it is expected that seepage from the No Action operation would be different than historical. So, the change in potential seepage was calculated by taking historical seepage calculation and subtracting it from a new seepage calculation using the new reservoir elevations. Based on conversations with the Oregon Department of Water Resources, a 3-month lag time was assumed to route the change in seepage back to the reach above Wickiup Reservoir. This addition to the model was done with equations that use the current Crane Prairie Reservoir elevation as input, so any new changes to Crane Prairie Reservoir elevation would adjust the seepage return.

2.2.2. Wickiup Reservoir

Outflows from Wickiup Reservoir are managed to maintain a minimum of 100 cfs between September 16 and March 30. Between March 31 and September 15, a minimum outflow of 600 cfs is used, if possible. Once irrigation releases begin, outflows from Wickiup Reservoir often exceed 600 cfs to meet downstream irrigation demand. If required releases exceed 600 cfs prior to April 30, the outflow is not allowed to decrease more than 30 cfs in a single flow adjustment or cumulatively over the course of multiple flow adjustments. Maximum non-irrigation season outflows are kept below 800 cfs until April 15 unless the reservoir needs to make flood releases.

2.2.3. Crescent Lake

As long as there is enough inflow and stored water, outflows from Crescent Lake are managed to maintain minimum flows of 30 cfs from March 15 through November 30 and 20 cfs from December 1 through March 14. If the reservoir storage drops below 7,000 acre-feet, outflows are reduced to 6 cfs. Crescent Lake has two storage rights, a right for 35,000 acre-feet with a January 1, 1911 priority date and a right for 51,050 acre-feet with a priority date of January 1, 1961. Regardless of the storage in Crescent Lake, it is allowed to accrue a new 35,000 acre-feet each year under the January 1, 1911 priority date, not to exceed to the total storage capacity in the reservoir.

2.3. Crooked River Operation

Operating rules on the Crooked River, particularly at Prineville Reservoir, reflect changes that were made in the Crooked River Collaborative Water Security and Jobs Act of 2014 (also called Crooked River Legislation). Changes are still being made to the operations as real time implications are observed and discussed. As additional experience is gained, the model logic will continue to be refined, but, for the purpose of this study, the logic used is as described below.

Prineville Reservoir has seven storage accounts that fill in priority by the dates shown in Table 2. All of the accounts, except for the uncontracted account, fill in proportion to their space with equal priority. The uncontracted space fills last and is used to augment flows seasonally for fishery purposes as coordinated by USFWS and Reclamation.

Table 2. Prineville Reservoir storage rights from Crooked River legislation

Model Water Right Name	Priority Date	Maximum Storage Volume
CityOfPrineville	4/8/1914	5,100 acre-feet
LowLine	4/8/1914	330 acre-feet
Ochoco	4/8/1914	60,640 acre-feet
Others	4/8/1914	6,527 acre-feet
Peoples	4/8/1914	3,497 acre-feet
RentalNUID	4/8/1914	10,000 acre-feet
Uncontracted	4/9/1914	65,520 acre-feet
Total	--	***151,614 acre-feet***

Releases from the uncontracted account (also known as the fish and wildlife account) are calculated for the irrigation season (April 1 to October 15) and the non-irrigation season (October 16 to March 31) using the storage in the account on April 1. To calculate the irrigation season, the model first reserves a volume of water for the non-irrigation season equal to 50 cfs released each day from October 16 to March 30 or the volume of water in the uncontracted account on April 1, whichever is greater (Minimum Winter Release Volume [MWRV]). The remaining volume is then divided equally among the 365 days and that value is released each day (Irrigation Season Release) with a maximum release of 50 cfs. This approach intentionally reserves water for winter releases.

$$\text{MWRV} = \text{Max}\begin{cases} V * \frac{50\text{ cfs} * 1.98\text{ AF/d}}{\text{cfs}} \\ \text{UV} \end{cases}$$ where

MWRV = Minimum Winter Release Volume

V = Number of days between and October 15 current year and April 1 next year

UV = Storage in the uncontracted Account on April 1

$$\text{Irrigation Season Release} = \text{Min}\begin{cases} (\text{UV} - \text{MWRV}^{3})/(365\text{ d} * \frac{1.98\frac{\text{AF}}{\text{d}}}{\text{cfs}}) \\ 50\text{ cfs} \end{cases}$$

For the non-irrigation season, the irrigation season release flow rate is added to the minimum winter release flow rate and is released from the uncontracted account.

Non-Irrigation Season Release = Irrigation Season Release + MWRV

[3] This equation is limited to a positive result in the model.

Table 3 shows example irrigation season and non-irrigation season releases from the uncontracted account given April 1 storage volumes in the uncontracted account. These releases are added to irrigation season storage releases, runoff season flood releases, and other minimum flow requirements described below.

Table 3. Calculated irrigation and non-irrigation season releases based on April 1 uncontracted volume in Prineville Reservoir

Total Storage Prineville Reservoir (acre-feet)	Uncontracted Volume April 1 (acre-feet)	Irrigation Season Release (cfs)	Non-irrigation Season Release (cfs)
148,633	62,520	50	113
118,000	36,987	21	71
88,000	6,987	0	6
78,000	0	0	0

Other minimum releases include a 10 cfs release maintained from Bowman Dam and a 7 cfs release from the City of Prineville mitigation account. These releases are executed in the model using the following logic described below.

If releases from Bowman Dam are less than 10 cfs, then:

1. The first 7 cfs will be released from the City of Prineville mitigation account, if available. If the City of Prineville mitigation account did not fill, the release will be the amount of storage in the account on April 1 divided by 365 days.
2. The remainder will be made up with water from the uncontracted/fish and wildlife account.
3. If the uncontracted/fish and wildlife account is empty, the remainder will be made up with live flow.
4. If there is insufficient live flow, the remainder will be made up with stored water from the first fill accounts in proportion to their storage.

2.4. Special Diversion Operations

TID, OID, and NUID divert water from multiple streams to satisfy demand for their districts. All three of these diversions require unique model constructs and rules to ensure the correct amount of water is diverted from the appropriate tributary.

TID diverts water from Tumalo Creek and supplements with water from Crescent Lake via the Upper Deschutes. It also has a live flow of 9.5 cfs directly from the Deschutes. TID first tries to satisfy its demand using natural flow rights, the majority of which are on Tumalo Creek. If there is still shortage, TID will request stored water from Crescent Lake via the Upper Deschutes.

OID diverts from both the Crooked River and Ochoco Creek and first tries to satisfy the demand based on recent historical diversion rates from each tributary, Crooked River and Ochoco Creek, using both natural flow and stored water rights. If there is still a shortage, OID will divert additional water from Prineville Reservoir.

NUID diverts water from both the Upper Deschutes River and the Crooked River. On the Upper Deschutes, NUID can divert water under its 1913 live flow water right and can request stored water from Wickiup Reservoir. On the Crooked River, it can divert under its 1955 live flow right and request rental water from Prineville Reservoir [4]. When the model is running, it will first try to satisfy the total demand for the district using historical diversion rates for each tributary. If it is a year when Wickiup did not fill, the initial request from the Upper Deschutes at the North Unit Main Canal [NUID.divReq] is reduced from its historical daily average [NUID.divReqHistAvg] using an equation that scales the demand to storage in Wickiup [Wic.Storage] on April 1. 20,000 acre-feet is added to the numerator to estimate the diversions from live flow. This equation is intended to replicate the behavior of NUID demand in drier years.

$$NUID.divReq = NUID.divReqHistAvg * \frac{Wic.Storage[April\ 1, current\ year] + 20{,}000\ AF}{150{,}000\ AF}$$

If there are shortages when compared to the NUID.divReqHistAvg, additional water will be diverted from the Crooked River to satisfy the demand limited by the pump capacity, the amount of water in the rental account on Prineville Reservoir, and the requirement to leave live flow instream per an agreement between Deschutes River Conservancy and NUID (called the DRC agreement [OWRD 2013]). This agreement, signed in 2013, requires that NUID allow flow to bypass its pumps; however, NUID is not required to release stored water to meet this minimum flow requirement. The amount of flow varies depending on water year conditions and month (Table 4). A dry year is defined if the storage in Prineville Reservoir is less than 135,000 acre-feet after March 30, or if the outflow from the reservoir is less than 75 cfs for the previous 30 days.

Lastly, a conservation option was implemented in the model where COID will line a portion of their canal and transfer the savings (approximately 29.4 cfs or 9,388 acre-feet, annually) during the irrigation seasons from the North Canal (also sometimes referred to as the Pilot Butte Canal) to the North Unit Main Canal via a pipeline. When the model is running, the North Canal diversion request remains the same and the first 29.4 cfs diverted is transferred to satisfy NUID's total diversion request. NUID's diversion request is reduced by 29.4 cfs since they will be getting that water via the pipeline rather than from the river.

[4] NUID also has a 1968 priority water right that it does exercise in some years. However, the maximum diversion rate for the 1955 water right is 200 cfs, which is the maximum physical pump capacity. For simplicity, the model only simulates the 1955 right since there is no case when the other right would be used for the purposes of this model.

Table 4. Deschutes River Conservancy bypass flows for dry and non-dry years[5]

Month	Dry Year (flow in cfs)	Non-Dry Year (flow in cfs)
Jan	0	0
Feb	0	0
Mar	0	0
Apr	120.617	181.417
May	50	95.598
Jun	54.381	86.081
Jul	51.451	61.451
Aug	56.846	68.146
Sep	57.599	114.219
Oct	121.874	151.574
Nov	0	0
Dec	0	0

3. Scenario Descriptions

The RiverWare model assumptions were adjusted for each of the four alternatives evaluated for the DBHCP EIS.

3.1. Alternative 1: No Action

The No Action model is the baseline model described in Section 2. No additional changes were made to the model for the No Action alternative.

[5] For May in dry years, the agreement allowed flows to drop to 43.798 cfs. Negotiations between NUID and FWS have made 50 cfs the minimum flow past the pumps. This was modeled in No Action and the Alternatives, though it is not a required action in No Action. This resulted in similar shortages to NUID in No Action and Alternative 2A; in reality, the shortages in No Action would be lower.

3.2. Alternative 2 (Preferred): Districts' DBHCP Proposal

The Alternative 2 model includes the assumptions defined in the Districts' DBHCP proposal. Alternative 2 starts with all of the assumptions in Alternative 1 and then adds to them. The primary changes include changes to Crane Prairie, Wickiup, Crescent, and Crooked River operations. Three versions of this alternative were run to simulate implementation through time: Alternative 2A represents the first 7 years of implementation, Alternative 2B represents years 8 through 12, and Alternative 2C represents years 13 through 30.

3.2.1. Crane Prairie Reservoir

Crane Prairie Reservoir is operated to minimize elevation changes throughout the year to maximize habitat for the OSF and the operations are the same for all three implementation phases. The reservoir is operated between 38,000 acre-feet and 48,000 acre-feet, which is different from the No Action operating range of 35,000 to 50,000 acre-feet. In the model, this is accomplished by including a storage account that is dedicated to the OSF with a senior priority date of August 30, 1899; this date is one day earlier than the most senior water right on the Deschutes River downstream of Crane Prairie Reservoir, which belongs to Swalley Irrigation District. This ensures that the highest priority in the model is to maintain 38,000 acre-feet of storage in Crane Prairie. Three other storage accounts represent 10,000 acre-feet of storage for AID (3,500 acre-feet), COID (3,000 acre-feet), and LPID (3,500 acre-feet)[6].

Due to the senior priority date of the OSF account, it is kept full unless evaporation or seepage reduce its volume and it cannot be made up with inflows. The 10,000 acre-feet of active storage that results from operation of the reservoir for OWF is utilized as summarized below.

- November 1 to March 14: Crane Prairie Reservoir begins to store water, if available, until the reservoir reaches 48,000 acre-feet.
- March 15 to July 15: Crane Prairie Reservoir passes inflow to hold the storage volume achieved on March 15. Ideally, this volume would be between 46,800 and 48,000 acre-feet.
- July 16 to July 31: Crane Prairie Reservoir storage is reduced at a maximum rate of 225 acre-feet per day.
- July 31 to October 31: Crane Prairie Reservoir storage is reduced at a maximum rate of 450 acre-feet per day until storage in Crane Prairie is 38,000 acre-feet, then 38,000 acre-feet is maintained until November 1.

Outflows from Crane Prairie Reservoir are generally managed to maintain a minimum release of 75 cfs, if possible. If flows cannot be maintained at 75 cfs, the model will allow flows to drop to a minimum of 30 cfs.

[6] The distribution of the accounts is still being negotiated; these were the distributions used for modeling purposes.

3.2.2. Wickiup Reservoir

Minimum outflow requirements will change as Alternative 2 is implemented through time. Outflows from Wickiup Reservoir are managed to maintain a minimum between September 16 and March 30 as shown in Table 5. Between March 30 and September 15, a minimum outflow of 600 cfs is used, if possible. Once irrigation releases begin, outflows from Wickiup Reservoir often exceed 600 cfs to meet downstream irrigation demand. If required releases exceed 600 cfs prior to April 30, the outflows cannot subsequently decrease more than 30 cfs in a single flow adjustment or cumulatively over the course of multiple flow adjustments. Maximum non-irrigation season outflows are kept below 800 cfs until April 15 unless the reservoir needs to make flood releases. Maximum irrigation season outflows are shown in Table 5; these outflow limitations are applied just to the outflow, not the downstream demand request. NUID, being the junior user on the system and the primary user of Wickiup outflow, is therefore the most affected by this outflow reduction.

Table 5. Non-irrigation season minimum and irrigation season maximum Wickiup outflows based on implementation years

Alternative	Implementation Years	Non-Irrigation Season Minimum	Irrigation Season Maximum
2A	First 7 years	100 cfs	Amount needed to satisfy downstream demand (as much as 1,800 cfs)
2B	Years 8 through 12	300 cfs	1,400 cfs
2C	Years 13 to 30	400 cfs and will increase to 500 cfs if Wickiup has more than 100,000 acre-feet on November 1 each year.	1,200 cfs

3.2.3. Crescent Lake

TID is setting aside a volume of water in Crescent Lake to be used for minimum flows as they reduce demand through conservation in their district. They intend to increase the size of the volume and the minimum outflows through time as they implement conservation. The timing of their implementation is not exactly aligned with the year ranges defined in Alternatives 2A, 2B, and 2C, so an approximation of the volumes and minimum flows was used in the model (Table 6). The volumes are determined based on April 1 storage in Crescent Lake and (like Wickiup) the volumes and minimum outflow will change through time as Alternative 2 is implemented. Crescent Lake is operated to ensure minimum outflows as shown in Table 6. The minimum outflows from Crescent Lake are lower than for No Action because it was determined that it was more important to shape the outflows at critical times of the year for the species than to maintain a higher flow throughout the winter storage season.

Table 6. Non-irrigation season minimum outflows from Crescent for each alternative version

Alternative	Non-Irrigation Season Minimum	Volume Reserved for Minimum Flows based on Crescent Storage on April 1		
		Crescent below 45,000 acre-feet on April 1	Crescent between 45,000 and 75,000 acre-feet on April 1	Crescent above 75,000 acre-feet on April 1
2A	10 cfs	5,264 acre-feet	7,264 acre-feet	8,764 acre-feet
2B	10 cfs	6,464 acre-feet	8,464 acre-feet	9,964 acre-feet
2C	12 cfs	8,864 acre-feet	10,864 acre-feet	12,364 acre-feet

In real time, a portion of this reserved volume will be used to provide a buffer during the fall when irrigation deliveries are turning off and to augment flows in the spring. Both of these operations will be managed in real time based on weather and flow conditions in critical habitat locations and may result in different flows seasonally and annually. In order to understand how this operation might work, the model simulates a fall reduction in flows starting on October 1 and a spring increase in flows starting on April 20. It should be noted that typical irrigation season releases start around July 1, however flows were simulated to start earlier to demonstrate an example of releases to assist OSF life history needs. If October 1 outflows are greater than 50 cfs, they are reduced by 10 cfs a day down to 50 cfs and held at 50 cfs through October 15. After October 15, outflows are reduced 10 cfs a day down to the minimum and held through the winter. If outflows are less than 50 cfs on October 1, they are reduced by 10 cfs a day down to the minimum and held through the winter. On April 20, flows begin increasing in even increments to a spring minimum that starts on May 1. The May 1 minimum is calculated by dividing the volume remaining for minimums on March 31 by 61 days. The volume on March 31 is used because it represents the remaining volume after the fall reduction and winter minimums are used before the volume is adjusted on April 1 to account for the volume to be used in the upcoming year.

3.2.4. Crooked River

OID will supplement winter flows on the Crooked River up to 50 cfs if outflows from Prineville Reservoir are less than 50 cfs. Water from the City of Prineville Mitigation Account will be released only in the months of December and January, and the daily release quantity will be the volume on November 30 divided by 61 days. This operation is the same for all three implementation phases.

3.3. Alternative 3

The Alternative 3 model is the same as the No Action and Alternative 2 model, except that it uses different non-irrigation season minimum and irrigation season maximum outflows from Wickiup, and that the outflow from the uncontracted account in Prineville Reservoir is protected from being diverted. Three versions of this alternative were run to simulate implementation through time: Alternative 3A represents the first 5 years of implementation, Alternative 3B represents years 6 through 10, and Alternative 3C represents after years 11 through 30. Results are shown only for Alternative 3C.

3.3.1. Wickiup Reservoir

Wickiup releases are the same as described in Alternative 2 with the exception of the non-irrigation season minimums and the irrigation season maximums. In Alternative 3C, the non-irrigation season minimum outflows are determined using the storage in Wickiup on October 1 and December 1 as summarized below.

- If October 1 Wickiup storage is less than 75,000 acre-feet, minimum outflow is 400 cfs.
- If October 1 Wickiup storage is greater than 75,000 acre-feet, minimum outflow is 500 cfs.
- If December 1 Wickiup storage is greater than 75,000 acre-feet, minimum outflow can increase by 100 cfs, up to 500 cfs.

3.3.2. Crescent Lake

Crescent Lake is operated to ensure minimum outflows are 20 cfs throughout the year. In July through September, the minimums are kept to 50 cfs if there is enough water in the reservoir.

3.3.3. Crooked River

The Crooked River has a difference in operations because uncontracted releases are assumed to be bypassed by the NUID pumps in this alternative (in other words, the water is "protected" from diversion). Specifically, the NUID pumps were modeled to bypass the larger of minimum requirements from the DRC agreement or the release from the uncontracted account. The maximum irrigation season release from the uncontracted account is 80 cfs.

3.4. Alternative 4

The Alternative 4 model is the same as Alternative 3 except that the variable outflow requirements were modified slightly for Wickiup Reservoir and the minimum winter requirement from the uncontracted account on Prineville Reservoir was increased to 80 cfs. Two versions of this alternative were run to simulate implementation through time: Alternative 4A represents the first 5 years of implementation and Alternative 4B represents years 6 through 30. Results are shown only for Alternative 4B.

3.4.1. Wickiup Reservoir

Wickiup releases are the same as described in Alternative 3 with the exception of the non-irrigation season minimums. In Alternative 4B, the non-irrigation season minimum outflows are determined using the storage in Wickiup on October 1 and December 1 as summarized below.

- If October 1 Wickiup storage is less than 75,000 acre-feet, minimum outflow is 400 cfs.
- If October 1 Wickiup storage is greater than 75,000 acre-feet but less than 125,000 acre-feet, minimum outflow is 500 cfs.
- If October 1 Wickiup storage is greater than 125,000 acre-feet, minimum outflow is 600 cfs.
- If December 1 Wickiup storage is greater than 75,000 acre-feet, minimum outflow can increase by 100 cfs, up to 600 cfs.

3.4.2. Crooked River

Releases from the uncontracted account (also known as the fish and wildlife account) are calculated for the irrigation season (April 1 to October 15) and the non-irrigation season (October 16 to March 30) using the storage in the account on April 1. To calculate the irrigation season, the model first reserves a volume of water for the non-irrigation season equal to 80 cfs released each day from October 16 to March 30 or the volume of water in the uncontracted account on April 1, whichever is greater (Minimum Winter Release Volume). The remaining volume is then divided equally among the 365 days and that value is released each day (Irrigation Season Release). This approach intentionally reserves water for the winter.

$$\mathrm{MWRV} = \mathrm{Max}\begin{cases} V * \frac{80\ \mathrm{cfs} * 1.98\ \mathrm{AF/d}}{cfs} \\ \mathrm{UV} \end{cases} \quad \text{where}$$

M = Minimum Winter Release Volume

V = Number of days between April 1 next year and October 15 current year

UV = Storage in the uncontracted account on April 1

$$\text{Irrigation Season Release} = \mathrm{M}in\begin{cases} (\mathrm{UV} - \mathrm{MWRV}^{7})/(365\ \mathrm{d} * \frac{1.98\frac{\mathrm{AF}}{\mathrm{d}}}{\mathrm{cfs}}) \\ 80\ \mathrm{cfs} \end{cases}$$

For the non-irrigation season, the irrigation season release flow rate is added to the minimum winter release flow rate and is released from the uncontracted account.

Non- Irrigation Season Release = Irrigation Season Release + MWRV

The uncontracted releases are assumed to be bypassed by NUID in this alternative. Specifically, the NUID pumps were modeled to bypass the larger of the minimum requirements from the DRC agreement or the release from the uncontracted account.

[7] This equation is limited to a positive result in the model.

4. Scenario Results

The RiverWare model produces many different types of output that can be used to interpret the implications of the alternatives, including reservoir storage, flow at gages, and water delivered to water users. The reservoir storage and flow at gages were primarily used to determine if the model was performing as expected under the defined scenario. Shortages were calculated by subtracting the amount of water delivered to water users from the amount of water that was requested. In the years where NUID's irrigation request from Wickiup was reduced to reflect real-world operations, the shortage was still calculated with respect to the total demand. The shortages were used to determine the potential impacts of the various scenarios and to determine the volume of water that would be required to satisfy all of the objectives in the scenario.

Alternative results are displayed in a number of formats. Summary hydrographs are used to show the potential range of reservoir storage, reservoir outflow, and flow at gages. The summary hydrographs show the median value (the daily flow or storage value achieved in 50 percent of the years) as a colored line and include a shaded area showing the daily range of 20 to 80 percent exceedance.[8] Reservoir storage and outflow are shown together so that the relationship between storage and outflow can be observed. Irrigation deliveries are shown as annual exceedance graphs where total annual irrigation volumes are sorted in order of largest to smallest to indicate the frequency of delivering a particular volume. The ability to meet instream and out-of-stream model flow objectives is shown using shortage graphs, where the shortage represents the difference between a model objective and the modeled output. Shortages are summed annually and shown in exceedance graphs similar to irrigation deliveries.

4.1. Alternative 1: No Action

Results for No Action are displayed to establish a baseline against which to compare the other alternatives. Only the locations that experience a change in the alternatives are shown in the No Action section.

4.1.1. Upper Deschutes

Figure 5 shows summary hydrographs of the simulated storage (top) and outflow (bottom) from Crane Prairie Reservoir for No Action (Alternative 1). The storage graph shows the summary of the 20 to 80 percent range of storage for the scenario. The intended operation at Crane Prairie Reservoir was as shown below.

1. To be at or above 35,000 acre-feet for the entire year.

[8] The 20% exceedance value shows the value where only 20% of the values are larger; the 80% exceedance value shows the value where 80% of the values are larger. For example, the 20% exceedance storage in Crane Prairie Reservoir on June 1 is 49,000 acre-feet and the 80% exceedance storage is 47,500 acre-feet.

2. Increase from 35,000 acre-feet to 45,000 acre-feet by March 15.
3. Maintain 45,000 acre-feet from March 15 through May 1.
4. Increase from 45,000 to 50,000 acre-feet from May 1 to May 15, if possible.
5. Maintain the storage achieved on May 15 through July 15.
6. Release storage down to 35,000 acre-feet by November 1.

Figure 5 shows that these operational objectives can be achieved. The relationship between changes in storage and outflow can also be seen in these graphs. For example, on January 1, outflows decrease to fill Crane Prairie Reservoir to 45,000 acre-feet by February 15. The model shows abrupt changes in outflows because storage objectives are prioritized in the model. Real-time operations may be different than the model output because the model logic is based on rules that may turn on and off suddenly as conditions change, whereas real time operations may be able to smooth out the operational changes.

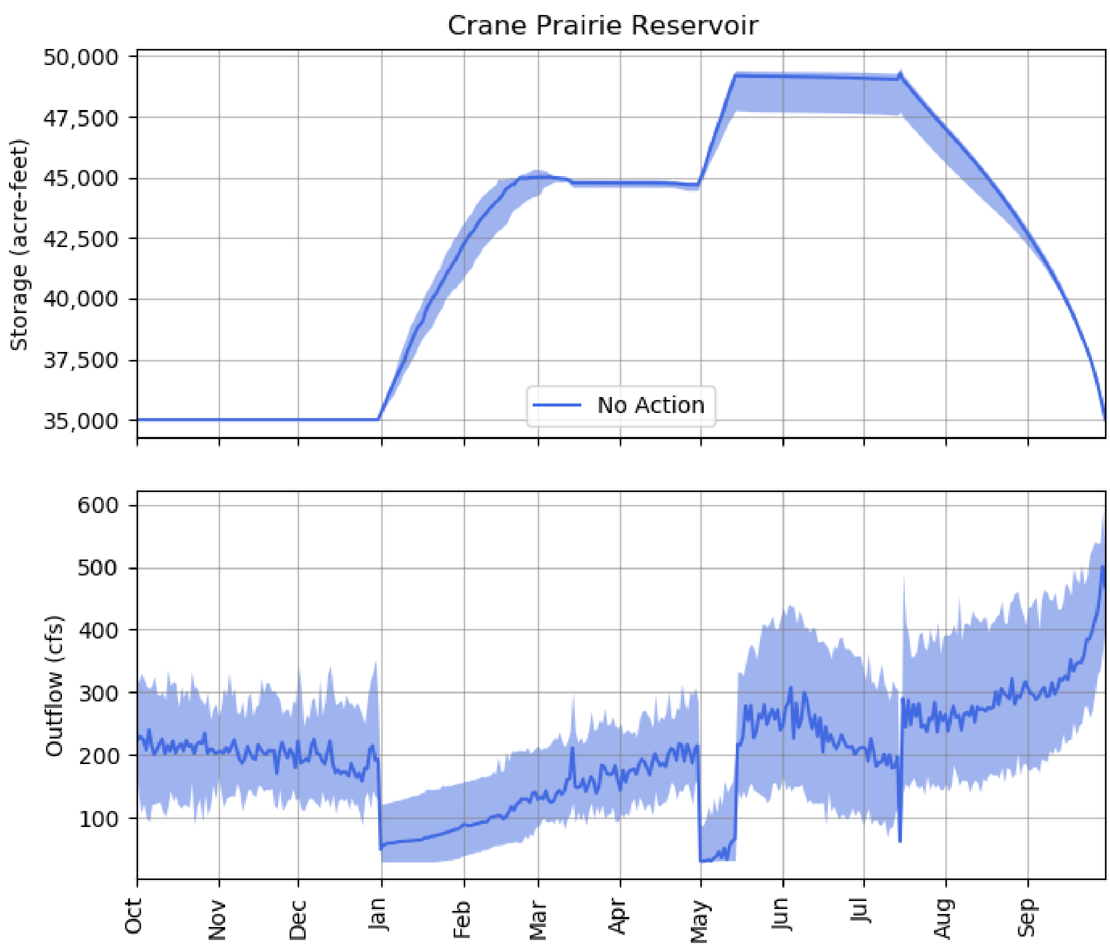

Figure 5. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crane Prairie Reservoir for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 6 shows summary hydrographs of the simulated storage and outflow from Wickiup Reservoir for No Action. Recall that the intended operation at Wickiup Reservoir was to maintain a minimum of 100 cfs outflow year-round and to meet downstream irrigation requests. From this graph, it can be seen that the model objectives were met. In addition, the figure shows the storage in Wickiup Reservoir that results from the upstream operation at Crane Prairie Reservoir and the outflow requirements. The summertime outflow pattern reflects Wickiup Reservoir releases to meet downstream irrigation demands, particularly for the NUID.

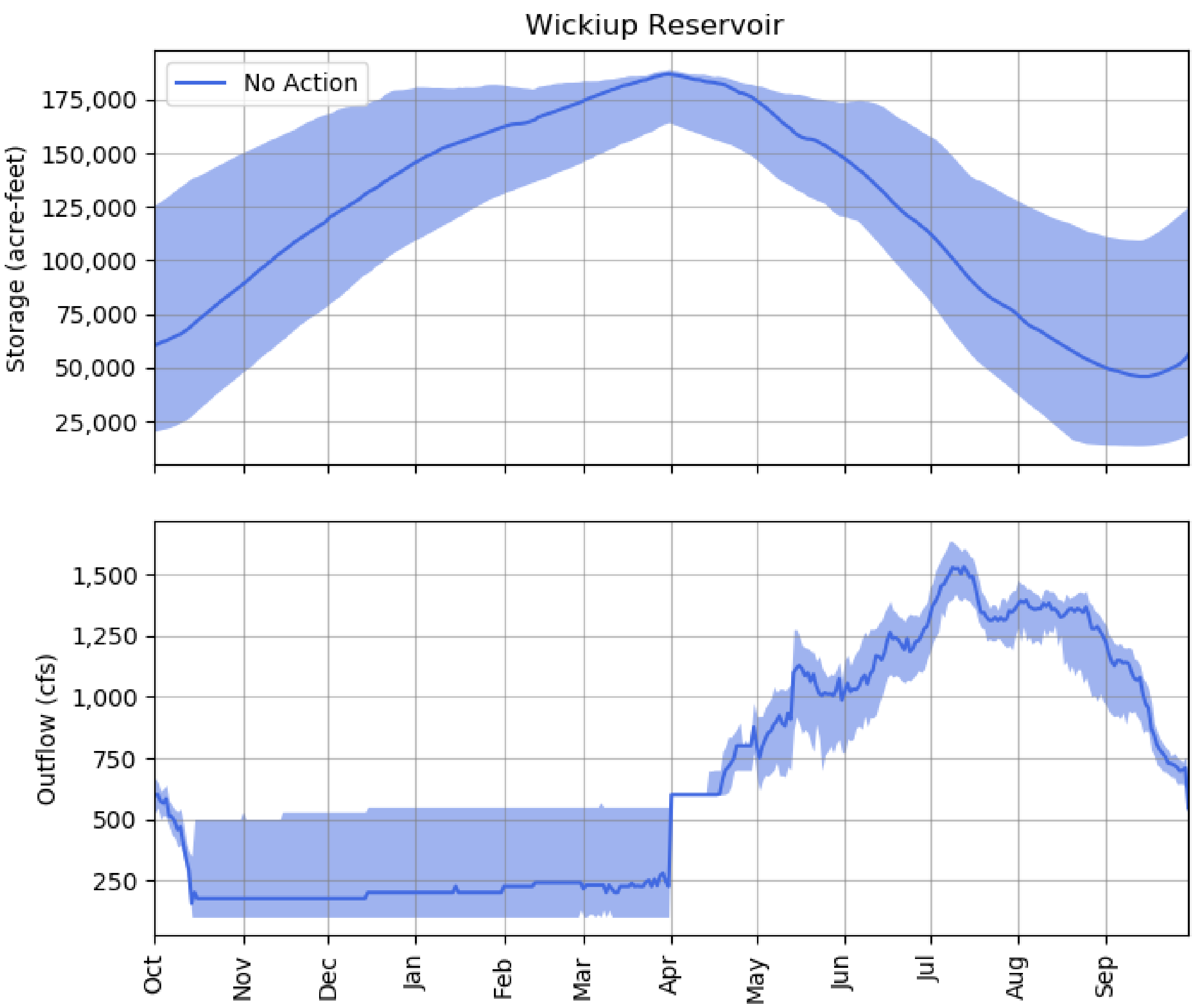

Figure 6. Summary hydrographs of simulated storage (top) and outflow (bottom) from Wickiup Reservoir for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 7 shows summary hydrographs for the storage and outflow from Crescent Lake for No Action. Recall that the intended operation for Crescent Lake was to maintain a minimum outflow of 30 cfs from March 15 to November 30 and 20 cfs from December 1 to March 14. The outflow graph shows that this operation is achievable in all years above the 80 percent flow exceedance, and the storage graph shows the statistical range of storage on any given day during the year for the simulation period. While mode summary hydrographs generally show the annual pattern of storage or flow, that is not the case for Crescent Lake storage. This is because the reservoir capacity exceeds the typical annual inflows to the reservoir, so the reservoir can store water for multiple irrigation seasons. As a result, the annual storage pattern can be very different from year to year. The increased outflow in the higher flow years in February are due to flood releases required to prevent the reservoir from overtopping.

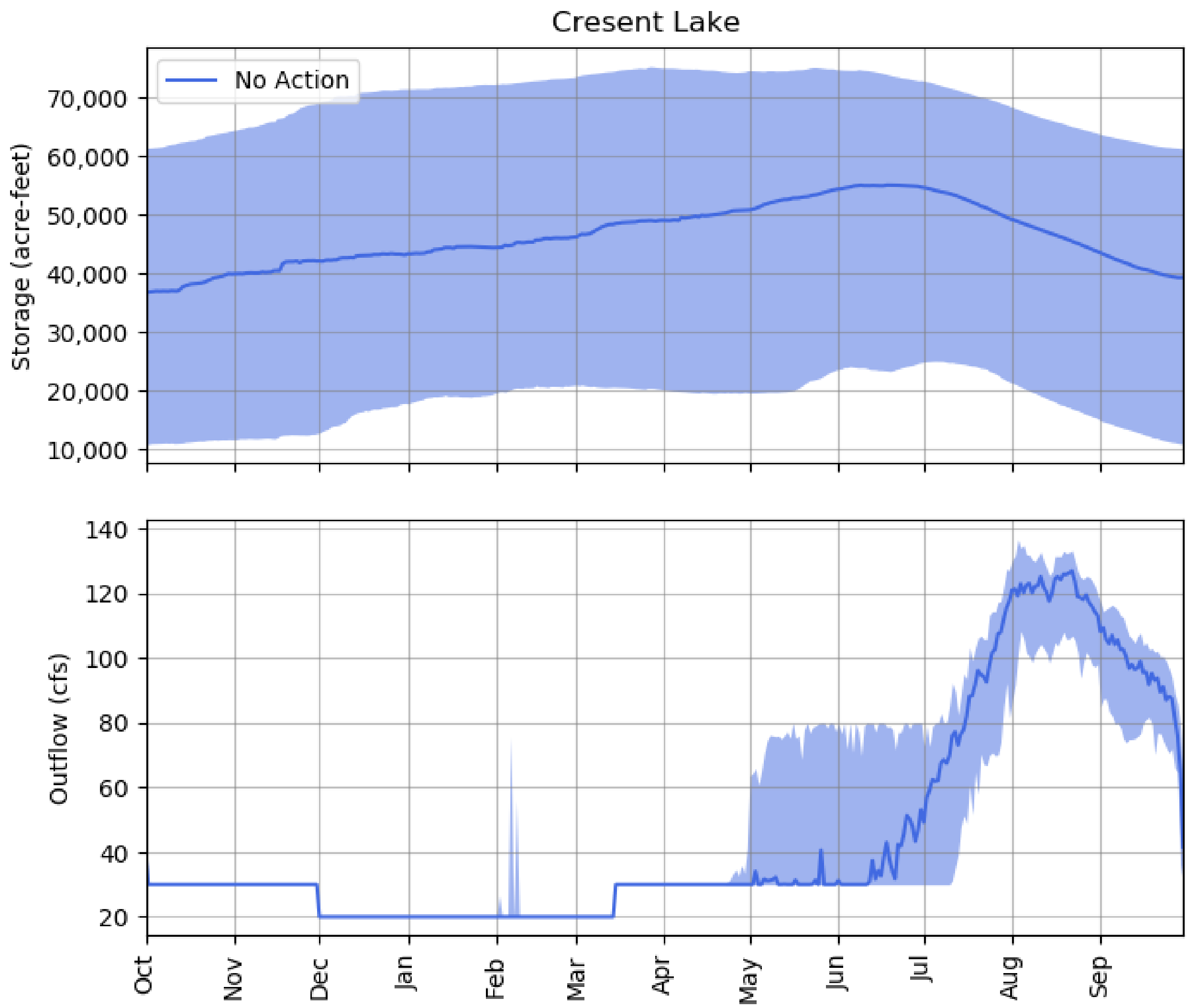

Figure 7. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crescent Lake for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 8 shows a summary hydrograph of the simulated flow in Little Deschutes River at La Pine for the No Action Alternative. The flow at this gage is largely unregulated, with only a small contribution from Crescent Creek and Crescent Lake in the spring but a larger contribution in the summer and fall.

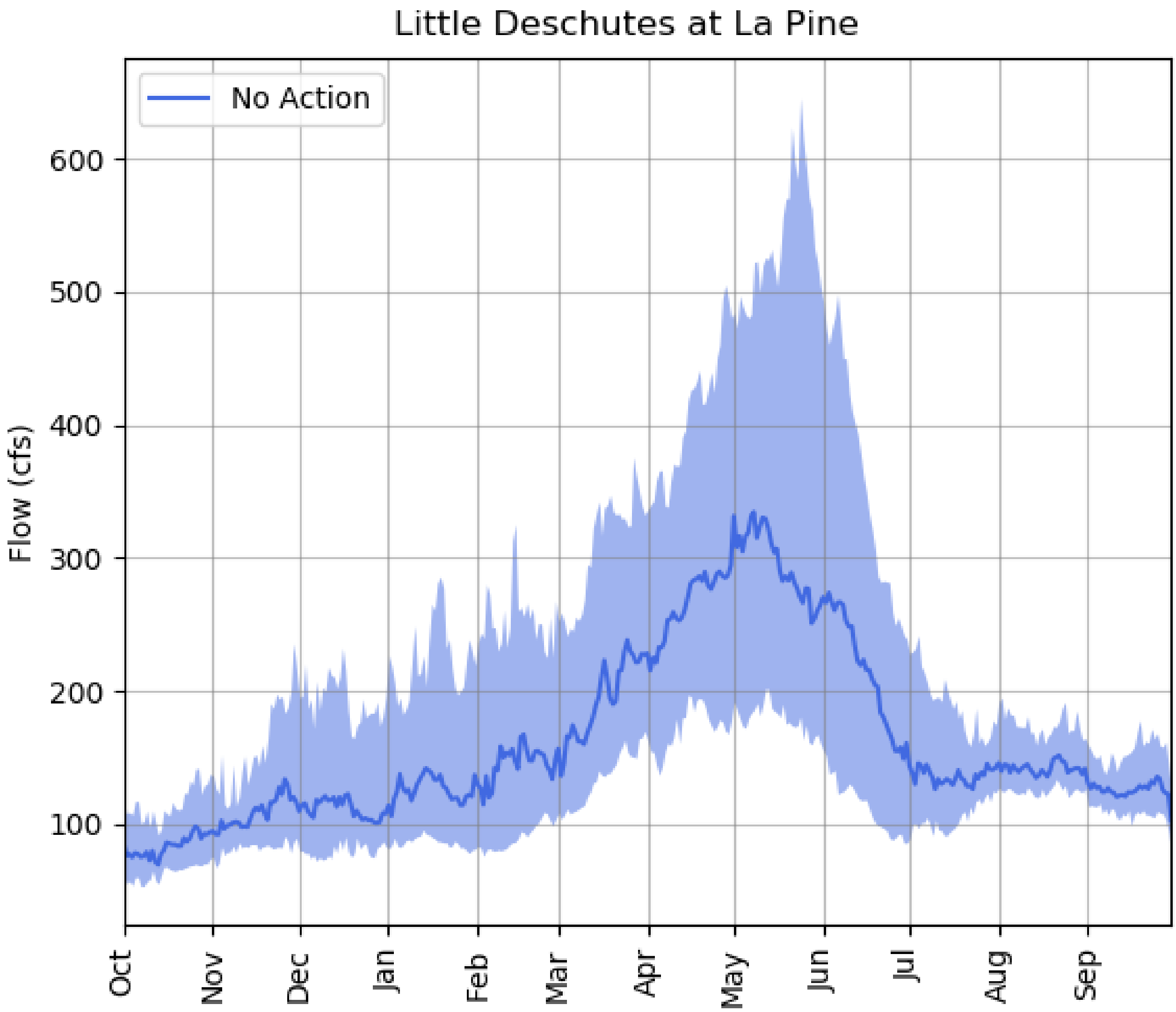

Figure 8. Summary hydrograph of simulated flow in the Little Deschutes River at La Pine for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 9 shows a summary hydrograph of the simulated flow in the Deschutes River at Benham Falls for No Action. This gage is upstream of the major diversions but downstream of the reservoirs. It is heavily influenced by the outflow from Wickiup Reservoir and the flow from the Little Deschutes.

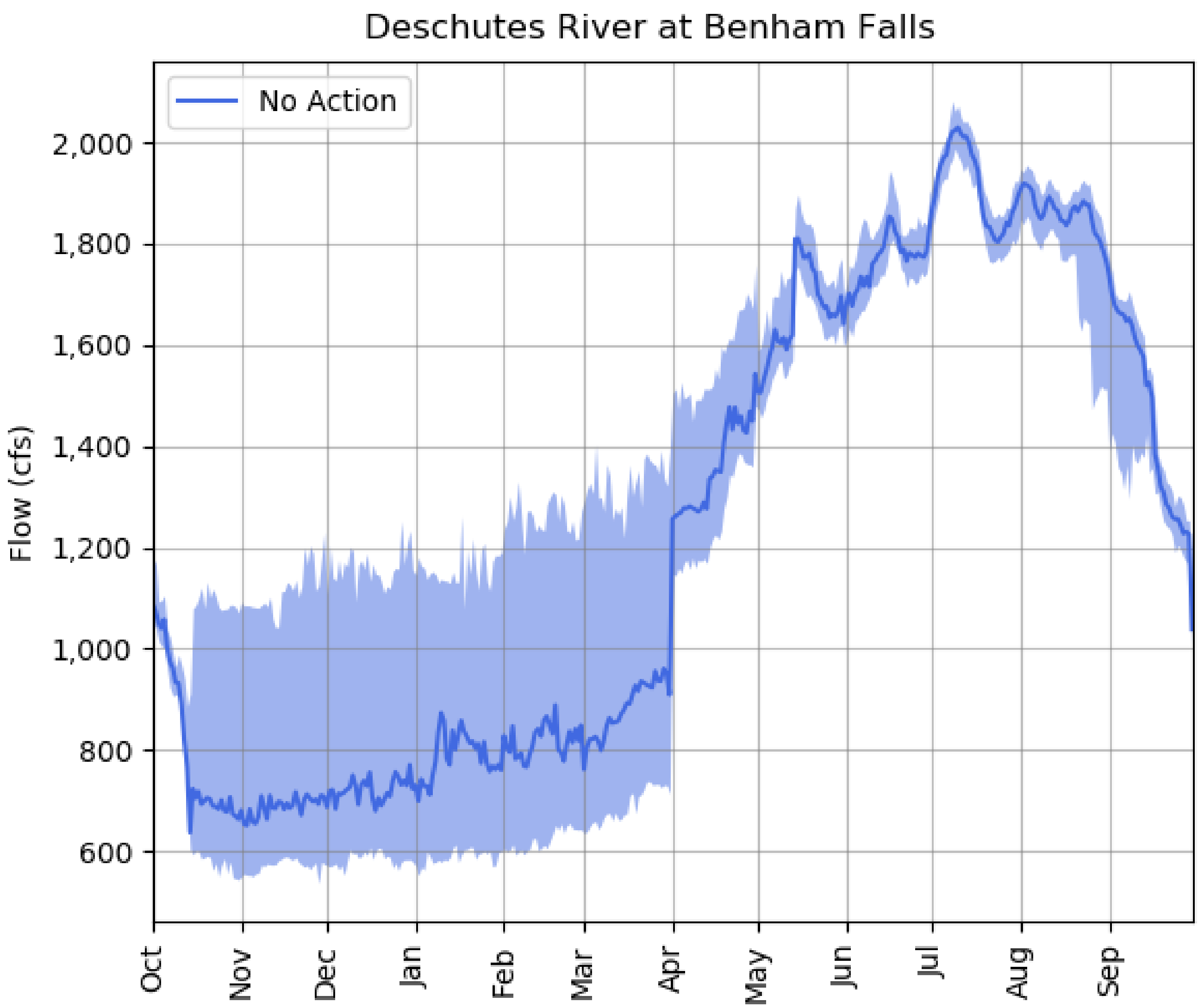

Figure 9. Summary hydrograph of simulated flow in the Deschutes River at Benham Falls for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 10 shows a summary hydrograph of the simulated flow in the Deschutes River below Bend for No Action. The gage is located downstream of all of the major irrigation diversions; therefore, it is representative of the lowest flow between Bend and the Pelton-Round Butte dam complex.

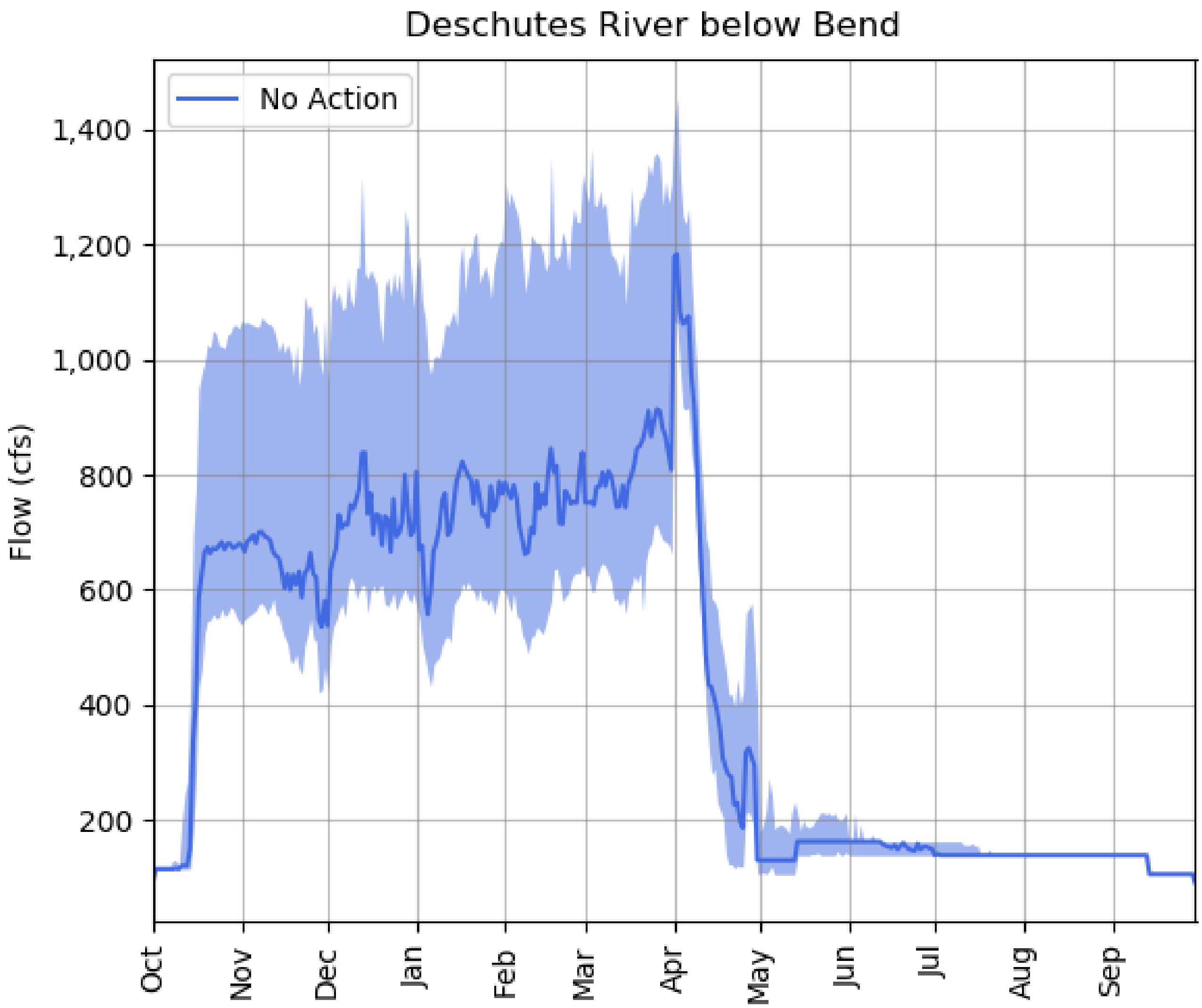

Figure 10. Summary hydrograph of simulated flow in the Deschutes River below Bend for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

4.1.2. Tumalo Creek

Figure 11 shows a summary hydrograph of the simulated flow in Tumalo Creek below the TID diversion for the No Action alternative. Tumalo Creek is a tributary to the Upper Deschutes; it does not have any on-channel storage and supplies water for the City of Bend and TID. The hydrograph represents the lowest flow on the creek below all diversions.

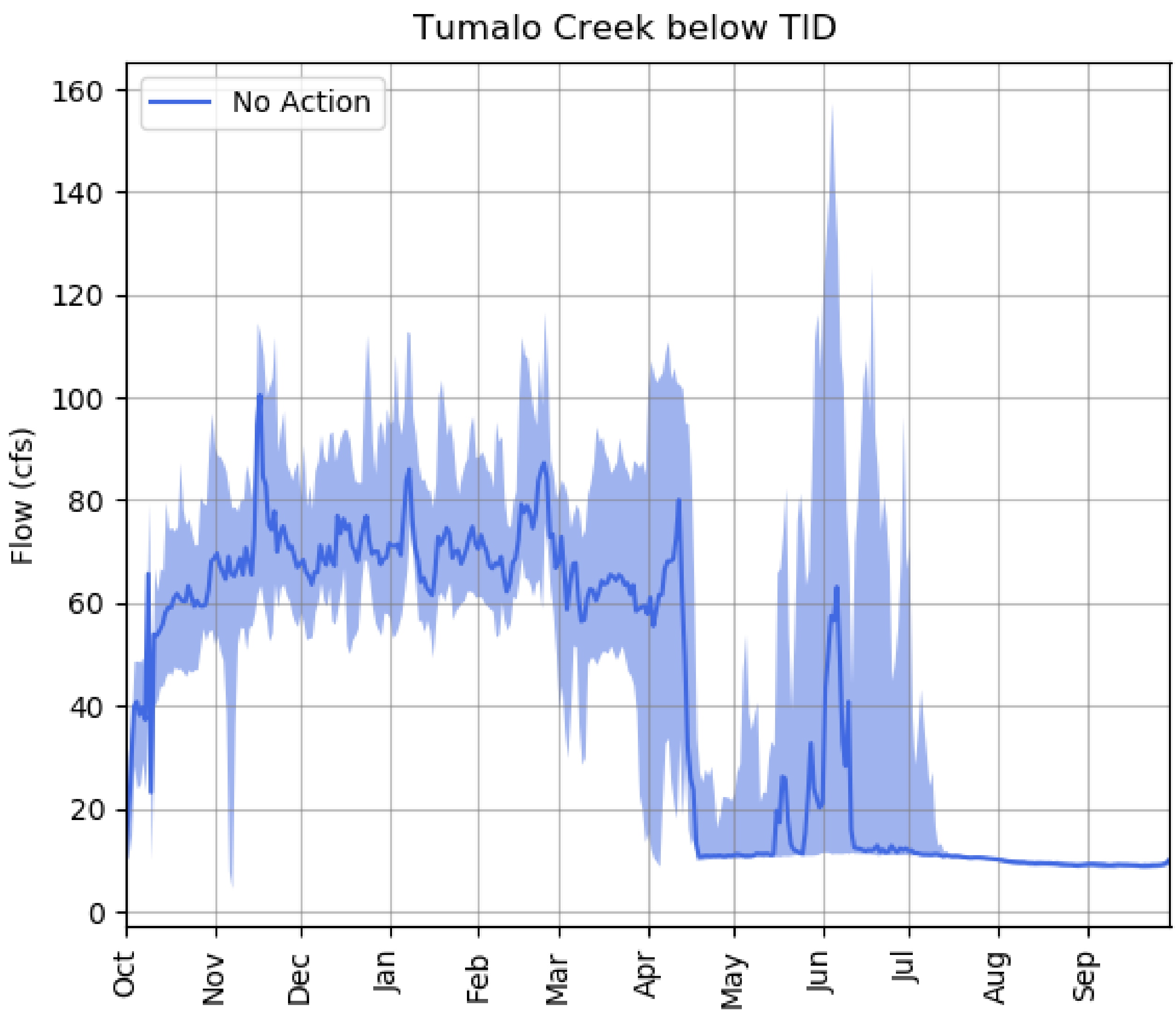

Figure 11. Summary hydrograph of simulated flow in Tumalo Creek below the TID diversion for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

4.1.3. Whychus Creek

Figure 12 shows a summary hydrograph of the simulated flow in Whychus Creek at Sisters for the No Action alternative. Whychus Creek is a tributary to the Upper Deschutes River; it does not have any on-channel storage and supplies water for three small irrigation districts (Edgington, Sokol, and Plainview), along with the much larger Three Sisters Irrigation District (TSID). Output at this control point represents the lowest flow on the creek.

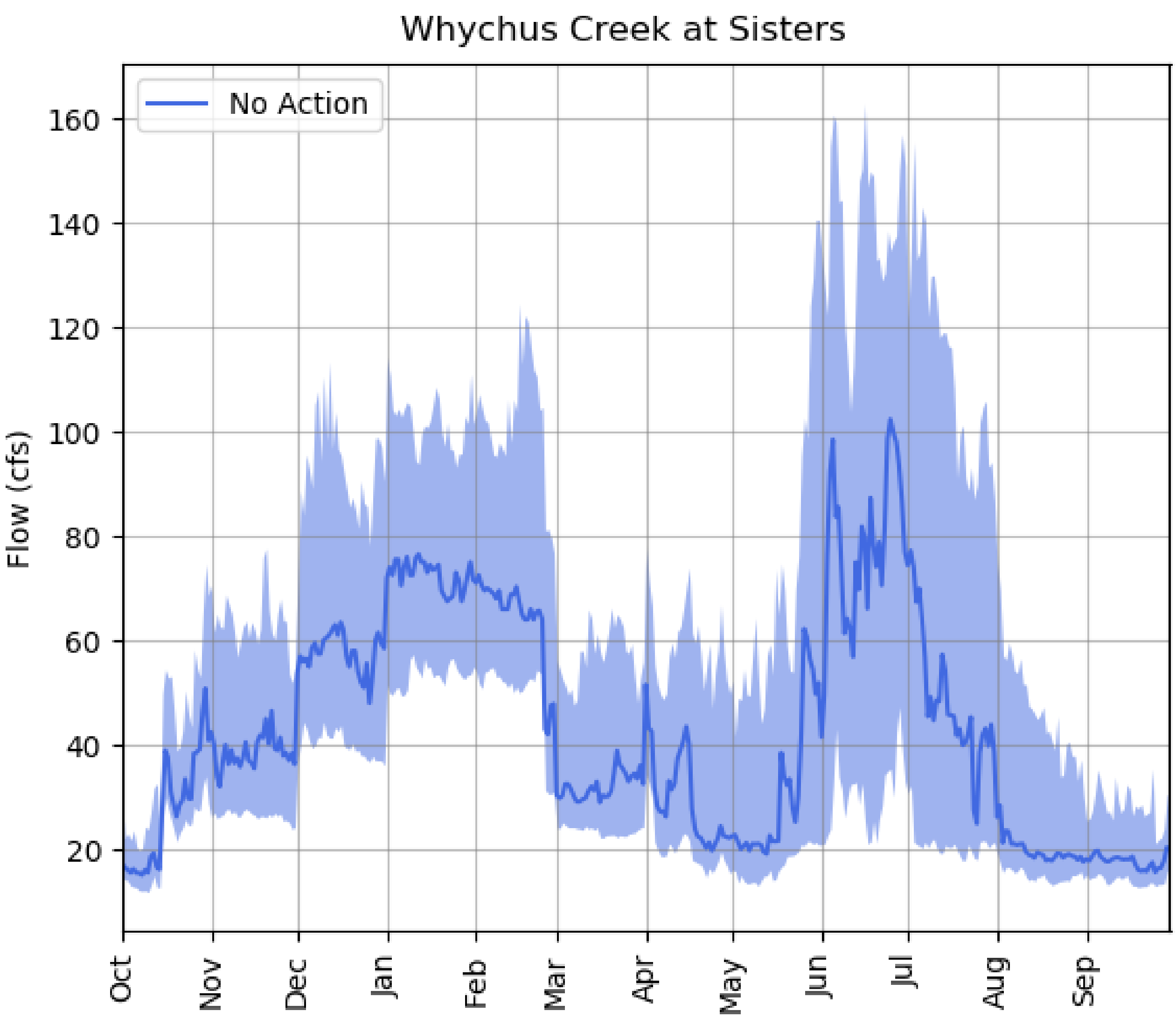

Figure 12. Summary hydrograph of simulated flow in Whychus Creek at Sisters for the No Action Alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

4.1.4. Crooked River

Figure 13 shows summary hydrographs for simulated storage and outflow from Prineville Reservoir for No Action. Prineville Reservoir typically reaches its peak storage volume between April and June and releases water throughout the irrigation season to meet downstream demand and ecological flow objectives, all of which were met in this scenario. During the fall and winter, it releases water as necessary to make space in the reservoir to capture spring runoff and prevent flooding downstream of the dam. In the winter, it releases flows based on the uncontracted flow equations described in Section 2.3. The release pattern in November, December, and January for higher outflows is a result of the model attempting to maintain storage at or below the flood rule curve, which is adjusted on a monthly basis.

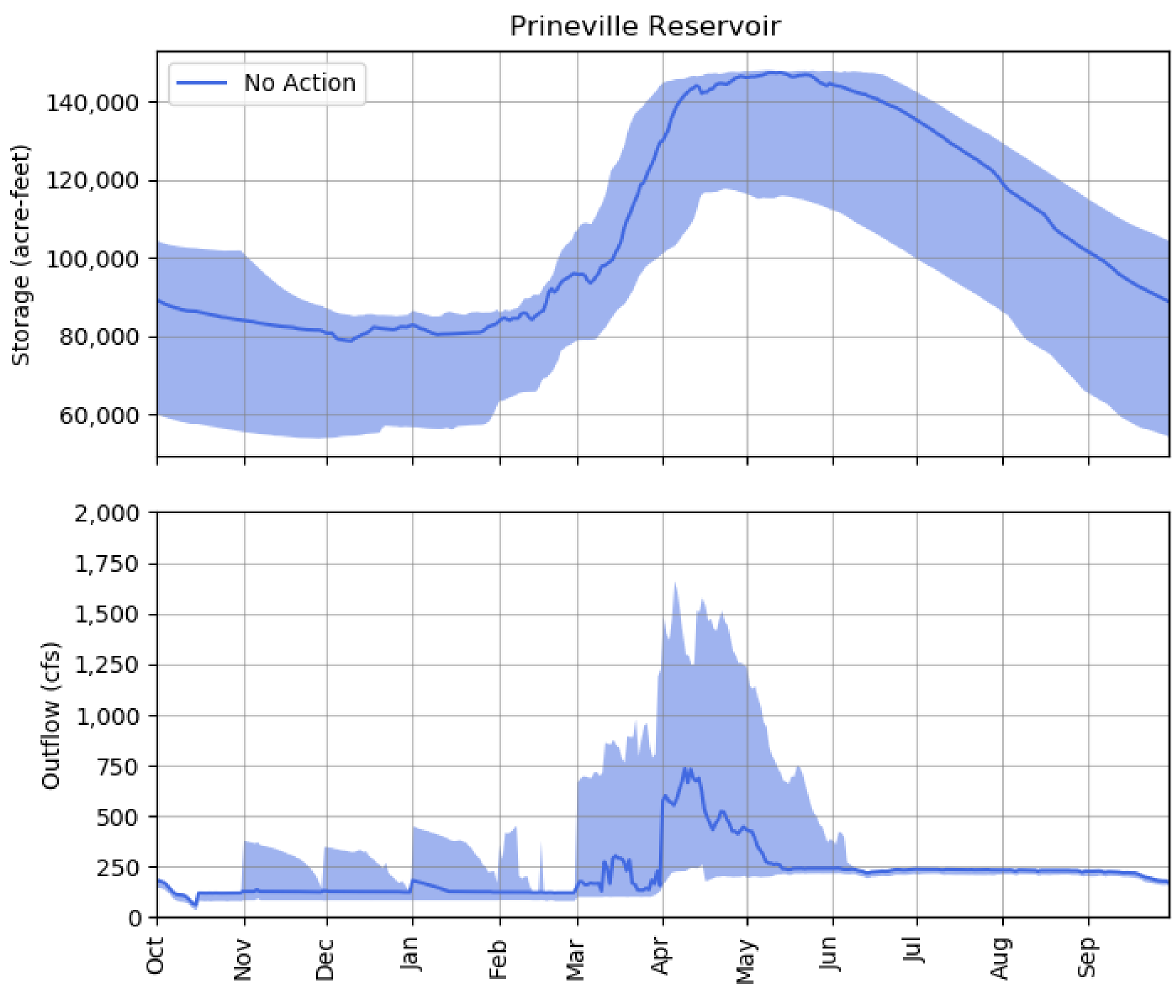

Figure 13. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 14 shows summary hydrographs for simulated storage and outflow from Ochoco Reservoir for No Action. Like Prineville Reservoir, Ochoco Reservoir typically reaches its peak storage volume between April and June and releases water throughout the irrigation season to meet downstream demand and ecological flow objectives. During the fall and winter, water is released to make space in the reservoir as necessary to capture spring runoff and prevent flooding downstream of the dam. During the winter, enough water is released to maintain 5 cfs in the creek.

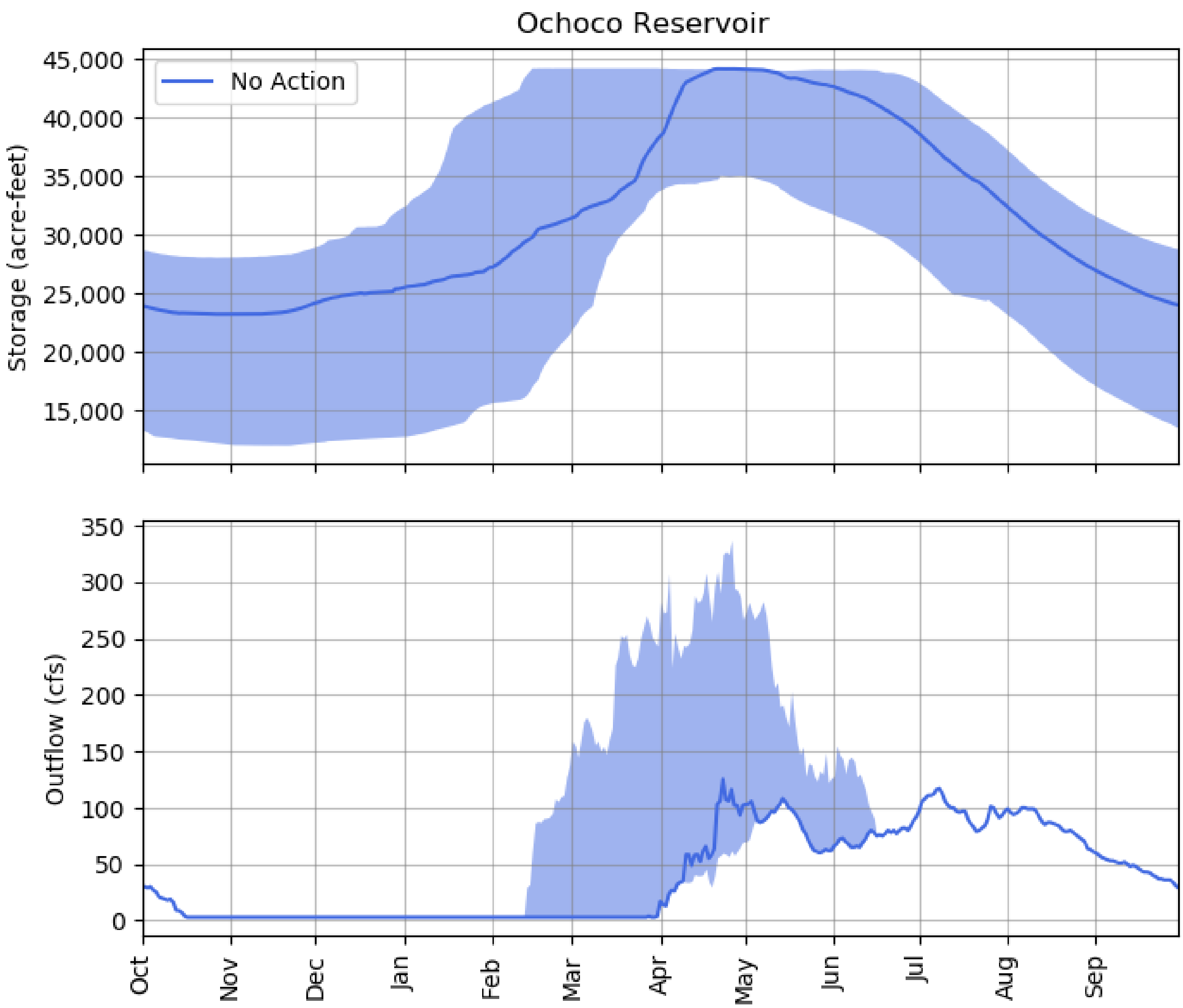

Figure 14. Summary hydrographs of simulated storage (top) and outflow (bottom) from Ochoco Reservoir for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 15 shows a summary hydrograph of the simulated flow in the Crooked River at Highway 126 for No Action. The flow at this gage generally represents a low flow point in the river below some of the major diversions and above most return flows; the minimum flow requirements at this gage were met with this scenario. It is largely influenced by the outflow from Prineville Reservoir in the winter and by the upstream diversions and contracted reservoir releases in the summer.

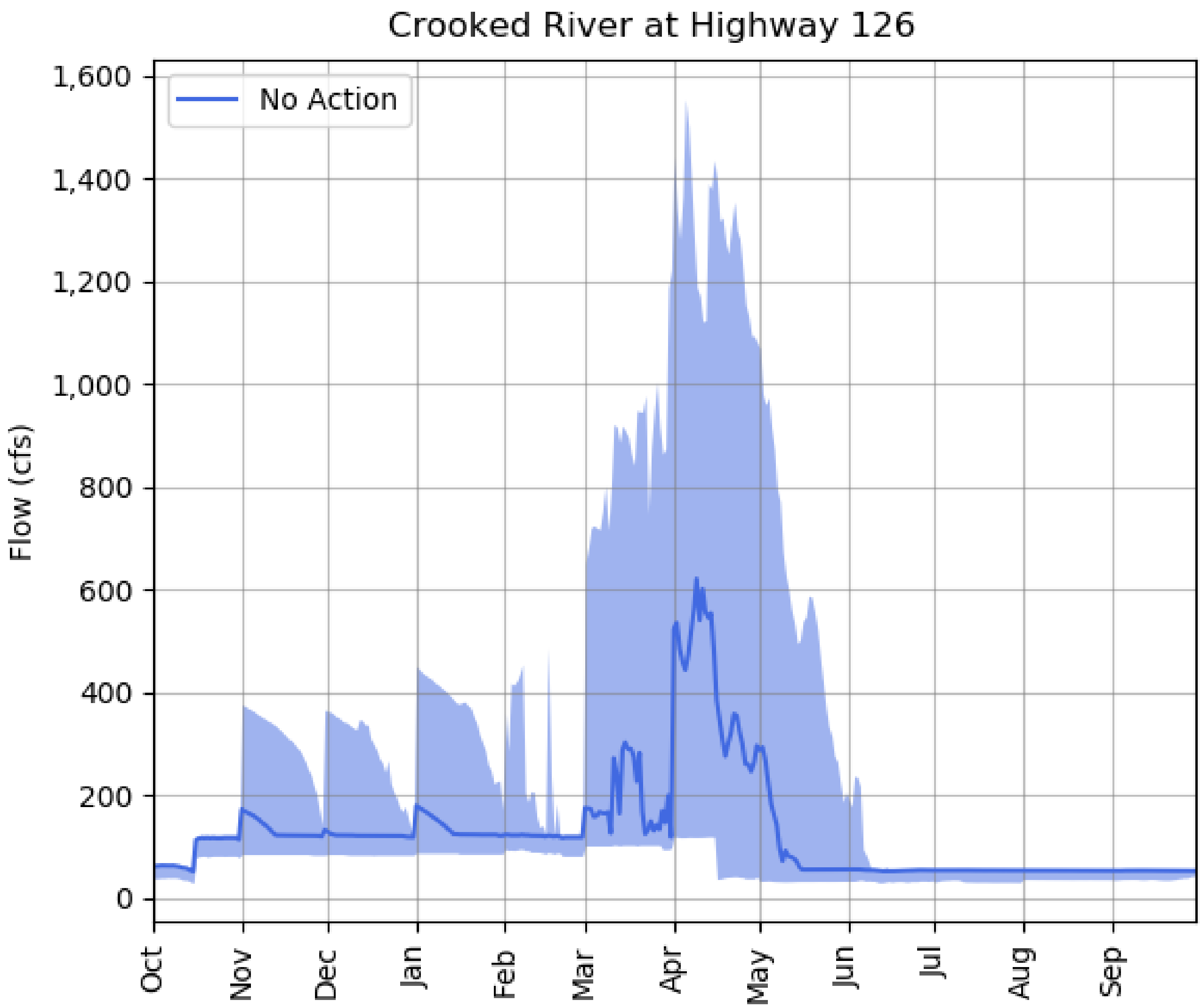

Figure 15. Summary hydrograph of simulated flow in the Crooked River at Highway 126 for the No Action alternative. The dark blue line represents the median and the shaded blue areas represent the 20 to 80 percent exceedance.

Figure 16 shows a summary hydrograph of the simulated flow in the Crooked River below the NUID pumps for No Action. The flow at this gage generally represents another low flow point in the river below major diversions and above irrigation return flows. It is largely influenced by the outflow from Prineville Reservoir in the winter and by the upstream diversions in the summer. The minimum flows as described in the Deschutes River Conservancy Bypass Flow agreement were met in all years (note that the lowest modeled bypass flow was 50 cfs, though the agreement allows for a lower value, 43.798 cfs, in May in dry years).

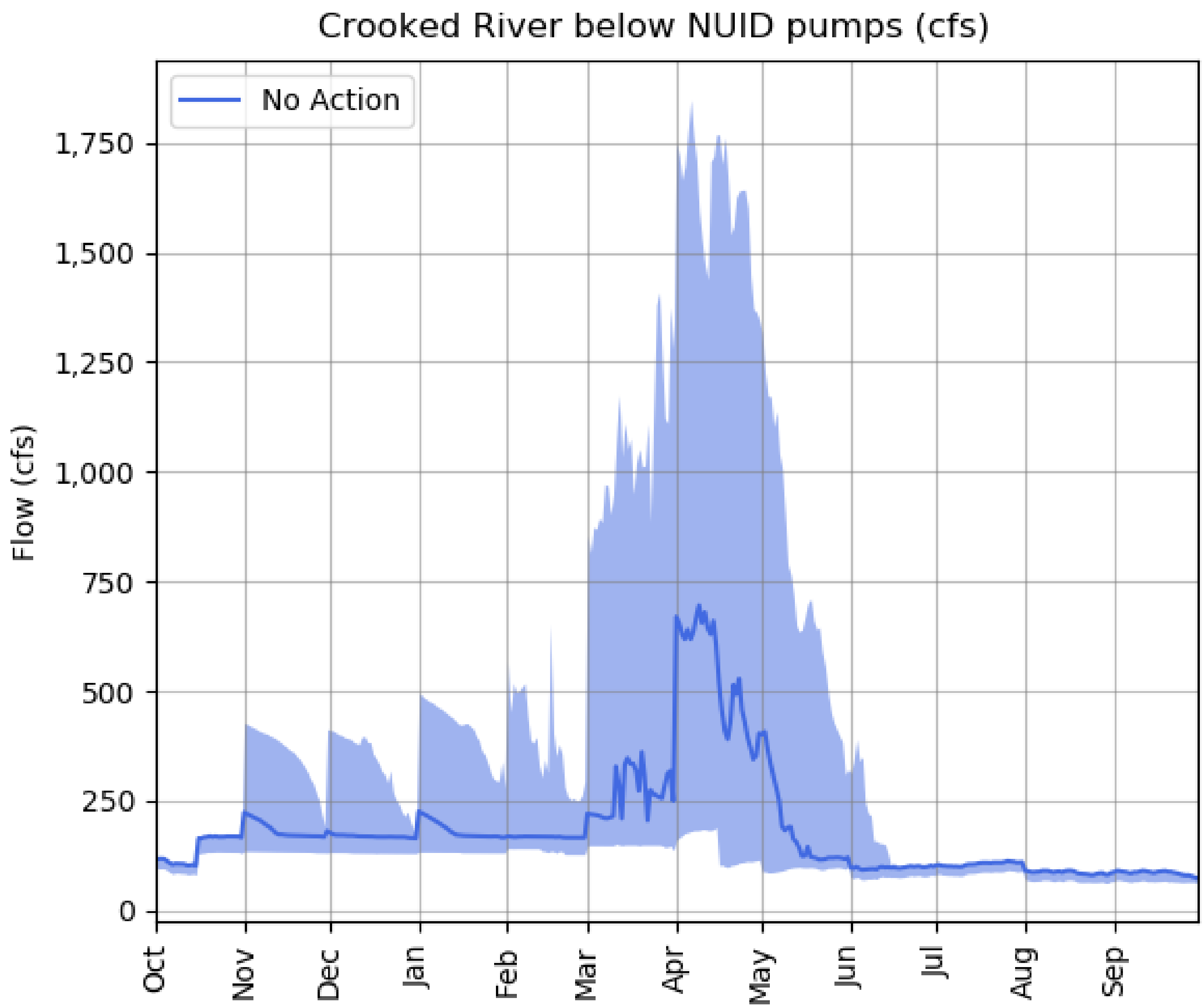

Figure 16. Summary hydrograph of simulated flow in the Crooked River below the NUID pumps for the No Action alternative. The dark blue line represents the median and the shaded blue area represents the 20 to 80 percent exceedance.

4.1.5. Irrigation Shortages

Irrigation shortages are calculated every model year and are the difference between the requested demand and the amount of water delivered to each district. The total annual shortages for the No Action alternative are ranked and shown in Figure 17. NUID has the largest shortage in the No Action alternative because it is the junior water user on the system.

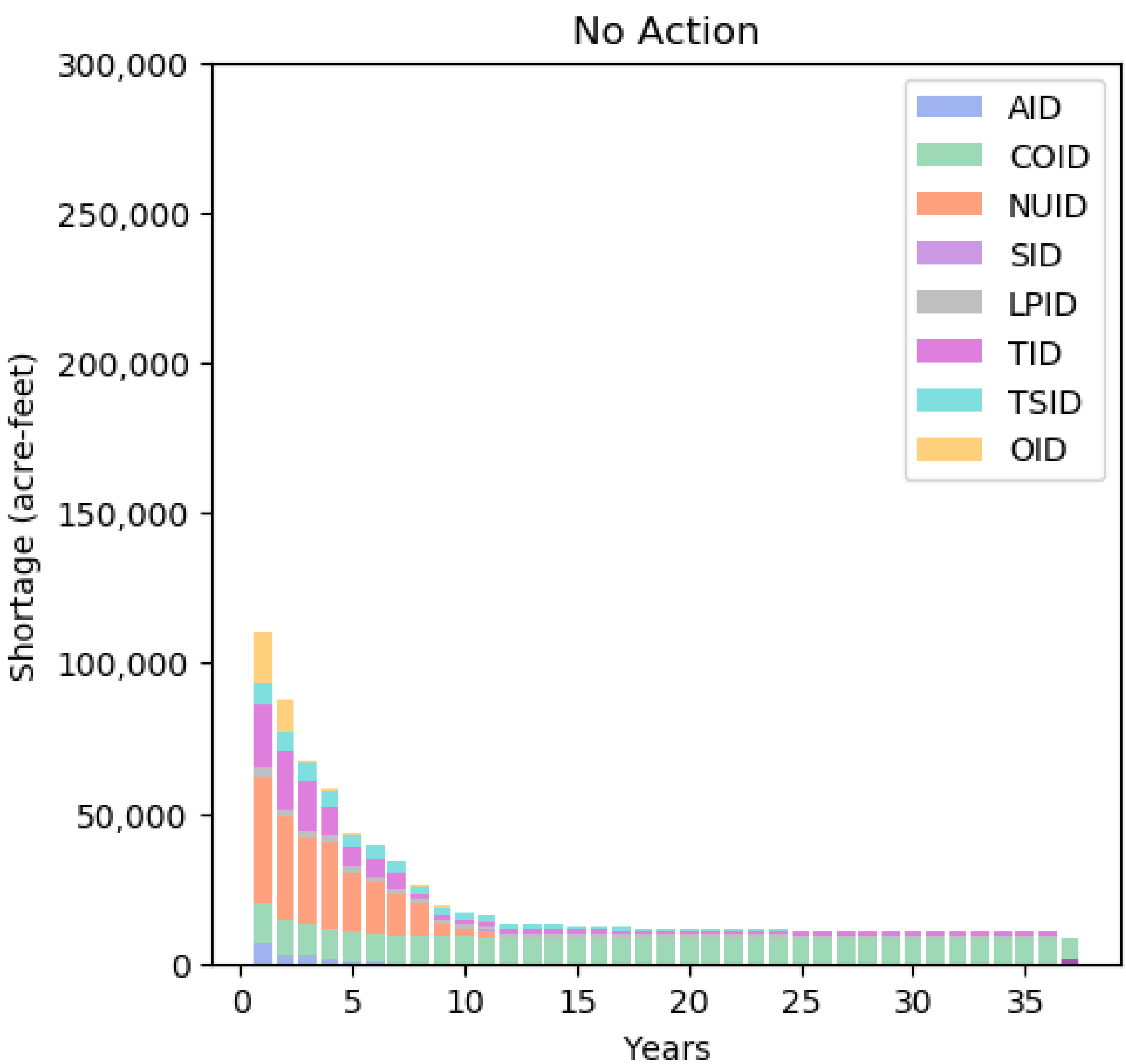

Figure 17. Irrigation shortages for the eight major districts in the basin for No Action

Table 7 shows the minimum, median, and maximum shortages from the total annual diversion for No Action. These are also shown as percent of total demand for each entity in order to illustrate the significance of the shortage.

Table 7. Minimum, median, and maximum shortages for No Action, reported both in volume (acre-feet) and as percent of total annual demand

District	No Action Alternative					
	Minimum		Median		Maximum	
	acre-feet	percent	acre-feet	percent	acre-feet	percent
AID	-	0%	-	0%	6,800	21%
COID	6,000	0.4%	6,200	0.4%	10,700	1%
NUID	-	0%	-	0%	42,100	21%
SID	-	0%	-	0%	-	0%
LPID	300	2%	1,300	8%	2,900	18%
TID	1,500	3%	1,500	3%	20,800	39%
TSID	-	0%	1,000	3%	6,400	18%
OID	-	0%	-	0%	15,600	20%

4.2. Alternative 2: Districts' DBHCP Proposal

The Alternative 2 results are displayed along with the No Action results for comparison. Only the locations that experienced a change from the No Action results are shown in this section. The DBHCP will be implemented in three major phases over time and the results shown reflect those time periods where Alternative 2A is years 0 to 7, Alternative 2B is years 8 to 12, and Alternative 2C is years 13 to 30.

4.2.1. Upper Deschutes

Figure 18 shows summary hydrographs of the simulated storage (top) and outflow (bottom) from Crane Prairie Reservoir for No Action Alternative (blue) compared to Alternative 2 (green). Recall that the intended operation for Crane Prairie Alternative 2 was as described below.

1. Store water from November 1 to March 14 to reach 48,000 acre-feet.
2. Pass inflow from March 15 to July 15 to maintain between 46,800 and 48,000 acre-feet.
3. Release storage at a maximum rate of 225 acre-feet per day from July 16 to July 31.
4. From July 31 to October 31, release up to 450 acre-feet per day until 38,000 acre-feet and then maintain 38,000 acre-feet until October 31.
5. Outflows are managed to maintain a minimum release of 75 cfs, if possible, and an absolute minimum of 30 cfs.

Figure 18 shows that this operation can be maintained through all three implementation phases. The difference between the Alternative 2 operation and the No Action operation is primarily due to the change in operating rules. However, the fill period between November 1 and March 14 also varies due to changes in inflow to the reservoir. Outflows from the reservoir are generally more consistent using the operation in Alternative 2 and show less dramatic changes than for No Action.

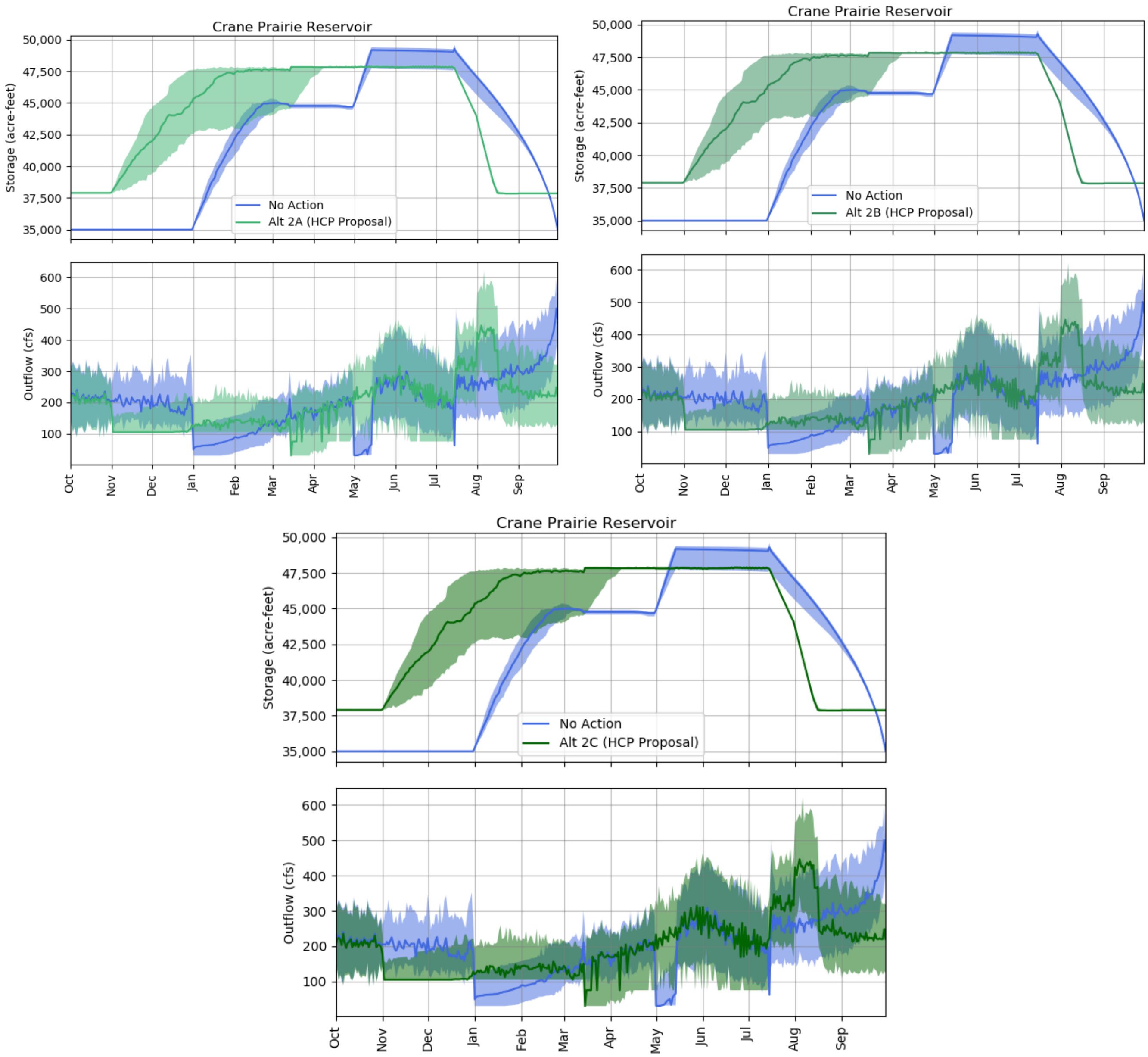

Figure 18. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crane Prairie Reservoir for No Action (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom. The dark blue or green line represents the median and the shaded blue or green areas represent the 20 to 80 percent exceedance.

Figure 19 shows summary hydrographs of the simulated storage and outflow from Wickiup Reservoir for No Action (blue) compared to Alternative 2 (green) with the three implementation phases. For all three implementation phases, Wickiup was able to meet the outflow objectives of Alternative 2; however, the reservoir has lower storage volumes than No Action, particularly in the later implementation phases, due to the higher outflows. For Alternative 2A, Wickiup maintains a minimum of 100 cfs in all years and does not have a maximum irrigation season outflow. This outflow results in similar storage to No Action. For Alternative 2B, Wickiup maintains a minimum storage season outflow of 300 cfs in all years and a maximum irrigation season outflow of 1,400 cfs. Storage in Wickiup is lower than No Action primarily due to the increase in winter flows. For Alternative 2C, Wickiup maintains a minimum storage season outflow of 400 cfs and a maximum irrigation season outflow of 1,200 cfs in all years.

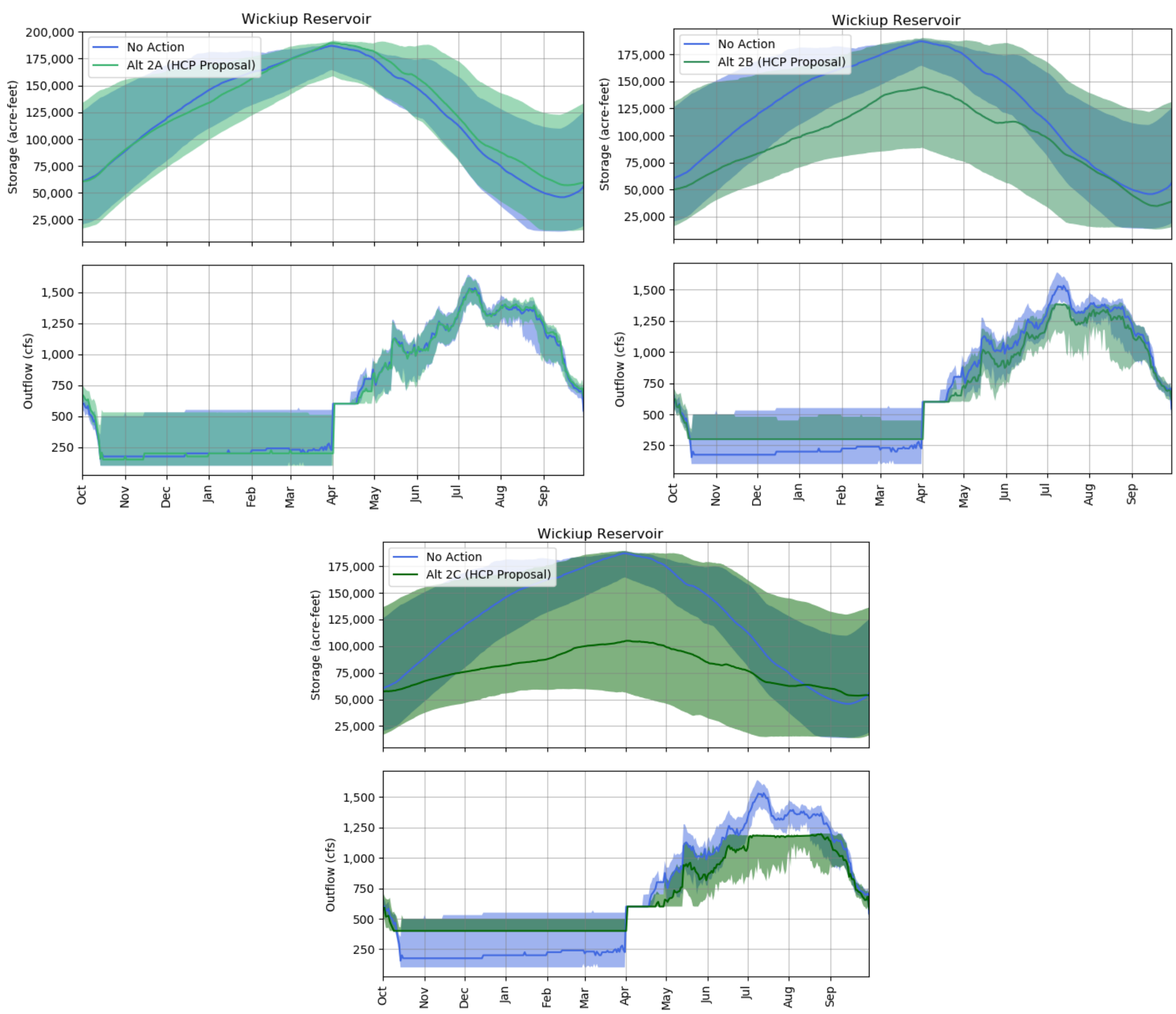

Figure 19. Summary hydrographs of simulated storage (top) and outflow (bottom) from Wickiup Reservoir for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom. The dark blue or green line represents the median and the shaded blue or green areas represent the 20 to 80 percent exceedance.

Figure 20 shows summary hydrographs for the storage and outflow from Crescent Lake for No Action (blue) compared to Alternative 2 (green) for all three implementation phases. Recall that the intended operation for Crescent Lake in Alternative 2 was to maintain a minimum of 10 cfs in the non-irrigation season (increased to 11 cfs in Alternative 2C), and then use a reserved portion of stored water to increase spring flows and reduce flows more slowly at the end of the irrigation season. These graphs indicate that the minimum can be maintained in all years and provide an example of how the spring and fall operation may occur, though this will be managed in real time based on weather and flow conditions in critical habitat locations which may result in flow that look different from these graphs. As noted in the scenario description, the minimum outflows from Crescent are lower than No Action because it was determined to be more important to shape the outflows at critical times of the year for the species than to maintain a higher flow throughout the year.

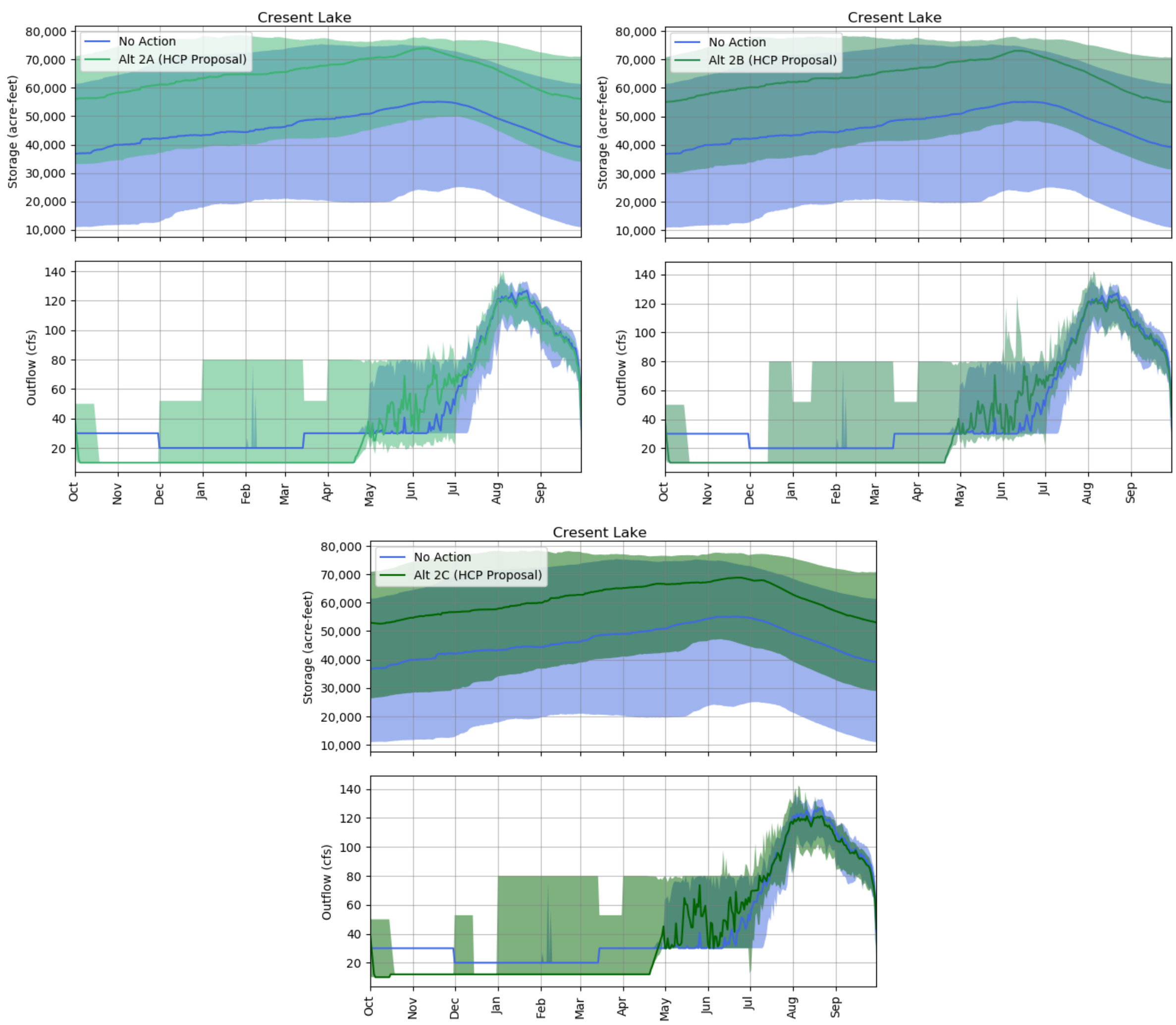

Figure 20. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crescent Lake for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B is shown at the top right, and 2C at the bottom. The dark blue or green line represents the median and the shaded blue or green areas represent the 20 to 80 percent exceedance.

Figure 21 shows a summary hydrograph of the simulated flow in the Little Deschutes River at La Pine for No Action (blue) compared to Alternative 2 (green) for all three implementation phases. As mentioned previously, the flow at this gage is largely unregulated, with a small contribution from Crescent Creek and Crescent Lake in the spring and a larger contribution in the summer and fall. The changes in the releases from Crescent Lake can be seen primarily in the fall months, but, overall, the flow is relatively similar at this gage for both alternatives.

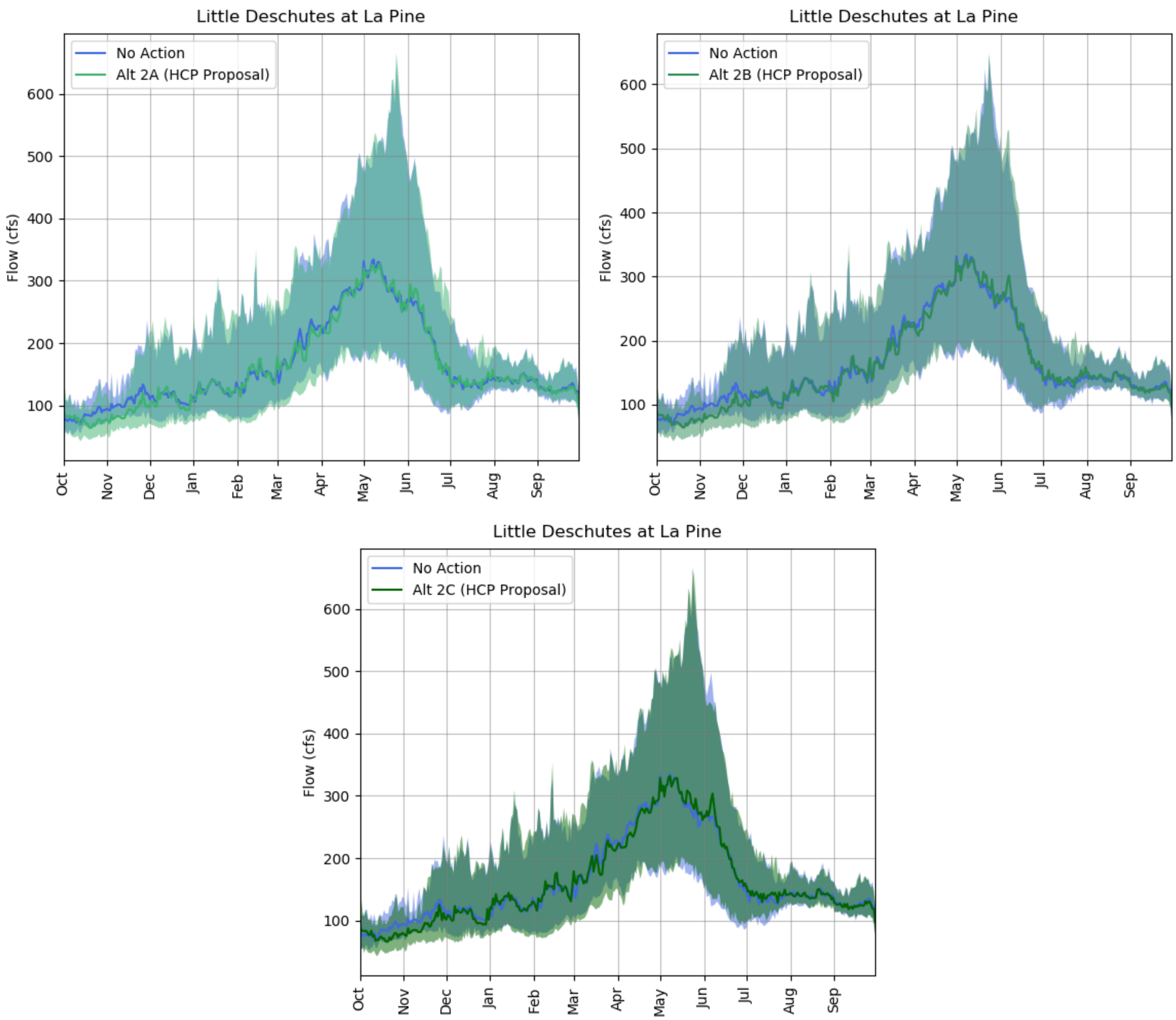

Figure 21. Summary hydrograph of simulated flow in the Little Deschutes River at La Pine for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left), 2B at the top right, and 2C at the bottom. The dark blue and green lines represent the median and the shaded area represents the 20 to 80 percent exceedance.

Figure 22 shows a summary hydrograph of the simulated flow in the Deschutes River at Benham Falls for No Action (blue) compared to Alternative 2 (green) for all three implementation phases. This gage is heavily influenced by the outflow from Wickiup Reservoir. Consequently, the changes from No Action mimic the changes at Wickiup Reservoir.

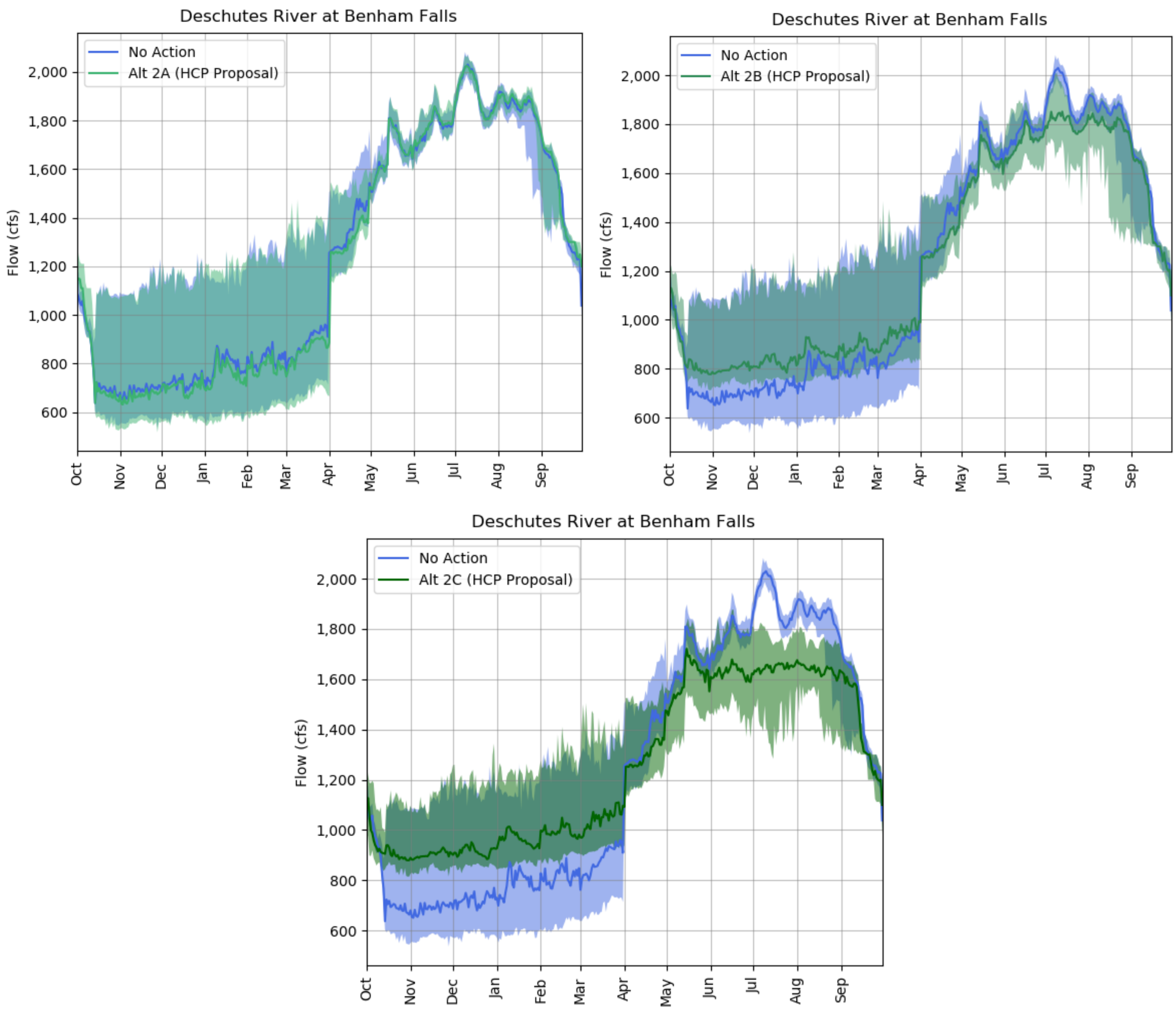

Figure 22. Summary hydrograph of simulated flow in the Deschutes River at Benham Falls for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom). The dark blue and green lines represent the median and the shaded area represents the 20 to 80 percent exceedance.

Figure 23 shows a summary hydrograph of the simulated flow in the Deschutes River below Bend for the No Action alternative (blue) compared to Alternative 2 (green) for all three implementation phases. The minimum flow targets are able to be met in all implementation phases. The effects of the increased releases from Wickiup Reservoir can be seen in the winter months when the range and median of flow is incrementally larger than for No Action. The summer flows at this location are similar for both alternatives. The effects of the minimum outflow requirements below Wickiup Reservoir in April and the rate of outflow reduction at the end of the irrigation season can be seen in these graphs, which show there is flow passing Bend that is not being diverted for irrigation. These additional releases are over and above irrigation demand but could be diverted in real time if the districts had a need for the water.

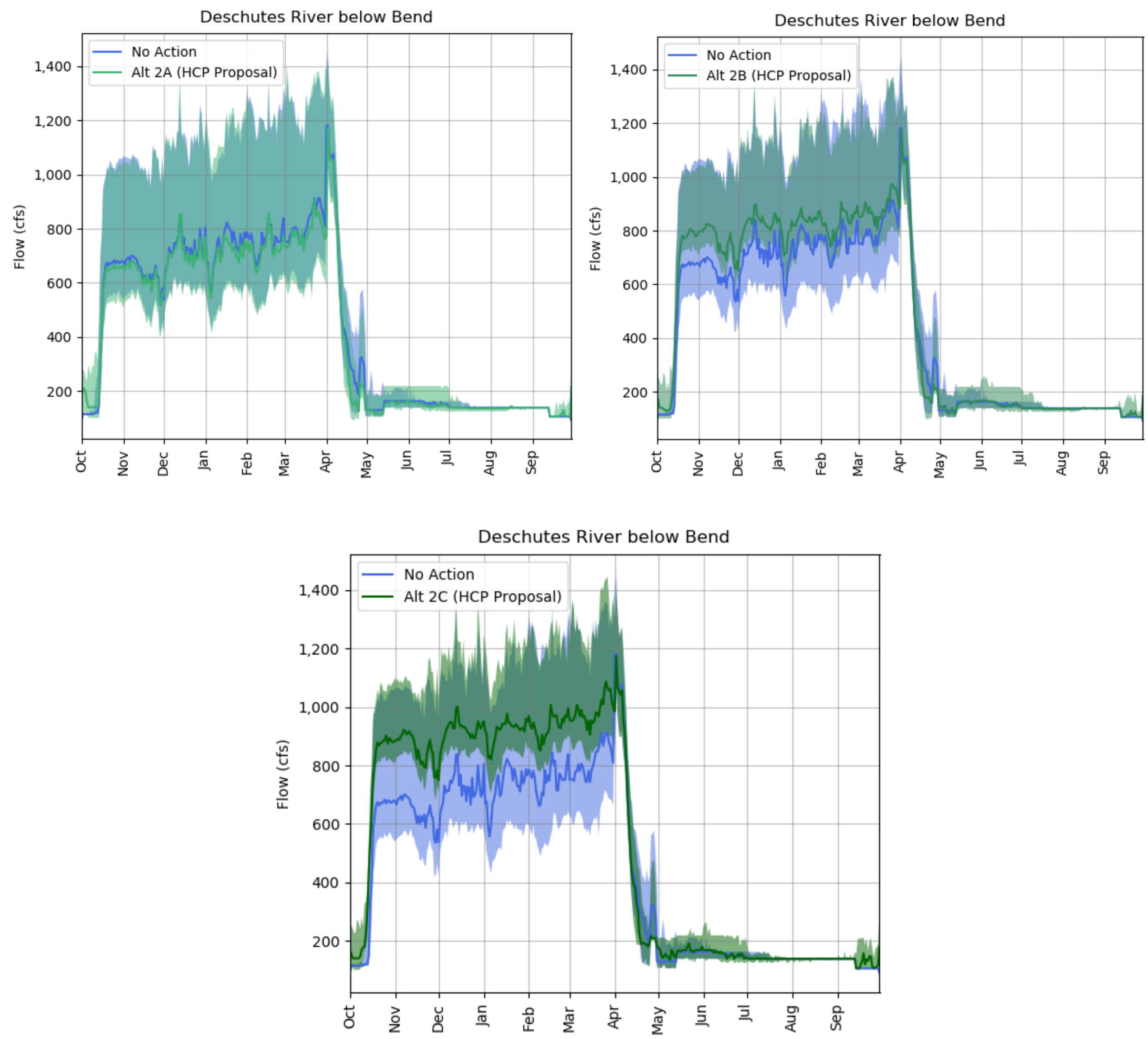

Figure 23. Summary hydrograph of simulated flow in the Deschutes River below Bend for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left), 2B at the top right, and 2C at the bottom. The dark blue or green lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.2.2. Tumalo Creek

There are no changes in Tumalo Creek flows from No Action to Alternative 2.

4.2.3. Whychus Creek

There are no changes in Whychus Creek flows from No Action to Alternative 2.

4.2.4. Crooked River

Figure 24 shows summary hydrographs for simulated storage and outflow from Prineville Reservoir for No Action (blue) compared to Alternative 2 (green) for all three implementation phases. Prineville Reservoir's operation in Alternative 2 reflects the changes in the Upper Deschutes. As more water is released from Wickiup Reservoir for minimum flows, there is less available for NUID during the irrigation season. This causes Prineville Reservoir to release more water from NUID's rental account, resulting in higher outflows and lower reservoir storage.

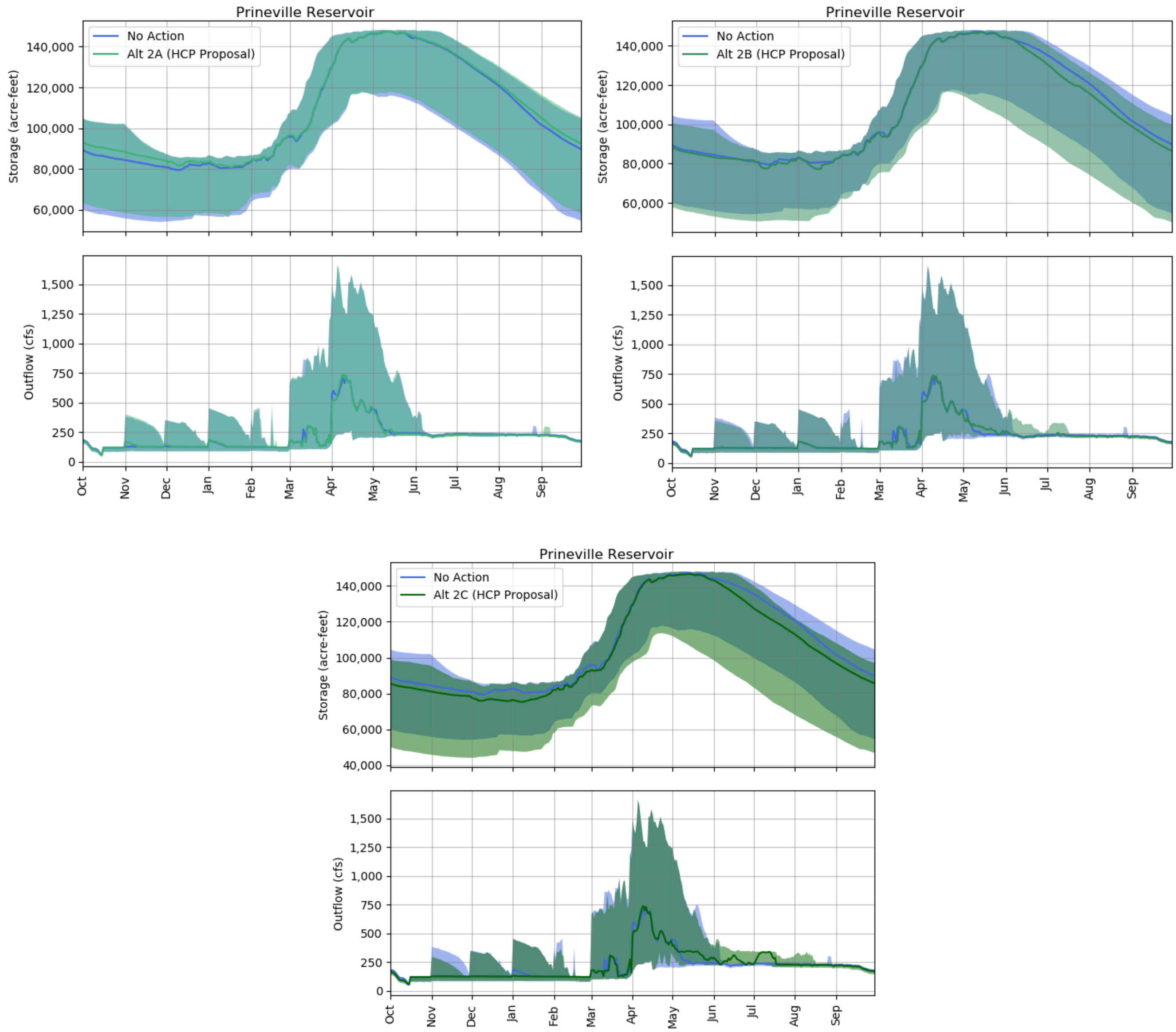

Figure 24. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom. The dark blue or green line represents the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 25 shows a summary hydrograph of the simulated flow in the Crooked River at Highway 126 for No Action (blue) compared to Alternative 2 (green). The effects of the change in Prineville Reservoir releases can be seen at this location, where the minimum flow objectives are able to be met in all years.

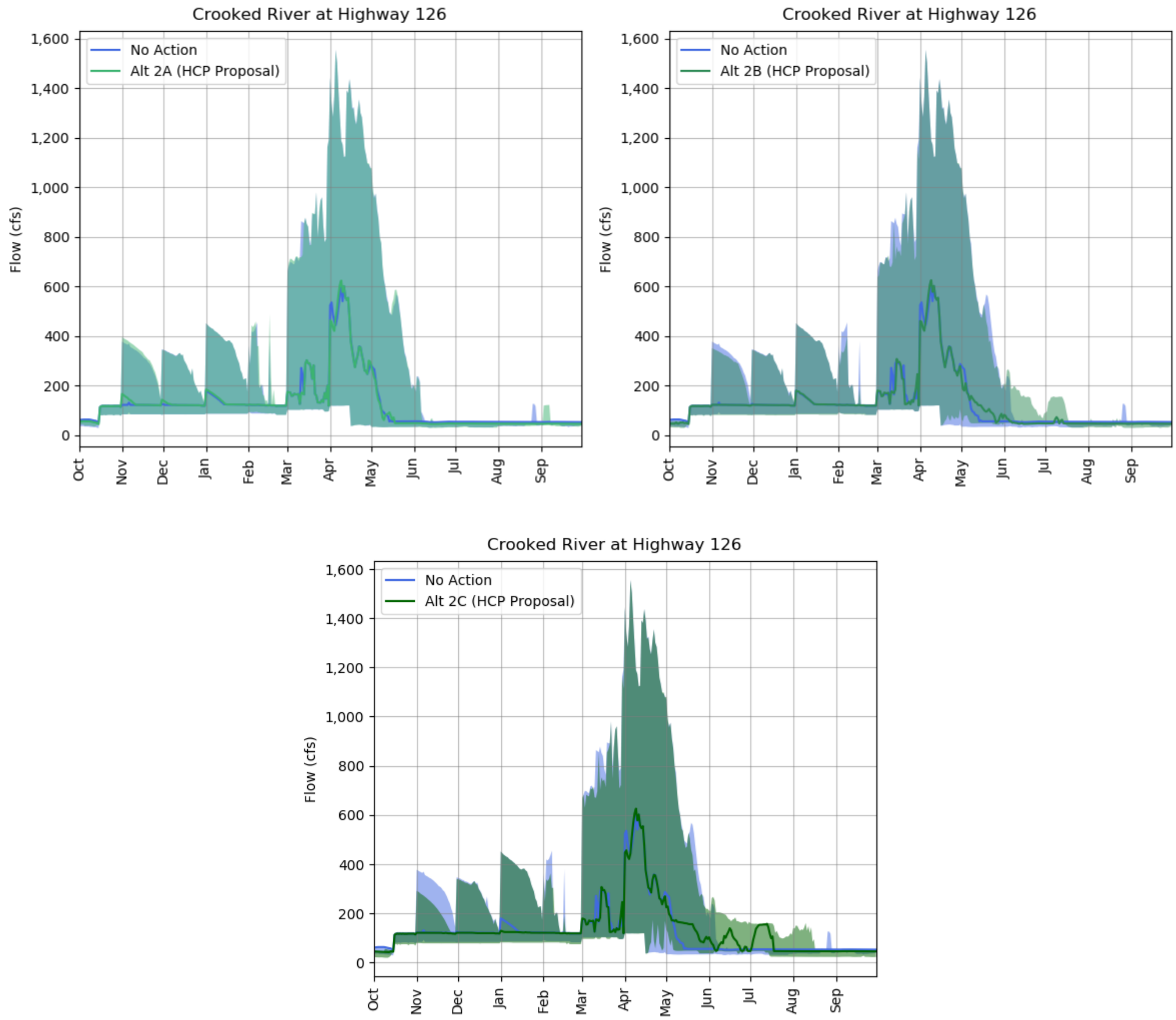

Figure 25. Summary hydrograph of simulated flow in the Crooked River at Highway 126 for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom. The dark blue or green lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 26 shows a summary hydrograph of the simulated flow in the Crooked River below the NUID pumps for No Action (blue) compared to Alternative 2 (green). The effects of the change in Prineville Reservoir releases can be seen at this location. The minimum flows as described in the Deschutes River Conservancy Bypass Flow agreement were met in all years.

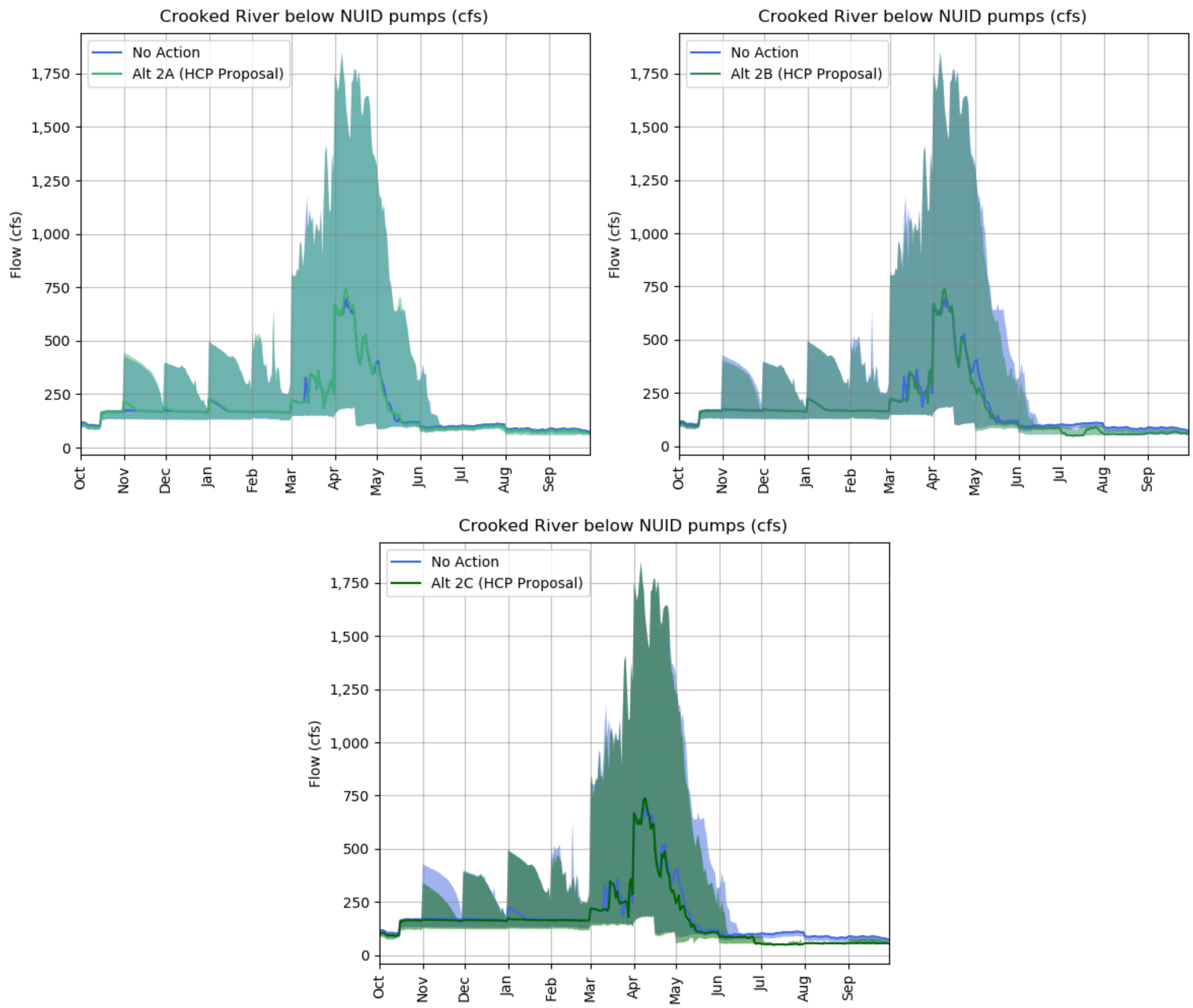

Figure 26. Summary hydrograph of simulated flow in the Crooked River below NUID pumps for the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left), 2B at the top right, and 2C at the bottom. The dark blue or green lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.2.5. Irrigation Shortages

Irrigation shortages are calculated every model year and are the difference between the requested demand[9] and the amount of water delivered to each district through the implementation phases. Even though there are three implementation phases with different lengths, each phase is modeled for the entire model run period (1980 through 2018) to get the best assessment of potential effects under different hydrologic conditions. The years indicated on the graphs are the years of the run period, not the years of the implementation phase.

The total annual shortages for Alternatives 2A, 2B, and 2C are ranked and shown in Figure 27. NUID has the largest shortage in Alternative 2 because it is the junior water user on the system. This shortage increases as Alternative 2 is implemented because the increased non-irrigation season flows out of Wickiup Reservoir reduce the amount of stored water available for NUID. Other districts also experience increased shortage because of the increased non-irrigation season flow requirement, and, in the case of LPID and AID, because their storage allocation in Crane Prairie was smaller than for No Action.

Table 8 shows the minimum, median, and maximum shortages from the total annual diversion for No Action, Alternative 2A, Alternative 2B, and Alternative 2C. The shortages are also shown as percent of total demand for each entity to illustrate the significance of the shortage.

[9] Even if model demand was reduced to respond to hydrologic conditions, the total shortage was still calculated using the full, non-reduced annual demand.

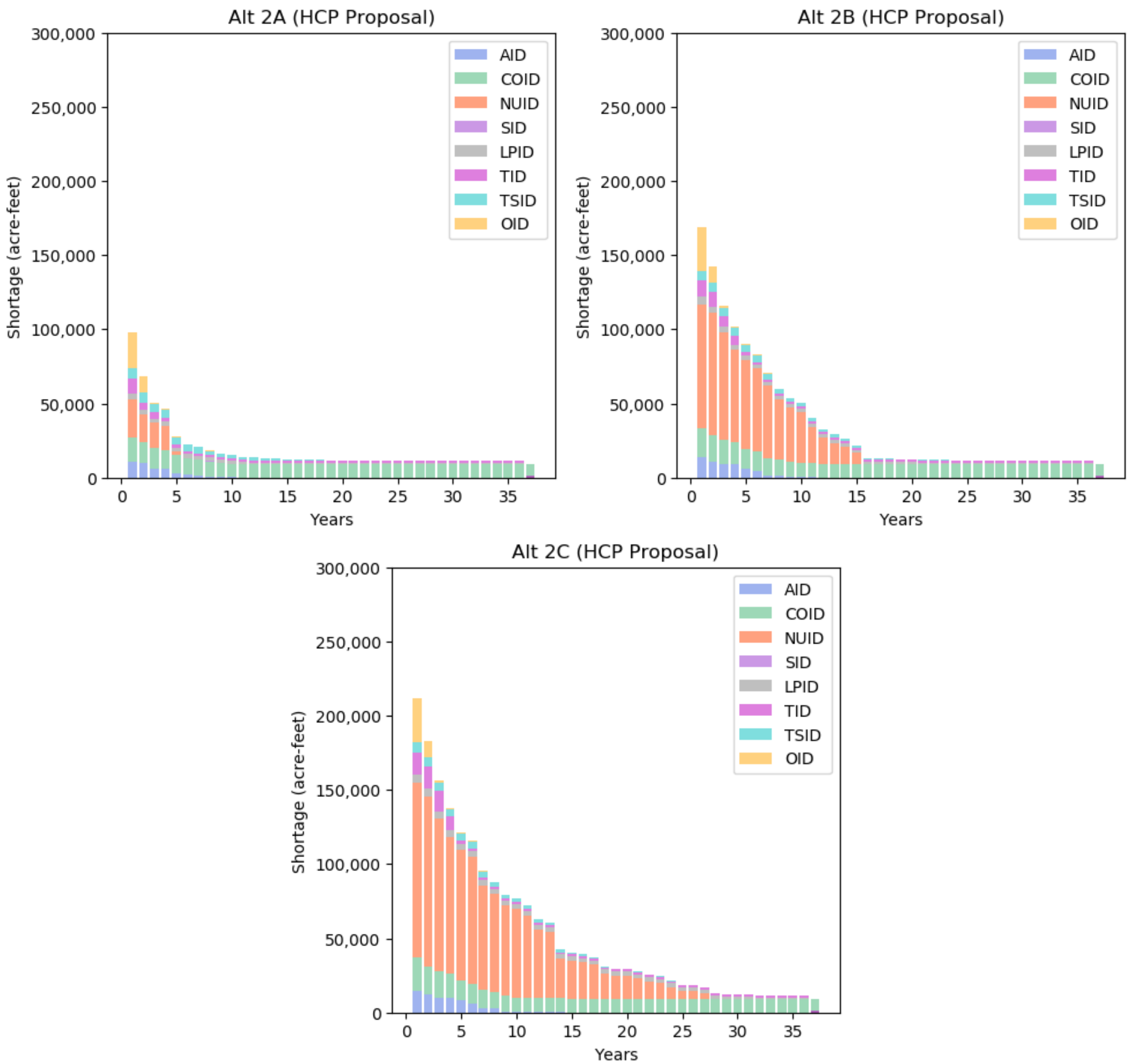

Figure 27. Irrigation shortages for the eight major irrigation districts for Alternative 2

Table 8. Minimum, median, and maximum shortages for No Action, Alternative 2A, Alternative 2B, and Alternative 2C, reported both in volume (acre-feet) and as percent of total annual demand

Alternative	District	Minimum Shortage		Median Shortage		Maximum Shortage	
		Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent
No Action	AID	-	0%	-	0%	6,800	21%
	COID	6,000	0.4%	6,200	0.4%	10,700	1%
	NUID	-	0%	-	0%	42,100	21%
	SID	-	0%	-	0%	-	0%
	LPID	300	2%	1,300	8%	2,900	18%
	TID	1,500	3%	1,500	3%	20,800	39%
	TSID	-	0%	1,000	3%	6,400	18%
	OID	-	0%	-	0%	15,600	20%
Alternative 2A	AID	-	0%	-	0%	10,900	34%
	COID	6,600	0.5%	6,600	0.5%	12,800	1%
	NUID	-	0%	-	0%	35,200	18%
	SID	-	0%	-	0%	-	0%
	LPID	200	1%	900	6%	4,000	25%
	TID	1,500	3%	1,500	3%	9,900	19%
	TSID	-	0%	1,000	3%	6,400	18%
	OID	-	0%	-	0%	23,100	30%
Alternative 2B	AID	-	0%	-	0%	13,800	43%
	COID	6,600	0.5%	6,600	0.5%	15,400	1%
	NUID	-	0%	8,000	4%	92,900	47%
	SID	-	0%	-	0%	-	0%
	LPID	900	6%	1,700	11%	5,200	32%
	TID	1,500	3%	1,500	3%	11,000	21%
	TSID	-	0%	1,000	3%	6,400	18%
	OID	-	0%	-	0%	27,900	36%
Alternative 2C	AID	-	0%	-	0%	14,700	46%
	COID	6,600	0.5%	6,700	0.5%	17,100	1%
	NUID	-	0%	25,700	13%	126,000	64%
	SID	-	0%	-	0%	-	0%
	LPID	900	6%	2,600	16%	5,500	34%
	TID	1,500	3%	1,500	3%	15,500	29%
	TSID	-	0%	1,000	3%	6,400	18%
	OID	-	0%	-	0%	28,000	36%

As a consequence of using more Wickiup flows for winter releases, there is less water available during the irrigation season for NUID; therefore, there is more reliance on flow from the Crooked River. Table 9 shows the percent of NUID deliveries that are from the Crooked River in the various stages of the alternative.

Table 9. Maximum, median, and minimum percent contributions of the Crooked River to NUID total delivery

Percent Contribution	Alternative			
	No Action	Alternative 2A	Alternative 2B	Alternative 2C
Minimum	7%	7%	7%	7%
Median	7%	7%	7%	17%
Maximum	14%	15%	34%	45%

4.3. Alternative 3

This section presents results for Alternative 3, along with the results for No Action and Alternative 2C for comparison. Only the locations that experienced a change from the No Action alternative are shown, and results are shown only for the final phase of Alternative 3, i.e., Alternative 3C.

4.3.1. Upper Deschutes

Figure 28 shows summary hydrographs of the simulated storage and outflow from Wickiup Reservoir for No Action (blue) compared to Alternative 3C (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). The graphs show the results of the scenario where minimums between 400 and 500 cfs were maintained and defined by November 1 Wickiup Reservoir storage contents, as compared to the No Action alternative where minimum outflows were 100 cfs and to Alternative 2C where outflows ranged from 400 to 500 cfs. The graphs show that the ranges of flows are achievable for each of the alternatives. However, Wickiup Reservoir storage for Alternative 3C is lower than for both No Action and Alternative 2C.

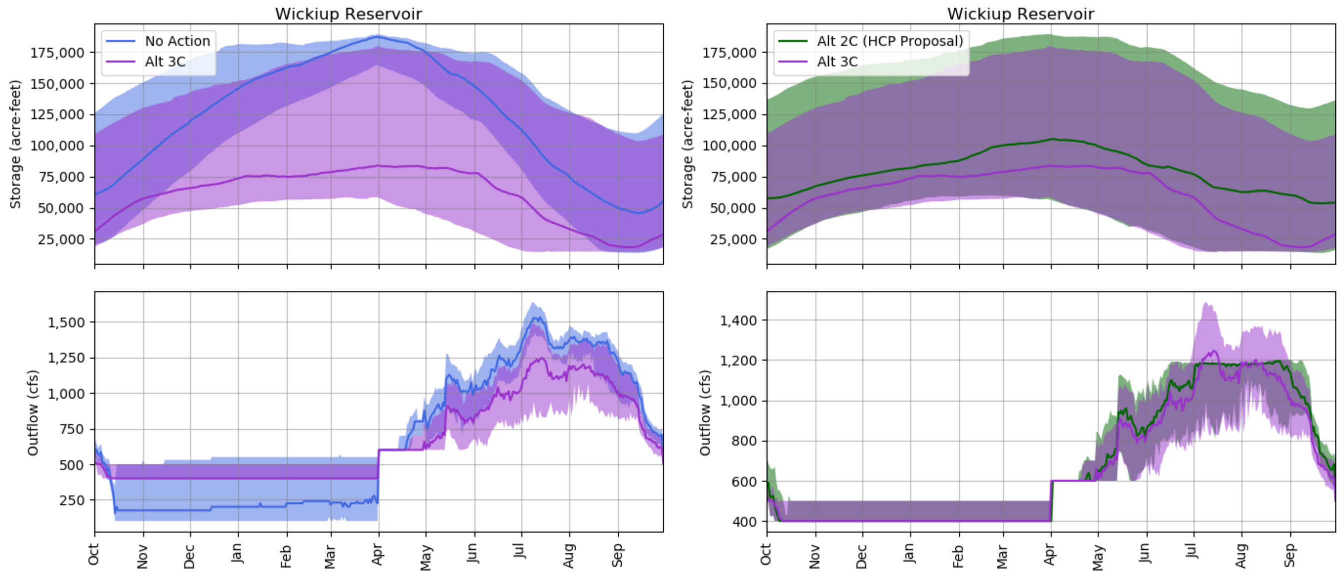

Figure 28. Summary hydrographs of simulated storage (top) and outflow (bottom) from Wickiup Reservoir. The graph on the left shows No Action (blue) compared to Alternative 3 (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 29 shows summary hydrographs for the storage and outflow from Crescent Lake for No Action (blue) compared to Alternative 3 (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). Recall that the intended operation for Crescent Lake in Alternative 3 was to maintain a minimum of 20 cfs throughout the year and 50 cfs from July 1 through September 30, if there is enough water in the lake; this operation was able to be achieved in all modeled years. The storage in Crescent Lake is slightly higher than for No Action because the outflow requirements are lower in Alternative 3C, which is largely due to the reduced minimum outflow requirements from Alternative 3C compared to No Action. When compared to Alternative 2C, Alternative 3C storage is lower because the minimum outflow requirement for Alternative 3C is higher than Alternative 2C.

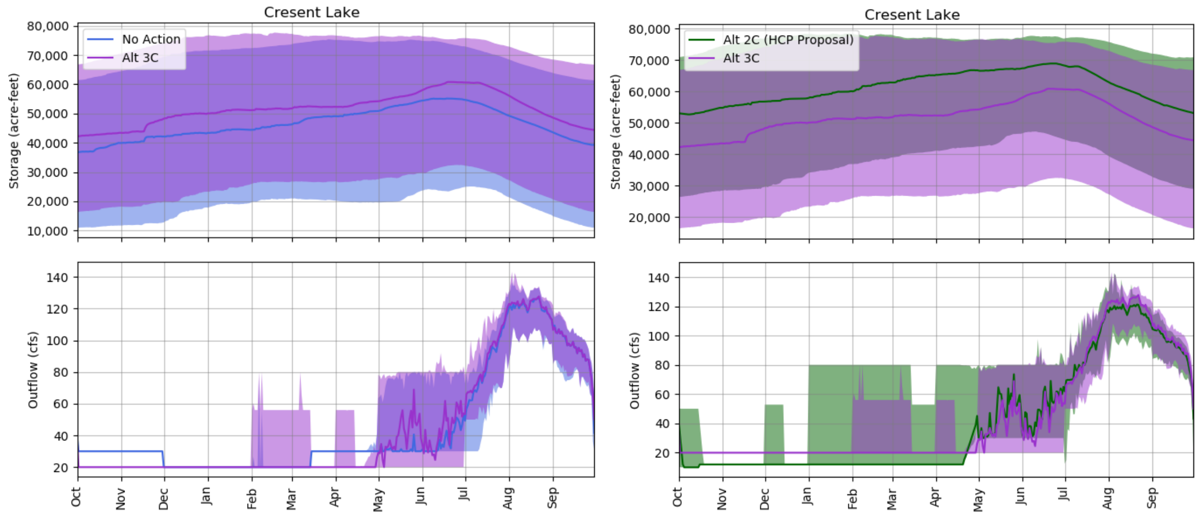

Figure 29. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crescent Lake. The graph on the left shows the No Action alternative (blue) compared to Alternative 3C (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 30 shows summary hydrographs of the simulated flow in the Little Deschutes River at La Pine for No Action (blue) compared to Alternative 3C (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). As mentioned previously, the flow at this gage is largely unregulated, with a small contribution from Crescent Creek and Crescent Lake in the spring and larger contributions in the summer and fall. The changes in the releases from Crescent Lake can be seen primarily in the summer months, but, overall, the flow is relatively similar at this gage for both alternatives. Note that the flow changes between Alternatives 2C and 3C are small relative to the total flow.

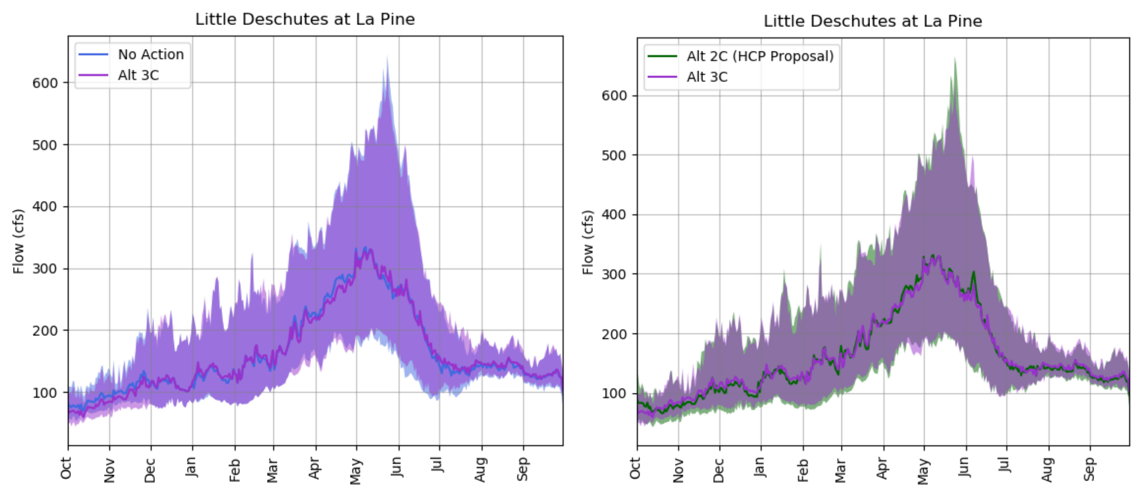

Figure 30. Summary hydrographs of simulated flow in the Little Deschutes at La Pine pumps. The graph on the left shows the No Action Alternative (blue) compared to Alternative 3C (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 31 shows summary hydrographs of the simulated flow in the Deschutes River at Benham Falls for No Action (blue) compared to Alternative 3C (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). This gage is heavily influenced by the outflow from Wickiup Reservoir, so the changes from No Action mimic those changes at Wickiup Reservoir. Note that the differences between Alternative 2C and Alternative 3C are small, except for the irrigation season outflow limit from Wickiup that can be seen at Benham Falls.

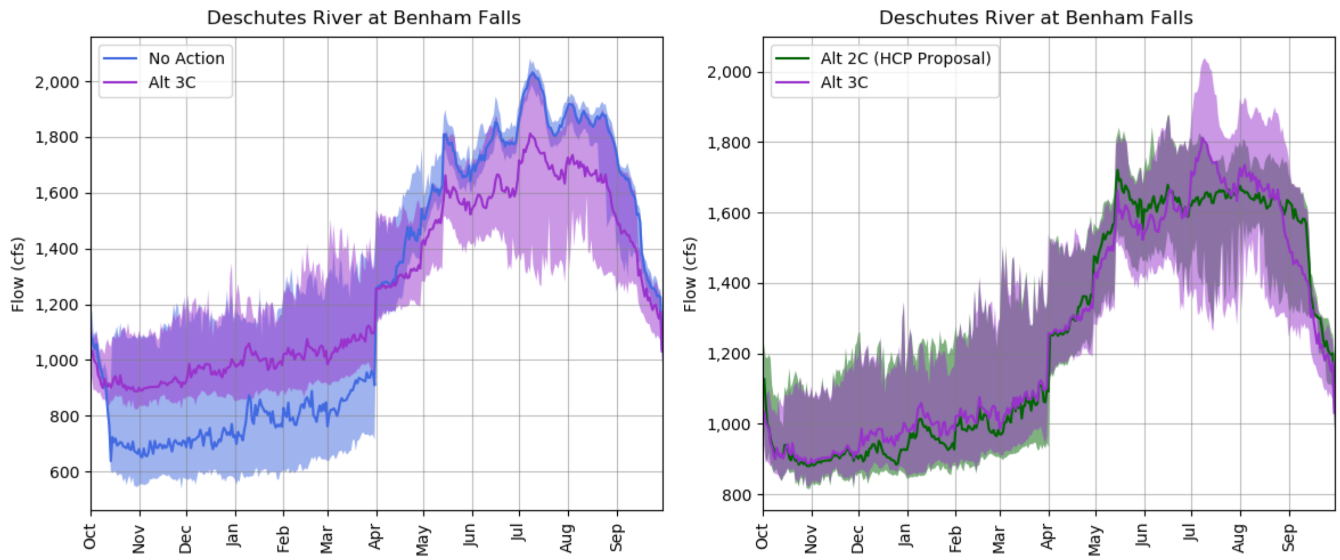

Figure 31. Summary hydrographs of simulated flow in the Deschutes River at Benham Falls. The graph on the left shows No Action (blue) compared to Alternative 3C (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 32 shows summary hydrographs of the simulated flow in the Deschutes River below Bend for No Action (blue) compared to Alternative 3C (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). The effects of the increased release from Wickiup Reservoir can be seen in the winter months when the range and median of flow is larger than for No Action. The summer flows are similar for all three alternatives.

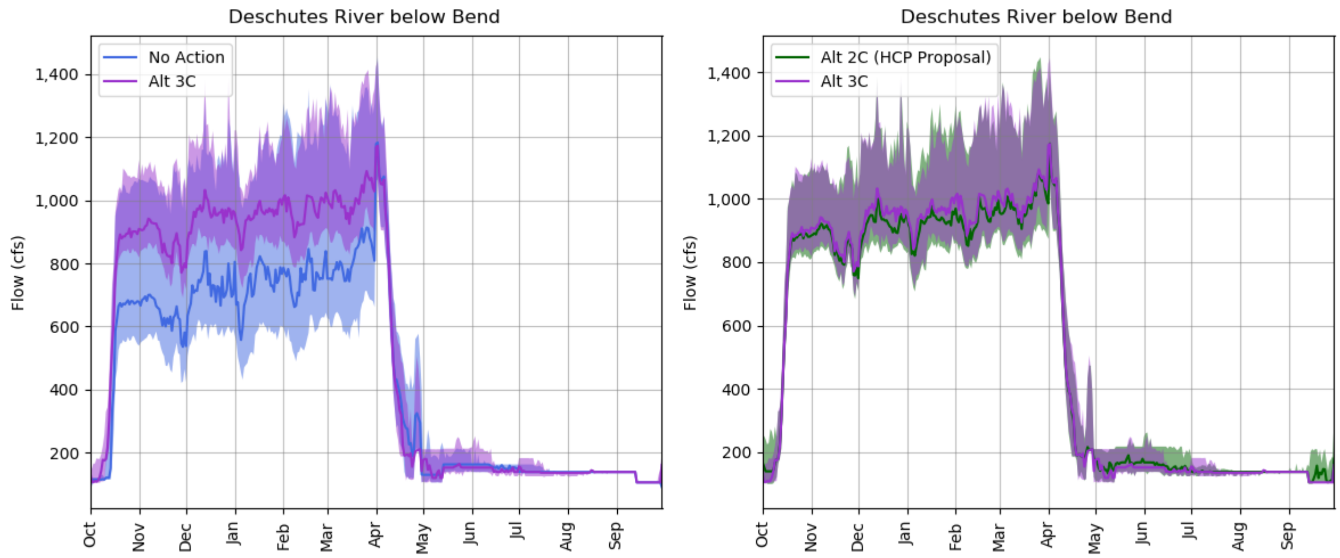

Figure 32. Summary hydrographs of simulated flow in the Deschutes River below Bend. The graph on the left shows No Action (blue) compared to Alternative 3C (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.3.2. Tumalo Creek

There are no changes in Tumalo Creek flows from No Action to Alternative 3.

4.3.3. Whychus Creek

There are no changes in Whychus Creek flows from No Action to Alternative 3.

4.3.4. Crooked River

The Crooked River has a difference in operation because the uncontracted releases are assumed to be bypassed by NUID in this Alternative (in other words, the water is "protected" from diversion). This is modeled by requiring NUID to bypass either the minimum flows required by the DRC agreement or the releases out of the uncontracted account, whichever is larger.

Figure 33 shows the storage and outflow from Prineville Reservoir for No Action compared to Alternative 3C (left), and for Alternative 2C compared to Alternative 3C (right). In Alternative 2, NUID could divert any uncontracted water over and above the DRC agreement flows. Under Alternative 3, they can no longer divert as much water in the river because they need to bypass the larger of the uncontracted release or the DRC agreement. To make up the difference, they request more from their rental account. This causes Prineville Reservoir storage to be slightly lower at the end of the irrigation season and, in some years, reduces storage on April 1. Since the uncontracted account is last to fill, it takes the shortage when Prineville Reservoir does not fill; this affects the amount it can release the following year. The overall effects are slightly different outflows and lower reservoir storage in Alternative 3.

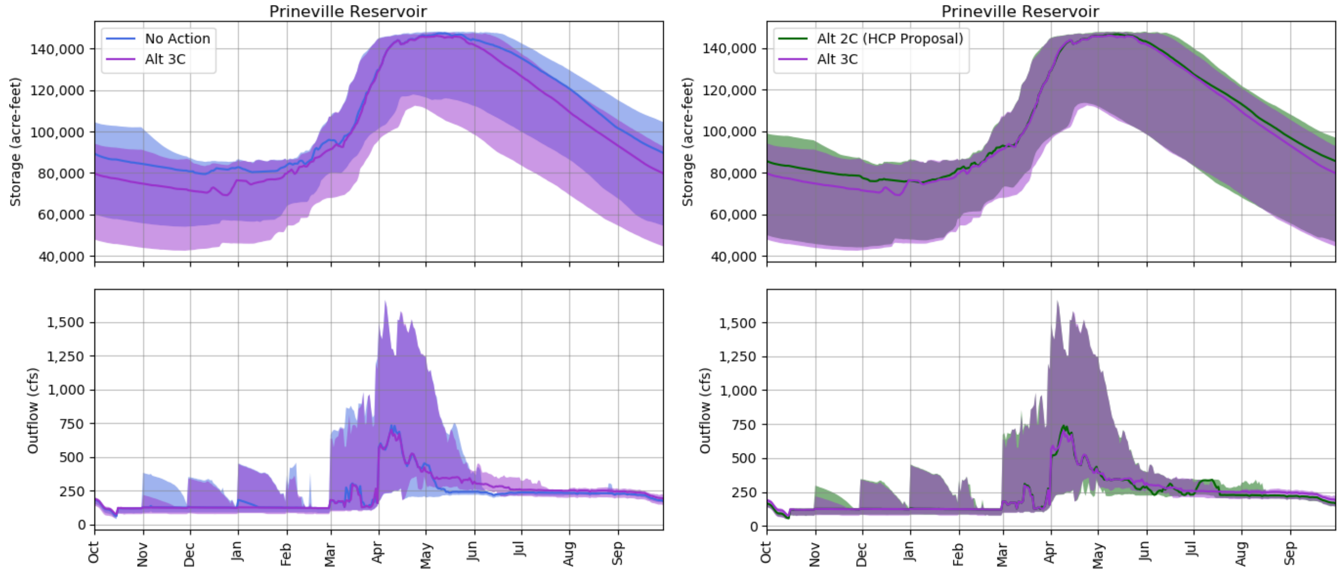

Figure 33. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir. The graphs on the left show No Action (blue) compared to Alternative 3C (purple). The graphs on the right show Alternative 2C (green) compared to Alternative 3C (purple). In all graphs, the colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

In the most extreme years from the simulation period, NUID used approximately 3,500 acre-feet more water from its rental account in Alternative 3C versus Alternative 2C. The effect on the uncontracted account was a reduction in storage of 3,400 acre-feet. This ultimately results in lower outflows from the uncontracted account.

Figure 34 shows summary hydrographs of the simulated flow in the Crooked River at Highway 126 for No Action (blue) compared to Alternative 3C (purple) (left), and for Alternative 2C (green) compared to Alternative 3C (purple) (right). The effects of the change in Prineville Reservoir releases can be seen at this location, where the minimum flows could be maintained in all model years.

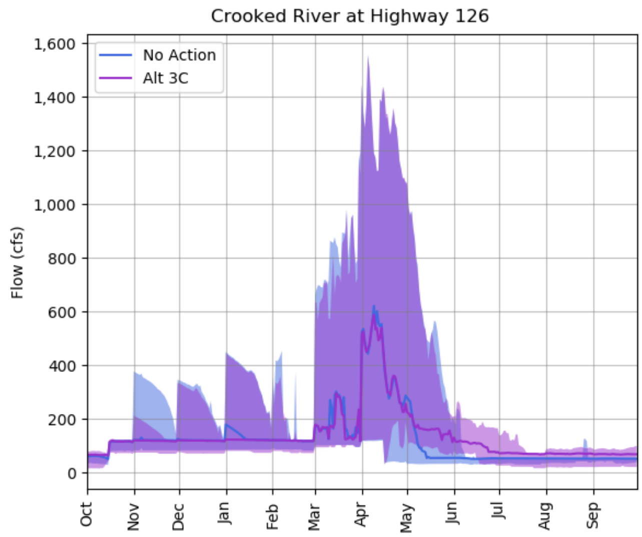

Figure 34. Summary hydrographs of simulated flow in the Crooked River at Highway 126. The graph on the left shows No Action (blue) compared to Alternative 3C (purple). The graph on the right shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 35 shows summary hydrographs of the simulated flow in the Crooked River below the NUID pumps for No Action (blue) compared to Alternative 3C (purple), and for Alternative 2C (green) compared to Alternative 3C (purple). Note that Alternative 3C shows slightly higher median flows than Alternative 2C in the summer. The effects of the change in Prineville Reservoir releases can be seen at this location, where the minimum flows as described in the Deschutes River Conservancy Bypass Flow agreement were met in all years with additional water supplied from the uncontracted account.

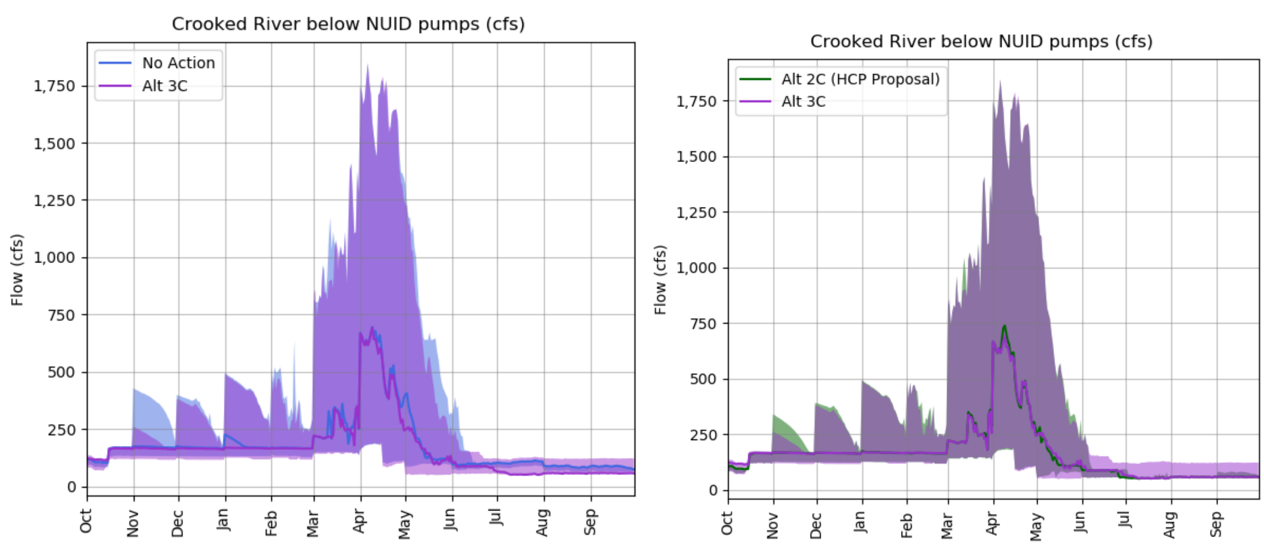

Figure 35. Summary hydrographs of simulated flow in the Crooked River below NUID pumps. The graph on the left shows the No Action Alternative (blue) compared to Alternative 3C (purple). The graph on the right

shows Alternative 2C (green) compared to Alternative 3C (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.3.5. Irrigation Shortages

Irrigation shortages are calculated every model year and are the difference between the requested demand[10] and the amount of water delivered to each district. Even though there are three implementation phases with different lengths, each phase is modeled for the entire model run period (1980 through 2018) to get the best assessment of potential effects under different hydrologic conditions. The years indicated on the graphs are the years of the run period, not the years of the implementation phase.

The total annual shortages for Alternative 3C are ranked and shown in Figure 36. NUID has the largest shortage in Alternative 3C because it is the junior water user on the system. This shortage is slightly larger than Alternative 2C in the median years because the uncontracted water out of Prineville Reservoir is bypassed the NUID pumps. Other districts also experience increased shortage because of the increased non-irrigation season flow requirement, and, in the case of LPID and AID, because their storage allocation in Crane Prairie was smaller than for No Action.

[10] Even if model demand was reduced to respond to hydrologic conditions, the total shortage was still calculated using the full non-reduced annual demand.

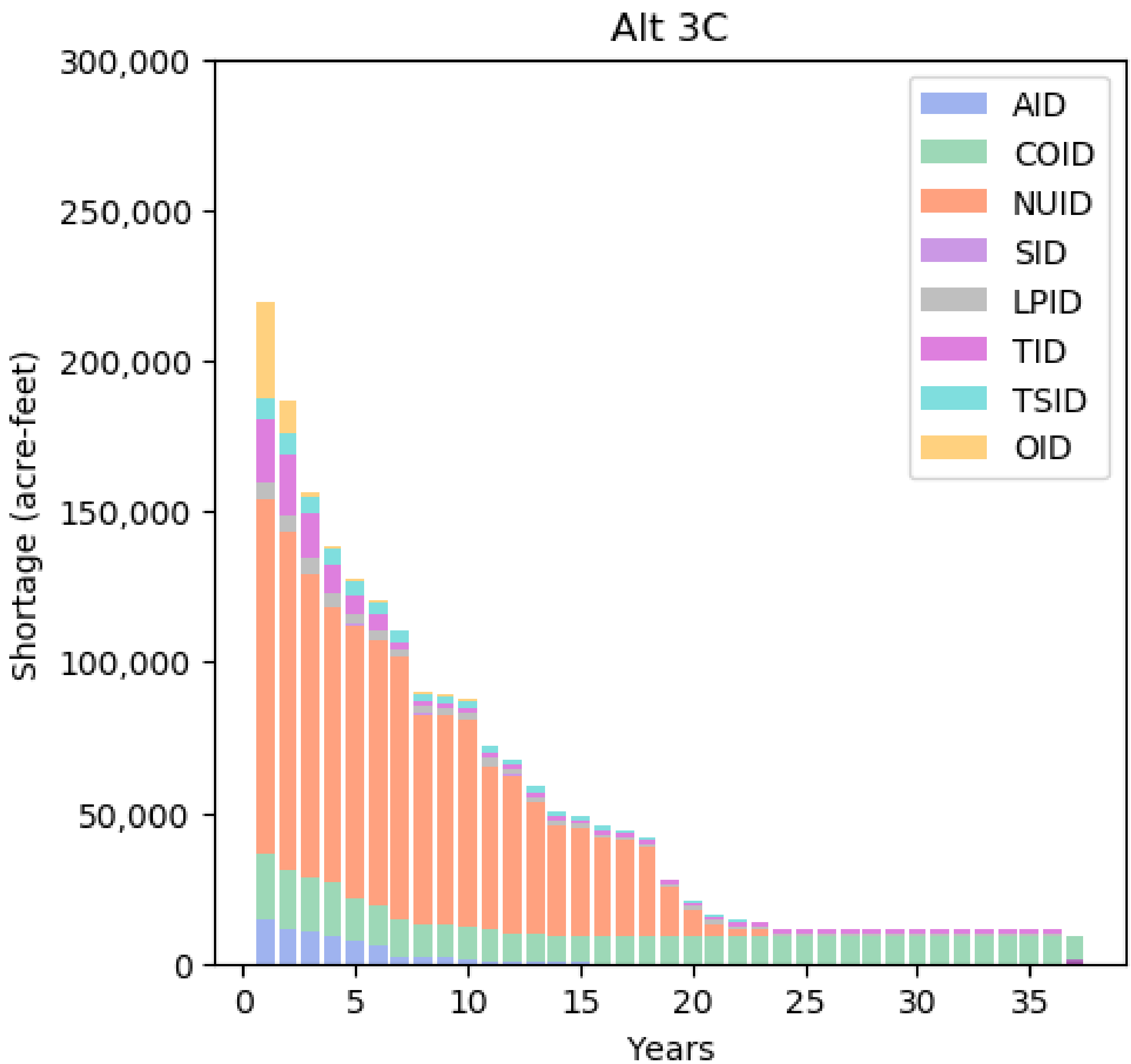

Figure 36. Irrigation shortages for the eight major irrigation districts for Alternative 3.

Table 10 shows the minimum, median, and maximum shortages from the total annual diversion for No Action and for Alternative 3C. The shortages are also shown as percent of total demand for each entity in order to indicate in the significance of the shortage.

Table 10. Minimum, median, and maximum shortages for No Action and Alternative 3C, reported both in volume (acre-feet) and as percent of total annual demand

District	No Action Alternative						Alternative 3C					
	Minimum		Median		Maximum		Minimum		Median		Maximum	
	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent
AID	-	0%	-	0%	6,800	21%	-	0%	-	0%	14,500	45%
COID	6,000	0.4%	6,200	0.4%	10,700	1%	6,600	0.5%	6,600	0.5%	17,100	1%
NUID	-	0%	-	0%	42,100	21%	-	0%	33,200	17%	126,000	64%
SID	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
LPID	300	2%	1,300	8%	2,900	18%	700	5%	900	6%	5,400	34%
TID	1,500	3%	1,500	3%	20,800	39%	1,500	3%	1,500	3%	20,700	39%
TSID	-	0%	1,000	3%	6,400	18%	-	0%	1,000	3%	6,400	18%
OID	-	0%	-	0%	15,600	20%	-	0%	-	0%	31,100	40%

A consequence of using more Wickiup flows for winter releases is there is less water available during the irrigation season for NUID; therefore, there is more reliance on flow from the Crooked River. Table 11 shows the percent of NUID deliveries that are from the Crooked River in the various stages of the alternative.

Table 11. Maximum, median, and minimum percent contributions of the Crooked River to NUID total delivery

Percent Contribution	Alternative	
	No Action	Alternative 3C
Minimum	7%	7%
Median	7%	18%
Maximum	14%	47%

4.4. Alternative 4

Alternative 4B results are displayed in this section, along with results from the No Action alternative and Alternative 2C for comparison. Only the locations that experienced a change from the No Action results are shown, and results are shown only for the final phase of Alternative 4 (Alternative 4B).

4.4.1. Upper Deschutes

Figure 37 shows summary hydrographs of the simulated storage and outflow from Wickiup Reservoir for the No Action alternative (blue) compared to Alternative 4B (orange-red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). The graphs show the results of the scenario where minimums between 400 and 600 cfs were maintained and defined by November 1 Wickiup Reservoir storage contents, as compared to No Action (where minimum outflows were 100 cfs) and Alternative 2C (where outflows ranged from 400 to 500 cfs). The graphs show that the ranges of flows are achievable for each of the alternatives. However, Wickiup Reservoir storage in Alternative 4B is lower than both No Action and Alternative 2C.

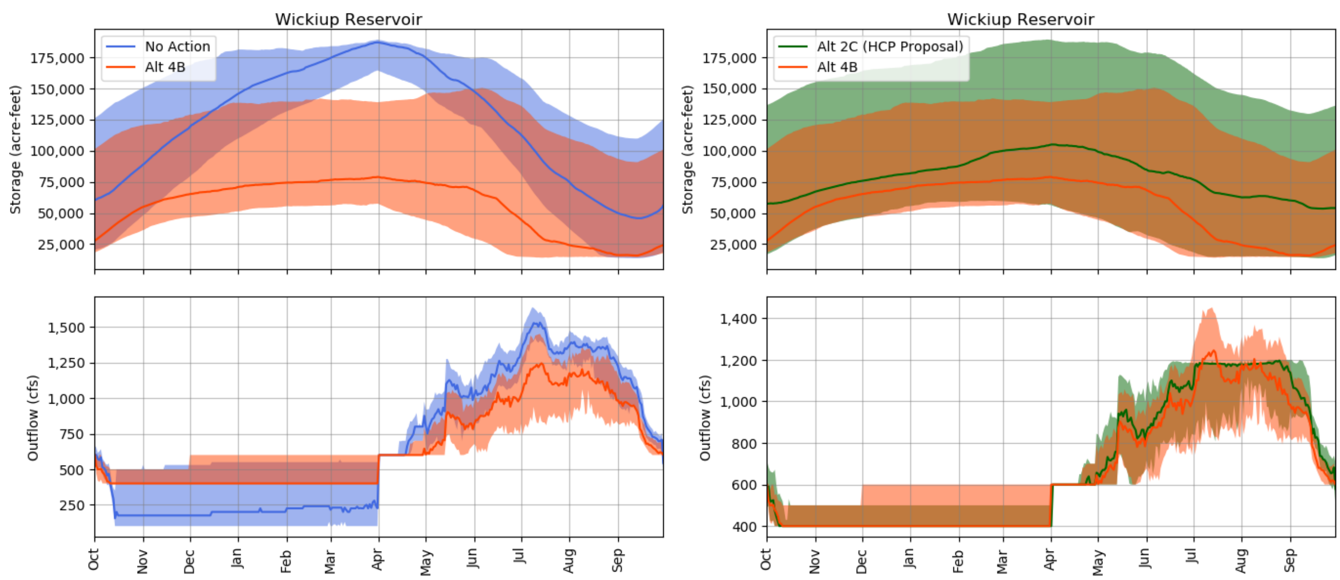

Figure 37. Summary hydrographs of simulated storage (top) and outflow (bottom) from Wickiup Reservoir. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (orange-red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 38 shows summary hydrographs for the storage and outflow from Crescent Lake for No Action (blue) compared to Alternative 4 (orange-red), and for Alternative 2 (green) compared to Alternative 4B (orange-red). Recall that the intended operation for Crescent Lake in Alternative 4 was to maintain a minimum of 20 cfs throughout the year and 50 cfs from July 1 through September 30, if there is enough water in the lake. The storage in Crescent Lake is slightly higher than for No Action because the outflow requirements are lower in Alternative 4B, largely due to the reduced minimum outflow requirement for Alternative 4B when compared to No Action. When compared to Alternative 2C, Alternative 4B storage is lower also because the minimum outflow requirement for 4B is higher than Alternative 2C, resulting in lower storage in Alternative 4B.

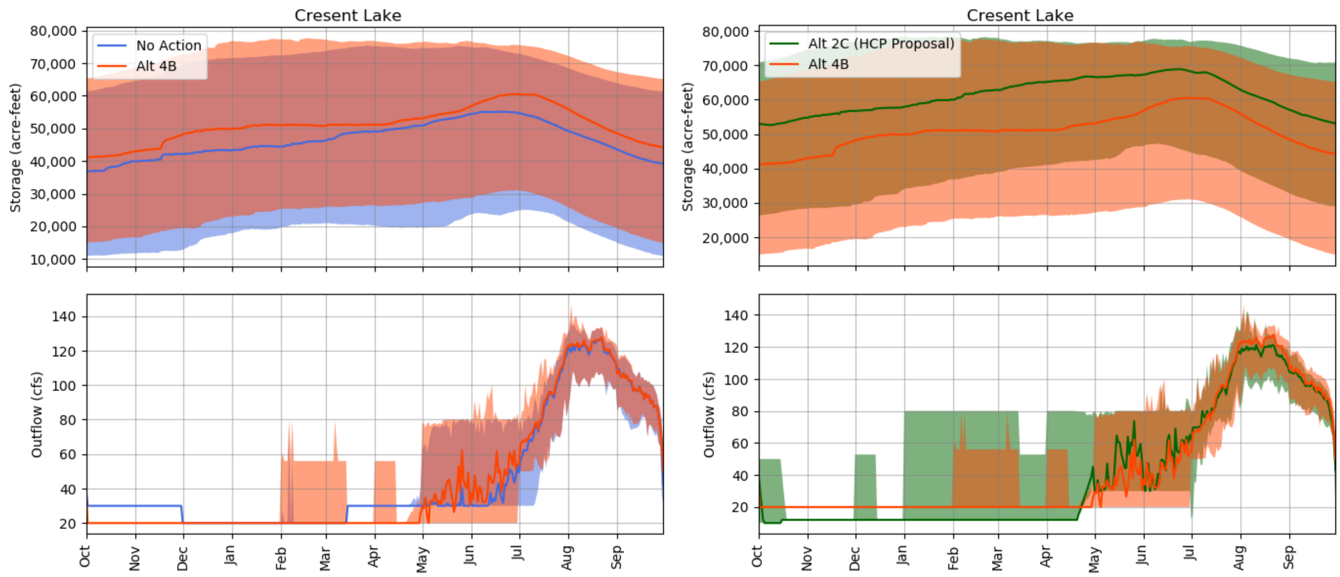

Figure 38. Summary hydrographs of simulated storage (top) and outflow (bottom) from Crescent Lake. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (orange-red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 39 shows summary hydrographs of the simulated flow in the Little Deschutes River at La Pine for the No Action alternative (blue) compared to Alternative 4B (orange-red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). As mentioned previously, the flow at this gage is largely unregulated, with a small contribution from Crescent Creek and Crescent Lake in the spring and a larger contribution in the summer and fall. The changes in the releases from Crescent Lake can be seen primarily in the summer months, but, overall, the flow is relatively similar at this gage for both alternatives. Note that the flow changes between Alternatives 2C and 4B are small relative to the total flow.

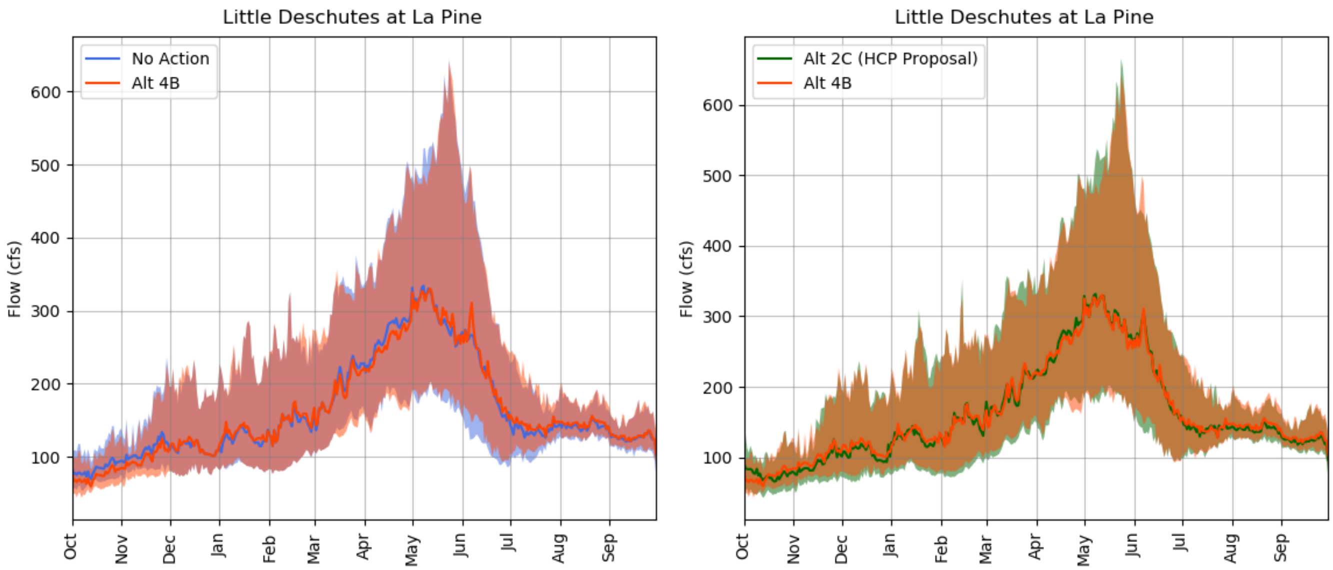

Figure 39. Summary hydrographs of simulated flow in the Little Deschutes at La Pine pumps. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (orange-red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 40 shows summary hydrographs of the simulated flow in the Deschutes River at Benham Falls for the No Action alternative (blue) compared to Alternative 4B (orange-red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). This gage is heavily influenced by the outflow from Wickiup Reservoir, so the changes from No Action mimic those changes at Wickiup Reservoir. Note that the differences between Alternative 2C and Alternative 4B are small.

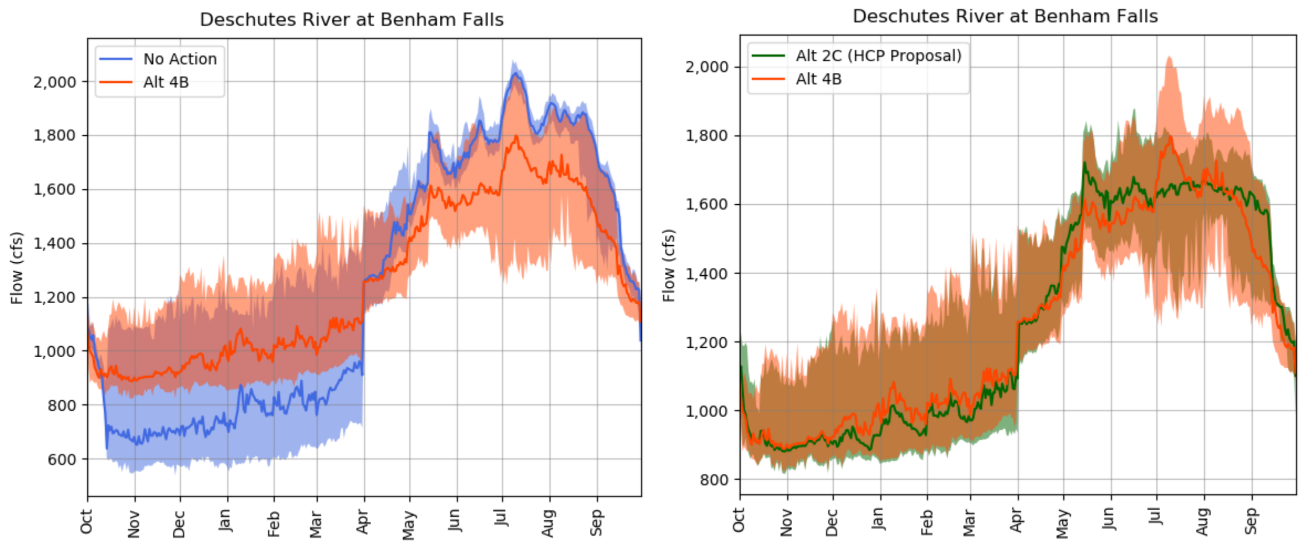

Figure 40. Summary hydrographs of simulated flow in the Deschutes River at Benham Falls. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 41 shows summary hydrographs of the simulated flow in the Deschutes River below Bend for No Action (blue) compared to Alternative 4B (orange-red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). The effects of the increased release from Wickiup Reservoir can be seen in the winter months, when the range and median of flow is larger than for No Action. The summer flows are similar for all three alternatives.

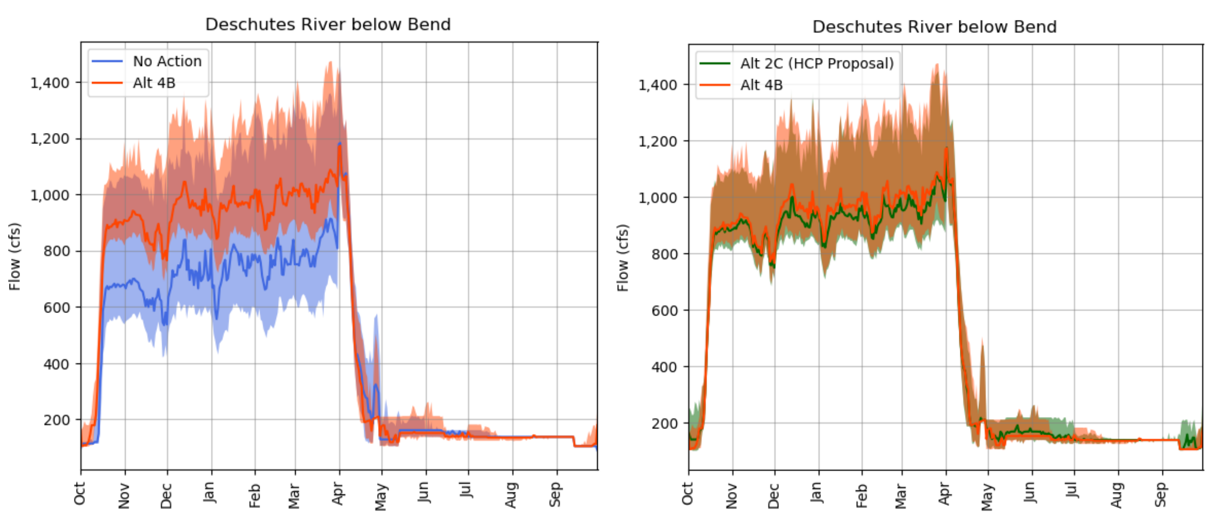

Figure 41. Summary hydrographs of simulated flow in the Deschutes River below Bend. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.4.2. Tumalo Creek

There are no changes in Tumalo Creek flows from No Action to Alternative 4.

4.4.3. Whychus Creek

There are no changes in Whychus Creek flows from No Action to Alternative 4.

4.4.4. Crooked River

The Crooked River has a difference in operations because the uncontracted releases from Prineville Reservoir are protected from diversion for irrigation. This is modeled by requiring NUID to bypass the larger of the minimum flows required by the DRC agreement and the releases out of the uncontracted account. In addition, the Crooked River is affected by the changes in Wickiup Reservoir outflow.

Figure 42 shows the storage and outflow from Prineville Reservoir for No Action and Alternative 4B. In Alternative 4B, the uncontracted flows are assumed to be bypassed by the NUID pumps, similar to Alternative 3C. In addition, higher winter outflows from Wickiup Reservoir reduce the Upper Deschutes supply to NUID, so the district requests additional rental water from Prineville Reservoir. Overall, the effect is slightly different outflows and lower reservoir storage in Alternative 4B.

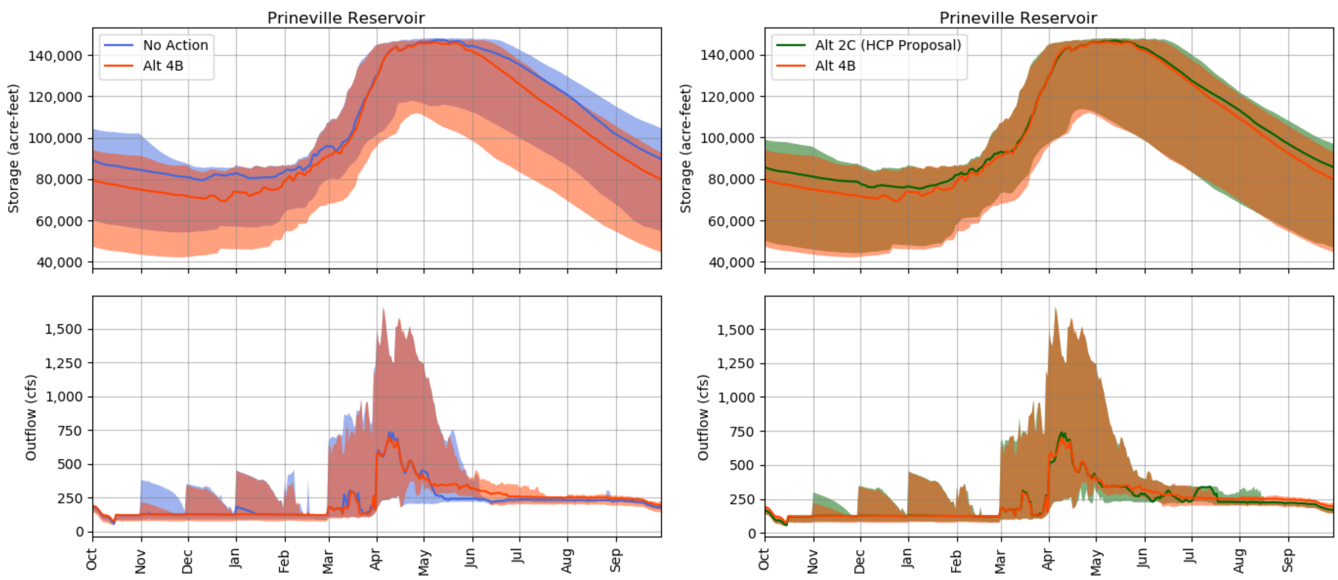

Figure 42. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (orange-red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

The change in Wickiup Reservoir outflows has a much larger effect on NUID shortages in Alterative 4B than in Alternative 3C; in the most extreme years, it uses almost the entire 10,000 acre-feet in the account. The effect on the uncontracted account is a reduction in storage by 28,000 acre-feet, which results in lower outflows from the uncontracted account.

Figure 43 shows summary hydrographs of the simulated flow in the Crooked River at Highway 126 for the No Action alternative (blue) compared to Alternative 4B (red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). The effects of the change in Prineville Reservoir releases can be seen at this location, where minimum flows can be achieved in all modeled years.

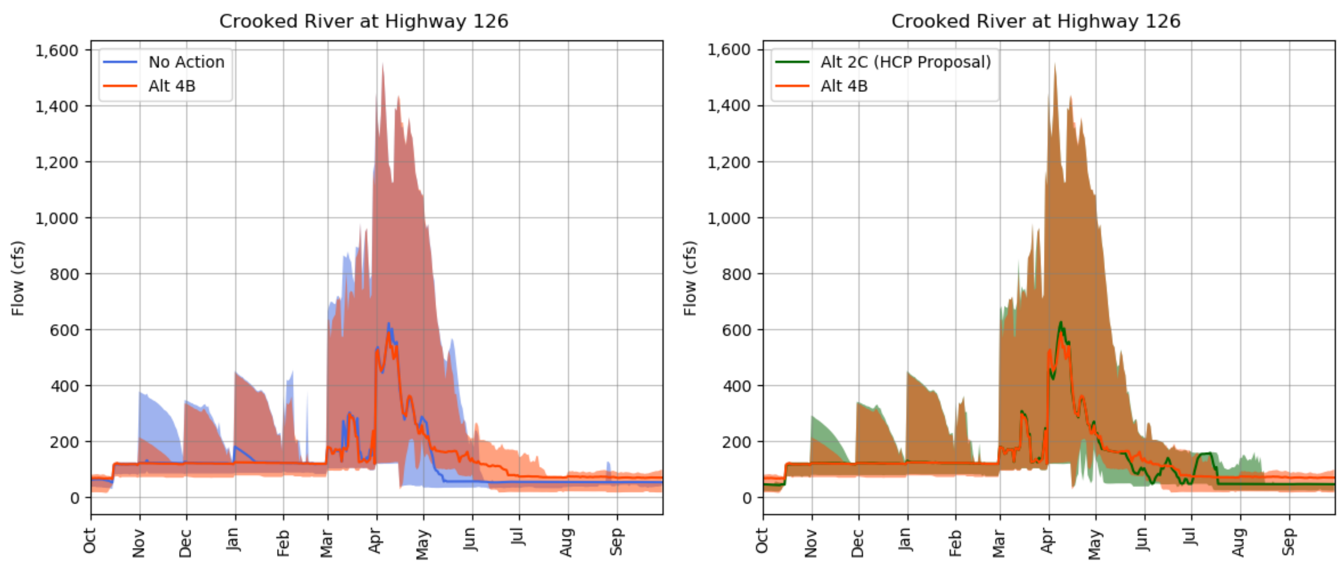

Figure 43. Summary hydrographs of simulated flow in the Crooked River at Highway 126. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

Figure 44 shows summary hydrographs of the simulated flow in the Crooked River below NUID pumps for No Action (blue) compared to Alternative 4B (orange-red), and for Alternative 2C (green) compared to Alternative 4B (orange-red). The effects of the change in Prineville Reservoir releases can be seen at this location, where the minimum flows as described in the Deschutes River Conservancy Bypass Flow agreement were met in all years with additional water supplied from the uncontracted account.

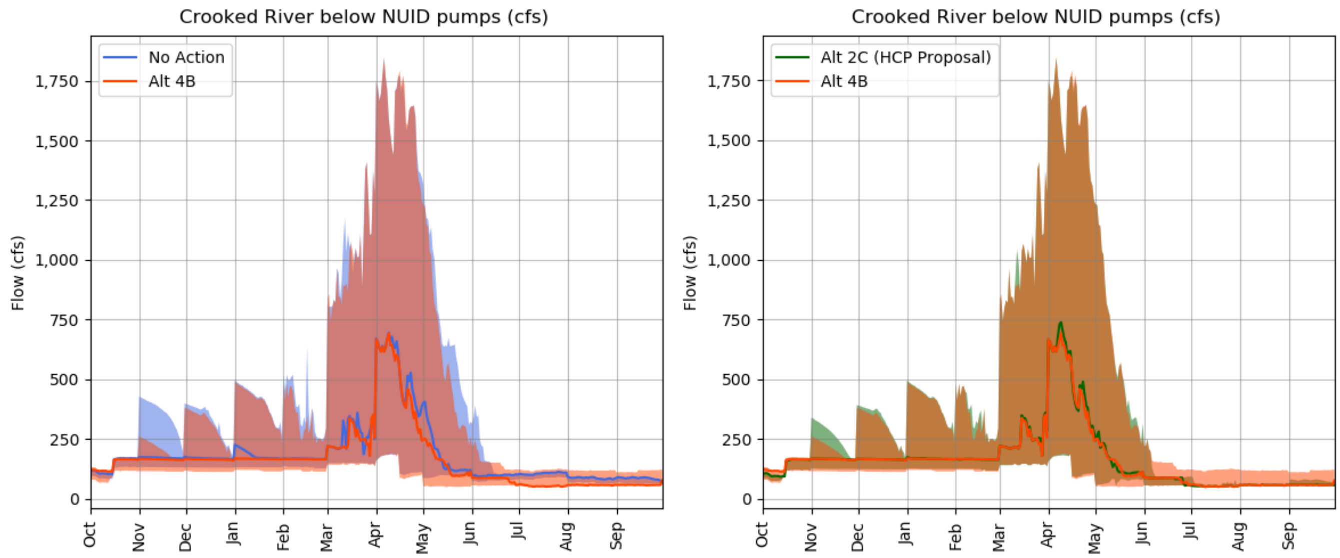

Figure 44. Summary hydrographs of simulated flow in the Crooked River below NUID pumps. The graph on the left shows the No Action alternative (blue) compared to Alternative 4B (red). The graph on the right shows Alternative 2C (green) compared to Alternative 4B (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance.

4.4.5. Irrigation Shortages

Irrigation shortages are calculated every model year and are the difference between the requested demand[11] and the amount of water delivered to each district. Even though there are three implementation phases with different lengths, each phase is modeled for the entire model run period (1980 through 2018) to get the best assessment of potential effects under different hydrologic conditions. The years indicated on the graphs are the years of the run period, not the years of the implementation phase.

The total annual shortages for Alternative 4B are ranked and shown in Figure 45. As for the No Action alternative, NUID has the largest shortage in Alternative 4B because it is the junior water user on the system. This shortage is increased because the non-irrigation season flows out of Wickiup Reservoir reduce the amount of stored water available for NUID. Other districts also experience increased shortages because of the increased non-irrigation season flow requirement, and, in the case of LPID and AID, because their storage allocation in Crane Prairie was smaller than for No Action.

[11] Even if model demand was reduced to respond to hydrologic conditions, the total shortage was still calculated using the full non-reduced annual demand.

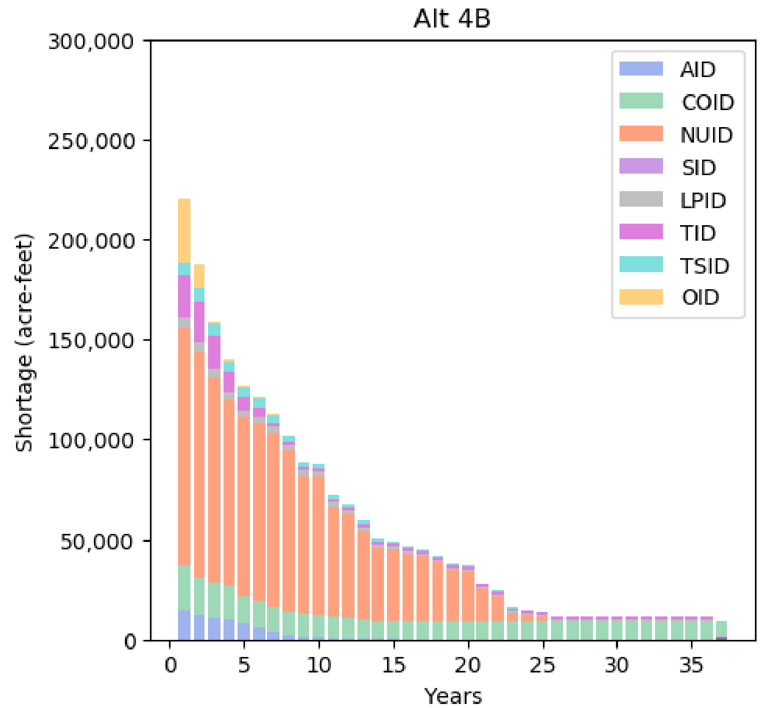

Figure 45. Irrigation shortages for the eight major irrigation districts for Alternative 4

Table 12 shows the minimum, median, and maximum shortages from the total annual diversion for No Action and Alternative 4B. These are also shown as percent of total demand for each entity to illustrate the significance of the shortage.

Table 12. Minimum, median, and maximum shortages for No Action and Alternative 4B, reported both in volume (acre-feet) and as percent of total annual demand

District	No Action Alternative						Alternative 4B					
	Minimum		Median		Maximum		Minimum		Median		Maximum	
	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent	Acre-feet	Percent
AID	-	0%	-	0%	6,800	21%	-	0%	-	0%	14,600	45%
COID	6,000	0.4%	6,200	0.4%	10,700	1%	6,600	0.5%	6600	0.5%	17,500	1%
NUID	-	0%	-	0%	42,100	21%	-	0%	37,500	19%	126,000	64%
SID	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
LPID	300	2%	1,300	8%	2,900	18%	900	6%	900	6%	5,400	34%
TID	1,500	3%	1,500	3%	20,800	39%	1,500	3%	1,500	3%	20,700	39%
TSID	-	0%	1,000	3%	6,400	18%	-	0%	1,000	3%	6,400	18%
OID	-	0%	-	0%	15,600	20%	-	0%	-	0%	31,100	40%

A consequence of using more Wickiup flows for winter releases is there is less water available during the irrigation season for NUID, and therefore, there is more reliance on flow from the Crooked River. Table 13 shows the percent of NUID deliveries that are from the Crooked River in the various stages of the alternative.

Table 13. Maximum, median, and minimum percent contributions of the Crooked River to NUID total delivery

Percent Contribution	No Action	Alternative 3C
Minimum	7%	7%
Median	7%	21%
Maximum	14%	46%

5. Limitations and Uncertainty

River-reservoir models, such as the one used in this study, are designed to replicate current operating criteria along with potential future operating criteria to test potential changes in operations. They use assumptions and simplifications that are required to develop repeatable logic and a suitable test environment for potential future conditions. They are not intended to be predictive in nature, nor are they intended to exactly replicate future operations on a day-to-day basis. Rather, they are intended to be used to understand trends and effects from plausible operations using a range of historical inflow hydrology. Therefore, selecting individual years, months, or days for analysis is not recommended. In addition, statistics from the model output should be used as a guideline for potential future conditions, but it should be recognized that changes to future inflow hydrology or variations in real time operations could affect the performance of those statistics in the future.

The output from the models presented in this analysis show the effects of specific operating criteria on key metrics such as reservoir outflow and storage, irrigation deliveries, and gage flows. The uncertainty in the results is captured in a range of outputs presented in the hydrographs and tables.

Due to the adaptive nature of some of the measures in the EIS, some of the operations described and modeled for this study represent the best assessment of the implementation of those measures. However, as more information is learned through implementation, the real-time operations may be different than the information presented in this report. The operations will be continuously monitored to ensure they remain within the constraints defined in the NEPA analysis.

6. Summary

Four alternatives were simulated for the DBHCP EIS using RiverWare. The major results from all of the alternatives are summarized below.

- Crane Prairie Reservoir can achieve the storage requirements in most years.
- Crescent Lake can achieve minimum flow requirements, resulting in:
  - Higher storage when compared to No Action.
- Higher winter outflows from Wickiup Reservoir can be achieved, resulting in:
  - Higher winter flows below Wickiup Reservoir, at Benham Falls, below Bend, and at Madras. The increase in flows depends on the flow range defined in the scenario.
  - Decreased winter storage in Wickiup Reservoir. This leads to less water available for irrigation releases in the summer.
  - Lower summer flows below Wickiup Reservoir and at Benham Falls, but not below Bend or at Madras. Lower summer flows below Wickiup Reservoir and at Benham Falls are also due to irrigation season maximum outflow limits.
  - Decreased storage in Crescent Lake due to additional live flow needed for downstream diversion.
  - Increased irrigation shortages, with NUID being the most impacted. Since NUID can also receive water from the Crooked River, storage in Prineville Reservoir is also affected.
- The combination of increasing fish and wildlife (uncontracted) releases from Prineville Reservoir during the irrigation season and bypassing the water by the NUID pumps (in other words, "protecting" the water from diversion) results in:
  - Increased use of NUID's rental account. The amount of water needed is dependent on minimum releases from Wickiup Reservoir.
  - Increased shortage to NUID.
  - Decreased uncontracted water in some years. This results in lower releases in the following year.

7. Literature Cited

Parenthetical Reference	Bibliographic Citation
LaMarche 2018	LaMarche, J. 2018., personal communication. Conversation and emails between Jonathan LaMarche, Hydrologist (Oregon Water Resources Department, Salem, Oregon) and Jennifer Johnson, Hydraulic Engineer, (U.S. Bureau of Reclamation, Boise, Idaho). Subject: The seepage processes between Crane Prairie and Wickiup Reservoirs. August 2018.
OWRD 2013	Oregon Department of Water Resources (OWRD). 2013. Agreement between North Unit Irrigation District and Deschutes River Conservancy regarding minimum stream flows in the Crooked River. Attachment 3 to Conserved Water Application CW-75. Signed September 18, 2013.
Reclamation 2017a	Bureau of Reclamation. 2017a. *Development of a Daily Water Management Model of the Deschutes River, Oregon, using RiverWare*. March 2017.
Reclamation 2017b	Bureau of Reclamation. 2017b. *Hydrologic Evaluation of Baseline and Proposed Management of the Deschutes Project for Oregon Spotted Frog (OSF Proposal)*. January 2017.
Reclamation 2017c	Bureau of Reclamation. 2017c. *Unregulated Flows in the Upper Deschutes Basin, Oregon*. October 2017.
Reclamation 2020	Bureau of Reclamation. 2020. DRAFT *Development of 2020 Level Modified Flows for the Deschutes River Basin*. June 2020.

8. Appendix – Logarithmic Graphs of Crooked River Flows

Since a large emphasis is placed on the low flows in the Crooked River, logarithmic graphs were developed to better portray the model output.

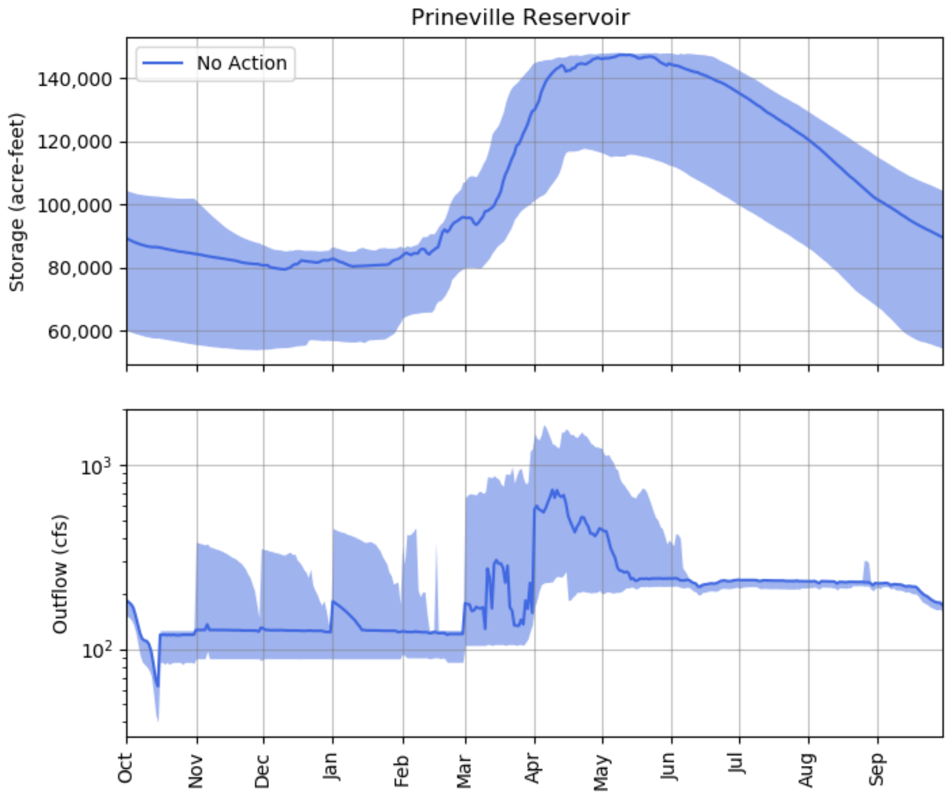

Figure 46. Summary hydrograph of simulated storage (top) and outflow (bottom) from Prineville Reservoir showing the No Action alternative. The dark blue line represents the median and the shaded blue area represents the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

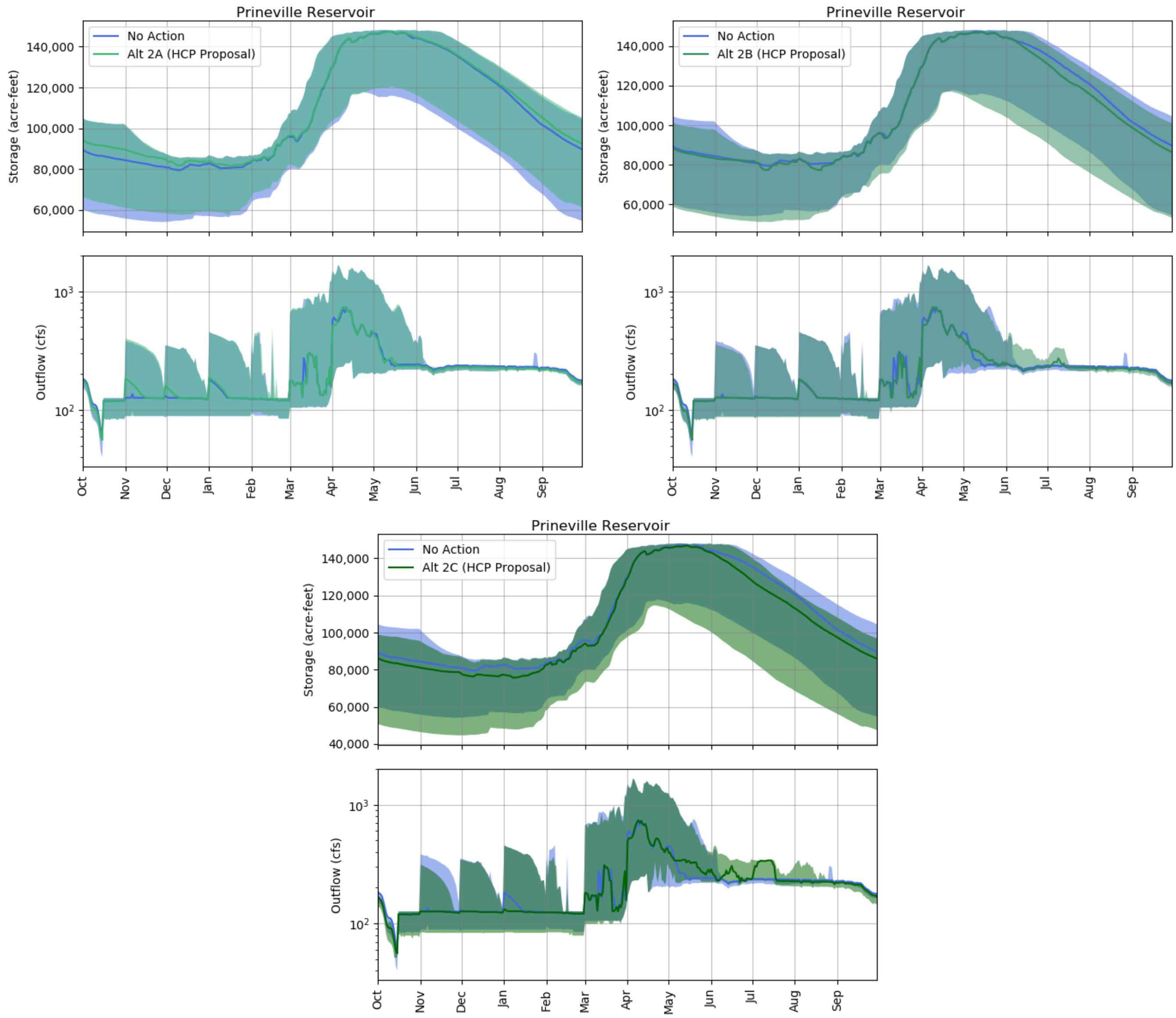

Figure 47. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir. The graphs show the No Action alternative (blue) compared to Alternative 2 (green); Alternative 2A is shown in the top left, 2B in the top right, and 2C at the bottom. The dark blue or green line represents the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

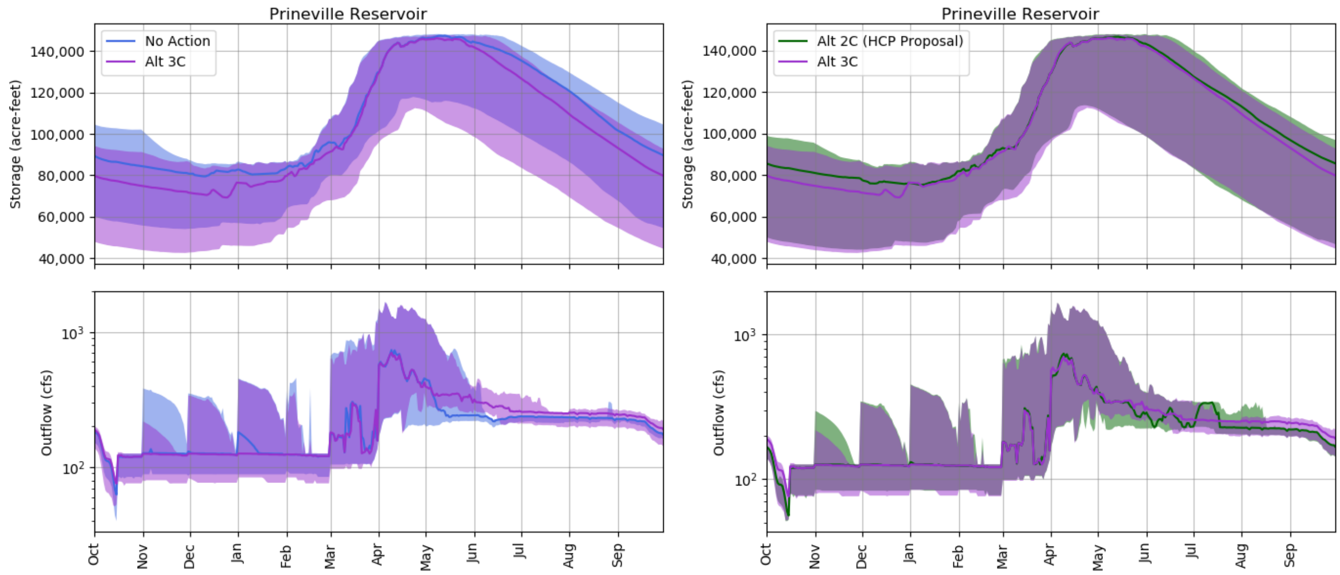

Figure 48. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir. The graphs on the left show the No Action alternative (blue) compared to Alternative 3 (purple). The graphs on the right show Alternative 2 (green) compared to Alternative 3 (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

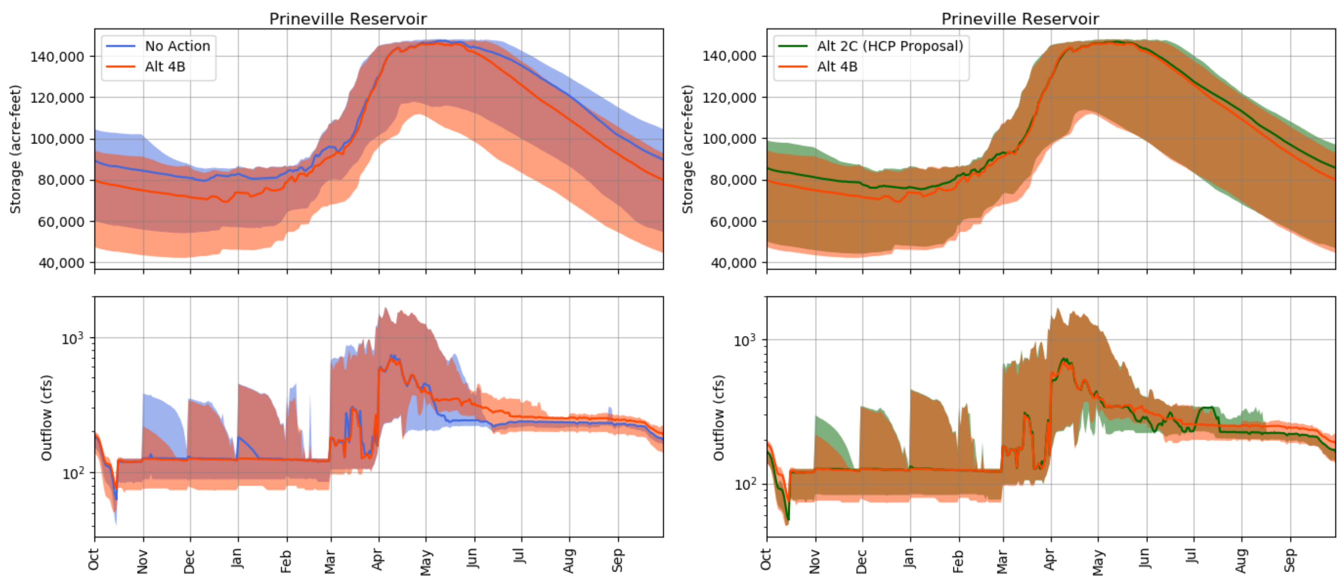

Figure 49. Summary hydrographs of simulated storage (top) and outflow (bottom) from Prineville Reservoir. The graphs on the left show the No Action alternative (blue) compared to Alternative 4 (orange-red). The graphs on the right show Alternative 2 (green) compared to Alternative 4 (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

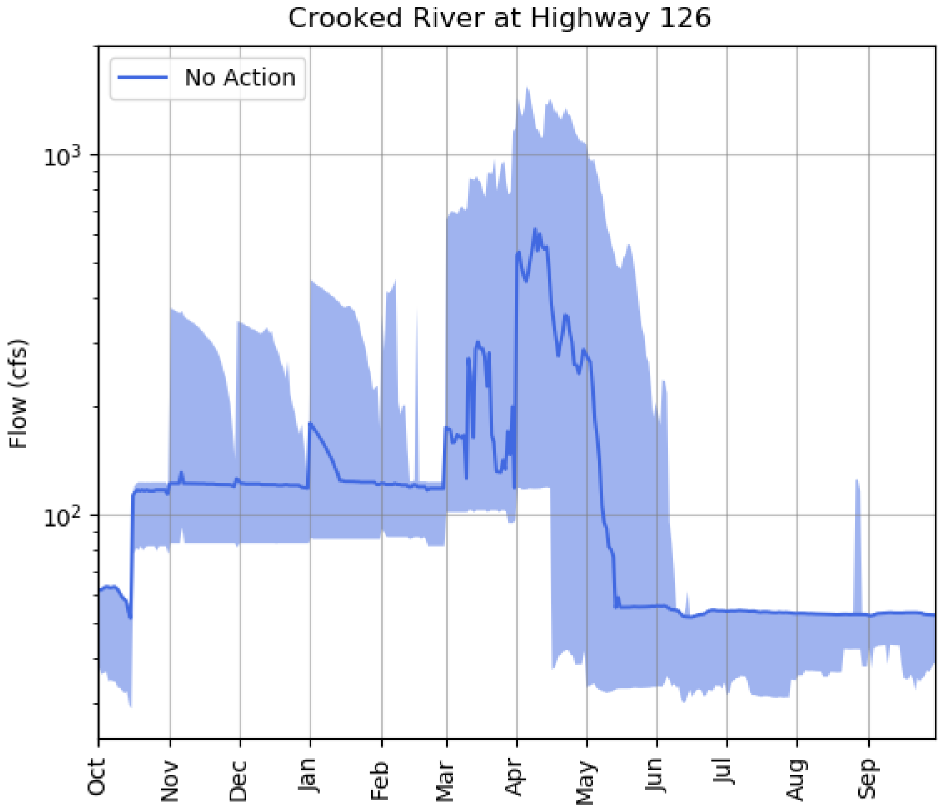

Figure 50. Summary hydrograph of simulated flow in the Crooked River at Highway 126 showing the No Action alternative. The dark blue line represents the median and the shaded blue area represents the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

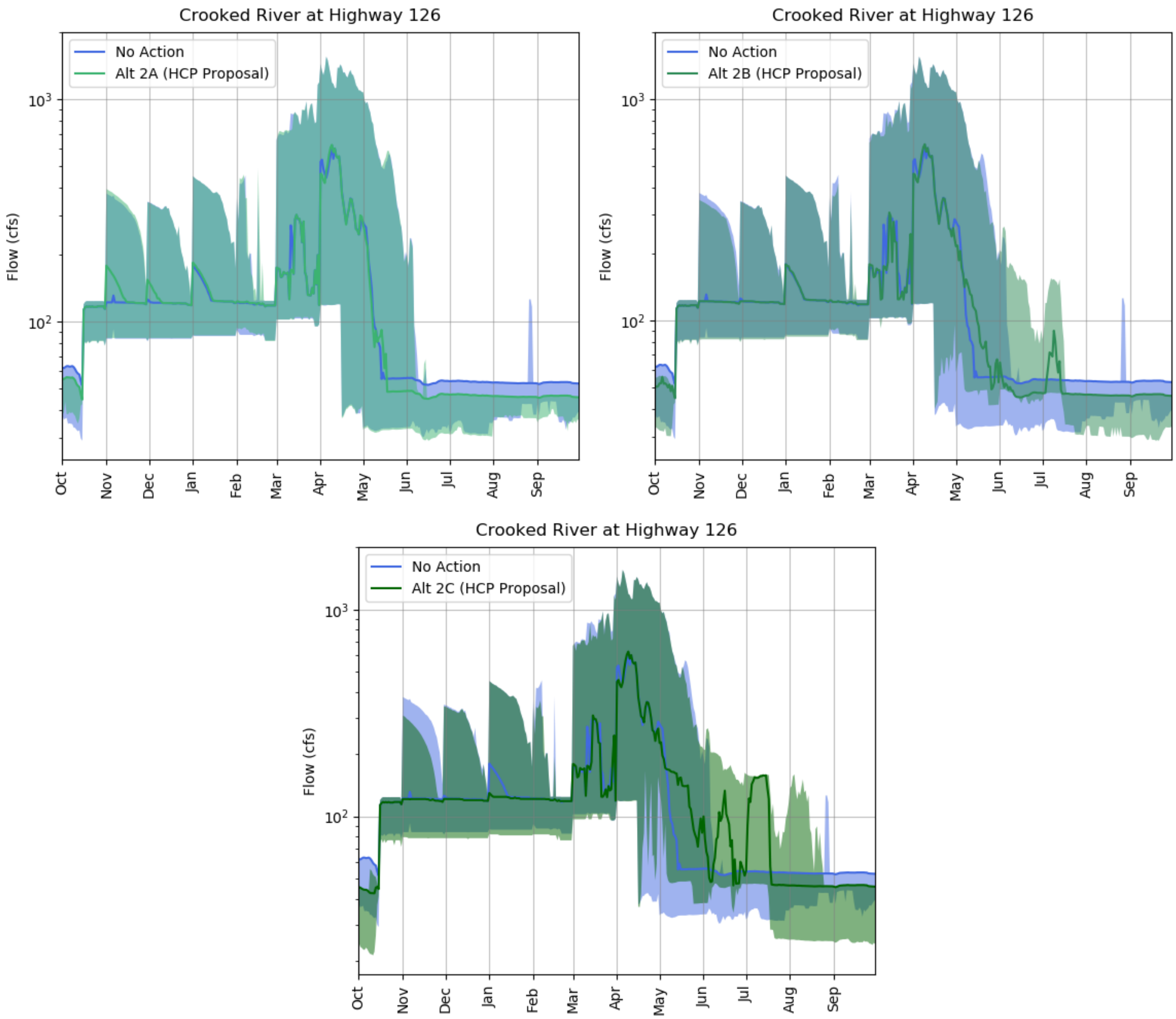

Figure 51. Summary hydrograph of simulated flow in the Crooked River at Highway 126. The graph shows the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom). The dark lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

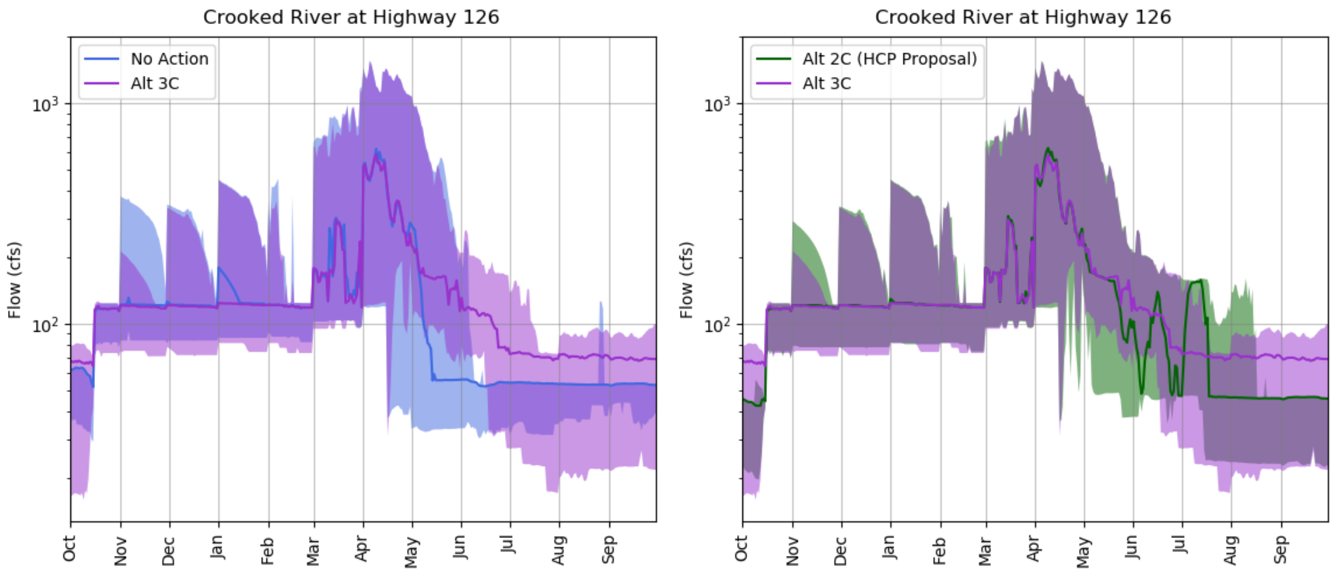

Figure 52. Summary hydrographs of simulated flow in the Crooked River at Highway 126. The graph on the left shows the No Action alternative (blue) compared to Alternative 3 (purple). The graph on the right shows Alternative 2 (green) compared to Alternative 3 (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

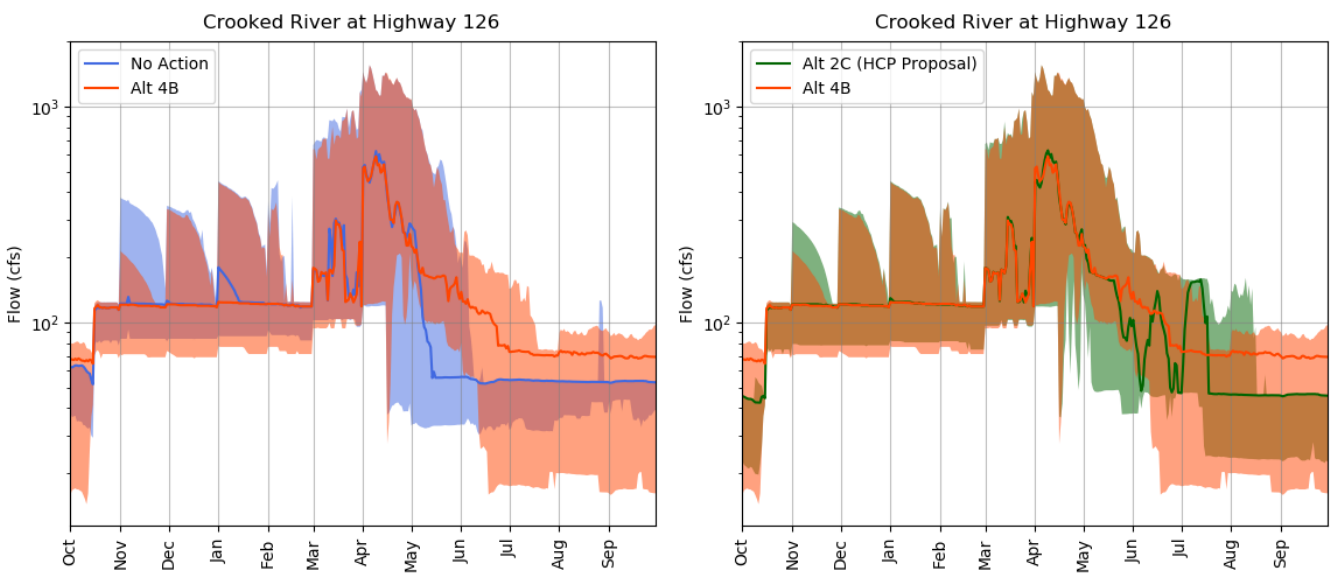

Figure 53. Summary hydrographs of simulated flow in the Crooked River at Highway 126. The graph on the left shows the No Action alternative (blue) compared to Alternative 4 (red). The graph on the right shows Alternative 2 (green) compared to Alternative 4 (red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

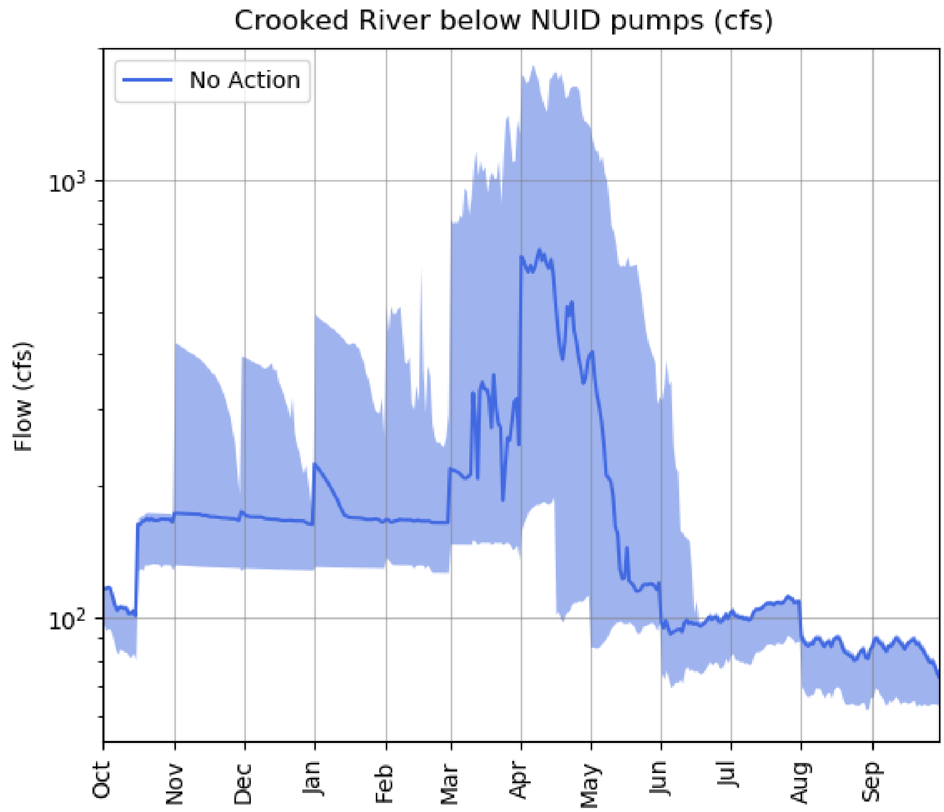

Figure 54. Summary hydrograph of simulated flow in the Crooked River below the NUID pumps showing the No Action alternative. The dark blue line represents the median and the shaded blue area represents the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

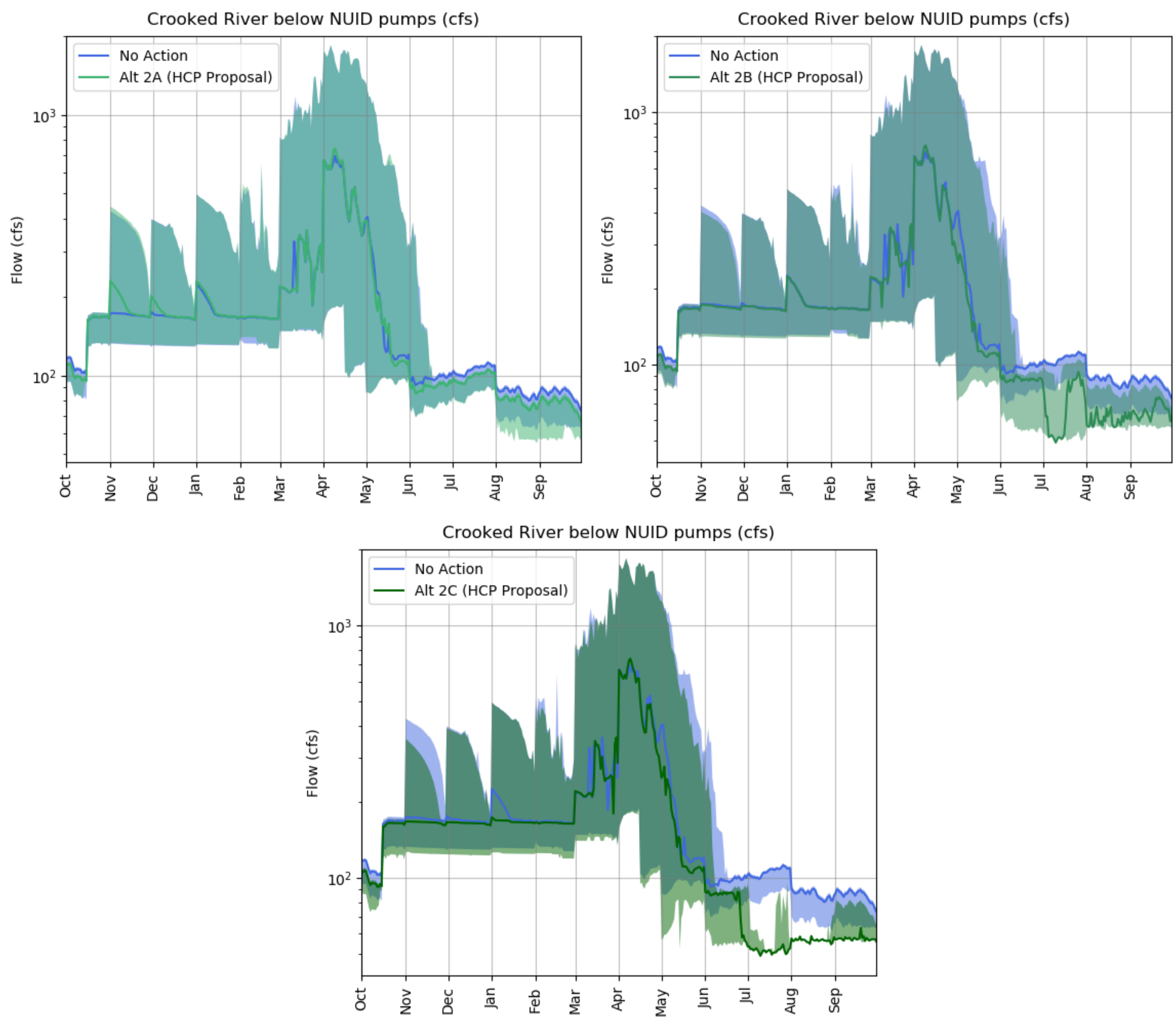

Figure 55. Summary hydrograph of simulated flow in the Crooked River below NUID pumps. The graph shows the No Action alternative (blue) compared to Alternative 2 (green); 2A is shown at the top left, 2B at the top right, and 2C at the bottom. The dark blue and green lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

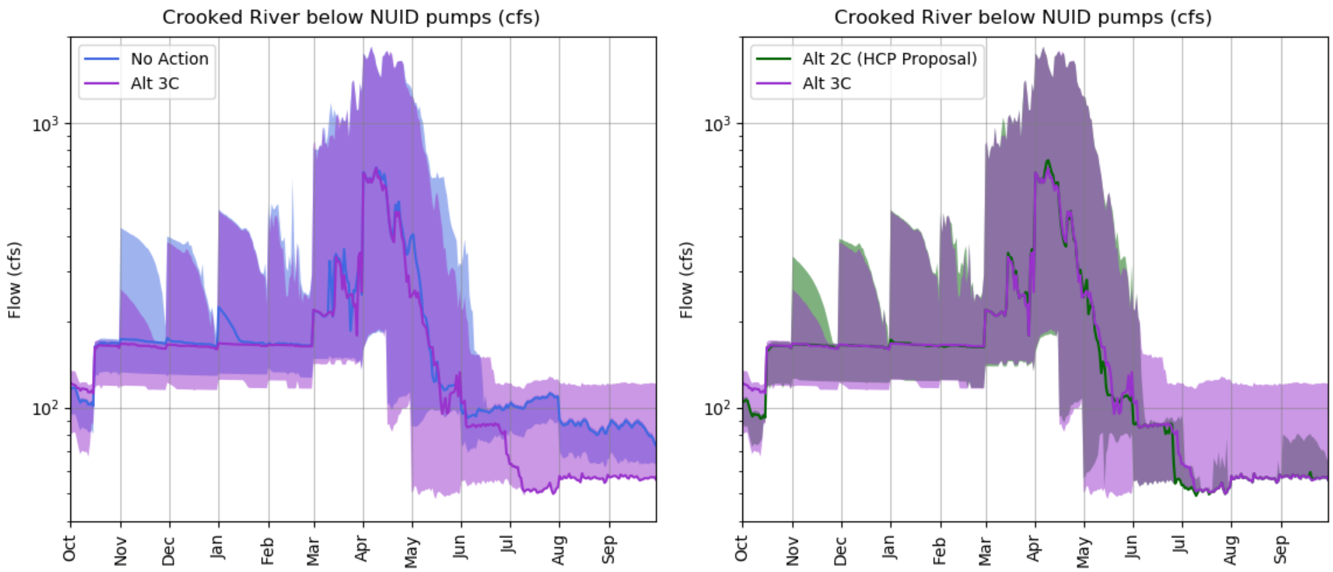

Figure 56. Summary hydrographs of simulated flow in the Crooked River below NUID pumps. The graph on the left shows the No Action alternative (blue) compared to Alternative 3 (purple). The graph on the right shows Alternative 2 (green) compared to Alternative 3 (purple). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.

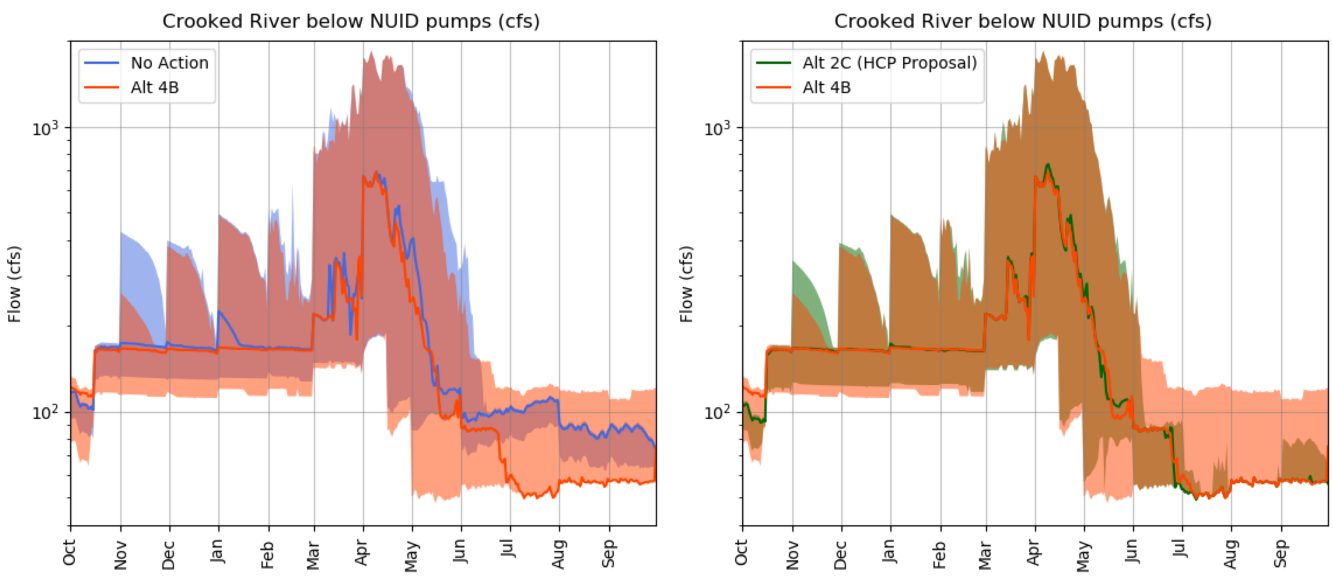

Figure 57. Summary hydrographs of simulated flow in the Crooked River below NUID pumps. The graph on the left shows the No Action alternative (blue) compared to Alternative 4 (red). The graph on the right shows Alternative 2 (green) compared to Alternative 4 (orange-red). The colored lines represent the median and the shaded areas represent the 20 to 80 percent exceedance. The y-axis for flows is shown in logarithmic scale.