Environmental Assessment

Snow Lake Water Release Control Valve Replacement

Chelan County, Washington

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

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U.S. Department of the Interior

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The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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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
CCT	Confederated Tribes of the Colville Reservation
cfs	cubic feet per second
Complex	Leavenworth Fisheries Complex
DAHP	Washington Department of Archelogy and Historic Preservation
dB	decibel
DO	Dissolved Oxygen
EA	Environmental Assessment
ESA	Endangered Species Act
FWCA	Fish and Wildlife Coordination Act
IPID	Icicle and Peshastin Irrigation Districts
ITAs	Indian Trust Assets
LNFH	Leavenworth National Fish Hatchery
MIS	Management Indicator Species
MRA	Minimum Requirements Analysis
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
PCBs	Polychlorinated Biphenyls
PDSI	Palmer Drought Severity Index
PEIS	Programmatic Environmental Impact Statement
Reclamation	Bureau of Reclamation
RM	River Mile
TMDL	Total Maximum Daily Load

UCR	Upper Columbia River
USFS	United States Forest Service, Okanogan-Wenatchee National Forest
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
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. This EA evaluates a proposal by Reclamation and the USFWS to replace the existing Upper Snow Lake tunnel water discharge control valve (existing valve) associated with the Leavenworth National Fish Hatchery (LNFH). The valve is part of the LNFH water delivery system and is owned and operated by USFWS.

Reclamation and the USFWS are cooperating agencies for the operation and maintenance of the LNFH, which is part of a complex of three national fish hatcheries called the Leavenworth Fisheries Complex (Complex). The three hatcheries that comprise the Complex are the Leavenworth, Entiat, and Winthrop National Fish Hatcheries. The national fish hatcheries were constructed by Reclamation as fish mitigation facilities for Grand Coulee Dam. Reclamation has funding responsibility for LNFH, while the USFWS manages and operates the Complex. Therefore, Reclamation and USFWS are co-lead agencies for any proposed undertakings affecting the Complex.

1.1 Project Area

Figure 1-1 depicts the project area or study area, which follows the water that is released through a tunnel from Upper Snow Lake to Nada Lake into Snow Creek, a tributary to Icicle Creek that enters at river mile (RM) 5.7, approximately 1 mile above the LNFHs 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 hatchery.

The project area is owned by USFWS, as shown in Figure 1-1, and the valve is surrounded by the Alpine Lakes Wilderness Area (ALWA), which is 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 Snow, Lower Snow, and Nada Lakes and the valve outlet works.

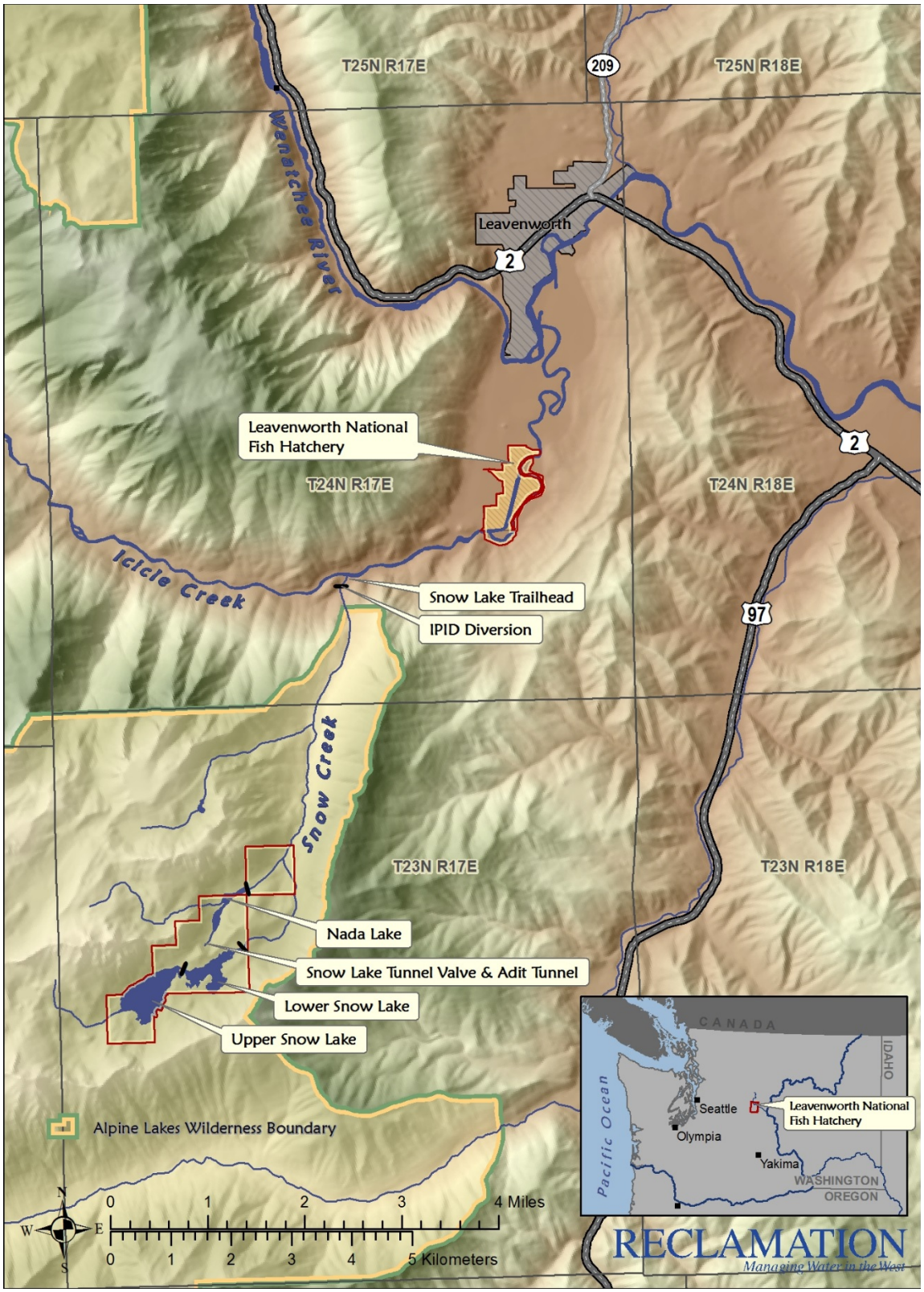

Figure 1-1. Overview of Project Area. The red outline associated with Upper Snow, Lower Snow and Nada Lakes delineates the USFWS's inholding. These lands are surrounded by, but not a part of, ALWA.

The Upper Snow Lake outlet works consists of:

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

1.2 Operation and Maintenance

Precipitation and runoff is stored in Upper and Lower Snow Lakes 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 will flow over the top of the small dam and into Lower Snow Lake (Figure 1-1). The released water flows down a steep boulder field into Nada Lake, where it is then released into Snow Creek which joins Icicle Creek (Figure 1-1).

Manual operation of both the butterfly valve and gate valve is done by a USFWS employee. The employee hikes into Snow Lake and turns the valves on/off and makes adjustments to the butterfly valve releases to meet the water needs of LNFH and the Icicle and Peshastin Irrigation Districts (IPID). Annual maintenance is also performed by employee(s) hiking into the site.

In 2001, the USFWS replaced the valve. The existing valve was designed only to release 30 cubic feet per second (cfs), which was believed to be sufficient to allow for use by both the LNFH and the downstream IPID, who have first call on the water released from Upper Snow Lake (up to 750 acre-feet). 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 that BiOp requires USFWS to release the equivalent of 50 cfs from the Snow Lakes reservoir system between July 20th and September 30th. Although infrequent, USFWS has at times 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 in excess of the valve design rates and exceeding its service life of 10 years, the existing valve is in need of replacement.

The 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, as well as in coordination with IPID. Reclamation is currently writing a Biological Assessment

in coordination with the USFWS for the installation and operation of a new valve since the 2011 USFWS BiOp (USFWS 2011) did not consider the valve replacement. 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 of up to 50 cfs of supplemental flow from August 1 through September 30 from the Snow/Nada Lake reservoirs. This supplemental flow is to ensure access to LNFH's surface water withdrawal and to improve instream flow conditions to the extent possible during the irrigation season, in cooperation with IPID.

IPID uses parts of LNFH's water delivery system to receive 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 of America and IPID allows IPID to release up to 30 cfs from Upper Snow Lake until their annual allowance of 750 acre-feet is exhausted during 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 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 analyzed in this EA and other related projects:

- 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 native 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 portions of Section 17 and 19, Township 23 North, Range 17 East, Willamette Meridian adjacent to Snow and Nada Lakes. Custody of these properties was never transferred to the USFS.
- In 1941, a contract was signed between the United States of America and Icicle and Peshastin Irrigation Districts relating to Water Storage Facilities on Snow (Twin) Lakes 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 and IPID was allotted a 750 acre-feet water storage contract with a maximum release rate of 30 cfs.

- In 1945, USFWS took over funding operations and maintenance of the LNFH, including the water delivery system.
- In 1949, a Memorandum of Agreement was signed between Reclamation and the USFWS pertaining to the custody and future operation of fish hatcheries and related facilities of the Columbia Basin Project (Reclamation 1949).
- In 1990, the Region 6 Wenatchee Land and Resource Management Plan for the Wenatchee National Forest (USFS 1990) was issued. This management program is reflective of a mixture of management activities that allow use and protection of the Wenatchee National Forest resources; fulfill legislative requirements; and address local, regional and national issues and concerns. Please note that the U.S. Forest Service is currently updating this plan and the update has not been finalized.
- In 2001, the Upper Snow Lake tunnel water discharge control valve was replaced by the USFWS. This valve had a design capacity of 30 cfs.
- In 2006, a BiOp for Operations and Maintenance of the LNFH was issued. Term and condition 24 of that BiOp required the USFWS to release the equivalent of 50 cfs from the Snow Lakes reservoir system between July 20th and September 30th.
- In 2006, the Wenatchee Watershed Management Plan was issued 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.
- In 2011, USFWS received a BiOp for Operations and Maintenance of the LNFH. As stated in the BiOp, under the proposed action, the LNFH would 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 assumed 50 cfs would be released throughout the scheduled period every year. Inability to do so would represent a trigger for reinitiating consultation.
- In 2012, the Icicle Work Group Guiding Principles was issued. The draft Icicle Strategy includes a list of projects addressing issues identified in the Guiding Principles. The Icicle Strategy will be released to the public in mid-2018.
- In 2015, NMFS issued a BiOp (NMFS 2015) which required USFWS to release water from Snow and Nada Lakes that would provide up to 50 cfs of supplemental flow in August and September to meet LNFH production needs.
- In 2017, the NMFS BiOP was issued which requires completion of certain water management activities by 2023. This BiOp requires USFWS to release up to 50 cfs. Although infrequent, USFWS has at times 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 in excess of the valve design rates and exceeding its service life of 10 years, the existing valve is in need of replacement.

- In 2017, the Leavenworth Fisheries Complex Project Implementation Plan laid out a conceptual maintenance and upgrade framework to be implemented from 2017-2027 at the LNFH (USFWS and Reclamation 2017). Section 4 of this EA provides a detailed review of reasonably foreseeable future actions that would cumulatively affect the same resource as the proposed action and alternatives.

1.4 Proposed Action

Reclamation is proposing to replace the existing valve at Upper Snow Lake. An engineering design for a new knife valve has been completed and this design would have a release capacity of up to 88 cfs and an expected service life of 50 years.

USFWS is proposing to operate the new valve to release up to 80 cfs downstream to LNFH and IPID. The new valve is designed to release up to 88 cfs; however, the simultaneous delivery would not exceed 80 cfs (50 cfs to LNFH and 30 cfs to IPID). Since the USFS manages access to the ALWA, the co-lead agencies would coordinate with USFS on the wilderness Minimum Requirement Analysis (see Appendix C) protecting wilderness values.

1.5 Purpose and Need for Action

The purpose of the proposed action is as follows:

- To facilitate compliance with term and condition 2c of the 2017 NMFS BiOp which states, 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 facilitate compliance with term and condition 2j of the NMFS BiOp which states, Reclamation shall replace the existing valve to accommodate multiple water users by the end of calendar year 2019.
- To facilitate compliance with the 2017 NMFS BiOP by reducing *take*[1] of downstream endangered fishes through implementation of a NMFS reasonable and prudent measure.
- 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.

[1] 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.

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.
- An increase in the valve release rate is required to meet combined demands by LNFH and IPID between July and October.
- To safely and reliably provide the required 50 cfs to LNFH. The required volume currently exceeds the 30 cfs design capacity of the existing valve.

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. The draft EA was posted on agency websites and mailed and/or emailed to Federal, state, and local agencies; Indian tribes; and interest groups. Reclamation and USFWS received public comments from nine parties, including non-governmental organizations and state and local agencies.

Reclamation and USFWS reviewed all comments, identified issues of concern, and are releasing this EA with additional analysis addressing these concerns. The issues listed in Table 1-1 are relevant to the analysis in this EA. Appendix A provides all comments received as of October 17, 2017, and 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.

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?

Resource	Issue
Wildlife	Would installation of the valve and future operations affect USFS management indicator species?
Wilderness	Would construction and operation of the valve degrade wilderness values?

1.7 Legal Authority

Funding for the Leavenworth Fisheries Complex (consisting of the Leavenworth, Entiat, and Winthrop National Fish Hatcheries) is provided under authority of Public Law Number 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 Number 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 authorized also to modify or add to the structures and operation 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 completed at the time of the enactment of Public Law Number 85-624.

2 DESCRIPTION OF ALTERNATIVES

This chapter describes three alternatives—a no action and two action alternatives to replace the Snow Lake water control valve structure. 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. The existing valve, a key component to getting supplemental water to LNFH and IPID, has been in place for 15 years and, as a result of regularly releasing water in excess of its designed release capacity of 30 cfs, has exceeded its service life of 10 years. 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. If the new valve cannot be installed by the end of 2019, the 2017 NMFS BiOp requires Reclamation and USFWS to notify NMFS and they might be required to reinitiate 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 this alternative, helicopter trips between LNFH and the helicopter landing site at the project location are estimated to be 30 round-trip flights over the 7 to 21 day span of the project. Allowing daily 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 eliminate the competition between the public and construction crews needing to camp on USFWS land. Snow Lake Helipad Number 2 is the primary site that would be used by the contractor (Figure 2-5). Helipad Number 3 would be the secondary site in the event of an emergency, or if the primary site is not available for unforeseeable reasons.

Daily flights may provide for better efficiency and quicker completion of the project as the contractor would be able to return to LNFH to address unforeseen supply, equipment and personnel issues, and resolve them quicker than having to wait until the next scheduled flight.

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

In this alternative, helicopter trips between LNFH and the helicopter landing site at the project location are estimated to be 15 round-trip flights over the 7 to 21 day span of the project. This alternative would require that the contractor establish a base camp 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 and measure as follows: Campsite 2 is 3.97 acres and Campsite 3 is 1.4 acres. Within these existing disturbed campsites, the camp set up by the contractor is likely to be located in a 50 feet by 50 feet area of flat brushless space.

2.4 Commonalities between Alternative 2 and Alternative 3

The following project description is applicable to both Alternative 2 and 3. A summary comparison of the Action alternatives is found in Table 2-1. Both alternatives would replace the existing butterfly water discharge control valve at Upper Snow Lake with a new knife valve. Due to the weight of the valve (approximately 1,300 pounds) and inaccessibility of the project site, under both alternatives the valve would be transported by helicopter to the outlet site. The new valve would be designed to have a 50 year service life and a release capacity of 88 cfs. The new valve would be operated to release up to 80 cfs in late summer in compliance with the 50 cfs requirement of the 2017 NMFS BiOp, and allow an additional 30 cfs release for IPID.

Figure 2-1. LNFH staging area and helipad.

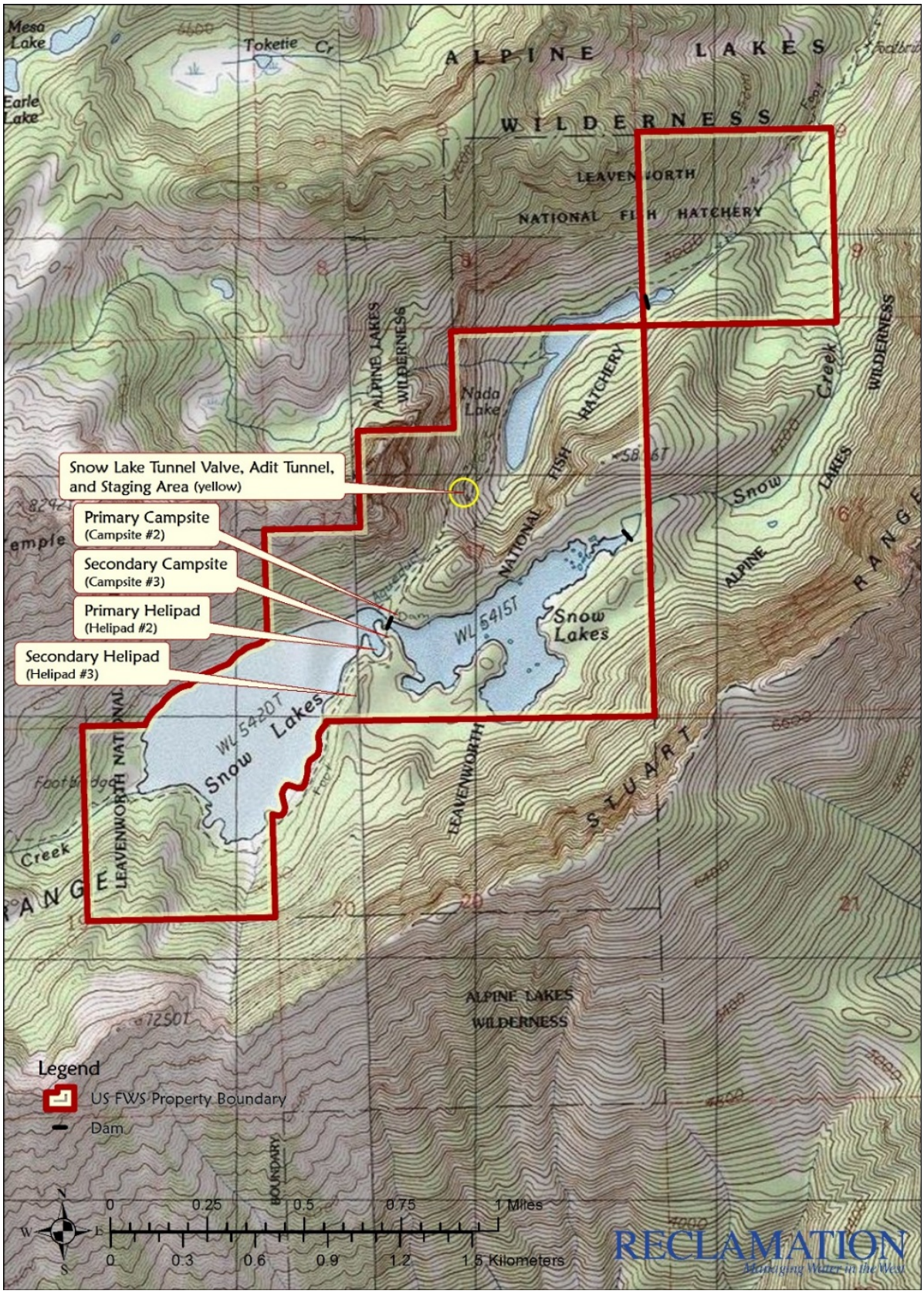

Figure 2-2. Outline of USFWS boundary, proposed campsites, and helicopter landing sites.

Construction is anticipated to take 7 to 21 days. Approximately two to five workers would be required for construction. This would include mobilization, construction, and demobilization and disposal. 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 areas. 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. Snow Lake Tunnel Outlet staging area is 0.13 of an acre (Blewett Quadrangle)
2. LNFH staging area (normally used for firefighting crews) is 23.74 acres (Leavenworth Quadrangle)
3. Helipad 2 staging area is 0.21 acres (Blewett Quadrangle)
4. Helipad 3 staging area is 0.21 acres (Blewett Quadrangle)

Mobilization

- Construction materials would be transported by truck to the LNFH staging areas 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 Number 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 Number 3 would be used as a secondary landing site in the event of an emergency, or if the primary sites are not available for unforeseeable reasons.
- The staging, landing, and loading areas would be located at LNFH and on lands 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 existing butterfly valve would be removed using power tools, chains, hand winches, gantry, hoists, levers, and come-alongs and then flown out from the site. The existing valve support made of concrete and wood may also be removed or

replaced, as needed, since the current condition is unknown until inspection after the valve is removed (Figure 2-4).

- 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 winches, gantry, hoists, levers, and come-alongs.

Demobilization and Disposal

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

Table 2-1. Summary Comparison of the Action Alternatives.

Alternative 2	Alternative 3
Contractor flight to view project staging areas, landing areas, and valve location. One round-trip flight.	Contractor flight to view project staging areas, landing areas, and valve location. One round-trip flight.
Construction timing constraints: October to November 2018, negotiated among parties to avoid impacts.	Construction timing constraints: October to November 2018, negotiated among parties to avoid impacts.
Estimated duration of construction: 7 to 21 days.	Estimated duration of construction: 7 to 21 days.
Estimated total round-trip flights: 30 round-trip.	Estimated total round-trip flights: 15 round-trip.
Transportation of equipment (power tools, chains, hand winches, gantry, hoists, levers, come-alongs, torches, generators, and chainsaws) and materials to site. Two round-trip helicopter flights.	Transportation of equipment (power tools, chains, hand winches, gantry, hoists, levers, come-alongs, torches, generators, and chainsaws), materials, and camping gear to site. Two round-trip helicopter flights.
Transportation of crew daily to and from site. Twenty-three round-trip flights to Helipad 2.	Transportation of crew to site. Two round-trip flights to Helipad 2
N/A	Establish work camp for crew at Campsite 2, or Campsite 3 in the event of emergency. Two to four round-trip flights.
Removal of existing valve and deteriorated material. One round-trip flight.	Removal of existing valve and deteriorated material. One round-trip flight.
Installation of new valve and valve support. One round-trip flight.	Installation of new valve and valve support. One round-trip flight.
Removal of equipment, materials, scrap metal, and debris from site. Two round-trip flights.	Removal of equipment, materials, scrap metal, debris, and camping gear from site. Two round-trip flights.
Transportation of crew from site is accounted for in daily round-trip calculation (of 23 round-trip flights) above.	Transportation of crew from site. Two round-trip flights.
Disposal of solid waste.	Disposal of solid waste.

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).

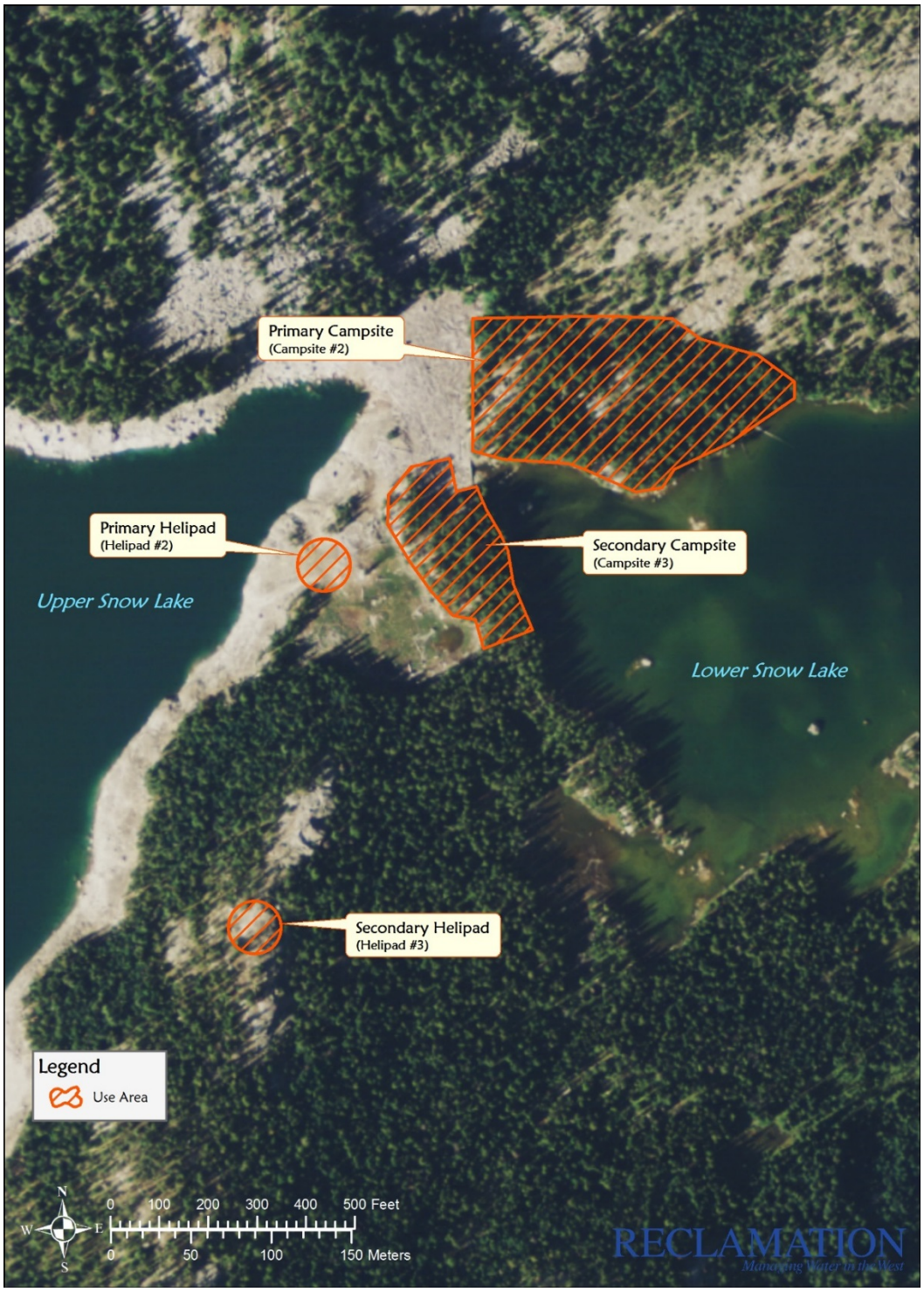

Figure 2-5. Locations of primary and secondary campsites and helipads located near Snow Lake Water Discharge control valve.

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 to 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, with activity restricted to and confined within those limits. There are no environmentally-sensitive areas that have been 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 lake bed 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 (USDA) Forest Service Specification 5100-1. The USDA Forest Service Specification 5100-1 defines performance specifications for spark arrester exhaust systems used on general-purpose engines (generators, motorcycles, agricultural equipment, etc.) in order 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 law. 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 off-site 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 Best Management Practices 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 that a toilet is not available, the contractor must use the following Best Management Practices for human waste:
    - To be able 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 would prevent the release of solid waste, contaminants, or other pollutants or wastes into Upper Snow and Nada Lakes, Snow Creek, or Icicle Creek.
- Spill containment kits would be readily available in areas where oil or petroleum products would be stored.
- Pollutants would be controlled through the use of sediment and erosion controls, wastewater and storm water 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 would implement the following Best Management Practices:

- Operators and aircraft would be licensed and comply with the applicable requirements of the Federal Aviation Administration (FAA) and the U.S. Department of the Interior's Office of Aviation Services' "Handling Loads Suspended from Rotorcraft" (ASME/ANSI B30.12) requirements.
- Final selection of helispots would be identified prior to construction and would be approved by the applicable federal 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. Wherever possible, helicopters should 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 or other sensitive wildlife.

2.4.1.8 Activities related to helicopter use (e.g. traffic control, dust abatement)

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 (see Reclamation's Safety and Health Standards 2014 Edition).
    - 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, but dismissed them 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 was considered (see 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 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 equipment and a wide, heavy valve 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 Wilderness Act's purpose is to leave the wilderness "untrammeled by man, where man himself is a visitor who does not remain" 16 U.S.C. §1131(c). The existing trail system should be left undisturbed and preserved.

2.5.2 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 because the trail is impassible for pack animals 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, trail blazing and other improvements. Therefore, the helicopter overflights in Alternatives 2 and 3 would only have short-term effects and be 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 would not meet the purpose and need identified in Section 1.5. Moreover, USFWS already analyzed relocating Leavenworth LNFH (McMillen and Jacobs 2016). In that analysis, USFWS concluded that a different geographic location was not likely feasible. The primary factors in reaching this decision include the following:

- Difficulty in obtaining funding for a new $35 to $40 million 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 USFWS and regional fisheries managers.
- Even minor changes to fish stock, abundance, run timing, Endangered Species Act (ESA) risk, or alteration in composition of mixed stocks could have a negative impact on 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	Washington Department of Archelogy and Historic Preservation has concurred with a finding of No Adverse Effect.	Washington Department of Archelogy and Historic Preservation has concurred with a finding of No Adverse Effect.
Fish	Under the No Action Alternative, the existing valve would continue to operate at 50 cfs and the term and condition 2b of the 2015 NMFS BiOp may not be met since IPID has first call on the water released from Snow Lake. Valve failure would result in only natural flows through Snow Creek, and reduction or cessation of supplemental flows to Icicle Creek. While Snow Creek fish species are not well understood, the water flow and temperature would likely revert to more natural conditions and support any natural fisheries that exist. With no Snow Lake water, production at LNFH would negatively be 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	Fisheries effects are not likely to result from the helicopter transport of equipment and personnel to the work site. The valve replacement would allow USFWS to continue operation of the LNFH in compliance with the NMFS 2017 BiOp. Effects of the additional release down Snow Creek are considered to be negligible due to the following: 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 and is thus within the realm of what these resident fish species experience naturally 4) It is not likely that IPID would withdraw at its maximum diversion rate. Likewise, other release scenarios of IPID's 750 acre-feet, such as lower volume releases over longer	Fisheries effects are not likely to result from the helicopter transport of equipment and personnel to the work site. The valve replacement would allow USFWS to continue operation of the LNFH in compliance with the NMFS 2017 BiOp. Effects of the additional release down Snow Creek are considered to be negligible due to the following: 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 and is thus within the realm of what these resident fish species experience naturally 4) It is not likely that IPID would withdraw at its maximum diversion rate. Likewise, other release scenarios of IPID's 750 acre-feet, such as lower volume releases over longer periods of time, would also likely lead to negligible effects to Snow Creek fisheries for these same reasons.

	No Action	Alternative 2: Helicopter Only	Alternative 3: Helicopter and Camping
	flow, decreased habitat and warmer temperatures. 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.	periods of time, would also likely lead to negligible effects to Snow Creek fisheries for these same reasons.	
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 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 would be affected by the noise of the construction equipment and the noise of the helicopter. 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 would be affected by the noise of the construction equipment and the noise of the helicopter. Effects would be mitigated using BMPs. Camping during the construction window could add to night time noise levels of less than 65 decibels.
Threatened and Endangered Species	Take would occur because the term and condition 2b 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	This alternative would result in long-term benefit to bull trout, Upper Columbia River Steelhead, and Upper Columbia River Spring Chinook salmon. The alternative may affect, but is not likely to adversely affect, all other listed species.	This alternative would result in long-term benefit to bull trout, Upper Columbia River Steelhead, and Upper Columbia River Spring Chinook salmon. The alternative may affect, but is not likely to adversely affect, all other listed species.

	No Action	Alternative 2: Helicopter Only	Alternative 3: Helicopter and Camping
	potentially compromise Endangered Species Act listed species and critical habitat due to increased temperatures and loss of cool supplemental water in Icicle Creek.		
Water Resources: Hydrology	Release capacity would be limited to 50 cfs	Release would be 50 to 80 cfs	Release would be 50 to 80 cfs
Water Resources: Water Quality	Temperature would warm, pH would rise, dissolved oxygen would rise, and 303d impairments would remain	Temperatures would cool, pH would decrease, dissolved oxygen would decrease, and 303(d) impairments would improve	LNFH would have a shortage of cool water to supplement its rearing and holding ponds.
Wilderness	No Effect	There would be minor, short-term effects on wilderness sight, sound, and solitude.	There would be minor, short-term effects on wilderness sight, sound, and solitude. The contractor base camp and crew camping would temporarily displace visitors. To minimize this impact, construction would occur outside the peak season of use. Accordingly, the impacts to recreational visitors within the Snow Lake Area are expected to be negligible.
Wildlife	Aquatic wildlife may be adversely affected downstream of the valve. Camping already creates minor disturbance or displacement of wildlife.	Aquatic wildlife would have a long-term beneficial impact. Terrestrial wildlife would be exposed to short-term increases in noise during construction.	Aquatic wildlife would have a long-term beneficial impact. Terrestrial wildlife would be exposed to short-term increases in noise during construction. Camping by the contractors would not disturb or displace wildlife compared to No Action.

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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 is shown in Figure 3-1 and includes Upper Snow and Nada Lakes, Snow Creek, and Icicle Creek down to the LNFH intake structure 1.

3.1 Cultural Resources

The National Historic Preservation Act (NHPA) requires Federal agencies to take into account 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 (NRHP). 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 E.O. 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 resource present is the LNFH, a historic district listed on the NRHP under National Register Criteria A and C, see Figure 2-1 and Figure 2-5 (Speulda 1998). At its time of completion, the LNFH was the largest hatchery in the world. In 1998, the Snow Lake Tunnel was listed on the NRHP as part of the LNFH historic district. In 2014, Historical Research Associates, Inc. compiled the LNFH Preservation Plan for the USFWS and determined the Snow Lake Tunnel is a contributing resource to the historic district, but it is not individually eligible (Sneddon, Beckner, and Miller 2014). Because the original tube valve was replaced in 2001 with the current butterfly discharge valve, it is not a historic property or contributing element to the district.

Indian tribes with potential interests in this undertaking were notified and neither the Colville Confederated Tribes (CCT) nor the Yakama Nation identified any cultural resources within the area of potential effects.

3.1.2 Environmental Consequences

3.1.2.1 Alternative 1: No Action

Under Alternative 1, no impacts to 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 at 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/work area.
2. The LNFH staging area is already in heavy use since 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. Those 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 and the USFWS consulted with the State Historic Preservation Officer (Washington Department of Archelogy and Historic Preservation or DAHP), CCT, and the Yakama Nation regarding effects of the action alternatives. DAHP concurred that there would be no effects to historic properties in the staging areas, work areas or campsites because no resources are present and they concurred with the finding of “No Adverse Effect” and no mitigation or further work is required (see Appendix D).

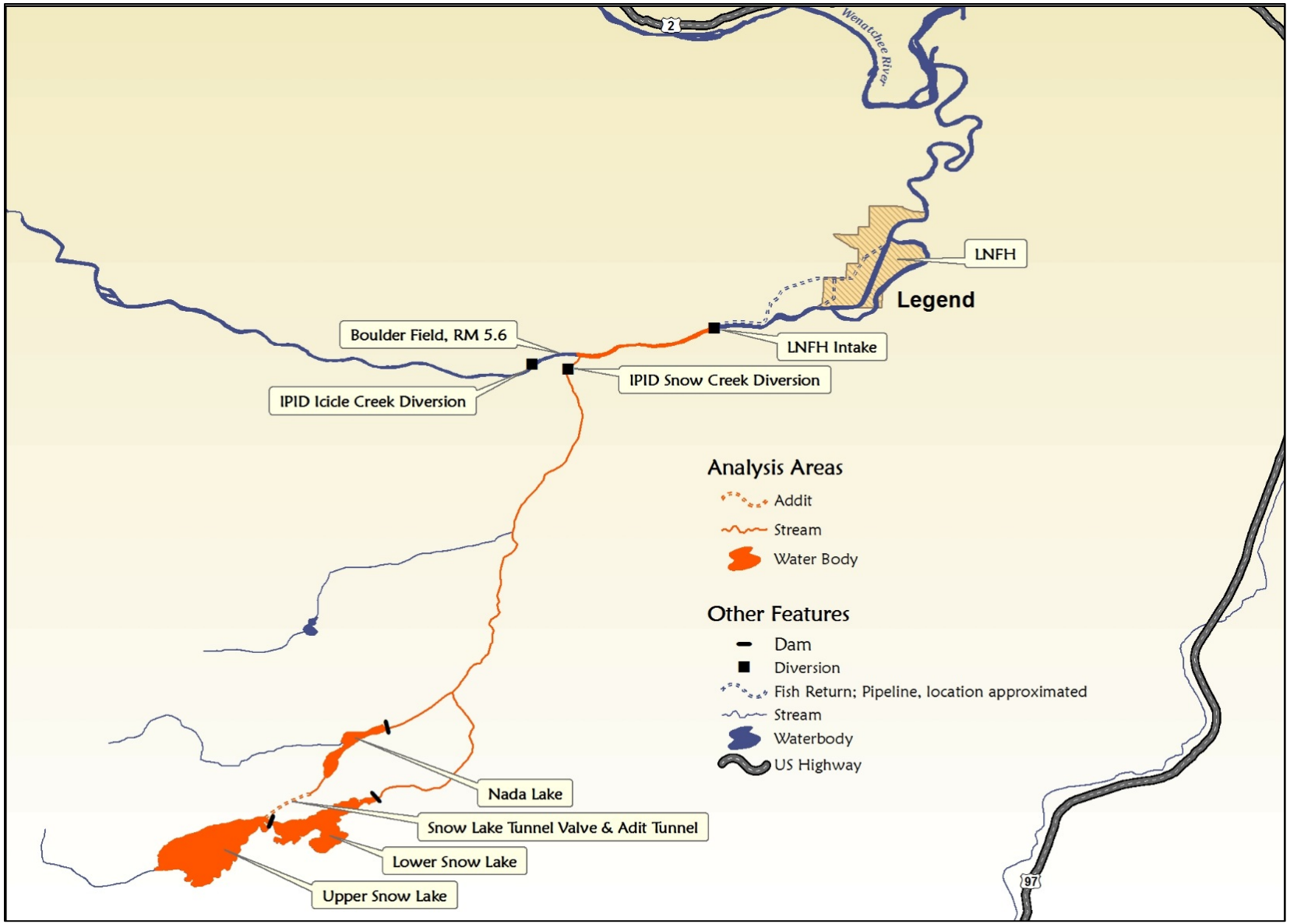

Figure 3-1. Areas of analysis.

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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 Lakes 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 Lakes, 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 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 *(Salvelinus confluentus)*, coho salmon (*Oncorhynchus kisutch)*, sockeye salmon (*Oncorhynchus nerka)*, summer Chinook salmon *(Oncorhynchus tshawytscha)*, Upper Columbia River steelhead (UCR Steelhead)(*Oncorhynchus mykiss)*, and Upper Columbia River spring Chinook (UCR Spring Chinook, *Oncorhynchus tshawytscha*) 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.

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 to Icicle Creek (Figure 3-1). In Icicle Creek, however, 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, 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 (for example, Helipad 2, see Figure 2-5). Effects on fisheries are not likely to result from the helicopter transport of equipment and personnel to the work site. Construction BMPs would prevent water quality impacts and, therefore, fish would not be affected. These activities are generally consistent with historical operation 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 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 could potentially be affected. However, these effects are considered to be negligible due to 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.
4. It is not likely that IPID would withdraw at its maximum diversion rate (NMFS 2017). Likewise, other release scenarios of IPID's 750 acre-feet, such as lower volume releases over longer periods of time, would also likely lead to negligible effects to Snow Creek fisheries for these same reasons.

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 it is disturbing or annoying due to its pitch or loudness (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 residences 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 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 base camp for wildland fires, search and rescue, and for other uses such as hauling large woody debris for restoration projects. Helicopter traffic is a normal occurrence. Sensitive receptors to noise changes within the more urbanized 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 the activities of these components of the proposal would be limited to daylight hours, 7 days per week over the 21 day construction period. Also, the construction period would be during a non-peak season for recreationists and when noise-sensitive wildlife have likely left the area. Construction noise would be caused by use of 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 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 the noise of the helicopter. 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 is currently being prepared to analyze effects of the proposed action on threatened and endangered species protected by the ESA. Also, effects to candidate species are being 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, Washington

at https://ecos.fws.gov/ipac/. NMFS species that were consulted on in the 2017 NMFS BiOp are included in this EA. Listed species in the county include three plant species, four mammals, three bird species, and three fish species. All of the plant species (showy stickleseed (*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 to not be present in the action area so the proposed action would have no effect on these species and they will not be 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 all large, carnivorous mammals and could be found in the action area as transient individuals because suitable habitat for them exists, but they generally have either not been documented or are rarely documented in the action area (Youkey 2017, pers. comm.). These species all have large home ranges, typically avoid human interaction, and could potentially be affected by the project due to noise disturbance from construction activities, helicopter flights, human interactions, and camping. The area is currently 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 that these species are to be found outside of the project area. If individuals do 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 to be displaced by human presence than the other mammal species discussed above (Ruediger et al. 2000).

Northern spotted owl (*Strix occidentalis caurina*) could potentially be found in the action area and the action area is within the designated critical habitat for this species. However, 5,000 feet in elevation is generally considered to be their upper limit, and Snow Lakes are above this (Youkey 2017, pers. comm.). There are fragmented habitat areas around Nada Lake and continuing 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) all 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 are 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 the LNFH UCR spring Chinook salmon program (NMFS 2017) in order to protect the cool water supplementation 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.

Table 3-2. This table lists the ESA-listed species in the action area, along with a brief description of their relationship to the affected environment and potential mechanisms for effects to be evaluated under the alternatives. This table also includes a summary of the effects analyses.

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 (*Gulo luscus*) 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 due to helicopter flights, construction activities, or camping; habitat alteration due to 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.	Not likely to adversely affect. Wolverines are unlikely to be in the construction and camping areas. Construction and camping are in previously disturbed areas. Effects expected to be insignificant and discountable.	Not likely to adversely affect. Wolverines are unlikely to be in the construction and camping areas. Construction and camping are in previously disturbed areas. Effects expected to be insignificant and discountable.
Canada Lynx *(Lynx canadensis),* 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 due to helicopter flights, construction activities, or camping; habitat alteration due to 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.	Not likely to adversely affect. Lynx have not been documented in the action area and it would be highly unlikely they would be in a position to be affected by disturbance activities due to construction, camping, or helicopter flights. There is no Canada Lynx designated critical habitat in or adjacent to the action area.	Not likely to adversely affect. Lynx have not been documented in the action area and it would be highly unlikely they would be in a position to be affected by disturbance activities due to construction, camping, or helicopter flights.
Gray wolf *(Canis lupus),* Endangered, No critical	A known wolf pack has denned approximately 10 miles south of Snow Lakes for about the past 5 years and there have	Disturbance to individuals due to helicopter flights, construction activities, or	No effect. There would be no construction or camping activity. Existing recreation use	The proposed project and associated activities are not likely to adversely affect this species.	The proposed project and associated activities are not likely to adversely affect this species.

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
habitat in action area	been no observations in the action area. Occurrence is unlikely due to current recreational use.	camping; habitat alteration due to construction.	would continue. Potential valve failure in the future would not affect land species.		
Grizzly Bear (*Ursus arctos horribilis*), Threatened, No critical habitat in action area	No critical habitat has been designated for this species. Existing recreational use of this area is so 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 due to helicopter flights, construction activities, or camping (presence of contractor food); habitat alteration due to 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 are not likely to adversely affect this species.	The proposed project and its associated activities are not likely to adversely affect this species.
Northern Spotted Owl (*Strix occidentalis caurina*), 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 Lakes and the project site exceed 5,000 feet in elevation, which is generally considered to be the upper limit for northern spotted owls (Youkey 2017, pers. comm.).	Disturbance to individuals due to helicopter flights, construction activities, or camping; habitat alteration due to 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 would not likely adversely affect this species. The effects of 30 helicopter flights would be temporary. The project work window falls after the young would be dispersed.	The proposed project and associated activities would not likely adversely affect this species. The effects of 15 helicopter flights would be temporary and insignificant. The project work window falls after the young would be dispersed.

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
Bull Trout (*Salvelinus confluentus*), Threatened, Critical habitat in action area	Bull trout do 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.	Downstream effects of water quality; temperature and increases in flow.	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.	The proposed project and associated activities may affect but is not likely to adversely affect bull trout or their designated critical habitat. Potential effects to bull trout and designated critical habitat include beneficial effects from cool water augmentation from Snow and Nada Lakes facilitated by the project.	The proposed project and associated activities may affect but is not likely to adversely affect bull trout or their designated critical habitat. Potential effects to bull trout and designated critical habitat include beneficial effects from cool water augmentation from Snow and Nada Lakes facilitated by the project.
Upper Columbia River Steelhead (*Oncorhynchus (=salmo) mykiss*), Threatened, Critical habitat in action area	Upper Columbia River 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.	Downstream effects of water quality; temperature and increases in flow.	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.	Replacement of the Snow Lake valve is required as a term and condition in the most recent BiOp for the Leavenworth National Fish Hatchery Spring Chinook salmon program (NMFS 2017) in order 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.	Replacement of the Snow Lake valve is required as a term and condition in the most recent BiOp for the Leavenworth National Fish Hatchery Spring Chinook salmon program (NMFS 2017) in order 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.

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
Upper Columbia River Spring-run Chinook Salmon (*O. tshawytscha*), Endangered, No critical habitat in action area	UCR spring Chinook salmon likely occur in Icicle Creek, but the extent of their distribution within Icicle Creek 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.	Downstream effects of water quality; temperature and increases in flow.	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.	Replacement of the Snow Lake valve is required as a term and condition in the most recent BiOp for the Leavenworth National Fish Hatchery Spring Chinook salmon program (NMFS 2017) in order 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.	Replacement of the Snow Lake valve is required as a term and condition in the most recent BiOp for the Leavenworth National Fish Hatchery Spring Chinook salmon program (NMFS 2017) in order 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.

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, lynx, grizzly bear, and wolves. Spotted owls would likely continue to be rare in the area with no occupancy in the Snow Lake area due to el.evation 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. Also, 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

The 2017 LNFH BiOp stipulates that: "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 discharge 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 natural variation already occurring within the system. Bull trout and UCR steelhead would likely experience beneficial effects of 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.

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.

The large mammal species would continue to possibly be transient through the action area, despite the disruption of helicopter overflight. Under Alternative 2, grizzly bear are less likely to remain in the habitat due to human influence. With daily flights, camping is not required, which removes the need for contractor onsite food storage and reduces the potential for human interaction. While unlikely to be found at the elevation of the project site, spotted owl may be affected by the helicopter over-flight 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. Species with seasonal breeding or juvenile dispersal considerations are not likely to be adversely affected due to the timing of the proposed construction activity (Youkey 2017, pers. comm.).

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 the amount of helicopter 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 do not preclude the potential for interaction due to human influence. The effects potentially imposed on wolves, lynx and wolverine by helicopter overflight would be reduced, commensurate with the reduction in the approximate number of flights provided for under Alternative 3. Furthermore, construction activity during fall of 2018 would be unlikely to disrupt overwintering of native wildlife species using riparian or forested habitat (Youkey 2017, pers. comm.). While unlikely to be found at the elevation of the project site, spotted owl may be affected by the helicopter over-flight 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 is currently being prepared 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). Note the environmental baseline is slightly different under ESA; whereas in NEPA the action alternatives are compared to the no action alternative based on the existing conditions and effects of moving forward in time

under each alternative. In this case, the ESA baseline includes the past supplementation of cold water from Snow and Nada Lakes into Icicle Creek via the existing Snow Lake valve. For NEPA analyses, it was assumed that, under the No Action alternative, at some point the existing valve would fail and the flow augmentation could cease, whereas the valve replacement would ensure the continued delivery of flow augmentation and potentially increased flows. 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 1 and construction crews camping to allow fewer helicopter flights under Alternative 2. The effects of these two alternatives are discussed in the above sections. The findings of effects for ESA-listed species are summarized as follows:

- Wolverine (candidate species) – Not Likely to Adversely Affect
- Canada lynx – Not Likely to Adversely Affect
- Gray Wolf – Not Likely to Adversely Affect
- Grizzly bear – Not Likely to Adversely Affect
- Northern Spotted Owl – Not Likely to Adversely Affect
- Bull trout – Not Likely to Adversely Affect (beneficial effects)
- UCR steelhead – Not Likely to Adversely Affect (beneficial effects)
- UCR spring Chinook salmon – Not Likely to Adversely Affect (beneficial effects)

3.5 Water Resources

Issues related to water resources analyzed in this section include the potential for drawn down 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 (WRWSC 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 in the summers, 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 flows 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 2004).

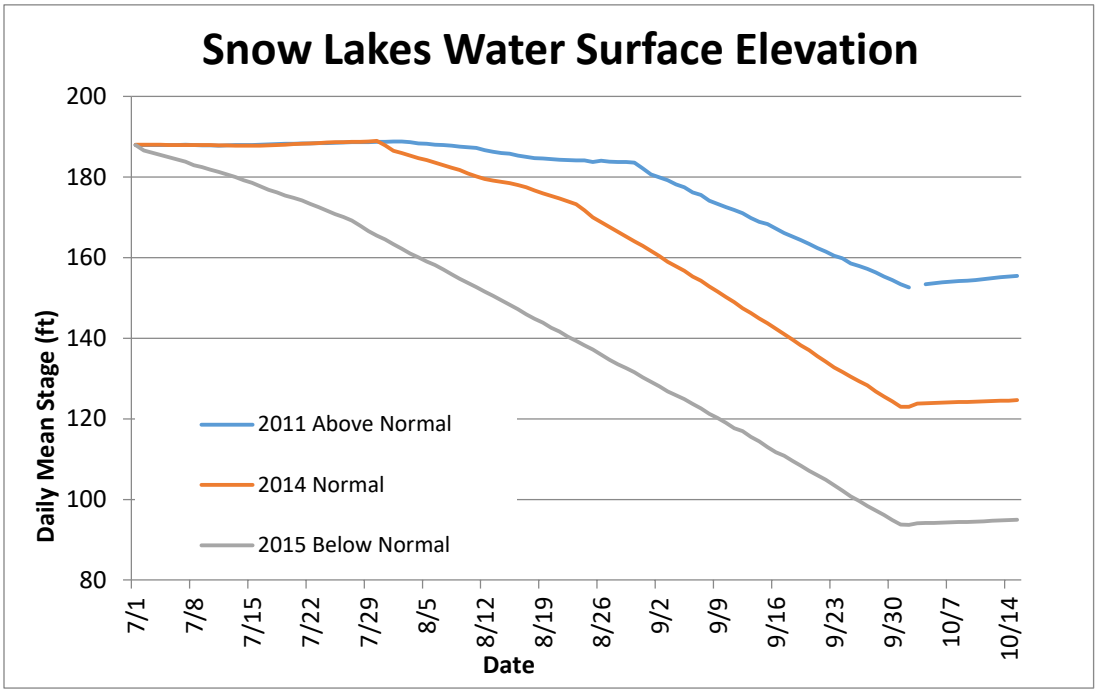

Figure 3-2. Above normal, normal, and below normal late summer months for Snow Lakes Basin was chosen based on the Palmer Drought Severity Index for the East Slope Cascades, WA.

Figure 3-2 displays Snow Lake elevations based on three recent years of above normal, normal, and below normal water years. The years were chosen over a period from 2006 to 2016. 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 Creek. The PDSI uses a 0 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 is that, in all 3 years—above normal, normal, and below normal—Snow Lake refilled.

Table 3-3. PDSI for Upper Snow Lake 2006-2016.

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 flows of 50 cfs 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. This commitment equates to a release of 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 reinitiation of consultation (USFWS 2014).

Historical data suggest flow releases from the valve occur between mid-July and mid-October for a period of 77 days. Outside this period, there has not been continuous stream flow 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 to 75 cfs. The maximum discharge of 75 cfs is more than double the current design capacity. The mean discharge out of the valve is 43.6 cfs.

Whether the Snow Creek watershed is able to maintain a necessary stream flow of 80 cfs is determined by several factors to include spring runoff storage into Snow Lake and Nada Lake. Data from the Snow Creek monitoring gage 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 0 cfs. The graph below identifies recent historical flow ranges (Figure 3-3).

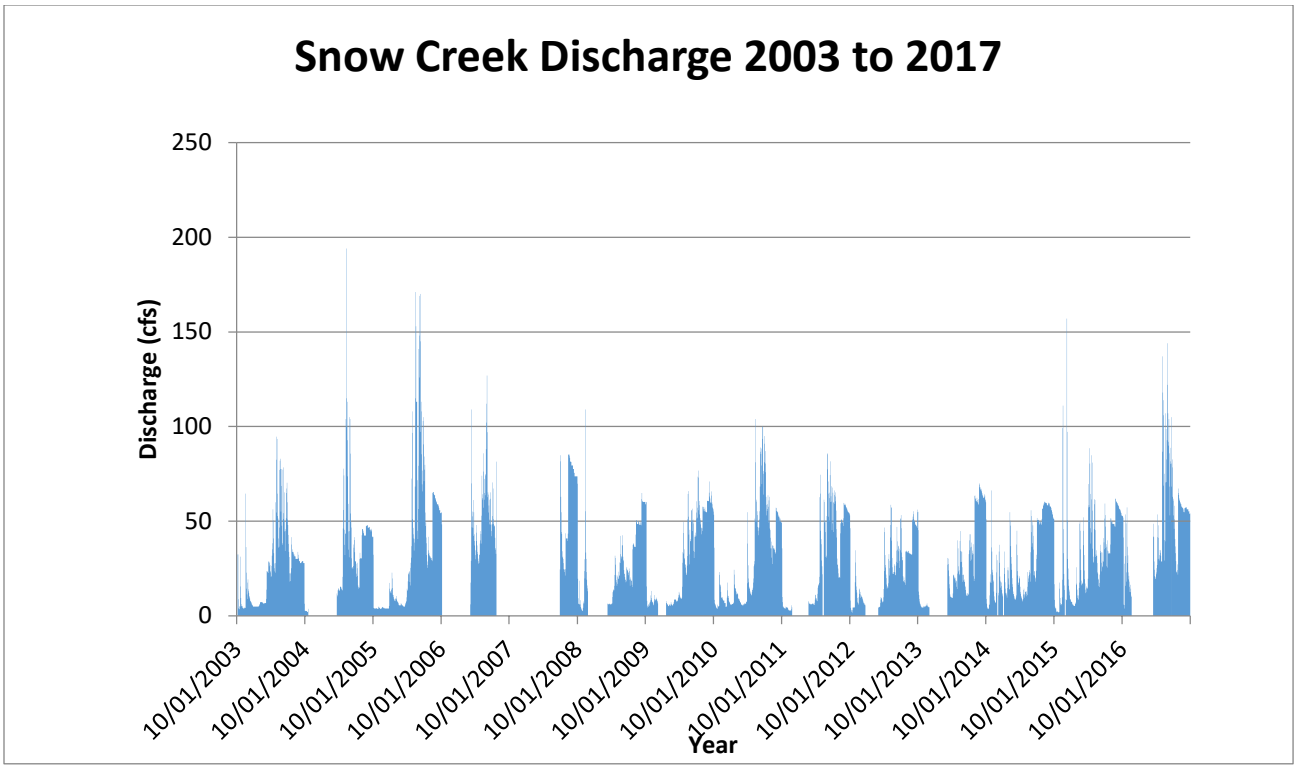

Figure 3-3. Snow Creek discharge measured year-round from 2003 to 2017.

Since data collection began in October 2003, flow data for Snow Creek has not been consistent. Several years contain missing daily values which effect the computation of yearly minimum, maximum and mean flow characteristics. Data from 2004, 2006, 2011, and 2016 contain complete or nearly complete flow data. Four days are missing from October 1 to October 4, 2004 and 6 days are missing from November 28 to December 3, 2016.

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. 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) (Figure 3-4). The figure indicates that in a normal (2014) and below normal water year (2015) Snow Creek release rates from the valve were higher.

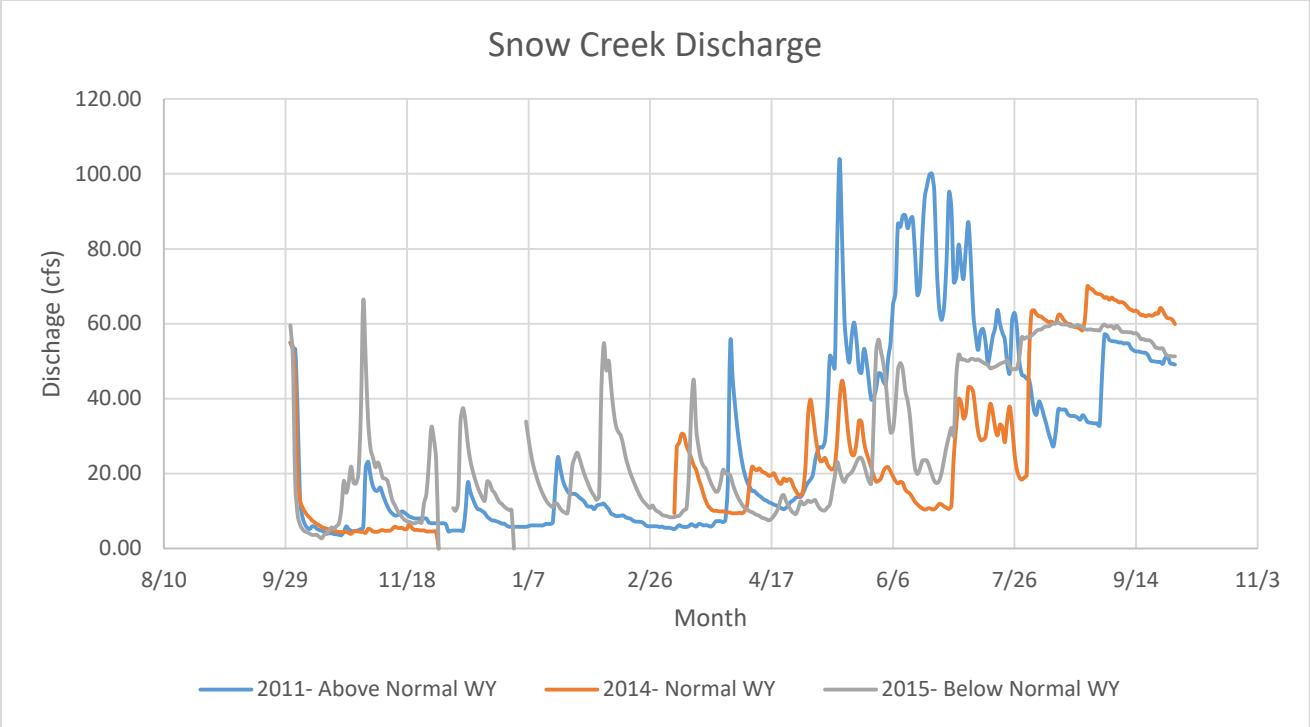

Figure 3-4. Snow Creek Discharge for 2011 Above Normal Water Year, 2014 Normal Water Year, and 2015 Below Normal Water Year using the Palmer Drought Severity Index. Continuous data from Snow Creek show sustained flow exceeding 80 cfs during snow runoff. Although 1 year may be short of water, it appears that even during 2-year and 3-year droughts, the lakes should still 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 2004).

Surface flows of Icicle Creek are continuously measured at a U.S. Geological Survey (USGS) gauging station (Number 12458000) located at RM 5.8. This gauging station is located above all water withdrawal operations in the watershed. This is the only consistently monitored flow data available for Icicle Creek prior to 2007. Daily mean flow data for water years 1936 to 1971 and from 1993 to present are available from the USGS office in Spokane, Washington. The available data from water years 1937 to 1999 show the annual mean flow of Icicle Creek at the gauging station to be 630 cfs. The lowest daily mean flow at this location was 44 cfs, recorded on November 30, 1936, and the highest daily mean was 14,100 cfs, recorded on November 29, 1995. In general, lowest daily flows are experienced during September and October, although daily mean flows of less than 100 cfs have occurred September through February. Most high flow events occur in May and June (USFS 1995). LNFH adds a supplemental flow of 50 cfs to Icicle Creek from July to October. However, LNFH is a non-consumptive water user that withdraws water at RM 4.5 and discharges at approximately RM 2.8.

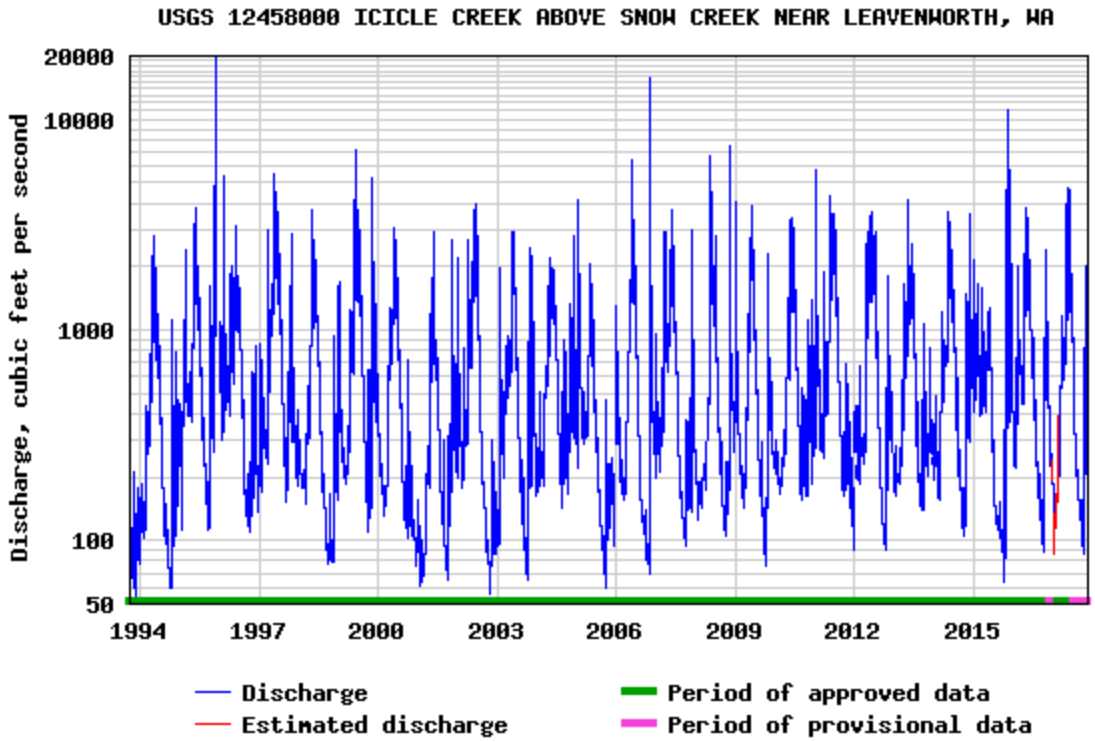

Figure 3-5. Icicle Creek discharge at USGS Station 12458000 measured year-round from 1994 to 2016 (USGS 2017).

During drought conditions in Icicle Creek, streamflow was as low as 50 cfs to 80 cfs for short periods of time. The last decade of flow data from Icicle Creek shows that the 2009 and 2015 flows were below 80 cfs. See USGS graph below:

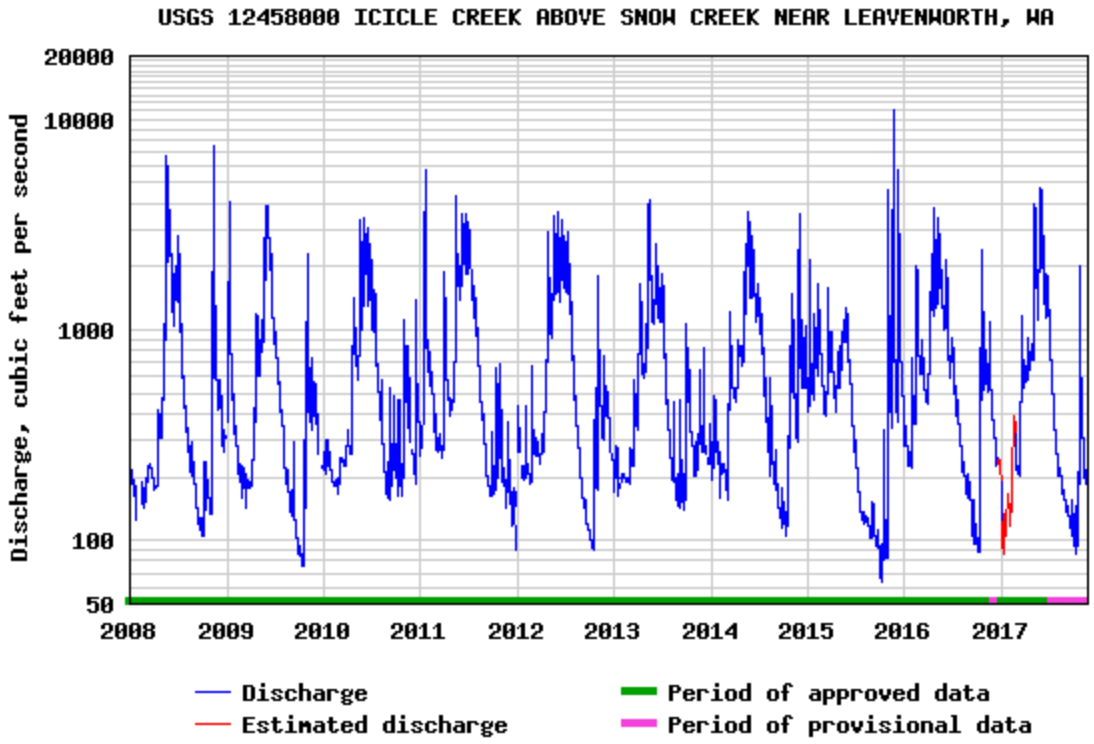

Figure 3-6. Icicle Creek discharge measured at USGS station 12458000 year-round from 2008 to 2017 (USGS 2017).

Riparian impacts based upon historical flows are limited. During precipitation and snow melt when runoff flows become elevated and tend to scour out channel bottoms and surrounding banks, impacts to riparian species depend upon soil type and root system. Due to channel morphology, flow rates can be extreme and have high velocities that remove infant vegetation plant species with limited root systems. Figure 3-3 indicates that runoff events in Snow Creek exceeded 190 cfs in recent years. This 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 is already naturally 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 IPID and LNFH from simultaneously being able to withdraw water. 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, without the water release of approximately 50 cfs from the Snow/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, reinitiation of 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 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 term 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 3.5.1.1 demonstrates that Upper Snow Lake can and will 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 snow melts out earlier. As a result, we see increased winter flows, and 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 being 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, there is a reasonable certainty that Upper and Lower Snow and Nada Lakes will continue to fill. Secondly, 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 Creek now and in the future.

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 9 percent increase over this amount. Section 3.5.1.1 (Figure 3-4) demonstrates that 80 cfs is well within the measured discharge and range of variability of Snow Creek. Therefore, the proposed action would have limited impacts upon Snow Creek riparian vegetation, as well as shoreline and sediment within Snow Creek. Periods of high runoff, such as those shown in Figure 3-3 (upwards of 190 cfs), can and do cause bank instability, denuded vegetation and head-cutting, and these occurrences are well documented by professional Hydrologists and Fluvial Geomorphologists. Releases of up to 80 cfs would

flow as "controlled" natural runoff, be well 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 303(d) Clean Water Act list for not meeting temperature and dissolved oxygen (DO) standards (Ecology 2016). Snow Creek is listed as impaired for temperature, pH, and DO. 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 dissolved oxygen 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 NTU or less; or a 10 percent increase in turbidity when the background turbidity is more the 50 NTU.
- **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 (TP) 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, adjacent to, and downstream of 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 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 21ºC (70ºF) 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 of 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. 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 (Reynolds 1984).

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. DO and pH is 0.52 kg/day and applies March 1 to May 31 and July 1 to October 31 each year (EPA 2017).

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 (>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 (Wetzel 1983 and Welch 1992). 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.

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 hill slope erosion rates for the watershed are high and estimated to total 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, 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.

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. Also, 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. The Ecology Wenatchee River Watershed Source Assessment for PCBs was published in July 2016 and is available online here: 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 continues to be operational. Failure of the valve and loss of storage water as a resource for the hatchery would return Snow Creek to natural flow and would likely increase

water temperature, hence exacerbating existing water quality issues in Icicle Creek. Snow and Icicle Creeks would remain waters of concern due to the impairments listed above; however, improvements over time might occur due to active management under the various Total Maximum Daily Load implementation plans for the Wenatchee Basin (Ecology 2007).

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

Any temporary construction-related impacts to surface water quality would be avoided or minimized by complying with a 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 time frame 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 to lower 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 also 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 dissolved oxygen 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 hydrogen ion concentration (pH) becomes high at night and too low during the day. However, increased stream flow 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.

There was no data found on Snow Creek for sediments or turbidity. There is the possibility that the proposed action could result in increased turbidity in Snow Creek and Icicle Creek. However, runoff events in Snow Creek have exceeded 190 cfs in recent years, specifically 2003 to 2016, which far exceeds the proposed flow rate, see Section 3.5.1.2 and Figure 3-3.

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 north-eastern shores of the lakes transition to wet forest consisting of Douglas fir and Cedar with an understory of Salal, berries and mountain hemlock descending along Snow Creek (https://www.fs.usda.gov/recarea/mbs/recarea/?recid=79416).

Wildlife species and habitat evaluated in this analysis include Management Indicator Species 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 Management Indicator Species (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 elapphus 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 reduced 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 Alternative 3 Effects Common to Both Alternatives

Under Alternatives 2 and 3, there would be no terrestrial habitat loss because areas used for staging or construction are already disturbed. Some limited staging disturbances would occur on 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 for a period 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 general, in response to periodic increases in noise and activity, most wildlife species are expected to disperse to adjacent habitat areas to avoid impacts. Species with seasonal breeding or juvenile dispersal considerations are not likely to be adversely affected due to the timing of the proposed construction activity (Youkey 2017, pers. comm.). Construction activity during the fall would be unlikely to disrupt overwintering of native wildlife species using riparian or forested habitat (Youkey 2017, pers. comm.).

There is a known Peregrine falcon nest near Snow Creek. Construction activities and associated helicopter use would occur in the fall, which is outside of the 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 could potentially be affected. However, these effects are considered to be negligible due to the following:

1. Increased flows of this magnitude would only occur for a maximum total of 12 days at 80 cfs, after which IPIDs 750 acre-feet water supply would be exhausted and releases would return to 50 cfs.

2. This 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 already experiences naturally.

3. It is not likely that IPID would withdraw at its maximum diversion rate (NMFS 2017).

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

3.6.2.3 Alternative 3

Under Alternative 3, a contractor base camp and crew camping would occur at established USFWS campsites. However, frequent recreation occurs in this area on lands owned by USFWS and in the adjacent ALWA. Therefore, impacts to wildlife associated with camping are expected to be minimal. 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 wildlife could be reduced compared to Alternative 2 because of the reduced number of round-trip 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.

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 goats if they are in the vicinity of flights or construction during that time of year.

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 to 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 wilderness 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:** This criteria is 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 man-made features go fundamentally unnoticed. The Wilderness Act also states that wilderness is "…an area where the

earth and its community of life are untrammeled 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 vast 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 its 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, bird watching, 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 being part of a fragile ecosystem and as 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, and the Upper and Lower Snow Lakes (USFS 2017a). For camping within the Enchantment Permit Area between May 15 and October 31, public applicants must submit a request to an online, pre-season lottery. Any permits not allocated by the lottery are available on a first-come, first-served basis through the Recreation.gov Advance Reservation System. Additionally, 25 percent of permits are held by the Leavenworth Ranger District for day-of trips (USFS 2017b). According to the Forest Service, 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 (Number 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 of 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 and Upper and Lower Snow 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 in wilderness values, recreation or trail use.

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

LNFH facilities existed at the time of the designation as wilderness. As required by the Wilderness Act, access to valid occupancies such as the LNFH facilities is required. Still, 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 coordination with the USFS regarding their 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 round-trip flights and Alternative 3 to 15 round-trip 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 pre-date the wilderness and human developments or alternations in and of themselves do not disqualify an area from wilderness (USFWS 2008).

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 go to 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 any repairs to its support structures would not create a long-term adverse effect on the designated wilderness. The replacement activities would be outside the wilderness area and, 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 transportation of people and equipment would result in the addition of noise and mechanical sounds to the Enchantment Permit Area for short periods of time.

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 consultation with the USFS, 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 mid-week to avoid high-use periods.

The impacts to 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 a period of 7 to 21 days and would only affect those individuals within the immediate proximity to the proposed activities.

There would be no additional trail use and no additional use at the 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 affects on recreation. Under Alternative 3, crews would camp in one of the USFWS's designated campsites. Visitors or recreational users may be displaced from one of the campsites in the Snow Lake Zone for the duration of the construction project, projected to last between 7 to 21 days. However, alternative 3 meets the Minimum Requirement Analysis requirements for the Wilderness Act. The impacts of alternative 3 to naturalness for solitude and unconfined recreation are half those of alternative 2.

4 CUMULATIVE IMPACTS

Past and ongoing actions that affect the resources are described in the sections above. In addition to the information in Section 1.3, Section 4.1 identifies reasonable 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 contribute to the resources analyzed at this time. 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 Leavenworth Hatchery Complex (e.g. Winthrop, Entiat, and

Leavenworth National Fish Hatcheries). 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 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 after subtracting the amount of water diverted by LNFH and all water users is less than 60 cfs, LNFH will not route more water into the hatchery channel than the volume of its Snow/Nada Lake storage release (up to 50 cfs) minus the IPID's 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 Work Group completed a draft Icicle Strategy, which consists of projects that address concerns identified in the Icicle Work Group Guiding Principles. Chelan County and Ecology are in the process of developing a Programmatic Environmental Impact Statement (PEIS) for the Strategy. The release of the draft PEIS is expected in mid-2018. The valve replacement project started after scoping for the PEIS. The valve replacement is related to the Icicle Strategy in that it helps meet an Icicle Work Group Guiding Principle (Sustainable Hatchery), but it is not part of any alternative proposed by the Icicle Strategy. Operation and maintenance projects such as this one are not part of the Icicle Strategy or its associated Draft PEIS. At this time, we cannot identify foreseeable actions 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 analyses how the actions above might create additive, countervailing, or synergistic cumulative impacts to those 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

The NMFS BiOp could change flows based on the Terms and Condition 2d cited above. In the event of a low flow water year, how the supplemental water use is utilized could change. 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.

4.2.2 Cumulative Impacts to Noise in Wilderness

While recreation in the wilderness area is managed under the Region 6 Wenatchee Land and Resource Management Plan for the Wenatchee National Forest (USFS 1990), ongoing effects to wilderness values and noise will occur to the ALWA. Public concerns in regard to helicopter use was identified and addressed by the USFS in the comment period for the Land and Resource Management Plan Wenatchee National Forest EIS. The response from the USFS stated that Federal regulations prohibit the possession or use of mechanized equipment in wilderness. This regulation applies to the Forest Service 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. Fire suppression Search and Rescue and some law enforcement are such situations. 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 other feasible way to get a job done, such as USFS's practice of flying full toilet vaults out of the Enchantment Area of the Alpine Lakes Wilderness. 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 contracted 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
CCT	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
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 spring Chinook 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.
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)	Currently writing BA and will be consulting with USFWS.
WDWF	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 Carmak	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
Marybeth 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

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APPENDIX

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APPENDIX A: COMMENTS AND RESPONSES

1. Public Comment and Response Process

This appendix describes the public comment and response process to finalize the 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 find their comments and understanding 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 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 are those that:

- 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 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. 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:

- 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	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	Karl Forsgaard	Alpine Lakes Protection Society and 25 other interested parties
74	Constance Sidles	Seattle Audubon Society's Conservation Committee
12	Christine Rader	Individual
11	caschott1@outlook.com	Individual
67	Natalie Williams	Individual
42,70,72,70,73	Jeff Dengel	Washington Department of Fish and Wildlife

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

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 more 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 Biological Opinion. 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 MRA to address impacts to the surrounding wilderness with helicopter use.
3. The construction period is listed for 7 to 21 days as it is unclear if the valve support will need to be replaced. In the event it needs to be replaced, the new concrete for the valve support will 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, then a maximum of 80 cfs may need to be released.
5. We are currently working with the state of Washington on 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 Ecology agrees with that interpretation.

Response

The action is being proposed to implement the downstream flow requirements of the NMFS 2017 BiOp; they did not require mimicking a natural hydrograph.

Category: Climate Change

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/Nada Lake 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

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 EO 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

Comment Numbers: 8, 9, 39, 40, 70, 73

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

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 EIS instead of an EA.

Response

The 15 day public comment period exceeded regulatory requirements for an EA. However, the co-lead agencies are allowing additional public involvement with this revised EA. The agencies do not agree with the comments that an EIS is required. The valve replacement

project started after scoping for the PEIS. The valve replacement is related to the Icicle Strategy in that it helps meet an Icicle Work Group Guiding Principle (Sustainable Hatchery), but it is not part of any alternative proposed by the Icicle Strategy.

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

Summary Comment

Commenter questioned effects of the larger valve capacity on the water storage in Snow Lakes and the downstream effects.

Response

Water storage in Snow Lakes and downstream effects of the 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

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. In addition, Reclamation is working with the state of Washington on a Hydraulic Project Approval permit.

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

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.

APPENDIX B: ISSUES ELIMINATED FROM DETAILED STUDY

The interdisciplinary team eliminated the following issues (resources) from detailed study as directed by CEQ 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 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. Climate Change

Issue

Would Greenhouse gas emissions from the proposed action contribute to climate change?

Rationale for Elimination

The Proposed Action would not generate over 25,000 metric tons of carbon dioxide-equivalent greenhouse gases and, therefore, a quantitative analysis of climate change effects is not required. However, Reclamation used the Palmer Drought Severity Index (PDSI) to project future climatic-hydrologic scenarios in the EA. Climate change was raised as a comment on the draft EA, but no additional analysis is required beyond use of the PDSI. Further, the findings from the University of Washington Climate Impacts Group were incorporated in the effects analysis for water resources (Mauger et al. 2017).

3. 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.

4. 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 EO 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

5. 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.

6. 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.

7. 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 ITAs will not be addressed further in this EA.

8. 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 are owned by the USFWS.

9. 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 will identify the work sites and landing zones with fencing, signage and personnel, thereby greatly reducing or eliminating the risk to workers and the public.

10. Socioeconomics

Issue

Would the proposed action result in socioeconomic effects?

Rationale for Elimination

There will 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 will be short-term, localized impacts to recreation in the immediate area of the project. This is discussed in the Wilderness section.

11. 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 is 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.

12. 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.

13. 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.

14. 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 EA.

Reclamation and 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.

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

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 Struture 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:

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 maxium 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 NOT necessary to meet this criterion.
C. Wilderness Character	
Untrammeled	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 mimimize impacts to the furtherst extent possible.

Project Title: Snow Lake Water Control Struture 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

☐ NO

DESCRIBE OTHER DIRECTION

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	*Example: Transportation of personnel to the project site*
Component 1	Transporation 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 Struture 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

How will each of the components of the action be performed under this alternative?

Component of the Action		Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
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	*Example: Personnel will travel by horseback*	☐	☐	☑
1	No flights would be required.	☐	☐	☑
2	No staging would occur.	☐	☐	☑
3	The current valve would continue to operate past its service life, limited to 50 cfs.	☐	☐	☑
4	The existing valve would not be tested. No water would be release if valve malfunctions.	☐	☐	☑
5	Existing debris would not be removed.	☐	☐	☑
6		☐	☑	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
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	*Example: Personnel will travel by horseback*	☐	☐	☑
1	No flights would be required.	☐	☐	☑
2	No staging would occur.	☐	☐	☑
3	The current valve would continue to operate past its service life, limited to 50 cfs.	☐	☐	☑
4	The existing valve would not be tested. No water would be release if valve malfunctions.	☐	☐	☑
5	Existing debris would not be removed.	☐	☐	☑
6		☐	☐	☑
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Undeveloped Total Rating			0	

Explain:

No Action would occur.

NATURAL

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1	No flights would be required.	☐	☐	☐
2	No staging would occur.	☐	☐	☐
3	The current valve would continue to operate past its service life, limited to 50 cfs.	☐	☐	☐
4	The existing valve would not be tested. No water would be release if valve malfunctions.	☐	☐	☐
5	Existing debris would not be removed.	☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
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 untrammeled and natural appearance of the area.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1	No flights would be required.	☐	☐	☐
2	No staging would occur.	☐	☐	☑
3	The current valve would continue to operate past its service life, limited to 50 cfs.	☐	☐	☐
4	The existing valve would not be tested. No water would be release if valve malfunctions.	☐	☐	☑
5	Existing debris would not be removed.	☐	☐	☑
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
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	*Example: Personnel will travel by horseback*	☐	☐	☑
1	No flights would be required.	☐	☐	☑
2	No staging would occur.	☐	☐	☑
3	The current valve would continue to operate past its service life, limited to 50 cfs.	☐	☑	☐
4	The existing valve would not be tested. No water would be release if valve malfunctions.	☐	☐	☑
5	Existing debris would not be removed.	☐	☐	☑
6		☐	☐	☑
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
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 Struture 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

How will each of the components of the action be performed under this alternative?

	Component of the Action	Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
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	*Example: Personnel will travel by horseback*	☐	☐	☑
1	30 helicopter would be utilized to move people and supplies. Daily Flights maximum # 30	☐	☐	☑
2	Staging would occur outside the boudaries of the Wilderness	☐	☐	☑
3	Maintenance activities would include the use of power tools chains, wrenches & come-alongs.	☐	☐	☑
4	Flows increased from a maximum of 50 cfs to a maximum of 80 cfs	☐	☐	☑
5	Some of the existing debris left during the initial construction would be removed.	☐	☐	☑
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
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 be visible to visitors in the immediate area.

UNDEVELOPED

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

Explain:

Under this alternative, the proposed action would temporarily diminish opportunties 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	*Example: Personnel will travel by horseback*	☐	☐	☑
1	30 helicopter would be utilized to move people and supplies. Daily Flights maximum # 30	☐	☐	☑
2	Staging would occur outside the boudaries of the Wilderness	☐	☐	☑
3	Maintenance activities would include the use of power tools chains, wrenches & come-alongs.	☐	☐	☑
4	Flows increased from a maximum of 50 cfs to a maximum of 80 cfs	☑	☐	☐
5	Some of the existing debris left during the initial construction would be removed.	☐	☐	☑
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
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 Struture 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

How will each of the components of the action be performed under this alternative?

Component of the Action		Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
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	*Example: Personnel will travel by horseback*	☐	☐	☑
1	15 helicopter would be utilized to move people and supplies. Daily Flights maximum # 15	☐	☐	☑
2	Staging would occur outside the boudaries of the Wilderness.	☐	☐	☑
3	Maintenance activities would include the use of power tools chains, wrenches & come-alongs.	☐	☐	☑
4	Flows increased from a maximum of 50 cfs to a maximum of 80 cfs	☐	☐	☑
5	Some of the existing debris left during the initial construction would be removed.	☐	☐	☑
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
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	*Example: Personnel will travel by horseback*	☐	☐	☑
1	15 helicopter would be utilized to move people and supplies. Daily Flights maximum # 15	☐	☐	☑
2	Staging would occur outside the boudaries of the Wilderness.	☐	☐	☑
3	Maintenance activities would include the use of power tools chains, wrenches & come-alongs.	☐	☐	☑
4	Flows increased from a maximum of 50 cfs to a maximum of 80 cfs	☐	☐	☑
5	Some of the existing debris left during the initial construction would be removed.	☐	☐	☑
6		☑	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
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	*Example: Personnel will travel by horseback*	☐	☐	☑
1	15 helicopter would be utilized to move people and supplies. Daily Flights maximum # 15	☐	☑	☐
2	Staging would occur outside the boudaries of the Wilderness.	☐	☐	☑
3	Maintenance activities would include the use of power tools chains, wrenches & come-alongs.	☐	☑	☐
4	Flows increased from a maximum of 50 cfs to a maximum of 80 cfs	☐	☐	☑
5	Some of the existing debris left during the initial construction would be removed.	☐	☐	☑
6		☑	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
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	*Example: Personnel will travel by horseback*	☐	☐	☑
1	15 helicopter would be utilized to move people and supplies. Daily Flights maximum # 15	☐	☑	☐
2	Staging would occur outside the boudaries of the Wilderness.	☐	☐	☑
3	Maintenance activities would include the use of power tools chains, wrenches & come-alongs.	☐	☑	☐
4	Flows increased from a maximum of 50 cfs to a maximum of 80 cfs	☐	☐	☑
5	Some of the existing debris left during the initial construction would be removed.	☐	☐	☑
6		☑	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
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	*Example: Personnel will travel by horseback*	☐	☐	☑
1	15 helicopter would be utilized to move people and supplies. Daily Flights maximum # 15	☐	☐	☑
2	Staging would occur outside the boudaries of the Wilderness.	☐	☐	☑
3	Maintenance activities would include the use of power tools chains, wrenches & come-alongs.	☐	☐	☑
4	Flows increased from a maximum of 50 cfs to a maximum of 80 cfs	☑	☐	☐
5	Some of the existing debris left during the initial construction would be removed.	☐	☐	☑
6		☐	☐	☑
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
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 Struture 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 (see Appendix C). 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 (USDA 2017). 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 "untrammeled 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
Untrammeled	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 Struture 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 Helicopte
☑	Alternative 3:	Water Discharge Control Valve Removal and Replacement with up to 15 Helicopte
☐	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?

Prohibited Use	Quantity
☐ Mechanical Transport:	
☐ Motorized Equipment:	
☐ Motor Vehicles:	
☐ Motorboats:	
☐ Landing of Aircraft:	
☐ Temporary Roads:	
☐ Structures:	
☐ 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

dahp
protect the past, shape the future

BUREAU OF RECLAMATION
OFFICIAL FILE COPY

MAIL CODE	SIGN	ACTION DATE	COPY
1000	X		
1002	X		
1100			
1600	X		
1700			
5000	X		
5130	X		
1001	X		
1409	X		
500	X		
ACTION			
1007	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
CCAO AUG 28 2017 YFO
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

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