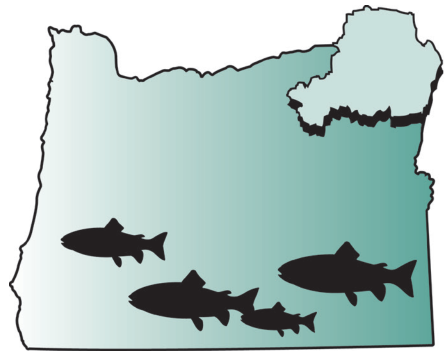
RIPPLES IN THE GRANDE RONDE



SUMMER EDITION 2017

RIVERS UNITING NEIGHBORS · QUARTERLY NEWS FROM THE GRANDE RONDE MODEL WATERSHED

using HISTORY to help shape the RIVER'S FUTURE

by Seth White, *Columbia River Inter-Tribal Fish Commission*

Drive along Highway 203 up Catherine Creek or along Highway 244 up the Grande Ronde River, and you'll likely notice the commotion on the riverbank: bright-colored flagging dangling from trees, log piles staged on the bank, bulldozers poised to carve out river bends, and fencing prepped for streamside vegetation enclosures. If you're lucky, then you also might see the occasional fish biologist with GPS and clipboard in hand, busily scribbling notes. These are some of the telltale signs of river restoration.

The logic of river restoration is straightforward: habitat quality for salmon and steelhead has diminished compared to baseline conditions. In response, federal, state, local, and tribal agencies, along with non-government organizations and landowners, are pitching in to create better habitat for fish. Better habitat means more productive nurseries and holding places for fish, cooler water temperatures, and potentially improved survival rates of adult fish as well as juvenile salmon and steelhead heading out to the mainstem Columbia River and, eventually, to the ocean and back.

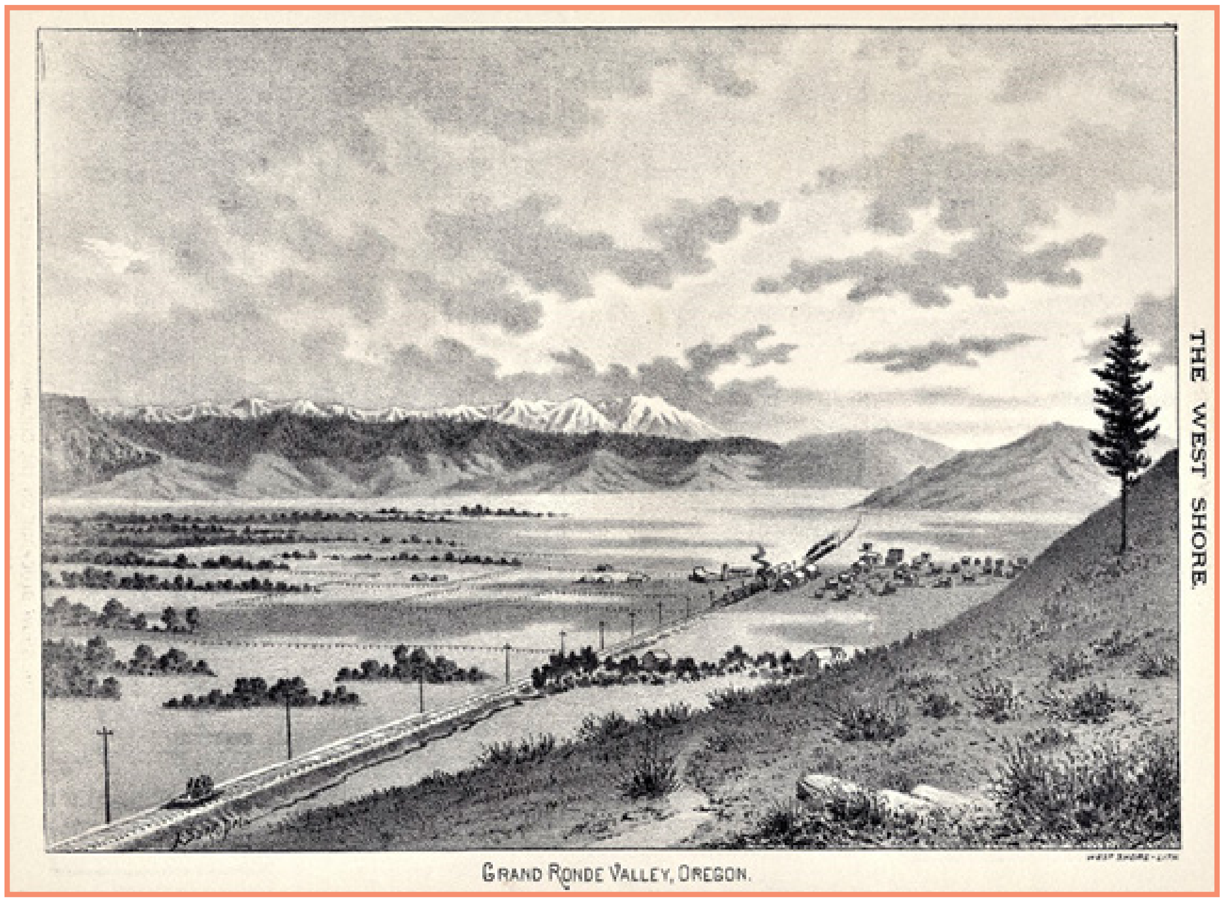


Figure 1. Illustrated postcard of the Grande Ronde Valley in 1885, after the valley was already modified by settlements, agriculture, pastures, and railroads (courtesy of the Oregon Historical Society).

But we often forget to ask what outcome we are trying to achieve with restoration efforts. Without the benefit of a time machine, how do we know what rivers looked like in the past and how they behaved? River restoration without a realistic baseline is like a doctor treating a sick patient without knowing what a healthy person looks like. History can help us make better river restoration diagnoses.

Historical ecology is a discipline that involves using multiple sources of information to describe past conditions and inferring what that means to fish, wildlife, and ecosystems. While traveling through the Grande Ronde Valley on July 30, 1851, John Johnson wrote: "It appeared to be the most beautiful valley I had ever looked upon. The hills dressed in green, with springs of water running from the sides, with groves of willows and cotton wood, and thousands of ponies grazing, and Indians driving in all directions..."

Travelers and settlers like Johnson left many other written accounts. These records, coupled with other sources of information such as oral histories of tribal elders, fur trappers' records, land surveys, and historical illustrations or photographs, we can start shedding light on what these rivers were like (Figure 1).

Continued on page 4, **History**

Reconnecting the Habitat Dots

FISH PASSAGE AT ONE OF THE UPPER GRANDE RONDE'S LAST MAJOR STEELHEAD MIGRATION BARRIERS

by Sarah Brandy, *U.S. Forest Service*

Let's just start off with a not-so-funny fish joke, shall we?

What did the fish say when it ran into the concrete wall?

Answer: Dam!

An obvious element of restoring fish habitat in any given watershed is inventorying and assessing artificial barriers that restrict or eliminate movement for migratory fish. It has long been accepted that restoration efforts should prioritize reconnecting isolated, high-quality fish habitat, such as habitat made inaccessible by culverts, dams, diversions, or other artificial obstructions. For more than 100 years, the dam built on Beaver Creek that impounds water in the La Grande Reservoir has severed migratory fish's connection to approximately 14 miles of habitat upstream. From the confluence with the Grande Ronde River, Beaver Creek had open passage for approximately 13.5 miles, and then BAM! A dam.

Beaver Creek, including upper Beaver Creek, was historically home to Snake River Basin Steelhead, Columbia River Bull Trout, and Snake River Basin Chinook Salmon. It is an area that has been managed as "designated critical habitat" and included in recovery plans for these Endangered Species Act-listed fish, despite the lack of occupancy due to the artificial barriers in the system. These barriers to fish passage included Beaver Creek Dam, Beaver Creek upstream diversion dam, and the municipal water intakes on Beaver Creek, Cove Creek, and West Fork Beaver Creek. In June 2017, a project proposed in the long-time-in-coming plan to provide fish passage at these locations broke ground.

Because of the remote location of this project, the fishpass over the dam needed to be designed to be maintenance-free and operational in a high mountain, deep snow environment that is unattended, according to Brett Moore, Project Manager with Anderson Perry & Associates. Anderson Perry had previous success working on several smaller-scale fish passage projects; however, this project was unique in that it would provide upstream and downstream passage in the middle of the eastern spillway for the reservoir. To facilitate passage at this location, the project design involved stacking together more than 60 precast concrete units, each in a curved vortex weir pattern, that would result in a series incremental steps allowing fish to navigate and have resting pools up to and over the dam, as well as providing ease of navigation in downstream movement. Seven different designs were initially reviewed after the City of La Grande spent a healthy chunk of money, more than $200,000, on studies that assessed restoring passage. "It took 20 years," said Norm Paulus, Public Works

Looking up Beaver Creek at the dam forming the municiple resevoir, but blocking passage to migratory fish species (courtesy of GRMW).

...Continued on page 3, **Habitat Dots**

... *continued from page 2,* **Habitat Dots**

Director for the City of La Grande, referring to the amount of time between initial project scope and planning and this summer's implementation. "We're not in this kind of work," he said, which makes this summer's accomplishment an even bigger fish tale.

In addition to providing fish passage at the main dam, the upper diversion dam on Beaver Creek, upstream of the reservoir that had been a vertical barrier to fish passage, was restored. Passage at this site included stream simulation, which filled in and regraded the channel for 500 feet leading up to this diversion barrier by using boulders and grade control structures, channel substrate, and large woody material. Additional elements in the contract included post-construction site restoration, such as upland and riparian re-planting and bank stabilization, in areas disturbed during construction.

The location of this project is particularly unique because it is designated as La Grande municipal watershed, a secondary water source for the City of La Grande. Fish habitat in the upper watershed has remained fairly pristine public land managed by the Wallowa-Whitman National Forest because of its management designation as a municipal water source and roadless area. Currently, resident populations of *O. mykiss* and introduced brooke trout thrive in the cool water and high-quality habitat in this watershed. The watershed provided the primary drinking water source for La Grande residents until 2002, when the last series of wells were completed to meet the community's water demand. Fish passage was not considered when the dam and other diversion barriers were originally constructed.

Previous restoration efforts in Beaver Creek have been underway since the City began working with The Freshwater Trust five years ago to release water from the bottom of the dam during periods of low flow to aid fish survival when temperatures reach lethal levels. The City of La Grande's lease agreement with The Freshwater Trust allows the release ~168 acre feet of water per year between late July and the end of August. The money the City receives from leasing water instream has been used to help fund fish passage improvements.

Individual precast concrete fish ladder steps being installed in the middle of the dam spillway (courtesy of Anderson Perry & Associates Inc.).

Some of the immediate results of this project include an increase in availability of habitat to migratory fish and the potential resulting increase in fish production. The moment of truth may come as soon as this spring, according to Oregon Department of Fish and Wildlife (ODFW) Grande Ronde Steelhead and Habitat Monitoring Project Leader, Ted Sedell. He expects to see steelhead redds upstream of the reservoir this spring. ODFW spawning ground surveys found four redds just over a mile downstream of the dam in spring 2017.

Continued on page 8, **Habitat Dots**

BONNEVILLE POWER ADMINISTRATION

Ripples in the Grande Ronde is funded by the Bonneville Power Administration and the Oregon Watershed Enhancement Board

OREGON WATERSHED ENHANCEMENT BOARD OWEB

... *continued from front page,* **History**

History provides insights into why rivers have changed so significantly from their natural conditions. Historian Jerry Gildemeister documented a litany of land uses contributing to changes in river conditions. Intensive land use impacts began to take effect around 1812 with intense beaver trapping and continued through the late 1980s, with activities as diverse as draining marshland and diking river sections for agriculture in the Grande Ronde Valley; logging hillslopes and riparian areas with associated splash damming and, later, road-building; cattle and sheep grazing on public and private land; dredge mining; and damming (Table 1).

Table 1. Land use history of the upper Grande Ronde River and Catherine Creek from 1812 to 1989 (adapted from J. Gildemeister, 1998. *Watershed History: Middle & Upper Grande Ronde River Subbasins, Northeast Oregon*).

1812	Fur trader Robert Stuart observes beaver as common; War of 1812 intensifies beaver trapping
1850	Donation Land Claim Law enacted, encouraging settlement by emigrants
1855	Treaty between U.S. and upper Columbia River Indian Tribes exchanging ceded lands for reservations and reserving rights to traditional hunting, fishing, and gathering
1861-1862	First land claim in Grande Ronde Valley; first sawmill and salmon-blocking dam built on Grande Ronde River
1865-1869	Water-powered flourmill established on Catherine Creek; railroad route laid out across Grande Ronde Valley
1870	Construction begins on State Ditch and Catherine Creek ditch, draining lakes and swamplands in the Grande Ronde Valley
1890	Grande Ronde Lumber Company acquires timberland and begins constructing splash dams on Grande Ronde River and tributaries
1890s-1900	Development of railroad network in Grande Ronde tributaries; estimated 50 sawmills in the watershed and an annual timber export estimated at 32.5 million board feet
1934	Taylor Grazing Act leads to decline of livestock grazing on public lands
1939	Mine dredging begins in Grande Ronde River
1946	Establishment of Union County Soil and Water Conservation District leads to substantial land leveling, ditching, and stream channeling projects
1984-1985	Log jams blasted on Catherine Creek to alleviate flooding; U.S. Army Corps of Engineers clears willow and cottonwood from riparian zones
1989	Recognition that peak flows had shifted as much as 30 days earlier based on 1904-1989 records, partly attributed to land use in watershed

Figure 2. General Land Office surveyors in Oregon, 1923 (courtesy of the Oregon Historical Society).

An example of how historical records can help describe past watershed conditions comes from the use of General Land Office records. At the Columbia River Inter-Tribal Fish Commission, we used General Land Office records to describe historical river widths prior to splash damming in the 1890s. Splash damming was the practice of pooling cut timber in small reservoirs created by wooden dams, then obliterating the dams (usually with dynamite) to transport logs to mills downriver on the flood wave. The upper Grande Ronde River and its tributaries had several splash dams, many of them sending logs to the now-defunct sawmill in Perry.

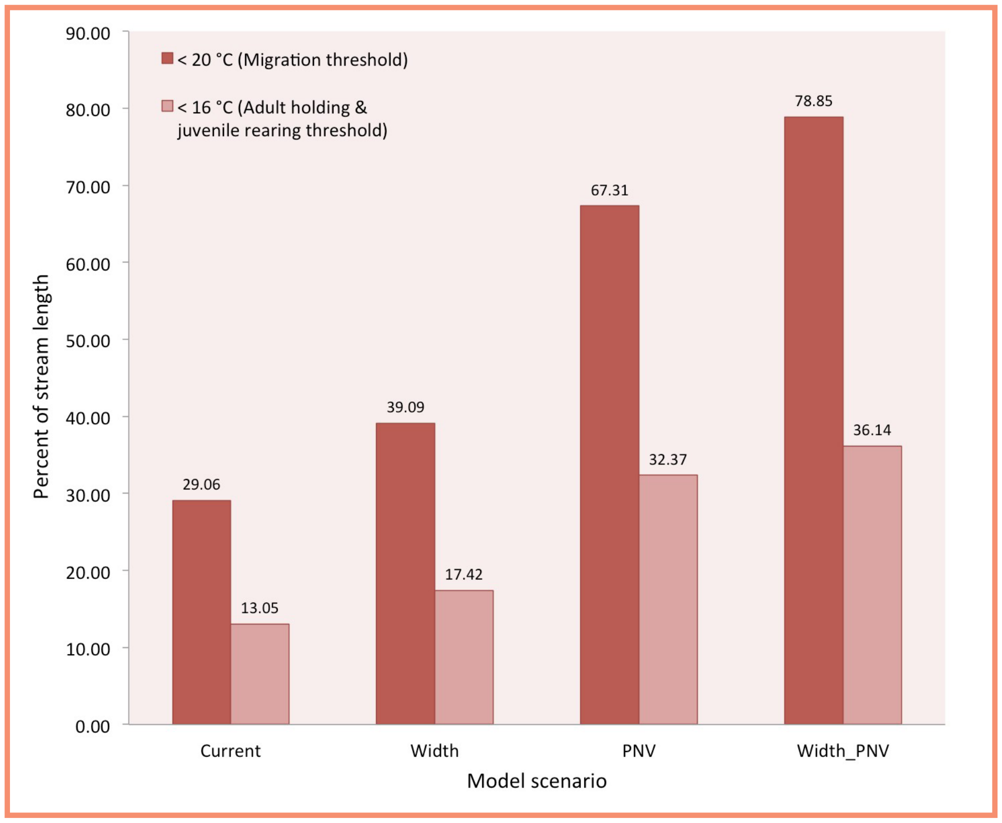


Figure 4. Percentage stream length below biological water temperature thresholds for model scenarios. Model scenarios represent current conditions (Current), restored channel width (Width), restored potential natural vegetation (PNV), and the combination of vegetation and channel width restoration (Width_PNV).

Side effects of splash damming included the scouring and widening of stream channels as well as the loss of important pool habitat for fish.

The General Land Office Surveys (Figure 2), originally intended to provide information on timber and agricultural value for land claims across the U.S. West, also contained documentation of river channel widths measured in "chains and links," where one chain is 66 feet long and each chain is 100 links. By transcribing the original surveyors' notes to digital mapping software and comparing the historical river widths to contemporary measurements, we were able to estimate how much river channel widening has occurred across the basin.

We found that since the historical baseline period, bankfull stream channel widths have increased from an average of 55 to 68 feet in large streams, 14 to 18 feet in small streams confined by valley walls, and 11 to 21 feet in small streams coursing through wide valleys. In contrast, in the nearby Minam River—which runs through the Eagle Cap Wilderness where land use has been less intensive—river channel widths did not change on average compared with the historical baseline period. These findings indicate that land use in the upper Grande Ronde River and Catherine Creek has contributed to river channel widening.

After we established that river channels had widened from their historical conditions, we asked what this change means for fish, especially salmon and steelhead that have a narrow window of water temperatures they can tolerate. Using a water temperature model that incorporates vegetation, hillside shade, climate factors, and river channel shape, we found that widened channels translate into much warmer water temperatures and that river restoration, including narrowing channels to their historical widths, would have significant benefits for fish (Figure 4). For example, when coupled with restoration of streamside vegetation, channel width restoration could increase the proportion of stream length suitable for salmon and steelhead migration from 30 percent in the current state to nearly 80 percent in the restored state in the upper Grande Ronde River and Catherine Creek combined.

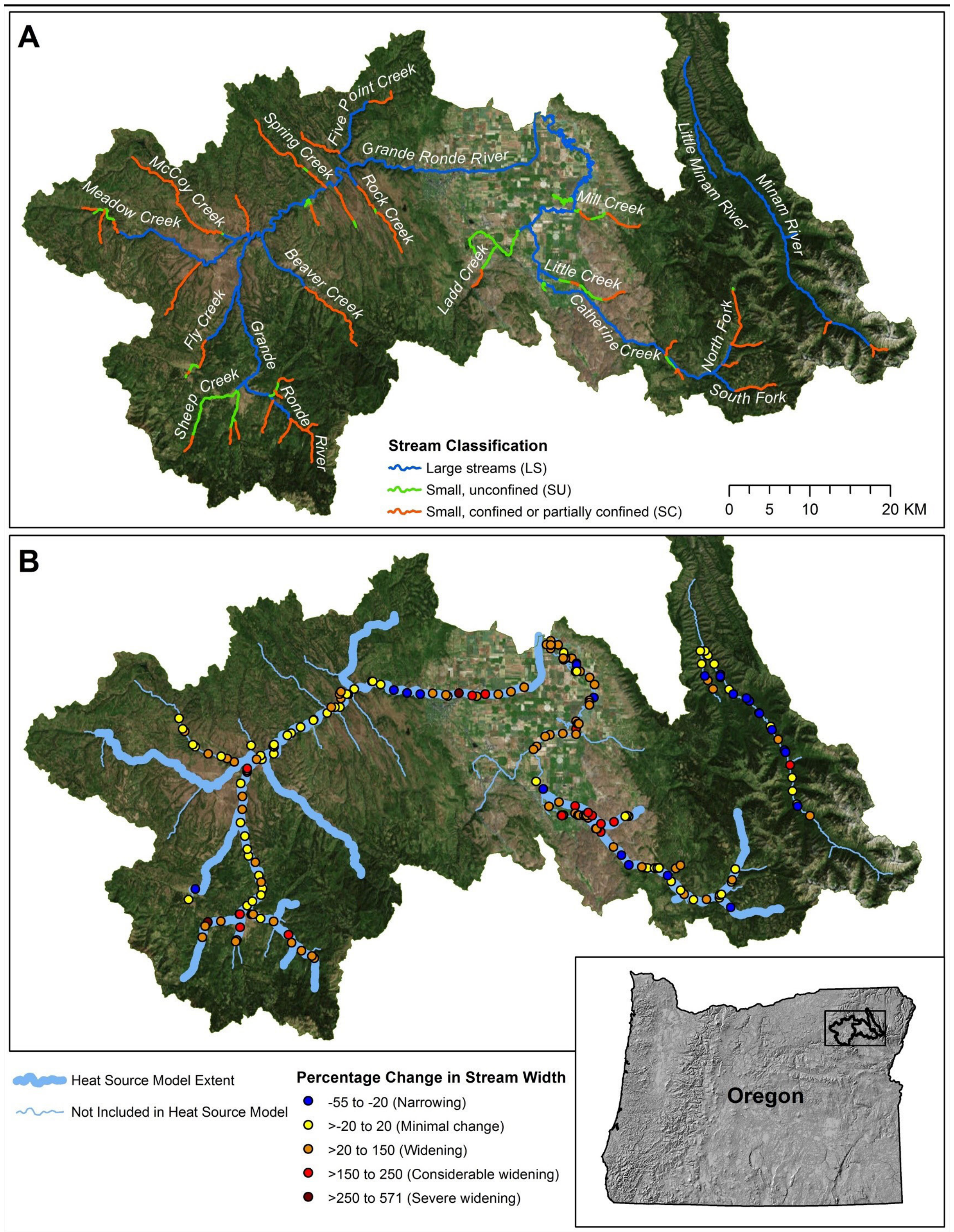


Figure 3. A) Major salmon-bearing tributaries and a stream classification and B) values of channel change estimates in places where historical General Land Office surveys overlapped with contemporary Oregon Dept. of Fish and Wildlife Aquatic Inventory

As with all fields of science, historical ecology requires us to acknowledge the limits of what we know. The historical approach has the potential disadvantage of misrepresenting past conditions when information sources are dated after major changes to a watershed occur. For example, beavers are known to be important engineers of river channels that bring positive benefits to fish habitat, yet they were already trapped to very low numbers by the early 1800s (Table 1). However, the earliest Government Land Office records used to help recreate so-called baseline conditions come from 1850s and later. This disadvantage is called the "shifting baseline" problem, in which our snapshot of historical conditions is taken later than when significant changes occurred, therefore underestimating the potential of rivers to support aquatic life. With this issue in mind, we consider our estimates of the potential benefits of river restoration to salmon and steelhead to be conservative. Restoration to pre-settlement river conditions—though probably not a practical reality—would likely yield even greater benefits to fish.

Although historical conditions are not always the targeted outcome for restoration efforts, history can help answer questions about the character of rivers in the past. Using history as a guide has the advantage of allowing us to set restoration targets based on documented conditions for a particular river. In collaboration with the Oregon Department of Fish and Wildlife and the Confederated Tribes of the Umatilla Indian Reservation, we are currently working with other sources of historical information—including U.S. Fisheries Bureau surveys from the 1930s to 1940s—to help describe the long-term loss of the large pool habitats that are crucial for rearing Chinook Salmon in the upper Grande Ronde River, Catherine Creek, and across the entire Columbia River basin. Using this and other information about the importance of water temperature, stream habitat, riparian vegetation, and other conditions, we hope to provide guidance for setting restoration targets that are beneficial both to salmon and trout, and to people who depend on healthy fish populations.■

Micro-Hydropower

Renewable Energy Generation in Wallowa County

by Malcolm Moncheur, *Wallowa Resources Summer Intern*

It's a blindingly bright day in early August as we drive up the dirt road toward the lush, green base of Chief Joseph Mountain. In the car with me is my boss, Kyle Petrocine, the renewable energy program manager with WR Community Solutions, Inc. (WRCSI). WRCSI is the for-profit subsidiary of Wallowa Resources (WR), an Enterprise-based nonprofit organization with a mission to empower rural communities to create strong economies and healthy landscapes through land stewardship, education, and job creation.

Kyle and I are meeting with Wendy McCullough, manager and one of the family-owners of Bowerman Ranch, LLC (BRLLC), which has been a family-owned property since the 1940s. One of WRCSI's main initiatives is working with landowners to harness the many springs, streams, creeks, ditches, and irrigation conduits that crisscross Wallowa County to generate renewable hydroelectricity. We are dropping by BRLLC for an initial site visit to view their water resource, discuss energy generation goals, and take some GPS points.

But before I get to the BRLLC's specific project, let me provide some background on hydroelectric power. When most of us think of hydropower, we picture huge, controversial projects like the Hoover Dam, with thousands of megawatts of capacity. Wallowa County, however, is suited for smaller "micro-hydro" projects, which are defined as having less than 100 kilowatts of capacity along with a far less significant environmental impact than large dams. "Conduit hydro" is the generation of hydroelectric power on an existing canal, ditch, or pipeline that already conveys water primarily for irrigation, domestic, or municipal use. In fact, conduit hydro is considered to be a no-impact form of hydropower, and projects like these are very attractive to Wallowa County landowners. Micro-hydro, especially conduit hydro, aligns well with WR's mission to pursue projects that are good for the community, the local economy, and the environment.

Micro-hydro projects begin with water being diverted from a stream or ditch into a penstock, where it runs downhill and through a turbine before being discharged back into the body of water. The combination of flow and vertical drop (head) creates pressure at the bottom of the pipeline. The pressurized water leaving the end of the pipe creates the force that drives the turbine. Micro-hydro projects can be viable with head as low as 10 feet (a low-head, high-flow project) or flows as low as 25 gallons per minute (a low-flow, high-head project). These projects can result in annual energy savings from $500 to $20,000 through net-metering agreements with utility providers, in which the energy generated by the turbine is fed back into the grid and credited towards the owner's power bill.

To determine the micro-hydro project potential of the BRLLC's site, we drove up a dirt road into the timber property until we reached a creek that originates on the family property.

Continued on page 7, **Micro-Hydropower**

BC Creek as it crosses the Chief Joseph Trail. The intake to the proposed hydro project would be located just downstream of the trail (courtesy of Malcolm Moncheur).

... *continued from page 6,* **Micro-Hydropower**

We estimated the flow as a starting point (flow measurements will be taken later over time) and gathered GPS data at the potential points of diversion and powerhouse locations to measure head. This information, along with data on topography, road access, and proximity to electrical transmission lines, will be synthesized in a scoping study in which WRCSI will give the site a “thumbs up” or “thumbs down” for further evaluation.

Learning tangible skills such as those involved in putting together a scoping study is just a portion of what I am doing this summer. As WRCSI’s first renewable energy intern, I am learning every step of project development, from the initial site visit to turbine selection and powerhouse design. It is rare to find organizations at the nexus of engineering and community stewardship, and I am so excited to explore that interconnection through this internship.

There is growing awareness that renewable energy provides important benefits that coincide with local communities’ economic, social, and environmental goals. Investing in renewable energy reduces dependence on fossil fuels, creates local jobs, offsets power bills, keeps energy dollars local, and diversifies the county’s energy sources, which strengthens the independence and resiliency of rural communities. Especially when combined with irrigation modernization projects, micro-hydro makes use of our resources in a sustainable and responsible way.

While creating power from moving water is age-old, the rebirth of micro-hydro and no-impact conduit hydro is only now taking place. Micro-hydro is still in its infancy in the technology lifecycle and still fairly expensive. Funding organizations such as the Energy Trust of Oregon (ETO), U.S. Department of Agriculture Rural Development, the Oregon Department of Energy, and other state and federal organizations help make micro-hydro a financially feasible option. Funding is geared toward either pre-development assistance (which includes feasibility, permitting, engineering and design, grant-writing, interconnection, and planning costs) or development assistance (which includes purchase of equipment, construction, commissioning, and startup).

Vern Spaur’s second hydro station uses water discharged from the first station to generate power before dumping the water back into the irrigation ditch (courtesy of Malcolm Moncheur).

WRCSI can provide this kind of pre-development and development assistance as well as create funding plans and prepare funding applications for a project. WRCSI also is working to bring down the cost of micro-hydro through standardization and innovative design and application.

One of these innovations is the development of the community hydro model. Community hydro is when one or more hydro stations are installed on a shared piece of infrastructure, such as an irrigation mainline, and the benefits of the power produced are shared among multiple entities, such as all of the farmers and landowners on that system. This approach spreads out capital costs, captures otherwise-wasted energy, and lowers farmers’ power bills. WRCSI is pioneering the community hydro concept by working with 27 farmers/landowners to install up to four micro-hydro turbines on a new pipeline being designed by the Natural Resource Conservation Service.

Vern and Marti Spaur, Wallowa business owners, have experienced the benefits of micro-hydro firsthand since 2011. Taking advantage of the topography of their property, they installed two different turbines

...Continued on page 8, **Micro-Hydropower**

... *continued from page 7,* **Micro-Hydropower**

that—through net-metering—offset the annual power bill for most of their ranch as well as their co-located auto shop. Vern also is on the board of Creating Memories for Disabled Children, an organization that aims to create opportunities for disabled youth to "experience the outdoors, connect with nature, and create memories that will last a lifetime." They own a summer camp at the head of Wallowa Lake and are working with WRCSI to install a turbine on the property. As Vern told me, "This is a nonprofit for disabled kids, and the turbine would completely eliminate the power bill, which is the main expense for the camp. The long-range goal is to install a small fish hatchery in conjunction with the Nez Perce Tribe. Disabled kids almost never get to see nature, and they could see fish get raised."

Vern's words are on my mind as I return to the office, working on Google Earth. I stare at the many sinuous blue lines flowing down from the Wallowa Mountains into the valley, twisting, curving, dividing, multiplying. I feel fortunate to be working with Wallowa Resources to fulfill its vision: a future where this resource is harnessed responsibly for the community, generates renewable energy for Wallowa County, and helps sustain the rural agricultural lifestyle for future generations.■

... *continued from page 3,* **Habitat Dots**

According to Sedell, "Even with the projected low returns this year, I would expect to see steelhead migrating upstream of the dam." ODFW has added the habitat upstream of the dam to their "universe" and will be monitoring this newly accessible area for steelhead spawning as part of a rotating panel in the Upper Grande Ronde River Basin.

This project also has succeeded in terms of the widespread recognition it has received for the collaboration involved in completing it. According to Paulus, the city "couldn't have had a better partnership than we did with the U.S. Forest Service, ODFW, and National Marine Fisheries Service. The city wouldn't have got there without the collaboration of these partners." In addition, Oregon Water Resources was the largest funding entity, supporting the project with $600,000. Another $150,000 came from Oregon Watershed Enhancement Board funds and $150,000 from the Grande Ronde Model Watershed.

Let's hope the steelhead enjoy their reconnected real estate, and hopefully, the passage up to it.■

Grande Ronde Model Watershed
UPCOMING BOARD MEETINGS

Tuesday, October 24th, 2017
5:00 p.m.
Ascension School
1104 Church St.
Cove, OR 97824

Tuesday, November 28th, 2017
5:00 p.m.
Wallowa Community Center
204 E 2nd St.
Wallowa, OR 97885

The public is welcome to attend.

Meeting dates are subject to change.
Please call (541) 663 - 0570 to confirm.
Thank you!

Grande Ronde Model Watershed
1114 J Avenue | La Grande OR 97850
Ph. 541-663-0570 | Fax 541-962-1585

WWW.GRMW.ORG

Margaret McGladrey | Ripples Editor
grmw.ripples.editor@gmail.com