Blacktail Creek has been impacted by historic mining practices and the mere fact that it runs directly through an urban setting. Historically, also known as Blacktail Deer Creek and Bell Creek, it is an example of a municipal stream that is fairly intact, supporting fish and riparian wildlife along its course through the Summit Valley. The damages to this creek include: deposits of slag and mine tailings from historic smelter activity from the Bell Smelter; channelization through the city; impacts and sedimentation from roads; tailings within the floodplain; and fish entrapment due to aging culverts. Given its impacts and the fact that the stream continues to support cutthroat trout, restoration dollars spent on this stream are likely to yield high returns, in other words, a good bang for the buck.

The Natural Resource Damage Program has allocated $957,000 for restoration projects along Blacktail Creek. The nature of these projects depends on the specific reach and the type of impacts. Some projects are fairly simple and will not require large amounts of cash, however, the projects may be stalled due to the need to comply with federal regulations for flooding and mapping of the floodplain.

Continued on page 16.
The Montana Steward: Headwaters Edition

Big Sky Watershed Corps
Evan Norman

In October of 2015, I submitted an application to be a Big Sky Watershed Corps Member through the AmeriCorps program. AmeriCorps is a program for young adults to serve in various different capacities and gain on-the-job skills. When I interviewed to be a service member for the Big Sky Watershed Corps, I didn’t know where I would be placed. Based on my interests and previous experiences, my program manager matched me with the Silver Bow Creek Watershed Education Program (CBWEP). At first, I thought I was signing up to work for a website that was difficult to pronounce. Only hearing that last statement proved to be true.

While working for CBWEP, I had the opportunity to see much more of the state than I otherwise would have. This was special for me, having grown up in Juneau, Alaska, where it is landlocked on one side and has water on the other. The only way in and out of Juneau is by boat or plane. On the other hand, throughout Montana, there is no shortage of roads that connect to one another. During classroom visits, I like to explain that we travel from Libby on the Idaho border to Baker on the North Dakota border, and to all of the towns in between. Since we spend the majority of our Americorps term of service, so I signed up for another term in 2017. From those two-year experiences, I understand the importance of community stewardship and awareness of what is going on in one’s backyard to students, teachers, friends, family, and citizens. I worked on projects for the CBWEP program and outreach activities for local schools, and created new ways to communicate about the projects and information that CBWEP delivers. After 6,000 beneficiaries, 2,000 data points collected, 2 miles of stream banks improved and 4,000 student hours devoted to a student-centered curriculum. The CBWEP program is funded by partners such as Montana Tech, local businesses and individual donors. There are multiple ways to support CBWEP, this year’s theme was the Black and Orange Ball in honor of Halloween. While our fundraiser was unfortunately cancelled due to a storm cancelling all events due to the COVID-19 pandemic. The Southwest Montana Fly Fishing and Conservation Camp received 16 scholarships for camps totaling $1,200, which is the record number of scholarships over received over our AmeriCorps program. This year’s largest donor to our Annual Fundraiser was the Dennis and Phyllis Washington Foundation. Montana Resources, local businesses, and individuals supported our programs this year.

Southwest Montana Fly Fishing and Conservation Camp Receives Sustaining Grant Kayla Lappin

The Silver Bow Creek Watershed Education Program (CBWEP) received a $15,000 grant to be distributed over the next three years from the Dennis and Phyllis Washington Foundation. CBWEP’s annual Southwest Montana Fly Fishing Camp, in addition to the grant, $1,200 was raised at CBWEP’s annual fundraiser on October 27, 2017. CBWEP would like to thank the Dennis and Phyllis Washington Foundation, Montana Resources, local businesses, and individual supporters for their generosity. Unlike any other camp in the state, the Southwest Montana Fly Fishing Camp brings kids to fish on recently restored Superfund sites within the Clark Fork Watershed. Kids fish on Silver Bow Creek and the Clark Fork River, waterways once declared unfishable. Kids learn about why these waters are now fishable and about the restoration efforts on Silver Bow Creek and the Clark Fork River. A tour of Montana Resources also teaches kids about responsible mining practices.

All unique to the camp are need-based scholarships. Kids who cannot afford the $75 fee can apply for a full fee waiver. “We don’t want to see any kids miss out on the camp because they can’t afford the camp fee,” said Doyle, CBWEP staff member who directs the camp.

The 2018 camp will take place end of July/beginning of August, at Camp Watampa on Georgetown Lake. The camp fee is $75 per kid, and is split between all kids and transportation is included. Registration is limited to 30 kids and early registration is encouraged. To register for the camp or apply for a camp scholarship, please contact Chris Doyle at 406-496-4790.

CFWEP Fundraiser Update Kayla Lappin

CFWEP’s annual fundraiser took place on October 27, 2017. This year’s theme was the Black and Orange Ball in honor of Halloween. While our fundraiser was unfortunately cancelled due to a storm cancelling all events due to the COVID-19 pandemic. The Southwest Montana Fly Fishing and Conservation Camp, and K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Resources, local businesses, and individual donors supported our programs this year.

The Montana Steward: Headwaters Edition

The Big Sky Watershed Corps
Evan Norman

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Over 14,000 Students Reached Since 2005

During this past year, CFWEP reached over 9,000 students across the state of Montana, generating over 19,000 student hours of contact through our various programs. We also reached over 65 teachers this year. We have seven staff members and two students that help us achieve these numbers. We had 20 different programs and outreach events in 2017. These events included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included our Restoration Education Program (REP), Bringing Research to the Classroom (BRIC), TIC visits, K-12 teacher support, such as Montana Resources, Montana Tech, and Montana Tech. Our programs this year included.
Meet Jocelyn Dodge, Beaverhead-Deerlodge Recreation Forester
Interviewed By: Evan Norman

Tell us a little about yourself and your position.

I obtained a recreation management degree from the University of Montana and have worked for my entire career of 35 years in recreation management fields, and I love it. I love working with the public and love being able to see the difference the public appreciation of the community and visitors appreciate and benefit from. I have been with the U.S. Forest Service for 27 years in the Beaverhead-Deerlodge Forest. In the early 1990s, it was known as the Deerlodge Forest; it was combined with the Beaverhead Forest to form Beaverhead-Deerlodge Forest. Prior to working with the Forest Service, I worked for city and county recreation departments in Missoula and Flathead counties. Currently, I am responsible for the recreation management of the old Deerlodge Forest boundary, which is 1.2 million acres of land.

How did partnerships change Thompson Park into what it is today?

The biggest change I’ve seen is an overall growth in outdoor recreation in Butte and the Southwest Montana area. Thompson Park has flourished as a result. Thompson Park was once an area that was pretty well ignored by the Forest Service and Butte-Silver Bow. In 1922, the park was designated by Congress, which turned out to be the only nationally designated municipal recreation area in the United States. The mayor of Butte and the U.S. Secretary of Agriculture signed a unique agreement that gave recreation opportunities in the park to the City of Butte, while the U.S. Forest Service retained resource management responsibilities.

In the 1950s, the facilities, roads, and trails envisioned were constructed by the Works Progress Administration (WPA). During the same time period, Mountain Bell Telephone Company was responsible for installing the water fountains that are on Montana Highway 2 (Hading Way) to help old Ford Model T’s get over the pass. These fountains also served as a source of clean drinking water for Butte citizens. It started the first volunteer and partnership opportunities in the park.

What is the background of the Basin Creek area and what are the recreation plans for it?

Basin Creek used to be a destination for Butte; it was frequented by locals similar to the popularity of Thompson Park or the Nine Mile house on Montana Highway 2. The ability to open the area up for recreation exists because of the construction of the new Butte-Silver Bow Watershed Treatment Facility. Now the question is, how can we make a connection for outdoor recreation between Basin Creek and Thompson Park? The Beaverhead-Deerlodge Forest Plan requires the Basin Creek Municipal Watershed to be protected. There are limitations on the scope of what can happen in that area, including the use of existing trails and roads. We are determining how to use those existing trails and roads to tie Thompson Park into the Basin Creek reservoir area. Currently, there is no public entry into the Basin Creek Municipal Watershed. District Ranger, David Sabo, continuously looks at how we manage this area including how we protect the watershed area, how we meet the forest plan, and how we provide accessibility. There is always the challenge of balancing the need to protect natural resources of U.S. Forest Service land with the public use of that land. There are plans for that area to be open in late spring or early summer of 2018, with limited access.

How should a trail user handle an obstacle on the trail?

There are many different ways to handle an obstacle on the trail. The first is to try not to go around it, which can create a new, unplanned trail. The biggest challenge users face while traveling on a trail includes coming upon a fallen log or a boggy area, and then they decide to go around it. Creating a braided trail could extend the movement of water, which causes erosion concerns. These days, motorized users typically carry a chainsaw. Cutting down trees in your way on the trail is just fine. The one issue we have is users only cutting the obstacle wide enough for them to get by; and not providing a wide enough clearing for other users. When an obstacle is not cleared wide enough, U.S. Forest Service Crews have to go in there to clear it again. For motorized users, it is important to clear enough for long trailers, which is a challenge. An obstacle on a trail could be education, one-on-one work with individuals and groups to answer questions, and workshops that focus on the balance that we are trying to achieve in the area.

What is one message you would like to share with local visitors and tourists?

We manage the recreation program for the public and that includes all users, but at the same time, the public needs to take responsibility for our recreation opportunities can continue in the future. Connecting youth and adults with the land is important for understanding and minimizing your impacts, and for providing for continued recreational opportunities.

Outdoor recreation is important for our economy, not just as a business, but also for enhancing the quality of life for all of us. We are challenged to use social media to get youth connected to the outdoors and gain an appreciation that will carry on when they are adults. We want the public to be engaged because they are the ones who can share their experiences to leaders and decision-makers at all levels. Any notes on safety in the local area?

Tell us a little about the work with AmeriCorps.

We work with a variety of user groups and businesses to provide recreation opportunities. Our partnerships include motorized and non-motorized user groups from the Butte, Whitehall, Philipsburg, Anaconda and Ennis areas. Most of our partnerships assist with maintaining and improving year-round trails and camping opportunities. Groups such as the Mining City Trail Riders and the Hi Mountain Nordic Ski Education Foundation help to groom winter trails, while groups such as the Montana Wilderness Association and Upper Clark Fork Back Country Horsemen help with trail maintenance and in our wilderness areas. We have a strong relationship with mountain bicyclists to maintain trails and help develop winter trail riding for fat biking – a growing sport in Butte. There has, and will continue to be, a strong reliance on partnerships to provide and maintain recreational opportunities.

What is unique about the Whitehall-Pipestone area?

Whitehall-Pipestone is a popular area for motorized recreation and a non-motorized opportunity for mountain bikers. With outdoor recreation as a top economic driver in Montana, we look at how to manage areas for recreation while also protecting resources. We strive to do this with partners; we work with them to understand through education the need to build trails in a certain way, for example, away from streams.

It is important to understand how different areas require different management strategies, and to understand why we need to protect stream crossings, whether that be a road or a trail, for the protection of west slope cutthroat trout stream habitat. This area allows motorized use, and with the granitic soils of the area, erosion control features are a much greater requirement for routes. Motorized recreation groups and clubs have done a great job of understanding the need for maintenance and changes in routes in order for those opportunities moving forward. Be aware of the impacts of use, and how these impacts can be reduced long term. We use Facebook and Twitter to update our users about blowdowns or muddy trails, which aligns well with US Forest Service’s “leave no trace” ethic.

What are some challenges to new recreational sites?

The challenges of creating new recreational sites are dwindling budgets and the high cost of construction for new sites. In recent years, there has been a consolidation of offices, reduced budgets, and a backlog of maintenance work at existing recreation facilities. The Forest Service needs to maintain and upgrade the sites we have before we think of adding new ones. For instance, Thompson Park once had campgrounds and picnic sites that deteriorated to the point that couldn’t maintain them. It’s hard to paint rotten boards. The decision to rework our existing sites or create new sites is sometimes dependent on whether or not we can partner with other agencies and/or groups to take on some of the maintenance. The improvements in Thompson Park could not be completed without the incredible partnership with Butte-Silver Bow. Neither the U.S. Forest Service nor Butte-Silver Bow could take care of the whole area on their own, including the 25 miles of rehabilitated trails and the Milwaukee Railroad Trail.

The Montana Steward: Headwaters Edition

What are the best ways to be stewards?

Citizens need to understand that our agency is based on multiple uses. The most difficult thing for the public to understand is how to maintain that balance. We look at growing outdoor recreation opportunities, but the design needs to assure that those resources are protected. We design trails to reduce conflict, provide a challenge, ensure safety, and create something that can be maintained long-term. There needs to be education, one-on-one work with individuals and groups to answer questions, and workshops that focus on the balance that we are trying to achieve in the area.

Tell us a little about the work with AmeriCorps.

Thompson Park was reconstructed with partnerships and grants through the Natural Resource Damage Program (NRDP), Forest Service Capital Investment funds, Recreational Trails Program funds, the Resource Advisory Council, 21st Century Funding and National Forest Foundation grants. AmeriCorps St. Louis has been working with us for 17 years, and the above partnerships and grants have provided work opportunities to service members. The partnership with AmeriCorps St. Louis came after I responded within 30 minutes to their executive director about whether anyone in Montana had a project for them. They came out that summer and helped work on the forest fires of the year 2000. Butte Ranger District, Jefferson Ranger District, and other recreation managers saw the importance of the group and engaged them as a partner along with the Montana Conservation Corps. They were a well-received group, loved the Montana experience, and the partnership continues to be built on. Funding for the site, materials, trail maintenance equipment, and stipends all allow AmeriCorps service members and other volunteers to work on a variety of different projects. Many of these AmeriCorps folks pursue work in fire and disaster mitigation with other state or federal agencies.

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Butte Receives Public Art Installations through Stormwater Art Project

Kayla Lappin

The very first signal box art installation was sponsored by CFWE in 2016 and is located at the corner of Montana Street and Park Street. It features a photograph taken by Brian Varner. Following this installation, a call to local artists was made in June 2017 for additional artwork ideas; the project received 11 submissions. Since June, three additional signal boxes have been sponsored and wrapped.

Another signal box at the corner of Harrison Avenue and Ambrose Avenue is sponsored by The StoneFly Fly Shop. It features artwork from Clayton Heggem, a student at Butte High School.

CFWE is looking for additional sponsors for the remaining 30 signal boxes around Butte. Sponsorships can be made at two levels; a $300 level and a $600 level. Sponsors will be featured on the signal boxes themselves, on the CFWE Facebook page, in CFWE publications, and on the CFWE and Butte Stormwater websites. If you are interested in becoming a sponsor, please visit cfwe.org/stormwaterart or contact Kayla Lappin at klapping@mettech.edu or 406-221-6198.

Mike Marcin and Chris Bradley of The StoneFly Fly Shop with Butte High Student and Artist, Clayton Heggem.

Dr. Robert Pal. Signal box sponsored by Headframe Spirits.

The Montana Steward: Headwaters Edition

Why a Creek is a Creek and a River is a River

Dr. Arlene Alvord

We have all heard of streams, brooks, creeks, tributaries, and rivers. But, what exactly is the difference between these terms, and what are the accepted definitions of these terms according to leading experts? First, let’s agree that we will keep our focus on what these terms mean for us here in the United States, understanding that they may not hold the same meaning for other countries, or even within various cultures of the same country. Second, the U.S. Geological Survey (USGS) states there are “no official definitions for generic terms as applied to geographic features.” So please consider this a work in progress with no end in sight.

Most sources agree that the term, stream, is used to describe all freshwater that flows in a clearly defined channel from higher to lower elevations on the surface of the planet; so, brooks, creeks, and rivers are all types of streams. A brook is flowing freshwater considered by some to be smaller than a creek and found flowing in rugged terrain, but brook is also used as a synonym for creek. Creeks are flowing freshwater streams that serve as tributaries for other creeks or rivers, they are typically smaller than a river.

A tributary is a stream that feeds into a river, rather than ending in a lake, pond or ocean; tributaries can be the size of brooks, creeks or rivers. The smaller the stream is usually considered a tributary of the larger one. By common standards, the stream will keep the name of the stream that had the most volume of water at the confluence, but sometimes history or other factors can also affect the stream’s name.

Rivers are defined as flowing freshwater on Earth’s surface with considerable water volume, most of which flows towards an ocean, sea or lake, or into another river. Rivers grow as more and more tributaries drain into them. Similar to how a snowball rolling downhill gets larger as it descends. Rivers display increases in the width and depth of the water on their way down in elevation. When one river joins another, it is common to keep the name of the river that had the highest volume of water at the confluence. However, other factors may come into play that override this standard.

Most would agree that a river has more water volume than a brook or creek. However, since many streams were named prior to any scientific consensus of definitions, it is possible to see a “river” flowing into a “creek,” for example, the Northern Virginia, Little River flows into Goose Creek. Scientifically speaking, however, the name is not as important as the location and physical features of the stream in terms understanding its behavior and ecological characteristics.

The development of the concept of stream order was a welcomed outcome of the work of two scientists, Robert E. Horton (1945) and Arthur N. Strahler (1952, 1957). The stream order concept applied a quantitative approach to understanding stream hierarchy, that is, the rank of streams relative to each other within the watershed system (source). With the stream order concept, numerical designations are assigned to streams to indicate where the stream is placed within a watershed system. Literature on the subject is available at: www.bedfordcountyconservation.com/Watershed/watershed_page2_stream%20order.htm

Dr. Robert Pal. Signal box sponsored by Headframe Spirits.
Headwaters of Blacktail and Basin Creeks
Abby Peltona

Overview of Blacktail and Basin Creeks

Blacktail Creek is a 17-mile long waterway that begins in the Highland Mountains, south of Butte, Montana. From its headwaters in the Highlnds, the Blacktail flows north through Thompson Park, the Butte Country Club, then through Father Sheehan Park. Thereafter, Blacktail Creek had formed a confluence with Silver Bow Creek when Silver Bow was still a naturally flowing creek. When open pit mining started, some of Silver Bow Creek’s waters were diverted. After Montana Resources restored the mine in the 1980s, Silver Bow Creek’s waters were fully diverted. Silver Bow Creek’s channel is still used today to catch stormwater and snowmelt runoff. Blacktail Creek and the historic Silver Bow Creek channel come together at Texas Avenue across from the Chamber of Commerce.

The single stream continues on as Silver Bow Creek with Blacktail Creek primarily supplying the flow of water. Please see the Blacktail and Basin Watershed Geography map on page 10.

Lake Avoca. Photo courtesy of The Montana Standard.

Lake Avoca. Photo courtesy of The Montana Standard.

Coke Ovens at Bell Smelter Site. Photo courtesy of The Montana Standard.

History of Blacktail and Basin Creeks

Blacktail Creek

Scientists envision that prior to European settlers arriving in the Summit Valley, our area was a pristine ecosystem consisting of many creek drainages, dendritic stands, abundant wetlands, and lush riparian areas encouraged by numerous beavers. In 1852, Charles Meader constructed the Bell Smelter along Blacktail Creek. The town or neighborhood known as Meaville was named after the Bell’s owner. The Holiday Inn Express is currently located at the original smelter site. The smelter operated on and off from 1881 to 1886, processing copper ores from the Bell Mine and treating some Liquidator Mine ores in the later years. Ores were first processed using open heap roasting in coke ovens, although blast furnaces and a concentrator plant were later adopted for roasting the ore. Despite the short life of the Bell Smelter, Blacktail Creek was nicknamed, and often still referred to, as Bell Creek by locals. The flame for the stack still exists, buried underneath the ground running north.

Butte citizens had often used Blacktail Creek as a dumping ground, which prompted Lou Parent, a local teacher, to gather his students from Webster-Garfield School and start cleaning the creek in 1970. Thus CUBS, Clean Up Blacktail Creek Stream Day, was born; Mr. Parent and his students cleaned the creek annually for many years. CFWEP has undertaken the event over the past four years, with Mr. Parent’s blessing. Next year will mark our fifth annual CUBS event on May 24, 2018.

In 1859, Blacktail Creek was dammed to create Lake Avoca, a popular boating and water recreation area. The lake had a pavilion and a park, as well as boats available to use in the summer months. Children would play hockey and ice skate in the winter on the lake. Lake Avoca was drained in 1939, and the present-day Butte Country Club was established where it once was.

Blacktail Creek again flowed freely, however, as a straight channel. Blacktail Creek is a 17-mile stream that runs through the ground running north. As Bell Creek by locals. The flume for Bell Smelter, Blacktail Creek was called it “the land of the shining mountains.” In the late 1890s, Blacktail Creek was dammed to create two reservoirs for drinking water in Butte. Beavers were trapped off to prevent gianid in the reservoir. The reservoirs were so pristine that no filtration was necessary until 2011.

The French settled in Basin Creek, establishing dairy farms and gardens. They also created road houses with big stables to provide rest for the horses and their teamsters who were moving ore over the Continental Divide. These roads houses were located at Lone, Five, and Nine Mile, marking the southern roadway leaving Butte toward Whitehall. Timber cutting also occurred throughout the Basin Creek watershed for the mines of Butte.

Blacktail and Basin Creeks in Butte

Native westslope cutthroat trout inhabit Blacktail Creek. To ensure the success of this population, the aquatic habitat needs to be improved. To be successful, these trout need the 5 C’s: cold, clean, complex, and connected waters. Part of on-going restoration work on Blacktail Creek includes removal of fish passage barriers that are currently in place along the creek.

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Native westslope cutthroat trout inhabit Blacktail Creek. To ensure the success of this population, the aquatic habitat needs to be improved. To be successful, these trout need the 5 C’s: cold, clean, complex, and connected waters. Part of on-going restoration work on Blacktail Creek includes removal of fish passage barriers that are currently in place along the creek.

Westslope cutthroat trout are also present in Basin Creek, as well as in the reservoirs. These could once again be great fisheries, with a few restoration dollars to enhance habitat and create recreational access. Connectivity to the upper part of Basin Creek is crucial in providing more space for the trout to spawn, which would allow them to remain a self-sustaining population. Further restoration projects could also establish better connectivity with Basin Creek and Blacktail Creek, as well as other waters downstream.

One project that can aid in fisheries is the Watershed Restoration Council’s (WRC) Blacktail Watershed Restoration and Monitoring project (nicknamed, the beaver mimicry project). CFWEP is a primary partner with the WRC and scientist Amy Chaubick of Great West Engineering. Beaver mimicry work has been on-going in the Highlands as well as a part of Blacktail Creek for three years now. Beaver dam analogues are built using site materials including soil, rock, and wood posts. These structures are semi-permeable and filter sediment out of the water, thus improving water quality for fish and other organisms in the creek. The structures also increase groundwater storage and stream flows, again, providing better habitat for fish. Some other goals of this project are to increase floodplain connectivity, reduce flow thus increasing the sinuosity of the stream, increase spawner species, such as willows and aspens and provide more wetland and stream habitat. Encouraging willow and aspen growth can also help prevent forest fires. Please see Blacktail Watershed Restoration and Monitoring Project in this edition for more information regarding the project and our partners.

Restoration efforts in the Blacktail Watershed include the Basin Creek Water Treatment Plant, which was built in response to the 2011 revocation of the filtration waivers for Basin Creek Reservoir. The $30 million water treatment plant uses ceramic-membrane filtration. Part of the funds were appropriated by the Butte Natural Resources Damage Program Council (BNRC) with the stipulation that the reservoir area be opened to the public. Basin Creek Reservoir is dated to have some accessibility by June, 2018. Eventually, bikes, paddleboards, canoes, kayaks, and swimmers will be allowed in the reservoirs.

We are currently rewriting the history of these creeks to be a story of restoration success. Please see Restoration of Blacktail and Basin Creeks in this edition for more information regarding other efforts that are on-going and how you can get involved.

Bassin Creek. Photo courtesy of The Montana Standard.

Bassin Creek Reservoirs. Photo courtesy of Google Maps.

Editor’s Note: Information for this article was gathered from earlier articles by Shawn Denley “Blacktail: Butte’s forgotten creek is a promise,” published in February of 2016, and Mike Smith’s “The hidden Bassin Creek Reservoir opened to recreation next year.” Published in April of 2017. Permission for photographs was graciously allowed by the Butte-Silver Bow Public Archives and The Montana Standard.
Blacktail and Basin Creeks Watershed Geography

Blacktail Creek
Basin Creek
Silver Bow Creek
Silver Bow Creek (Ephemeral)


Blacktail and Basin Creeks Watershed Geography

Blacktail Watershed Restoration and Monitoring Project
Evan Norman

Historically, beavers were the construction engineers who provided abundant wetlands throughout southwest Montana. A wetland can be an extravagant oasis for plants, birds, trout, amphibians, ungulates, and rodents, including the beaver. The remnants of these wetland areas now hold historic beaver dam complexes that built natural valleys of sediment and debris. Pressure from climate change and the absence of beavers has depleted groundwater in many of these valleys. This water shortage has changed many ecosystems from aquatic to terrestrial. Enter beaver dam analogues (BDAs), or beaver mimicry techniques, for restoration.

BDAs are constructed with conifer stakes, boulders, and sedge sod in the stream channel. These structures serve as a flow impediment, reducing stream energy, pooling water, and reconnecting side channels. When installed, earthen materials act as a ramp for water to advance on and spill down. Willows and conifer limbs are weaved between the stakes parallel to streamflow to further disperse flow. Variations of these structures can be built with machinery, but the simplest structures only require tools that can be carried to the project location. The materials needed are site-sourced, which is why BDAs are known as a low-impact restoration technique.

Ideally, BDAs are built in drainages with historic beaver activity, allowing for the potential of beaver to return. Subsequently, existing beaver dams have already shaped the landscape to an appropriate stream slope and valley width for restoration. Ideal beaver habitats have slopes of 1-3% (Oregon, et al. 1998) and are located in average valley widths greater than 150 feet (Vose, 1993). Stream slopes that are steep can be problematic because they increase flow velocities as well as water pressure on BDA structures. Furthermore, shallow gradients provide an opportunity for the structures to deposit sediments and move water laterally. Wide, gently sloping valleys provide the space for water to infiltrate into valley soils to recharge groundwater, and promote riparian and woody vegetation growth. Aspen, cottonwood, willow, and alder can then establish roots in these saturated soils to provide future shade and bank stability.

BDAs near Butte are on headwater streams in private parcels on upper Blacktail Creek, above the Basin Creek Reservoir, and in the Browns Gulch Project Area, northeast of Butte. The structures support small drainage areas and assist in naturally storing sizeable volumes of water that come from storm events and snowmelt. The structures above Basin Creek Reservoir provide an additional source of storage for municipal use and for Silver Bow Creek streamflow. Throughout this project, the Clark Fork Watershed Education Program has installed and monitored BDAs alongside partners. These partners include Great West Engineering, Montana Fish Wildlife and Parks, the Watershed Restoration Coalition, Water and Environmental Technologies, and Montana Tech. Butte-Silver Bow County, the U.S. Forest Service, and private landowners have allowed access for restoration and monitoring to occur. These projects are made possible through a Wildlife Conservation Society Climate Change Adaptation Grant and restoration dollars through the Montana Department of Justice, Natural Resource Damage Program.

In order to effectively judge how BDAs impact sites, partners are measuring treatment and control reaches in each of the project’s active drainages. Monitoring efforts are focused on streamflow volumes, groundwater levels, macroinvertebrate and fish populations, vegetation growth, and topography changes. Continuous temperature and pressure transducers track water depth and temperature flux. Frequent site visits for maintenance and monitoring will continue throughout 2018 with watershed expansion in the future. You can track monitoring information, access research articles, or find additional project and watershed background at cfwep.org/beavermimicry.

BDAs have gained popularity as an ecological restoration technique. These structures help contribute the benefits that come from keystone species like beaver. Beaver, however, can have unwanted effects on tree growth, culverts, and road integrity. The issues that beaver present can be counteracted using management practices that protect engineering designs and woody vegetation growth. We can restore wetlands by mimicking the beaver’s effects on the ecosystem.

Beaver dam analogue on Blacktail Creek. Photo by Evan Norman.

They said that they had nothing but respect for him, and that it was clear that the mine worked in Butte, started sharing stories with him about his grandfather. He started working in Elko, some of the old-timers at the Elko mine, who had followed in his grandfather’s footsteps. He is currently a short-range planner for a mine in the Greeley neighborhood, in the shadow of the concentrator, as we say.

In my lifetime, that was a creek. I fished there, played in the stream there, and waded through the stench at times; I also ruined more than one pair of shoes doing so. But anyway, in my neighborhood, right behind where the Town Pump (on Harrison Avenue by the Civic Center) is now located, Silver Bow Creek was a free-flowing stream. It wasn’t until around 1992 that it was allowed there, that the mine of Butte, the EPA and the DEQ started referring to the channel as a storm drain. By 1994, they were pretty much exclusively referring to it as the MSD or Metro Storm Drain.

So, why use? I started having discussions with various political leaders, business owners, and concerned citizens about the fact that it seemed that the mine wasn’t getting a fair shake with the clean-up. When I looked around, Massola was getting beautiful parks, and here Butte was stuck with an ugly “storm drain” coursing through the center of our city.

Initially, there were several of us involved in the discussions about the best strategies to force the issue with the State of Montana, EPA, and BPA/ARCO. Eventually, the Silver Bow Creek Headwaters Coalition was formed, consisting of myself, Sister Mary Jo MacDonald, and Feita Daly.

In our research, we found that in 1911 the State of Montana recorded and named all of its waterways. Silver Bow Creek was a named waterway on maps and within descriptions of Butte during this time. Therefore, it was a named waterway of the State of Montana. There was a statutory process set up to determine waterway names and should a name change be desired, there is to be a series of public meetings and involvement of the citizens. When Butte-Silver Bow, EPA, DEQ, and BPA/ARCO unilaterally started referring to Silver Bow Creek as the Metro Storm Drain, they did not go through the proper process of making that name change, and most certainly did not involve the public.

We contacted Jim Goetz who agreed to take our case. He thought that it would be best to take the suit to district court and sue the State of Montana over the name. We were not suing for clean-up. Rather we were suing to have this section of Silver Bow Creek recognized by the agencies as a creek, specifically, a waterway of the state. The State of Montana didn’t argue that this section had always been called Silver Bow Creek. The State of Montana argued that because of the impoundment of the creek for the tailings pond, the expansion of the Berkeley Pit, and the installation of the sub-drain system that captures contaminated groundwater, the waterway was “rendered so unnatural” that it was no longer qualified to hold its original name of Silver Bow Creek.

We were in court for a long time. The Silver Bow Creek Headwaters Coalition filed our suit on November 4, 2010. When Judge Brad Newman finally issued his decision on August 21, 2015, we couldn’t have been happier. He ruled that the section of Silver Bow Creek had always been referred to as Silver Bow Creek, and was indeed a waterway, despite the fact that it had been altered by historic mining activity. It wasn’t a storm drain, rather, a creek.

What was your hope in pursuing the lawsuit? In other words, what did you hope would come of official recognition that this area was indeed a waterway or creek?

We felt that the agencies were using the MSD name illegally, which degraded the status of Silver Bow Creek and allowed them to not treat this area the way they were treating other waterways. We felt that by degrading Silver Bow Creek to a storm drain, the EPA and the State of Montana were allowing BPA/ARCO to only have to do the minimum to protect human health and the environment. Since this area was “only a storm drain,” they wouldn’t be required to restore the area like the sections they did below Montana Street, thereby allowing BPA/ARCO to get away with doing much less in this area. When we filed the lawsuit, we had one goal, and one goal only—to make Butte a better and more environmentally safe place to live. We held to the ideal that the decisions made about Silver Bow Creek were forever decisions and had forever consequences. Therefore, it was important that responsible decisions be made. Allowing the State of Montana and other agencies to continually degrade this area did not sit well with me. I had to use my voice to raise awareness that this corridor, right in the middle of our city, was not getting the restoration it deserved.
2017 Teacher of the Year: Christina Pavlovich

Mr. Christina (Chris) Pavlovich is a 4th-grade teacher at East Side Intermediate in Livingston, Montana. She has been teaching for 10 years, and has a passion for place-based and project-based learning. She ties science in her classroom directly to local places, and then generalizes or compares to other, more distant places. This way, students can easily connect with what is studied.

The Science and Engineering Practices, part of the framework for the Next Generation Science Standards (NGSS), are paramount in her classroom. Students engage in each practice deeply in order to understand their ecosystem and the organisms within it.

When asked, “What inspires you to be a teacher?” Ms. Pavlovich said, “For me, 10 years of reviewing, re-reading science and engineering knowledge is one of the most important endeavors of a lifetime. Those who I teach will surpass me in knowledge and know more than I will ever know. When we work together, we will evolve into ideas that cannot yet be described. That’s incredible.”

She has created an after-school program for her students in the Yellowstone Watershed that resembles some of CFWEP’s programming. Her program is called Watershed Warriors. During school hours, all 5th-grade students (around 100 per year) receive 4+ hours of watershed education per year. The program meets 100% of NGSS as well as standards in Common Core ELA, Common Core ELa, and Indian Education for American Indians.

Each of her legacy teachers has worked with CFWEP since the beginning of our program in 2005. They have all been committed to what it means to fully embrace CFWEP programming, and have worked to ensure that our curriculum is enriched by engagement experiences. Every legacy teacher has completed numerous professional development offerings with CFWEP. These offerings have often been long-term, job-embedded, and included leadership development. The legacy teachers have each demonstrated dedication to improving their craft and ensuring high-quality science instruction within their classrooms. Their legacy teachers have been critical to our success, and their leadership has been instrumental in creating scientifically literate citizens of tomorrow.

Kathy Foley

Ms. Kathy Foley is a 7th-grade teacher at Anaconda Junior/Senior High School in Anaconda, Montana. Ms. Foley has extended our curriculum and has involved his students in additional stewardship activities throughout the community of Anaconda. She has also followed the progression of the history pieces, especially as related to Anaconda History. Ms. Ormino has worked to ensure that his students are engaged in all 5th-grade core science activities beyond our 5-day visit, including learning about fish habitats, restoration of natural fish populations, local ecology field trips, and the history of mining and smelting in Anaconda.

Davey Brandl

Mr. Davey Brandl is a 7th-grade science teacher at East Side Middle School in Butte, Montana. Mr. Brandl has extended our curriculum and has involved his students in additional stewardship activities throughout the community of Butte. Mr. Brandl has also followed the progression of the history pieces, especially as related to Butte History. Mr. Brandl has worked to ensure that his students are engaged in all 5th-grade core science activities beyond our 5-day visit, including learning about fish habitats, restoration of natural fish populations, local ecology field trips, and the history of mining and smelting in Anaconda.

Darcy Schindler

Mr. Darcy Schindler teaches 4th-grade science and 10th-grade biology at Deer Lodge Middle School, Montana. Mr. Schindler obtained his bachelor’s degree from the University of Montana and his master’s degree from the University of Arizona. He has lived in Montana his entire life and has worked to ensure that his students are made aware of the restoration activities in their area. His 10th-grade students take the CFWEP curriculum deeper, often pursuing research questions of their own that are related to the health of the waterways in their area.

CFWEP Legacy Teachers: Kathy Foley, Mary Anne Hansen, Bob Orrino and Darcy Schindler

As a legacy teacher team member, Ms. Pavlovich and Mr. Schindler have been critical to our success, and their leadership has been instrumental in creating scientifically literate citizens of tomorrow.

Darcy Schindler

Mr. Darcy Schindler teaches 4th-grade science and 10th-grade biology at Deer Lodge Middle School, Montana. Mr. Schindler obtained his bachelor’s degree from the University of Montana and his master’s degree from the University of Arizona. He has lived in Montana his entire life and has worked to ensure that his students are made aware of the restoration activities in their area. His 10th-grade students take the CFWEP curriculum deeper, often pursuing research questions of their own that are related to the health of the waterways in their area.

CFWEP Legacy Principal: Larry Driscoll

Mr. Larry Driscoll is a 7th-grade science teacher at Anaconda Junior/Senior High School in Anaconda, Montana. Mr. Driscoll has extended our curriculum and has involved his students in additional stewardship activities throughout the community of Anaconda. He has also followed the progression of the history pieces, especially as related to Anaconda History. Mr. Ormino has worked to ensure that his students are engaged in all 5th-grade core science activities beyond our 5-day visit, including learning about fish habitats, restoration of natural fish populations, local ecology field trips, and the history of mining and smelting in Anaconda.

Mr. Bob Orrino is a 7th-grade science teacher at Anaconda Junior/Senior High School in Anaconda, Montana. Mr. Orrino has extended our curriculum and has involved his students in additional stewardship activities throughout the community of Anaconda. He has also followed the progression of the history pieces, especially as related to Anaconda History. Mr. Ormino has worked to ensure that his students are engaged in all 5th-grade core science activities beyond our 5-day visit, including learning about fish habitats, restoration of natural fish populations, local ecology field trips, and the history of mining and smelting in Anaconda.

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Tom Moclak

One of our 2017 volunteers of the year is Tom Moclak from Whitehall, Montana. Tom came to CFWEP in 2013 through our Student Mosquito Monitoring Program. He and his family have been on a mission of collecting mosquito field data to complete environmental analysis for any management actions occurring on National Forest land; timber harvest, mining, grazing, etc. Tom is also very passionate about fire suppression efforts using his knowledge and skills as a wildland fire activist. (A READ resource advise) a BARED (Burned Area Emergency Response) team member and does 30 plus fires a year.

Tom Moclak teaches fly tying at the Southwest Montana Fly Fishing and Conservation Camp. He is an avid fly fisherman and his son, Stone, participated in the 2015 camp, and several years later became one of our graduates and camp counselors. Tom has been a volunteer for the camp since 2013. He helps CFWEP run the fly-tying and fly-casting portions of our camp. He spends all year tying flies for the kids. This year we had 50 kids attend and Tom donated 50 flies for each camper to take home. His dedication to the program and the kids is what makes the kids stay out of trouble for all those who attend. He inspires young kids to want to know more about fly fishing and the art of fly tying. Some of the campers now have their own fly tying gear because of Tom. We recognize Tom for his outstanding dedication to the Southwest Montana Kids Fly Fishing and Conservation Camp, and his support of CFWEP and the young members of our local communities.

Ask Dr. A: What are Headwaters? Arlene Alvarado

Headwaters refers to the fact that all rivers start somewhere. The place where a river starts is the head of the river, the place where a river ends is called the mouth of the river. According to the United States Geological Survey (USGS), the headwaters of a river is the farthest place from the mouth of that river. Therefore, the longest tributary or stem of a river is typically considered its headwater source.

Rivers have three general parts: the source, the course, and the mouth. The source is the place where the river's waters start; the course is the path the river takes and includes its floodplains and wetlands; and the mouth is the end of the river where it drains into another water body. It can drain either into freshwater in the form of another river or a lake or reservoir, or into saltwater in the form of a bay, sea, or ocean.

Measure the distance from the farthest headwaters to the river's mouth and you have the length of the river's source. Rivers can travel thousands of miles – the Amazon River, for example, travels about 4,000 miles; our watershed’s Columbia River travels almost 1,400 miles. Because of this, the waters of a river often traverse very different landscapes, starting in high elevation and ending in low elevation. For this reason, rivers are broken into three general courses (reaches) for study:

The upper course (reaches) of a healthy river where the waters start is steep, has very fast-moving water, contains many rapid, and has clean, clear, cold water with lots of dissolved oxygen. The river bed of the upper course contains large rocks, coarse gravel, and pebbles. The middle course of the river has a gentler slope which reduces the water’s flow, has more pools, has a higher diversity of plants and animals, and has rooted plants near shorelines. The river bed of the middle course consists of small gravel and sand and the channel is wider compared to the upper course. The lower course has the gentlest slope, reducing the water’s flow further; a wider, deeper channel; and a muddy and silt-covered river bed. The differences in the physical features of a river’s three courses significantly affect the biological features – the types of animals and plants found in each course. For example, the upper and middle courses support an abundance of aquatic insects that require high dissolved oxygen concentrations and the cold-water fish that thrive on a steady diet of these insects and smaller fish. The lower course supports lots of plankton, mollusks, and crayfish, but few types of aquatic insects; it also supports those fish that rely more on plankton and algae-based food webs and that can tolerate higher turbidity and temperatures.

Historically, prior to immigrant settlement, it was probably accurate to consider Silver Bow Creek the headwaters of the Clark Fork River. Technically, however, if we follow the “rule” for headwaters, today it would more accurate to designate Blacktail Creek as the Clark Fork River’s headwaters since the Flow of Silver Bow Creek’s waters was altered by Butte’s hard-rock mining activity. It is unclear, however, if there has ever been an instance in which a designated headwater source was modified to account for human activity.
Continued from pg. 1, Restoration of Blacktail and Basin Creeks

**Restoration Plans on Blacktail Creek by Reach**

In the Highland Mountains, Blacktail Creek is impacted by sanding and sediment from the road along Highway 2. Fish passage is difficult in this reach as culverts have aged, with erosion below the culverts creating waterfalls of sorts from the outlets. Fish are unable to pass these areas as the distance is too high for the fish to jump upstream and through the culvert. Sedimentation from road sanding is a normal occurrence in streams located near roadways that are sanded during the winter months. In order to alleviate these sedimentation issues, installing slash windows along the roadway would be an easy solution to reach sediment leaving the roads. Also in this area, the need for natural water storage is paramount. Beaver mimicry devices have been installed to help alleviate this issue. See Blacktail Watershed Restoration and Monitoring Project on page 11 of this edition for more details about this project.

Further downstream toward Continental Drive, fish passage again becomes an issue due to aging culverts. Culvert replacement within the creek traveling through both private and public properties is planned for Grove Gulch, a former tributary of Blacktail Creek, no longer connects to Blacktail, which leads to some wetland loss and fish entainment. Within this area, the most likely restoration plans are replacing culverts, addressing sedimentation, and studying connectivity.

Nutrient loading issues present themselves in the reach that moves through the Blacktail Loop area. Nutrient loading is defined as the quantity of nutrients, primarily nitrogen and phosphorus, that are added to bodies of water. With excessive nutrient loading, algae and aquatic plants grow to the point of causing harm to the water body. Resident education and public outreach regarding how best to upgrade aging septic systems and otherwise mitigate nutrient loading from other sources, such as fertilizers, is part of the restoration plan for this reach. As Blacktail Creek makes its way through the Country Club Golf Course toward Father Sheehan Park, the creek is cut off from its natural floodplain. When Lake Avoca (located at the present-day Butte Country Club Golf Course) was drained and the dam on Blacktail Creek breached in 1939, the original Blacktail Creek channel was gone. The solution at the time was to simply heap the lake bed materials onto the banks of the former channel. This heaping created a severely incised channel through the golf course. Addressing the incising and reconnecting the stream to its floodplain is no small task. Estimates for the restoration in this portion of the creek likely have contaminated bed sediments that may need to be removed should connectivity between the creek and the wetlands be restored.

This reach of Blacktail Creek is considered part of Butte Area One. Some of the money allocated by the Butte Natural Resource Council for alluvial groundwater connection to surface flow may be available for this area. To start to improve this reach, the Blacktail Creek berm, near the Butte Chamber of Commerce, will need to be removed. Other improvements of this reach include reducing sedimentation, improving fish passage, and addressing the potential issues from the mine tailings impoundment in the floodplain.

**Restoration Plans on Basin Creek by Reach**

Another notable creek within Summit Valley is Basin Creek. This creek also has its origins in the Highland Mountains. Today, Basin Creek basically stops at the Basin Creek Reservoir. However, a remnant of Basin Creek that acts more like a perennial or seasonal stream remains flowing through the city of Butte during high flow times. Restoration activities are planned exclusively for the upstream reaches of Basin Creek. Maintaining improved water quality upstream of the reservoir not only ensures drinking water quality for Butte residents, but also ensures that the prime fish habitat upstream of the reservoir is maintained. There are ample opportunities for improving recreation and public use upstream of the reservoir. Improvements such as increasing natural storage of water in the high mountain parks; decreasing sediment and erosion; and ensuring easier fish passage, will create major rewards within this section. The rewards are higher quality of water within the reservoir, which is then less costly to treat, and increased recreational opportunities for the public.

**Flooding and Floodplain Mapping**

The hurdle facing most of the restoration projects for these streams is the completion of a detailed floodplain map for the Federal Emergency Management Agency (FEMA). The detailed mapping requires surveying the current conditions of the floodplain, and modeling the conditions that may be affected by the planned restoration project.