Methow Beaver Project
Accomplishments 2015

March 2016

by **Kent Woodruff, Project Coordinator**

We believe that the improvement of the landscape we are responsible for is an obligation to the generations to come. Given the changes we expect are in our future, this project demonstrates one way to sustain this valley.

Water is essential for everything we do in the Methow.

The electricity we use, the snow we ski, the firewood we burn, the rivers we float, everything we eat, all our manufactured goods, the animals, plants, and fish we are trying to conserve, even the air we breathe all have a water component.

The Methow Beaver Project is pleased to be in the stream improvement, water quality, and water conservation business.

Goals

The goals of the Methow Beaver Project partnership include enhancing water quality and storing water; collecting, evaluating, and sharing information about beavers and the critical role they play in the watershed; developing and sharing methods for working with beavers; and engaging a community of biologists, students, and volunteers in beaver restoration so we can all learn and grow. The project is one example of adapting to climate change to offset snowpack loss by storing water in beaver wetland 'sponges'. We hope to encourage other natural resource professionals to expand conservation actions, which strengthen our natural communities' resistance to oncoming change.

Purpose

This project re-establishes active beaver colonies to streams in the Methow River sub-basin and thereby restores key watershed processes that have been missing for as long as 200 years. We actively contribute to the goals prescribed in the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan, the Chewuch Watershed Analysis, multiple Reach Assessments, and the Chewuch Watershed Action Plan. The Recovery Plan specifically lists beaver restoration as an enhancement for productivity, abundance, diversity, and structure in Table 5.9 (in the Recovery Plan) with contributions to Water Quantity, Water Quality, and Woody Debris Restoration.

By storing millions of gallons of water in headwater wetlands, each beaver colony helps offset the smaller snowpack from a warming world. As we gain understanding of some new ecological trajectories related to climate change, the project demonstrates an adaptive practice to help build a more resilient ecosystem. We avoid the 'debate' over climate change and are simply adapting to the effects of fires, floods, drought, early stream runoff, and additional precipitation delivered as rain instead of snow.

Activities

Each year we collaborate with willing landowners who perceive conflicts with beavers. In many cases, as an alternative to lethal removal, we live trap and move unwanted beavers to our holding facility at the US Fish and Wildlife Service (USFWS) National Fish Hatchery, where they are evaluated, weighed and measured, gender determined, and grouped together with other beavers. Once they have established pair bonds, we release them in suitable sites, usually in river tributaries, where they can establish new colonies.

We evaluate suitable release sites using our habitat model and a locally developed site-evaluation score-card system. To improve success, we construct temporary lodges for predation deterrence, carefully aggregate groups of beavers and take them to the best sites. We monitor release results while supporting beavers there with supplemented aspen for food and building materials.

We use every medium possible (local and national radio programs, feature films, newspapers, handout cards, posters at festivals and conferences, short documentary films, popular magazines, our website, online news, professional signs, evening programs, school and library visits, service club meetings, public tours, technical presentations for professional colleagues, and even face-to-face encounters at gas stations and grocery stores) to deliver messages to all age groups and audiences about water quality

improvements, salmon habitat enhancement, and climate change benefits of beavers. In 2015 we reached over 2 million people with stories about beaver benefits.

We continue to implement a highly rigorous study of the temperature and stream flow improvements realized with beaver restoration. Using the data we have gathered to date and additional data collection for the next two or more years, we are engaging graduate students at Washington State University (WSU) and the University of Washington (UW) to evaluate information from post-beaver-treatment changes to streams. We will continue to gather data to pursue answers to questions about the ways beavers improve streams.

Sharing the project with other biologists to support similar beaver restoration efforts has been a focus (we coordinate with projects in Washington, Oregon, Idaho, Utah, California, Colorado, Alberta, Saskatchewan, and British Columbia). We readily share the ideas and techniques developed here. In 2015 we proposed and cooperated in an International Beaver Knowledge Exchange with a biologist in England who joined the Methow Beaver Project and the Sky Beaver Project to share ideas from the UK and to take some ideas back across the Atlantic.

In 2015, with the very generous contributions from the US Forest Service (USFS) National Genetics Laboratory in Missoula, Montana, and collaboration with the Yakima Beaver Project and the Sky Beaver Project, we began an initial assessment of beaver DNA from multiple populations close to the Methow Valley and far away in Washington to evaluate relatedness and isolation of beaver populations in Washington. More will be gleaned from this investigation in the months ahead.

An important note is that all project activities are carefully coordinated with other restoration and management organizations working in the Methow watershed. The very effective cooperative forum for watershed project coordination is the Methow Restoration Council, composed of more than 30 working entities from throughout the area that meet monthly to share ideas, receive project reviews, and collectively improve the function of the Methow River Watershed. We are fortunate such a forum has persisted here for more than 15 years.

A new beaver pond in the Chewuch Watershed

2015 Accomplishments

Hot, dry weather, fires, and floods provided another year of significant challenges in 2015. In spite of those challenges the project achieved many of the goals we set.

Landowner Contacts

We interact with landowners throughout North Central Washington and listen to concerns about beavers and share ideas and possible solutions. In 2015 we connected with 44 landowners who reached out to us. We discussed possible solutions to beaver issues, and the variety of benefits beavers provide. We assisted 38 of those landowners with technical advice and/or relocation services that other businesses charge $100 per day to provide.

Beaver Relocation

The core of the work we do involves relocating beavers to places where they used to be. We estimate the pre-European beaver population of the Methow at perhaps 5 times greater than what we see today. This obviously had a profound influence on watershed function. Our challenge is to move toward recovering some of that function.

Beaver establishment and retention is difficult. Success is measured by a slow accretion of established sites. Many recent popular media stories have told how this restoration method is as simple as dropping beavers from airplanes and they will do the rest. Our experience over 8 years is one of trial and error, where we make two steps forward and at least one step backward. It is likely that over thousands of

years prior to human influence, beavers overcame some of the challenges of occupying the landscape at a similar step forward / steps backward pace. Factors including predation, drought, fire, flood, and disease were impediments to population dispersal and establishment historically and they continue to be similar challenges currently. With the intense trapping of the Hudson Bay Company era, most of North America's beavers were eliminated with the attendant profound changes in stream ecology. Each of the above-listed population effects is amplified today as we work toward reconnecting a fragmented population, while coping with climate change impacts. Patience and persistence is required. Improving hydrologic stability in this watershed is the reward.

Indeed, this effort is unlike many other contemporary restoration practices where you plant trees, or remove diversion dams, or build fence, or develop water sources and, at the end of the project, the goals are accomplished. Beavers are wild animals that have unpredictable preferences. They are highly mobile. We are learning that one year is different from the next. Each release site has a different set of suitable and unsuitable characteristics – some that we recognize, some that we can't. Consequently and sometimes painfully, we are learning to patiently accept slow progress, which was likely the way beavers initially recolonized the landscape 12,000 years ago following glacial retreat.

2015 was a disappointing year for this Project in multiple ways. The 35-year average spring/summer precipitation in the Methow Valley (April through September) is 4.79 inches. In the record fire season of 2014, precipitation for spring/summer was 3.42 inches. Then, following the warm and dry winter, the 2015 spring/summer precipitation was only **1.35** inches. Temperatures for the same period were well above average, creating severe low flow conditions and setting the stage even more significant fire.

Lower stream flows create more challenges in establishing beavers. In at least three cases, release locations that were perfectly suitable, dried up and beavers abandoned successful initial establishments. In addition, some of the most successful long-term established sites also were abandoned. New establishments were encouraging, but were offset by unpredictable exodus.

Winter 2015/2016 has provided above average precipitation and we are hopeful that early visits to release sites will show that beavers persisted in other release locations due to winter moisture recovery.

Fifty five beavers were captured in 2015; five of them recaptures. Five beavers died in captivity of unknown causes. Despite working with the Washington State Disease Diagnostic Laboratory at Washington State University, these mortalities remained 'unknown-cause'. Other beaver projects in Washington also experienced higher than normal 'unknown-cause' mortalities. We will continue to cooperate with others and monitor this mystery.

We released 50 beavers in 20 releases to 17 sites. Seven of those sites remained active during our last visits in late 2015. A record number (15) of the beavers we released in 2015 were detected on in-stream monitoring arrays away from the places where they were placed. This is a hint that conditions may have been less suitable for establishment in this year, or at least there were factors influencing beavers to leave.

Since 2008, we have released 274 beavers to 61 locations. Beavers established themselves (for some period of time) at 45 of those locations (**Figure E**). Some sites have been more ephemeral than we expected. Some sites have persisted since we established them. **Table 1** displays the distribution of sites

across the (Upper Columbia Salmon Recovery Board (UCSRB) assessment units that are currently holding water. Thirty sites were successful as of October 28, 2015.

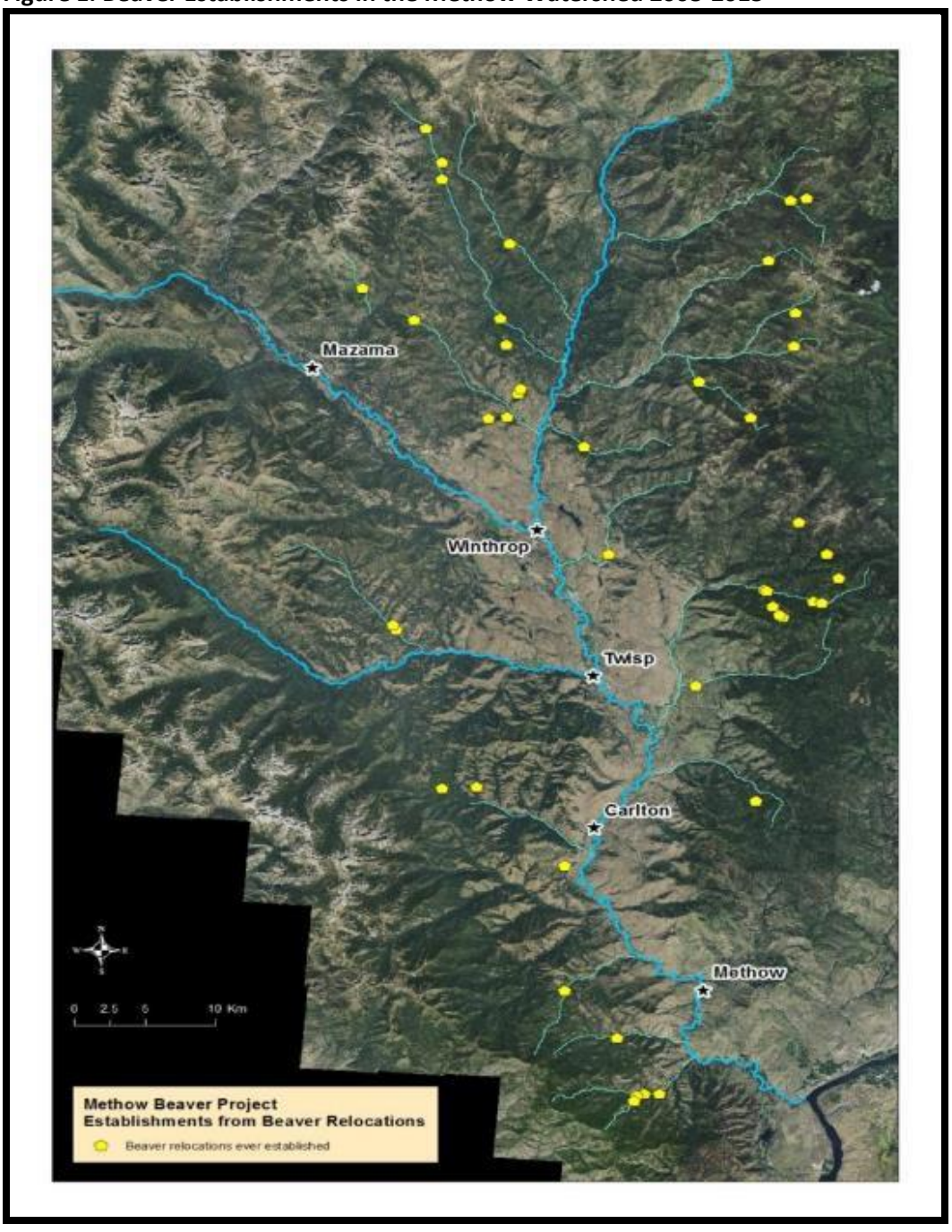
Table 1. Release sites and success by UCSRB Assessment Unit*

Subwatershed	2015 release sites	2015 success	Total release sites	Total successful sites
Lower Chewuch	7	2	23	10
Upper Chewuch	0	0	5	0
Beaver Creek	2	2	8	4
Upper Methow	1	0	2	0
Middle Methow	4	3	7	6
Lower Methow	1	0	7	7
Libby Creek	2	0	4	2
Black Canyon Creek	0	0	3	3
Lower Twisp	0	0	2	1
Total	**17**	**7****	**61**	**30**

*Early Winters, Lost River, Wolf Creek, Upper Twisp, and Gold Creek Assessment Units are lower priority for release
** Woody, Benson South Fork, Copper Flat, Bear Ck. at Flow, Beaver SF Camp, Beaver SF Cattle Guard, Lower Beaver Ck.

The Cub Creek Site that continues to expand each year – July 21, 2015

Figure E. Beaver Establishments in the Methow Watershed 2008-2015



In 2015, we initiated an innovative cooperative effort with the Chelan PUD to accept and incorporate live beavers removed from PUD project sites rather than lethal removal. This resulted in 8 additional beavers for us to release to suitable sites high in the Methow. These then became two new confirmed establishments.

As the project continues and more beavers are distributed to some of the 14 Assessment Units, we suspect beavers will continue to disperse to places we don't find. While this makes it increasingly difficult to quantify the exact effect we are having on specific portions of the watershed, we conclude that an expanded network of beavers in the watershed is a positive outcome, even if some beaver sites are not located.

Abundant water is held both above and below ground at each beaver pond. This is a site that was not located until 6 months after beavers were released 3 km upstream. This complex, in the Beaver Creek drainage, now contains 10 dams and associated ponds. This site holds an estimated half a million gallons of water in ponds and underground.

Beaver cost / benefit

One aspect of beaver management is the savings we have helped landowners realize by removing beavers causing problems. In the last 8 years we have reduced problems associated with irrigation infrastructure, reduced the loss of shade and ornamental trees, reduced maintenance on culverts and road impacts, reduced direct impacts to property , and reduced the loss of orchard trees. We conservatively estimate the financial benefit to landowners and managers of at least $1000 per beaver moved.

On the other hand, we are keenly aware of the significant ecosystem value that beavers provide to the watershed. In a recent assessment of the fiscal benefits beavers provide, EcoNorthwest determined the following values for the Escalante Basin in Utah:

Sediment Retention $2 per cubic yard
Riparian Habitat $1,000/acre/year
Wetland Habitat $8,000/acre/year
Aquatic Habitat $4,000/acre/year
http://www.econw.com/media/ap_files/ECONorthwest_Publication_Escalante-Beaver-Values_2011-10.pdf

In the Methow Watershed these values would translate to about $1750 per beaver, per year for the beavers we have moved so far, based on the number of successful establishments created. The Escalante report noted additional economic benefits that we have not included here, making this a very conservative estimate.

Finding the balance between the significant benefits that beavers provide and curbing the impacts they cause to people is a source of ongoing debate and discussion. The Methow Beaver Project intends to help guide these discussions.

Project monetary value to the community

Beaver project salaries, equipment purchases, oil and gasoline, repair work, and project supplies are all monetary contributions to the local economy. Based on multipliers reported for the tree fruit industry in Okanogan County, each dollar spent on labor is actually worth $1.57 for the county economy. In addition, value added for residents (ecosystem services) and costs avoided (the additional economic considerations noted above) amount to a further value. Without creating a lengthy economic analysis here, the key economic benefits of beaver project salaries, project expenditures, ecosystem benefits, and costs avoided are estimated to have contributed at least $605,000 to Okanogan County residents in 2015 and nearly $4 million since we began the expanded project in 2008.

Watershed benefits (that we can directly discern)

To date in the Methow watershed, beavers we released have added 780 acres of wetland habitat, 19 acres of pond surface, 780 acres of riparian habitat, and improved 19 miles of stream habitat. 4875 acres of adjacent upland habitat is improved because of beaver dams built.

Acknowledgement

We were humbled and honored to receive a valued award from the Western Division of the American Fisheries Society at their annual conference in Portland in August, 2015. Some of the project benefits noted in this report were highlighted in the ceremony for the **Riparian Challenge Award** given to the Methow Beaver Project by Division President, Hilda Sexauer (a one-time fisheries biologist in the Methow - a long time ago).

Before and After

A beaver release site in the lower Chewuch – September 2015

The same site one week later

Before and After

The pond of a newly established beaver pair in 20 Mile Creek in August 2015.

Education and Outreach

We continue to update and follow a written Education and Outreach Plan that focuses on watershed improvement and climate change adaptation.

We reached literally millions of people in audiences throughout the country (and internationally) with stories told via print, radio, online, and video media (see **Appendix A**).

Our message have included…

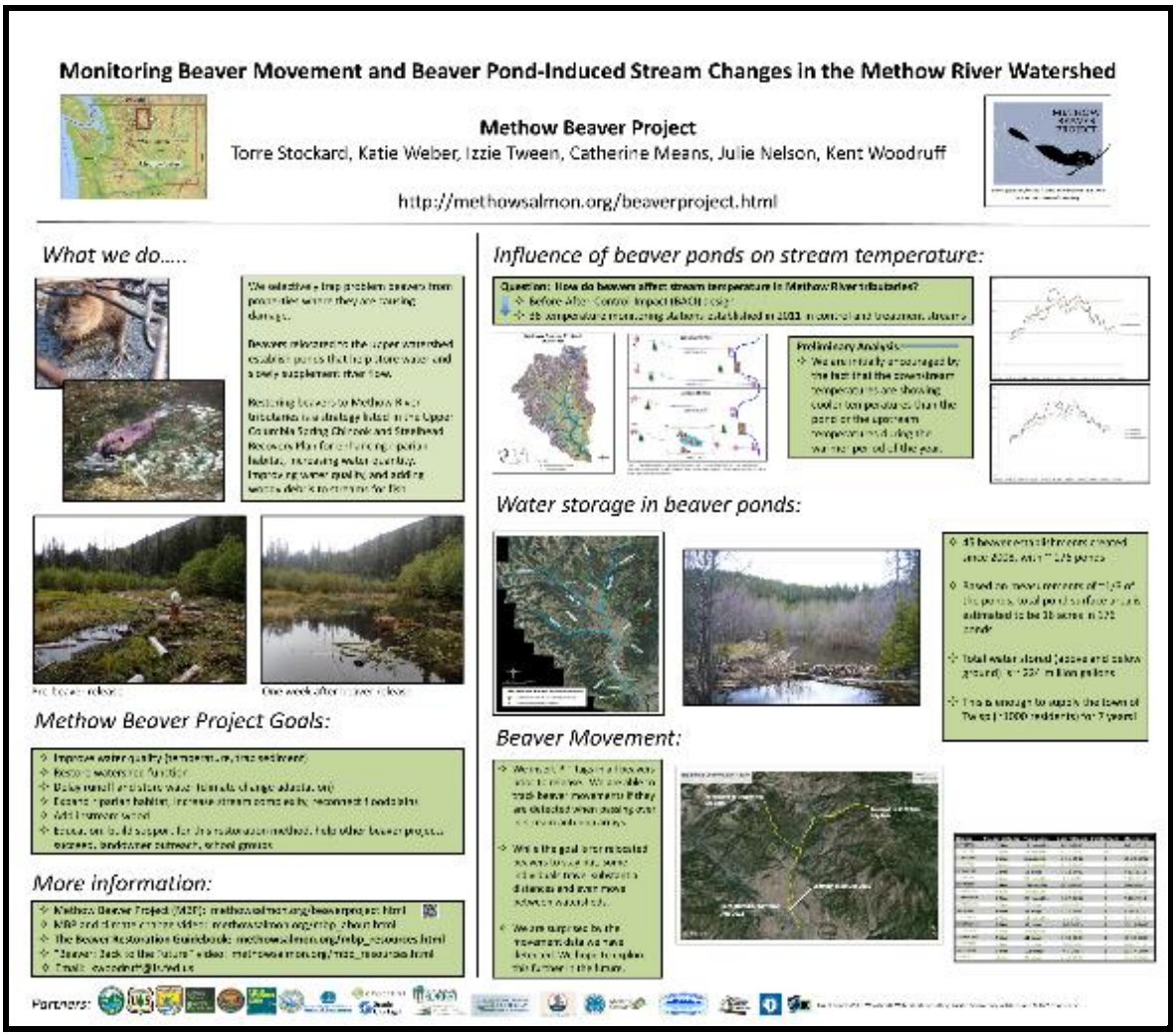
- *"Beavers have a role in water quality improvement and late season water availability*."
- "*Where problems are occurring with beaver, this project may be able to help*."
- *"Methow Beaver Project is restoring native wildlife to places where they have been removed, where their dam building activities will increase stream complexity to the benefit of numerous native fish species, especially salmon. Beavers are a naturally occurring keystone agent of ecological change; as they build dams they are improving water quality by trapping sediment, creating habitat for birds, amphibians, ducks, and mammals, and storing water for future use. "*
- *"Methow Beaver Project is a partnership of agencies involved in restoring beavers to their historic mountain areas. They instinctively store water on the landscape that supplements late season stream flow for all users, especially ranchers and farmers."*
- "*Beaver restoration is an inexpensive and effective way to improve water quality, store groundwater, and increase stream complexity for aquatic organisms including ESA- listed salmon."*

<u>Beaver Facility in Winthrop</u>

We are fortunate to have a place where people can see the beavers we capture as they are waiting to be returned to suitable places in the watershed. 3515 visitors from 30 States and 14 foreign countries visited the USFWS hatchery where we care for beavers. They were provided information about the project, our partners, our sponsors, and our watershed improvement endeavors.

Posters

We employed several different posters at educational events. One example:



Venues where we shared posters and made presentations:

Conferences

Salmon Recovery Conference – Vancouver
American Fisheries Society – Portland
State of the Beaver – Canyonville
SRFB Science Conference – Wenatchee
River Restoration Northwest – Stevenson
WA Beaver Working Group – Ellensburg

Workshops

NPLCC – Everett
NPLCC – Portland
NPLCC – Seattle
NPLCC – Weed
NPLCC – Juneau
Whitman – Walla Walla
Techniques – Winthrop
Fishing Day - Winthrop

We reached over 2250 participants at these events who represented more than 171 agencies and organizations across 17 states and five foreign countries.

Handouts

We developed some handout cards to share key project information.

We participated in a beaver and climate change documentary that was produced by Grand Canyon Trust, and delivered to all US Forest Service offices.
http://methowsalmon.org/mbp_resources.html

We are creating an additional climate adaptation film in cooperation with the Wildlife Conservation Society. The film project is called "**10 Decades**". www.10Decades.org

Another major accomplishment was the publication of the **Beaver Restoration Guidebook**. **3200 website visitors** have investigated its usefulness. It is popular both in the US and Europe and encourages people to initiate beaver restoration in new places. See our website (below) for a link. In 2016 we plan to publish version 2.0.

We enhanced the project website:
http://methowsalmon.org/beaverproject.html

We gratefully acknowledge project sponsors at every education event!

Watershed Investigations

Temperature and Flow

In 2008 we initiated the most rigorous study of its kind aimed at answering: “How do beavers affect stream temperature and stream flow in tributaries to the Methow River?” In 2011 we set up 38 monitoring stations with data loggers in a Before-After, Control-Impact study design to gather *meaningful, statistically defensible* answers to that question. Fires and floods affected some temperature and flow stations.

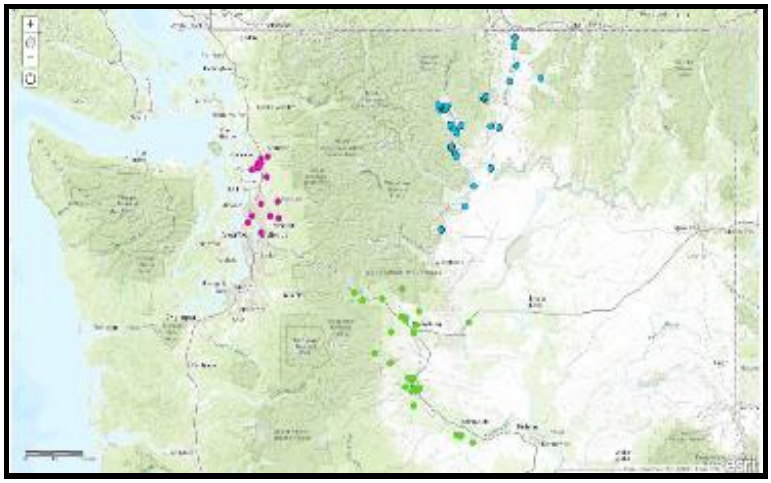
Unplanned beaver establishment affected some flow stations. We will continue in 2016 with the post-treatment phase of data collection. The temperature study will continue for two more years before data analysis. The flow study will be adjusted in 2016 to take into account the sites impacted and it, too, will proceed for two more years.

Water Storage

Our 2015 intern from England, Izzie Tween, tackled the challenge of assessing water storage in beaver ponds created. She collected data on water storage at 60 beaver ponds. Collectively she measured an annual water volume stored of about 2.8 million gallons of water. That’s enough for the daily needs of 38 Twisp households for the entire year. In 2016 Izzie will initiate her graduate studies at WSU to conduct even more detailed investigations of the water stored and the way it is delivered later in the year.

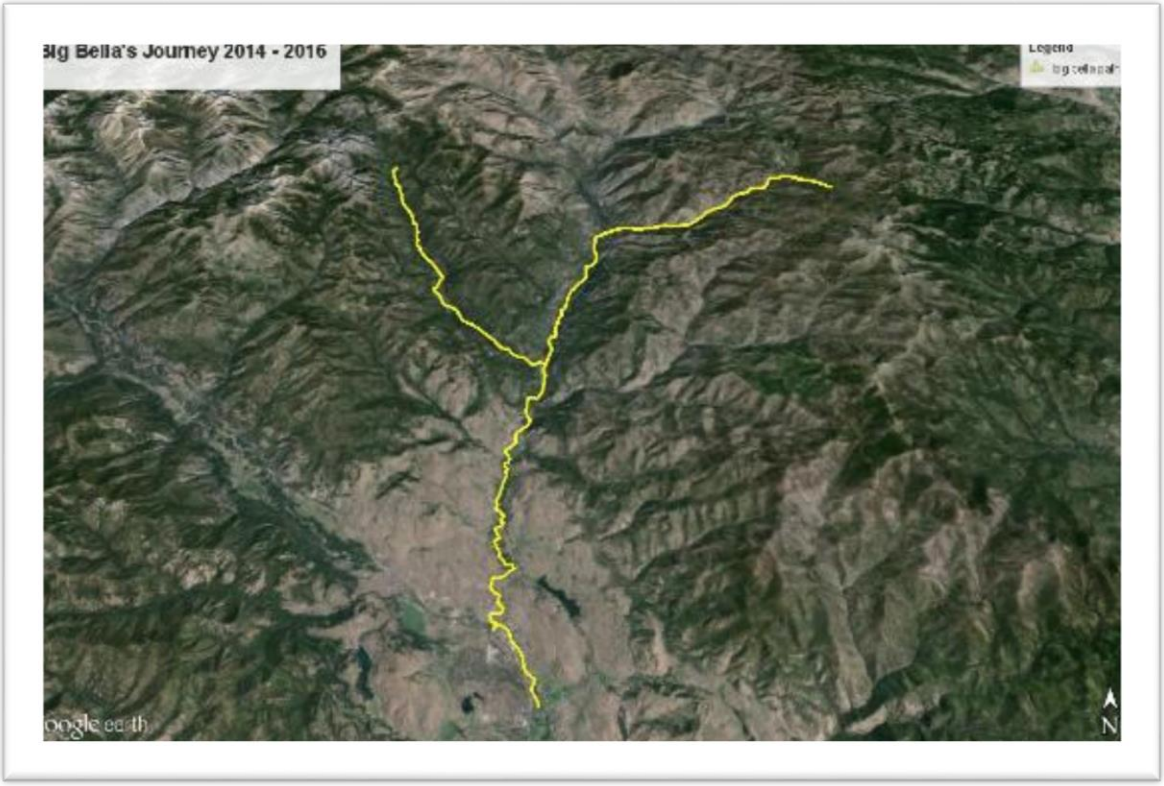
Beaver Relatedness Investigation

We have a solid partner in the National Genetic Laboratory in Missoula Montana. They have helped us archive DNA for every beaver we capture (for future research). They have determined the sex of every beaver we have captured using DNA assessment of hair samples. Most recently we are working together on an analysis of samples from beavers in several drainages across Washington to determine the degree of population isolation they exhibit. The initial results are intriguing. The analysis is ongoing.



Locations of beaver samples from three study areas: pink are from the Tulalip, green are from the Yakima, and blue are from the Methow, Okanogan, Columbia and Entiat.

Beaver Movements



We continue to monitor movements of the beavers released though PIT tags inserted in tails. To date we have movement information from 38 beavers including the track above that documents two separate captures and two releases of a single beaver that was recorded travelling 76 km in 9 weeks.

Obviously we don't want to record any movement of the beavers we release. Beavers that stay in place are the ones achieving our goals. However, it is becoming increasingly clear that we continue to work with a very mobile animal that easily moves large distances throughout the watershed. Of the beavers for which we have recorded movements, the average movement is 43 km and the greatest distance moved is over 200 km.

International Knowledge Exchange

For the first time, the project initiated an International Exchange to share beaver information, techniques, and with other countries and to gain beaver understanding from outside the United States. Izzie Tween, an enthusiastic ecologist from the United Kingdom answered the prospectus and eagerly joined the Methow Beaver Project and the Sky Beaver Project for the 2016 field season.

She completed a report on her internship that is posted on our website.

Information Sharing

We hosted a Techniques Workshop for **26 participants** from 6 states to share what we have learned and provide other interested projects (especially from California) the opportunity to "try this at home". Many groups have indicated they will be starting similar projects in Idaho, California, Colorado, Oregon, Montana, British Columbia, and Alberta, citing inspiration from our success (and failures).

Techniques Workshop participants

Volunteer Involvement

Young biologists, high school students, college students, graduate students, and local adults (young and old) have all volunteered with us to learn more and gain some understanding of wildlife work of the 21st century as demonstrated by this project. We were given an astounding 1748 hours of volunteers contributions this season. Volunteers cleaned, carried, fed, trapped, educated, and monitored alongside our project staff. They have been another key audience for our education effort and some of the most effective message carriers about the project, beavers, water storage and climate change. Cumulatively we have far exceeded our expectations for assistance from volunteers. People have traveled a long way to help and learn at our project. The monetary value contributed to the project this year is an amazing $23,808.

Volunteers assisting with beaver transport

Student Participation

Koharu Yonebayashi developed a program and report about the Methow Beaver Project for her classmates and teachers at Liberty Bell High School as her Senior Class Presentation. We are proud of her and wish her well as she explores the next steps of her education and career.

Koharu filming for her senior class presentation

Finally, the unending dedication, long hours, innovative solutions, and amazing persistence of the 2015 crew was the glue that held this challenging project together.
Julie, Torre, Catherine, Katie, and Izzie - I appreciate all you did.

Special thanks to SPENCER EISENSTADT, age 13, for this report's outstanding title page artwork!

Bonneville Environmental Foundation has supported our education and outreach program for years

BONNEVILLE ENVIRONMENTAL FOUNDATION

We are grateful for the partners who have made the Methow Beaver Project possible!

Woodsmith Watershed Consulting

We are especially grateful for the support of our 2015 contributors.

Appendix A. Stories to which the Methow Beaver Project contributed in 2015

Beavers and Water: A Beautiful Relationship in the Methow 5000
https://www.nationalforests.org/blog/beavers-and-water-in-the-methow

Beavers Are Great for the Environment. As Neighbors, Not So Much 600000
http://www.nbcnews.com/science/environment/beavers-are-great-environment-neighbors-not-so-much-n329986

Beavers: Nature's First River Restoration Engineers 1000
http://www.ecotrust.org/beavers-natures-first-river-restoration-engineers-2/

Beavers Provide Free Labor to Build Salmon Habitat 100000
http://www.opb.org/radio/programs/thinkoutloud/segment/beavers-provide-free-labor-to-build-salmon-habitat/

Beaver Reintroduction a watershed success. Inside Ecology. Friday December 4, 2015. 3000
http://ecologywa.blogspot.com/2015/12/beavers-reintroduction-watershed-success.html

Coca-Cola Leaves It to Beavers to Fight the Drought 5000
The soft-drink giant is deploying the dam-building animals to replenish groundwater supplies.
http://www.takepart.com/article/2015/09/23/coca-cola-using-beavers-increase-water-supply

How beavers help save water 300000
http://loe.org/shows/segments.html?programID=15-P13-00012&segmentID=6

Leave it to Beavers 1000000
http://www.pbs.org/wnet/nature/leave-it-to-beavers-leave-it-to-beavers/8836/

Leaving it to Beavers in Washington: Restoring Nature's Hydrologists 5000
http://www.beaversww.org/assets/PDFs/LeavingItToBeaversInWash.pdf

Make Way for Beaver 8000
http://www.thefreshwatertrust.org/make-way-for-beaver/

The Nature of Things: Beaver Whisperers 1000000
http://www.cbc.ca/beaverwhisperer/film.html

Using Beaver to Restore Streams, Managers from California to Alaska Gather to Learn 5000
http://www.northpacificlcc.org/News/03-04-2015/beaver-workshops

WMI Landscapes: Partners in the Pacific Northwest Develop Beaver Restoration Guidebook 5000
https://www.wildlifemanagementinstitute.org/index.php?option=com_content&view=article&id=838%3Awmi-landscapes-partners-in-the-pacific-nw-develop-beaver-restoration-guidebook&Itemid=95

Working with Beavers to Restore Watersheds. R-6 Update – USFS internal news website 3500
http://fsweb.r6.fs.fed.us/public-affairs/r6-update/

Working with Beavers to Restore Watersheds. USDA Blog. Washington DC 35000
http://blogs.usda.gov/2015/07/15/working-with-beavers-to-restore-watersheds/

The beaver whisperer 30000
http://www.hcn.org/issues/47.19/the-beaver-whisperer

Beaver Sexing 30000
http://www.hcn.org/articles/how-do-you-sex-a-beaver-squeeze-and-sniff

Methow Beaver Project feature article 2700
http://www.hcn.org/issues/47.19/the-beaver-whisperer

Estimated audience reached through these stories in 2015 = 2,049,200 people

A Methow Beaver Project crew member