Water Project Integration

High Value Resource

Range of Uses

Demand Timing

Conflicts

INTEGRATED WATER PROJECT DEVELOPMENT

DIVERSE GROUPS SET ASIDE DIFFERENCES TO IMPROVE CONDITIONS IN THE ICICLE CREEK BASIN

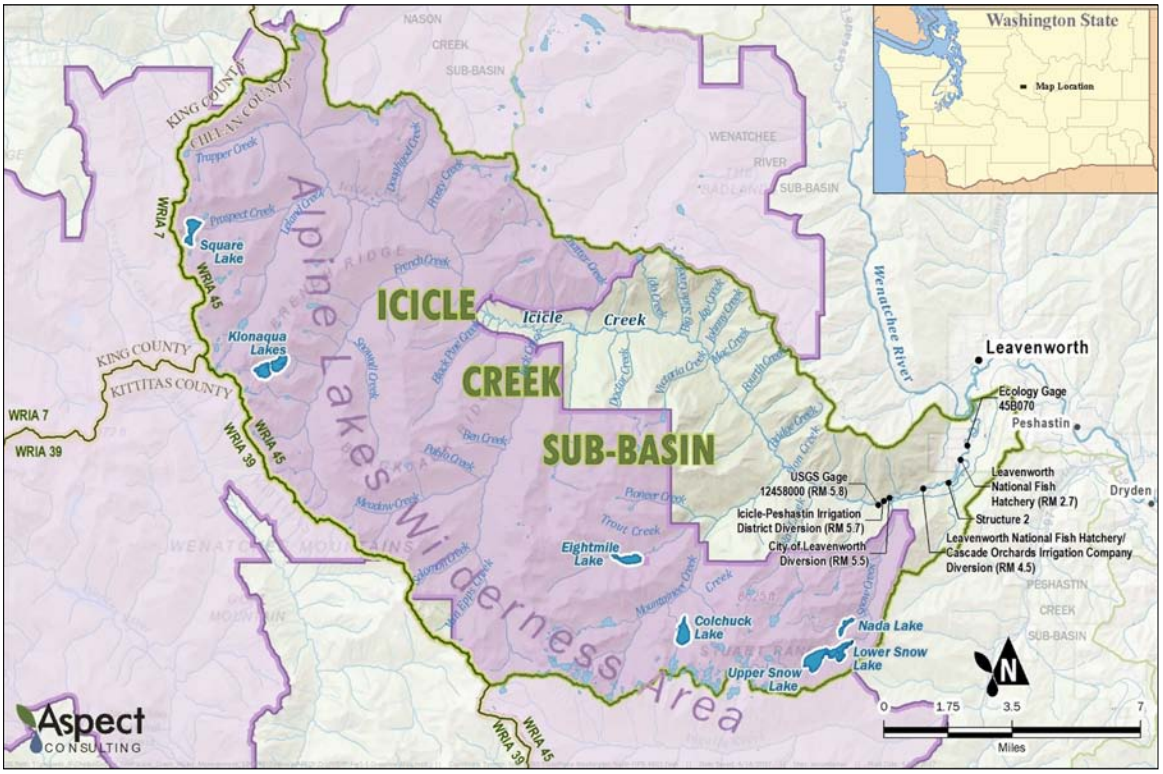
by Mike Kaputa, Director, Chelan County Natural Resources Department (Wenatchee, WA)

Introduction

The Icicle Creek basin encompasses an area approximately 212 square miles northwest of the City of Leavenworth in central Washington State. This makes it the largest sub-watershed in Water Resource Inventory Area 45 (WRIA 45), contributing 20% of the Wenatchee River's annual flow. The area has high aesthetic, recreational, and environmental value because much of the land coverage resides on undeveloped land in the Alpine Lakes Wilderness and the Wenatchee National Forest. The Icicle Creek basin brings life to the local economies by providing the primary water source to the City of Leavenworth, which is a nationally renowned tourist destination, and to the Icicle-Peshastin Irrigation District (IPID), which supplies water to the agricultural base along the Wenatchee River Valley from Leavenworth to the City of Wenatchee. The Icicle Creek basin also sustains life for aquatic resources — namely anadromous fish species such as Chinook, Coho, and Steelhead — which utilize instream flows for rearing and spawning habitat. These fish are an important cultural resource for the regional First Nations of the Colville Confederated Tribes and Yakama Nation.

Because flows from Icicle Creek support a broad range of local and regional demands — from domestic water supply to agricultural irrigation to habitat for anadromous fish species — a diverse set of stakeholders is affected by the relative health of this watershed. Like many watersheds in central and eastern Washington, balancing available supplies with demands is not necessarily a matter of overall quantity. Rather, it is a matter of the timing of supplies relative to the timing of demands. Significant excess supplies exist for a relatively short window in the spring and early summer months during the freshet period. However, a significant deficit of supplies develops later in the year during late summer / early fall — just when returning salmon are looking to spawn. This imbalance, specifically with the late summer instream supply shortage, has resulted in significant conflict between stakeholders. Resolutions are needed.

An unusual challenge with the Icicle Creek basin is related to the types of conflicts. While instream vs. out-of-stream conflicts exist in many basins, the Icicle Creek basin also has conflicts related to different fish proponents (e.g. native fish vs. hatchery fish), and diverging environmental interests (e.g. instream flow interest vs. wilderness interest). This makes arriving at solutions even more difficult in that not all costs are viewed as monetary and not all stakeholders place the same value on the same benefits — whether the benefits be instream or out-of-stream.



Water Project Integration

Historic Development

Hatchery v. Wild Fish

Municipal Rights

Late Summer Competition

Instream Flows

Long-Standing Conflicts Over Water

The conflicts between Icicle Creek basin stakeholders are very real and long-standing. Early economic development in this region depended on agriculture. As a result, major water resources infrastructure were built in Icicle Creek and high in the Alpine Lakes region decades before the area was designated as wilderness by the federal government in 1976. National economic factors led to the construction of Grand Coulee Dam, which blocked salmon migration along the uppermost reaches of the Columbia River. This fisheries impact was addressed by the construction and operation of the Leavenworth National Fish Hatchery (LNFH) in the late 1930s. LNFH now produces 1.2 million smolts annually. A small fraction of these smolts later return as adult chinook salmon to repeat the species' lifecycle. Not everyone agrees that this practice is best, because hatchery-raised fish compete for limited instream resources with native-born populations of fish. The hatchery site is also a historical Tribal fishing ground, where each year the Yakama Nation and Colville Confederated Tribes catch fish as they have done since time immemorial. This makes the returning hatchery fish critical for Tribal sustenance. The disagreement between hatchery and wild fish is so deep that it is the subject of both prior and ongoing litigation, such as *Wild Fish Conservancy v. Salazar et al.*, 628 F.3d 513 (9th Cir. 2010), *Wild Fish Conservancy v. Irving et al*., 221 F. Supp. 3d 1224 (E.D. Wash. 2016), *Wild Fish Conservancy v. Washington State Department of Ecology*, No. P10-019 (Wash. Pollution Control Hearings Bd., July 11, 2016), and *Center for Environmental Law and Policy v. United States Fish and Wildlife Service*, No. 2:15-CV-0264-SMJ, 2017 WL 1731706 (E.D. Wash. May 3, 2017).

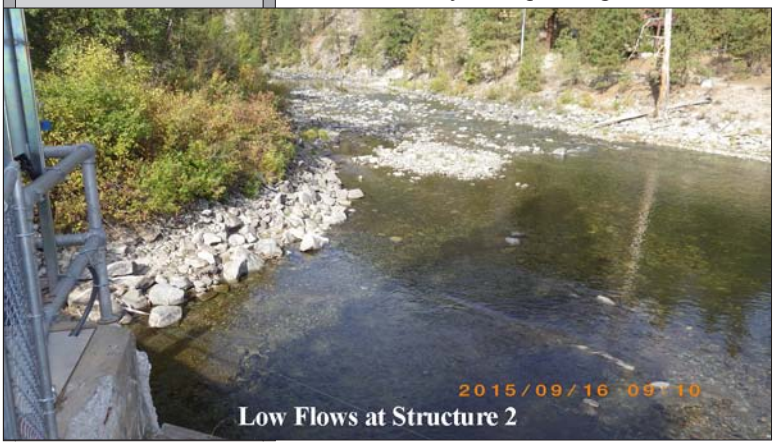
Current conflicts are not limited to fish. Over the years, the City of Leavenworth has transitioned from a rail town to a bustling top tourist destination with close to two million visitors each year. While domestic supplies for the City represent a tiny fraction of overall water demand, that use is none-the-less contentious. The magnitude of the City's diversionary right from Icicle Creek has also been the subject of litigation. In 2012, the Chelan County Superior Court ruled in favor of the Washington State Department of Ecology (defendant) against the City of Leavenworth (plaintiff), in *City of Leavenworth vs. Department of Ecology*, No. 09-2-00748-3 (Chelan Cnty. Super. Ct. Dec. 19, 2011), limiting the determination of the City's annual quantity to 275acre-feet per year. The City contends that their annual quantity should be much higher (1,085 acre feet per year) based on year-round continuous diversion. The City has appealed this decision. Currently, this case is on hold in hopes that a coordinated effort between stakeholders may arrive at better solutions.

Demands on the System and Current Challenges

Notwithstanding legal disagreements for water supplies, various water appropriations (water rights) place significant stress on the system because all users compete for water at the same time. Irrigators, fish, domestic users, and hatchery fish targets all need precious late summer water. Climate change has the potential to create additional shortages for all of these users. The following subsections discuss some of the specific challenges in the Icicle Creek basin.

Instream Flows

Instream flows are an important component of the Icicle Creek basin's water budget. Adequate instream flows contribute to healthy aquatic and riparian ecosystems, protection of federal Endangered Species Act (ESA) listed fish species, water quality, aesthetics, and recreation. Instream flow protection has been promoted through instream flow rules and watershed planning initiatives, with high importance assigned to improving habitat for salmonids. However, instream flows in late summer often drop below those set in Washington Administrative Code (WAC) 173-545-040. That rule sets minimum flows in the lower reaches of Icicle Creek at 275 **c**ubic **f**eet per **s**econd (cfs), but in drought years flow can be as low as 20 cfs in the historical channel near the LNFH. These low stream flows affect water quality and limit habitat diversity for aquatic species, and have contributed to exceedances of state and federal standards for temperature. Icicle Creek supports three ESA-listed species: Upper Columbia spring Chinook salmon, Steelhead, and bull trout. The picture below shows the low flow of 35.7 cfs during the 2015 drought at LNFH Structure 2, which is the start of the natural channel reach of Icicle Creek adjacent to the Hatchery.



Low Flows at Structure 2

Leavenworth National Fish Hatchery

The US Bureau of Reclamation (Reclamation) funds the operation and maintenance of LNFH as mitigation for fish losses resulting from the construction of Grand Coulee Dam and creation of the Columbia Basin Project. LNFH is operated by the US Fish and Wildlife Service (USFWS) on behalf of Reclamation. Water supply to the hatchery is from a combination of Icicle Creek surface water flows and

Water Project Integration

Hatchery Production

groundwater, with reservoir storage (Snow Lakes and Nada Lake) located in the Alpine Lakes Wilderness Area. To ensure production goals of 1.2 million fish are met, LNFH needs a reliable supply of cool, pathogen-free water year-round. Such supply is not always possible. Nor is meeting fish production targets. The situation is also getting worse because of climate change. In the 2015 drought, LNFH had to euthanize fish and move others to offsite acclimation facilities due to warm temperatures and water-borne disease that threatened to critically disrupt hatchery operations.

Tribal and Non-Tribal Harvest

The Yakama Nation and Colville Confederated Tribes have harvest rights in lower Icicle Creek, as stated in the Yakama Treaty of 1855, Article 10.

Adult spring-run Chinook salmon return to LNFH between mid-April and mid-July each year. A Tribal fishery is permitted during this time if run size is large enough to both meet the hatchery broodstock goal of ~1,200 spawners and provide fish in excess of hatchery needs. The broodstock goal is a function of the hatchery's obligation under *U.S. v. Oregon*, 302 F. Supp. 899 (D. Or. 1969) to produce 1.2 million juvenile spring Chinook salmon.

Tribal Fishing

The success of the Tribal fishery is dependent on the concentration of returning adult salmon in the pool at the base of the fish ladder. This is the location where the majority of Tribal fishing currently occurs with Tribal members using traditional dipnets, or modern rod-and-reel, from scaffolds erected along the streambank. Tribal fish harvest has declined considerably since 2001. Based on data provided by Yakama Nation Fisheries (Table 1 below is from Steven Parker from Yakama Nation Fisheries, sent November 28, 2016), Tribal spring Chinook harvest between 2001 and 2014 has decreased by 90%, going from 5,075 fish harvested to 547. This decline has been consistent over this period.

Domestic Uses and Municipal Supply

Growth Outpaces Rights

Icicle Creek and groundwater in the Icicle Creek basin are important water sources for municipal and domestic uses. According to the 2010 US Census, the City of Leavenworth has a population of ~2,000, but it is also an internationally renowned tourist destination that attracts nearly two million visitors each year. The City has water rights to withdraw 1.5 cfs from Icicle Creek and 2.2 cfs from groundwater for municipal use. However, these water rights are not sufficient to support population projections out to 2050. Based on growth rates set by the City of Leavenworth Water System Plan and the Wenatchee Watershed Assessment, it is predicted that by 2050 there will be 199 new homes outside the Urban Growth Boundary in the Icicle Creek basin, and 2,546 more **e**quivalent **r**esidential **u**nits (ERUs) within the Urban Growth Boundary. Because this area is so heavy with recreation and tourism, the projected demand was based on ERUs rather than population.

Icicle Creek Spring Chinook Fishery

Return Year	Trapped @ Hatchery	Sport Harvest	YN Harvest	CCT Harvest	Percent Tribal Harvest	Remaining in River	Total Run
1999	2,103	108	175		7.2	45	2,431
2000	4,457	1,606	3,238		34.2	163	9,464
2001	6,259	2,260	5,075		33.6	1,488	15,082
2002	6,459	1,201	3,796		30.9	828	12,284
2003	4,825	935	1,852		22.7	549	8,161
2004	2,308	347	863		23.1	214	3,732
2005	2,560	103	1,063		28.0	67	3,793
2006	1,957	529	588		18.7	73	3,147
2007	1,708	115	751		28.6	48	2,622
2008	3,229	347	1,036		21.2	283	4,895
2009	3,232	640	617	210	13.2	195	4,684
2010	11,307	993	683	310	5.2	237	13,220
2011	4,970	873	233	365	3.8	77	6,153
2012	3,749	971	287	123	5.6	131	5,138
2013	2,094	323	42		1.6	134	2,593
2014	4,375	TBD	547		10.4	357	5,279

Note – all fish are of hatchery origin
YN = Yakama Nation; CCT = Colville Confederated Tribes
Blank boxes represent absence of data

Agricultural Reliability

Agriculture is a crucial component of the Chelan County economy. In 2012, over 75,000 acres were in agricultural production, generating $206,000,000 in market value for the County. The waters of the Icicle Creek basin play an important role in this agricultural production by providing water to IPID and Cascade Orchard Irrigation Company (COIC), which supply water to nearly 9,000 acres. In total, 129 cfs of irrigation diversions are authorized from Icicle Creek.

IPID manages five lakes — Square, Klonaqua, Colchuck, Eightmile and Snow — in the Icicle Creek basin to supplement water supplies during drought years. These lakes include manmade infrastructure that was built in the 1920s through the 1950s to allow for additional storage and release of water within the Icicle Creek basin to offset their diversions from the creek itself. In drought years, storage from all the lakes is used to provide water to IPID. In non-drought years, the district drains one lake rotationally for maintenance activities.

Despite the importance of agriculture and irrigation, there is not enough water to supply all of the irrigation demand. In the Icicle Creek basin and Wenatchee River Watershed, there are approximately 38 water rights that can be curtailed based on low streamflow. On average, these water users face curtailment in at least 7 out of every 10 years.

Water Project Integration

Salmonid Habitat

Habitat

The Upper Columbia Revised Biological Strategy (Biological Strategy) identifies the following factors affecting habitat conditions for ESA-listed salmonids in Icicle Creek:

- Land development downstream of LNFH has affected stream channel migration, recruitment of large wood, and off-channel habitat.
- There is a barrier to migration in the boulder field.
- Water withdrawals in Icicle Creek (primarily between Rat Creek and LNFH) likely contribute to low flows and high temperatures.
- The Icicle Road upstream of Chatter Creek may confine the stream channel and affect floodplain function in certain places.

Additional passage barriers exist at the hatchery, which are used for operation, including water management, broodstock collection, and Tribal fishery maintenance. Biological Strategy: *See* RTT (Regional Technical Team). 2014. *A Biological Strategy to Protect and Restore Salmonid Habitat in the Upper Columbia Region. A Draft Report to the Upper Columbia Salmon Recovery Board*.

Integrated Strategy

Working for Solutions: The Icicle Work Group

These problems have created a critical need to improve conditions in the Icicle Creek basin and ensure that reliable water resources for fish, agriculture, and domestic water users are available. Over the last five years, it has become clear that an integrated strategy is needed to address ecological and usage issues while considering the potential climate impacts, and ensuring all actions comply with state and federal law. Fortunately, a group is currently working to do just that.

Work Group Formation

Finding common ground among conflicting parties and agreeing on a strategy is what Chelan County and over a dozen stakeholders in the Icicle Creek basin set out to do in 2012 with the formation of the Icicle Work Group. Co-led by the Washington State Department of Ecology's (Ecology's) Office of Columbia River (OCR) and Chelan County, and funded largely by Washington state funding sources, the IWG represents local, state, and federal agencies, Tribes, irrigation and agricultural interests, and environmental organizations. All these parties convened to develop solutions to chronic water supply problems affecting families, farms, and fish in the Icicle Creek basin. Each stakeholder has had a voice in the formation of the guiding principles, which if followed, will ensure that individual stakeholder needs will be met.

Members

Icicle Creek Work Group Members:

Cascade Orchard Irrigation Company
Chelan County
City of Leavenworth
City of Cashmere
Confederated Tribes of the Colville Reservation
Confederated Tribes of the Yakama Indian Nation
Icicle and Peshastin Irrigation District
Icicle Creek Watershed Council
National Oceanic and Atmospheric Administration Fisheries
Trout Unlimited – Washington Water Project
US Bureau of Reclamation
US Fish and Wildlife Service – Leavenworth National Fish Hatchery
US Forest Service
Washington State Department of Ecology
Washington State Department of Fish and Wildlife
Washington Water Trust

Diverse Interests

Historically, it is rare to get diverse fish proponents in the same room with hatchery managers to brainstorm common solutions. One would also not expect to see the City of Leavenworth on the same side of the table as Ecology on water matters, since the two have been at odds over the extent of the City's diversionary right from the Icicle Creek. Building trust between senior irrigators and instream flow advocates is challenging. What unites these strange bedfellows is the simple need for more water for everyone — particularly during the driest times of the year when streamflows are at their lowest, crop demand is at their highest, and anadromous species are preparing to spawn. There is a shared realization that they can accomplish more by working together than by litigating separately.

Compromise Benefits

This is no small task, and it requires everyone to give a little to get a little. For example, IPID holds senior diversionary rights, whose demands at times may seem to dwarf the remaining flows left instream for other demands. IPID's presence alone is so significant that improvements to their infrastructure may yield the most benefit to instream flows. In exchange for improvements that reduce their long-term cost and improve reliably, they have expressed a willingness to reduce their diversions or re-organize their storage facilities' operations. Similarly, LNFH has experienced temperature and pathogen problems, which they can resolve by transitioning to greater reliance on groundwater and installing additional conservation and reuse practices, which will leave more water instream. At the end of the day, compromising to find ways to increase supply, reduce diversions, and better utilize diverted water is the name of the game. The IWG members are putting aside their differences, knowing that the sum here is greater than its parts.

Water Project Integration

Icicle Strategy

Guiding Principles

The IWG's Guiding Principles

This diverse group developed a common set of goals to work towards for Icicle Creek basin's overall benefit. Their cooperative efforts, known as the Icicle Strategy, resulted in formal Guiding Principles to best outline and address the area's most chronic and dire water supply needs. These principles (see table below) include: setting specific targets for increased flows in sensitive reaches; clearly defining the need for coexistence between native and hatchery fish populations through improved habitat and sustainable hatchery function; and identifying obligations to Tribal treaty rights and local, state, and federal laws.

Guiding Principle	Metric	
Improve Instream Flows	Icicle Creek Historic Channel: • 60 cfs minimum flows (drought years) • 100 cfs minimum flows (non-drought years), short-term goal • 250 cfs minimum flows (non-drought years), long-term goal • 2,600 cfs maximum flow to preserve habitat function	Flow improvement needed (in projects) to meet total minimum flows: 40 cfs[1]
Improve sustainability of LNFH	• Meet *U.S. v. Oregon* and other agreements specifying fish production requirements • 57 cfs supply protected long-term (at least 20 cfs conservation goal) • Diverse source availability (temperature, pathogen-free) to maximize fish health • Structures minimize unintended fish passage impediments	
Protect Tribal and Non-Tribal harvest	• Catch per unit of effort (CPUE) improved • Maintain multi-species harvest opportunities • Tribal Impacts Assessment and Adaptive Management Plan being implemented, addressing attraction flows, sediment transport, fish migration/straying, site access and amenities	
Improve Domestic Supply	• 1,750 acre-feet of reliable year-round supply (2.5 cfs average, 5 cfs peak)	
Improve Agricultural Reliability	• Automate / Optimize Alpine Lakes Reservoirs for improved reliability (plus instream flow benefit) • Restore/repair Eightmile Lake Reservoir up to 2,500 acre-feet (1,125 ac-ft additional instream flow/domestic benefit) • Current interruptible agricultural users have firm supply in average water years / agriculture water bank (2 to 4 cfs)	
Enhance Icicle Creek Habitat	• Improve passage in Icicle Creek including to Upper Icicle Creek • Make investments in physical habitat improvement with consideration for high flow habitat and low flow refuge, minimize fish passage impediments, and improve limiting factor spawning/rearing • Offset project-related terrestrial impacts with land acquisition/easements	
Comply with State and Federal Law, and Wilderness Acts	• Identify and engage regulators in the process • Environmental review completed (project check) • All projects appropriately permittable (project check) • All diversions (LNFH, IPID, COIC) appropriately screened (project check)	

[1]Based on a review of historic stream gage records, the existing average low flow in historic channel in non-drought years is 65 cfs (16 of the most recent 20 years) and average drought low flows is 20 cfs (2001, 2003, 2005, 2015). To meet Guiding Principle flow targets, approximately 40 cfs in project flow benefit is needed.

Potential Solutions

Prior the formation of the Icicle Work Group (IWG) and its associated Icicle Strategy, each stakeholder had been developing projects that only met their own individual needs. This created problems getting projects completed because each lacked broad local support, faced funding challenges, and often were up against opposition from other local stakeholders because individual goals conflicted.

Project List

One of the IWG's first exercises was to assemble a master project list based on:

- Conceptual ideas by its members
- Projects identified in the Wenatchee Watershed Plan (a larger watershed scale plan approved in 2006)
- Projects already waiting in various funding program queues
- Projects in active appraisal or feasibility studies.

In the first few months of the IWG (e.g., early 2013), over 60 potential projects had been identified that could assist in meeting the Guiding Principles.

Screening Evaluation

Following identification of potential projects, and concurrent with their efforts to put numeric standards to the qualitative Guiding Principles, the IWG developed a screening evaluation for the projects. This method included considering factors such as project benefits and costs and water right pedigree (which includes a right's reliability, priority date, and federal or state origination). Then the IWG went through several iterative exercises where projects were aggregated to meet the Guiding Principles and provided a range of options based on the above listed factors. Only then were they advanced for consideration.

PEIS

Since the formation of the IWG, a suite of projects has survived and have progressed to varying degrees (conceptual, appraisal, and feasibility). These projects were then offered to the public during environmental scoping of a Programmatic Environmental Impact Statement (PEIS). The PEIS process began in early 2016, and as of the date of this article, is the subject of a public comment period on the draft PEIS. Description of some of the projects being considered in the draft PEIS are now presented.

Water Project Integration

Irrigation Upgrade

Conservation Projects - Irrigation System: Saving water can have as meaningful an impact as generating new supplies, and irrigators are continually working on ways to limit losses from their seepage. Projects explored as part of the Icicle Strategy include piping and lining of IPID and COIC canals. On-farm efficiency upgrades such as soil-moisture sensors and micro-spray emitters are also being explored, along with reductions in operational spill through the use of re-regulation reservoirs. These improvements will conserve water while benefiting fish by increasing streamflow.

Supply Efficiency

Conservation Projects - Domestic Systems: These projects focus on technical assistance to conserve domestic water supply for the City of Leavenworth and Chelan County. These efforts implement municipal and rural water efficiency projects such as replacing aging pipes, leak detection and repair, meter installation, and water use conservation to improve domestic supply. The goal, in concert with the other projects, is to create enough water to sustain the City and County through 2050.

Hatchery Improvements

Leavenworth National Fish Hatchery Conservation & Water Quality Improvements: The IWG has proposed several projects to improve LNFH water supply and reliability and to enhance Tribal and recreational fish harvest:

Hatchery Conservation — Install recirculating tanks, which use about half as much water as conventional raceways and thereby benefit instream flows. Engage projects to offset some of the surface water use by improving access to groundwater.

Groundwater Augmentation — Restore diminished groundwater supply through new well construction to meet temperature and pathogen standards.

Effluent Pumpback — Hatchery effluent water to augment groundwater supply and instream flows.

Automated Controls

Alpine Lakes Reservoirs Optimization, Modernization, and Automation: One effort with large instream flow benefits is the Alpine Lakes Release Optimization Project. This project involves releasing more water for fish from the Alpine Lakes reservoirs operated by IPID instead of holding it in reserve for long-term irrigation drought relief. The project aims to upgrade existing irrigation infrastructure operated by IPID and USFWS in the Alpine Lakes Wilderness area by modernizing and automating up to seven existing lakes that are operated as reservoirs. To do this, engineers are working to design automated controls that can remotely adjust release from the lakes in response to low flow levels in Icicle Creek. This contrasts with the current operation, which releases water manually and only when irrigators need it during drought years. All water supplied by the project benefits instream flow. Meanwhile, IPID improves its ability to remotely manage a large number of sites that are difficult to access,while preserving the water for their orchardists during critical drought years.

Wilderness Concerns

The challenge with this project is the concern over impacts to the Alpine Lakes Wilderness Area where the reservoirs are located. At the time of its creation in 1976, IPID and Reclamation retained property or easements to the reservoirs, which allows for their perpetual use and operation. Proponents of the Wilderness Area would rather not see these improvements be made and in the long-term want to see the reservoir infrastructure removed in its entirety. Beyond the short-term construction impacts (e.g. solar panels, telemetry to remotely operate gates), re-operation of the lakes means visitors will experience something different — namely lower lake levels in the late summer when water that used to be left in the lake to hedge against irrigator drought risk will now be released for fish.

Water Bank

Eightmile Lake Restoration Project: This project aims to restore Eightmile Lake Reservoir to its historic high water mark. Damage at the dam has limited its full capacity for many years. The project would improve instream flow and agricultural reliability, and provide domestic supply benefits. To do this, the Eightmile Lake Dam would be rebuilt and 900 acre-feet of the restored supply would be used to form a water bank that could be debited to offset population growth through 2050 for the City of Leavenworth and surrounding rural areas in Chelan County. As another project located in the Wilderness Area and as a reservoir (as opposed to conservation), this project has also received significant scrutiny as to its merits and potential impacts.

Source Exchange

Source Exchange: Two major source exchange projects are being considered in the PEIS which will reduce or eliminate major diversions from Icicle Creek. COIC is looking at ways to divert their water further downstream on the Wenatchee River through pumps rather than draw from Icicle Creek. Under this model, Icicle Creek is used to convey water downstream to a new surface water pump station. The PEIS also considers a partial pumpback scenario for IPID, which would divert a portion of their Icicle and Peshastin Creek diversions from the Wenatchee River instead. The drawback of these projects is the added pumping cost required to lift the water back to the original canal. Since these projects would be dedicated for fish only (no new irrigated acres), it is challenging to find adequate long-term funding for pumping, operation, and maintenance costs.

Agricultural Reliability

Water Markets: Under this project, the IWG would create a voluntary Icicle Water Market to improve reliability for agriculture use in the Icicle Creek basin and Wenatchee River Watershed during shortages. The water market would be seeded with an initial 1,000 acre-feet of senior water rights.

Restoration

Habitat Protection and Enhancement: Restoring, improving, and protecting habitat throughout the Icicle Creek basin for fish and wildlife is key to the IWG's work. To help achieve this, they have identified stream restoration and protection projects such as riparian plantings, engineered log jams, and conservation easements to improve stream habitat and ecosystem health.

Water Project Integration

Tribal Fishery

Fish Passage: The IWG has proposed several projects to improve fish passage in Icicle Creek by assessing and removing barriers so fish have better access to healthy habitats. These include improved operation at LNFH's Structure 2 and modification of channel morphology at the Boulder Field.

Protect Tribal Fishery: This project ensures other proposed IWG projects do not have negative effects on Tribal fisheries and federally protected harvest rights. To accomplish this, IWG will develop an adaptive plan that includes an assessment of flow and channel morphology at current fishing locations. This plan will develop alternatives for attraction and retention of fish in Tribal fishing areas during the harvest periods that are coordinated with changing operations at LNFH and increased flow. Additionally, the plan will include monitoring fishery effectiveness as a key project component.

Fish Screen Upgrades

Fish Screen Compliance: The LNFH, City of Leavenworth, and IPID each have a large diversion on Icicle Creek with screens that do not meet current requirements. The IWG is proposing to upgrade these screens to comply with Washington State and federal laws (see Revised Code of Washington (RCW) 77.57.070 and WAC 220-660) and help LNFH meet screening requirements set in the Biological Opinion. These screening projects will help decrease fish mortality in Icicle Creek.

Instream Reservation

Instream Flow Rule Amendment: Within the Wenatchee River Instream Flow Rule (WAC 173-545), a reservation of water was established for future domestic use in the Icicle Creek basin. Currently, the reserve is set at 0.1 cfs, but the rule allowed an increase to 0.5 cfs in the Icicle Creek basin if low flows in Icicle Creek were addressed. This will help meet domestic water needs for Chelan County through 2050. Coupling this rule amendment with the flow improvement and habitat projects would fulfill the expanded reservation provision requirements.

Increased Storage

Enhanced Storage in Alpine Lakes: Another alternative in the PEIS evaluates the opportunity to increase storage at existing lakes (e.g. raise Eightmile Lake and Upper Snow Lake to higher water levels) and create new storage at Upper Klonaqua Lake (current storage is only in Lower Klonaqua Lake). The majority of this water would be used for further instream flow benefits, with some additional supplies for domestic use longevity. Since this would create the most construction-related impacts in the Wilderness Area, these alternatives have been highly scrutinized and criticized by wilderness supporters.

Alternatives

Many Ways to Achieve the Goal

The IWG understood that there is no one project that will fix all of Icicle Creek basin's issues and that there is not just one way to achieve the goals set forth in their Guiding Principles. As the projects came together, the IWG mixed and matched potential solutions into various combinations that could create the most benefit for the lowest cost. The result is five Alternatives, each with its own package of projects from the options discussed above — all of which, if fully implemented, are able to meet all of the Guiding Principles.

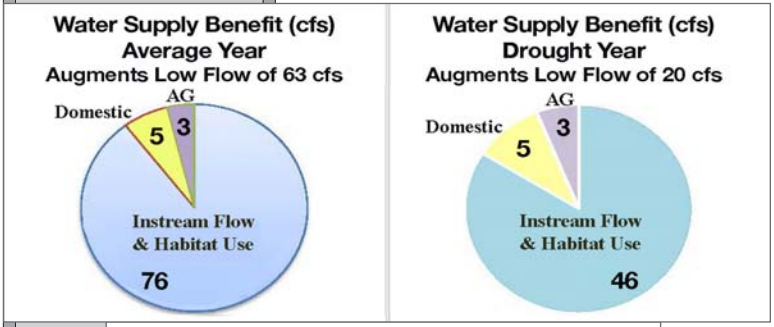
Common Sense Solutions

A common theme throughout the alternatives (with the exception of the "do nothing" alternative) is a set of common-sense solutions, which consist of conservation, water market development, habitat projects, Tribal fisheries protections, and amendments to instream flow rules. These solutions are found throughout all the alternatives and have nearly-uniform support based on the comments received on the PEIS to-date. The other alternatives are distinguished by the degree to which other major other projects are incorporated. Each alternative is listed and described briefly in the table below.

Icicle Work Group Alternatives under Consideration

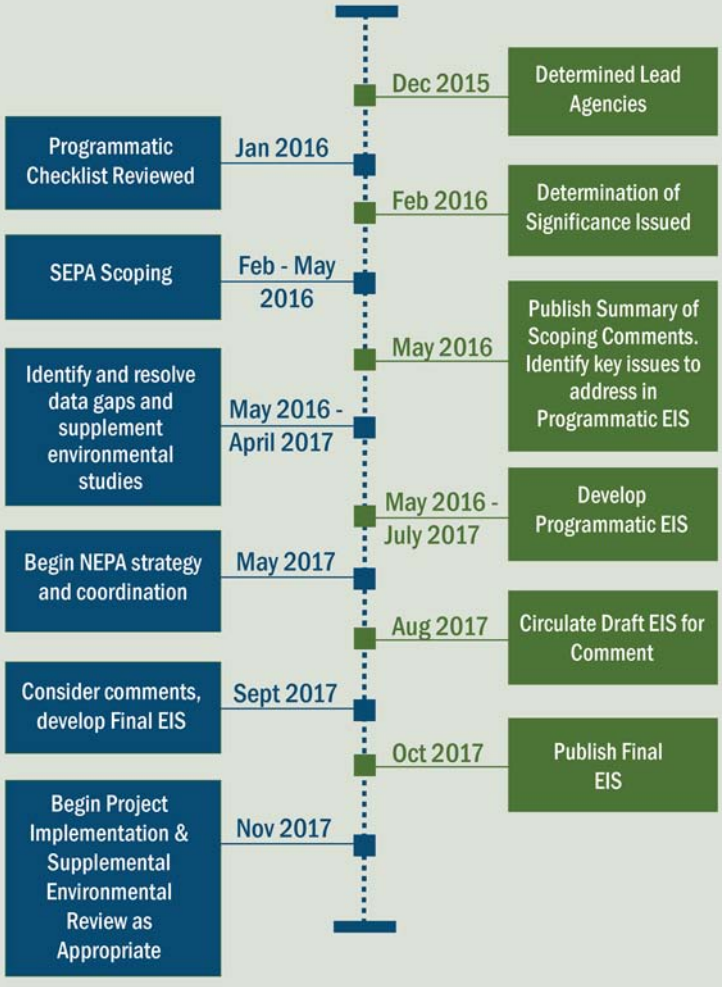
Alternative Being Considered	Projects
No Action Alternative	No Action
Alternative 1 Construction Cost= $81.7M Flow Improvement = 85 cfs	• Alpine Lakes Reservoirs Optimization, Modernization and Automation • Eightmile Lake Restoration • All other conservation, habitat, fish passage, water market, fish screen, and Tribal fishery protection projects.
Alternative 2 Construction Cost= $91.6M Flow Improvement =80 cfs	• Eightmile Lake Restoration • Peshastin Irrigation District Pump Exchange • All other conservation, habitat, fish passage, water market, fish screen, and Tribal fishery protection projects.
Alternative 3 Construction Cost= $89.0M Flow Improvement =67 cfs	• Peshastin Irrigation District Pump Exchange • Legislative fix for instream flow impacts associated with out-of-time mitigation of conservation projects • All other conservation, habitat, fish passage, water market, fish screen, and Tribal fishery protection projects.
Alternative 4 Construction Cost= $96.4M Flow Improvement =153 cfs	• Alpine Lakes Reservoirs Optimization, Modernization and Automation • Eightmile Lake Enhancement • Upper Klonaqua Storage Enhancement • Upper Snow Storage Enhancement • All other conservation, habitat, fish passage, water market, fish screen, and Tribal fishery protection projects.

Water Project Integration



These pie charts show the additional water supply developed from Alternative 1. Alternatives 2, 3, and 4 provide similar benefits. Numbers represent the increase in cfs.

What is the Timeline for Environmental Review?



Substantial Benefits

All of the Alternatives being considered in the PEIS would have a transformative effect on the Icicle Creek basin. For example, the pie charts summarize instream benefits in both an average year and drought year, as well as improvement in agricultural reliability and extending domestic supplies through 2050. In each of the Alternatives — because the flow achievement goal is the most ambitious Guiding Principle — approximately 90% of the water supply development benefits instream flow and habitat. With this level of improvement, it is the IWG's hope that it will signal an end to decades of litigation over water supplies in the basin.

Public Outreach and Next Steps

The IWG's work has included a robust public process. While not everyone agrees with every solution proposed, the IWG has made a good faith effort to ensure that everyone's voice has been heard and have undertaken a significant outreach effort in the last five years. In addition to quarterly public meetings, IWG members have given numerous presentations to local community groups and the public. The PEIS process launched in early 2016 contained a thorough public process, including the current public comment period, as outlined in the following figure.

At the culmination of the PEIS process, the Icicle Work Group anticipates that it will provide a recommendation to the co-leads (Ecology and Chelan County) on a Preferred Alternative to implement, likely in the fall of 2017. After a Final PEIS is adopted, several actions are likely. Those projects that have a National Environmental Policy Act (NEPA) nexus, or those projects that do not have sufficient information in the PEIS to fully evaluate environmental impacts, will require supplemental environmental review. Those projects without a NEPA nexus that have a sufficient evaluation in the PEIS would proceed to implementation, presuming that permitting occurs and funding is available.

The Cost of Doing Nothing is High

Real solutions to conflicts in the Icicle Creek basin have never been closer than they are now. Much more work, however, is needed. Without the coordinated approach of the IWG, projects may continue to progress individually and may lead to improved conditions. But, without the participation of IWG members and projects developed as part of the Icicle Strategy, any enhancements developed by one entity may not be as effective as if they were implemented and managed along with multiple projects and stakeholder input. Simply put, project implementation may take much longer in the best case or not at all in the worst case. A No-Action Alternative has the potential to further complicate the following issues or leave them unresolved:

Resumption of *City of Leavenworth vs. Department of Ecology*, No. 09-2-00748-3 (Chelan Cnty. Super. Ct. Dec. 19, 2011): This case is currently on hold while the City of Leavenworth and Ecology try to resolve the issues through the IWG. The Guiding Principles address the City of Leavenworth and surrounding area's domestic supply concerns and calls for 1,750 acre-feet of reliable year-round supply. Without the projects that would increase domestic supply, the City's diversion amount will remain in contention and litigation would resume.

Water Project Integration

Mike Kaputa, AICP, is Director of the Chelan County Natural Resources Department, an appointed position working for the Chelan County Commissioners. He has been with the County since 1996, starting as an environmental and senior planner. The department works with local citizens and numerous agency, Tribal, and non-profit partners to advance water resource, salmon recovery, land use, and recreation projects and programs. His department also oversees capital construction projects, leads regulatory updates, manages collaborative policy initiatives, and performs research and monitoring. Mr. Kaputa earned his B.A. in Environmental Science and dual Master's degrees in Educational Studies and Urban and Environmental Planning from the University of Virginia.

Losing benefit from IPID participation: IPID currently manages its Alpine Lake reservoirs solely for irrigation needs. As the biggest senior water right holder in the basin, losing them as a participant would significantly undercut the instream flow objectives of the basin. None of the Alternatives being considered in the PEIS expand irrigation in IPID. The only benefit they would derive is infrastructure improvements that will benefit fish and instream flows.

LNFH risks losing State partnership: The LNFH is actively collaborating with Ecology and Washington Department of Fish and Wildlife as part of the Icicle Strategy to assess hatchery operations and look for ways to improve and enhance the infrastructure to make it more sustainable, while increasing water quality and benefiting fish health and habitat. Synergy will be lost in this process if the collaboration ends and projects are not addressed under the Icicle Strategy.

Restricted long-term growth in the City of Leavenworth and Icicle Creek basin: One of the IWG's priorities is to meet current and future domestic water supplies for the City of Leavenworth and surrounding basin through 2050. Without a sustainable plan for addressing growth in the City of Leavenworth and rural Chelan County, there is no guaranteed plan for the water supply to keep up with demand as the population rises. Past water planning efforts only planned for growth through 2020.

No improved agricultural reliability: Several of the projects proposed by the IWG have an added benefit of improving agricultural water reliability. If no-action occurs under the Icicle Strategy, it is unlikely the Water Markets project will be implemented. The interruptible water users in the basin will continue to face hardship when low streamflows prevent them from irrigating. IPID and COIC would not enjoy improved delivery systems from new infrastructure that can serve their members better.

Possible fish screening process delays: The Icicle Strategy includes upgrading fish screens at major diversions along Icicle Creek to comply with current fish passage requirements. The City of Leavenworth, IPID, and the LNFH/COIC have diversions in need of fish screen upgrades. Without an integrated process, each entity would have to seek funding and go through the fish screen design and implementation process independently, likely resulting in delayed implementation.

Conclusion

The IWG's plan represents the best chance for the Icicle Creek basin. Its efforts are the result of years of collaboration and compromise between a diverse group invested in finding the best options for fish, farmers, residents, and recreationists. The PEIS that is out for public review and comment shows the impact of each alternative and benefits they can potentially bring to the basin. With public input over the next several months, Ecology and Chelan County look forward to selecting a package of projects to implement real change in the Icicle Creek basin.

For Additional Information:
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Meet the Author: *Author Mike Kaputa will be presenting on the Icicle Creek Basin water project collaboration at the American Water Resources Association Annual Conference*
Portland, Oregon, November 5-9 — Info at: www.awra.org

WATER BRIEFS

RIVER PROTECTION FIRST ANTI-DEGRADATION STANDARD OR

The Oregon Environmental Quality Commission voted unanimously July 13 to designate the North Fork Smith River and its tributaries in southern Oregon as the first Outstanding Resource Water (ORW) in Oregon. The designation stems from a petition filed February 2016 from a group of conservation and fishing organizations. Outstanding Resource Waters are high quality waters that constitute an outstanding state resource due to their extraordinary water quality or ecological values, or where special protection is needed to maintain critical habitat areas. *See* Oregon's ORW policy at OAR 340-041-0004(8). The North Fork Smith River is a federally-designated Wild and Scenic River. It is a 28-mile tributary of the Smith River that flows south into California on its way to the Ocean. The decision adds protections under Oregon's water quality standards to ensure that there is no degradation of water quality. The policies would prohibit new permitted point source discharges to the waters and would prohibit other activities that could degrade the current high water quality, exceptional ecological characteristics, and values of the waters.

This is Oregon's first designation of an ORW, and the first in the Pacific Northwest. The waters of the North Fork Smith River are valuable habitat for endangered populations of Coho salmon, several rare plant species and other fish and wildlife.

Oregon Department of Environmental Quality (ODEQ) took public comment on the petition and issued a detailed report supporting the special designation (*see* website below). The designation deals a potentially fatal blow to an international corporation's efforts to mine nickel and other minerals from the North Fork's watershed. "The Outstanding Resource Waters designation would likely preclude any surface mining in the watershed. There are unvalidated claims for nickel mining owned by the Red Flat Mining Corporation. Red Flat had proposed exploratory drilling to begin the process of validating these claims." ORW Rulemaking Report (Item P), page 5.

For info: Jennifer Wigal, ODEQ, 503/ 229-5323 or wigal.jennifer@deq.state.or.us; Final Rules/Staff Report at website: www.oregon.gov/deq/wq/Pages/WQ-Standards-ORWO.aspx

