



Icicle Creek Water Resource Management Strategy

Columbia River Policy Advisory Group

December 8, 2016

Background

- **Co-Conveners:** Ecology OCR and Chelan County DNR
- **Process:** Assembled Icicle Workgroup (IWG) Stakeholders
- **Timeline:**
 - 2012 to 2015: Guiding Principles adopted, studies completed, and alternative projects considered
 - 2015 to 2016: Icicle Strategy (base package) endorsed by IWG and SEPA scoping
 - 2016 to 2017: Programmatic Environmental Impact Statement and feasibility studies ongoing
 - 2017 to 2022: Individual project environmental review checks, permitting, design and implementation
- **Goals:** Meet instream and out-of-stream objectives in Icicle Creek Basin, provide an alternate pathway for conflict resolution other than litigation

IWG Members

- Office of Columbia River
- Chelan Co Board of Commissioners
- Conf Tribes of the Yakama Indian Nation
- WA State Dept of Fish & Wildlife
- Conf Tribes of the Colville Reservation
- WA State Dept of Ecology
- Icicle & Peshastin Irrigation District
- USFWS – Leavenworth Fish Hatchery
- City of Leavenworth
- NOAA Fisheries
- Chelan County
- Cascade Orchard Irrigation Co
- Icicle Creek Watershed Council
- WA Water Trust
- US Forest Service
- Trout Unlimited
- Agricultural Representative Mel Weythman
- Agricultural Representative Daryl Harnden
- City of Cashmere
- US Bureau of Reclamation







Bellingham

Seattle

Tacoma

Olympia

Icicle Creek Subbasin

Wenatchee Basin

Wenatchee

Spokane

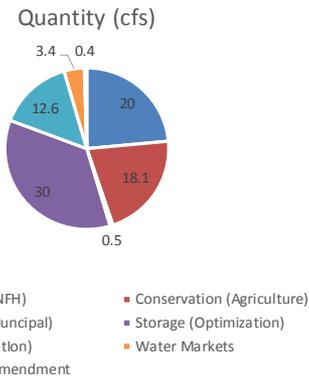
Icicle Strategy Overview

Guiding Principles for the Icicle Strategy

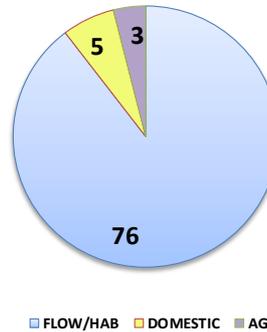


Icicle Strategy Overview

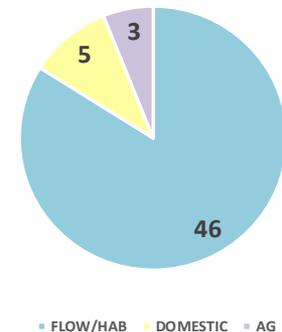
Who Benefits? Who Gets The Water?



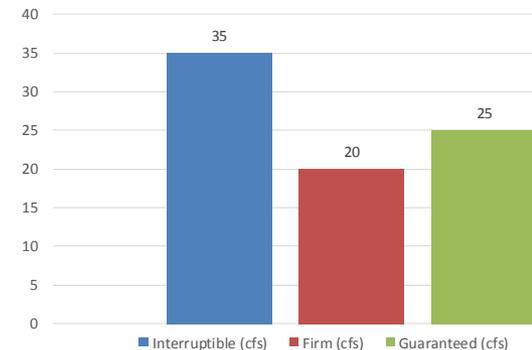
Water Supply Benefit (cfs)
Average Year
Augments Low Flow of 63 cfs



Water Supply Benefits (cfs)
Drought Year
Augments Low Flow of 20 cfs



Water Supply Benefit (84 cfs)
Average Year Pedigree of Water



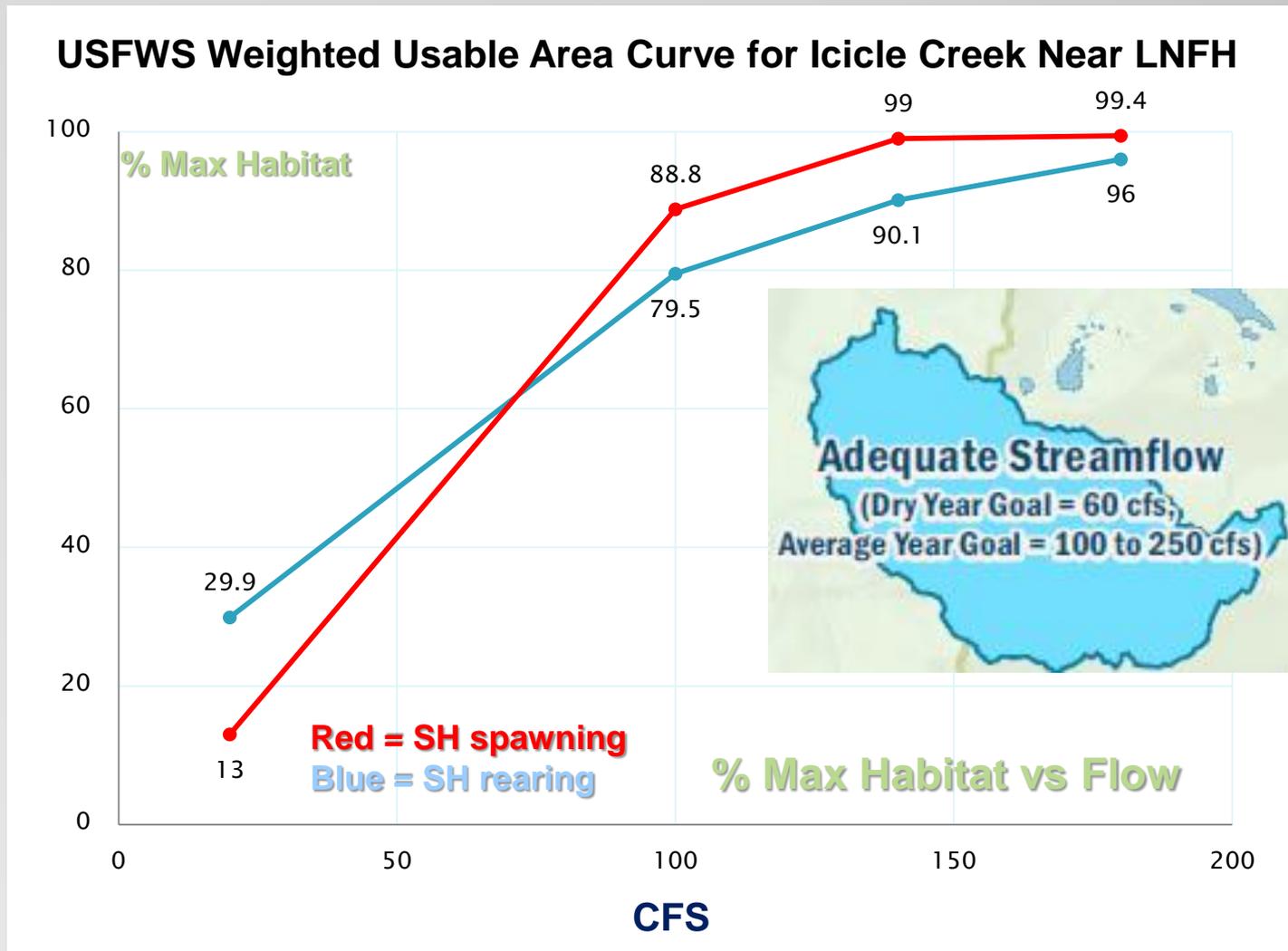
Reliability Level of Icicle Water Supply Projects

Water supply made available by proposed projects are grouped according to the following:

- ***Guaranteed*** - water rights are permanently placed in the State Trust Program under RCW 90.42.080
- ***Firm*** - water rights that are described as “non-permanent conveyances” under RCW 90.42.040
- ***Interruptible*** - water rights that are subject to interruption during drought years

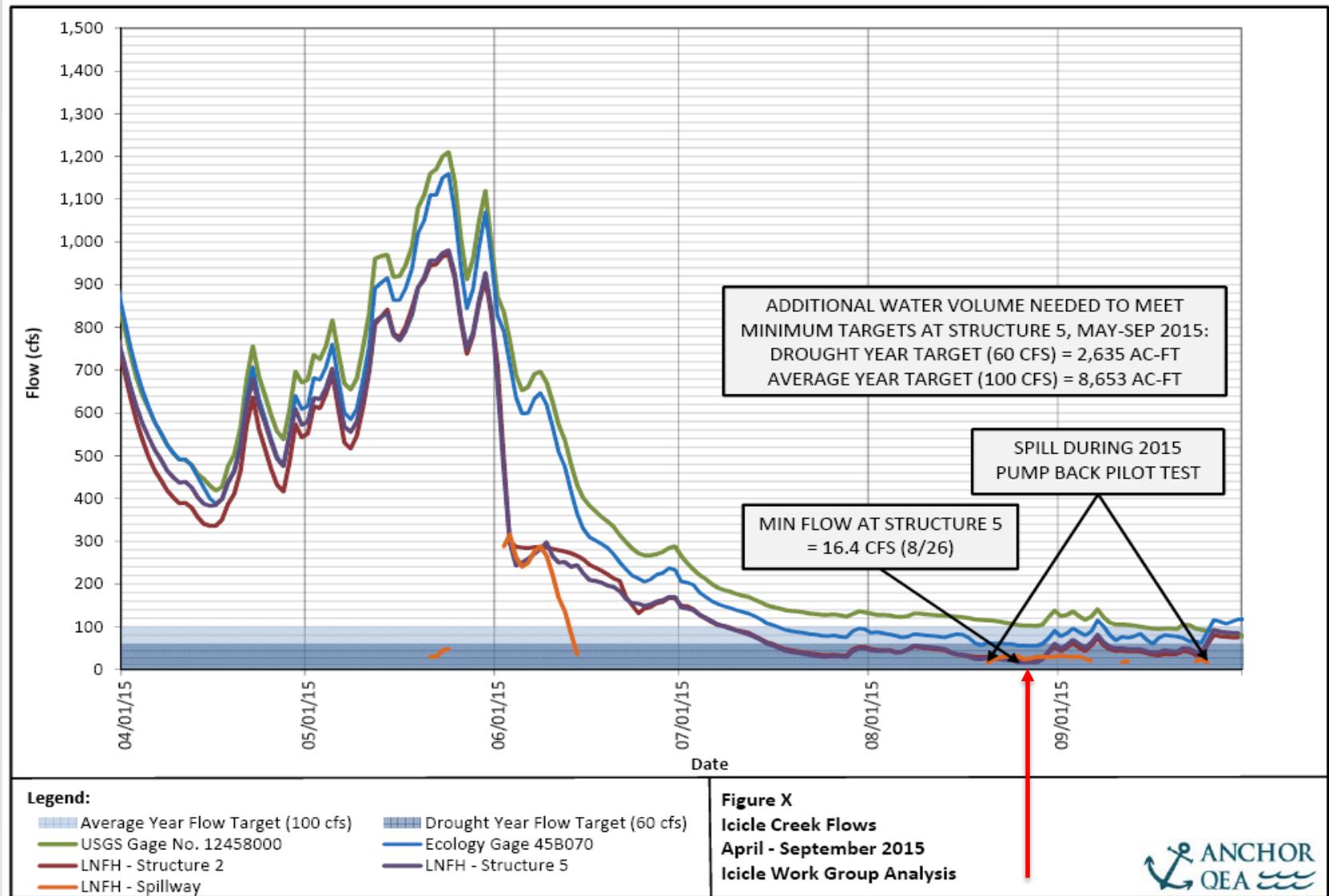
Icicle Strategy Overview

Where Did the Flow Numbers Come From? Does It Help Fish?



2015 Drought Icicle Creek Flow

How Bad Does Instream Flow in Icicle Creek Get?



What Does Flow In Icicle Creek Look Like?



Low flow in late 2001 was about 20 cfs (and 16.4 cfs in 2015)

SEPA - Process

- **Pre-Scoping**
 - Co-Lead Agency Memorandum of Agreement
 - Identify cooperating agencies
 - NEPA integration strategy
 - Stakeholder meetings
 - Identify potential permits
- **Complete Expanded Checklist**
 - Assemble existing environmental documents
 - Assemble outreach materials
 - Issue Determination of Significance
- **Public Notice / Open House / Comment Period**
- **Evaluate Comments**
 - Is there sufficient information? How address data gaps?
 - Respond to comments
- **Threshold Determination**
 - Retain Determination of Significance (begin EIS process)

SEPA Process Overview

Icicle Strategy SEPA

- **Proposal: Guiding Principles and “base package”**
- **Scoping: What should be addressed in the PEIS?**
 - Alternatives
 - Mitigation measures
 - Impacts
 - Approvals
- **Will Project Environmental Review Occur?**
 - Yes, if new substantial environmental impacts are found.
 - No, just the Programmatic EIS if no new substantial impacts.

Integrated Base Package

Icicle Working Group Integrated Base Package

September 9, 2016

Total Project Benefit ≈84 cfs & 30,500 acre-feet, Total Investment including 25% contingency ≈ \$81.7 M, Cost/acre-foot ≈ \$2,700 / acre-foot (85%+ to instream flow)

This Integrated Package is characterized by a project list meeting all Icicle Subbasin Guiding Principles with substantive flow benefit in the late summer/early fall in the historic channel. Key features include retaining the existing hatchery facilities with aggressive multiple-source augmentation and conservation measures, modernization of the Alpine Lakes, restoration of Eight-Mile Lake, and habitat/screening projects. IPID Pump Exchange at Dryden (50 cfs) could increase benefits by up to 25 cfs in Icicle Creek, total cost would increase to about \$100 M (\$2,800 / acre-foot).

Project Name (Guiding Principle Met)	Description	Cost	Integrated Plan Benefits			
Alpine Lakes Reservoir Optimization, Modernization, and Automation (FLOW) (HAB)	Automate/optimize releases of the 6 Alpine Lakes (flow benefit estimated over 92 days), but can be adapted to shorter duration / higher peak flows (and winter flow benefit). Flow benefit to instream and out-of-stream uses in normal years, to IPID in drought years. INTERRUPTIBLE, REACH BENEFITS BELOW LAKES TO PACIFIC OCEAN	\$680K	30	cfs	5,465	ac-ft
IPID Irrigation Efficiencies (FLOW) (HAB)	Update Irrigation Comprehensive Plans and fund efficiency projects, assumes savings of 3,000 ac-ft (about 10%) at an average cost of \$2,500/ac-ft. Flow benefit is non-consumptive, reach specific, and during the irrigation season. GUARANTEED, REACH BENEFITS FROM IPID DIVERSION TO WENATCHEE RIVER	\$7.5 M	10.1	cfs	3,000	ac-ft
Cascade Orchards Irrigation Efficiencies (FLOW) (HAB)	Update Irrigation Comprehensive Plans and fund efficiency projects, assumes savings of 2,100 to 3,500 ac-ft and 8 to 11.9 cfs. Flow benefit is non-consumptive, reach specific, and during the irrigation season. GUARANTEED, REACH BENEFITS FROM IPID DIVERSION TO WENATCHEE RIVER	\$4.5 M	8.0	cfs	2,100	ac-ft
Domestic Conservation Efficiencies (DOM)	Fund domestic conservation for City of Leavenworth and Chelan County consisting of metering, pipe replacement, and rural conservation designed to achieve domestic savings at \$2,500/ac-ft. GUARANTEED	\$2 M	0.5	cfs	400	ac-ft
Leavenworth National Fish Hatchery Conservation, Water Quality Improvements (FLOW) (HAB) (LNFH) (LAWS)	Combination of on-site reuse, effluent pump-back, and wellfield enhancements. Flow benefit is nonconsumptive and reach-specific. FIRM, REACH BENEFITS IN HISTORIC CHANNEL	\$20 M	20	cfs	14,454	ac-ft
Eight-Mile Lake Reservoir Restoration Project (FLOW) (HAB) (DOM) (AG)	Restore Eight-Mile Lake from existing 1,600 ac-ft to normal permitted pool volume of 2,500 ac-ft (900 ac-ft), 60-day flow benefit, adaptive, plus winter flows. Domestic permits based on CU mitigation up to 3,600 ac-ft and 5 cfs. INTERRUPTIBLE/GUARANTEED, REACH BENEFITS FROM EIGHT-MILE LAKE TO WENATCHEE RIVER	\$1.6 M	12.6	cfs	3,600	ac-ft
Water Markets (AG)	Create an Icicle Water Bank, seed with an initial acquisition of 1,000 ac-ft at \$3,000 / ac-ft for for interruptible ag users during times of shortage and instream flows. INTERRUPTIBLE/GUARANTEED, IN ICICLE AND/OR WENATCHEE RIVER	\$3 M	3.4	cfs	1,000	ac-ft
Habitat improvements in Icicle Creek, land acquisition (HAB)	Riparian plantings, engineered log jams, conservation easements, and other habitat projects. Land acquisition coordinated with the Upper Wenatchee Community Lands Plan and opportunities identified in the Icicle Basin.	\$2.5 M	2.7	miles	2000	acres
Rehabilitate Leavenworth Hatchery Intake, Operational Improvements at Structure 2, Icicle Creek Passage, Tribal Fisheries Improvements (HAB) (TRIBAL)	Replace delapidated sections of intake piping, improve passage in Icicle Creek including to Upper Icicle Creek, reoperation of Structure 2 and Hatchery Channel, increased tribal fishing access/amenities.	\$6.5 M	Improve fish passage and hatchery operation			
LNFH / COIC Screening Improvements, IPID Screening, City of Leavenworth (HAB) (LAWS)	Improve screens to current standards. IPID & City screening project to be completed in advance of Boulder Field implementation. LNFH Screen could be in the range of \$5 to \$12 M depending on COIC and conservation.	\$17 M	Improve fish passage and hatchery operation			
Instream Flow Rule Amendment (DOM)	Modify WAC 173-545 Icicle Reserve from interim level of 0.1 cfs to final level of 0.5 cfs	\$50 K	0.4	cfs	400	ac-ft
Guiding Principles	How Does This Integrated Plan Option Meet the Guiding Principles?					
Improve Instream Flow (FLOW)	100 cfs average year goal met (≈140 cfs), 60 cfs drought year goal met (≈67 cfs).					
Sustainable Leavenworth National Fish Hatchery (LNFH)	Goal of source redundancy, restored capacity, fish rearing, water quality, and passage met.					
Protect Tribal Treaty and Non-Tribal Harvest (TRIBAL)	Instream flow improvement balanced by preservation of fishery, with adaptive management strategy in place, amenity and access increases.					
Improve Domestic Supply (DOM)	Peak domestic need of 2,300 ac-ft met (≈4,200 available), if storage releases mitigating consumptive use when instream flows are not met (credits for natural flow availability and return flow).					
Improve Agricultural Reliability (AG)	Automation for IPID, 1,000 ac-ft for agricultural interruptibles met.					
Enhance Icicle Creek Habitat/Passage/Screens (HAB)	Goal of additional habitat improvement met with adaptive management.					
Comply with State and Federal Law, Wilderness Acts (LAWS)	Goal met through project check requirement on all permits and environmental review.					
Long-term projects to achieve 250 cfs could include the IPID Dryden Pump Exchange, conservation and markets, Snow Creek diversion project, Upper Klonauqua storage, etc. Flow benefits based on storage can be shaped for further flow benefits based on seasonal releases. For example, if IPID Pump Exchange and Eight-Mile releases could be combined to increase drought year low-month benefit to approximately 102 cfs.						

PEIS Alternatives

What Alternatives Are Being Considered?

- No Action
- Icicle Workgroup Base Package (conservation at LNFH, COIC, IPID, and City, Alpine Lake Automation, Eightmile Restoration, Water Markets, Screening & Passage, Habitat, Tribal Adaptive Management, Rule Amendment).
- Base Package without Alpine Lakes Automation but with IPID Pump Exchange at Dryden
- Base Package without any lake restoration or automation, but with IPID Pump Exchange at Dryden, enhanced conservation, and Legislative Change to waive instream flow impacts.
- Base Package with expansion of Eightmile Lake, Upper Klonauqua Storage Enhancement, Upper Snow Storage Enhancement

What Alternatives Are Not Being Considered?

- Removing Leavenworth National Fish Hatchery, decommissioning existing dams, selling District water rights, District point of diversion change out of Icicle Creek

SEPA Process Overview

Timeline

- **May 11, 2016 comments due on the scope of the PEIS**
- June 2016: Initiate PEIS development
- Summer 2017: Publish PEIS and begin ***public comment period***
- Fall 2017: Issue final PEIS and begin project-level environmental review, if necessary

Overview of Potential Projects

- **Conservation**
- **Groundwater Augmentation**
- **Reuse**
- **Pump Exchange**
- **Modification of Existing Storage**
- **New Storage**
- **Water Markets**
- **Fish Passage and Screening**
- **Habitat Improvement**
- **Tribal Fishery Enhancement**

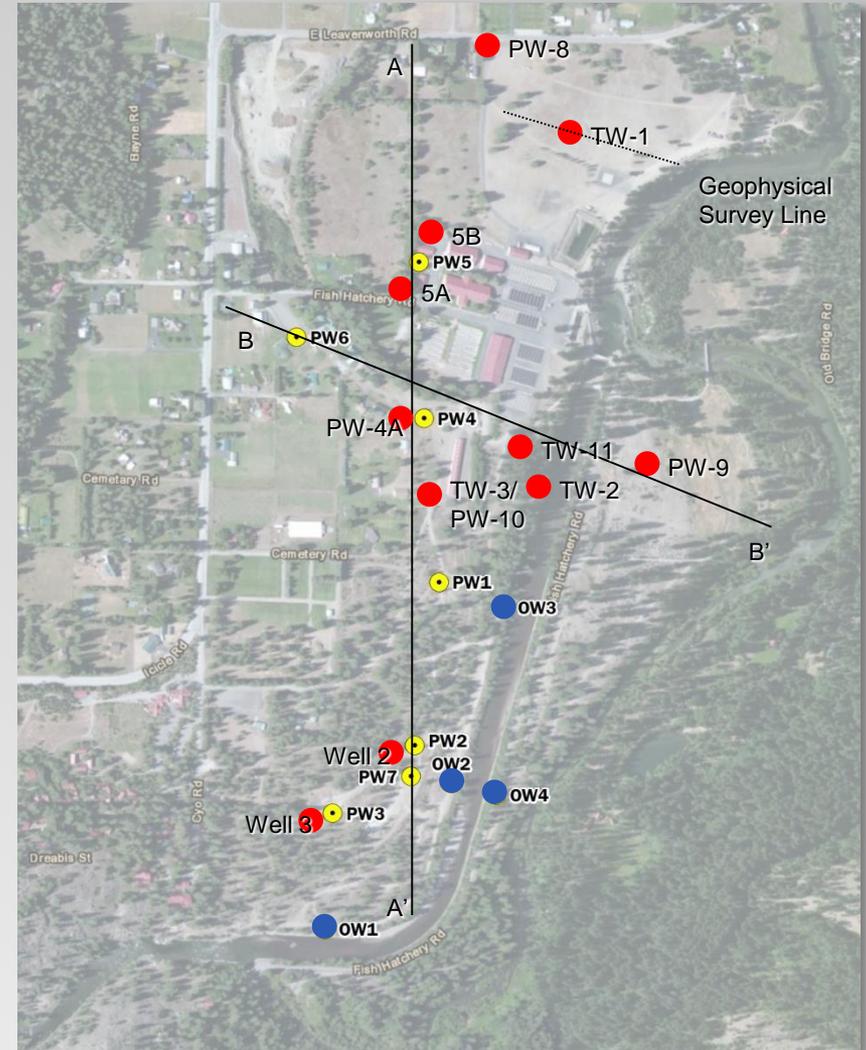
Conservation

- Conservation Survey of IPID, COIC, and Leavenworth
- COIC likely best conservation opportunity for pipeline upgrades and pump station relocation
- IPID pipe upgrades more limited and costly
- Leavenworth use generally has declined per capita
- On-farm savings generally limited, highly efficient
- **Guaranteed** (non-consumptive)



Groundwater Augmentation

- Expand groundwater supplies at LNFH
- 7+ cfs
- Firm
- Geophysical testing completed 12/2014
- Ranney well testing in 2015
- Production level shallow groundwater collectors planned



Reuse

- **Pilot evaluation of reuse at LNFH**
- **Up to 20 cfs savings anticipated**
- **Firm**
- **Reuse has been successful at other area hatcheries.**



Pump Exchanges

■ IPID

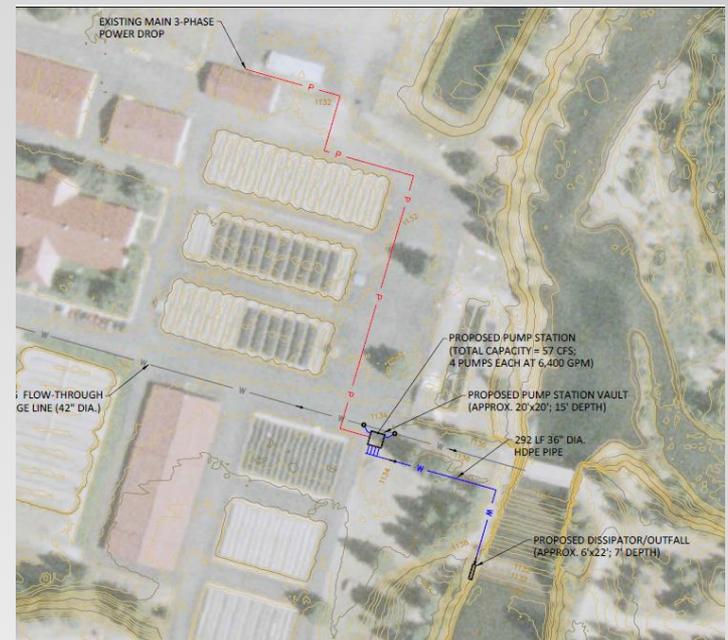
- 40 to 62 cfs
- Guaranteed
- Appraisal studies complete, O&M funding required

■ LNFH

- 28-57 cfs, piloted in 2015
- Firm
- Pilot retrospective study underway

■ COIC

- 8 to 11 cfs
- Guaranteed
- Design study next



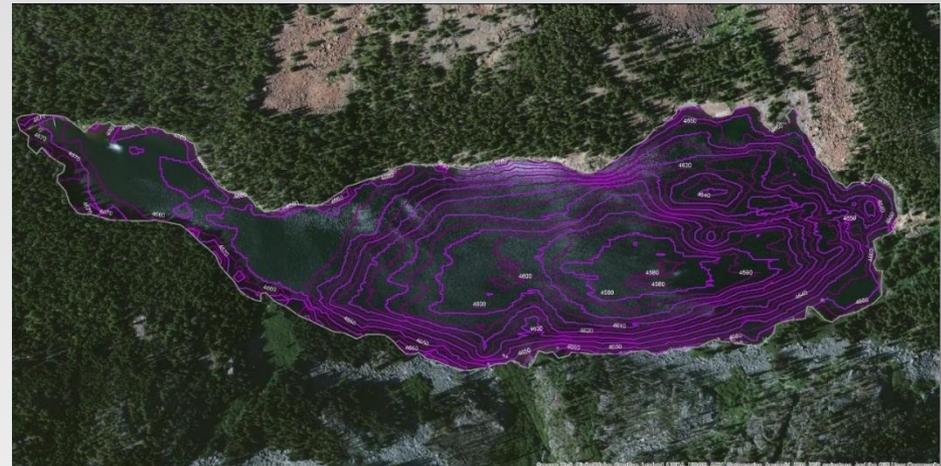
Modification of Existing Storage

■ Alpine Lakes Optimization

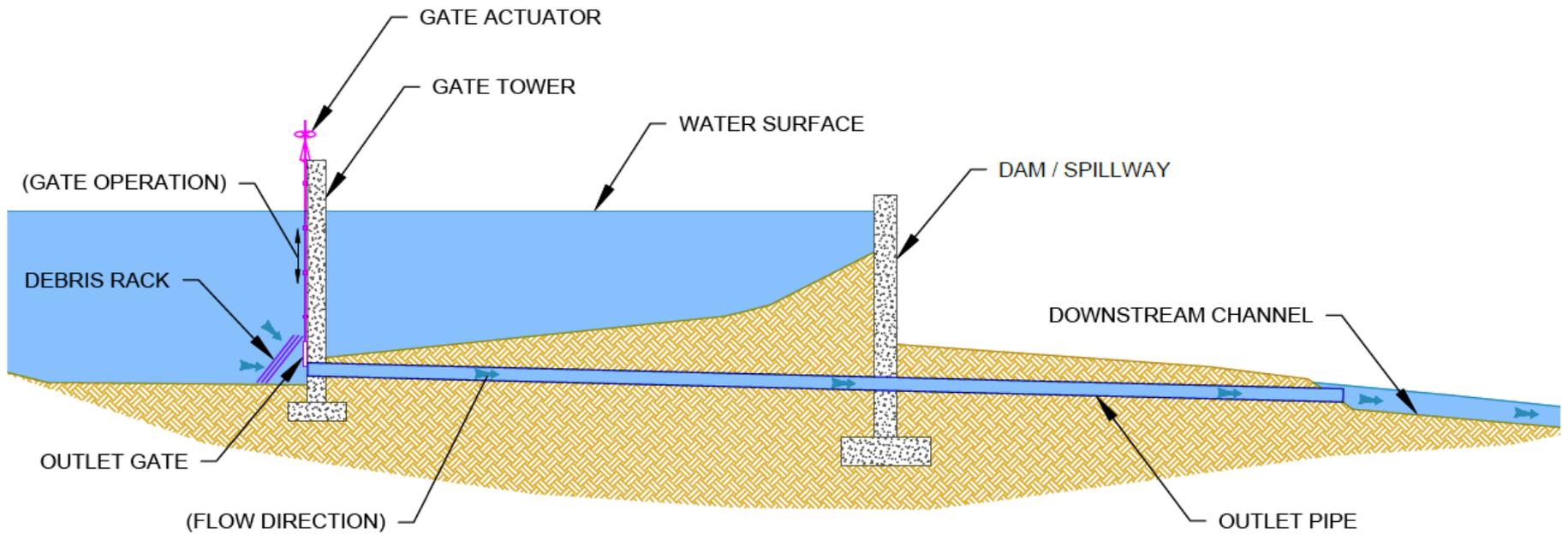
- Automate and re-operate Lakes
- 30-42 cfs Interruptible
- \$86K - \$3.5M
- \$16 - \$450 /ac-ft

■ Eight-Mile Lake Restoration

- Restore up to 1125 ac-ft (2500 ac-ft total)
- 5-10 cfs Guaranteed
- Dam repair and/or siphon
- \$1.5 - \$1.7M
- \$1400 - \$2400 / ac-ft



How Do the Alpine Lake Dams Work?



Irrigation District / Alpine Lake Summary

Historical Perspective

- Dams have been on the lakes since the 1920's.
- Water rights were adjudicated in Superior Court in 1927.
- Alpine Lakes Wilderness Act passed in 1976.
- Congress appropriated LWCF funds to purchase three inholders: BNSF, Pack River Co., and IPID. BNSF and Pack River were purchased. IPID also sold and exchanged some lands within the Wilderness.
- In 1990 IPID and the USFS agreed to a land exchange where the USFS received title to IPID's land interest and IPID retained easements for operation, maintenance, replacement, repair, modification, and upgrading of dams.

IPID Irrigation District Operations

Operational Perspective

- Water from all the dams used to augment District's water supply during drought years (e.g. 2001, 2005, 2015), but prorationing still occurs, which has an economic impact.
- Annually, at least one dam each year is drawn down for maintenance purposes.
- All of the dams are aging and routine infrastructure upgrades are necessary and part of the easement the District retained.
- District deferred some maintenance on Eightmile Lake because of opportunity to collaborate as part of the Icicle Strategy.
- Nada Dam went through a major replacement like that being contemplated for Eightmile Lake in 2009 (USFWS).
- The District provides 9,500 acres of irrigation, predominately high efficiency fruit orchards.

What Would Post-Construction Look Like?

Automate the Lakes and Release Water Annually

- New Gates
- Solar Panel
- Radio Antennae



Lower Klonauqua Lake Gate Actuator



Nada Lake Solar Panel Installation for Monitoring Equipment

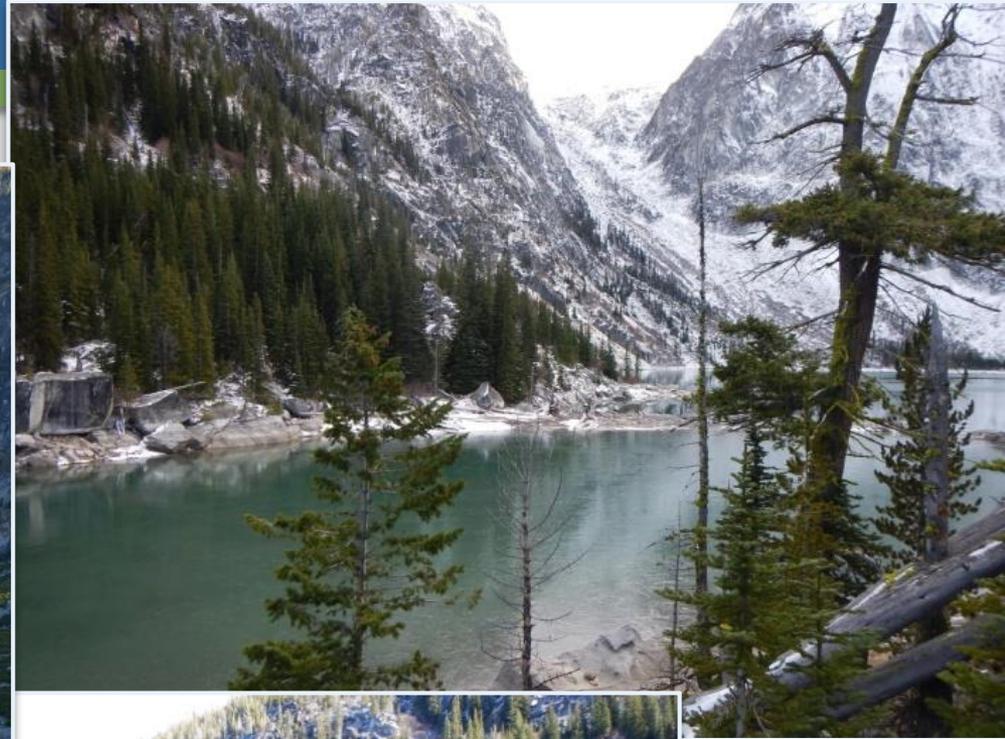


Nada Lake Parshall Flume Stilling Well/Monitoring Equipment Housing

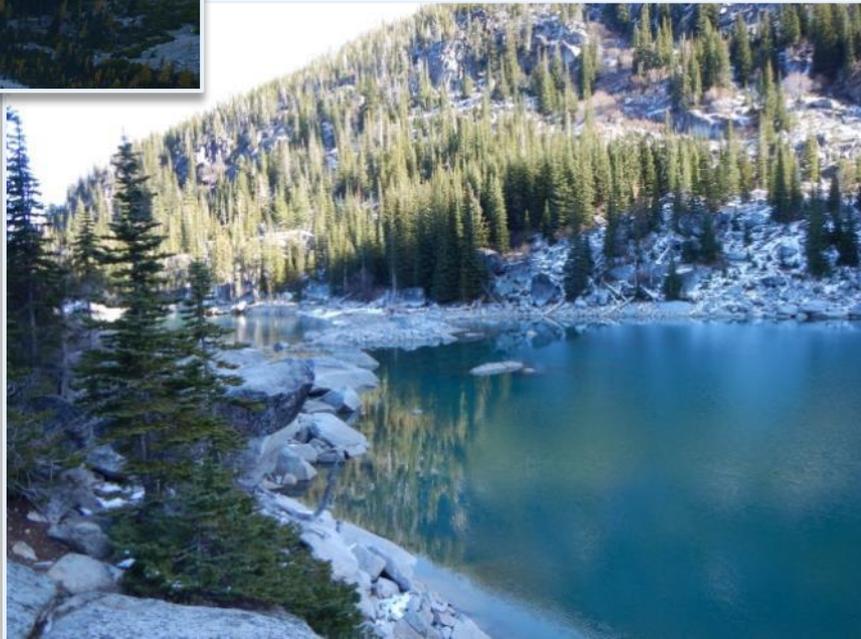
Square Lake



Colchuck Lake



September 2015



Klonaqua Lake



July 2014



Eightmile Lake



July 2014

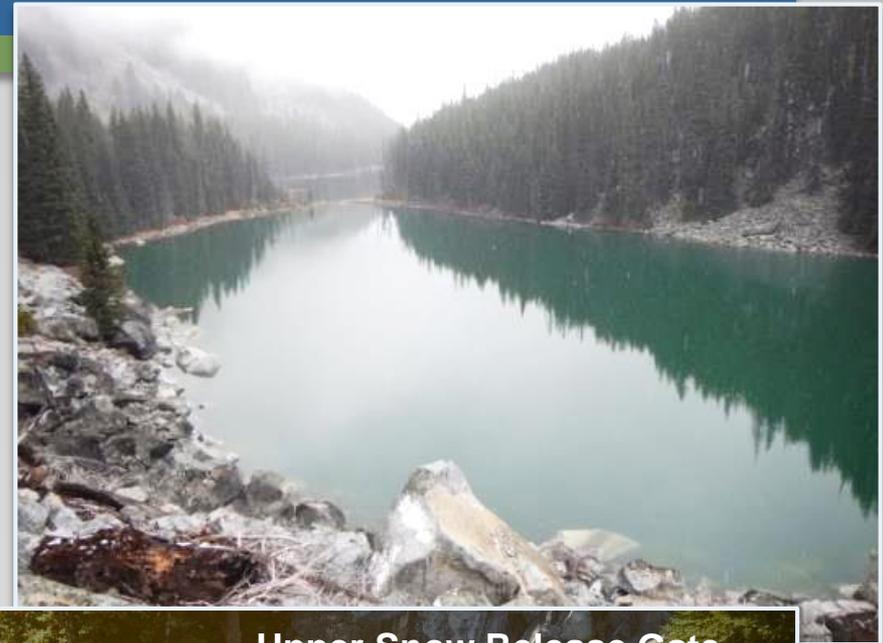


Upper Snow, Lower Snow & Nada Lakes



September 2015

IPID retains rights to Snow Lakes for irrigation but by agreement uses their other lakes first to prioritize water for LNFH.



Upper Snow Release Gate

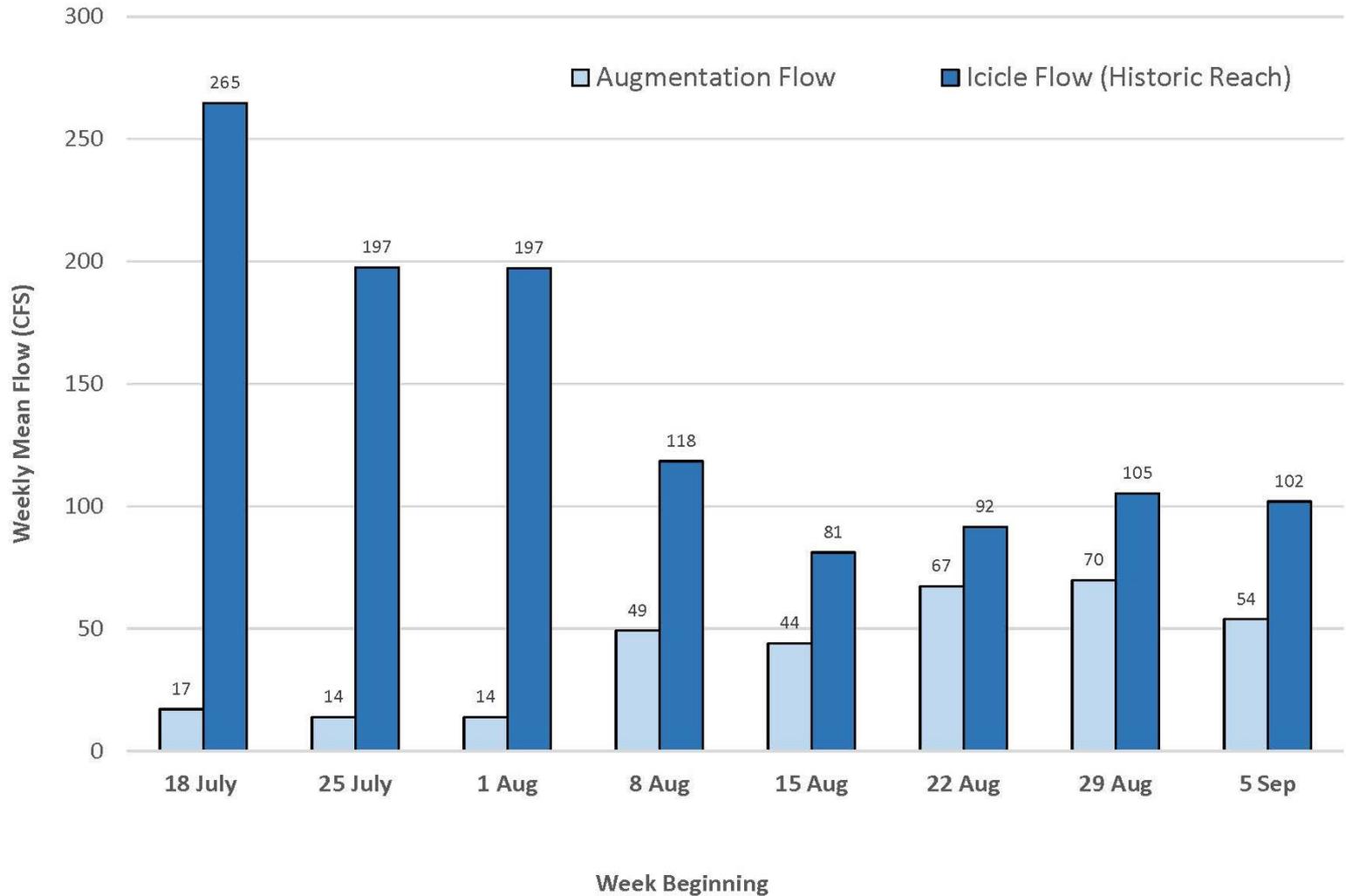


2016 IPID Maintenance & Opportunistic Flow Augmentation

Maintenance on all Alpine Lakes in 2016 created opportunity for evaluating instream flow benefits via trust donations.

1. **Maintain 100 cfs at Structure 2** (adaptive based on actual flows)
2. **Colchuck** - 700 ac-ft drawdown by Sept. 1st for maintenance.
3. **Eightmile** - peak release early for design inspection and natural seepage. No weekly adjustments due to submerged headgate.
4. **Square and Klonauqua** - Maximum 10 cfs after Sept. 15th for Bull Trout spawning in Leland Creek and French Creeks.
5. **Upper Snow** - Initial release 5 cfs due to valve limitations (adaptive later in the year depending on LNFH flow needs).
6. **Avoid significant ramping changes** (more than 10 cfs) in a week in the late summer/fall.

Augmentation Contribution



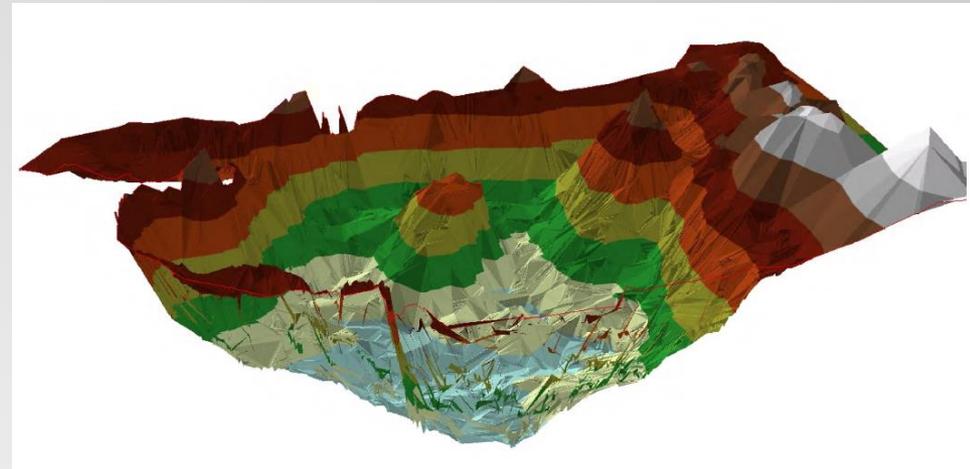
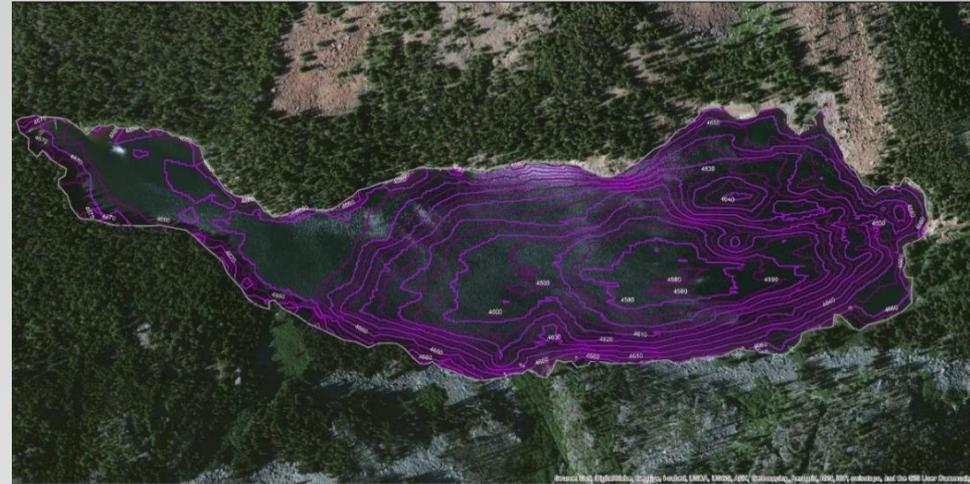
New Storage Alternatives in PEIS

■ Eight-Mile

- 1 ft pool raise and/or siphon
- 1,000 ac-ft expansion
- 11.6 cfs

■ Klonaqua

- Construct outlet tunnel
- 10-50 ft drawdown
- 600-2500 ac-ft
- 5-20 cfs



Water Markets

- Facilitate transactions between sellers and buyers
- Likely shift agricultural use to municipal or instream flow
- Season of use challenges exist
- 500 ac-ft produces about 3 cfs for 90 days
- Valuations in the range of \$1,000 - \$2,000
- Purchase cost on the order of \$500K to \$1M
- Additional transaction and formation costs

Supply

Sellers: Water right holders

Projects:
Retime available water

Banking Functions

- Certifies validity of water rights
- Business rules for bank
- Establishes pricing
- Marketing
- Regulatory interaction

Demand

Buyers:

- Mitigation for new uses
- Reliability for existing uses

Fish Passage & Screening

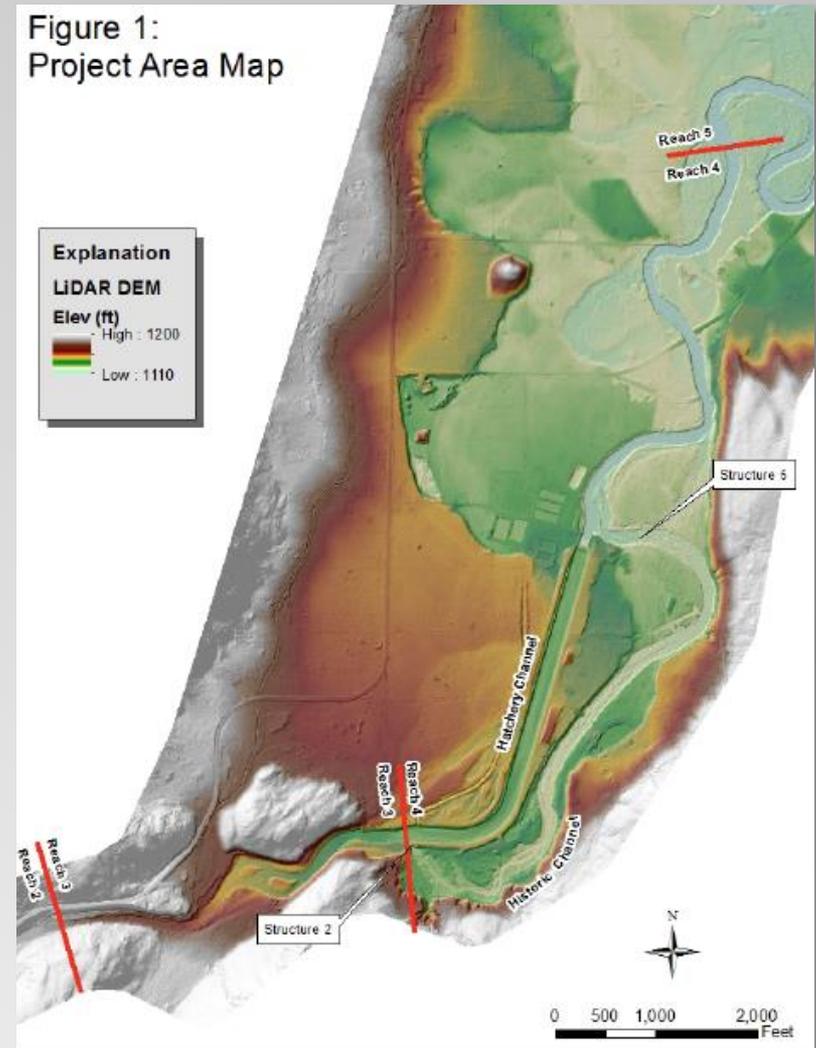
- LNFH Structure 2 modifications
- LNFH Structure 5 modifications
- LNFH / COIC Intake and Fish Screen
- IPID Fish Screen
- WDFW Fish Screen and Diversion Inventory



Habitat Improvement

- **IWG Recommendation: no additional high flow through historic channel**
- **Additional high flow habitat improvements in other reaches**
- **Targeted habitat improvements in Icicle Creek pending IFC input and project development**

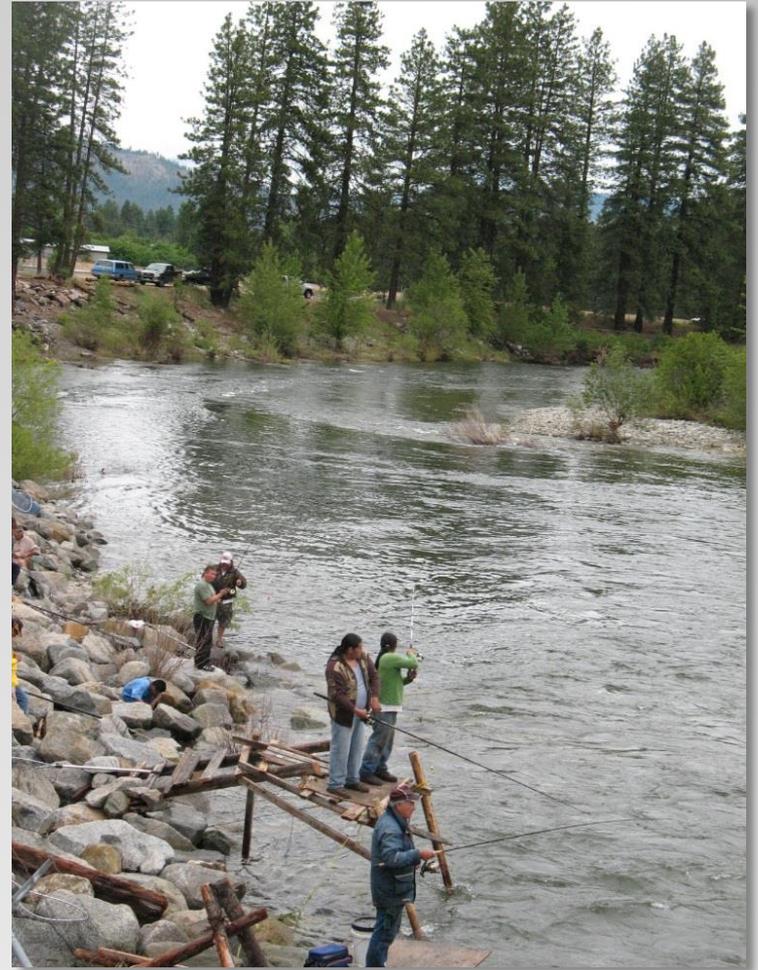
Figure 1:
Project Area Map



Tribal Fishery Enhancement

Tribal Impacts and Enhancement Study

- Protection measures for existing historic location
- Additional locations or access acquired?
- Different fishing methods permitted?
- Location amenities enhanced?
- Adaptive management and monitoring as projects implemented?





Questions?

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