

RECLAMATION

Managing Water in the West

Snow Lake Water Release Control Valve Replacement

FINDING OF NO SIGNIFICANT IMPACT AND FINAL ENVIRONMENTAL ASSESSMENT

Chelan County, Washington

PN FONSI 18-1

PN EA 18-1



**U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Columbia-Cascades Area Office
Yakima, Washington**



**U.S. Department of the Interior
U.S. Fish and Wildlife Service
Pacific Region
Leavenworth Fisheries Complex
Leavenworth, Washington**

August 2018

Mission Statements

U.S. DEPARTMENT OF THE INTERIOR

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian tribes and our commitments to island communities.

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Introduction

The Bureau of Reclamation (Reclamation) and the U.S. Fish and Wildlife Service (USFWS) have prepared the *Snow Lake Water Release Control Valve Replacement Environmental Assessment* (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. As co-lead agencies, Reclamation and USFWS evaluated the proposal to replace the existing upper Snow Lake water-release control valve (existing valve) associated with the Leavenworth National Fish Hatchery (LNFH) and evaluated the operations of the new valve as part of the water delivery system.

The LNFH is part of the Leavenworth Fisheries Complex (Complex) that also includes the Entiat National Fish Hatchery and the Winthrop National Fish Hatchery. The Complex was constructed by Reclamation as fish mitigation for the construction of Grand Coulee Dam. Reclamation and the Bonneville Power Administration (BPA) fund the operations and maintenance, while the USFWS owns, manages, and operates the Complex and water delivery system.

Background

The project area extends from upper Snow Lake downstream to the LNFH. The LNFH is located in Chelan County, Washington, approximately 3 miles south of Leavenworth. Upper Snow Lake is approximately 7 miles from the hatchery (see EA Section 1.1). The USFWS-managed water delivery system includes upper and lower Snow Lake, Nada Lake, and the valve outlet works. For a detailed description of the outlet works, see EA Section 1.1.

In 2001, USFWS installed the existing valve, which was designed to release 30 cubic feet per second (cfs); at the time, it was believed sufficient for use by both the LNFH and the Icicle and Peshastin Irrigation District (IPID). The IPID has priority on the water released from upper Snow Lake (up to 750 acre-feet).

Since 2006, the USFWS has consistently operated the existing valve to release up to 50 cfs, (despite design limitations) to comply with the 2006 USFWS Biological Opinion (BiOp). In addition, USFWS has infrequently operated the existing valve to release up to 75 cfs when both LNFH and IPID have needed simultaneous water delivery. As a result of regularly releasing water far in excess of the valve design rates (up to 75 cfs) and exceeding its 10-year service life, the existing valve will be replaced with a new one.

The new valve is designed to release up to 88 cfs, and simultaneous delivery would not exceed 80 cfs (50 cfs to LNFH and 30 cfs to IPID). The new valve will be operated in compliance with the 2017 National Marine Fisheries Service (NMFS) BiOp in cooperation with IPID. The NMFS BiOp Term and Condition 2j requires the valve to be replaced by the end of 2019. The NMFS BiOp also requires releases of up to 50 cfs of supplemental flow from August 1 through September 30 from the Snow Lake and Nada Lake reservoirs (Term and Condition 2c). This supplemental flow improves instream flow conditions in Icicle Creek for the benefit of at-risk species, to the extent possible, during the irrigation season.

Alternatives

The EA analyzed the following no action alternative and two proposed action alternatives:

Alternative 1: No Action

Under the No Action Alternative (EA Section 2.1), Reclamation would not fund the valve replacement, and the USFWS would continue to operate the existing LNFH water delivery system until the valve malfunctions or fails, resulting in interrupted water delivery to LNFH and IPID. When the existing valve malfunctions or fails, the guard gate would be closed so no water would be released through the upper Snow Lake water-release control valve. Reclamation and USFWS would notify NMFS and would be required to reinstate consultation under Section 7 of the Endangered Species Act.

Alternative 2: Water Release Control Valve Replacement with Helicopter Flights and No Camping

Under Alternative 2 (EA Section 2.2), Reclamation would fund the design and installation of a new valve. A helicopter would be used to transport the new valve from LNFH to the existing Snow Lake Helipad Number 2. Helicopters would fly daily to transport construction material, equipment, and crews from LNFH to Snow Lake Helipad Number 2. Helipad Number 3 would serve as a secondary site in case of an emergency or unavailability of the primary site for unforeseeable reasons. About 30 roundtrip helicopter flights would be required between LNFH and the helicopter landing site over the 7- to 21-day project.

Alternative 3: Water Release Control Valve Replacement with Helicopter Flights and Camping

Alternative 3 (EA Section 2.3) would be the same as Alternative 2 except construction crews would establish a basecamp on USFWS land and hike 0.4 to 0.6 miles to the construction site. About 15 roundtrip helicopter flights would be required between LNFH and the helicopter landing site over the 7- to 21-day project compared to the 30 roundtrip flights required in Alternative 2.

Decision and Finding of No Significant Impact

Based upon the EA and considering public comments, Reclamation and USFWS have determined that implementing Alternative 3 with about 15 roundtrip helicopter flights will not significantly affect the quality of the human environment.

No environmental effects meet the definition of significance in context or intensity as defined at 40 CFR 1508.27; therefore, an environmental impact statement (EIS) is not required for this proposed action. This finding is based on the analysis in the EA and consideration of the context and intensity as summarized below:

Context

The project is a site-specific maintenance action directly involving about 30 acres of land administered by the USFWS. The study area extends from upper Snow Lake downstream to the LNFH.

Intensity

The following discussion is organized around the 10 significance criteria described in 40 CFR 1508.27, which were incorporated into the resource analysis and issues considered in the EA:

1. Impacts may be both beneficial and adverse.

The proposed action will affect resources described in the EA and summarized below in Table 1. Best Management Practices (BMPs) will be used to reduce impacts on resources and are incorporated into the design of Alternative 3.

2. The degree to which the selected alternative will affect public health or safety, or a minority or low-income population.

The proposal will have no significant impacts on public health or safety. The percentage of minority and low-income populations residing in Chelan County are not more than 50 percent nor meaningfully greater than those in the State of Washington; therefore, the requirements of Executive Order 12898 do not apply.

Table 1. Summary of impacts on resources.

| Resources | EA Section | Overall Effects |
|-----------------------------------|-------------------|--|
| Cultural and Historic Resources | 3.1 | No adverse effect to the LNFH Snow Lake Tunnel, which is listed on the National Register of Historic Places. No other historic properties in the staging, work, or campsite areas. |
| Fish | 3.2 | Beneficial effects due to an increase in flows in Snow and Icicle creeks that will lower stream temperatures. |
| Noise | 3.3 | Minor, short-term annoyance, but not significant due to limits on the number of flights, coordination of flight paths, and timing of the action. Noise from construction would be minimal. |
| Threatened and Endangered Species | 3.4 | <p>2017 NMFS BiOP</p> <ul style="list-style-type: none"> • Upper Columbia River steelhead (<i>Oncorhynchus mykiss</i>) – not likely to adversely affect (beneficial effects) • Upper Columbia River spring Chinook salmon (<i>Oncorhynchus tshawytscha</i>) – not likely to adversely affect (beneficial effects) <p>2018 USFWS Letter of Concurrence (LOC)</p> <ul style="list-style-type: none"> • Wolverine (<i>Gulo luscus</i>, candidate species) – not likely to jeopardize the continued existence • Canada Lynx (<i>Lynx canadensis</i>) – not likely to adversely affect • Gray Wolf (<i>Canis lupus</i>) – not likely to adversely affect • Grizzly Bear (<i>Ursus arctos horribilis</i>) – not likely to adversely affect • Northern Spotted Owl (<i>Strix occidentalis caurina</i>) and their DCH – not likely to adversely affect • Bull Trout (<i>Salvelinus confluentus</i>) and their DCH –not likely to adversely affect (beneficial effects) |
| Water Resources: Hydrology | 3.5.1 | Minor long-term beneficial effect: releases up to 80 cfs will be possible, allowing LNFH and IPID to withdraw water simultaneously. |
| Water Resources: Water Quality | 3.5.2 | No construction effects due to BMPs and minor long-term beneficial effects to downstream dissolved oxygen (DO), hydrogen ion concentration (pH), and temperatures. |
| Wildlife | 3.6 | Minor, short-term impacts due to noise should the species be present during construction. However, effects will be minimized by timing of the action and BMPs. |
| Wilderness | 3.7 | Minor, short-term impacts on sight, sound, and solitude. However, effects will be minimized by timing of the action and BMPs. |

3. Unique characteristics of the geographic area.

There are no parklands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas that will be affected by the proposed action. As described in the EA, helicopter flights and construction activities will cause minor, short-term impacts on sight, sound, and solitude of people recreating in the Snow Lake Zone of the Alpine Lakes Wilderness Area (see EA Appendix C). Alternative 3 has been selected as the best way to minimize impacts on wilderness values by limiting the number of helicopter flights and by timing the action.

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

Reclamation and the USFWS provided public notification and involvement by posting the draft EA and revised EA on each agency's website and by mailing it to representatives of other Federal agencies, State and local governments, Indian Tribes, public and private organizations, and individuals. Based on the public comments received (see EA Appendix A), the effects of the proposed action on the quality of the human environment are not likely to be highly controversial, as defined in 43 CFR 46.30¹.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

There are no predicted effects on the human environment considered highly uncertain or involving unique or unknown risks. The upper Snow Lake water-release control valve has been in use since 1939, and no change in water rights or water storage contracts will result from continued release from the water-release control valve. Reservoir release operations are expected to continue in compliance with the 2017 NMFS BiOp and existing IPID water storage contract.

6. The action will not establish a precedent for future actions with significant effects and will not represent a decision in principle about a future consideration.

The action is not precedent-setting. The LNFH and valve have been operated for 79 years, and the original valve was replaced in 2001. Alternative 3 will not authorize additional releases above the current 80 cfs.

¹ Controversial refers to circumstances where a substantial dispute exists as to the environmental consequences of the proposed action and does not refer to the existence of opposition to a proposed action, the effect of which is relatively undisputed (43 CFR 46.30).

7. Whether the action is related to other actions that are individually insignificant, but cumulatively significant.

Section 4 of the EA analyzed the degree to which cumulatively significant impacts could occur as a result of the alternatives, while Section 3 described the impacts of past and present actions that have occurred or are ongoing in the study area. As shown in the EA, Section 4.2, Alternative 3 will not create cumulative impacts on cultural resources, fish, threatened and endangered species, wildlife, or wilderness. Cumulative impacts on water resources and noise will be insignificant.

8. The degree to which the action may adversely affect sites, districts, buildings, structures, and objects listed in, or eligible for, listing in the National Register of Historic Places (National Register).

Reclamation and the USFWS consulted with the State Historic Preservation Officer (SHPO) of the Washington Department of Archaeology and Historic Preservation (DAHP), the Confederated Tribes of the Colville Reservation (Colville Tribes), and the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation) regarding effects of the action alternatives on cultural resources including historic properties and Indian sacred sites. While the tunnel is a contributing resource to the National Register's LNFH Historic District, DAHP concurred that there will be no adverse effects to this historic property. Because the original Snow Lake Tunnel outlet valve was replaced in 2001, the replacement of the current valve does not affect an original feature of the historic property. Likewise, there were no effects in the staging areas, work areas, or campsites because no historic properties are present. The DAHP concurred with the finding of "no adverse effect" for Alternative 3, and no mitigation or further work is required (see EA Appendix D).

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 Endangered Species Act of 1973.

The proposed action is a requirement of the 2017 NMFS BiOp and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation to avoid take of listed species. Reclamation consulted with NMFS and USFWS, and both agencies concur with the finding of "may affect, not likely to adversely affect" for species described in Section 3.4 of the final EA.

10. Whether the action threatens a violation of Federal, State, local, or Tribal law, regulation or policy imposed for the protection of the environment.

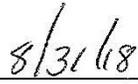
Alternative 3 will not violate any Federal, State, local, or Tribal law, regulation, or policy imposed for the protection of the environment; the action agencies are required to comply with the 2017 NMFS BiOp and Endangered Species Act.

The Colville Tribes and the Yakama Nation were consulted, and these Tribes did not identify any historic properties, Indian Trust Assets, or Indian sacred sites that will be affected by Alternative 3.

Approved:



Dawn Wiedmeier
Area Manager, Columbia-Cascades Area Office
Bureau of Reclamation, Pacific Northwest Region
Yakima, Washington



Date



Dave Irving
Complex Manager, Leavenworth Fisheries Complex
U.S. Fish and Wildlife Service, Pacific Region
Leavenworth, Washington



Date

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Managing Water in the West

Snow Lake Water Release Control Valve Replacement

FINAL ENVIRONMENTAL ASSESSMENT **Chelan County, Washington**

PN EA 18-1



U.S. Department of the Interior
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Cover Photograph: *Existing* butterfly valve and valve support at the Snow Lake Water Control Structure.

Acronyms and Abbreviations

| | |
|-------------------|--|
| ALWA | Alpine Lakes Wilderness Area |
| BiOp | Biological Opinion |
| BMP | Best Management Practices |
| BPA | Bonneville Power Administration |
| Colville Tribes | Confederated Tribes of the Colville Reservation |
| cfs | cubic feet per second |
| Complex | Leavenworth Fisheries Complex |
| DAHP | Washington Department of Archaeology and Historic Preservation |
| dBA | A-weighted decibel |
| DCH | Designated Critical Habitat |
| DO | Dissolved Oxygen |
| EA | Environmental Assessment |
| Ecology | Washington State Department of Ecology |
| EPA | Environmental Protection Agency |
| ESA | Endangered Species Act |
| FWCA | Fish and Wildlife Coordination Act |
| Icicle Strategy | Icicle Workgroup Water Resource Management Strategy |
| IPID | Icicle and Peshastin Irrigation Districts |
| ITAs | Indian Trust Assets |
| LNFH | Leavenworth National Fish Hatchery |
| MIS | Management Indicator Species |
| MRA | Minimum Requirements Analysis |
| National Register | National Register of Historic Places |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| NMFS | National Marine Fisheries Service |
| NTU | Nephelometric Turbidity Units |
| PCBs | Polychlorinated Biphenyls |
| PDSI | Palmer Drought Severity Index |
| PEIS | Programmatic Environmental Impact Statement |
| pH | hydrogen ion concentration |

| | |
|----------------|---|
| Reclamation | Bureau of Reclamation |
| RM | River Mile |
| TMDL | Total Maximum Daily Load |
| UCR | Upper Columbia River |
| USFS | U.S. Forest Service, Okanogan-Wenatchee National Forest |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| WDFW | Washington Department of Fish and Wildlife |
| Wilderness Act | Wilderness Act of 1964 |
| Yakama Nation | Confederated Tribes and Bands of the Yakama Nation |

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1 INTRODUCTION

The Bureau of Reclamation (Reclamation) and the U.S. Fish and Wildlife Service (USFWS) have prepared this *Snow Lake Water Release Control Valve Replacement Environmental Assessment* (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. As co-lead agencies, Reclamation and USFWS evaluated the proposal to replace the existing upper Snow Lake water-release control valve (existing valve) associated with the Leavenworth National Fish Hatchery (LNFH) and evaluated operations of the new valve as part of the water delivery system.

The LNFH is part of the Leavenworth Fisheries Complex (Complex) that also includes the Entiat National Fish Hatchery and the Winthrop National Fish Hatchery. The Complex was constructed by Reclamation as fish mitigation for the construction of Grand Coulee Dam. Reclamation and the Bonneville Power Administration fund the operations and maintenance, while the USFWS owns, manages and operates the Complex and water delivery system.

1.1 Project Area

Figure 1-1 depicts the project/study area and follows the water released (controlled by an outlet valve) through a tunnel from upper Snow Lake to Nada Lake and into Snow Creek. Snow Creek is a tributary that enters Icicle Creek at river mile (RM) 5.4, approximately 1 mile above the LNFH’s intake system. The affected environment extends from upper Snow Lake downstream to the LNFH. LNFH is located approximately 3 miles south of Leavenworth, Washington, in Chelan County. Upper Snow Lake is located approximately 7 miles from the LNFH.

The valve at upper Snow Lake (Figure 1.1) needs to be replaced. Snow Lake is a USFWS inholding surrounded by the Alpine Lakes Wilderness Area (ALWA) managed by the U.S. Forest Service (USFS). USFWS has control over land use and the operations and maintenance of the LNFH water delivery system, including upper and lower Snow Lake, Nada Lake, and the valve outlet works.

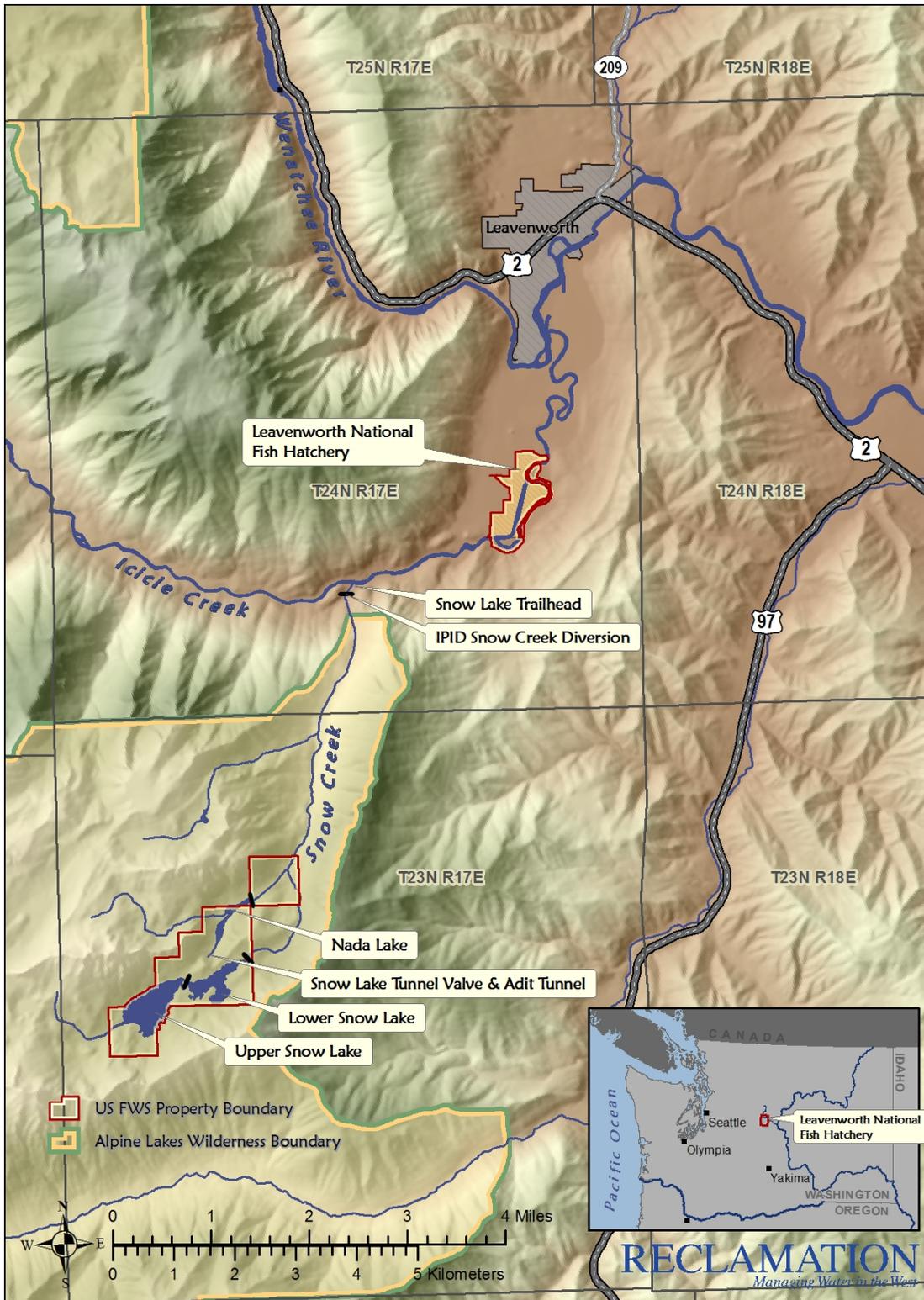


Figure 1-1. Overview of the project area. The red outline associated with upper and lower Snow Lake and Nada Lake delineates the USFWS’s inholding. These lands are surrounded by but not a part of ALWA.

As depicted in Figure 1-2, the upper Snow Lake outlet works consist of the following:

- A tunnel excavated approximately 2,400 feet through the hill to intersect with upper Snow Lake.
- A concrete plug approximately 150 feet upstream from the outlet end of the tunnel to block the tunnel so water flows into the 30-inch outlet pipe.
- A guard gate (operated entirely open or entirely closed) located immediately downstream from the concrete plug.
- A concrete wall that seals the pipeline tunnel just upstream from the existing butterfly valve (located about 130 feet downstream from the guard gate).
- A second tunnel located adjacent to the tunnel containing the 30-inch pipe provides access to the guard gate.

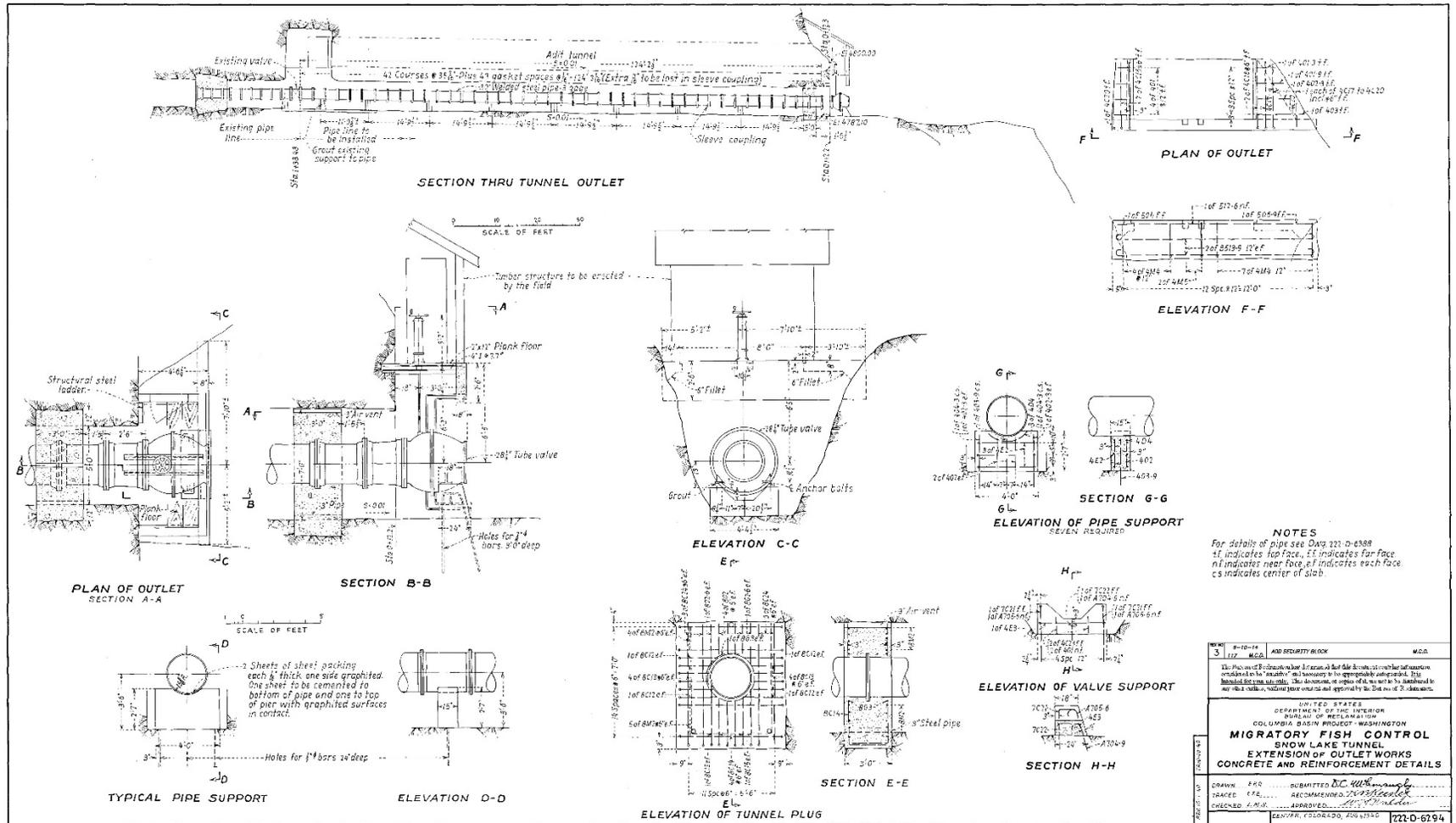


Figure 1-2. Project area outlet works at Snow Lake (specifications for the modification of Snow Lake valve. (Denver, Colorado, August 1940).

1.2 Operation and Maintenance

Precipitation and runoff is stored in upper and lower Snow Lake and Nada Lake. Water is released from upper Snow Lake through the existing butterfly valve from July to October. However, if the water surface elevation of upper Snow Lake is high enough, water flows over the small dam and into lower Snow Lake (Figure 1-1). Water flows over a steep boulder field that drains into Nada Lake and releases into Snow Creek, which flows into Icicle Creek (Figure 1-1).

USFWS employees hike up to the Snow Lake site to perform annual maintenance and manual operation of both the butterfly valve and gate valves. An employee turns the valves on/off and adjusts them to meet the water needs of LNFH and the Icicle and Peshastin Irrigation District (IPID).

The original Snow Lake valve (tube valve) was installed in 1939 and operated for 62 years. The tube valve was designed to release more than 70 cubic feet per second (cfs) at full pool (Reclamation, 1938). The existing valve was installed in 2001 and designed to release 30 cfs. Although smaller, it was believed to be sufficient to allow use by both the LNFH and IPID, which has priority use of the first 750 acre-feet of the water released from upper Snow Lake.

Despite the design limitations, the USFWS has consistently operated the existing valve to release up to 50 cfs since 2006 to ensure compliance with the 2006 USFWS Biological Opinion (BiOp). Term and Condition 24 of the 2006 BiOp requires USFWS to release the equivalent of 50 cfs from Snow Lake between July 20 and September 30. At times, USFWS has operated the valve to release up to 75 cfs, when both LNFH and IPID have needed simultaneous water delivery. Because of increased wear and tear from regularly releasing water in excess of the valve design and exceeding its service life of 10 years, the existing valve needs to be replaced.

The new valve would be operated in compliance with the 2017 National Marine Fisheries Service (NMFS) BiOp and the USFWS final consultation document for the valve replacement, and in cooperation with IPID. The 2017 NMFS BiOp Term and Condition 2j requires the valve to be replaced by the end of calendar year 2019. The 2017 NMFS BiOp also requires continued releases of up to 50 cfs of supplemental flow from August 1 through September 30 from the Snow Lake Nada Lake reservoirs (Term and Condition 2c). This supplemental flow improves instream flow conditions in Icicle Creek for Endangered Species Act (ESA) compliance.

IPID uses parts of LNFH's water delivery system to deliver irrigation water. This water is released from upper Snow Lake into Snow Creek via Nada Lake. It is then diverted from Snow Creek about a quarter-mile upstream from the confluence of Snow Creek and Icicle Creek. The 1941 contract between the United States and IPID allows the district to release up to 30 cfs from upper Snow Lake until its annual allowance of 750 acre-feet is exhausted during the irrigation season, typically between July and October.

1.3 History and Documents Related to LNFH Water Delivery System

While there are many past, present, and reasonably foreseeable actions potentially related to the operation of the LNFH with respect to the proposed Federal action analyzed in this EA, the co-lead agencies have identified the following information to assist the reader in understanding the issues:

- In 1930, Icicle and Peshastin Irrigation Districts acquired a deed from the State of Washington to inundate the bed and shores of Snow Lake (Reclamation, 1941).
- In 1938, LNFH construction started for the purpose of propagating and helping restore already depleted salmon runs in the Columbia River system. Icicle Creek runs adjacent to LNFH and the water from this creek was diverted for salmon holding and rearing ponds.
- In 1939, the Snow Lake valve installation was completed. The tube valve was designed to release over 70 cfs at full pool (Reclamation, 1938).
- In 1939, Reclamation acquired land adjacent to Snow Lake and Nada Lake. These lands are surrounded by, but are not a part of, the ALWA.
- In 1941, a contract was signed between the United States and IPID relating to water storage facilities on upper and lower Snow Lake and Nada Lake. To assure adequate water supply for LNFH, while maintaining instream flows in Icicle Creek and for private irrigation uses, a supplementary water supply of approximately 16,000 acre-feet was needed. Under this contract, USFWS was allotted a 16,000 acre-feet water right, while IPID was allotted a 750-acre-feet water storage contract with a maximum release rate of 30 cfs.
- In 1942, the State of Washington issued a water right certificate to Reclamation for storing 16,000 acre-feet of water in upper and lower Snow Lake and Nada Lake.
- In 1945, USFWS took over funding of operations and maintenance for the LNFH, including the upper Snow Lake valve.
- In 1949, a Memorandum of Agreement was signed between Reclamation and the USFWS transferring custody and responsibility for operations and maintenance of the complex to USFWS (Reclamation, 1949).
- In 1976, Congress passed Public Law 94-357 designating the ALWA and specifying that the USFS would administer certain lands of the Mount Baker-Snoqualmie and Wenatchee National Forests as wilderness, subject to valid existing rights. Ownership and management of the LNFH lands in Township 23 N, Range 17 E, remained with the USFWS.
- In 1990, USFS issued the Region 6 Wenatchee Land and Resource Management Plan for the Wenatchee National Forest (USFS, 1990). This management program allows for use and protection of the Wenatchee National Forest resources, fulfills legislative requirements, and addresses local, regional, and national issues and concerns. The USFS is currently updating this plan, which has not been finalized.

- In 1994, Reclamation reassumed responsibility for funding operations and maintenance of the LNFH complex.
- In 2001, the USFWS replaced the upper Snow Lake water-release control valve with a butterfly valve. The butterfly valve has a design capacity of 30 cfs and a design life of 10 years.
- In 2006, the USFWS issued a BiOp for operations and maintenance of the LNFH. Term and Condition 24 of this BiOp required the USFWS to release the equivalent of 50 cfs from Snow Lake Reservoir between July 20 and September 30.
- In 2006, the Wenatchee Watershed Management Plan was issued by the Water Resource Inventory Area 45 Planning Unit to address a 20-year planning horizon (through 2025) and incorporate an adaptive management focus to allow flexibility and integration of new information into the Plan’s current recommendations and actions (WRIA 2006).
- In 2011, NMFS issued a BiOp for operations and maintenance of the LNFH that required USFWS to release approximately 50 cfs from the Snow Lake Reservoir from early July through September 30 every year.
- In 2012, Chelan County and Washington Department of Ecology’s (Ecology) Office of Columbia River convened the Icicle Workgroup to find collaborative solutions for water management within the Icicle Creek Watershed. The Icicle Workgroup has developed a strategy for water resource management (Icicle Strategy). The draft Icicle Strategy includes a list of projects addressing issues identified in the Guiding Principles. The *Icicle Strategy Draft Programmatic Environmental Impact Statement* was released to the public in June 2018.
- In 2015, NMFS issued a BiOp (NMFS, 2015) that required USFWS to release water from Snow Lake Reservoir to provide up to 50 cfs of supplemental flow (consistent with the 2006 USFWS BiOp and the 2011 NMFS BiOp) in August and September.
- In 2017, NMFS issued a BiOp for the operations and maintenance of LNFH that required completion of certain water management activities by 2023 to achieve flow objectives for the benefit of listed species. The 2017 NMFS BiOp requires USFWS to release 50 cfs from August 1 to September 30 under Term and Condition 2c. It also requires Reclamation to replace the valve at Snow Lake by December 31, 2019, under Term and Condition 2j. The 2017 NMFS BiOp supersedes the 2015 NMFS BiOp.
- In 2018, USFWS issued a letter of concurrence on replacement of the upper Snow Lake water-release control. This letter stated that Alternative 3 “may affect, not likely to adversely modify” designated critical habitat of the Northern spotted owl (*Strix occidentalis caurina*), Bull Trout (*Salvelinus confluentus*), or Upper Columbia River (UCR) steelhead (*Oncorhynchus mykiss*).

1.4 Proposed Action

Reclamation proposes to replace the existing valve at upper Snow Lake. The engineering design has been completed for the replacement valve. The proposed knife valve has a release capacity of up to 88 cfs and an expected service life of 50 years.

USFWS proposes to operate the new valve to be able to release up to 80 cfs downstream to LNFH and IPID. While the new valve is designed to release up to 88 cfs, the simultaneous delivery would not exceed 80 cfs (50 cfs to LNFH and 30 cfs to IPID). The co-lead agencies submitted a Minimum Requirement Analysis (Appendix C) to the USFS for protecting wilderness values when accessing the USFWS lands surrounded by the ALWA. The USFS concurred with the co-lead agencies' determination that the USFS does not have jurisdiction over the valve replacement project, because it occurs on USFWS-owned land. However, the USFS has requested review of the flight plans prior to construction. The co-lead agencies would provide the USFS an opportunity to review and comment on the flight plan during the contractor's submittal process.

1.5 Purpose and Need for Action

The purpose of the proposed action is to facilitate the following:

- Compliance with Term and Condition 2c of the 2017 NMFS BiOp, which states, from August 1 to September 30, LNFH will release up to 50 cfs of storage water from Snow and Nada lakes to ensure access to the LNFH surface water withdrawal and improve instream flow conditions to the extent possible.
- Compliance with Term and Condition 2j of the 2017 NMFS BiOp, which states, Reclamation shall replace the existing valve to accommodate multiple water users by the end of calendar year 2019.
- Compliance with the 2017 NMFS BiOp by reducing take¹ of downstream endangered fish through implementation of a NMFS reasonable and prudent measure.
- Compliance with the 2011 USFWS BiOp requirement to release approximately 50 cfs from the Snow Lakes Reservoir system from early July through September 30 every year.
- Continued operation of the LNFH to propagate spring Chinook salmon as mitigation for construction and operation of Grand Coulee Dam and other purposes, including compliance with the hatchery production obligations of the United States.

The proposed Federal action is needed for the following reasons:

- The existing valve has exceeded its service life and could malfunction or fail, which would result in interrupted or uncontrolled water delivery within the Icicle Creek watershed and impaired water management.
- To comply with Term and Condition 2j of the 2017 NMFS BiOp, which states that Reclamation will replace the valve at Snow Lake to accommodate the water users, LNFH, and IPID, by December 31, 2019, safely and reliably provide the required 50 cfs to LNFH. The required volume currently exceeds the 30 cfs design capacity of the existing valve.
- A properly sized valve is required to meet combined water demands of LNFH (August 1 to September 30) and IPID (July and October).

¹ Take is defined in ESA Section 3 (18) as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect or to attempt to engage in any such conduct.

1.6 Public Notification and Scope of EA

On October 2, 2017, Reclamation and the USFWS issued a joint press release announcing availability of the draft EA and the start of a 15-day public comment period (October 2, 2017 through October 17, 2017). The draft EA was posted on agency websites and mailed or emailed to Federal, State, and local agencies; Indian Tribes; and interest groups. Reclamation and USFWS received nine comment documents by the end of the comment period, including submissions from non-governmental organizations and State and local agencies.

After reviewing public comments and concerns, Reclamation and USFWS completed additional analysis and issued a letter to interested parties on November 17, 2017, announcing a second comment period in late December 2017 to mid-January 2018.

On December 21, 2017, Reclamation and the USFWS issued another joint press release announcing availability of the revised draft EA and the start of a 21-day public comment period (December 21, 2017 through January 11, 2018). Reclamation and USFWS received six additional comment documents including submissions from non-governmental organizations and State and local agencies.

Appendix A provides all comments received as of January 11, 2018, and indicates where to locate responses or changes in this EA. Appendix B provides a list of resources considered but eliminated from further analysis.

As provided in 36 CFR 800.8, Reclamation is using the NEPA public review process to meet its public participation requirements under Section 106 of the National Historic Preservation Act (NHPA).

Table 1-1. Resources further expounded on in current impact analysis (in alphabetical order.)

| Resource | Issue |
|---|---|
| Cultural Resources | Would the proposal (undertaking) adversely affect historic properties? |
| Fish and Threatened and Endangered Species | Would replacement and operation of the valve impact fish and Threatened and Endangered Species? |
| Noise | Would construction and operation generate unwanted noise that may affect wildlife or recreationalist? |
| Water Resources | Would the proposal affect water storage in the lakes, downstream releases, water quality, and water supply? |
| Wildlife | Would installation of the valve and future operations affect USFS management indicator species? |

1.7 Legal Authority

Funding for the Complex is provided under authority of Public Law 76-826 (October 9, 1940) and Section 2(c) of the August 12, 1958, amendments to the Fish and Wildlife Coordination Act (FWCA), Public Law 85-624. The former authorizes hatcheries to be built as part of the fish protection program for the Grand Coulee Dam project. The latter provides that Federal agencies authorized to construct or operate water control projects are also authorized to modify or add to the structures and operations of such projects, if the construction has not been substantially completed on the date of enactment of the FWCA 16 USC § 2(c). Section 2 (g) of FWCA defines substantially complete as 60 percent of the estimated construction costs having been obligated at the time of enactment of FWCA. In 1980, the U.S. District Court for the Eastern District of Washington held that the Columbia Basin Project was not 60 percent complete at the time of the enactment of Public Law 85-624, thus determining that the FWCA applies to the Columbia Basin Project including Grand Coulee Dam and related mitigation facilities

2 DESCRIPTION OF ALTERNATIVES

This chapter describes three alternatives — a No Action Alternative and two action alternatives to replace the upper Snow Lake water-release control valve. Alternative 3 is the preferred alternative.

2.1 Alternative 1: No Action

Under the no action alternative, USFWS would continue to operate the existing LNFH water delivery system to meet LNFH and IPID water needs. The existing valve, a key component to delivering water to LNFH and IPID, would not be replaced. The valve has been in place for 17 years and has exceeded its service life of 10 years. In addition, the valve has experienced increased wear and tear from regularly releasing water in excess of its designed release capacity of 30 cfs. As a result, the existing valve will eventually malfunction or fail, resulting in interrupted water delivery to LNFH and IPID. When the existing valve malfunctions or fails, the guard gate would be closed so no water would be released through the upper Snow Lake valve. Under Alternative 1, Reclamation and USFWS would not comply with the 2017 NMFS BiOp that requires installation of a new valve by the end of 2019. Reclamation and USFWS would be required to notify NMFS and could be required to reinstate consultation under Section 7 of the Endangered Species Act.

2.2 Alternative 2: Water Release Control Valve Replacement with Helicopter Flights and No Camping

In Alternative 2, helicopter flights between LNFH and the helicopter-landing site at the project location are estimated to be 30 roundtrip flights throughout the 7- to 21-day span of the project. Snow Lake Helipad No. 2 would be the primary site for contractor use (Figure 2-5). Helipad No. 3 would be the secondary site in case of an emergency or unavailability of Helipad No. 2 for unforeseeable reasons.

Daily flights during the project would provide contractors the most flexibility in scheduling and performing work. Crews could be flown in-and-out daily, which would eliminate the competition between the public and construction crews for camping locations on USFWS land. Daily flights may provide better efficiency and quicker completion of the project as the contractor could return to LNFH to address unforeseen supply, equipment, and personnel issues, and resolve them faster than having to wait until the next scheduled flight.

2.3 Alternative 3: Water Release Control Valve Replacement with Helicopter Flights and Camping

In Alternative 3, helicopter flights between LNFH and the helicopter-landing site at the project location are estimated to be 15 roundtrip flights throughout the 7- to 21-day project. Snow Lake Helipad No. 2 is the primary site that would be used by the contractor (Figure 2-5). Helipad No. 3 would be the secondary site in case of an emergency, or if the primary site is not available for unforeseeable reasons

This alternative would require that the contractor establish a basecamp on USFWS land. The distance between the proposed contractor campsite and the construction site ranges from 0.4 to 0.6 miles. The proposed camping areas are shown in Figure 2-5. Campsite 2 is 3.97 acres and Campsite 3 is 1.4 acres. Within these existing campsites, the contractor's camp is likely to be located in a 50-foot-by-50-foot area of flat, brushless space.

2.4 Commonalities Between Alternative 2 and 3

The following project description is applicable to both Alternative 2 and 3. A pre-bid site visit would occur with contractors interested in bidding on the proposed project. Co-lead agency representatives and contractors would complete a roundtrip day-hike to the water-release control valve at upper Snow Lake. See Table 2-1 for a summary comparison of the action alternatives and post-contract award. Both alternatives would replace the existing butterfly water-discharge control valve at upper Snow Lake with a new knife valve. The weight of the valve (approximately 1,300 pounds) and the inaccessibility of the project site necessitate helicopter transport to the outlet site under both alternatives. The new valve is designed to have a 50-year service life and a release capacity of up to 88 cfs. The new valve would be operated to release up to 80 cfs in late summer to comply with the 50 cfs requirement of the 2017 NMFS BiOp (August 1 to September 30) and allow an additional 30 cfs release for IPID (July to October).



Figure 2-1. LNFH staging area and helipad.

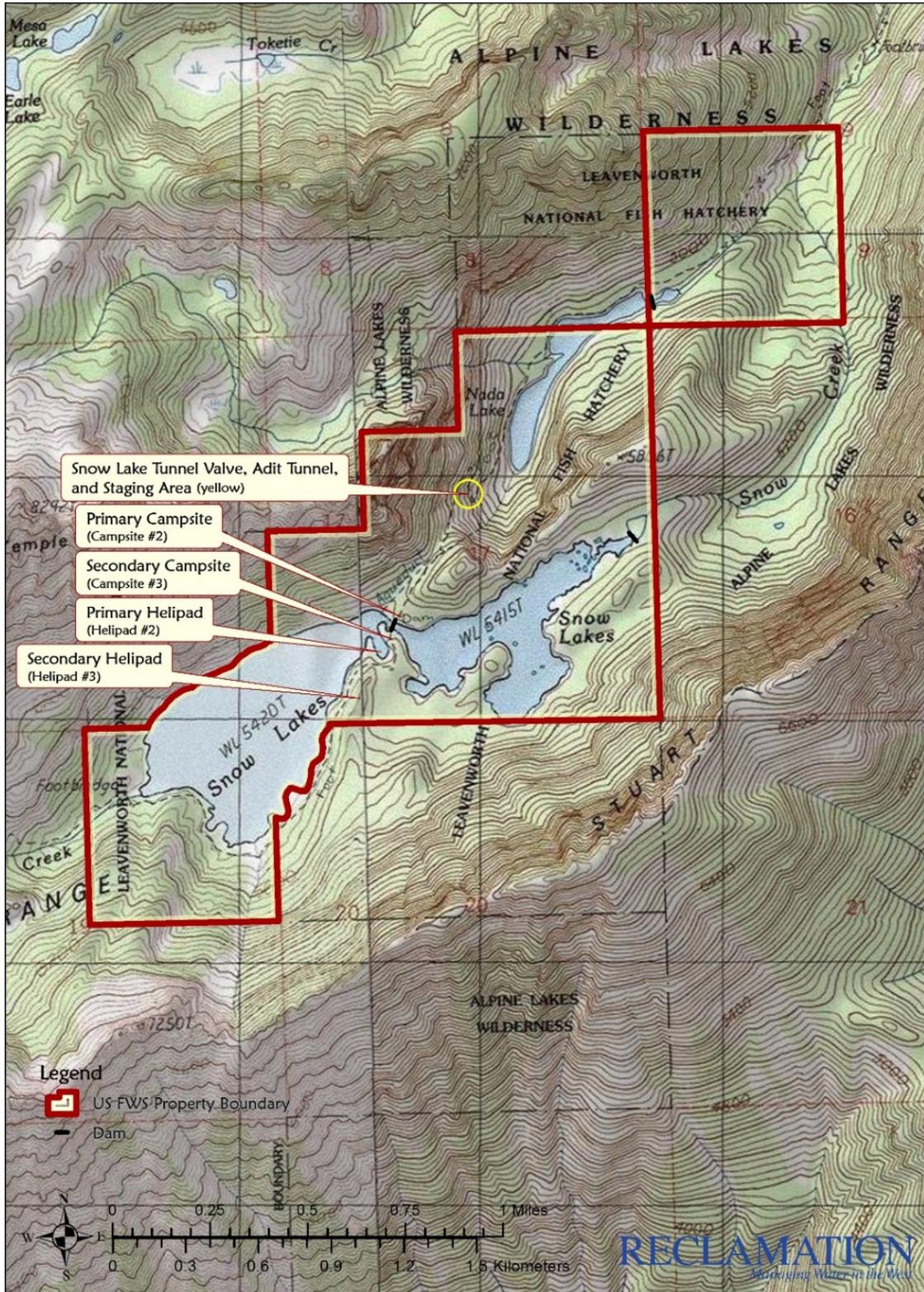


Figure 2-2. Outline of USFWS boundary, proposed campsites, and helicopter landing sites. This map shows high water elevations. The primary helipad would not be underwater during the proposed construction window of October and November.

Construction is anticipated to take 7 to 21 days. Approximately two to five workers would be required for construction, which includes mobilization, construction, demobilization, and disposal of wastes. Mobilization of construction materials and equipment would occur prior to the existing valve shutoff date in early October. A helicopter would be used to transport the valve to the project site and to carry materials, equipment, and crew from LNFH to the upper Snow Lake outlet and adit tunnel staging area. The specific use of helicopter flights is further outlined in Table 2-1 below.

The area used for staging would involve four locations as follows totaling 24.29 acres:

1. LNFH staging area (normally used for firefighting crews) is 23.74 acres (Leavenworth Quadrangle)
2. Snow Lake outlet and adit tunnel staging area is 0.13 acre (Blewett Quadrangle)
3. Helipad 2 staging area is 0.21 acre (Blewett Quadrangle)
4. Helipad 3 staging area is 0.21 acre (Blewett Quadrangle)

Mobilization

The mobilization process for the project would include the following:

- Construction materials would be transported by truck to the LNFH staging area using local highways (Figure 2-1).
- An existing helicopter pad located at LNFH would be used for helicopter takeoffs and landings (Figure 2-1). The LNFH is approximately a 7-minute helicopter flight from the upper Snow Lake valve project site.
- Of the three helipads in this document, Helipad No. 2 (Figure 2-2) has been identified as the primary helicopter-landing site at upper Snow Lake that would be used for the project. Helipad No. 3 would be used as a secondary landing site in case of an emergency or if the primary site is not available for unforeseeable reasons.
- The staging, landing, and loading areas would be located at LNFH and on land owned by the USFWS around the upper Snow Lake outlet and adit tunnel (Figure 2-2).
- Due to the remote location of the construction site, a first aid station would be located near the upper Snow Lake outlet where construction would occur.
- The adit tunnel (Figure 2-3) has locks, and the contractor could use it to securely store materials and equipment prior to the start of construction.

Construction

The construction process for the project would include the following:

- The existing butterfly valve would be removed using power tools, chains, hand winches, gantry, hoists, levers, and come-alongs and then flown away from the site. The existing valve support made of concrete and wood may be removed or replaced, as needed. The current condition of the valve support is unknown, and cannot be inspected until after the valve is removed (Figure 2-4). An appropriate course of action would be determined by the contractor at that time.

- The new valve would be flown in on a helicopter tether; lowered to the upper Snow Lake outlet; and installed using power tools, chains, hand winches, gantry, hoists, levers, and come-alongs.

Demobilization and Disposal

The demobilization and disposal process for the project would include the following:

- Crew, equipment, scrap metal, debris, and solid waste would be flown out.
- Construction and demolition waste would be disposed of or recycled in approved landfills by the contractor.

Table 2-1. Summary comparison of the action alternatives after contract award.

| Alternative 2 | Alternative 3 |
|---|--|
| <p>Contractor flight to view project staging areas, landing areas, and valve location. One roundtrip flight.</p> <p>Construction timing constraints: October to November 2019, negotiated between Reclamation, USFWS, USFS, and contractor to minimize impacts.</p> <p>Estimated duration of construction: 7 to 21 days.</p> <p>Estimated total roundtrip flights: 30</p> <p>Transportation of equipment (power tools, chains, hand winches, gantry, hoists, levers, come-alongs, torches, generators, and chainsaws) and materials to site: 2 roundtrip helicopter flights.</p> <p>Transportation of crew to and from site: 23 roundtrip flights to Helipad 2.</p> <p>N/A</p> <p>Removal of existing valve and deteriorated material: 1 roundtrip flight.</p> <p>Installation of new valve and valve support: 1 roundtrip flight.</p> <p>Removal of equipment, materials, scrap metal, and debris from site: 2 roundtrip flights.</p> <p>Transportation of crew from site is accounted for in daily roundtrip calculation (of 23 roundtrip flights) above.</p> <p>Disposal of solid waste.</p> | <p>Contractor flight to view project staging areas, landing areas, and valve location. One roundtrip flight.</p> <p>Construction timing constraints: October to November 2019, negotiated between Reclamation, USFWS, USFS, and contractor to minimize impacts.</p> <p>Estimated duration of construction: 7 to 21 days.</p> <p>Estimated total roundtrip flights: 15.</p> <p>Transportation of equipment (power tools, chains, hand winches, gantry, hoists, levers, come-alongs, torches, generators, and chainsaws), materials, and camping gear to site: 2 roundtrip helicopter flights.</p> <p>Transportation of crew to site: 2 roundtrip flights to Helipad 2</p> <p>Establish and breakdown work camp for crew at Campsite 2, or Campsite 3 in the event of emergency: 2 to 4 roundtrip flights.</p> <p>Removal of existing valve and deteriorated material: 1 roundtrip flight.</p> <p>Installation of new valve and valve support: 1 roundtrip flight.</p> <p>Removal of equipment, materials, scrap metal, debris, and camping gear: 2 roundtrip flights.</p> <p>Transportation of crew from site: 2 roundtrip flights.</p> <p>Disposal of solid waste.</p> |



Figure 2-3. Adit tunnel entrance located to the right of the valve control house (shown at right in left photograph) and adit tunnel interior (in right photograph).



Figure 2-4. Existing butterfly valve and valve support (circled in yellow).

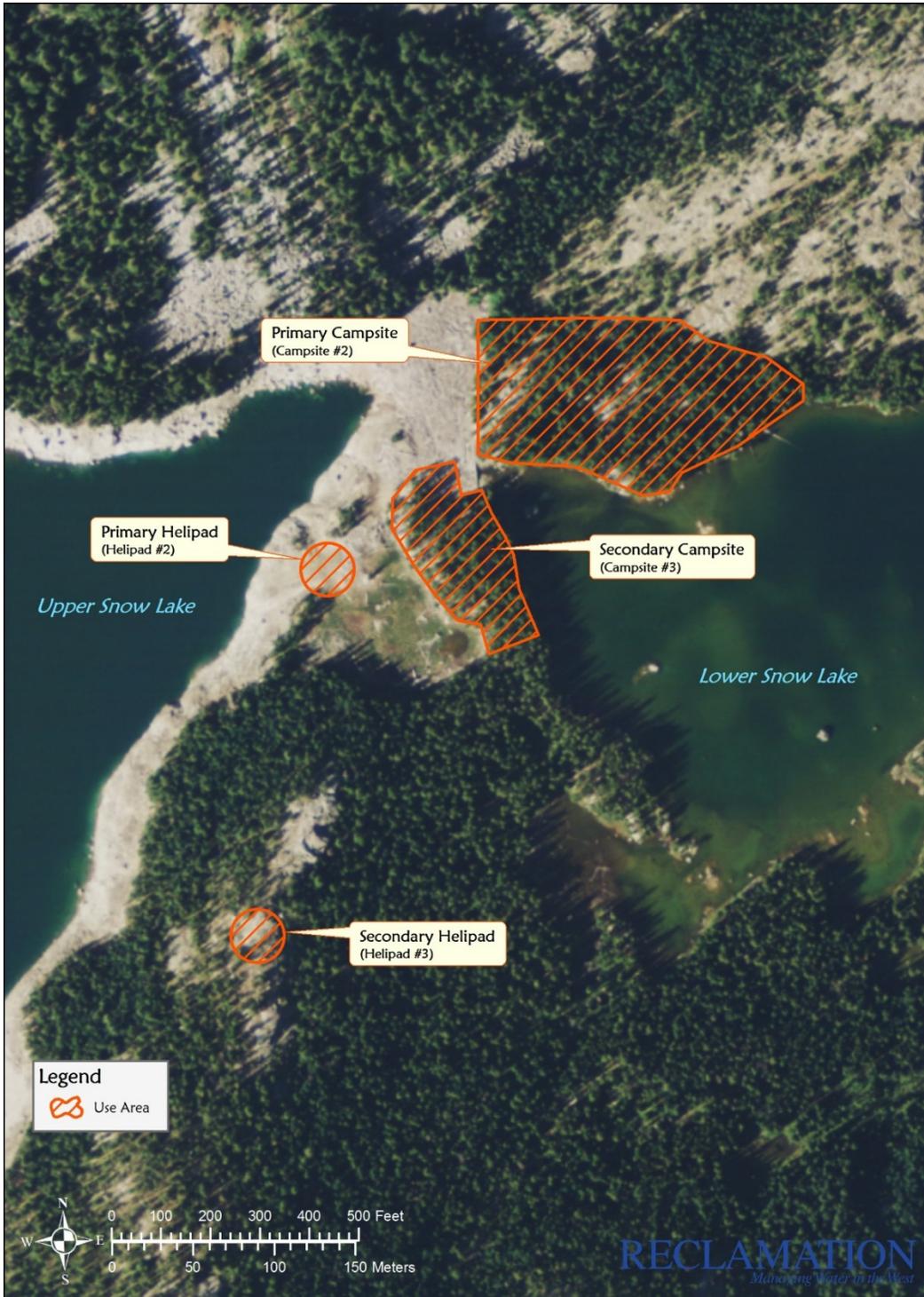


Figure 2-5. Locations of primary and secondary campsites and helipads near upper Snow Lake water-release control valve.

2.4.1 Construction Standards, Resource Protection Measures and Best Management Practices

The following construction standards, resource protection measures, and Best Management Practices (BMPs) would be implemented by the contractor hired for the project to reduce the potential for impacts on the environment. Further detail on control methods would be described in the construction specifications.

2.4.1.1 General

The limits of construction activities would be predetermined in contract solicitation documents, with activity restricted to and confined within those limits. There are no environmentally sensitive areas identified in the valve-replacement project area. All areas associated with the project are previously disturbed areas.

2.4.1.2 Air Quality

Currently, the State of Washington is in attainment for all criteria pollutants (EPA 2017). Reasonably available methods and devices would be used to prevent, control, and otherwise minimize atmospheric emissions or discharges of air contaminants.

The following air quality control methods would be implemented during the proposed project:

- Equipment and vehicles that have excessive exhaust gas emissions would not be operated until corrective repairs or adjustments reduce such emissions to acceptable levels.
- Helicopter take offs and landings at LNFH and on the dry lakebed of upper Snow Lake could cause dust. Dust control for exposed soil areas at the project site and at the sling-load drop site would be abated with water as needed.

2.4.1.3 Noise Control

The following noise control methods would be implemented during the proposed project:

- Construction activities would only be allowed during daylight hours.
- Mufflers and spark arrestors would be required for continuously running generators, pumps, and/or other stationary equipment to meet the decibel requirements as defined by the U.S. Department of Agriculture Forest Service Specification 5100-1. The U.S. Department of Agriculture Forest Service Specification 5100-1 defines performance specifications for spark arrester exhaust systems used on general-purpose engines (e.g., generators, motorcycles, agricultural equipment) to prevent forest fires.

2.4.1.4 Invasive Species Control

The following invasive species control methods would be implemented during the proposed project:

- Contractors would be required to ensure that all equipment entering the project and staging areas be free of noxious weeds, invasive species, and their propagules, in accordance with State of Washington protocols. This includes aquatic and terrestrial (i.e., land dwelling) species. Specific information to be followed is available online at <http://wdfw.wa.gov/publications/01490/wdfw01490.pdf> (last accessed December 19, 2017).
- To minimize the potential for the spread of noxious weeds, all equipment used during construction would be power-washed offsite to remove all soil and plant material prior to entering the project area.

2.4.1.5 Wilderness Regulations and Guidance

The proposed project would be implemented in accordance with the following wilderness regulations and guidance:

- All activities would be implemented in a manner that does not disturb, excavate, or penetrate native soil.
- Food storage would follow wilderness BMPs to avoid conflicts with wildlife (NPS, 2017).
- The contractor would be responsible for following the Wilderness Human Waste Disposal Protocol (NPS, 2014). Improper disposal of human waste can cause water pollution, harm wildlife and fish, and affect the wilderness experience of others. The contractor must use a pit toilet. In the event a toilet is not available, the contractor must use the following BMPs for human waste:
- To dispose of waste properly, bring the necessary and appropriate tools and equipment, such as a spade, small trowel, waste disposal bag, or portable toilet.

2.4.1.6 Solid Waste and Hazardous Substance Management

The following solid waste and hazardous substance management measures would be implemented during the proposed project:

- The contractor would be required to comply with the Resource Conservation and Recovery Act, Oil Pollution Act, and all applicable State and local requirements for handling solid waste and hazardous substances. No burning of construction trash would be permitted.
- Construction activities would be performed by methods that prevent the release of solid waste, contaminants, or other pollutants or wastes into upper Snow and Nada lakes, Snow Creek, and Icicle Creek.
- Spill containment kits would be readily available in areas where oil or petroleum products would be stored.

- Pollutants would be controlled using sediment and erosion controls, wastewater and stormwater management controls, construction-site management practices, and other controls, including State and local control requirements.
- Spark arresters would be used to prevent emission of flammable debris from combustion sources.

2.4.1.7 Use of Helicopter

Helicopters would be used for construction, and the following BMPs would be implemented:

- Operators and aircraft would be licensed and in compliance with the applicable requirements of the Federal Aviation Administration and the U.S. Department of the Interior’s Office of Aviation Services’ “Handling Loads Suspended from Rotorcraft” (ASME/ANSI B30.12) requirements.
- Flight paths would be identified prior to construction and would be approved by the applicable Federal and State agencies.
- Before each day’s operation, the contractor would be required to conduct a briefing for pilots and ground personnel and discuss the plan of operation in detail.
- The contractor would be required to follow Reclamation’s Helicopter Operations Safety and Health Standards Chapter 19.25 in Reclamation’s Safety and Health Standards 2014 Edition (Reclamation, 2014).
- The contractor would be required to avoid flying over residences and campsites when possible. Wherever possible, helicopters would avoid flying directly over trails.
- Helicopter flights over designated wilderness areas would be limited to pre-approved flight paths coordinated with applicable Federal agencies. The contractor would abide by any stipulations in an agreement between them and the USFS.
- Where feasible and safe, helicopters would avoid flying over mountain goats (*Oreamnos americanus*) or other sensitive wildlife.

2.4.1.8 Activities Related to Helicopter Use

The following remote work-location safety precautions would be implemented during the proposed project:

- The contractor would be required to review and comply with all applicable safety and health regulations to ensure a comprehensive safety plan. For instance, contractors would be required to follow Reclamation’s Safety and Health Standards 2014 Edition (Reclamation, 2014).
- Emergency medical services would be readily available for employees, and employees would know how and where to access the services or supplies as described in Reclamation’s Safety and Health Standards 2014 Edition (Reclamation, 2014). In particular, the following safety precautions would be implemented:
 - The contractors would provide a safe work environment at all times. This would include posting, fencing, barricading, or flagging all work areas to keep the public away from project-related activities.

- Employees would be adequately trained to render first aid and cardiopulmonary resuscitation (CPR). Adequate first aid supplies would be provided to address medical emergencies.
- Reliable means of communication would be provided to contact emergency medical facilities. Specific guidance would be provided on actions to take when a medical emergency occurs. Emergency numbers would be posted in a visible and highly trafficked area.

2.5 Alternatives Considered but Eliminated from Detailed Analysis

During the alternative development process for the draft EA, the co-lead agencies considered two additional alternatives that were dismissed from further analysis as described below. After reviewing and considering public comments on the draft EA, an additional alternative was considered but eliminated after conducting a minimum requirement analysis (Appendix C).

2.5.1 Use of Pedestrian Transportation and Traditional Skills

The use of non-mechanized means of access (via the Snow Lake foot trail 1553) and traditional skills and equipment were considered (Appendix C). From the Snow Lake trailhead, the foot trail crosses Icicle Creek and switchbacks to Nada Lake for 5.6 miles. The trail continues to the southeast end of Nada Lake. The trail then switchbacks over a large talus and scree slope for 1.7 miles to lower Snow Lake. The trail continues another 1.5 miles along the south shore of upper Snow Lake (USFS, 2017c). The use of pedestrian transportation via this trail was eliminated because the valve weighs approximately 1,300 pounds and could not be disassembled into smaller pieces for transport to the project site by foot. A totally non-motorized, non-mechanized alternative would not meet the requisite engineering or construction requirements for this proposal.

In addition, the foot trail to the project site travels through the wilderness area and would need a significant amount of reconstruction prior to hauling equipment and a wide, heavy valve up the steep, rugged terrain. Rehabilitation of the Snow Lake trail would require extensive improvements and excavations and would be a permanent change in the wilderness area. The Wilderness Act’s purpose is to leave the wilderness “untrammelled by man, where man himself is a visitor who does not remain” 16 USC §1131(c). This purpose renders infeasible the reconstruction of the existing trail system this alternative would require.

2.5.2 Use of Pack Animals

The use of pack animals to transport crews and materials to the project site was also considered. However, the USFS has stated that pack animals would not be permitted because the trail is impassible for pack animals due to recent landslides (Schoor, 2017). Rehabilitation of the Snow Lake trail for use of pack animals would create a permanent irreversible effect due to the blasting, trailblazing, and other improvements this alternative would require. As explained above, this likely would not be feasible due to the purpose of the Wilderness Act.

Therefore, the helicopter flights in Alternatives 2 and 3 present the only feasible alternatives. Even if this was not the case, the helicopter flights would have only short-term effects and less of an impact on wilderness values than upgrading the trail for pack animals.

2.5.3 Remove LNFH

The decommissioning of LNFH was considered; however, it was beyond the scope of this project and did not meet the purpose and need identified in Section 1.5. Moreover, USFWS already analyzed relocating LNFH (McMillen Jacobs Associates, 2016). In that analysis, USFWS concluded a different geographic location was not likely feasible. The primary factors in reaching this decision include the following:

- Difficulty obtaining funding for a new \$35 to \$40 million hatchery facility.
- Difficulty obtaining adequate, new water rights and supplies that meet water quality criteria at a reasonable cost — a potential fatal flaw.
- Straying hatchery fish would be a major concern to USFWS and regional fisheries managers.
- Even minor changes to fish stock, abundance, run-timing, ESA risk, or alteration in composition of mixed stocks could have a negative impact on usual and accustomed fishing areas locally and throughout the Columbia River, and may be inconsistent with Tribal rights.

2.6 Comparison of Alternatives

Table 2-2. Summary comparison of alternatives and potential impacts to the affected environment

| | No Action | Alternative 2: Helicopter Only | Alternative 3: Helicopter and Camping |
|---------------------------|---|--|---|
| Cultural Resources | No Effect | No adverse effect to the National Register of Historic Places (National Register) listed LNFH Snow Lake Tunnel with no other historic properties in the staging, work or campsite areas. | No adverse effect to the National Register listed LNFH Snow Lake Tunnel with no other historic properties in the staging, work or campsite areas. |
| Fish | <p>Under the No Action Alternative, the existing valve would continue to operate up to 50 cfs, and the Term and Condition 2c and 2j of the 2017 NMFS BiOp may not be met as IPID has first call on water released from Snow Lake. Valve failure would result in only natural flows through Snow Creek and reduce or cease supplemental flows to Icicle Creek. While Snow Creek fish species are not well understood, the water flow and temperature would likely revert to conditions that are more natural and support any natural fisheries that exist.</p> <p>With no Snow Lake water, production at LNFH would be negatively impacted and result in less adult hatchery fish available for sport, Tribal and commercial harvest. Native fish in Icicle Creek would be negatively affected due to lower flow, decreased habitat, and warmer temperatures.</p> <p>In Icicle Creek, the current benefit of cooler water supplementing Icicle Creek flows would no longer occur, and the cool-water species that inhabit it could be negatively affected.</p> | <p>Fisheries effects are not likely to result from the helicopter transport of equipment and personnel to the worksite. The valve replacement would allow USFWS to continue operating the LNFH in compliance with the NMFS 2017 BiOp.</p> <p>Effects of the additional release down Snow Creek are considered to be beneficial due to the following:</p> <ol style="list-style-type: none"> 1) Snow Creek is a steep gradient and likely not important fish habitat 2) Increased flows of this magnitude would likely be infrequent 3) The infrequent increase in flow down Snow Creek is within the natural variation of the creek with spring runoff, thus within the realm of what resident fish species experience naturally. | <p>Fisheries effects are not likely to result from the helicopter transport of equipment and personnel to the worksite. The valve replacement would allow USFWS to continue operating the LNFH in compliance with the NMFS 2017 BiOp.</p> <p>Effects of the additional release down Snow Creek are considered to be beneficial due to the following:</p> <ol style="list-style-type: none"> 1) Snow Creek is a steep gradient and likely not important fish habitat 2) Increased flows of this magnitude would likely be infrequent 3) The infrequent increase in flow down Snow Creek is within the natural variation of the creek with spring runoff, thus within the realm of what these resident fish species experience naturally |

| | No Action | Alternative 2: Helicopter Only | Alternative 3: Helicopter and Camping |
|--|--|--|--|
| Noise | Under the No Action Alternative, noise and acoustical resources in the area would not change from existing conditions, which are estimated to range from 20 to 65 or more A-weighted decibels (dBA). | Short-term noise impacts would occur due to construction activities and helicopter flights. Helicopters would be restricted to 2000 feet altitude above the wilderness area. However, hikers or campers at the two potential campsites could be affected by the noise of the construction equipment and helicopter. For the effects of noise on wildlife, see the Wildlife section of this table. Effects would be mitigated using BMPs. | Short-term noise impacts would occur due to construction activities and helicopter flights. Helicopters would be restricted to 2000 feet altitude above the wilderness area. However, hikers or campers at the two potential campsites could be affected by the noise of the construction equipment and helicopter. For the effects of noise on wildlife, see the Wildlife section of this table. Effects would be mitigated using BMPs. Camping during the construction window could add to nighttime noise levels of less than 65 dBA. |
| Threatened and Endangered Species | Take may occur because the Term and Condition 2c of the 2017 NMFS BiOp may not be met since IPID has first call on the water released from Snow Lake. If the existing valve were to malfunction or fail, the guard gate would be closed so no water would be released through the upper Snow Lake valve, which would impede water delivery to IPID and LNFH. In addition, valve failure could potentially compromise ESA-listed species and critical habitat due to loss of cool supplemental water in Icicle Creek leading to increased temperatures. | This alternative would result in benefit to Bull Trout, UCR steelhead, and Upper Columbia River (UCR) spring Chinook salmon. This alternative may affect, but is not likely to adversely affect, all other listed species. This alternative would not jeopardize the continued existence of wolverine, a species proposed for listing. | This alternative would result in benefit to Bull Trout, UCR steelhead, and UCR spring Chinook salmon. This alternative may affect, but is not likely to adversely affect, all other listed species. This alternative would not jeopardize the continued existence of wolverine, a species proposed for listing. |
| Water Resources: Hydrology | Release would be 50 to 75 cfs, which is outside the 30 cfs design release capacity of the current upper Snow Lake water-release control valve. | Release would be up to 50 to 80 cfs. | Release would be up to 50 to 80 cfs. |

| | No Action | Alternative 2: Helicopter Only | Alternative 3: Helicopter and Camping |
|---|---|---|---|
| Water Resources: Water Quality | <p>When the valve fails, water temperature would warm, the hydrogen ion concentration (pH) would rise, dissolved oxygen would rise, and 303d impairments would remain.</p> <p>LNFH would have a shortage of cool water to supplement its rearing and holding ponds.</p> | <p>Water temperatures would cool, pH would decrease, dissolved oxygen would decrease, and 303(d) impairments would improve.</p> | <p>Water temperatures would cool, pH would decrease, dissolved oxygen would decrease, and 303(d) impairments would improve.</p> |
| Wilderness | <p>No effect on wilderness sight, sound, and solitude.</p> <p>When the valve fails, aquatic wildlife may be adversely affected downstream from the valve.</p> | <p>There would be minor, short-term effects on wilderness sight, sound, and solitude.</p> | <p>There would be minor, short-term effects on wilderness sight, sound, and solitude.</p> <p>The contractor basecamp and crew camping would temporarily displace visitors. To minimize this impact, construction would occur outside the peak season of use. Accordingly, the impacts on recreational visitors within the Snow Lake area are expected to be negligible.</p> |
| Wildlife | <p>Aquatic wildlife may be adversely affected downstream from the valve. Camping already creates minor disturbance or displacement of wildlife.</p> | <p>Effects to aquatic wildlife would be beneficial. Terrestrial wildlife would be exposed to short-term increases in noise during construction.</p> | <p>Effects to aquatic wildlife would be beneficial. Terrestrial wildlife would be exposed to short-term increases in noise during construction.</p> <p>Camping by the contractors would not disturb or displace wildlife compared to No Action since camping already creates minor disturbance or displacement of wildlife.</p> |

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the resources in Table 1-1 and predicts the environmental consequences associated with the implementation of each alternative. The resources or issue topics are listed alphabetically. This analysis was updated in response to public comments received on the draft EA released on October 2, 2017. Based on these comments, Reclamation and USFWS completed additional analysis in Chapter 3. The analysis area includes upper Snow and Nada lakes, Snow Creek, and Icicle Creek down to the LNFH intake structure (Figure 3-1).

3.1 Cultural and Historical Resources

The NHPA requires Federal agencies to consider their impact on historic properties, which means any district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (National Register). Cultural resources covers a wider range of resources than historic properties and includes cultural items protected under the Native American Graves Protection and Repatriation Act and Indian sacred sites as defined by Executive Order 13007.

3.1.1 Affected Environment

The 29.68-acre area of potential effects (including both staging and camping areas) has been inventoried for cultural resources, and the only historic property in the area is the LNFH—a historic district listed on the National Register. See Figure 2-1 and Figure 2-5 (Speulda, 1998).

Archaeological evidence for indigenous groups that occupied the Snow Lake area has been dated to at least 12,000 years before present. The project area is within the traditional territory of the Wenatchi Tribe, one of the Confederated Tribes of the Colville Reservation (Colville Tribes). Descendants of the Wenatchi can also be members of the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation). The project area is within Yakama Nation's ceded lands.

Prior to the coming of Euro-Americans in the 1800s, the Wenatchee Valley was occupied by the Wenatchi people. As in many other parts of Washington State, the earliest known Euro-American travelers into the Wenatchee Valley were fur trappers. The Treaty of 1855 led to the relocation of the Wenatchi people over the next decade to the Yakama and Colville reservations. Subsequently, the local population became comprised of Chinese immigrant goldminers and Euro-American settlers working in the timber and agriculture industries. Father Urban Grassi, a Catholic Priest that brought Catholicism to the Wenatchi Tribe in 1872 (Wilma, 2006) was first to use irrigation in the Wenatchee Valley. The growth in the upper Wenatchee Valley in areas such as Leavenworth was tied to the development of the Great Northern Railway in the late 1800s. However, the economy suffered when the Great Northern Railway moved its division point and the railroad away from Leavenworth in 1922. During the Great Depression, Leavenworth was buoyed by the construction of the LNFH from 1939 to

1941. The LNFH was used to populate streams with fingerlings in the Wenatchee, Entiat, Methow, and Okanogan rivers (Neilson, 1940).

One of the features of the LNFH Complex is the Snow Lake water discharge valve (described in the introduction), which was used to bring additional cool water to the LNFH. The tunnel and its embedded 30-inch pipeline carries water from Snow Lake and was completed in October 25, 1939 (Nielsen, 1940); however, once the Snow Lake Tunnel was in operation, it was discovered that the tube valve had to be relocated to the outlet portal of the tunnel. With the outlet located 124 feet inside the tunnel, wind velocities reached 60 miles per hour when the valve was open, which made it too dangerous for operating personnel. As a result, in 1940, 124 feet of pipe was added to the existing pipe, along with concrete supports, a concrete plug, and another 20-inch butterfly valve at the outlet. In addition, a control house was built on a concrete structure in front of the outlet portal for the new valve (Reclamation, 1940). From 1941 to 1945, Reclamation worked on the operations and maintenance at the LNFH. Then, in 1945, Reclamation transferred operations and maintenance to the USFWS. In 1949, the USFWS obtained complete ownership and operation of the LNFH (Speulda, 1998).

In 1998, the Snow Lake Tunnel was listed on the National Register as part of the LNFH historic district. At the time of completion, the LNFH was the largest hatchery in the world. The LNFH was determined eligible under National Register Criteria A and C (Speulda, 1998). In 2014, Historical Research Associates, Inc. compiled the LNFH Preservation Plan for the USFWS; in this document, the Snow Lake Tunnel was determined a contributing resource to the historic district and not individually eligible on its own (Sneddon, Beckner, and Miller, 2014). The original tube valve was replaced in 2001 with the current butterfly valve. Because the original tube valve was replaced, this current valve is not a character-defining feature of the National Register-listed Snow Lake Tunnel.

Indian Tribes with potential interests in this undertaking were notified, and neither the Colville Tribes, nor the Yakama Nation identified historic properties of Tribal importance within the area of potential effects.

3.1.2 Environmental Consequences

3.1.2.1 Alternative 1: No Action

Under Alternative 1, no impacts on cultural resources including the LNFH historic district would occur.

3.1.2.2 Proposed Action: Alternative 2 and Alternative 3

Helicopter delivery of the new valve and supplies would not affect any archaeological or ethnographic resources at the Snow Lake Tunnel outlet or the LNFH. As listed below, all work is within areas where no additional ground disturbance or vegetation clearing is required:

1. All work at the Snow Lake Tunnel outlet staging and work area is within an existing staging and work area.
2. The LNFH staging area is already in heavy use as it has been used for firefighting crews.

3. The proposed helipads are areas that have been previously cleared and used as landing areas.

Helicopter delivery of the new valve and supplies would not affect any historic resources at the Snow Lake Tunnel outlet or at the LNFH. The proposed replacement of the 2001 butterfly valve with a knife discharge valve, connecting pipe, and new controls would result in a determination of No Adverse Effect for the Snow Lake Tunnel. The USFWS replaced the original valve and valve control house in 2001. These two outlet features of the Snow Lake Tunnel water control structure are no longer original or character-defining features of the Snow Lake Tunnel. The original valves inside the tunnel at Station No. 1+38.48 and the steel pipeline, inlet, and the tunnel itself are still character defining features.

Reclamation consulted with the State Historic Preservation Officer at the Washington Department of Archaeology and Historic Preservation (DAHP), USFWS, Colville Tribes, and the Yakama Nation regarding effects of the action alternatives. DAHP concurred that there would be No Adverse Effects to historic properties in the area of potential effects for the proposed undertaking. No mitigation or further work is required (see Appendix D).

3.2 Fish

This section describes the fish species present within the project area and their distributions, species status, and habitat conditions. Information on threatened and endangered species is provided in Section 3.4.

3.2.1 Affected Environment

The affected environment for fish is from upper Snow Lake down to LNFH (see Figure 3-1). Sport fisheries in upper and lower Snow Lake are managed by the Washington Department of Fish and Wildlife (WDFW). In the past, lakes were stocked with westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*), rainbow trout (*O. mykiss*), and non-native Eastern brook trout (*Salvelinus fontinalis*) and lake trout (*Salvelinus namaycush*). No recent or current stocking occurs in upper or lower Snow Lake, but there are self-sustaining populations of Cutthroat Trout and brook trout (Vasquez 2017, pers. comm.). Fisheries in Snow Creek are not well documented, but given the lake populations cited above, it is possible that any of the species listed above are present (Vasquez, 2017, pers. comm.). It is notable that Snow Creek is a steep gradient and thus likely not important fish habitat (NMFS, 2017).

Fish in Icicle Creek include longnose dace (*Rhinichthys cataractae*), speckled dace (*Rhinichthys osculus*), sculpin (*Cottus*), longnose sucker (*Catostomus catostomus*), bridgelip sucker (*Catostomus columbianus*), northern pikeminnow (*Ptychocheilus oregonensis*), Cutthroat Trout, rainbow trout, Eastern brook trout, Bull Trout, Coho salmon (*Oncorhynchus kisutch*), sockeye salmon (*Oncorhynchus nerka*), summer Chinook salmon (*Oncorhynchus tshawytscha*), UCR steelhead and UCR spring Chinook salmon (NMFS, 2017). Yakama Nation rears and releases Coho salmon at LNFH and sockeye salmon spawn at Lake Wenatchee in low numbers (Gale 2017, pers. comm.). Affected environment and environmental consequences for Bull Trout, UCR steelhead, and UCR spring Chinook salmon are discussed further in the Threatened and Endangered Species Section 3.4.



Figure 3-1. Areas of analysis.

3.2.2 Environmental Consequences

3.2.2.1 Alternative 1: No Action

An eventual failure of the existing valve would result in only natural flows through Snow Creek, and reduction or cessation of supplemental flows outside of precipitation events in Icicle Creek (Figure 3-1). In Icicle Creek, the current benefit of cooler water from Snow Lake supplementing Icicle Creek flows would no longer occur, and the coolwater species that inhabit it could be negatively affected, see Section 3.5.2.

3.2.2.2 Proposed Action: Alternative 2 and Alternative 3 Effects Common to Both Alternatives

Under Alternatives 2 and 3, limited staging would occur within the dry areas on the lake margins when the lake is drawn down at the end of the summer (e.g., Helipad 2, see Figure 2-5). Effects on fisheries are not likely to result from the helicopter transport of equipment and personnel to the worksite. Construction BMPs would prevent water quality impacts; therefore, fish would not be affected. These activities are generally consistent with historical operations and maintenance activities that have occurred, such as the previous valve replacement in 2001. The self-sustaining populations of brook and Cutthroat trout would be expected to continue.

The proposed valve replacement would allow USFWS to continue operation of the LNFH in compliance with the 2017 NMFS BiOp with 50 cfs supplementation flow from Snow and Nada lakes. The current maximum release documented out of the existing valve is 75 cfs, and the new valve would allow release of up to the full 50 cfs for LNFH and up to 30 cfs for IPID. In this case, fish in Snow Creek could experience a flow increase of up to 5 cfs and potentially affected. However, the operation is not considered to have significant effects for the following reasons:

1. Snow Creek is a steep gradient and likely not important fish habitat.
2. Increased flows of this magnitude would only occur for a maximum total of 12 days at 80 cfs, after which IPID's 750 acre-feet water supply would be exhausted and releases would return to 50 cfs.
3. The increased level of flow down Snow Creek is within the natural variation of the creek with spring runoff; therefore, it is within the realm of what the effected fish experience naturally.

3.3 Noise

This section defines noise and describes the existing acoustical environment and the potential environmental consequences of noise during the Proposed Action.

3.3.1 Affected Environment

Noise is defined as unwanted sound that is objectionable because its pitch or loudness is disturbing or annoying (USGS, 2006). Because the human ear is not equally sensitive to all frequencies, the most common method of measuring frequency is the A-weighted sound level or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is

most sensitive. In the A-weighted decibel scale, everyday sounds normally range from 30 dBA (very quiet) to 80 dBA (annoying) to 90 dBA (very annoying) to 100 dBA (very loud) (EPA, 1981). Representative noise levels in units of dBA from the loudest types of construction equipment are shown in Table 3-1.

Table 3-1. Representative construction noise levels (University of Washington 2017 and WDOT 2017).

| Tool, Equipment | A-Weighted Sound Level in Decibels |
|------------------------------|------------------------------------|
| Heavy truck (at 50 feet) | 90 |
| Light traffic (at 100 feet) | 50 |
| Welder/Torch | 74 |
| Generator | 73-81 |
| Pneumatic drill (at 50 feet) | 80-85 |
| Chainsaw | 84 |
| Hand power tool | 95-118 |
| Hand power saw | 97-114 |
| Screw gun, drill motor | 98-124 |

Washington Administrative Code 173-60-050 does not regulate construction noise between 7:00 a.m. and 10:00 p.m. Chelan County regulates noise through Title 7 of the Chelan County Code. The land near the hatchery is accessible by road, and residents nearby are noise-sensitive receptors. Noise in this area is primarily automobile traffic ranging from 50 to 90 dBA (WDOT, 2017).

The study area for noise disturbance in the proposed project includes Snow and Nada Lakes and LNFH. The Snow Lake area is remote and exposed to little anthropogenic noise except for recreationalists who are hiking to, and camping and recreating around, the lakes. The area managed by the USFS beyond that which is owned by the USFWS is managed for its wilderness values, including solitude. While direct noise monitoring is not available for the study area or surrounding ALWA region, extrapolation to noise monitoring in national parks indicates ambient noise levels may be in the low 20s dBA.

LNFH is a staging area and basecamp for wildland fires, search and rescue, and other uses such as hauling large woody debris for restoration projects. Helicopter traffic over the ALWA is usual given firefighting, and search and rescue activities. Sensitive receptors to noise changes within the more urban areas include residents, workers, and recreationalists. These individuals' sensitivity to changes in the noise environment would depend on the

relative change in noise conditions and how close to, and for how long, they are exposed to the change.

3.3.2 Environmental Consequences

3.3.2.1 Alternative 1: No Action

Under the No Action Alternative, noise and acoustical resources in the area would not change from existing conditions, which are estimated to range from 20 to 65 or more dBA. The dBA from overflights or flyover noise from fixed wing and helicopters may range from 87 dBA to higher levels.

3.3.2.2 Proposed Action: Alternative 2 and Alternative 3 Effects Common to Both Alternatives

Helicopter use and construction activities would result in increased noise. However, the noise from these activities would be limited to daylight hours, 7 days per week over the 21-day construction period. In addition, the construction period would occur during the non-peak season for recreationists and when noise-sensitive wildlife have likely left the area.

Construction noise would be caused by a generator and power hand tools (see Table 3-1). No heavy equipment would be used related to this project.

Federal regulations (14 CFR pt. 36) require that helicopters not exceed noise thresholds. It is anticipated that the type of helicopter used would be similar to a Eurocopter AS 350 B3, which is rated at 84 dBA at ground level, 90 dBA at takeoff, about 90 dBA at flyover, and 91 dB at approach (EPA, 1981). According to the Environmental Protection Agency (EPA, 1981) 90 dBA (very annoying) is comparable to the sound of city traffic.

Under both action alternatives, helicopters would not land in the wilderness areas managed by the USFS. Helicopters would be restricted to 2,000 feet altitude above the wilderness area. However, hikers or campers at the two potential campsites could be affected by the noise of the construction equipment and helicopter. For effects of noise on wildlife, see the Threatened and Endangered Species and Wildlife sections of this chapter. To estimate the expected noise from the chainsaw and helicopter on recreationalists, the standard Base 10-log equation was used to calculate noise at the two campsites closest to the helipad (WDOT, 2017). As an example of noise dissipation, the helicopter noise would be about 63 dBA at 650 feet and 75 dBA at 220 feet.

3.4 Threatened and Endangered Species

3.4.1 Affected Environment

A biological assessment (BA) was prepared for USFWS to analyze effects of the proposed action on threatened and endangered species protected by the ESA under their jurisdiction. Effects to candidate species were also evaluated to avoid delays in case they become listed before the project is implemented. These species were identified using the USFWS's online Information for Planning and Consultation tool for Chelan County at <https://ecos.fws.gov/ipac/>. The effects of the proposed action on threatened and endangered species protected by the ESA under NMFS's jurisdiction were consulted in the 2016 BA

submitted to NMFS and the resultant 2017 NMFS Biological Opinion. These NMFS species are included in this EA.

Listed species in the county include three plant species, four mammals, three bird species, and three fish species. All plant species —showy stickseed (*Hackelia venusta*), Wenatchee Mountains checkermallow (*Sidalcea oregana var. calva*), and whitebark pine (*Pinus albicaulis*); and two bird species — marbled murrelet (*Brachyramphus marmoratus*) and yellow-billed cuckoo (*Coccyzus americanus*) — were determined as not present in the action area, so the proposed action would have no effect on these species, therefore, not discussed further.

The four mammal species — North American wolverine (*Gulo luscus*, candidate), Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), and Grizzly bear (*Ursus arctos horribilis*) — are large, carnivorous mammals and could be found in the action area as transient individuals as suitable habitat for them exists. Generally, these mammals either have not been documented or rarely documented in the action area (Youkey, 2017, pers. comm.). These species all have large home ranges and typically avoid human interaction, but could potentially be affected by the project due to noise disturbance from construction activities, helicopter flights, human interactions, and camping. However, the area is already affected by high recreational use that limits use by these species (Youkey, 2017, pers. comm.).

Moreover, adequate suitable habitat that does not have recreational disturbance occurs adjacent to the project area; therefore, it is more likely than not these species would be found outside of the project area. If individuals happen to wander through the action area, they are likely to encounter human activity (under the No Action and both action alternatives) and move to areas of lesser disturbance. Canada lynx display comparatively limited behavioral response to humans and are less likely displaced by human presence than the other mammal species discussed above (Ruediger et al., 2000).

High frequency recreational activity in the action area preceding seasonal wolverine denning activity significantly reduces the potential for wolverine occurrence in the project area. Wolverines appear to avoid areas that are heavily used by people (USFS, 2008). Furthermore, while female wolverine occurrence has been negatively associated with helicopter skiing in the winter, females have been shown to relocate dens and kits with and without human activity nearby. Human disturbance at wolverine den sites may result in den abandonment, but not in kit abandonment (USFS, 2008). However, we cannot be certain that wolverine would not be present. There is a small potential for effects from the helicopter flights to cause wolverine dispersal.

Northern spotted owl could potentially occur in the action area, and the action area is within the designated critical habitat for this species. However, elevation 5,000 is generally considered their upper limit, and Snow Lake is above this (Youkey, 2017, pers. comm.). There are fragmented habitat areas around Nada Lake that continue down to the trailhead, but no nesting has been indicated in past surveys (Youkey 2017, pers. comm.). Potential mechanisms for effects to Northern spotted owl include disturbance to nesting owls or habitat disturbance from construction activities, camping, and helicopter trips.

The fish species (Bull Trout, UCR steelhead, and UCR spring Chinook salmon) occur in Icicle Creek. However, Snow Creek is not considered important habitat for these species, and they are not present in Snow or Nada lakes. Snow Creek’s gradient is too high for Bull Trout, UCR steelhead or UCR spring Chinook salmon to pass from Icicle Creek into Snow Creek (KellyRingel, 2017, pers. comm.). Even if passage were possible, Snow Creek’s high gradient would provide little, if any, suitable rearing habitat (Vazquez, 2017). Further, before the supplementation flows released between July and October, temperatures are ordinarily too warm in Snow Creek for Bull Trout (Neibauer, 2017, pers. comm.). These fish species all rely on cool water and currently receive the benefit of cool-water augmentation to Icicle Creek from Snow Lake valve operations.

Replacement of the Snow Lake valve is required as a Term and Condition in the 2017 NMFS BiOp for LNFH’s UCR spring Chinook salmon program (NMFS, 2017) to protect the cool-water supplementation benefit for ESA-listed fish. Potential effects to fish species accordingly include beneficial effects from cool-water augmentation from Snow and Nada lakes facilitated by the project.

Table 3-2. ESA-listed species in the action area with a brief description of their relationship to the affected environment and potential mechanisms for effects evaluated under the alternatives.

| Species ESA Status | Affected Environment | Potential Effects Considered | Effects of Alternative 1 -- No Action | Effects of Proposed Action Alternative 2 | Effects of Proposed Action Alternative 3 |
|---|---|--|---|--|--|
| North American wolverine (<i>Gulo luscus</i>) Candidate Species no critical habitat in action area | Suitable habitat exists in the project area and transient individuals may travel through. However, occurrence is unlikely because of current high recreational use of the area and the existence of more suitable habitat with no disturbance adjacent to the project area. | Disturbance to individuals from helicopter flights, construction activities, or camping; habitat alteration from construction. | No effect. There would be no construction or camping activity. Existing recreation use would continue. Potential valve failure in the future would not affect land species. | The proposed project and its associated activities may affect, but are not likely to jeopardize the continued existence of the species. Effects are expected to be short term. | The proposed project and associated activities may affect, but are not likely to jeopardize the continued existence of the species. Effects are expected to be short term. Effects under Alternative 3 are less, as proposed helicopter are flights reduced. |
| Canada lynx (<i>Lynx canadensis</i>), Threatened, No critical habitat in action area | Suitable habitat exists in the project area, but there are no records of lynx in the area. There is no Canada lynx designated critical habitat in or adjacent to the action area. | Disturbance to individuals from helicopter flights, construction activities, or camping; habitat alteration from construction. | No effect to lynx or critical habitat. There would be no construction or camping activity. Existing recreation use would continue. Potential valve failure in the future would not affect land species. | The proposed project and associated activities may affect, but is not likely to adversely affect Canada lynx individuals. There is no Canada lynx designated critical habitat (DCH) in or adjacent to the action area. This project would have no effect to DCH. | The proposed project and associated activities may affect, but is not likely to adversely affect Canada lynx individuals. Effects under Alternative 3 are less, as proposed helicopter flights are reduced. There is no Canada lynx DCH in or next to the action area. This project would have no effect to DCH. |
| Gray wolf (<i>Canis lupus</i>), Endangered, No critical habitat in action area | A known wolf pack has a den approximately 10 miles south of Snow Lake in the past 5 years; none have been observed in the action area. Occurrence is unlikely due to current recreational use. | Disturbance to individuals from helicopter flights, construction activities, or camping; habitat alteration from construction. | No effect. There would be no construction or camping activity. Existing recreation use would continue. Potential valve failure in the future would not affect land species. | The proposed project and its associated activities may affect, but is not likely to adversely affect gray wolf individuals. | The proposed project and associated activities may affect, but is not likely to adversely affect gray wolf individuals. Effects under Alternative 3 are less, as proposed helicopter flights are reduced |

| Species ESA Status | Affected Environment | Potential Effects Considered | Effects of Alternative 1 -- No Action | Effects of Proposed Action Alternative 2 | Effects of Proposed Action Alternative 3 |
|--|--|--|---|--|---|
| Grizzly Bear (<i>Ursus arctos horribilis</i>), Threatened, No critical habitat in action area | No critical habitat has been designated for this species. Existing recreational use in this area is high, and the availability of suitable habitat on the periphery of the area suggests occurrence of this species in the project area is unlikely (Youkey 2017, pers. comm.). | Disturbance to individuals from helicopter flights, construction activities, or camping (presence of contractor food); habitat alteration from construction. | No effect. There would be no construction or camping activity. Existing recreation use would continue. Potential valve failure in the future would not affect land species. | The proposed project and associated activities may affect, but is not likely to adversely affect Grizzly bear individuals. | The proposed project and its associated activities may affect, but is not likely to adversely affect Grizzly bear individuals. Effects under Alternative 3 are less as proposed helicopter flights are reduced. |
| Northern Spotted Owl (<i>Strix occidentalis caurina</i>), Threatened, Critical habitat in action area | The closest record of a nest site is 2.7 miles to the east, over the high ridge, and down again along Allen Creek (Youkey 2017, pers. comm.). Snow Lake and the project site exceed 5,000 feet elevation, which is generally considered to be the upper limit for Northern spotted owl (Youkey 2017, pers. comm.). | Disturbance to individuals from helicopter flights, construction activities, or camping; habitat alteration from construction. | No effect. There would be no construction or camping activity. Existing recreation use would continue. Potential valve failure in the future would not affect land species. | The proposed project and associated activities may affect, but is not likely to adversely affect Northern spotted owls or their DCH. | The proposed project and associated activities may affect, but is not likely to adversely affect Northern spotted owls or their DCH. Effects under Alternative 3 are less as proposed helicopter flights are reduced. |

| Species ESA Status | Affected Environment | Potential Effects Considered | Effects of Alternative 1 -- No Action | Effects of Proposed Action Alternative 2 | Effects of Proposed Action Alternative 3 |
|---|---|--|--|--|---|
| <p>Bull Trout (<i>Salvelinus</i> <i>confluentus</i>), Threatened, Critical habitat in action area</p> | <p>Bull Trout occur in Icicle Creek. However, their presence in Snow Creek is unlikely due to high temperatures and a high gradient with little-to-no appropriate spawning or rearing habitat (Neibauer 2017, pers. comm.). Critical habitat for Bull Trout is designated in Icicle Creek, but no critical habitat is designated in Snow Creek.</p> | <p>Downstream effects of water quality; temperature and increases in flow.</p> | <p>Cool-water augmentation would cease, and resulting decreased flows and increased temperatures in Icicle Creek may negatively affect Bull Trout that rely on cool, clear water in Icicle Creek.</p> | <p>The proposed project and associated activities may affect, but is not likely to adversely affect Bull Trout or their DCH. Potential effects to Bull Trout DCH include beneficial effects from cool-water augmentation from Snow and Nada lakes facilitated by the project.</p> | <p>The proposed project and associated activities may affect, but is not likely to adversely affect Bull Trout or its DCH. Potential effects to Bull Trout DCH include beneficial effects from cool-water augmentation from Snow and Nada lakes facilitated by the project.</p> |
| <p>Upper Columbia River Steelhead (<i>Oncorhynchus</i> <i>mykiss</i>), Threatened, Critical habitat in action area</p> | <p>UCR steelhead occur in Icicle Creek, which is designated critical habitat. Steelhead do not occur within Snow Creek due to high temperatures and a high gradient with little-to-no appropriate spawning or rearing habitat.</p> | <p>Downstream effects of water quality; temperature and increases in flow.</p> | <p>Cool-water augmentation would cease, and resulting decreased flows and increased temperatures in Icicle Creek may negatively affect UCR steelhead that rely on cool, clear water in Icicle Creek.</p> | <p>Replacement of the Snow Lake valve is required as a Term and Condition in 2017 BiOp for the LNFH spring Chinook salmon program (NMFS, 2017) to protect this benefit for ESA-listed fish. Potential effects to fish species include beneficial effects from cool-water augmentation from Snow and Nada lakes facilitated by the project. This project and associated activities may affect, but is not likely to adversely affect UCR steelhead.</p> | <p>Replacement of the Snow Lake valve is required as a Term and Condition in the 2017 BiOp for the LNFH spring Chinook salmon program (NMFS 2017) to protect this benefit for ESA-listed fish. Potential effects to fish species include beneficial effects from cool-water augmentation from Snow and Nada lakes facilitated by the project. This project and its associated activities may affect, but is not likely to adversely affect UCR steelhead.</p> |

| Species ESA Status | Affected Environment | Potential Effects Considered | Effects of Alternative 1 -- No Action | Effects of Proposed Action Alternative 2 | Effects of Proposed Action Alternative 3 |
|---|---|---|--|--|--|
| <p>Upper Columbia River spring-run Chinook Salmon (<i>O.tshawytscha</i>), Endangered, No critical habitat in action area</p> | <p>UCR spring Chinook salmon likely occurs in Icicle Creek, but the extent of their distribution within is unknown. They do not occur within Snow Creek due to high temperatures and a high gradient with little-to-no appropriate spawning or rearing habitat.</p> | <p>Downstream effects of water quality, temperature, and increases in flow.</p> | <p>Cool-water augmentation would cease, and resulting decreased flows and increased temperatures in Icicle Creek may negatively affect UCR spring Chinook salmon that rely on cool, clear water in Icicle Creek.</p> | <p>Replacement of the Snow Lake valve is required as a Term and Condition in the 2017 BiOp for the LNFH spring Chinook salmon program (NMFS, 2017) to protect this benefit for ESA-listed fish. Potential effects to fish species include beneficial effects from cool-water augmentation from Snow and Nada lakes facilitated by the project. This project and associated activities may affect, but is not likely to adversely affect UCR spring Chinook salmon.</p> | <p>Replacement of the Snow Lake valve is required as a Term and Condition in the 2017 BiOp for the LNFH spring Chinook salmon program (NMFS, 2017) to protect this benefit for ESA-listed fish. Potential effects to fish species include beneficial effects from cool-water augmentation from Snow and Nada lakes facilitated by the project. This project and its associated activities may affect, but is not likely to adversely affect UCR spring Chinook salmon.</p> |

3.4.2 Environmental Consequences

In this section, the environmental consequences of the proposed action on Federal threatened and endangered plant, terrestrial wildlife, and fish species are discussed in generalities (mammals, bird, and fish species). Specific effects by species are summarized in Table 3-2.

3.4.2.1 Alternative 1: No Action

Under the No Action Alternative, the current operational parameters of the existing valve would be used until the valve's eventual failure, at which time no water would be released and the cool supplemental flows in Icicle Creek would be reduced or cease altogether. There would not be any construction, camping, or helicopter activity, but normal recreational activity would continue to limit use of the suitable habitat in the area by large carnivores, such as wolverines, Canada lynx, grizzly bear, and wolves. Northern spotted owls would likely continue be rare in the area with no occupancy in the Snow Lake area due to elevation beyond their upper habitat limits and potential nesting in the lower reaches of the trail between Snow Creek, Nada Creek, and the trailhead. Cool water augmentation would cease and resulting decreased flows and increased temperatures in Icicle Creek may negatively affect Bull Trout, UCR steelhead, and UCR spring Chinook salmon. In addition, hatchery production would be negatively affected due to a lack of sufficient cool water, which would threaten the ability to meet mitigation targets and fulfill tribal trust responsibilities.

3.4.2.2 Proposed Action: Alternative 2 and Alternative 3, Effects Common to Both Alternatives

It is acknowledged that the window for wolverine denning activity (late October/early November) in Washington could potentially overlap with the construction window. Effects to wolverine denning and presence could occur from helicopter flights and construction noise under both alternatives. There are no other listed species with breeding concerns, but dispersal of transient individuals could occur if they were present in the action area. These effects would be minimized by restricting flight altitude to 2000 feet. WDFW would review and concur with flight plans to avoid known habitat and lessen potential effects. Effects are expected to be temporary.

The 2017 LNFH BiOp stipulates, "from August 1 through September 30, provide up to 50 cfs of supplemental flow from the Snow/Nada Lake Basin Supplementation Water Supply Reservoirs to ensure access to LNFH's surface water withdrawal and improve instream flow conditions to the extent possible during the irrigation season in cooperation with IPID as described in this Opinion" (NMFS, 2017). The new valve's increased capacity would ensure that both IPID and the LNFH could simultaneously withdraw the maximum water supply that their respective water contract and water rights allow. Changes in flows in Icicle Creek associated with operations of the new valve would be within the flow ranges already occurring within the system. Bull Trout and UCR steelhead would likely experience beneficial effects of up to an additional 8 cfs of cool water in Icicle Creek, after up to 42 cfs are diverted to LNFH to satisfy requirements for the propagation of UCR spring Chinook salmon, at times of low natural flow.

3.4.2.3 Alternative 2: Helicopter Only

The proposed action under Alternative 2 would include the staging and construction activity to replace the existing valve and an estimated 30 round-trip helicopter flights in and out of the project over the course of 7 to 21 days. Helicopter activity would occur in the area on a daily basis. Camping would not be expected, but there would be increased human activity due to the construction and associated daily flight activity.

It is possible that large mammal species would continue to pass through the action area, despite the disruption of helicopter overflight. Under Alternative 2, species are less likely to remain in the habitat due to human influence. With daily flights, camping is not required, which removes the need for the contractor to store food onsite and reduces the potential for human interaction. While unlikely to be found at the elevation of the project site, Northern spotted owl may be affected by the helicopter overflight path. The effects of the helicopter flights would be temporary and insignificant, particularly as the project work window falls after the young would be dispersed.

3.4.2.4 Alternative 3: Helicopter and Camping

Alternative 3 would require staging and construction activity to fall within the same 7- to 21-day timeframe. However, rather than daily helicopter flights to transport contractors to and from the construction site, contractors would camp at designated sites 0.4 to 0.6 miles from the worksite. Round-trip helicopter flights are estimated at 15 flights over the course of the 7 to 21-day work window. These flights would facilitate various phases of the removal and replacement of the existing valve.

Transient presence of the large mammal species is just as likely, if not more likely than under Alternative 2, given the reduction in flights. However, under Alternative 3, the potential for grizzly bear interaction with contractors is elevated given the extended presence of food stored 0.4 to 0.6 miles from the project area at designated campsites. Best management practices would be adhered to regarding food storage, but the implementation of BMPs does not preclude the potential for interaction due to human influence. The effects potentially imposed on wolves, Canada lynx, and wolverine by helicopter overflight would be reduced, commensurate with the reduction in the approximate number of flights provided under Alternative 3. Furthermore, construction activity during fall 2019 would be unlikely to disrupt overwintering of native wildlife species using riparian or forested habitat (Youkey, 2017, pers. comm.). While unlikely found at the elevation of the project site, Northern spotted owl may be affected by the helicopter overflight path. The reduction in the number of helicopter flights required under this alternative would reduce the potential effects experienced by this species as compared to Alternative 2. The effects of the helicopter flights would be temporary and insignificant, particularly as the project work window falls after the young would be dispersed.

3.4.3 ESA Conclusions on Threatened and Endangered Species

A biological assessment was submitted to USFWS on January 19, 2018, to evaluate effects of the proposed action on listed species, as compared to the environmental baseline (a “snapshot

in time” of conditions for the species at the time of evaluation). The effects of the two Action Alternatives on ESA-listed species were very similar, differing only in the implementation strategy of more helicopter flights and less camping in Alternative 2 and construction crews camping to allow fewer helicopter flights under Alternative 3. The effects of these two alternatives are discussed in the above sections. A letter of concurrence was received from USFWS on March 1, 2018. The findings of effects for ESA-listed species are summarized as follows:

- Wolverine (candidate species) – not likely to jeopardize the continued existence of this species
- Canada lynx – not likely to adversely affect
- Gray wolf – not likely to adversely affect
- Grizzly bear – not likely to adversely affect
- Northern spotted owl and their DCH – not likely to adversely affect
- Bull Trout and their DCH – not likely to adversely affect
- UCR steelhead – not likely to adversely affect
- UCR spring Chinook salmon – not likely to adversely affect

3.5 Water Resources

Issues related to water resources analyzed in this section include the potential for drawdown and refill, and the potential for increased flow down Snow Creek. The resources discussed are divided into two sections—Hydrology and Water Quality.

3.5.1 Hydrology

3.5.1.1 Affected Environment

The Wenatchee River Watershed has various demands on the water resources within the region, namely instream flows. The discharge of Icicle Creek has been altered by water diversions since 1905. These diversions can reduce the flow in the lower reaches to very low levels during the summer and early fall (WRSC, 1998). Water is diverted above the Snow Lakes trailhead (RM 5.7) by the City of Leavenworth (1912, 3 cfs year-round) and the IPID (1910, 117 cfs during the irrigation season). Also, water is diverted below the trailhead (RM 4.5) by LNFH (1942, 42 cfs year-round) and Cascade Orchard Irrigation Company (1905, 12 cfs during irrigation season). Irrigation diversions can remove 48 percent and 79 percent of the mean August and September flows, respectively (Mullan, et al. 1992). To ensure adequate water supply for LNFH throughout the summer months, a supplementary water supply (16,000 acre-feet) was developed in the Snow/Nada Lakes Basin, about 7 miles from LNFH and 1 mile above it in elevation. IPID also supplements its irrigation diversions from four other high elevation lakes.

According to Wurster and Montgomery Water Group, in most years, the reservoirs are capable of providing 50 cfs of supplemental flow from approximately early July to October with a reasonable expectation of refilling the withdrawn amount by July of the following year (Wurster, 2006 and Montgomery Water Group 2004). Full pool at upper Snow Lake occurs

at elevation 5,420 feet, and has an estimated storage of 12,450 acre-feet (Wurster, 2006). The term “water year” deals with surface-water supply, and it is defined as the 12-months from October 1 of any given year through September 30 of the following year. The water year (WY) is designated by the calendar year in which it ends, which includes 9 of the 12 months. Thus, the year ending September 30, 1999, is called the “WY 1999” (USGS, 2016).

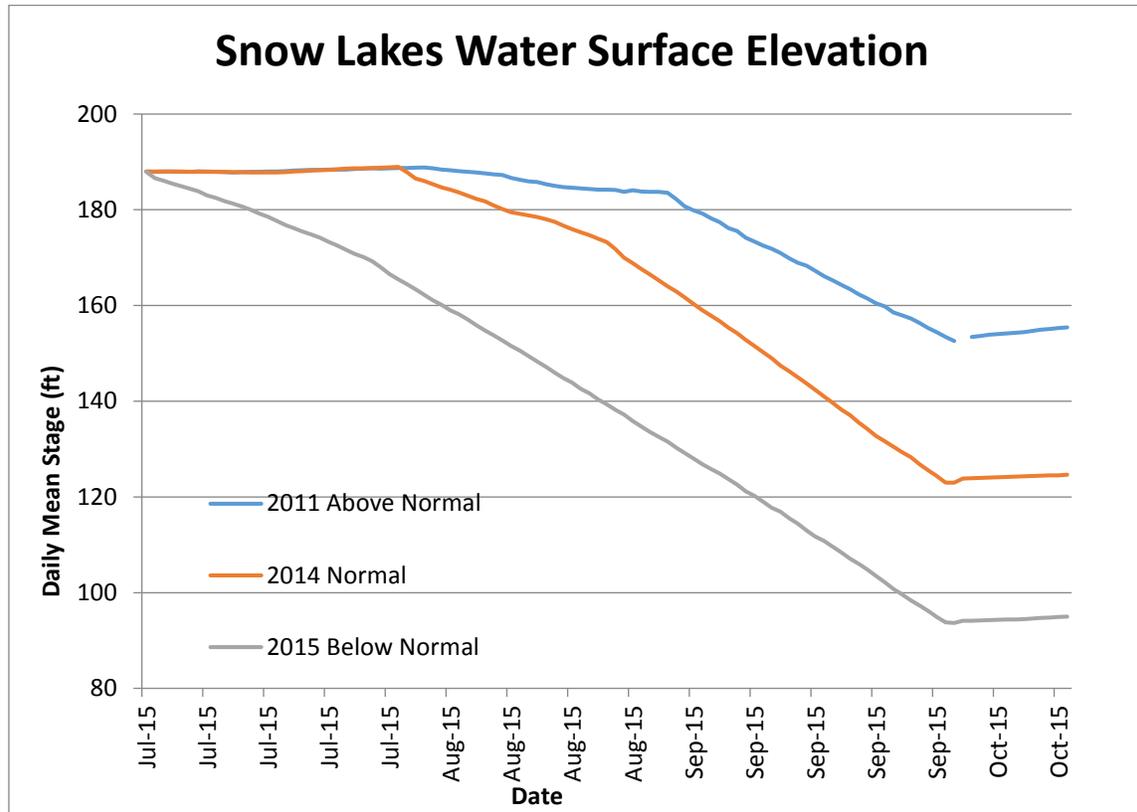


Figure 3-2. Above normal, normal, and below normal late summer months for Snow Lake Basin based on the Palmer Drought Severity Index for the East Slope Cascades, Washington.

Figure 3-2 displays Snow Lake elevations based on three recent years of above normal, normal, and below normal water years. Figure 3-2 shows that reservoir elevations fluctuate based on water years. The Palmer Drought Severity Index (PDSI) for the East Slope Cascades, Washington classified 2011 as an above normal water year, 2014 as a normal water year, and 2015 as a below normal water year. This PDSI was determined by selecting the options of Climate Division 6: East Slope Cascades/Washington, 1-month interval, and PDSI at the following website: <https://www.ncdc.noaa.gov/cag/> (last accessed December 19, 2017).

Table 3-3 shows the calculations for the PDSI for Snow Lake. The PDSI uses a zero as normal, and drought is shown in terms of negative numbers. For example, negative 2 is moderate drought, negative 3 is severe drought, and negative 4 is extreme drought. Palmer’s algorithm also is used to describe wet spells, using corresponding positive numbers. The Palmer index can therefore be applied to any site for which sufficient precipitation and

temperature data is available. An important note: in all 3 years—above normal, normal, and below normal—Snow Lake refilled.

Table 3-3. PDSI for upper Snow Lake WY 2006 to 2016.

| Palmer Drought Severity Index | | | |
|-------------------------------|-----------------------------|--------------------------------|--------------|
| Year | PDSI August | PDSI September | |
| 2006 | -0.56 | -0.91 | |
| 2007 | -1.78 | -1.93 | |
| 2008 | -0.82 | -1.3 | |
| 2009 | -0.58 | -0.67 | |
| 2010 | 2.46 | 2.96 | |
| 2011 | 3.3 | 2.39 | Above Normal |
| 2012 | 2.39 | 1.37 | |
| 2013 | 1.4 | 3.04 | |
| 2014 | 0.35 | 0.13 | Normal |
| 2015 | -3.56 | -3.62 | Below Normal |
| 2016 | -1.82 | -1.8 | |

Supplemental flow of 50 cfs from Snow Creek ensures LNFH can withdraw its full water right from Icicle Creek from approximately July to October. These supplemental flows also benefit the Icicle Creek system by reducing water temperatures and increasing flow levels when flows are typically reduced due to upstream irrigation. The 50 cfs release from Snow Lake equates to nearly 7,000 acre-feet of storage, a volume recommended by Wurster (2006) with an estimated 60 percent probability that inflows to upper Snow Lake will meet or exceed the released volume. Events such as prolonged equipment malfunction or two or more consecutive years of drought would alter the release operations and may result in reinitiating consultation (USFWS, 2014).

Historical data suggest flow releases from the valve occur between July and October for a period of 77 days. Outside this period, there has been limited continuous streamflow data available to determine the natural flow conditions found within this portion of the Snow Creek watershed. There are monitoring stations installed at four locations along the Snow Creek watershed mainly to monitor inflow/outflow into and from Snow Lake. Flow data is collected during periods when the Snow Lake valve is opened for irrigation and LNFH water needs. The range of discharge out of the current valve over the average of 77 days is between 16.7 and 75 cfs. The maximum discharge of 75 cfs is more than double the current 30 cfs design capacity. The mean discharge out of the valve is 43.6 cfs.

Whether the Snow Creek watershed is able to maintain the LNFH's 50 cfs and IPID's 30 cfs simultaneously is determined by several factors, which include spring runoff storage into Snow Lake and Nada Lake. Data from the Snow Creek monitoring gauge shows only elevated flow rates exceeding 80 cfs during periods of runoff. The Snow Creek monitoring

gage flows collected from October 2003 to 2017 show a maximum of 194 cfs on May 9, 2005. Minimum flows have been zero cfs. The graph below identifies recent historical flow ranges (Figure 3-3).

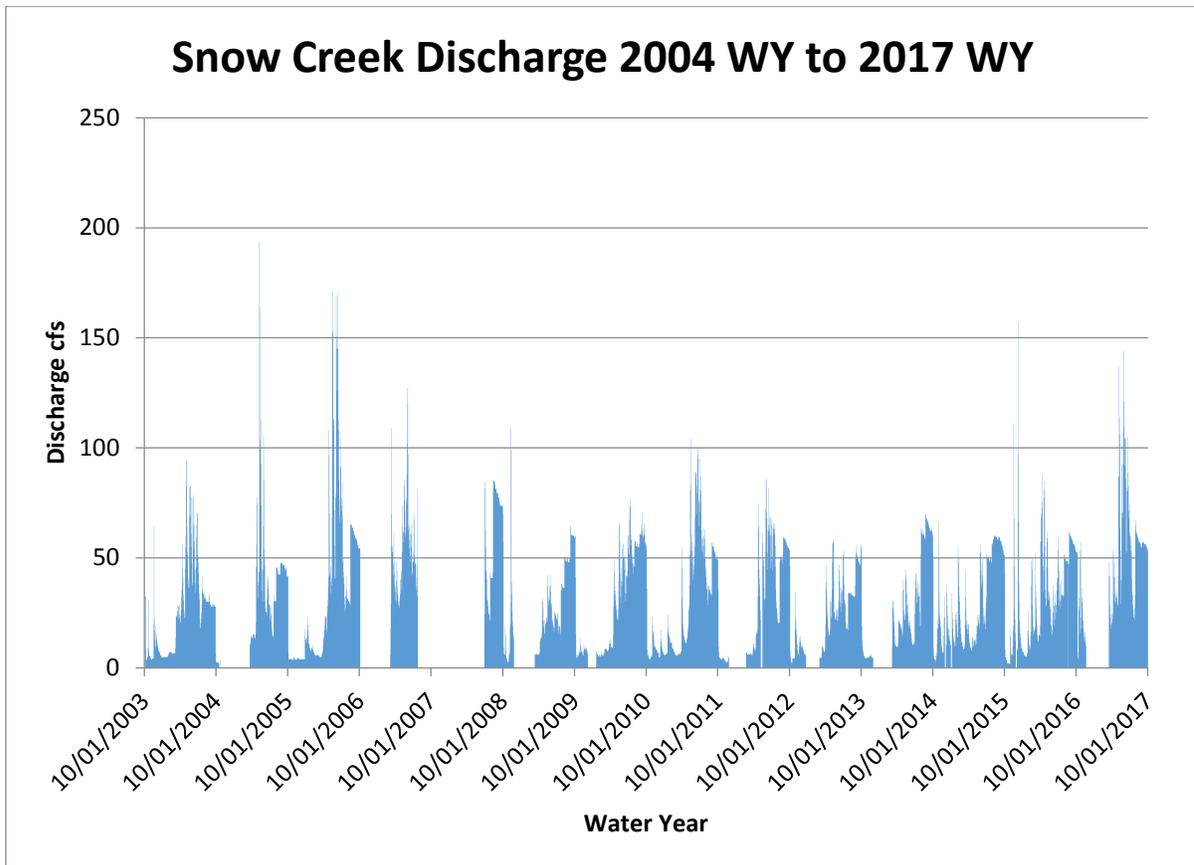


Figure 3-3. Snow Creek discharge measured year-round from WY 2003 to 2017. Data is in water years. WY 2004 begins 10/01/2003 to 9/30/2004.

Since data collection began in October 2003 (WY 2004), flow data for Snow Creek has not been consistent. Several years contain missing daily values, which have a minor effect on the computation of yearly minimum, maximum, and mean flow characteristics. Water years 2004, 2006, 2011, and 2016 contain complete flow data; however, 4 days are missing from WY 2005 (October 1 to October 4, 2004) and 6 days are missing from WY 2017 (November 28 to December 3, 2016). Spikes in the data that occur in the early part of the water year may be caused by icy conditions.

As stated, the PDSI for the East Slope Cascades, Washington, classified 2011 as an above normal water year, 2014 as a normal water year, and 2015 as a below normal water year. Figure 3-4 indicates that in normal (2014) and below normal (2015) water years, Snow Creek cfs rates ranged from 60 to 70 cfs.

The PDSI uses readily available temperature and precipitation data to estimate relative dryness. It is a standardized index that spans -10 (dry) to +10 (wet). It has been reasonably successful at quantifying long-term drought. As it uses temperature data and a physical

water balance model, it can capture the basic effect of global warming on drought through changes in potential evapotranspiration.

However, according to Dai and NCAR, key limitations of the PDSI are as follows:

- It is not as comparable across regions as the Standardized Precipitation Index, but this can be alleviated by using the self-calibrating PDSI.
- It lacks multi-timescale features of indices like the Standardized Precipitation Index, making it difficult to correlate with specific water resources like runoff, snowpack, reservoir storage, etc.
- It does not account for snow or ice (delayed runoff); assumes precipitation is immediately available (2017).

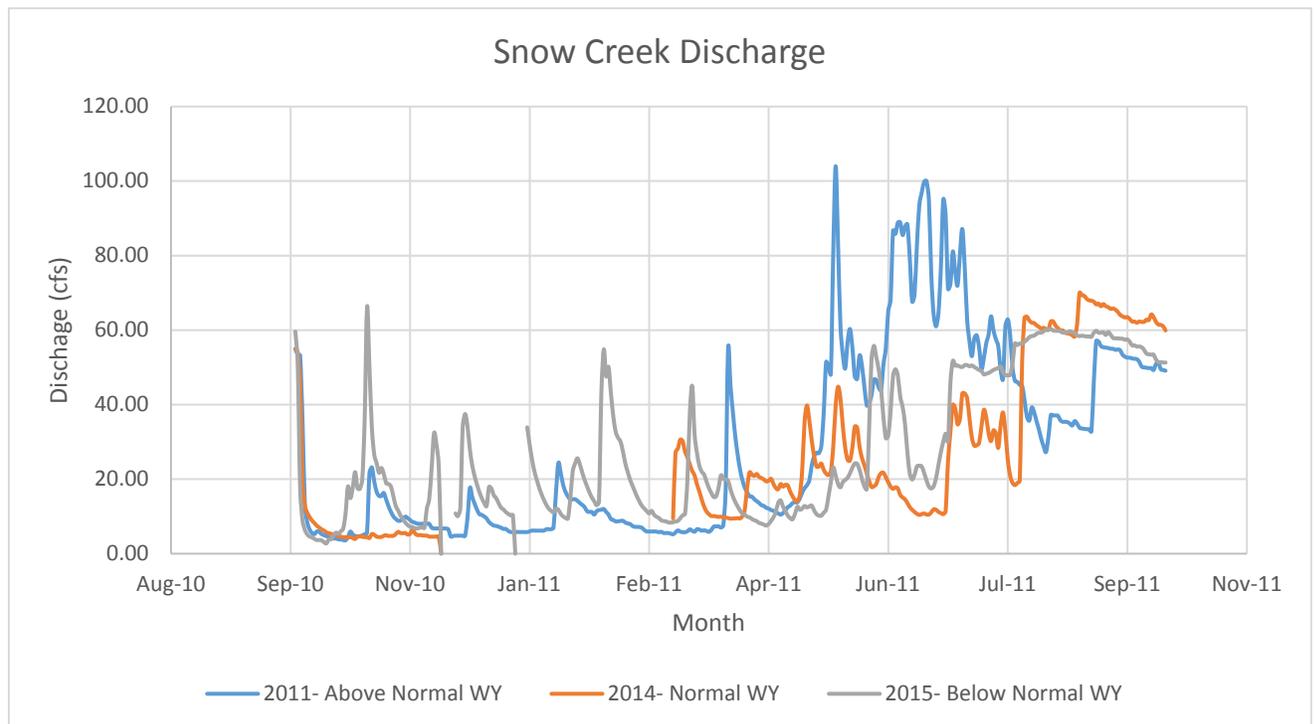


Figure 3-4. Snow Creek discharge for 2011 above normal water year, 2014 normal water year, and 2015 below normal water year using the PDSI.

Continuous data from Snow Creek show sustained flow exceeding 80 cfs during snow runoff. Although 1 year may be short of water, it appears that even during 2-year and 3-year droughts, the lakes should provide about 40 cfs for 3 months provided sufficient storage in the lakes exists. That supply should be adequate for meeting water supply needs (Montgomery Water Group, 2004).

Surface flows for Icicle Creek are continuously measured at the USGS gauging station (No. 12458000) located at RM 5.8. This gauging station is located above all water withdrawal operations in the watershed. This is the only relatively consistently monitored flow data available for Icicle Creek prior to 2007. Daily mean flow data for WY 1936 to 1971 and from 1993 to present are available from the USGS. The annual mean flow of Icicle Creek at

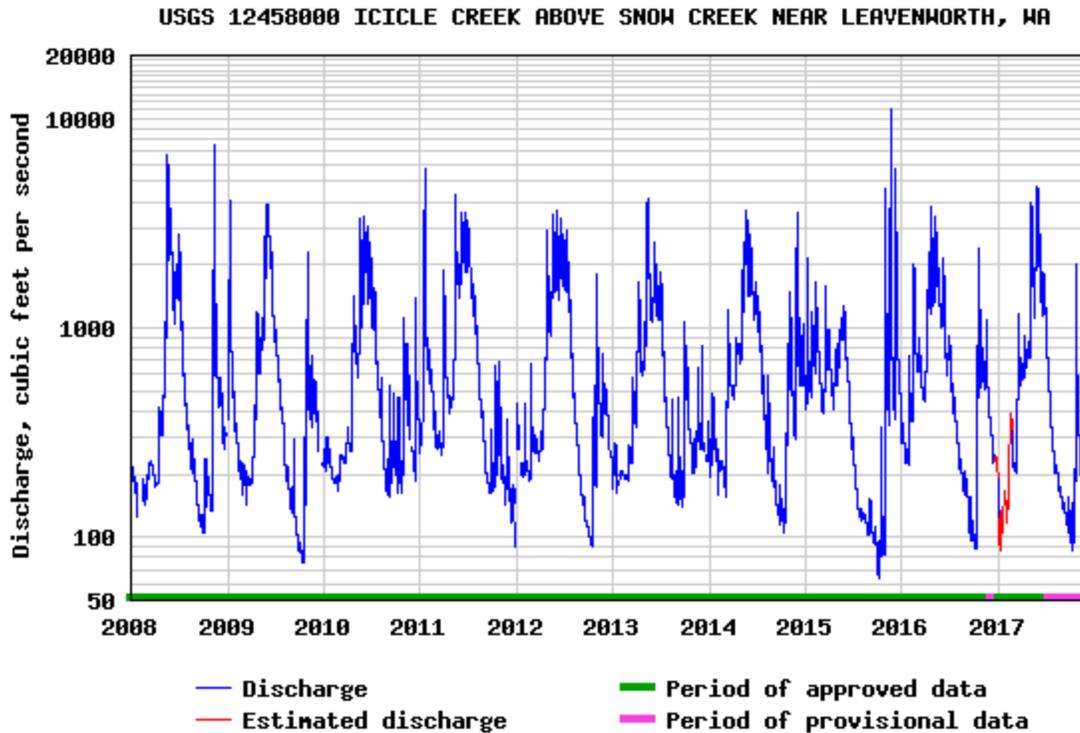


Figure 3-6. Icicle Creek discharge measured at USGS station 12458000 year-round from 2008 to 2017 (USGS, 2017).

Riparian impacts based upon historical flows are limited. During precipitation and snowmelt when runoff flows become elevated and tend to scour out channel bottoms and surrounding banks, impacts on riparian species depend upon soil type and root systems. Due to channel morphology, flow rates can be extreme and have high velocities that remove emergent vegetative plant species with limited root systems. This natural variation is similar for aquatic macroinvertebrates. Seasonal impacts on macroinvertebrates are observed during the winter and spring runoff events. During these periods of runoff, a stream can be denuded of its invertebrate population, but recolonize as the flows are decreased and macroinvertebrates drift from upstream habitats. Aquatic organisms that are restricted to their habitat or environment have natural adaptations to survive periods of drought. Figure 3-3 indicates that runoff events in Snow Creek exceeded 190 cfs in WY 2005. The level of flow down Snow Creek ranges from zero cfs to 194.7 cfs and is within the natural variation of the creek with spring runoff, so it is within the realm of what is already occurring.

3.5.1.2 Environmental Consequences

3.5.1.2.1 Alternative 1: No Action

Under the No Action Alternative, USFWS would continue to operate the upper Snow Lake valve as has been done in the past. Reclamation and the USFWS would not replace the valve at upper Snow Lake and no efforts would be made to ensure a reliable water source for LNFH and IPID in the future. The discharge would remain limited to approximately 50 cfs, which could restrict the ability of IPID and LNFH to withdraw water simultaneously. IPID

would have first access to the water supply, which would potentially leave LNFH with a shortage of cool water to supply its rearing and holding ponds. In addition, in the likely event of valve failure, without the average water release of approximately 50 cfs from the Snow and Nada lake supplementation reservoirs in August and September, the downstream reaches of Icicle Creek could go dry in some years (Skalicky et al., 2013).

The valve has passed its life expectancy and will eventually malfunction or fail. This may lead to reinitiating consultation with NMFS. As stated in the 2017 NMFS BiOp, “if events such as prolonged equipment malfunction or two or more consecutive years of drought occur, this may alter the lake reservoir release operations. If this occurs and the USFWS determines it is necessary to alter releases, reinitiating consultation may be necessary” (NMFS, 2017).

3.5.1.2.2 Proposed Action: Alternative 2 and Alternative 3 Effects Common to Both Alternatives

Under Alternatives 2 and 3, there would be no change in water rights or water storage contracts. The valve would be replaced under both alternatives ensuring a reliable water supply at the release rate of up to 50 to 80 cfs needed for both the LNFH and IPID from July into October. The proposed action alternatives would allow Reclamation and USFWS to comply with the 2017 NMFS BiOp terms and conditions, specifically terms and conditions 2j, and may assist with meeting terms and conditions 2c, d, and e.

Reclamation and USFWS’s PDSI analysis presented in Section 3.5.1.1 demonstrates that upper Snow Lake would refill in below average water years. Notably, the only year it did not refill in the last 17 years was in 2001, a drought year (Anchor QEA, 2011). Mauger et al. (2017) modeled climate projections into the 2080s specific to changing streamflow in Icicle, Peshastin, and Mission Creeks. Their findings follow a similar pattern for all three streams. For instance, the authors found changes in streamflow follow the expected response to a decrease in snowpack — more precipitation falls as rain in winter, snow accumulation is reduced, and the snowmelt occurs earlier. This results in increased winter flows, an earlier and less-pronounced peak in spring flows, and a decrease in summer flows in each of the three creeks.

This research highlights two important points. The first is that precipitation will continue to occur in the analysis area but is more likely to melt earlier, and more precipitation could come as rainfall and not snow. Thus, it is reasonably certain that upper and lower Snow Lake and Nada Lake will continue to fill. Second, summer base-flows in these creeks will decrease. This highlights the beneficial effects that flow releases associated with this proposed action could have in Icicle and Snow creeks currently and in future releases of 50 to 80 cfs between July and October.

The replacement valve has the capacity to reliably deliver 80 cfs. As discussed throughout this EA, the current valve has released up to 75 cfs on some occasions. The new release capacity represents a 6.67 percent increase over this amount. Section 3.5.1.1 (Figure 3-4) demonstrates that 80 cfs is well within the measured release and range of variability of Snow Creek. Therefore, the proposed action would have limited impacts upon Snow Creek riparian vegetation, as well as sediment erosion within Snow Creek. As well documented by

professional hydrologists and fluvial geomorphologists, periods of high runoff (upwards of 190 cfs), such as those shown in Figure 3-3, can and do cause bank instability, denuded vegetation, and head-cutting. Releases of up to 80 cfs would flow as “controlled” natural runoff, which is below maximum-recorded flow for this system, and occur within the established Snow Creek channel. Therefore, flows up to 80 cfs are not expected to cause abnormal or deleterious effects.

3.5.2 Water Quality

3.5.2.1 Affected Environment

Sections 303(d) and 305(b) of the Clean Water Act requires states to identify and characterize waters that do not meet, or are not expected to meet, applicable water quality standards. Portions of the Wenatchee River watershed do not meet standards for aquatic life, but a total maximum daily load (TMDL) implementation plan has been initiated to improve water quality of impaired surface waters (Ecology, 2009). Icicle Creek is on the Washington State Water Quality Assessment (also known as the 303(d) list) for not meeting temperature and dissolved oxygen (DO) standards (Ecology, 2016). Snow Creek is listed as impaired for temperature, pH, and DO (Ecology, 2016). The Washington State water quality standards applicable to Snow and Icicle creeks are as follows:

- **Temperature:** 13°C from August 15 to July 15 and 16°C from July 15 to August 15.
- **Dissolved oxygen:** To protect core summer salmonid habitat, the 1-day minimum DO criterion is 9.5 mg/L and should not fall below this concentration frequency more than once every 10 years on average.
- **pH:** pH shall be within the range of 6.5 to 8.5 standard units, with a human-caused variation within the above range of less than 0.2 units.
- **Turbidity:** To protect core summer salmonid habitat, the maximum turbidity shall not exceed 5 nephelometric turbidity units (NTUs) over background when the background is 50 NTUs or less; or a 10 percent increase in turbidity when the background turbidity is more the 50 NTUs.
- **TMDL:** Ecology completed a TMDL for the Wenatchee River watershed, including Icicle Creek, for DO and pH, which was approved by the EPA on August 25, 2009. The TMDL allocates 5.7 µg/L (maximum daily total phosphorus concentration) and 0.52 kg/day of total phosphorus maximum daily mass loading during the critical periods of March through May and July through October to the LNFH (Ecology, 2009).
- **Polychlorinated Biphenyls (PCBs):** To protect aquatic life, PCB concentrations in surface water must not exceed 2.0 µg/L as an acute criterion over a 24-hour period.

Temperature

In 2016, temperature loggers were deployed at 13 sites in Icicle Creek upstream from, adjacent to, and downstream from the LNFH. During the summer, Icicle Creek water warmed as it moved downstream with two exceptions — the Snow Creek confluence and the LNFH spillway pool. Snow Creek received water from a diversion that withdraws water from the bottom of Snow Lake during the summer. Prior to supplementation, water in Snow

Creek had a high 7DADMax (average of seven consecutive measures of daily maximum temperatures) of 1.7°C warmer than water temperatures recorded 0.1 km upstream in Icicle Creek. However, immediately after supplementation began, water temperatures in Snow Creek dropped to 0.8°C cooler than Icicle Creek 0.1 km upstream. Snow Creek water temperatures continued to drop throughout the period of supplementation. The largest water temperature difference between Snow Creek and Icicle Creek 0.1 km upstream was 5.0°C and occurred on August 15, 2016. Temperatures as high as 21°C (70°F) have been recorded in Icicle Creek (Mullan et al., 1992). The spillway pool at LNFH receives hatchery effluent river water mixed with well water making an off-channel pool with a high 7DADMax that was on average 1.8°C cooler than in Icicle Creek directly upstream from LNFH. At both locations, Icicle Creek water temperatures were reduced by LNFH operations (Fraser, 2017).

Phosphorus

Icicle Creek is very sensitive to any addition of nutrients, due to the temperature, DO, and pH values that have been obtained during monitoring. Although phosphorus levels are relatively low (less than 20 ug/L), they are consistently too high to meet the pH water-quality standards (Ecology, 2009). Nutrients can create nuisance conditions in streams by choking streams with excessive plant and algae growth. These conditions may interfere with water intake structures, water conveyance in irrigation canals, and recreation including fishing, boating, and swimming.

Nutrients (nitrogen and phosphorus) are necessary for algal growth of periphyton, and phosphorus is often the most limiting nutrient for algal growth in natural freshwater (Wetzel, 1983). This is particularly true if the dissolved inorganic nitrogen to orthophosphate ratio (N:P ratio) is greater than 7 (Ecology, 2009).

The upper headwaters of Icicle Creek and Snow Creek have always been at or near the reporting limit (3 ug/L) for phosphorus. Operational changes at LNFH have taken place and a decrease in phosphorus concentration in the discharge was observed in 2007 compared with the 2002 concentrations. The final mass-loading effluent limit for total phosphorus, on all outfalls at the LNFH, comes directly from the wasteload allocation assigned to LNFH in the 2009 Wenatchee TMDL for DO and pH. The total phosphorus loading is 0.52 kg/day and applies March 1 to May 31 and July 1 to October 31 each year (Ecology, 2009).

Dissolved Oxygen

In upper Icicle Creek (above the LNFH), DO concentrations were less than the 9.5 mg/L criterion during the summer months. Natural conditions currently restrict any cumulative change in DO greater than 0.2 mg/L due to non-point loading. In these reaches, the diel changes in the continuous DO and pH data were primarily due to photosynthesis and respiration of periphyton (attached algae). These changes were observed from the late August survey when water temperatures were warm (greater than 18.0 °C) and diel water temperature change was approximately 3 to 4°C. DO excursions below 9.5 mg/L also occurred during the July and September surveys. Periphyton respiration and photosynthesis can cause large diel fluctuations in DO and pH (Ecology, 2009). Photosynthesis dominates during daylight hours and respiration dominates at night. DO is generated during

photosynthesis, producing maximum DO concentrations in the afternoon. Respiration by periphyton and bacteria consumes DO, causing minimum DO concentrations usually in the early morning just before sunrise (Ecology, 2009).

pH

Based on water quality data collected in 2002 and 2003 from lower Icicle Creek, pH exceeded the upper 8.5 pH criterion during the low-flow season (July to October). Excessive periphyton growth caused the pH to exceed the 8.5 upper pH limit. Exceedances also occurred from August to January and in April indicating that the onset of excessive periphyton productivity (i.e., enough to cause pH exceedances) occurred in August and continued through the winter despite very low water temperatures in the winter (growth rates for periphyton are temperature-dependent). Phosphorus is the limiting factor relating to periphyton growth (Ecology, 2009).

Turbidity

Little to no data is available for sedimentation and turbidity in Snow Creek. However, it has been historically observed that high sediment loads occur in Icicle Creek. All of the dominant land types in the Icicle Creek watershed have high sediment delivery hazards and background hillslope erosion rates for the watershed are high and estimated over 4,500 tons per year (USFS, 1995). High sediment delivery rates were reported in a majority of the upper reaches surveyed. The surveyors also reported that sedimentation appeared to be a problem throughout the system (USFWS, 2014). There was no data found on Snow Creek for sediments or turbidity; however, with the existing channel morphology, flow rates can be extreme with high velocities that can remove silt and scour from the channel, along with certain plant species that have limiting root systems. Runoff events in Snow Creek have exceeded 190 cfs in recent years, 2003 to 2016 (USFWS, 2014).

PCBs

Ecology conducted a source assessment for PCB impacts in the Wenatchee River Watershed from 2014 to 2015 and reported the findings in 2016. In a May 9, 2016, report to the EPA, Ecology reported that based on water sampling results, there is no obvious source of PCBs in Icicle Creek. In addition, after 2 years of sampling the sediments and periphyton near the LNFH, there is no evidence that the hatchery is contributing significant amounts of PCBs to the creek. Ecology's Wenatchee River Watershed Source Assessment for PCBs was published in July 2016 and is available online: <https://fortress.wa.gov/ecy/publications/documents/1603029.pdf> (last accessed December 19, 2017).

3.5.2.2 Environmental Consequences

3.5.2.2.1 Alternative 1: No Action

Under the No Action Alternative, no change in water quality would occur as long as the existing valve is operational. Failure of the valve and loss of storage water as a resource for the hatchery would return Snow Creek to natural flows and would likely increase water temperature, hence exacerbating existing water quality issues in Icicle Creek and the

Wenatchee Basin. Snow and Icicle creeks would remain waters of concern due to the impairments listed above; however, improvements overtime might occur due to active management under the various TMDL implementation plans for the Wenatchee Basin (Ecology, 2009). If the flows decrease to the point that Snow Creek goes dry, as stated in Section 3.5.1, this would further exacerbate the existing water quality issues within the Wenatchee River Basin Watershed.

3.5.2.2.2 Proposed Action: Alternative 2 and Alternative 3 Effects Common to Both Alternatives

Any temporary construction-related impacts on surface water quality would be avoided or minimized by complying with a Construction Stormwater General National Pollutant Discharge Elimination System Permit, if required. Otherwise, BMPs would be used to minimize the impacts. Operation of the new valve and the projected alteration of releases in the July to October timeframe could potentially alter constituents of concern in Snow and Icicle creeks. In particular, temperature, DO, pH, phosphorus, and turbidity could be altered.

The addition of flows from Snow Creek, which has cooler temperatures, is expected to continue lowering the water temperature of Icicle Creek after mixing. Additionally, LNFH outflow is expected to further cool Icicle Creek due to the transport and discharge of cooler Snow Creek water through the facility and, perhaps, due to the addition of colder groundwater in the hatchery outflow. Future temperatures under the action alternatives are likely to be similar to those documented during prior LNFH supplementation flows with decreases of water temperatures from RM 5.5 to 4.5 during this time (USFWS, 2006).

Ultimately, the effect of the action alternatives and LNFH's future operation of its water delivery system would improve water temperature conditions seasonally in some reaches of Icicle Creek. The temperature cooling effect of LNFH operations, particularly the addition of colder Snow Creek water, is also expected to increase DO in Icicle Creek. This is mainly due to higher saturation conditions for DO in the cooler water; although, there may be a decrease in downstream DO due to increased decomposing periphyton.

In the proposed project, waterbodies affected by the growth of periphyton, due to the addition of phosphorus, the natural re-aeration processes cannot compensate for plant and bacterial respiration, and DO levels become too low at night. Additionally, the pH becomes high at night and too low during the day. However, increased streamflow below the hatchery, decreased temperatures, and increased DO levels should help to control the onset of periphyton growth, possibly improving beneficial uses and the quality of the water. LNFH has a mass-loading value set for phosphorus, which should continue to reduce the concentrations of phosphorus and growth of periphyton, further reducing the risk of pH levels rising to the point of non-compliance with Washington State Water Quality Standards.

There was no data found on Snow Creek for sediments or turbidity. It is possible the proposed action could result in increased turbidity in Snow Creek and Icicle Creek. However, runoff events in Snow Creek range from zero cfs to 190 cfs between WY 2003 and WY 2016, which exceeds the proposed maximum release rate of 80 cfs (see Section 3.5.1

and Figure 3-3). The natural conditions contribute more impact on turbidity in the creeks than the proposed 50 to 80 cfs release from the valve.

Since there are no obvious sources of PCBs in Icicle Creek, there should be no impacts from PCBs with regard to the proposed project.

3.6 Wildlife

3.6.1 Affected Environment

The area evaluated for effects to wildlife species extends from upper Snow Lake, through Nada Lake, down Snow Creek to the confluence with Icicle Creek, ending at LNFH. Wildlife habitat in the drainage includes riparian vegetation and habitat on the perimeter of upper Snow and Nada lakes, extending down Snow Creek. At higher altitude in the immediate vicinity of the project site, steep gradient talus slopes and boulder fields on the northeastern shores transition to wet forest consisting of Douglas fir and Cedar with an understory of Salal, berries and mountain hemlock descending along Snow Creek (USFS, 2018).

Wildlife species and habitat evaluated in this analysis include management indicator species (MIS) for the USFS Region 6 Wenatchee Land and Resource Management Plan for the Wenatchee National Forest (USFS, 1990); Threatened, Endangered and Sensitive species listed for Chelan County; and species of special interest or with unique or limited habitat in the assessment area (e.g., mountain goats).

Management Indicator Species

The Region 6 Wenatchee Land and Resource Management Plan for the Wenatchee National Forest identifies multiple wildlife MIS (USFS, 1990). Mature and old growth habitat MIS used in the plan are Northern spotted owl, pileated woodpecker (*Dryocopus pileatus*), pine marten (*Martes martes*) and the northern three-toed woodpecker (*Picoides dorsalis*), each frequently affected by habitat distribution and abundance. Rocky Mountain elk (*Cervus elaphus nelson*), mountain goats, and mule deer (*Odocoileus hemionus*) are the MIS identified for big game habitat, typically affected by alteration or distribution of cover and forage. Riparian habitat MIS for the forest are ruffed grouse and beaver. Wildlife use of riparian habitat is greater than adjacent areas, accounting for the representation of approximately 260 species by riparian habitat MIS.

3.6.2 Environmental Consequences

3.6.2.1 Alternative 1: No Action

Under the No Action Alternative, reduced flows in Icicle Creek and increased water surface elevation of upper Snow Lake as a result of valve malfunction could create temporary effects on riparian-obligates.

3.6.2.2 Proposed Action: Alternative 2 and 3 Effects Common to Both

Under Alternatives 2 and 3, there would be no terrestrial habitat loss because areas used for staging or construction is already disturbed. Some limited staging disturbances would occur

on the dry lakebed at the east end of upper Snow Lake following drawdown at the end of the summer, but this would not result in loss of habitat or displacement of wildlife because the area is already subject to fluctuations in water surface elevation. Construction activity would last up to 21 days at the upper Snow Lake tunnel outlet works. Wildlife would likely be exposed to some short-term increases in noise during construction due largely to multiple helicopter trips. In response to periodic increases in noise and activity, most wildlife species are expected to disperse to adjacent habitat areas to avoid impacts.

It is acknowledged that the window for black bear denning activity (late October/early November) in Washington could potentially overlap with the construction window (Smith et al., 1994). Effects to black bear denning and presence could occur from helicopter flights and construction noise under both alternatives. These effects would be minimized by restricting flight elevation to 2,000 feet. WDFW would review and concur with flight plans to avoid known habitat and lessen potential effects. Effects are expected to be temporary.

There is a known Peregrine falcon nest near Snow Creek. Construction activities and associated helicopter use would occur in the fall, which is outside Peregrine falcon breeding season and after juvenile dispersal. Therefore, project activity would be unlikely to disturb or adversely affect individual birds (Youkey 2017, pers. comm.).

As stated earlier, the current maximum release documented out of the valve is 75 cfs, and the new valve would allow release of the full 50 cfs for LNHF flows and up to an additional 30 cfs for IPID. In this case, wildlife around Snow Creek would experience an increase of up to 5 cfs and potentially affected. However, these effects are considered negligible due to the following:

- Increased flows of this magnitude would only occur for a maximum of 12 days at 80 cfs, after which IPID's 750 acre-feet of water supply would be exhausted, and releases would return to 50 cfs.
- The level of flow down Snow Creek is within the natural variation of the creek with spring runoff, so it is within the realm of what the creek experiences naturally.

Likewise, other release scenarios of IPID's 750 acre-feet, such as lower volume releases over longer periods, would also likely have negligible effects to wildlife for these same reasons.

3.6.2.3 Alternative 3

Under Alternative 3, a contractor basecamp and crew camping would occur at established USFWS campsites. Frequent recreation occurs on lands owned by USFWS in this area and in the adjacent ALWA; therefore, impacts on wildlife associated with camping are expected to be minimal. Contractor campers would be required to store supplies in bear-proof containers to limit potential interaction with black bears. These campsites have already been disturbed, and pit toilets are located near the campsites as outlined in Figure 2-5. Under Alternative 3, project-associated disturbance to all wildlife could be reduced (compared to Alternative 2) because there are fewer roundtrip helicopter flights.

3.6.2.4 Other Wildlife Species — Mountain Goats

Helicopter flights have been shown to disturb mountain goats (Cote 1996). The degree of disturbance is directly related to the distance between the helicopter and the goats. In Cote’s study, 85 percent of goats were greatly disturbed by helicopter flights less than 500 meters away, while only 9 percent of goats were greatly disturbed by flights more than 1,500 meters away (Cote, 1996). Goats that were greatly disturbed would run to the nearest escape terrain, typically a cliff face, where they may stay alert and forego foraging for some time. Cote (1996) recommended that helicopters remain at least 2 km (1.25 miles) away from mountain goat herds.

Reclamation would work with WDFW to identify an overflight plan that would minimize impacts on mountain goats to the greatest extent possible. Flight altitude would also remain at or above 2,000 feet for the greatest duration possible, excluding positioning of the new valve during installation.

3.6.2.4.1 Alternative 1: No Action

The No Action alternative would not affect habitat or populations for mountain goats.

3.6.2.4.2 Alternatives 2 and Alternative 3

Helicopter flights or construction activities could have minor, but short-term disturbance impacts to mountain goats if they are near of flights or construction during that time of year. Effects under Alternative 3 are less than under Alternative 2 due to the reduction in flights.

3.7 Wilderness

3.7.1 Affected Environment

The Wilderness Act of 1964 (Wilderness Act) established the National Wilderness Preservation System to protect Federal lands that qualify as wilderness by limiting allowable uses and management actions that would result in impacts on the natural setting. ALWA was inducted into the National Wilderness Preservation System in 1976 by the Alpine Lakes Area Management Act. The LNFH and location of the proposed valve replacement is within the Enchantment Permit Area but, as noted in Chapter 1, the project lands are not a part of the wilderness area.

In 1976, the ALWA was established as wilderness because it met the following criteria:

1. **Size:** Section 2(c) of the Wilderness Act defines wilderness as an area that, “...has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition.” The ALWA encompasses 394,000 acres.
2. **Naturalness, Untrammeled or Apparent Naturalness:** These criteria are defined as an area that, “...generally appears to have been affected primarily by the forces of nature with the imprint of man’s work substantially unnoticeable.” According to the designating legislation, “the area is comprised of an environment of timber valleys rising to rugged, snow-covered mountains, dotted with several hundred lakes,

- displaying unusual diversity of vegetation, and providing habitat for wildlife (Alpine Lakes Area Management Act of 1976).” Any manmade features go fundamentally unnoticed. The Wilderness Act also states that wilderness is, “...an area where the earth and its community of life are untrammelled by man...” and that it retains its “primeval character and influence.” Aside from the reservoir developments, the designated trail system and established campsites are the only signs of human activity within the wilderness. The majority of the area remains relatively untouched.
3. **Solitude or Primitive and Unconfined Recreation Quality:** This criteria refers to how wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation. Solitude is a personal, subjective value defined as, “isolation from the sight, sound, and presence of others and the developments of humans.” The abundance of natural resources and recreational opportunities were noted in the designating legislation. This region is abundant in natural resources, including opportunities for a great diversity of recreational use and enjoyment during all seasons of the year. Recreation opportunities include backpacking, climbing, kayaking, canoeing, rafting, horse packing, birdwatching, stargazing, and extraordinary opportunities for solitude (Alpine Lakes Area Management Act of 1976).
 4. **Other Values:** While these values are not required, they are documented as part of the evaluation process and in designating legislation. Other values documented for ALWA include the potential for outdoor education and scientific research. The area was also described as part of a fragile ecosystem and having outstanding natural beauty.

The ALWA encompasses approximately 394,000 acres in the Central Cascades Region. More than 700 lakes and mountain ponds dot the glacier-carved terrain of this wilderness. Since 1981, the USFS has managed carrying capacity for the ALWA through planning and zoning, with the LNFH recognized as an inholding within the Enchantment Permit Area (USFS, 1981). This area includes Nada Lake, and upper and lower Snow Lake (USFS, 2017a). For camping within the Enchantment Permit Area between May 15 and October 31, public applicants must submit a request through an online preseason lottery. Permits not allocated by the lottery are available on a first-come, first-served basis through the online Recreation.gov Advance Reservation System. Additionally, 25 percent of permits are held by the Leavenworth Ranger District for daytrips (USFS, 2017b). According to the USFS, the demand for overnight permits far exceeds the number available (USFS, 2017b).

The Enchantment Permit Area is an extremely popular hiking area that is accessed by 47 trailheads and 615 miles of trails (USFS, 2017a). The Snow Lakes Trail (No. 1553) is a popular hiking trail near the proposed project location and staging area. The trail is 12.0 miles long and gains 6,500 feet elevation from the trailhead to upper Snow Lake (USFS, 2017c).

Fishing is managed by WDFW. In addition to possessing a freshwater fishing license, anglers age 15 and over must comply with specific size limits, gear restrictions, and bag limits (WDFW, 2017). Access to Nada Lake and upper and lower Snow Lake for fishing is

limited by seasonal access into the Core Enchantment Zone. For additional information on fish within this part of the project area, see Section 3.2.

3.7.2 Environmental Consequences

3.7.2.1 Alternative 1: No Action

Under the No Action Alternative, there would be no change or alteration of wilderness values. Hiking and camping in the area would continue. An eventual valve failure would result in only natural flows through Snow Creek and impacts on fisheries. These fishery impacts are discussed in Section 3.2.2.1 and 3.4.2.1.

3.7.2.2 Proposed Action: Alternative 2 and Alternative 3: Effects Common to Both Alternatives

LNFH facilities existed at the time of the designation as wilderness. As required by the Wilderness Act and the act designating the ALWA, access to valid occupancies such as the LNFH facilities is required. While allowed under the Act, there would be effects of the action alternatives on some wilderness values. The magnitude of these effects was determined by considering the public comments on the draft EA and coordinating with the USFS regarding its wilderness management objectives.

3.7.2.2.1 Wilderness Characteristics

Visitor expectations of apparent naturalness, remoteness, and solitude would be impacted by the sight and sound of a helicopter bringing crews and equipment to and from the project area. As previously discussed, Alternative 2 would limit the contractor to 30 roundtrip flights and Alternative 3 to 15 roundtrip flights. The use of the helicopter to fly crews and equipment into the area would create minor, short-term effects to visitors' perceptions of sight, sound, and solitude. Apparent naturalness of the surrounding wilderness would be affected by the use of helicopters and power tools for the valve installation. Human developments or alternations in and of themselves do not disqualify an area, as long as they are not major and the natural processes can largely be restored (USFWS, 2008). The LNFH facilities predate the wilderness, and human developments or alternations in and of themselves do not disqualify an area from wilderness (USFWS, 2008). Alternatives 2 and 3 meet the USFS's minimum requirement analysis requirements for the Wilderness Act (see Appendix C).

The installation or construction activities described for the proposed action would result in minor, short-term effects on sight, sound, and solitude, but most visitors do not visit the valve location. Instead, they remain on the trail or in campsites. If the existing LNFH developments or alternations did not disqualify the area for wilderness, the replacement of the existing valve and repairs to its support structures would, by extension, not create a long-term adverse effect on the designated wilderness. The replacement activities would occur outside the wilderness area and of limited duration. After completion, the valve and support structure would remain similar in appearance, and the changes would be substantially unnoticeable in the unit as a whole.

3.7.2.2.2 Recreation and Trails

The proposed helicopter transport of people and equipment would result in the addition of noise and mechanical sounds to the Enchantment Permit Area for short periods. These noises would draw the attention of visitors and compete with the sights and sounds of the natural world. However, helicopters would be restricted to 2,000 feet above the ground, and the number of flights would be limited to the least amount possible for transporting crews and equipment to and from the site. If possible, flights would be scheduled midweek to avoid high-use periods.

The impacts on recreational visitors within the Snow Lake Area would be minimized by the heavy, dense vegetation and rugged environment. The mechanical sounds would be muffled over relatively short distances, and the helicopter flights would be screened for the majority of the Snow Lake Trail route. The helicopter noise would be about 63 dBA at 650 feet and 75 dBA at 220 feet. Impacts would occur in short bursts of activities over 7 to 21 days and affect only individuals within the immediate proximity to the proposed activities.

There would be no additional use of the trail and Snow Lake parking area beyond the normal seasonal use by recreationists. There would be no effects to safety of hikers or campers associated with helicopter flights or the construction at the valve site within LNFH.

3.7.2.3 Alternative 3: Helicopter and Camping

Alternative 3 differs from Alternative 2 in its impacts on recreation. Under Alternative 3, crews would camp in one of the USFWS designated campsites. Visitors or recreational users may be displaced from a campsite in the Snow Lake Zone for the duration of the construction project, 7 to 21 days. The impacts of Alternative 3 on naturalness for solitude and unconfined recreation are half those of Alternative 2 because of fewer planned helicopter flights. However, the onsite camping in Alternative 3 would have some increased effects to naturalness.

4 CUMULATIVE IMPACTS

Past and ongoing actions that affect resources are described in Chapter 3. In addition to this information, Section 4.1 identifies reasonably foreseeable future actions that might cumulatively effect the same resources described above.

4.1 Cumulative Actions

4.1.1 LNFH Implementation Plan

The framework laid out in the *Leavenworth Fisheries Complex Project Implementation Plan: 2017-2027* (USFWS and Reclamation, 2017), does not have additional actions that would affect the resources analyzed. At this time, we cannot identify reasonably foreseeable actions affecting the resources in this EA. Reclamation considers the implementation plan to be an important guidance document for potential projects occurring through 2027 for the entire Complex, not just LNFH. However, the plan, in its entirety, is not considered “ripe” for action (per 40 CFR 1508.23) because appropriated funding must be requested and congressionally approved. Funding for some of these projects has been requested, but has not been congressionally approved at this time.

4.1.2 NMFS BiOp

The 2017 NMFS BiOp requires completion of certain activities by 2023. The only cumulative action from the 2017 NMFS BiOp is Term and Condition 2d. In September, if the natural flow remaining is less than 60 cfs (after subtracting the amount of water diverted by LNFH and all water users), LNFH will not route more water into the hatchery channel than the volume of its Snow and Nada lakes storage release (up to 50 cfs) minus the IPID withdrawal from Snow Creek and diversion at Structure 1 (up to 42 cfs) (NMFS, 2017).

4.1.3 Icicle Work Group Water Resource Management Strategy (Icicle Strategy)

The Icicle Workgroup completed a draft Icicle Strategy, which consists of projects that address concerns identified in the Icicle Workgroup Guiding Principles. Chelan County and Ecology are in the process of developing a programmatic environmental impact statement (PEIS) for the Icicle Strategy. The release of the draft PEIS occurred in mid-2018. The valve replacement project started after scoping for the PEIS. The valve replacement is related to the Icicle Strategy as it helps meet the Icicle Workgroup guiding principle of a sustainable hatchery. At this time, we cannot identify any reasonably foreseeable actions in the Icicle Strategy affecting the resources in this EA.

4.1.4 Wenatchee Land and Resource Management Plan

The Region 6 Wenatchee Land and Resource Management Plan for the Wenatchee National Forest (USFS, 1990) regulates visitor access and recreation activities to land surrounding the LNFH. Because the USFS is in the process of updating this plan, we cannot assume reasonably foreseeable actions at this time.

4.1.5 USFWS BiOp

The 2011 USFWS BiOp (USFWS, 2011) analyzed the effects of the current LNFH hatchery program and operations on listed Bull Trout and designated critical habitat. This analysis included the beneficial operation of Snow and Nada lakes storage water to Icicle Creek.

4.2 Cumulative Impacts to Resources

This section presents an analysis of how the actions above might create additive, countervailing, or synergistic cumulative impacts on the resources described above. None of the reasonably foreseeable actions would create cumulative impacts on cultural resources, fish, threatened and endangered species, wildlife, or wilderness.

4.2.1 Cumulative Impacts to Water

Water withdrawals at LNFH as described in the proposed action would be altered under low flow conditions to comply with Terms and Conditions 2d and 2f in the 2017 NMFS BiOp. According to Term and Condition 2d, if flows in Icicle Creek are less than 60 cfs after all withdrawals during irrigation season, LNFH will not be allowed to route more water into the hatchery channel than what is being released from storage in Snow and Nada lakes, minus what is being diverted by IPID. In addition, Term and Condition 2f requires LNFH to operate, “in a manner intended to maintain daily average instream flow goals of 40 cfs in October, 60 cfs in November through February, and 80 cfs in March in the Icicle Creek historical channel.” In both cases, the LNFH withdrawal from Icicle Creek would be less than or equal to the proposed 42 cfs.

4.2.2 Cumulative Impacts to Noise in Wilderness

While recreation in the wilderness area is managed according to the Region 6 Wenatchee Land and Resource Management Plan for the Wenatchee National Forest (USFS, 1990), ongoing effects to wilderness values and noise would occur to the ALWA. Public concerns about helicopter use were identified and addressed by the USFS in the comment period for the *Land and Resource Management Plan Wenatchee National Forest Environmental Impact Statement*. The response from the USFS stated that Federal regulations prohibit the possession or use of mechanized equipment in wilderness. This regulation applies to the USFS as well as the public. The Secretary of Agriculture has authorized the use of mechanized and motorized equipment for emergency purposes, such as threats to life and private property. These include firefighting, search and rescue, and some law enforcement. There are allowances in the Wilderness Act for continuation of specified prior existing rights. Use of mechanized equipment may be approved if reasonably necessary to carry out those rights. On rare occasions, helicopters can be approved if there is no feasible alternative to get a job done, such as USFS’s practice of flying full toilet vaults out of the Enchantment Area of the ALWA. Other work, including trail maintenance, would be done by primitive means to avoid impacts on wilderness visitors. Primitive means will be used even if shown to be more costly (USFS, 1990).

5 CONSULTATION AND COORDINATION

The following individuals from Federal, state, and local agencies, Indian tribes, and interested parties and individuals were contacted or consulted during the development of this EA.

Table 5-1. List of agencies and Indian tribes consulted.

| Name | Authority for Consultation | Findings and Conclusions |
|-----------------|--|---|
| Colville Tribes | Indian tribe with potential Indian Trust Assets (ITAs), historic properties, and resources of tribal concern | Tribe did not identify any of these resources as being affected by the proposal |
| DAHP | Consultation on undertaking per NHPA (Title 54 USC 306108) | DAHP concurred, by letter dated August 28, 2017, with finding of No Adverse Effect |
| NMFS | Section 7 of Endangered Species Act (16 USC 1531) | NMFS determined that the overall LNFH Spring Chinook Program is likely to adversely affect UCR steelhead and UCR spring Chinook salmon in the BiOp issued August 9, 2017. However, the BiOp identified increased flows in Icicle Creek from Snow Lake valve water releases as a benefit to UCR steelhead and spring Chinook salmon. |
| USFS | Agency with authority over AWLA | Contractor would work with USFS on wilderness impact minimization. This may include signage and updates on the ALWA webpage. |
| USFWS | Section 7 of Endangered Species Act (16 USC 1531) | Co-lead on EA and issued Letter of Concurrence for ESA Species |
| WDFW | Agency with expertise on impacts to wildlife species | Data on wildlife species incorporated in Chapter 3 |
| Yakama Nation | Indian tribe with potential ITAs, historic properties, and resources of tribal concern | Tribe did not identify any of these resources as being affected by the proposal |

Table 5-2. List of preparers.

| Name | Title | Responsible for the Following Sections |
|----------------------|-------------------------------------|---|
| Bergin Parks | Interdisciplinary Team Lead | Quality control |
| Candace McKinley | Interdisciplinary Team | Quality control, project management |
| Corey Carmack | Tribal Liaison | Tribal coordination |
| Elizabeth D. Heether | Environmental Protection Specialist | Review and quality control |
| Eve Skillman | Outdoor Recreational Planner | Wilderness resources |
| Heather Lawrence | Natural Resource Specialist | Physical resources, social resources |
| Juddson Sechrist | Interdisciplinary Team Lead | Quality control, project management |
| Kelsey Doncaster | Historian | Historical resources, consultation, and coordination on the built environment |
| Mary Rinehart | Natural Resource Specialist | Review and quality control |
| Robert Hamilton | Engineer | Review and quality control |
| Shawna Castle | Natural Resource Specialist | Biological resources |
| Warren F.X. Hurley | Archeologist | Cultural resources, ITAs, consultation, and coordination |
| Steve Croci | Supervisory Fish Biologist | Review and quality control |
| Mary Lindenberg | Hydrologist | Data, review, and quality control |

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APPENDICES

APPENDIX A: COMMENTS AND RESPONSES

1. Public Comment and Response Process

Appendix A describes the public comment and response process for the final environmental assessment (EA). Section 1.1 defines terms useful in understanding this document and the changes made to the draft EA. Section 1.2 describes how the comments were acquired, categorized, addressed, and documented. Section 1.3 provides guidance on the use of this document. Section 2 presents summary comments and responses to comment categories raised by multiple commenters.

1.1. Definitions

Several terms are helpful in assisting commenters to find their comments and understand the responses.

Comment

A distinct statement or question about a particular topic, such as:

- Purpose and need for action
- Merits of alternatives
- Any aspect of potential environmental impacts arising from the alternatives
- Agencies' use of facts, methods, or analyses in the EA
- Agencies' implementation of the National Environmental Policy Act (NEPA) process
- Matters outside the scope of the EA

Commenter or Public

This term includes any and all potentially interested or affected parties, whether private citizens; state, local or tribal governments; environmental groups; water users or irrigation districts; civic and community organizations; businesses; etc.

Comment category

The resource topic or issue to which a comment is addressed. This may include the NEPA process including alternatives, the Affected Environment section of the EA, or a specific resource category such as water quality.

Comment document

A written version of comments submitted by a commenter. This may be a letter, email, or transcript of oral comments at a public hearing. A comment document may contain any number of comments.

Substantive comment

A comment relevant to the scope of the EA, environmental analysis, or NEPA process that merits a response. Comments that offer support or opposition to an alternative are not substantive comments. Substantive comments include the following:

- Question, with reasonable basis, the accuracy of the information in the EA
- Question the adequacy of the environmental analysis
- Present reasonable alternatives other than those in the EA
- Merit changes or revisions to the proposal

Summary comment, summary response

A summary capturing the essence of similar comments on a given comment category and the summary response to those comments.

1.2. The Analytical Process

The draft EA was first made available to the public on October 2, 2017. Nine comment documents were received by the end of the comment period (October 17, 2017) containing 77 comments. The second comment period opened on December 21, 2017. Six additional comment documents were received by the end of the comment period (January 11, 2018) containing 24 comments. Each comment document was read by the interdisciplinary team to understand the overall intent and perspective of the commenter. All comments received were in the form of emails or emails with attachments. Within each comment document, all substantive comments were numbered and assigned a comment category.

In compliance with 40 CFR 1503.4, possible responses to substantive comments include the following;

- Modifying alternatives
- Developing and evaluating new alternatives not previously given serious consideration in the EA
- Supplementing, improving, or modifying the analyses
- Making factual corrections to the EA
- Explaining why the comment does not warrant further agency response or indicating those circumstances that trigger agency reappraisal or further response

Three comments (numbers 11, 12, 13) expressed support for the proposed action.

1.3 How to Use this Document and Find Your Comment

Table A-1 correlates names of commenters (individuals or organizations) with the assigned comment number. Commenters should locate their name and associated comment numbers in Table A-1.

Within each comment document, comments were numbered consecutively and assigned a comment category. See Section 2 for summary comment and responses. Summary comments and responses are presented in Section 2 alphabetically by topic

Table A-1. Correlation of comment document number with commenters.

| Comment Numbers | Commenter | Affiliation |
|---|--------------------------------|---|
| 75 | David E Ortman | Wise Use Movement |
| 3-5,7-9,14,15.1,15.2,16-19,24,26,27,39-41,43-52,56,57,59.2,60-62,71 | Lisa Pelly | Trout Unlimited |
| 13,103-1 | Mike Kaputa | Chelan County Natural Resources Department |
| 1,2,6,10,20,22-23,25,28,29-37,53-55,58,59.1,63-66,68-69,106-1 to 106-10 | Karl Forsgaard | Alpine Lakes Protection Society and 25 other interested parties |
| 74,105-1,105-2 | Constance Sidles | Seattle Audubon Society's Conservation Committee, and 6 other parties |
| 12 | Christine Rader | Individual |
| 11 | caschott1@outlook.com | Individual |
| 67 | Natalie Williams | Individual |
| 42,70,72,70,73,104-1 | Jeff Dengel, Carmen Andonaegui | Washington Department of Fish and Wildlife |
| 101-1 to 101-3 | Jena F. Gilman | Individual |
| 102-1 to 102-5 | Ann Fink | Individual |

2. Summary of Comments and Responses

This section presents comment categories and responses. The organization is alphabetically by comment category in the EA.

Category: Alternatives

Comment Numbers: 1, 3, 4, 5, 6, 42, 43, 47, 50, 57, 75, 106-8, 106-9

Summary Comment

The action alternatives, permits to implement the alternatives, and mitigating measures (Best Management Practices) are not adequately explained or justified. In particular, comments were as follows:

1. Why can't workers walk to the site; they do not need to be flown in by helicopter across the wilderness?
2. Why can't the number of helicopter flights be reduced?
3. Why is the duration of action so long?
4. Why is 80 cfs the right discharge volume?
5. What permits would be needed to increase discharge and protect fish?

Response

1. The section on Alternatives Considered but Eliminated from Detailed Study has been updated to provide further explanation of why the contractor cannot walk in to the worksite on a daily basis.

2. As stated in the updated section, the co-lead agencies did not want to restrict eligible private contractors from bidding on the job by restricting the number of helicopter flights, given the importance of getting the work done in compliance with the 2017 NMFS BiOp. In addition, the agencies needed to address if it would be quicker to fly in and out on a daily basis to complete the construction. The agencies have completed a minimum requirements analysis (MRA) to address impacts on the surrounding wilderness with helicopter use.
3. The construction period is listed for 7 to 21 days because it is unclear if the valve support would need to be replaced. If it needs to be replaced, the new concrete for the valve support would need to cure for 7 days. The 7-day cure time is included in the 7 to 21 day construction window.
4. The 2017 NMFS BiOp requires 50 cfs supplementation flows to Icicle Creek, and IPID has a water storage contract for a maximum withdrawal of 30 cfs. If water is called simultaneously, a maximum of 80 cfs may need to be released.
5. We are currently working with the State of Washington to obtain a Hydraulic Project Approval permit for the increase in release from the valve.

Category: Alternatives, Mimic Natural Hydrograph

Comment Number: 57

Summary Comment

A reverse hydrograph does not follow natural flow variation, even if those managed flows are within a natural flow range. Snow Creek will be kicking out a big slug of water at the time when flows should naturally be receding. Also, need a better understanding of how LNFH interprets the Qi under their water right since no Qi is described and if Washington State Department of Ecology (Ecology) agrees with that interpretation.

Response

The action is being proposed to implement the downstream flow requirements of the NMFS 2017 BiOp for the benefit of listed species; it did not require mimicking a natural hydrograph. In addition, the creek has not had a natural hydrograph since the valve began operating in 1939.

Category: Hydrologic Variability

Comment Number: 45

Summary Comment

There is no flow regime or future operations table in the EA. How will increasing discharge to 80 cfs affect Snow and Nada lakes storage? How will water be used and at what schedule? In general, snowpack and snow-water equivalent have been declining in the Cascade Mountains while snowpacks have been melting earlier. The impact of these trends on water management of Snow/Nada lakes should be addressed in the EA.

Response

The Bureau of Reclamation used the Palmer Drought Severity Index (PDSI) to project future climatic-hydrologic scenarios in the EA. Reclamation and USFWS recognized that droughts may occur more frequently in the future and have used PDSI to analyze those scenarios. Further, the findings from the University of Washington Climate Impacts Group was incorporated in the effects analysis for water resources (Mauger et al., 2017)

Category: Environmental Justice

Comment Number: 7

Summary Comment

The Environmental Justice section is contradictory and needs revision.

Response

In compliance with Executive Order 12898, no minority or low-income populations have been identified in the study area in Chelan County. Therefore, Reclamation and the USFWS have determined that there would be no disproportionate impacts on Environmental Justice and this issue has been eliminated from detailed study.

Category: Fish, Wildlife and Threatened and Endangered Species, Aquatic

Comment Numbers: 8, 9, 39, 40, 70, 73, 106-11, 102-5, 104-1

Summary Comment

Commenters expressed concerns about the impacts of the alternatives on wildlife, including fish, listed fish, black bears, wolverine and mountain goat.

Response

The sections on wildlife and threatened and endangered species have been updated, and the impact analysis, especially impacts caused by noise, has been clarified.

Category: NEPA Process, Scoping and Public Involvement

Comment Numbers: 23, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 74, 101-1, 101-2, 101-3, 102-1, 103-1, 105-1, 105-2, 105-3, 106-1 to 106-5

Summary comment

Commenters questioned the scope of analysis including whether Ecology's State Environmental Policy Act process is a related action. Also, commenters asked for more time to review the Draft EA and to extend the comment period. One commenter requested an Environmental Impact Statement instead of an EA.

Response

The initial public comment period exceeded the minimum regulatory requirements for an EA. Moreover, the co-lead agencies have taken the additional step of allowing additional public involvement with this revised EA.

Based on the analysis of effects, the agencies do not agree with the comments that an environmental impact statement is required. Nor do the agencies agree that Ecology's process is a related action. The valve replacement project started after scoping for the programmatic environmental impact statement (PEIS), and its justification exists independent of that effort. The valve replacement is at most conceptually related to the Icicle Workgroup water resource management strategy (Icicle Strategy) in that it helps meet an Icicle Work Group Guiding Principle (Sustainable Hatchery).

Category: NEPA Process, Style and Format

Comment Numbers: 15.2, 16, 17, 18, 19, 51, 71

Summary Comment

The EA should be improved with better references, details, and editing.

Comment response

Document has been updated and edited throughout.

Category: Noise

Comment Numbers: 24, 59.2

Summary Comment

Noise analysis needs to address effects on wildlife and campers.

Response

Noise section analysis expanded to address these effects.

Category: Purpose and Need

Comment Numbers: 14, 25, 44, 46, 52, 53, 60, 64

Summary Comment

Purpose and need is not adequately explained or summarized.

Response

The purpose and need statement has been revised based on these comments.

Category: Water, Snow Lakes Storage and Downstream Effects

Comment Numbers: 10, 20, 54, 55, 63, 102-4

Summary Comment

Commenter questioned effects of the larger valve capacity on the water storage in Snow Lakes and the downstream effects. One commenter expressed concern on recreationalists being able to camp and cross the creek.

Response

Water storage in Snow Lakes and downstream effects of the potentially higher release volume was updated.

Category: Visual

Comment Number: 41

Summary Comment

The EA should analyze visual impacts of the helicopters.

Response

Comment noted and Wilderness section has been updated to address visual impacts.

Category: Water Quality

Comment Numbers: 2, 21, 56, 58, 59.1

Summary Comment

The Water Quality section needs to address Clean Water Act compliance and water quality in the lakes and any downstream impairment.

Response

The Water Quality section has been updated to address these comments.

Category: Water Rights

Comment Numbers: 49, 61, 62, 102-3, 106-7

Summary Comment

What is the effect on water rights?

Response

The Action alternative would not change the USFWS water right or IPID water storage contract.

Category: Wetlands

Comment Number: 15.1

Summary Comment

There are numerous contradictions in the document that need to be clarified. For example; the EA states “no wetlands in the project area” but then goes on to discuss wetland habitats in the Alpine Lake Wilderness and the species they support. Are there wetlands?

Response

The National Wetlands Inventory, which is maintain by the USFWS, indicates the presence of wetlands in lower Snow Lake. While lower Snow Lake is part of the project area, no work is planned in that area. As such, no impacts to wetlands would occur and wetlands will not be further addressed in this EA.

Category: Wilderness

Comment Numbers: 22, 65, 66, 67, 68, 69, 102-2, 106-6, 106-10

Summary Comment

The EA does not adequately explain impacts on wilderness character or values.

Response

The Wilderness section has been updated and a minimum requirements analysis has been added, even though not required.

APPENDIX B: ISSUES ELIMINATED FROM DETAILED STUDY

The interdisciplinary team eliminated the following issues (resources) from detailed study as directed by the Council on Environmental Quality regulations at 40 CFR 1500.1(b) and 1500.2(b). Other sections were eliminated because the proposal would cause only inconsequential effects to occur to these issues or resources. No further information on these eliminated issues appears in the Environmental Assessment (EA).

1. Air Quality

Issue

Would use of Mechanized transport associated with the proposed action could generate air emissions?

Rationale for Elimination

There would be a slight increase in exhaust emissions from helicopter staging and worker transport. Proper maintenance of equipment would prevent any increase in regulated air quality parameters over established limits. Best Management Practices implemented as part of the project would avoid measurable air quality impacts. Examples of appropriate Best Management Practices include dust suppression during construction, maintaining construction equipment exhaust emission controls according to manufacturer's instructions, and reducing emissions through carpooling of workers. The study area is in attainment for all criteria pollutants (EPA 2017). There would be a slight increase in exhaust emissions, but it would not affect the air quality attainment status.

2. Energy

Issue

Would the proposed action could impact the production of energy or disrupt energy distribution?

Rationale for Elimination

Energy supplies would not be impacted by the alternatives. Therefore, energy use or disruption of energy distribution is not addressed further in this EA.

3. Environmental Justice

Issue

Would the proposed action have disproportionately high and adverse human health or environmental impacts on an environmental justice population?

Rationale for Elimination

In compliance with Executive Order 12898, no minority or low-income populations have been identified in the study area in Chelan County. Therefore, the U.S. Bureau of Reclamation (Reclamation) and the U.S. Fish and Wildlife Service (USFWS) have determined that there would be no disproportionate impacts on environmental justice

4. Minerals, Geology, and Soils**Issue**

Would the proposed action have impacts to minerals, geology and soils?

Rationale for Elimination

No adverse impacts to geology and soils are anticipated because no new ground disturbance activities are anticipated. If the valve support requires repair, ground disturbance would be associated with soils that have been previously disturbed from past replacement activities.

5. Hazardous Waste and Materials**Issue**

Would the proposed action result in an increased risk of release of hazardous substances or petroleum products?

Rationale for Elimination

No hazardous contamination conditions are known to exist within the project and staging areas. Hazardous materials such as petroleum are discussed in Section 2.4.1 above and would be mitigated through Best Management Practices. Therefore, hazardous materials and wastes are not addressed in this EA.

6. Indian Trust Assets**Issue**

Would the proposed action have potential to affect Indian Trust Assets?

Rationale for Elimination

No Indian Trust Assets are located within the project area, therefore, Indian Trust Assets will not be addressed further in this EA.

7. Land Use/Realty

Issue

Would the proposed action change land use or conflict with applicable plans and regulations?

Rationale for Elimination

Land use and realty would not change under either alternative or with implementation of the related actions; therefore, land use is not addressed further in this EA. The land where landings and work would take place is owned by the USFWS.

8. Public Health and Safety

Issue

Would the proposed action have potential impacts to worker and public safety?

Rationale for Elimination

Public health and safety concerns related to this project are addressed in Section 2.4.1 of the EA. The contractor would identify the work sites and landing zones with fencing, signage, and personnel, thereby greatly reducing or eliminating the risk to workers and the public.

9. Socioeconomics

Issue

Would the proposed action result in socioeconomic effects?

Rationale for Elimination

There would be no changes in demographics; local, regional or national economy; land use values; public services; or religious patterns. Therefore, socioeconomics will not be discussed further in the EA. There would be short-term, localized impacts to recreation in the immediate area of the project. This is discussed in the Wilderness section of the EA.

10. Vegetation/Sensitive Plants

Issue

Would the proposed action have effects on vegetation communities including sensitive plant species?

Rationale for Elimination

No impacts to vegetation are anticipated in this EA. All work would occur in areas that are already disturbed and minimal or no vegetation exists in the work area. If camping is required, it would be in previously established and designated areas. Therefore, vegetation will not be addressed further in this EA.

11. Visual Resources

Issue

Would the proposed action could have impacts to visual resources?

Rationale for Elimination

The Wilderness section has been updated to address visual impacts.

12. Wetlands

Issue

Would the proposed action could impact wetlands?

Rationale for Elimination

The National Wetlands Inventory, which is maintain by the USFWS, indicates the presence of wetlands in lower Snow Lake. While lower Snow Lake is part of the project area, no work is planned in that area. As such, no impacts to wetlands would occur and wetlands will not be further addressed in this EA.

13. Wild and Scenic Rivers

Issue

Would the proposed action have effects to Wild and Scenic designated rivers?

Rationale for Elimination

There are no Wild and Scenic Rivers in the project area; therefore, Wild and Scenic Rivers are not addressed further in this EA.

APPENDIX C: DRAFT WILDERNESS MINIMUM REQUIREMENTS ANALYSIS

Introduction

Public comments received in response to the Proposed Action were reviewed by members of the Interdisciplinary Team in order to identify key issues specific to this project. The effects of helicopter use in an area that is surrounded by wilderness for the proposed valve replacement work is identified as one important issue, and is analyzed in the minimum requirements analysis and in the Environmental Assessment (EA).

The Bureau of Reclamation (Reclamation) and the U.S. Fish and Wildlife Service (USFWS) have undertaken this minimum requirements analysis out of respect for the wilderness values of lands neighboring the project site. This analysis should not be construed to mean that the project site is itself part of the Alpine Lakes Wilderness. Rather, it is an indication of the action agencies desire to analyze and mitigate the effects of their actions on wilderness values.



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MINIMUM REQUIREMENTS DECISION GUIDE WORKBOOK

"...except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act..."

-- The Wilderness Act of 1964

Project Title: Snow Lake Water Control Structure Replacement

MRDG Step 1: Determination

Determine if Administrative Action is Necessary

Description of the Situation

What is the situation that may prompt administrative action?

The proposed action is to remove the existing Upper Snow Lake tunnel water discharge control valve and replace it with a new valve. The Proposed Action is needed to satisfy the following:

The purpose of the proposed action is:

- To facilitate compliance with term and condition 2j of the NMFS BiOp which states, that Reclamation shall replace the valve to accommodate IPID by the end of calendar 2019.
- To facilitate compliance with term and condition 2c of the NMFS BiOp which states, that from August to the end of September the hatchery will release up to 50 cfs of storage water from Snow and Nada lakes to ensure access to the LNFH surface water withdrawal and improve instream flow conditions to the extent possible.
- To reduce *take* of downstream endangered fishes by implementing a reasonable and prudent measure in a biological opinion issued by the NMFS (NMFS 2017).
- To facilitate continued operation of the LNFH to propagate spring Chinook salmon as mitigation for construction and operation of Grand Coulee Dam and other purposes.

Take is defined at ESA Section 3 (18) as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or to attempt to engage in any such conduct.

Options Outside of Wilderness

Can action be taken outside of wilderness that adequately addresses the situation?

YES

NO

EXPLAIN & COMPLETE STEP 1 OF THE MRDG

Explain:

In order to repair the valve the maintenance workers, equipment and construction material will be required to cross wilderness.

Criteria for Determining Necessity
Is action necessary to meet any of the criteria below?

A. Valid Existing Rights or Special Provisions of Wilderness Legislation

*Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that **requires** action? Cite law and section.*

YES

NO

Explain:

In 1941, a Water Supply Contract was filed between IPID, and the United States of America (Reclamation) (Reclamation 1941) for water supply from Snow and Nada Lakes. The two districts are operated jointly and are collectively known as the IPID.

B. Requirements of Other Legislation

Is action necessary to meet the requirements of other federal laws? Cite law and section.

YES

NO

Explain:

The Endangered Species Act of **1973** (ESA; 16 U.S.C. § 1531 et seq.)

C. Wilderness Character

Is action necessary to preserve one or more of the five qualities of wilderness character?

UNTRAMMELED

YES

NO

Explain:

UNDEVELOPED

 YES NO

Explain:

NATURAL

 YES NO

Explain:

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

 YES NO

Explain:

OTHER FEATURES OF VALUE

 YES NO

Explain:

The new valve would be a knife valve that provides the following design benefits that were not incorporated into the existing valve: a newer more robust design; an extended service life of 50 years; and a larger size to accommodate an increased discharge rate. This water delivery is necessary to meet the term and condition 2j and 2c of the 2017 NMFS BiOp. The new valve would be designed to increase instream flows to Icicle Creek and meet the discharge rate needed in late summer for LNFH operations and IPID irrigation deliveries. The proposed knife valve replacement would allow for the necessary release of up to 80 cfs. The proposed action would ensure the ability of the valve to deliver both IPID's water storage right at a maximum release of 30 cfs and LNFH water right and NMFS BiOp requirement of 50 cfs simultaneously from Upper Snow Lake.

Step 1 Determination
Is administrative action necessary in wilderness?

| Criteria for Determining Necessity | Summary Responses |
|--|---|
| A. Existing Rights or Special Provisions | Action IS necessary to meet this criterion. |
| B. Requirements of Other Legislation | Action IS necessary to meet this criterion. |
| C. Wilderness Character | |
| Untrammelled | Action IS NOT necessary to meet this criterion. |
| Undeveloped | Action IS NOT necessary to meet this criterion. |
| Natural | Action IS NOT necessary to meet this criterion. |
| Solitude/Primitive/Unconfined | Action IS NOT necessary to meet this criterion. |
| Other Features of Value | Action IS necessary to meet this criterion. |

Is administrative action necessary in wilderness?

YES

EXPLAIN & PROCEED TO STEP 2 OF THE MRDG

NO

Explain:

Because the location is surrounded by wilderness the only way to replace the valve is to cross the wilderness. Flights would be required to stay 2,000 feet above ground while traversing the wilderness area. Reclamation, USFWS and the contractor will work with USFS to minimize impacts to the furthest extent possible.

Project Title: Snow Lake Water Control Structure Replacement

MRDG Step 2

Determine the Minimum Activity

Other Direction

*Is there "special provisions" language in legislation (or other Congressional direction) that explicitly **allows** consideration of a use otherwise prohibited by Section 4(c)?*

AND/OR

Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?

YES

DESCRIBE OTHER DIRECTION

NO

Describe Other Direction:

Under the proposed action and Alternative 3, Reclamation and the USFWS would design, fund, and replace the Upper Snow Lake tunnel water discharge control valve. The minimum activity required to complete the project have been planned in conjunction with the USFS.

In 2011 USFWS received a BiOp for Operations and Maintenance of the LNFH. As stated in the BiOp, under the proposed action, the LNFH will release approximately 50 cfs from the Snow Lakes Reservoir system from early July through September 30 every year. Unusual events such as Equipment malfunction or consecutive years of very limited snowpack could preclude release of 50 cfs through the entire period, but the Service expects these events to be rare. For this effects analysis, the Service assumes 50 cfs will be released throughout the scheduled period every year. Inability to do so would represent a trigger for reinitiating consultation.

The 2017 NMFS BiOp includes a term and condition requiring the valve replacement by the end of calendar year 2019. The 2017 NMFS BiOp also requires releases up to 50 cfs of supplemental flow, from August 1 through September 30, from the Snow/Nada Lake Basin Supplementation Water Supply Reservoirs, to ensure access to LNFH's surface water withdrawal and improve instream flow conditions to the extent possible during the irrigation season in cooperation with IPID.

Time Constraints

What, if any, are the time constraints that may affect the action?

Staging of construction materials and equipment may occur prior to the valve shut off date in early October (the end of irrigation season). Construction is proposed to begin after irrigation withdrawals are suspended for the season, typically in early October. The 7 to 21 day construction period could continue until mid-November, or until access became limited due to winter weather conditions.

Components of the Action

What are the discrete components or phases of the action?

| | |
|-------------|---|
| Component X | <i>Example: Transportation of personnel to the project site</i> |
| Component 1 | Transportation personnel and equipment |
| Component 2 | Staging of personnel, equipment and first aid station |
| Component 3 | Removal of existing valve and replacement of existing valve |
| Component 4 | Testing of the new valves |
| Component 5 | Removal of construction materials, equipment and debris |
| Component 6 | |
| Component 7 | |
| Component 8 | |
| Component 9 | |

Proceed to the alternatives.

Refer to the [MRDG Instructions](#) regarding alternatives and the effects to each of the comparison criteria.

Project Title: Snow Lake Water Control Structure Replacement

MRDG Step 2: Alternatives

Alternative 1: No Action

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

Under the No Action Alternative, USFWS would continue to operate the existing LNFH water delivery system. The Upper Snow Lake butterfly valve, a key component to getting supplemental water to LNFH and IPID, was designed with an estimated service life of 10 years. It has currently been in place for 15 years and has passed its service life. The butterfly valve will eventually malfunction or fail, resulting in interrupted water delivery to LNFH and IPID. When the valve malfunctions or fails, the guard gate would be closed so no water would be released through the Upper Snow Lake valve. If the valve cannot be installed by the end of 2019, The NMFS BiOp requires Reclamation and USFWS to notify NMFS and might be required to reinitiate consultation under Section 7 of the Endangered Species Act.

| Component Activities | |
|---|--|
| <i>How will each of the components of the action be performed under this alternative?</i> | |
| Component of the Action | Activity for this Alternative |
| X <i>Example: Transportation of personnel to the project site</i> | <i>Example: Personnel will travel by horseback</i> |
| 1 Transporation personnel and equipment | No flights would be required. |
| 2 Staging of personnel, equipment and first aid station | No staging would occur. |
| 3 Removal of existing valve and replacement of existing valve | The current valve would continue to operate past its service life, limited to 50 cfs. |
| 4 Testing of the new valves | The existing valve would not be tested. No water would be release if valve malfunctions. |
| 5 Removal of construction materials, equipment and debris | Existing debris would not be removed. |
| 6 | |
| 7 | |
| 8 | |
| 9 | |

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

| UNTRAMMELED | | | |
|--|--------------------------|-------------------------------------|-------------------------------------|
| Component Activity for this Alternative | Positive | Negative | No Effect |
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 No flights would be required. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 No staging would occur. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 The current valve would continue to operate past its service life, limited to 50 cfs. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 The existing valve would not be tested. No water would be release if valve malfunctions. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Existing debris would not be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 0 | 1 | NE |
| Untrammeled Total Rating | -1 | | |

Explain:
 No action would occur. Existing debris left on site during initial construction would not be removed and would continue to negatively effect on the untrammeled nature of the area.

UNDEVELOPED

| Component Activity for this Alternative | Positive | Negative | No Effect |
|--|--------------------------|--------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 No flights would be required. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 No staging would occur. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 The current valve would continue to operate past its service life, limited to 50 cfs. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 The existing valve would not be tested. No water would be release if valve malfunctions. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Existing debris would not be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 0 | 0 | NE |
| Undeveloped Total Rating | 0 | | |

Explain:

No Action would occur.

NATURAL

| Component Activity for this Alternative | Positive | Negative | No Effect |
|--|--------------------------|-------------------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 No flights would be required. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 No staging would occur. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 The current valve would continue to operate past its service life, limited to 50 cfs. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 The existing valve would not be tested. No water would be release if valve malfunctions. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Existing debris would not be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 0 | 1 | NE |
| Natural Total Rating | -1 | | |

Explain:

No action would occur. Existing debris left on site during initial construction would not be removed and would continue to negatively affect the untrammelled and natural appearance of the area.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

| Component Activity for this Alternative | Positive | Negative | No Effect |
|--|--------------------------|--------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 No flights would be required. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 No staging would occur. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 The current valve would continue to operate past its service life, limited to 50 cfs. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 The existing valve would not be tested. No water would be release if valve malfunctions. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Existing debris would not be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 0 | 0 | NE |
| Solitude or Primitive & Unconfined Recreation Total Rating | 0 | | |

Explain:

Under the No Action Alternative, the valve would continue to operate at 50 cfs and the term and condition 2j and 2c of the 2017 NMF Biological Opinion may be challenged by IPID who have first call on the water released from Upper Snow Lake (up to 750 af). If the valve were to malfunction, the guard gate would be closed so no water would be released through the Upper Snow Lake valve. Valve malfunction may impede water delivery to IPID and LNFH.

OTHER FEATURES OF VALUE

| Component Activity for this Alternative | Positive | Negative | No Effect |
|--|--------------------------|-------------------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 No flights would be required. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 No staging would occur. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 The current valve would continue to operate past its service life, limited to 50 cfs. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4 The existing valve would not be tested. No water would be release if valve malfunctions. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Existing debris would not be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 0 | 1 | NE |
| Other Features of Value Total Rating | -1 | | |

Explain:

Under the No Action Alternative, the valve would continue to operate at 50 cfs and the term and condition 2j and 2c of the 2017 NMFS Biological Opinion may not be met due to IPID who have first call on the water released from Upper Snow Lake (up to 750 af) and potential benefits would not be realized. Under current operation, no effects are anticipated to threatened and endangered species. However, in the event of valve malfunction, listed species and/ or critical habitat could be negatively effected due to the loss of cool supplemental water in Icicle Creek and a potential shortage of water to LNFH rearing and holding ponds. Icicle Creek is designated critical habitat for bull trout and Upper Columbia River Steelhead.

| Summary Ratings for Alternative 1 | |
|---|-----------|
| Wilderness Character | |
| Untrammeled | -1 |
| Undeveloped | 0 |
| Natural | -1 |
| Solitude or Primitive & Unconfined Recreation | 0 |
| Other Features of Value | -1 |
| Wilderness Character Summary Rating | -3 |

Project Title: Snow Lake Water Control Structure Replacement

MRDG Step 2: Alternatives

Alternative 2: Water Discharge Control Valve Removal and Replacement with up to 30 Helicopter Flights

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

The proposed action would remove and replace the existing outdated butterfly water discharge control valve at Upper Snow Lake with a knife valve. Helicopters would be used to stage equipment prior to construction and would be used during construction to transport contract personnel, equipment, and supplies to the site during the valve replacement project. Under the proposed action, the current valve would be replaced with a new valve with a 50 year service life. This would reduce the possibility of malfunction and help to ensure reliable water delivery to IPID and LNFH. Further, valve replacement is the central step in achieving compliance with term and condition 2j and 2c of the 2017 NMFS Biological Opinion by allowing up to 80 cfs of discharge from the new valve.

In this alternative, helicopter trips between LNFH and the helicopter landing site at the project location would be restricted to 30 round trip flights over the 7 to 21 day span of the project. Allowing 30 round trip flights during the project would provide contractors the most flexibility in scheduling and performing the work. Crews could be flown in and out daily which would likely eliminate the need for construction crews to camp on USFWS land that is surrounded by ALWA. Thirty round trip flights may provide for better efficiency and quicker completion of the project as the contractor would be able to return to the base to address unforeseen supply, equipment and personnel issues, and resolve them quicker than having to wait until the next scheduled flight.

Staging of construction materials and equipment may occur prior to the valve shut off date in early October (the end of irrigation season) at the three staging locations. Once staging has been completed, the existing butterfly valve would be removed using power tools, chains, hand wrenches, and come-alongs and then flown out from the site. The existing valve support made of concrete and wood may also be removed and/or replaced as needed. The new valve would then be flown in on a helicopter tether; lowered to the Upper Snow Lake outlet; and installed using power tools, chains, hand wrenches and come-alongs. Once installation is completed, demobilization would occur and crew, equipment, and scrap metal and debris would be flown out.

| Component Activities | |
|---|---|
| <i>How will each of the components of the action be performed under this alternative?</i> | |
| Component of the Action | Activity for this Alternative |
| X <i>Example: Transportation of personnel to the project site</i> | <i>Example: Personnel will travel by horseback</i> |
| 1 Transporation personnel and equipment | 30 helicopter would be utilized to move people and supplies. Daily Flights maximum # 30 |
| 2 Staging of personnel, equipment and first aid station | Staging would occur outside the boudaries of the Wilderness |
| 3 Removal of existing valve and replacement of existing valve | Maintenance activities would include the use of power tools chains, wrenches & come-alongs. |
| 4 Testing of the new valves | Flows increased from a maximum of 50 cfs to a maximum of 80 cfs |
| 5 Removal of construction materials, equipment and debris | Some of the existing debris left during the initial construction would be removed. |
| 6 | |
| 7 | |
| 8 | |
| 9 | |

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

| UNTRAMMELED | | | |
|---|-------------------------------------|--------------------------|-------------------------------------|
| Component Activity for this Alternative | Positive | Negative | No Effect |
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 30 helicopter would be utilized to move people and supplies. Daily Flights maximum # 30 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 Staging would occur outside the boudaries of the Wilderness | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 Maintenance activities would include the use of power tools chains, wrenches & come-alongs. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 Flows increased from a maximum of 50 cfs to a maximum of 80 cfs | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Some of the existing debris left during the initial construction would be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 1 | 0 | NE |
| Untrammed Total Rating | 1 | | |

Explain:
 The use of a helicopter would provide a means of transportation that would not affect the untrammed character. The supplies and equipment would be staged in an in-holding surrounded by wilderness and would be visible to visitors in the immediate area.

UNDEVELOPED

| Component Activity for this Alternative | Positive | Negative | No Effect |
|---|--------------------------|--------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 30 helicopter would be utilized to move people and supplies. Daily Flights maximum # 30 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 Staging would occur outside the boudaries of the Wilderness | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 Maintenance activities would include the use of power tools chains, wrenches & come-alongs. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 Flows increased from a maximum of 50 cfs to a maximum of 80 cfs | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Some of the existing debris left during the initial construction would be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 0 | 0 | NE |
| Undeveloped Total Rating | 0 | | |

Explain:

The supplies and equipment would be staged in an in-holding surrounded by wilderness and would likely be visible to visitors in the immediate area.

NATURAL

| Component Activity for this Alternative | Positive | Negative | No Effect |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 30 helicopter would be utilized to move people and supplies. Daily Flights maximum # 30 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2 Staging would occur outside the boudaries of the Wilderness | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 Maintenance activities would include the use of power tools chains, wrenches & come-alongs. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 Flows increased from a maximum of 50 cfs to a maximum of 80 cfs | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Some of the existing debris left during the initial construction would be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 1 | 1 | NE |
| Natural Total Rating | 0 | | |

Explain:

Under this alternative, the proposed action would temporarily diminish the quality of the primitive setting by competing with the sights and sounds of the natural world due to the use of up to 30 round trip helicopter flights. Effects would be mitigated using Best Management Practices to include use of specialty mufflers and construction activities limited to daylight hours. Maintenance activities may result in increased noise in conjunction with the use of power tools. Maximum water flows would remain in the existing channel would fit the natural appearance of the area. These impacts may have a shorter duration than seen under Alternative 3.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

| Component Activity for this Alternative | Positive | Negative | No Effect |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 30 helicopter would be utilized to move people and supplies. Daily Flights maximum # 30 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2 Staging would occur outside the boudaries of the Wilderness | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 Maintenance activities would include the use of power tools chains, wrenches & come-alongs. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4 Flows increased from a maximum of 50 cfs to a maximum of 80 cfs | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Some of the existing debris left during the initial construction would be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 1 | 2 | NE |
| Solitude or Primitive & Unconfined Recreation Total Rating | -1 | | |

Explain:

Under this alternative, the proposed action would temporarily diminish opportunities for solitude by competing with the sights and sounds of the natural world due to the use of up to 30 round trip helicopter flights. Temporary impacts would also occur from replacement activities that would disturb the solitary experiences of recreationists during the construction period.

OTHER FEATURES OF VALUE

| Component Activity for this Alternative | Positive | Negative | No Effect |
|---|-------------------------------------|--------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 30 helicopter would be utilized to move people and supplies. Daily Flights maximum # 30 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 Staging would occur outside the boudaries of the Wilderness | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 Maintenance activities would include the use of power tools chains, wrenches & come-alongs. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 Flows increased from a maximum of 50 cfs to a maximum of 80 cfs | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 Some of the existing debris left during the initial construction would be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 1 | 0 | NE |
| Other Features of Value Total Rating | 1 | | |

Explain:

Negative impacts which results from not meeting the terms and conditions of the 2017 NMFS BiOp or valve malfunction would be avoided and beneficial impacts to cold water fishery would be realized.

| Summary Ratings for Alternative 2 | |
|---|----------|
| Wilderness Character | |
| Untrammeled | 1 |
| Undeveloped | 0 |
| Natural | 0 |
| Solitude or Primitive & Unconfined Recreation | -1 |
| Other Features of Value | 1 |
| Wilderness Character Summary Rating | 1 |

Project Title: Snow Lake Water Control Structure Replacement

MRDG Step 2: Alternatives

Alternative 3: Water Discharge Control Valve Removal and Replacement with up to 15 Helicopter Flights

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

The proposed action would remove and replace the existing outdated butterfly water discharge control valve at Upper Snow Lake with a knife valve. Helicopters would be used to stage equipment prior to construction and would be used during construction to transport contract personnel, equipment, and supplies to the site during the valve replacement project. Under the proposed action, the current valve would be replaced with a new valve with a 50 year service life. This would reduce the possibility of malfunction and help to ensure reliable water delivery to IPID and LNFH. Further, valve replacement is the central step in achieving compliance with term and condition 2j and 2c of the 2017 NMFS Biological Opinion by allowing up to 80 cfs of discharge from the new valve.

In this alternative, helicopter trips between LNFH and the helicopter landing site at the project location would be restricted to 15 round trip flights over the 7 to 21 day span of the project. Under this alternative, a contractor would have to adhere to a strict flight schedule to ensure that the staging, work and debris clean up could be completed with no more than 15 round trip flights. This alternative would likely require that the contractor have a base camp and crew camping on USFWS land that is surrounded by ALWA. Unplanned round trip flights for incidentals would not be possible. Also, if an unforeseen situation arises, project delays could occur because of the need to wait for the next scheduled flight. Staging of construction materials and equipment may occur prior to the valve shut off date in early October (the end of irrigation season) at the three staging locations. Once staging has been completed, the existing butterfly valve would be removed using power tools, chains, hand wrenches, and come-alongs and then flown out from the site. The existing valve support made of concrete and wood may also be removed and/or replaced as needed. The new valve would then be flown in on a helicopter tether; lowered to the Upper Snow Lake outlet; and installed using power tools, chains, hand wrenches and come-alongs. Once installation is completed, demobilization would occur and crew, equipment, and scrap metal and debris would be flown out.

| Component Activities | |
|---|---|
| <i>How will each of the components of the action be performed under this alternative?</i> | |
| Component of the Action | Activity for this Alternative |
| X <i>Example: Transportation of personnel to the project site</i> | <i>Example: Personnel will travel by horseback</i> |
| 1 Transporation personnel and equipment | 15 helicopter would be utilized to move people and supplies. Daily Flights maximum # 15 |
| 2 Staging of personnel, equipment and first aid station | Staging would occur outside the boudaries of the Wilderness. |
| 3 Removal of existing valve and replacement of existing valve | Maintenance activities would include the use of power tools chains, wrenches & come-alongs. |
| 4 Testing of the new valves | Flows increased from a maximum of 50 cfs to a maximum of 80 cfs |
| 5 Removal of construction materials, equipment and debris | Some of the existing debris left during the initial construction would be removed. |
| 6 | |
| 7 | |
| 8 | |
| 9 | |

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

| Component Activity for this Alternative | Positive | Negative | No Effect |
|---|-------------------------------------|--------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 15 helicopter would be utilized to move people and supplies. Daily Flights maximum # 15 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 Staging would occur outside the boundaries of the Wilderness. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 Maintenance activities would include the use of power tools chains, wrenches & come-alongs. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 Flows increased from a maximum of 50 cfs to a maximum of 80 cfs | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Some of the existing debris left during the initial construction would be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 1 | 0 | NE |
| Untrammeled Total Rating | 1 | | |

Explain:

The use of a helicopter would provide a means of transportation that would not affect the untrammeled character. The supplies and equipment would be staged in an in-holding surrounded by wilderness and would likely be visible to visitors in the immediate area.

UNDEVELOPED

| Component Activity for this Alternative | Positive | Negative | No Effect |
|---|-------------------------------------|--------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 15 helicopter would be utilized to move people and supplies. Daily Flights maximum # 15 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 Staging would occur outside the boudaries of the Wilderness. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 Maintenance activities would include the use of power tools chains, wrenches & come-alongs. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 Flows increased from a maximum of 50 cfs to a maximum of 80 cfs | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Some of the existing debris left during the initial construction would be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 1 | 0 | NE |
| Undeveloped Total Rating | 1 | | |

Explain:

The use of a helicopter would provide a means of transportation that would not affect the undeveloped character. The supplies and equipment would be staged in an in-holding surrounded by wilderness and would be visible to visitors in the immediate area.

NATURAL

| Component Activity for this Alternative | Positive | Negative | No Effect |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 15 helicopter would be utilized to move people and supplies. Daily Flights maximum # 15 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2 Staging would occur outside the boudaries of the Wilderness. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 Maintenance activities would include the use of power tools chains, wrenches & come-alongs. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4 Flows increased from a maximum of 50 cfs to a maximum of 80 cfs | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Some of the existing debris left during the initial construction would be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 1 | 2 | NE |
| Natural Total Rating | -1 | | |

Explain:

Under this alternative, the proposed action would temporarily diminish the quality of the primitive setting by competing with the sights and sounds of the natural world due to the use of up to 15 round trip helicopter flights. Under this alternative, short-term noise impacts would occur due to construction activities and up to 15 round trip helicopter flights. Effects would be mitigated using Best Management Practices to include use of specialty mufflers and construction activities limited to daylight hours. Maintenance activities may result in increased noise in conjunction with the use of power tools. This impact would be to a lesser degree than seen under Proposed Action.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

| Component Activity for this Alternative | Positive | Negative | No Effect |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 15 helicopter would be utilized to move people and supplies. Daily Flights maximum # 15 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2 Staging would occur outside the boudaries of the Wilderness. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 Maintenance activities would include the use of power tools chains, wrenches & come-alongs. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4 Flows increased from a maximum of 50 cfs to a maximum of 80 cfs | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Some of the existing debris left during the initial construction would be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 1 | 2 | NE |
| Solitude or Primitive & Unconfined Recreation Total Rating | -1 | | |

Explain:

Under this alternative, the proposed action would temporarily diminish the quality of the primitive setting by competing with the sights and sounds of the natural world due to the use of up to 15 round trip helicopter flights. Temporary impacts would also occur from replacement activities that would disturb the solitary experiences of recreationists during the construction period. These impacts would be to a lesser degree than seen under the proposed activity.

OTHER FEATURES OF VALUE

| Component Activity for this Alternative | Positive | Negative | No Effect |
|---|-------------------------------------|--------------------------|-------------------------------------|
| X <i>Example: Personnel will travel by horseback</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 1 15 helicopter would be utilized to move people and supplies. Daily Flights maximum # 15 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 Staging would occur outside the boudaries of the Wilderness. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 Maintenance activities would include the use of power tools chains, wrenches & come-alongs. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 Flows increased from a maximum of 50 cfs to a maximum of 80 cfs | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5 Some of the existing debris left during the initial construction would be removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Totals | 1 | 0 | NE |
| Other Features of Value Total Rating | 1 | | |

Explain:

Negative impacts resulting from not meeting the terms and conditions of the 2017 NMFS BiOp or valve malfunction would be avoided.

| Summary Ratings for Alternative 3 | |
|---|----------|
| Wilderness Character | |
| Untrammeled | 1 |
| Undeveloped | 1 |
| Natural | -1 |
| Solitude or Primitive & Unconfined Recreation | -1 |
| Other Features of Value | 1 |
| Wilderness Character Summary Rating | 1 |

Project Title: Snow Lake Water Control Structure Replacement

MRDG Step 2: Alternatives Not Analyzed

Alternatives Not Analyzed

What alternatives were considered but not analyzed? Why were they not analyzed?

Use of Pedestrian Transportation and Traditional Skills

The use of non-mechanized means of access via the Snow Lake foot trail 1553 and traditional skills and equipment was considered. From the Snow Lake trail head the foot trail crosses Icicle Creek and switchbacks to Nada Lake for 5.6 miles. The trail continues to the south east end of Nada Lake. The trail then switchbacks over a large talus and scree slope for 1.7 miles to Lower Snow Lake. The trail continues another 1.5 miles along the south shore of Upper Snow Lake (USFS 2017c). The use of pedestrian transportation via this trail was eliminated because the valve weighs approximately 1,300 pounds and cannot be disassembled into smaller pieces to transport to the project site by foot. A totally non-motorized, non-mechanized alternative would thus not meet the requisite engineering or construction requirements for this proposal.

In addition, the foot trail to the project site is through the wilderness area and would need a significant amount of reconstruction prior to use in order to haul such a heavy, wide, and awkward valve and other equipment up the steep, rugged terrain. Rehabilitation of the Snow Lake trail would require extensive trail improvements and excavations and would be a permanent change in the wilderness area. The existing trail system should be left undisturbed and preserved. The Wilderness Act's purpose is to leave the wilderness "untrammelled by man, where man himself is a visitor who does not remain." 16 U.S.C. § 1131(c).

Use

of Pack Animals

The use of pack animals to transport crews and materials to the project site was considered. However, the USFS has stated that pack animals would not be permitted and the trail is impassible due to recent landslides (Schuur 2017). Rehabilitation of the Snow Lake trail for use of pack animals would create a long term irreversible effect due to blasting and trail blazing and other improvements. As an alternative with only short-term effect on wilderness, the helicopter overflights in Alternatives 2 and 3 would be less of an impact on wilderness values than upgrading the trail for pack stock.

Remove LNFH

The decommissioning of LNFH was considered. However, it was beyond the scope of this project and would not meet purpose and need identified in Section 1.5. Moreover, USFWS already analyzed relocating Leavenworth LNFH (McMillen and Jacobs 2016, Section 4). In that analysis, USFWS concluded that a different geographic location was not likely feasible. The primary factors in reaching this decision include:

- Difficulty in obtaining funding for the project cost of a new \$35 to \$40M hatchery facility
- Difficulty obtaining adequate new water rights and supplies that also meet water quality criteria at a reasonable cost. This is a potential fatal flaw.
- Straying hatchery fish would be a major concern to FWS and regional fisheries managers
- Even minor changes to stock, abundance, run timing, ESA risk, or alteration in composition of mixed stocks could have a negative impact on usual and accustomed fishing areas locally and throughout the Columbia River generally and may be inconsistent with tribal rights

Project Title: Snow Lake Water Control Struture Replacement

MRDG Step 2: Alternative Comparison

Alternative 1: No Action

Alternative 2: Water Discharge Control Valve Removal and Replacement with up to 30 Helicopter Flights

Alternative 3: Water Discharge Control Valve Removal and Replacement with up to 15 Helicopter Flights

Alternative 4: _____

| Wilderness Character | Alternative 1 | | Alternative 2 | | Alternative 3 | | Alternative 4 | |
|------------------------------------|---------------|----------|---------------|----------|---------------|----------|---------------|----------|
| | Positive | Negative | Positive | Negative | Positive | Negative | Positive | Negative |
| Untrammeled | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| Undeveloped | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Natural | 0 | 1 | 1 | 1 | 1 | 2 | 0 | 0 |
| Solitude/Primitive/Unconfined | 0 | 0 | 1 | 2 | 1 | 2 | 0 | 0 |
| Other Features of Value | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| Totals | 0 | 3 | 4 | 3 | 5 | 4 | 0 | 0 |
| Wilderness Character Rating | -3 | | 1 | | 1 | | 0 | |

Alternative 5: _____

Alternative 6: _____

Alternative 7: _____

Alternative 8: _____

| Wilderness Character | Alternative 5 | | Alternative 6 | | Alternative 7 | | Alternative 8 | |
|------------------------------------|---------------|----------|---------------|----------|---------------|----------|---------------|----------|
| | Positive | Negative | Positive | Negative | Positive | Negative | Positive | Negative |
| Untrammelled | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Undeveloped | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Natural | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Solitude/Primitive/Unconfined | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other Features of Value | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wilderness Character Rating | 0 | | 0 | | 0 | | 0 | |

Project Title: Snow Lake Water Control Structure Replacement

MRDG Step 2: Determination

Refer to the [MRDG Instructions](#) before identifying the selected alternative and explaining the rationale for the selection.

Selected Alternative

- Alternative 1: No Action
- Alternative 2: Water Discharge Control Valve Removal and Replacement with up to 30 Helicopt
- Alternative 3: Water Discharge Control Valve Removal and Replacement with up to 15 Helicopt
- Alternative 4: _____
- Alternative 5: _____
- Alternative 6: _____
- Alternative 7: _____
- Alternative 8: _____

Explain Rationale for Selection:

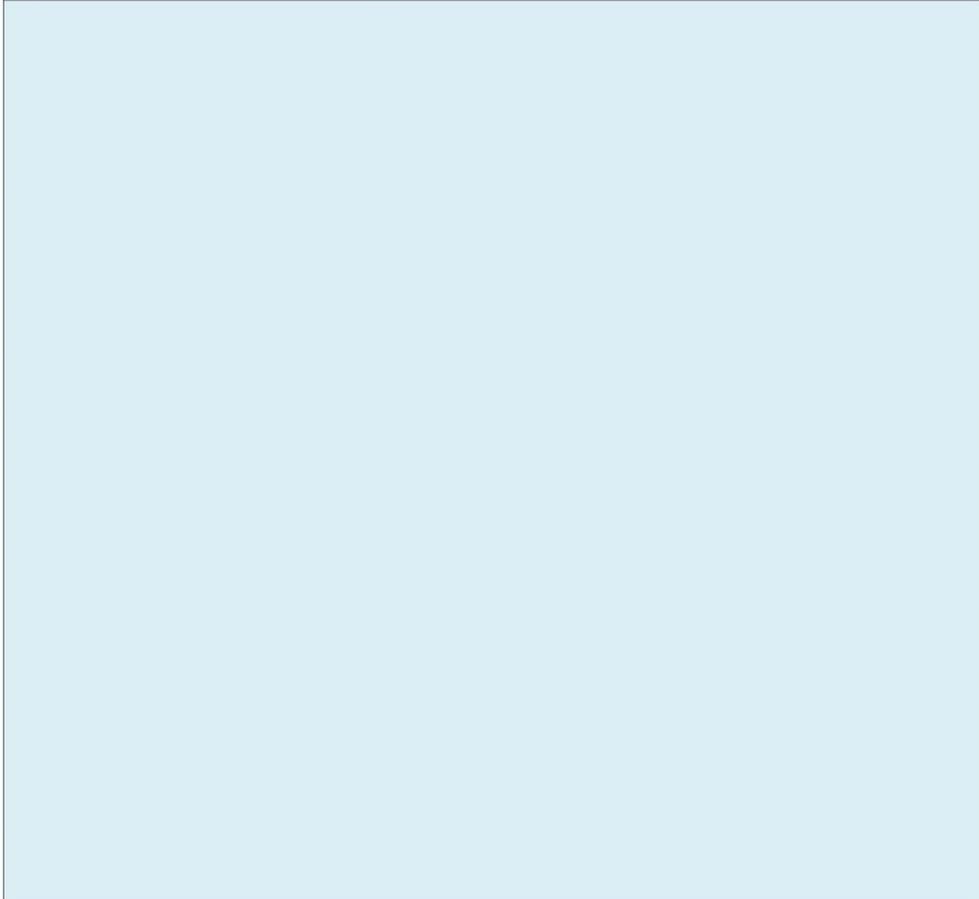
The No Action was not selected as the replacement of the valve is required to meet the term and condition 2j and 2c of the 2017 NMFS Biological Opinion protecting the cold water fishery and preserving critical habitat for bull trout and Upper Columbia River Steelhead.

The new valve would be designed to increase instream flows to IPIDs diversion and Icicle Creek and meet the discharge rate needed in late summer for LNFH operations and IPID irrigation deliveries. The proposed knife valve replacement would allow for the necessary release of up to 80 cfs.

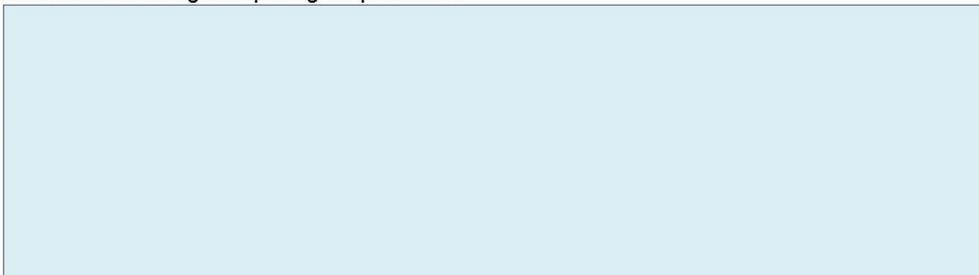
The selected Alternative 3 meets the minimum activity requirements as the impacts to naturalness and to the opportunities for solitude and unconfined recreation would be reduce by half when compared to Alternative 2. The proposed flights would have a duration of approximately 8 minutes and the total number of flights would be held to a strict schedule and limited 15 total round trips. Thereby mitigating impacts the wilderness characteristics.

If more space is needed, continue on the next page...

Explain Rationale for Selection, Continued:



Describe Monitoring & Reporting Requirements:



Approvals

Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative and for what quantity?

| <u>Prohibited Use</u> | <u>Quantity</u> |
|--|-----------------|
| <input type="checkbox"/> Mechanical Transport: | |
| <input type="checkbox"/> Motorized Equipment: | |
| <input type="checkbox"/> Motor Vehicles: | |
| <input type="checkbox"/> Motorboats: | |
| <input type="checkbox"/> Landing of Aircraft: | |
| <input type="checkbox"/> Temporary Roads: | |
| <input type="checkbox"/> Structures: | |
| <input type="checkbox"/> Installations: | |

Record and report any authorizations of Wilderness Act Section 4(c) prohibited uses according to agency policies or guidance.

Refer to agency policies for the following signature authorities:

| | | | | |
|-------------|--------------|--|-------------------------------------|--|
| Prepared | Name | | Position | |
| | Eve Skillman | | Regional Outdoor Recreation Planner | |
| | Signature | | Date | |
| | | | | |
| Recommended | Name | | Position | |
| | Eve Skillman | | Regional Outdoor Recreation Planner | |
| | Signature | | Date | |
| | | | | |
| Recommended | Name | | Position | |
| | | | | |
| | Signature | | Date | |
| | | | | |
| Approved | Name | | Position | |
| | | | | |
| | Signature | | Date | |
| | | | | |

APPENDIX D: CONCURRENCE LETTER



| MAIL CODE | SEARCHED | INDEXED | DATE | COPY |
|-----------|----------|---------|------|------|
| 1000 | X | | | |
| 1002 | X | | | |
| 1100 | | | | |
| 1600 | X | | | |
| 1700 | | | | |
| 5000 | X | | | |
| 5130 | X | | | |
| 1001 | X | | | |
| 1002 | X | | | |
| 500 | X | | | |
| ACTION | | | | |
| 1003 | X | | | |

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

August 28, 2017

Ms. Dawn Wiedmeier
Area Manager
US Bureau of Reclamation
1917 Marsh Road
Yakima, WA 98901-2058

Received in Mailroom

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AUG 28 2017

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Yakima, Washington

In future correspondence please refer to:

Project Tracking Code: 2017-08-05715
Property: Leavenworth National Fish Hatchery Snow Lake Tunnel Outlet
Valve replacement
Re: NO Adverse Effect

Dear Ms. Wiedmeier:

Thank you for contacting the State Historic Preservation Officer (SHPO) and Department of Archaeology and Historic Preservation (DAHP) regarding the above referenced proposal. This action has been reviewed on behalf of the SHPO under provisions of Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800. Our review is based upon documentation contained in your communication.

First, we agree with the Area of Potential Effect (APE) as mapped in the survey report. We also concur that the current project as proposed will have "NO ADVERSE EFFECT" on historic properties within the APE that are listed in, or determined eligible for listing in, the National Register of Historic Places. As a result of our concurrence, further contact with DAHP on this proposal is not necessary. However, if new information about affected resources becomes available and/or the project scope of work changes significantly, please resume consultation as our assessment may be revised. Also, if any archaeological resources are uncovered during construction, please halt work immediately in the area of discovery and contact the appropriate Native American Tribes and DAHP for further consultation.

Thank you for the opportunity to review and comment. Should you have any questions, please feel free to contact me.

Sincerely,

Russell Holter
Project Compliance Reviewer
(360) 586-3533
russell.holter@dahp.wa.gov

State of Washington • Department of Archaeology & Historic Preservation
P.O. Box 48343 • Olympia, Washington 98504-8343 • (360) 586-3065
www.dahp.wa.gov

