

Icicle Working Group Integrated Base Package

Draft 10/02/2015

Total Project Benefit ≈77 cfs & 26,800 acre-feet, Total Investment including 25% contingency ≈ \$64.2 M, Cost/acre-foot ≈ \$2,400 / acre-foot

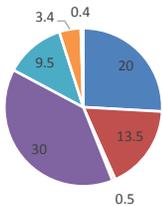
This Integrated Package is characterized by a project list meeting all Icicle Subbasin Guiding Principles with substantive flow benefit in the late summer/early fall in the historic channel. Key features include retaining the existing hatchery facilities with aggressive multiple-source augmentation and 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 \$83 M (\$2,800 / acre-foot).

Project Name (Guiding Principle Met)	Description	Cost	Integrated Plan Benefits			
Alpine Lakes Optimization, Modernization, and Automation (FLOW) (HAB)	Automate and 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 1,000 ac-ft (about 25%) 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	\$2.5 M	3.4	cfs	1,000	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 Restoration Project (FLOW) (HAB) (DOM) (AG)	Restore Eight-Mile Lake from existing volume of 1,375 ac-ft to normal permitted pool volume of 2,500 ac-ft, 60-day flow benefit (and winter flow benefit). Flow benefit can be adapted to shorter duration / higher peak flows. INTERRUPTIBLE/GUARANTEED, REACH BENEFITS FROM EIGHT-MILE LAKE TO WENATCHEE RIVER	\$1.6 M	9.5	cfs	1,125	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 RM 2.7-4.5, 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 at Boulder Field, 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 existing screens to current standards. IPID/City of Leavenworth screening project to be completed in advance of Boulder Field implementation.	\$5 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 4,100 ac-ft met (≈10K 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)	Restoration goal of about 225 ac-ft (1,600 ac-ft total 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.

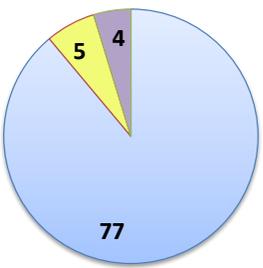
Long-term projects to achieve 250 cfs could include the IPID Dryden Pump Exchange, conservation and markets, Snow Creek diversion project, Upper Klonaqua storage, etc. Flow benefits based on storage can be shaped for further flow benefits based on seasonal releases. For example, if IPID Pump Exchange and Eight-Mile releases could be combined to increase drought year low-month benefit to approximately 102 cfs.

Quantity (cfs)



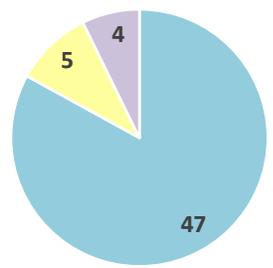
- Conservation (LNFH)
- Conservation (Municipal)
- Storage (Restoration)
- Instream Flow Amendment
- Conservation (Agriculture)
- Storage (Optimization)
- Water Markets

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



- FLOW/HAB
- DOMESTIC
- AG

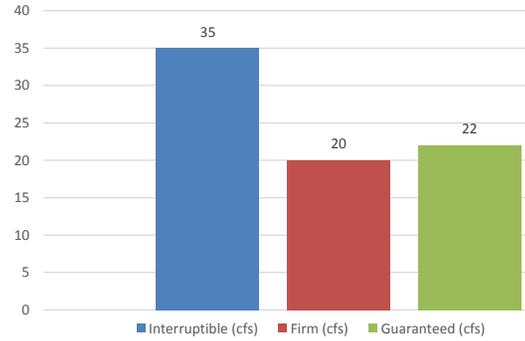
Water Supply Benefits (cfs)
Drought Year
Augments Low Flow of 20 cfs



- FLOW/HAB
- DOMESTIC
- AG



Water Supply Benefit (77 cfs)
Average Year Pedigree of Water



- Interruptible (cfs)
- Firm (cfs)
- Guaranteed (cfs)