Vol 1 Issue 2

Fall/Winter 2011

The Montana Steward

Cfwep.Org

Free 2011

Clark Fork Watershed Education Program

MontanaTech
THE UNIVERSITY OF MONTANA

Fishing In Montana

The Rewards of Restoration

INSIDE:

Teaching Watershed Science to Students

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Clark Fork Coalition, Montana Watercourse, Trout Unlimited and Cfwep.Org

Bill Ohrmann, Artist Rancher and Pioneer

Click on Cfwep.Org for Watershed News

The University of Montana Avian Science Center and Cfwep.Org to combine education forces in 2011.

How does geology influence the water quality of a river?

By Chris Gammons PhD.
Geological Engineering
Montana Tech

Frank Ponikvar Photo

We all know that water in its many forms can sculpt rocks and soil to form cirques, riverbeds, and floodplains. But can rocks and minerals influence stream water? The answer is yes, not only water quantity but also water quality. Certain rock types with high porosity and permeability, such as limestone or fractured granite, can store large volumes of cool groundwater in subterranean cracks or caves. This water is replenished by Spring rain and snowmelt, and is slowly released to maintain a constant baseflow in the nearby stream throughout the dry summer months. A river that lacks this type of aquifer in its headwaters may be more prone to spring floods and summer droughts. Rock type also influences river-water chemistry, but less than you might think. Most streams and rivers in southwest Montana have a healthy amount of dissolved calcium and bicarbonate, with usually minor levels of other solutes, such as sulfate, chloride, sodium, or metals. This is true whether the stream drains limestone, sandstone, or granite. Departures from this norm can usually be traced to one or more of the following causes: 1) urbanization or industrial pollution (e.g., acid mine drainage); 2) natural weathering of rock rich in pyrite and other sulfide minerals; and 3) geothermal activity. The upper Madison River, for example, has high concentrations of dissolved arsenic from hot springs in Yellowstone. Amazingly, the trout don't seem to mind the arsenic at all, even though the levels are well above drinking water standards!

Matt Vincent Photo

"The Butte Silver Bow Arts Foundation looks forward to working more with CFWEP"

By Gretchen Miller
Executive Director
Butte Silver Bow Arts Foundation

The Butte Silver Bow Arts Foundation (BSBAF) is excited for an opportunity to refocus on the mission of the organization. Beginning this winter season the BSBAF will be turning their attention on the Clark Chateau, formerly known as the Art Chateau. The new direction of the BSBAF will be geared toward helping not only regional artist but local artists in Butte as well. The BSBAF will be offering gallery space year round to local artists in both the Clark Chateau and the Venus Rising Espresso House. The Clark Chateau will be open year round with shorter hours of operation in the winter. The Clark Chateau will be open Tuesday - Friday as staffing is available until the third week of November when we will open Tuesday - Sunday.

The BSBAF looks forward to working with CFWEP in bringing environmental artists' works to Butte that will highlight environmental issues that will help educate viewers about the environmental issues. These exhibits can be a powerful tool to help educate the community and its' youth about the outcomes of various causes of environmental damages, and how to sustain the environment for future generations to enjoy.

The BSBAF will also be holding exhibits that will highlight Butte's history. One exhibit that is being worked out will consist of people from the community bringing a Butte related historic photograph of their family along with a short story telling what the photo is about to be displayed at the exhibit. Butte has had a colorful past, and many events occurred in the city of Butte that where related to art and culture. We hope this exhibit will bring a variety of Butte's history to the viewer. This exhibit is being planned to occur the first part of 2012.

Our goal in creating such exhibits is to involve the community as a whole in some exhibits. For the Christmas season we will also exhibit hand crafted ornaments or decorations created by anyone in the community. Your Christmas ornament or decorations will be on exhibit with your name attached to the ornament from the third week of November until the first week of January. After you can pick your ornament back up from us.

The Copper City Artists and the Butte Silver Bow Arts Foundation will work together to bring you a Christmas store at the Clark Chateau, where you can purchase Montana made gifts for Christmas. The Christmas store will open the third week of November and will continue to run after Christmas, ensuring that there will always be a venue for you to purchase Montana made items from local and regional artists. We are hoping that we will eventually be able to also add art supplies to our inventory at the store.

The Venus Rising Espresso House has moved to a new location at 128 W. Granite. We will be offering art exhibit space, as well as music events held two to three weekends a month at the Venus Rising Espresso House.

The foundation is excited about the new direction the organization is taking and look forward to bringing art, heritage, and culture to the community of Butte and Southwest Montana.

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Upper Clark Fork Research

Mariah Mayfield MSU Department of Ecology

Q. Describe your project in general, as far as area covered, length of study, a few details.

A. I am studying trout movement and habitat use in the entire upper Clark Fork (Warm Springs to Milltown). I use radio telemetry to follow the fish every week to figure out where are the critical habitat areas they are using, such as spawning tributaries, over-wintering habitat, and summer foraging habitat. Since the project started in 2009, I have tagged 269 trout, most of those being brown trout (since they are the most prevalent trout species in the upper Clark Fork) but I also tagged a lot of westslope cutthroat, and a few bull trout. The radio telemetry portion of the study will conclude this winter.

Q. Preliminary findings: what is the fish/trout population looking like in UCF and what are the limiting factors.

I can't really speak to the trout population of the Clark Fork, since that is not what my project is about, but we have found that trout are using a variety of spawning tributaries throughout the system. A few of these tributaries are streams that we didn't think fish would use. Other tributaries that fish have gone into for spawning have land use issues that are decreasing spawning success, such as irrigation diversions. Some cool anecdotes: we have some brown trout that have moved over 50 miles upstream to reach a spawning area. Also we have a few brown trout that go to the same spawning area every year and then after spawning, go back to exactly the same location in the mainstem. It's pretty interesting how some of these fish can be very predictable, while others will completely surprise us in their movement patterns.

Our preliminary results have also shown that there may be some patterns in tagged trout mortality, such as spikes in mortality rates during high flow periods and also during late summer when the water temperatures increase. One of my goals will be to analyze survival rates to determine if there are water quality factors contributing to mortality.

Q. Add a little personal perspective (i.e. biggest challenge/greatest accomplishment; relate it to restoration, etc.)

A. The biggest challenge is monitoring these fish every week since spring 2009. We're out there in all sorts of weather trying to keep track of fish that have a tendency to disappear on us. Quite a few of our fish have ended up being eaten by birds (bald eagles, osprey, great blue herons) and we also have pelicans that eat our fish- in fact we have a radio tag that ended up over on Canyon Ferry because a pelican took it there.

It's very exciting when these fish go into spawning tributaries that you never thought they would. Sometimes thinking about the remediation of the main tailings really overwhelms me, but then I think about how if we can restore some of these tributaries, it will really help the trout populations, especially the westslope cutthroat. The best part of this project has been my relationship with FWP. Region 2 biologists have been more than helpful when it comes to my project and there are actually 2 FWP technicians that work part-time on this project, helping me radio track the fish.

Native American Fishing Legends

The first individuals to "go fishing" in Montana were its original people, the American Indians. All of the tribes harvested fish, some more than others, but the presence of fishing as a practice here dates back to the last Ice Age some 15,000 years ago.

In the world of restoration, we try to repair damaged natural resources so that their ecosystems can function normally and fully to support higher biodiversity and for us, better quality use, be it for recreation or more crucial uses such as drinking water and irrigation. In many respects, restoration is the process of bringing a stream or a watershed back to a condition that reflects what the resource might have been prior to it being damaged. The original people's "place names" may be the best reflection of our resources' original condition.

In the Upper Clark Fork, two examples of places with fish in the original Salish name come to mind…

The confluence or meeting point of the Clark Fork and the Big Blackfoot Rivers near Bonner was called "the place of the big bull trout." With the removal of the Milltown Dam and its contaminated sediments – and some further improvements and stewardship – wouldn't it be something if the remnant populations of bull trout in the Clark Fork rebounded to their former days of glory?

One hundred or so miles upstream near Butte, Silver Bow Creek was known to the Salish as "the place where you shoot them in the head." This is not in reference to tribal conflicts with obstinate miners, but rather to the fishing methods the Salish used to harvest the plentiful bull and cutthroat trout in Silver Bow Creek's crystal clear waters. After serving as the industrial and municipal sewer for The Mining City for over a century, restoring the creek back to its original condition will be a long stretch. However, while the fish numbers are not high enough, nor the water clarity clear enough to "shoot them in the head," trout have started to come back to most of the restored reaches of Silver Bow. Very remarkable.

The stories and place names of our original people give us significant insight to our surroundings' pasts. Give Cfwep.Org's location on the west side of the Divide, following are a few selected Salish Kootenai legends and tales that have to do with fishing. One of them is a "Coyote Story," which provides an answer to a question we've heard time and time again: "were there ever salmon or steelhead in the Clark Fork?" Read on to find out the answer, but please read the following introductory note of cultural importance and respect before you do…

(The following is excerpted from the Montana Office of Public Instruction website, Indian Education for All, and is an introduction provided by the Confederated Salish Kootenai Tribes Cultural Committee, 2010.)

"We must ask one special favor…: our traditional Coyote stories--the legends of Coyote--and the other animal people…--should be told or discussed only during winter when snow is on the ground. The elders usually bring out the stories in November and put them away again when the snow is gone--usually by late February or March. Some say the stories are put away when the snakes come out. It is said that snakes will come to those who do not follow this custom or that cold weather will come during the warm months. Coyote stories, like other parts of our traditional way of life, are part of a seasonal cycle. By following this tradition, readers, teachers and students can enjoy this aspect of our culture--keeping and saving something for the time of year during which it belongs."

Why There are No Salmon in Lolo Creek

Editor's introduction: This Coyote Story takes place near the Lolo Pass, which is the divide between the Bitterroot/Clark Fork and Lochsa/Clearwater drainages. The place name for the Clearwater River is Epsumclee, which means "Salmon River." The name for Lolo Creek, a tributary to the Bitterroot is Tumsumclee, or "No Salmon River." Historically, the Lolo Pass was the route the Salish would take to travel to the Clearwater drainage to harvest salmon, given there were none in the Bitterroot/Clark Fork. From a scientific explanation, the reason there were never any salmon in the Clark Fork is due to the impassable ice dam near present day Lake Pend Oreille that held back Glacial Lake Missoula to the end of the last Ice Age.

(This story is from Indian Legends from the Northern Rockies, by Ella E. Clark, University of Oklahoma Press, 1966.)

Coyote went through the Jocko Valley, up the Bitterroot River beyond where Missoula is now. When he got up in the Bitterroot Mountains, about where Lolo Creek is, he stayed quite a while resting.

One day after close study about his travels, he said to himself, "Well, now here's something to think about. I came up all those rivers on the setting sun side of the mountains and the salmon followed me. They followed me because of my special power. But there are no salmon in this creek and there are none in the Bitterroot River. I wonder what I can do to get salmon in these streams on the rising sun side of the mountains."

Coyote lay there and thought and thought.

"Over the ridge is the Epsumclee, where there are plenty of salmon. I can get a fish from that river, bring it over the ridge, and put it here. Then there will be food for the people in this part of the country."

So one day Coyote went over the range and down to Epsumclee. There he caught a big salmon. "Here's what I'll take back," he said. "If I can get it up there alive, there will be salmon in the Bitterroot Valley forever."

While he was resting and thinking, Coyote heard a voice speaking to him: "Yes, you can do that. But it you fail, nothing can be done. You will have to work hard and do as I tell you. Cover the salmon with fresh, green grass. Carry it over the range. And be sure not to stop until you get to the other side of the range. Remember – don't stop!"

Coyote saw no one, but he heard a voice. "I can easily do that," he said to the voice.

"Don't forget. Don't stop at all," repeated the voice.

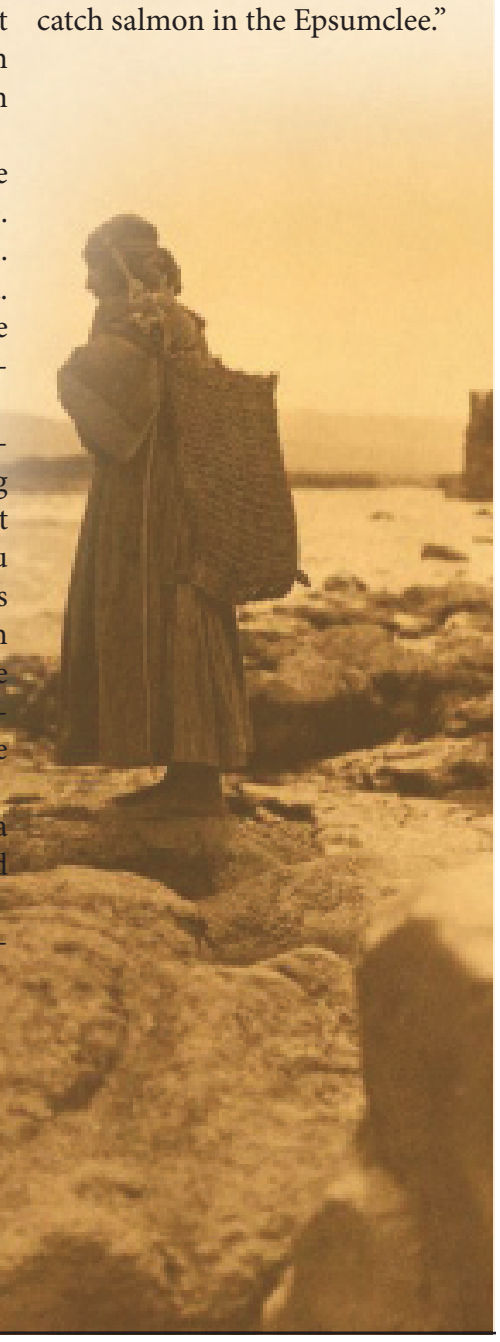
Coyote started on his return journey. He went and went and went. He became tired, and his pack got heavier and heavier. He became very tired, and also thirsty. At last, when he looked up to where he was going, he saw the top of the mountain not far ahead.

"I'm just about to the top," he thought. "I guess it won't hurt if I stop and rest awhile."

So he sat down, took the pack off his back gently, and put it down on the ground carefully. Somehow, the salmon got out of his pack. Coyote grabbed it, but it was so slippery it slid out of his hands. It dropped on the ground and slid away from his reach.

Where the salmon touched the ground, a spring at once gushed forth. Soon it formed a stream of swiftly flowing water. Coyote tried to catch the salmon, but the stream carried it down the west side of the range, back into the Epsumclee.

When Coyote got back up to the top of the range, he said, "Hereafter, this stream will be called Tumsumclee because here are no salmon here. The people who live near it will have to go over the range to get their salmon. They will make a trail over the mountains and travel over it to catch salmon in the Epsumclee."



It's Good To Be a Volunteer

A VISTA's View

Cfwep.Org's Annual Fly Fishing and ConservationCamp

By Jenny Miller
Cfwep.Org's ***AmeriCorps VISTA volunteer***

After graduating from the University of Montana in Missoula this past spring, I was chosen to be an AmeriCorps VISTA volunteer with Cfwep.Org. On my first day of service this past July, I wasn't sure what to expect. I anticipated walking around the office, introducing myself to the staff, and wandering around looking for something useful to do, because that is what I've done with previous jobs. Luckily, with Cfwep.Org, that was not the case. My first activity was dissecting a trout with the 12 – 17 year-old students at Cfwep.Org's annual fly-fishing camp! I was as excited, if not more, than the kids at camp to do the dissection, but even more excited that my first day of work at the most "real world" job I've had involved fish dissection and volunteering with the fly fishing camp. This day marked the first day of the fly fishing camp. The first four days of camp involve preparation for the fieldtrip out to Silver Bow Creek, Georgetown Lake, and Rock Creek. Throughout these days, students are taught trout species, anatomy, behavior, and habitat in Montana. They learn the history and restoration of the Clark Fork watershed, knot tying, casting, fishing etiquette, and even how to tie their own flies! Once they've learned the basics, they have the opportunity to put their new skills to the test on the field trip; the heart and soul of the camp. We were given a presentation by the game warden at Georgetown Lake and took a tour at the Washoe Park Fish Hatchery on the way home. This summer camp was a great success; everyone had a fabulous time, and everyone caught a fish! For future Cfwep.Org's summer fly-fishing camps to reach their full potential, we hope to increase the number of students involved with the camp. Students leave this experience not only equipped with the skills to fly-fish, but with an understanding and appreciation of our vital and unique Montana watersheds. Cfwep.Org looks forward to sharing the joys of watershed recreation with more of Montana's youth in the years to come!

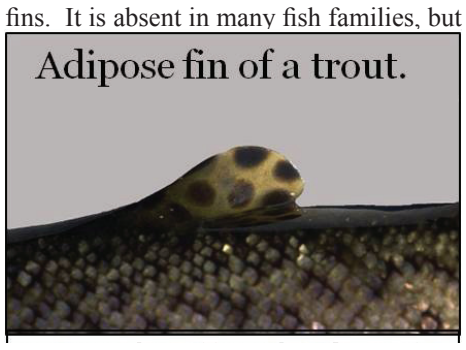
from left to right, Kadon Queer; Cfwep.Org Summer VISTA associate Chris Doyle; Marcus Boggess; Brandon Abernathy; Noel Mederos; Tara Feaster; Maddie Vincent; Cfwep.Org Americorps VISTA Jenny Miller; Kylee Rasnick and Jaicee Giop; in the front row, kneeling are Cfwep.Org Director Matt Vincent and Cfwep.Org volunteer extraordinaire and camp co-organizer, Doug Buskirk. Photo is taken at Camp Watanopa on Rainbow Bay at Georgetown Lake. Camp t-shirts were generously donated by the Patagonia Outlet in Dillon, compliments of Beth Sullivan.

Ask Dr. A

Dr. Arlene Alvarado is Cfwep.Org's Field Coordinator.

From: Ramsay School Students Question: What type of fish did we catch during our fieldtrip to Silver Bow Creek in May?

Excellent question! First I need to tell everyone some background information regarding this question. As part of our Base-level program, in which Cfwep.Org teaches students from the Clark Fork watershed about the current restoration efforts in our watershed, we take local students on fieldtrips to visit two sites along the watershed. With the assistance of our wonderful volunteer scientists, the students, collect data on water quality, riparian habitat characteristics and aquatic macroinvertebrates. Back in May of 2011, we took Ramsay School students to observe and collect data on Silver Bow Creek near Miles Crossing. During this trip, the students scooped up with a D-ring net a small fish about 3.5 cm long while collecting the aquatic macroinvertebrates. Everyone immediately wondered, "What kind of fish is this?" Identifying young fish is difficult because they have not yet fully developed their coloration and patterns, which are features useful in identification. The students did have some guesses that included rainbow trout, cutthroat trout, and other trout species. In addition to the difficulty in identifying a young fish, we also did not have our handy-dandy fish guide with us. So instead, I took a picture of the little fellow and then released it. After the fieldtrip, I showed the picture to our director, Matt Vincent. Matt guessed that the fish was a longnose sucker (Catostomus catostomus). He said he was sure it was not a trout because it lacked an adipose fin. The adipose fin is a soft, fleshy fin found on the back between the dorsal and caudal fins. It is absent in many fish families, but



is found in Salmonidae, Characidae and Ictaluridae. Salmonidae include salmon, trout, chars, freshwater whitefishes and graylings. Characidae, sometimes simply called characins, are a tropical and subtropical fish found in southwestern Texas and Mexico, and through out Central and South America. Ictaluridae are the family that include catfish. Since the little fish we caught did not have an adipose fin, it could not be any kind of trout. While the picture did not give all the details necessary to confidently identify the fish, the forked tail and rather large nose did suggest that it was most likely a longnose sucker. Longnose suckers (C. catostomus) are in the family Catostomidae and are distributed througout Western Montana.

Hey, hey, hey from Dr. A! We just finished another amazing field season of our Base-level Program at the end of October – and it was a great season! You may be wondering what our Base-level Program is. Well, through this program, Cfwep.Org staff instruct lessons regarding the Clark Fork River watershed and related restoration activities to students in our watershed. We lead and instruct five in-classroom lessons and run a one-day fieldtrip. During the fieldtrip, students collect data on various parameters related to watershed health. This program is funded by the Natural Resources Damage Program.

We regularly revise our lessons to keep up with the restoration efforts as well as to improve our teaching practices by applying evidence-based techniques that help students learn. This year's revisions included emphasizing the importance of riparian habitats and introducing the Boulder Batholith and its associated ore richness to students. We also incorporated information regarding the Milltown Dam and its subsequent removal. This fall we served all 7th grade students at East Middle School, 7th and 10th grade students at Drummond School, and 3-6th grade students at Garrison School. Nearly 400 students were directly served during fall 2011!

Figure 1. Garrison students proudly pose with their healthy riparian habitats which each created during our Base-level Program visit late October.

A very important part of our success has always been directly attributable to our outstanding volunteers. Without the help of knowledgeable, cheerful and enthusiastic volunteers to help lead the three fieldtrip stations - Water Quality, Aquatic Macroinvertebrates, and Riparian Habitat Assessment - we would not be able to offer such a great service to so many young students. Thanks to all who have contributed to Cfwep.Org's mission over these many years!

Volunteerism:

Get your feet wet.

Want to Volunteer with Cfwep.Org as a Campus Corps / AmeriCorps student? Call 496-4124 for more information.

Montana Watercourse and Cfwep.Org

By Kathryn S. Watson

Montana Watercourse and CFWEP.Org is a natural and vital partnership. In 2010 Montana Watercourse successfully reached 5,372 people across 31 towns in this, our treasure, state. In sum, Montanans spent over 23,644 hours learning about water resources and taking action to improve our quality of life. These marked successes are not due entirely to our staff of three. Truly, the credit lies with our partners, such as CFWEP.org, who provide multidisciplinary support, share their expertise on local issues, and help participants develop an ever-important sense of place.

Montana Watercourse has provided unbiased information, resources, tools and education to all water users since its inception in 1989. Housed on the Montana State University campus in Bozeman, our grant-funded organization is uniquely poised to support water resource decision making and stewardship. With the help of groups like CFWEP.org, we help develop local initiatives through:

- Co-sponsorship of water resource seminars
- Workshops and trainings on water topics
- Volunteer water monitoring training for communities and schools
- Assistance with local water education program development
- Publications and guides on water resource and watershed topics
- Teaching trunks filled with interactive water resource activities
- Educator workshops, trainings and tours using Project WET and other curricula and materials

As the leaves (finally) change we are reminded that the 2011-2012 school year is upon us. Please join Montana Watercourse and our partners in our mission to reach 3,000 students statewide this school year. If you have a passion for the outdoors, students, or Butte in general please join us!

Editors Note: Kathryn S. Watson is now the Outreach and Communications Director for the Energy Research Institute.

Fishing Report

Summer 2011Fishing Reports from Around the State of Montana

Fishing Reports
by Sam Amses

Rock Creek

Many fly fisherman in the Rocky Mountain West, have an involuntary physiological response to the words, “salmon fly hatch” that's similar to a dog hearing you say 'walk' or a child glimpsing Toys'r'us bags in Mommy's closet a little before christmas. Thier ears perk up up in the same way, pulses quicken slightly and some of the die-hards might even salivate a little. These symptoms are exaggerated exponentially in the weeks leading up to the fabled flight. Will the bugs fly true this year? Will I be ready if they do?

It brings out the worst in some. Not-so-sneaky eavesdropping in the bars where guides hand out, lying to loved ones, putting things off even more than usual and talking to themselves at the fly tying vise. Rock Creek provides a sanctuary for such crazies. Most years, even when neighboring rivers are still raging, there are fish eating big, orange bugs on the 'Creek.

The anticipation of the salmon fly hatch is often disproportionate to the event itself. All too often the river is a little high, the weather is too crazy, or the bugs just don't show. Many years the conditions may only line up correctly for a few short days, offering a very limited window to angling folks. “Should'a been here yesterday!” , becomes an all-to-true cliché. But when the stars align, it can be quite the spectacle.

This year's salmon fly event was pretty average. There were a couple really good days, but the hatch was mostly overshadowed (like it often is) by the golden stones right afterwards. There were precious few places to wet a line in June and even fewer places to fish dry flies, but towards the end of the month upper Rock Creek was one of them.

The water continued to drop through july with Golden stones and their smaller, 'yellow sally' cousins sticking around for most of the month. The entire river was reasonably wadable by the fifteenth and most days, a ruff stonefly imitation was all you really needed to hook fish. There are plenty of different insects available to the fish in july. Stoneflies, PMD's, PED's drakes, caddis, sallies, ants , beetles, blah, blah, blah. The 'Creek at this time is a hatch-matchers dream come true, but all you often need is a handful of attractive, buggy looking dry flies in order to feel like you're doing something right. Say what you will about the mid-summer crowds and the lack of lunkers, Rock Creek is nothing if not forgiving. It usually spits out at least a few twelve inchers for your efforts.

August sees a fair amount of pressure from anglers and all one needs to do is take a drive up Rock Creek Road on a saturday to understand why the fishing can get a bit slower this time of year. The water having dropped all summer is low enough that the fish are a tad more exposed and vulnerable. The sun beats down on the lower, clearer water, which I guess isn't fun if you're without eyelids. Many fish have been hooked multiple times already this summer and are a bit more neurotic than they were a few weeks ago.

But sometimes all it take is some new menu items to reshuffle the deck and grass hoppers are one of the big plusses for August on the 'Creek. All those meadowy banks are alive on hot sunny days and with golden stones gone the 'hopper' imitations are the go-to big bug. Caddis are still bopping around most afternoons and evenings and spruce moths have provided some stel-

Bitterroot River

Most summers, late June is a time of dry flyliss on the Bitterroot. There's a surface-smorgasbord consisting of several species of mayflies, caddis flies and stoneflies overlapping each other every afternoon. Fish are hungry after hunkering down through run-off and the river is usually in prime shape for floating. But June can be an interesting month. This year it didn't matter what was hatching, the fish were still hunkered down and only the kayakers were throwing high-fives. The fish were somewhere down in that murky turmoil, but we fly fisherman could do nothing. It was early July when any realistic conversations about fishing the 'Root actually took place.

When the river finally began to clear, it did so quickly and all the sudden we were...fishing again? We got started with large adult golden stonefly imitations lobbed again and again towards the banks hoping for a big, slow rise. We got some. Not many at first, but enough to keep from fishing deep nymph rigs. Most of the time. As the water dropped and cleared a bit more the fishing got better. There was more clarity, less speed, allowing fish to notice smaller morsels and rise more rhythmically. Many fish were still willing to eat large stonefly patterns even if you hadn't seen many real ones that day and nobody had to get up early or stay out late to find risers. It was the fishing we'd all been waiting for, just a month or so late.

Green drakes made a strong appearance dancing above the riffles in amorous swarms. Fish responded well to them on several outings and ate our' quigly's' the way they we thought they should. Towards the second half of the month, delicate, little sulfur-hued pale morning duns fed fish most days. They fell back to the water in the evenings as spent-wigged candies for the trout to sip at their leisure.
Caddis flies, also active as sun went down, combined with the 'PMD spinners' to make most evenings later in the month quite productive.

Through August, the water dropped more, continuing to clear and warm. Some days were great, others were relatively uneventful compared to July. We still had a surplus of cool water compared to the average August but hot, sunny afternoons slowed things down, making early morning and late evening sessions the best. Grasshoppers, abundant along the Bitterroot's meadowy banks, started being noticed in a big way mid-way through the month. Even on some sweltering, bright days you could normally count on motivating a couple nice fish off the banks for a hopper imitation. With a few less aquatic insects around, ants, beetles and other land-born critters became a more important part of the mix as well.

Easing into fall, it's impossible not to think about some of the incredible fishing in the months ahead. Many anglers switch focuses toward hunting, school, or both, leaving the rivers to those of us who have nothing better to do. However, in my opinion, there are few things better than watching pods of unmolested rainbow, brown and cutthroat trout gingerly sipping away on the current seams, backed by vibrant cottonwoods. The excitement of each take is enhanced greatly by the notion that winter is creeping closer. For now, I don't think too many anglers are waiting impatiently for the commencement of summer. A season that's all too short as it is, and always leaves me hoping that I've cherished the days accordingly. This year, with a shorter-than-normal fishing window, I at

Blackfoot River

In the two weeks of dropping, clearing water after spring run-off, the fishing on the Blackfoot River can compete with that of any river in the West. Some very large trout, after a nice break from anglers, are ravenously hungry. Usually starting sometime in late June this transitioning period into summertime offers a truly awesome window of angling opportunity. Fish chase large streamers and big stonefly nymphs through the murky-green water like it's their last meal. Some years this phenomenon takes place behind the scenes, and you can miss it all if you're not paying attention. Other seasons see a milder dose of insanity, with a few great days that fall just short of life-changing.

This year was somewhere in the middle. Subsurface tactics got the ball rolling once there was around eighteen inches of visibility, sometime in early July. We stripped streamers, dead-drifted big nymph rigs and tried a fews giant salmon fly dries just for fun. Fish were caught, some big ones too, but nothing too outrageous at first. We were mid way through the month when fishing got noticeably better.

Salmon fly adults stuck around for an unseasonably long stint this year. I noticed some hummingbird-sized individuals later in July than I thought I ever would. Along with some huge golden stoneflies, they made large dry flies effective as soon as there was enough clarity mid-way through the month. The slow, deliberate, undistracted rise of a West Slope Cutthroat trout can't be explained accurately via text.

The Blackfoot is a strong hold for our native salmonids and an excellent place to tie into a chubby cutthroat. More than once, from the green depths of one of the rivers stunning cliff pools, a massive bull trout ripped the struggling cutthroats of the end of our lines, leaving us speechless and a little scared.

Of all the area's rivers, the Blackfoot probably boasted some of the more consistent fishing over the past two months. When fish on the Bitterroot and Clark Fork were hugging the substrate to hide from the bright sun, there were usually at least a few curious trout on the blackfoot willing to rise.
This consistency, not going unnoticed by the angling community, lead to some crowding on the river through late July and August.

The past four weeks, more recreational floaters and tubers shared the river corridor with fisher-people. This constant afternoon flotilla certainly put some of the rivers bigger, smarter trout off their feed, but there were always some fish I the mood to play. Spruce moths and caddis flies bopping around kept fish looking up, and grasshopper patterns have been increasingly effective throughout the month. A stroll along any of the river's meadowy banks and the reason is quite apparent.

With fall approaching rapidly, it's easy to feel like the window of “fishability” is closing. Autumn, however, brings many exciting opportunities to warmly-dressed anglers who haven't steered focuses towards hunting, school, football, knitting, ect. As the tamaracks turn, big fish are getting prep'ed for winter and can be taken on streamer patterns and large nymphs. A couple of months to get one more really big trout before winter buckles down completely.
(More Fishing reports on. Page 12)

Climate Science 1820s to Date

By Lance Olsen

In the 1820s, Joseph Fourier got to wondering why Earth wasn't too cold to support life. He reasoned that solar energy should come streaming down through our atmosphere, strike Earth's surface, and bounce right back to the cold of outer space. Fourier wasn't sure, but he was willing to speculate that some of the several gases known to inhabit the atmosphere might somehow slow the escaping heat.

He got his hunch published. Not much happened except that some words were made public.

It wasn't 1859 that John Tyndall put Fourier's guess to the test, and found that two atmospheric gases did indeed have capacity to slow heat's rush to the cold of space: water vapor, and carbon dioxide.

Like Fourier, Tyndall got his work published in the journals of the day. Again, not much happened.

It wasn't until 1896 that Svente Arrhenius connected the dots from carbon dioxide to our burning of fossil fuels. Knowing that CO2 helped keep earth from being cold and lifeless, and knowing that it's a byproduct of burning the likes of coal, Arrhenius wondered what was going to happen if we kept adding more CO2 to the atmosphere than what was already in it.

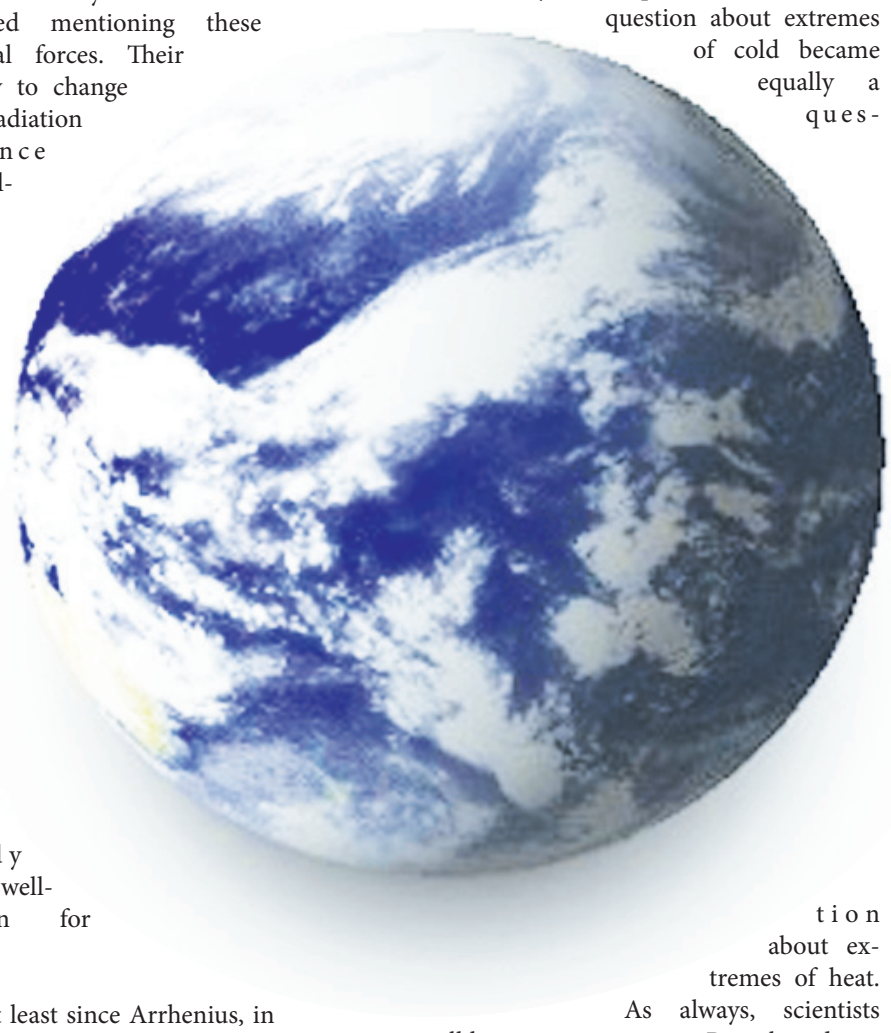
By his calculations, the world would warm. Arrhenius thought the warming was a good idea. His crude 19th Century climate model indicated that polar ice would melt, and Arrhenius warmed up to the prospect of a planet with less ice and snow.

Not everyone was impressed. In his book on the trials and tribulations of climate science, Spencer Weart says other scientists " found good reason to believe that our emissions could not change the climate. Anyway major change seemed impossible except over tens of thousands of years."

But not everyone was in denial. Starting in the late 1930s, Guy Callendar did some calculations of his own, and wondered how much added CO2 would add up to too much of a good thing. Partly thanks to Callendar, something eventually happened. In the 1950s, the U.S. hired Charles Keeling to start taking measurements of how much CO2 was in the atmosphere and learned, decade after decade, it was a gas on the rise.

CO2 had continued its rise as of September 1970, when Scientific American published Abraham Oort's "The Energy Cycle of the Earth." Also on the rise at the same time, the twin questions of how much of the gas was going to be too much of it, and whether it could really change the climate.

Oort's answer began with "The most likely way the climate could be influenced by either natural or artificial means seems to be through a trigger mechanism that ultimately changes the radiation balance ...." and he went on to discuss some triggers including natural variability or, as it's often put, natural cycles. Oort could not have avoided mentioning these natural forces. Their ability to change the radiation balance had already been well-known for years.



But at least since Arrhenius, in 1896, climate scientists have also had some strong hints that natural variability isn't the only kid on the block, and not the only one big enough to force change on the radiation balance. By 1970, Oort could report that " … the burning of fossil fuels would presumably lead to more absorption of long-wave terrestrial radiation in the atmosphere and consequently to greater heating."

And yes, too much CO2 could even be dangerous. In "The Carbon Cyle," another article in the September 1970 issue of Scientific American, Bert Bolin concluded that, "The greatest disturbances of which we are aware are those now being introduced by man himself. Since his tampering with the biological and geochemical balances may ultimately prove injurious -- even fatal -- to himself, he must understand them better than today."

Since the 1970s, a growing number of scientists in the US and around the world have been putting the basic ideas of Fourier, Tyndall, Arrhenius, Callendar, Oort, and Bolin to increasingly demanding tests. Skeptics' challenges forced scientists to apply yet other tests, and the at-first crude climate models got better and better. Yes, atmospheric gases exert controls on earth's heat, and too much heat is no good thing.

About 150 years had passed before Fourier's question about extremes of cold became equally a question about extremes of heat. As always, scientists still have many questions. But a broad picture is emerging. Recent years have seen increasing signs that Earth will be heated enough to be "injurious" in many ways and to much more than just us.

In 2006, Annual Reviews published a piece by Camille Parmesan. Commenting that effects of climate change on agricultural systems had already received a lot attention elsewhere, Parmesan restricted her focus to wild species and natural systems. She reviewed the evidence reported in more than 800 papers on climate, wildlife, and natural ecosystems from all over the world.

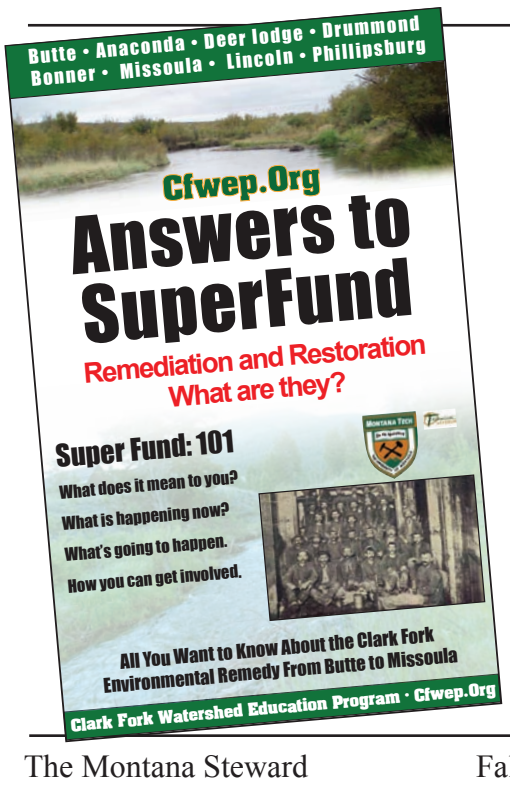
Parmesan wrote, " ... independent syntheses of studies worldwide have provided a clear, globally coherent conclusion: Twentieth-century anthropogenic global warming has already affected Earth's biota." She added, "A surprising result is the high proportion of species responding to recent, relatively mild climate change (global average warming of 0.6 C)."

Climate science has been a long and informative learning process. Weart says, "Earlier scientists had sought a single masterkey to climate, but now they were coming to understand that climate is an intricate system responding to a great many influences. Volcanic eruptions and solar variations were still plausible causes of change, and some argued these would swamp any effects of human activities. Even subtle changes in the Earth's orbit could make a difference. To the surprise of many, studies of ancient climates showed that astronomical cycles had partly set the timing of the ice ages. Apparently the climate was so delicately balanced that almost any small perturbation might set off a great shift. According to the new "chaos" theories, in such a system a shift might even come all by itself — and suddenly. Support for the idea came from ice cores arduously drilled from the Greenland and Antarctic ice sheets. They showed large and disconcertingly abrupt temperature jumps in the past."

Weart adds, "Greatly improved computer models began to suggest how such jumps could happen, for example through a change in the circulation of ocean currents. Experts predicted droughts, storms, rising sea levels, and other disasters. A few politicians began to suspect there might be a public issue here."

Again, questions remain. Climate science has been advancing rapidly, especially since the day of calculations done via powerhouse computers, and can now ask questions in greater and greater detail. But past couple hundred years have seem the gist of the story getting clearer and clearer. There's nothing we can do about natural variability – the next volcanic eruption, the next variation in solar output, the next wobble in Earth's spin around its axis. But it's a different story for all the things that we ourselves do to crank up the heat.

For an authoritative, nicely written – and free -- book on the (lively) history of climate science, see Spencer Weart's The Discovery of Global Warming.
Start here:
http://www.aip.org/history/climate/summary.htm



Bill Ohrmann, Rancher, Artist and Pioneer Drummond, Montana

As excerpted from his webpage (www.ohrmannmuseum.com), Bill Ohrmann is "a retired rancher, life-long artist, and in his paintings, a spokesman for the earth. With his brush, he has expressed his no holds barred view of man's inhumanity to nature, to each other, and to the creatures with which we share this planet. Alternating with the scenes of mayhem and dire predictions are hopeful, inspiring scenes of how it was or how it should be. Poetry and prose from authors such as Jack London, Isak Dinesen, and Missoula poet John Haines accompany many of the paintings."

He is so much more than that to us here at Cfwep.Org. He is a friend and a fellow educator in helping our next generations to understand the natural world around them and the consequences of our potential actions. Our first introduction to Bill was when we brought 34 Montana high school students into his museum during a thunderstorm in the summer of 2006. The kids were mesmerized, and so were we…forever.

Bill has lived in the Clark Fork basin his entire life, born in Ovando and raised in Drummond since the 1930s. He can remember when "the river ran red," a result of the then unregulated mining and smelting operations going on upstream in Butte and Anaconda. His paintings, "The Price" and "Checking In" portray scenes of an impacted Clark Fork headwaters area and "the price" we've paid – not to mention the price some select individuals should have, in his humble opinion . You'll never meet an individual more in touch with the roots of his society and surroundings than Bill.

Cfwep.Org is ecstatic to announce it is working with Bill to design a first-time calendar for 2013 that will feature nothing but his art. Proceeds will go to furthering the mission of Cfwep.Org in Montana. Keep your eye out for the calendar come holiday shopping season in 2012, but in the meantime, treat yourself with a trip to his museum.

The Ohrmann Museum and Gallery is located 2.5 miles south of Drummond on Highway 1 and houses Bill's paintings, woodcarvings, bronzes, and his immaculate – and in some cases, immense – welded steel sculptures. It is open daily from 10 am until 5 pm. If you're lucky, while you're there you might get a visit from the 91-year old genius!

Teacher Feature: Terri Daily

By Rayelynn Connole,
Cfwep.Org Curriculum Coordinator

This issue's teacher spotlight is on Terri Daily, a sixth-grade teacher at Kennedy Elementary in Butte. Terri and her students completed an eight month study of local water quality including macroinvertebrate populations, water chemistry and a final capstone study of their school's storm water and erosion issues. Her students presented their findings at a Butte School Board meeting this year. The Board, the Kennedy Parent Teacher Organization, and Kennedy's new principal, Mr. Ron Ricketts have taken a vested interest in addressing the storm water issues at Kennedy school and many of the students' recommendations have been put into action. For these reasons, we thought the spotlight of our fishing issue was justly deserved by Mrs. Daily and her students.

Cfwep.Org: What inspired you to bring this study into your class?

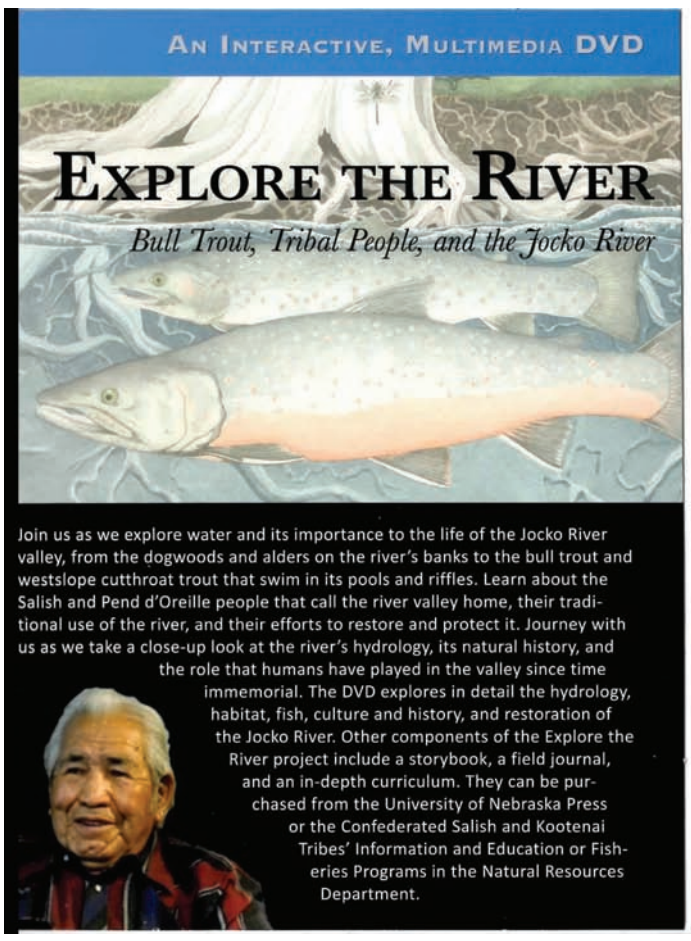
Terri: It all started with the Southwest Montana Science Partnership (SMSP) and the modules. (Note: SMSP is a professional development program organized by Cfwep.Org in partnership with a number of school districts, Montana State, UM-Western and Education Northwest) We started to look at macroinvertebrates and water quality at Father Sheehan Park. As a class, we researched many of the parameters and the findings that the students had for Father Sheehan and compared those findings to what is considered acceptable water quality. We also participated in another outdoor festival at the Saddle Club and the students noted that the macroinvertebrates that were brought in from the Big Hole River were much more diverse and more sensitive than the ones that we were finding in Blacktail Creek at Father Sheehan Park. We started asking ourselves questions about what was different between the two areas. We also visited with the Fish Wildlife and Parks biologist about native and non-native species of fish and learned about what habitat is required for native fish populations to survive.

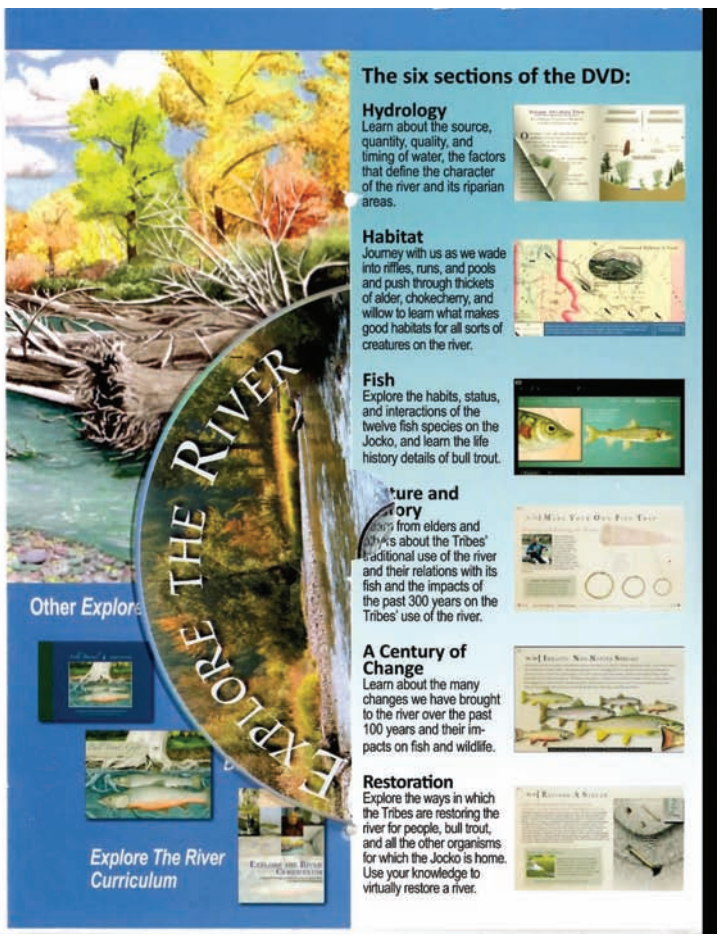
Through our research about storm water, we discovered various ways that storm water affects streams. We had lots of discussions about our impermeable surfaces, the gradient that our school is sited on, our roof drainage problems, and the many ways in which storm water can bring hazardous material to the stream. On our site, we were happy to discover that other than dirt and debris, our storm water is pretty good, with the pH being close to 7. We all agreed that we still needed to do something as even too much dirt and debris can be bad for fish habitat.

Cfwep.Org: After the students completed the study, what happened next?

Terri: When we completed the study, we were really concerned about safety issues for our students as the icicles that form off the roof are extraordinary and could really hurt someone when they fall. We noticed that the rain gutter just stopped and did not move the water effectively from the roof. We looked into bids from Butte Tin Shop to repair the gutter system and discovered that to correct just the one piece it would cost $2,790. We also noted the erosion issues were continuing and recommended that the drainage holes be cleaned weekly. Our PTO took up the banner of installing new steps leading to our playground in order to help with erosion there as well. The new steps are installed now and seem to be helping.

Last but not least, three of my students volunteered to present to the School Board. Riley Dobb, Caitlyn Sheehan, and Camille McEwen volunteered to present our findings and did a wonderful job! The students made recommendations to the board including those I already discussed, but also recommended to the board that the water coming from the roof could be re-used and recycled to water the field. Currently, the architects are meeting with Mr. Ricketts to further address the rain gutter problems. I hope that the district will seriously consider the idea of recycling the storm water and using it to water our field. That would be really cool and would bring everything full circle.





Check out the new multimedia Bull Trout curriculum, developed by Confederated Salish and Kootenai Tribes! Contact Germaine White at 406-675-2700 or go to www.cskt.org for more information.

University of Montana's Avian Science Center and Cfwep.Org Combine Field Studies in 2012

By ***Kristina Smucker***

We at the Avian Science Center are thrilled to continue expanding our working relationship with CFWEP. This fall we coordinated CFWEP's programs in four middle schools in the Missoula area. Becoming involved in CFWEP's school-year programs has at least two benefits:
(1) it builds on the existing partnership between the ASC and CFWEP, and (2) it provides an opportunity for us to fulfill part of our organization's mission, which is to "…promote ecological awareness and informed decision making through the… dissemination of science-based information…"

Craig Ballou shows 3rd graders what data we collect from birds.

First a little history on how our collaborations with CFWEP began. In 2006 the ASC developed and secured funding through the Natural Resource Damage Program (NRD) for the Bird's-eye View Education Program. This program takes place during the summer and aims to bring children and families that live in the Upper Clark Fork River basin out into riparian areas to learn about why healthy watersheds are important for birds. Briefly, the program takes place at bird banding stations

Kristina Smucker gives Audubon group a bird in the hand
ID quiz. A: female American Redstart!

where we use nets to catch songbirds and collect important scientific information. The public is invited us to join us to observe how bird research happens and see for themselves how past mining activities have affected the health of the Clark Fork and what this means for songbirds, Osprey, and other wildlife.

Rob Domenech, director of Raptor View Research Institute, places a band on an Osprey chick

After a pilot year, we realized we needed some help advertising and attracting visitors to our bird banding stations. We spend the majority of our time at the ASC conducting research and monitoring on birds, and so we needed a partner that had experience working with kids and other summer programs that might be interested in participating in our education program. CFWEP was an obvious partner and they enthusiastically helped to promote our program and attract summer camps and other visitors to our bird banding stations. CFWEP's early involvement in our program helped demonstrate our success, and in 2010 we received a second grant from NRD. This grant solidified our partnership and CFWEP took responsibility for advertising and also assisted in our program delivery.
In spring of 2011 the ASC and CFWEP explored possibilities for creating a long-term partnership: our Bird's-eye View program could serve as a summer portal and CFWEP would have year-round programs for children in the Upper Clark Fork River basin. In addition, with the ASC's home base in Missoula, we could help CFWEP by coordinating school-year programs at our end of the basin. With approval from NRD's Advisory and Trustee's Councils the partnership between ASC and CFWEP was formalized and our Bird's-eye View Program will be offered each summer for years to come.

Banding a **Western Wood-pewee.** Bands are like social security numbers - each bird gets a unique number

The opportunity to work with an organization, like CFWEP that has built a high-caliber and hugely successful place-based science education program, is really exciting. This partnership allows us to continue doing what we do well: use birds as a tool to provide information that helps us monitor the health of our watersheds. In return, CFWEP helps us communicate a "bird's-eye view" of the progress we're making in the restoration of the Upper Clark Fork River basin. CFWEP also get's to continue doing what it does well: exposing kids to the watershed and showing them how much fun it is to learn about science.

The Clark Fork Watershed Education Program and the Clark Fork Coalition

What's the the difference?

CFC Headquaters, Missoula

By Jill Albaban
Communication Coordinator for CFC

The Clark Fork Coalition (CFC) has worked since 1985 to protect and restore the Clark Fork basin. We emphasize public engagement through energetic, science-driven advocacy and partnerships in on-the-ground restoration—an approach that puts people in touch with Clark Fork River and the cause for a healthy watershed.
We have been working with the Clark Fork Watershed Education Program (CFWEP) on education and outreach efforts in the Clark Fork basin for over five years. Specifically, we've recently partnered on a youth education effort, "Hands on the Ranch," at the CFC's working ranch in the Deer Lodge Valley. This unique program has been quite successful—in its initial year, over 50 high school students learned stream restoration and monitoring techniques, and several senior students were selected to participate in a 40-hour Restoration Technician Certification Program. We're now in our second year of the program, and plan to expand the monitoring and restoration efforts beyond the CFC's ranch onto neighboring properties and streams.

Dry Cottonwood Creek entering Upper Clark Fork river on Clark Fork Coaltion Ranch

With increased funding, we understand that CFWEP plans to expand its education and outreach efforts in Missoula. The CFC hopes to support their growing efforts and programs in the following ways:
Help in outreach and publicity surrounding CFWEP's educational events, conferences, and classes
Help CFWEP identify potential students, schools, and groups for educational opportunities
Assist CFWEP in media outreach, including radio show appearances, guest blogs, and guest articles in CFWEP newsletters
Include CFWEP Superfund FAQ in CFC newsletter as an insert
Joint-fundraise through co-sponsored events
Cross-link on website, Facebook, blog, and eCurrents

Montana Tech Regional

Science & Engineering Fair

Division I
High school
February 28, 2012
Grades 9-12
Montana Tech Student Union Building
Division II
Middle School
March 2, 2012
Grades 5-8
Montana Tech HPER Complex

To find out more on the Montana Tech Regional Science & Engineering Fair, please visit our website at: http://www.mtechoutreach.org/ and click Science Fair.

From L to R; Frank Ponikvar Communication Coordinator Rayelynn Connole Curriculum Coordinator Dr. Arlene Alverado Field Coordinator Beverly Plumb Asst. Field Coordinator Matt Vincent Director - Bill Callaghan Co-Founding Dirrector Theresa Seccomb Honorary Adminsitrative assistant Colleen Elliott Co-Founding Director (Past Executive Director) Joe Griffin - Honorary Co-Founding Director Not Pictured Amy Verlanic Co-founder, ChristDoyle -Americorps Vista and Jenny Miller Americorp Vista

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The Cfwep.org has been a leading provider of environmental and restoration education programs and services in western Montana since 2005. Cfwep.org offers multi-disciplinary science and history programs for schools, teachers, and students in the Upper Clark Fork Basin. We also offer public education and outreach services such as tours, events, and publications that connect the public with the science and history of the amazing landscape of western Montana. Cfwep.Org is physically located in the Health Sciences building on the campus of Montana Tech in Butte, Montana. Our Mailing address is Cfwep.Org @ Montana Tech 1300 West Park Street Butte, Montana 59701. Cfwep.Org is our web address. Please direct your comments and suggestions to info@cfwep.org or Matt Vincent at MVincent@mtech.edu. The Montana Steward is a quarterly publication of the Clark Fork Watershed Program. The Montana Steward reserves the right to control its own publication schedule.Cfwep.Org is part of the Department of Technical Outreach at Montana Tech of the University of Montana, a 501c3 non-profit educational institution.

On Our Cover

Dip-netting in pools
Wishham
(The North American Indian; v.08)
Curtis, Edward S., 1868-1952.
Description by Edward S. Curtis:
In the quiet pools along the rocky shore the salmon sometimes lie resting from their long journey up-stream. The experienced fisherman knows these spots, and by a deft movement of his net he takes toll from each one.

The Director's Letter

Matt Vincent *Cfwep.Org*Director

Now in its second decade of work, the restoration of Silver Bow Creek is one of the most successful riparian restoration projects, arguably, in the world. Over a century of unregulated historic mega-mining rendered the stream not much more than an industrial sewer, devoid of most riparian and aquatic life when the project began at the turn of the 21st Century. Then, less than five years ago, trout and other aquatic life began to show up in measurable numbers – a testament that with some help from us, nature can bounce back from just about anything.

This past August, another type of incident occurred on Silver Bow Creek for the first time in its infamous history. An individual was cited for an illegal harvest of the stream's fledgling trout population. The man was caught hauling a "stringer-full" of large cutthroat trout out of the canyon near Fairmont Hot Springs. Luckily, he was caught. Fairly, he was ticketed and fined. Unfortunately, this is a symptom of something that could destroy the fishery before it even has a chance to recover.

With foresight, Fish, Wildlife and Parks will be releasing new fishing regulations for Silver Bow Creek when its revised rules come out in 2012: Catch and release only for cutthroat trout.

Regulation is one way to insure fisheries are preserved, or in the case of Silver Bow Creek recovered. Unfortunately, ignorance far outnumbers enforcement. Ultimately, it is up to us, the citizens who own the resources, to provide the most reliable insurance. It's called stewardship, and that's where Cfwep.Org comes in.

As long as there is ignorance, there will be a need for education. Cfwep.Org has been the leading provider of restoration education and environmental stewardship building in the Clark Fork basin since 2005. We pride ourselves in striving to achieve our mission on a daily basis with the 2,000+ students, teachers and citizens we reach each year: fostering environmental stewardship and scientific decision making through place-based learning.

There is even more good news to report. Coming in Spring 2012, you can join our charge. Cfwep.Org is opening its inaugural membership program. For a nominal annual fee, you will be helping improve the Clark Fork River, as well as the education and stewardship of Montana's next generations. As a sincere "thank you," you will be mailed copies of The Montana Steward newspaper to your home and receive other perks and information about Cfwep.Org's upcoming events. Hopefully you will make the decision to join the Cfwep.Org team.

This issue of The Montana Steward is a tribute to and feature on one of the greatest rewards from restoration that can be given to Montanans: FISHING. Ever since the first humans inhabited our "last, best place," fishing has been a way of life. Read about our partnerships with other organizations, the restoration and research underway within the basin, or catch up on how and where the "catching" was being done this past summer. We hope you enjoy and we welcome your comments and suggestions…we also look forward to meeting you when you join as a Cfwep.Org member in 2012!

Happy Holidays for 2011 and tighter lines in 2012,

Cfwep.Org

Cfwep.Org *would like to acknowledge the following members, volunteers and contributors. Their past and present support and assistance makes us who we are and our work possible:*

Dori Skrukrud, the El Dealbreakers, Bill Fisher at the Butte Depot, The Front Streeet Station, Terminal Meats, Anaconda Job Corps, Montana Historical Society Brian Shovers, Pam Roberts of Rattlesnake Productions, Greag Smith, Bruce Farling and Montana Trout Unlimited, Lance Olson, Chuck Jonkel and the crew at the Great Bear Foundation, Kurt Cunnigham at FWP; Rock Creek Cattle Company; Great Harvest Bread, The Hummingbird Cafe, Carters in Drummond; Patagonia Outlet in Dillon and Beth Sullivan; Chris Bradley and Mike Marcus at The Stonefly Fly Shop, Sam Ames, Tammy Gordon, Annette Kankleborg, Joe Naughton, Mariah Mayfield, Dave Hagengruber, Mark Sweeney, Jason Lindstrom, Montana FWP, Bill Callaghan, Chris Doyle, Lisa Sullivan, Kehli Kankleborg, Jessie Salix, Rebecca McNamara, U.S. Forest Service, Doug Buskirk, Colleen Elliott, Montana Bureau of Mines and Geology; Erik and Jami Kalsta; Debbie Kearns at the Hitchin'Post; George Goody, Montana Fly Company (Melrose); Dan Shepherd, Grizzly Hackle; Kim Draper, Jeff LeProwse, Water & Environmental Technologies, Josh Lee, Ashley Makowski, Hummingbird Café, Jason and Travis at KMSM FM 107.1; Uptown Café, Kathryn Watson and Montana Watercourse,, Andrea and Don Stierle; Gerry O'Brien, Patti Arntson and Matt Jozovich at The Montana Standard; Don Blacketter, Doug Abbott, Paul Conrad, Kumar Ganesan, Rick Douglass, Amy Kuenzi, Pat Munday, Chad Okrusch, Jed Wilson, Joe Kujawa, Doug Coe, Maggie Peterson, Cathy Isakson, Joe Figueira, Amy Verlanic; Montana Tech Dining Services; Art Anderson, Mary Durkin and the crew at the Montana Tech Physical Plant; Courtney Greyn; Carol Fox, Kathy Coleman, Doug Martin, Tom Mostad, Greg Mullen, Pat Cunneen and Michelle Golden at the Natural Resource Damage Program; Pat Bannon, Rick Duncan, Jessica Anderson; Brian Bender and Peggy Kerr at Powell County Planning; Chris Laity; Jake Troyer, Montana Watershed Coordination Council; Butte-Silver Bow Public Works, Planning Departments; Greenfield Printers, Insty Prints; Glenn Granger, Jim Dupuis, Tom Billiteen and Jeremy Whitlock with Butte-Silver Bow Youth Court; CTEC; Paul Tash; Ryan Carlisle and Redneck Sprinkling; Butte-Silver Bow GIS; Tom Malloy;; Marko Lucich and Cheryl Ackerman at the Butte Chamber of Commerce/Visitors Center; George Grant TU; Doug Ardiana and Sean Kiffe at Bonner School; Rich Prodgers, Bighorn Environmental; Marisa Pedulla; Ben Quinones, Tim Reilly, Joel Chavez with Montana DEQ; Brian Christianson and Rabi Vandergon with Montana Campus Compact; Monte Dollack; Bill and Phyllis Ohrmann; Dave Taylor Roofing; Sam Milodragovich and Northwestern Energy; Heiko Langner, Erick Greene; Clark Fork Coalition; UM-Avian Science Center and students on the Milltown Dam Education Program; Chris Gammons; Karen Laikala with Powell County Weeds; Carleen Cassidy, Joanne Lee and Colleen Fink at Montana Tech; and Doug Buskirk and Becky Guay of Anaconda!

Montana Department of Justice
Natural Resource Damage Program

The Future of Silver Bow Creek

An Interview with Greg Mullen

"Ramsay Flats" section of Silver Bow Creek, pre-restoration, circa 1990s.

NRDP's Greg Mullen in a restored reach of Ramsay Flats in fall 2011.

Cfwep.Org: What is your background/role on the Silver Bow Creek project and when did the remediation/restoration work begin?

Gregory Mullen: I graduated with a BS from Colorado State University in 1980 in natural resource management and a MS in forest hydrology from Michigan Technological University in 1988. Between degrees I was a forester with the USFS, BLM, U.S. Peace Corps in Lesotho, Africa, and private industry. I next worked for the State of Montana, first with the Superfund Program in 1989 and then with the Natural Resource Damage Program (NRDP) in 1991. My role on Silver Bow Creek consisted of directing and conducting scientific investigations in the 1990's to support the State's natural resource damage lawsuit against Arco. This lawsuit resulted in a settlement in 1998 for the severe aquatic and terrestrial injuries along Silver Bow Creek. In 2000, my focus for Silver Bow Creek work turned to implementation of restoration actions along the creek.

After the combined remedy restoration settlement with Arco in 1998, the Montana Department of Environmental Quality (DEQ) began remediation in 1999 along the first mile of the Silver Bow Creek. A year later, through restoration grant funding to the Greenway Service District, the NRDP started coordinating ecological restoration work along the floodplain and stream channel. Restoration, which entails actions that goes beyond what is required under remedy to bring the injured resources closer to a baseline condition, has been an inspiring and challenging endeavor over the years. Restoration of the stream and floodplain involves analysis of what remedial actions are to be implemented and then adding appropriate restoration components. Most of the restoration construction components such as additional stream length and complexity, wetland creation, or additional tailings removal are added to DEQ remedial design bid packages, and then implemented by remedial contractors. Revegetation components are also often added to the remedial designs, such as incorporation of compost to cover soils, addition of enhanced seed mixes, and planting of complementary riparian trees and shrubs. Joel Chavez with DEQ and I have worked diligently to insure remedy and restoration components are efficiently implemented. This endeavor has been a showcase of remedial/restoration coordination on Superfund sites not only in Montana, but also in the country as a whole.

The Greenway Service District plays a key role in defining a vision for and establishing a recreation corridor along the entire 25 mile Silver Bow Creek. Some of the GSD recreational components, such as paved trails and foot bridges have been or will be coordinated with remedial actions. Other access features, such as trailheads and signs, will be constructed over the next several years in areas already remediated/restored. Key land purchases by the GSD, play a crucial role in securing the placement of access features and allowing the whole Silver Bow Creek floodplain from Butte to Warm Springs Ponds to be available for public access. These recreational features and land purchases have been paid for by restoration grant funds. Dori Skrukrud, long time project manager of the GSD, states that "When restored, the Silver Bow Creek Greenway trail components will support lost outdoor recreation opportunities such as fishing, wildlife viewing, and open space enjoyment. The trail is an important tool to manage access and use and help direct corridor users on where to go and, more importantly, where not to go."

Young Butte angler Rye Vincent shows off one of the trophies of the Silver Bow Creek restoration, a large, colorful Westslope cutthroat. Good stewardship, education and the practice of catch and release might some day bring the creek and its fishery back to what it was before historic mining wiped it

Cfwep.Org: When is the project scheduled to be completed and what is the combined cost of remediation/restoration and redevelopment?

Gregory Mullen: Remedial actions will be mostly completed by the end of 2013, with the ecological restoration components to be completed in 2014 or 2015. Most Greenway access features should also be completed by 2015.

The cost of remediation has been about $80 million to date, with another $35 or so million needed for completion. Monies necessary for future remedial operation and maintenance components will be earmarked in the future. Costs for restoration ecological components, such as additional stream and floodplain work discussed above, will be about $13 million. Recreational access features constructed to date have cost approximately four million dollars, with another approximately six million dollars needed to complete the intended future access work. Combined, the remediation, restoration, and recreational costs are estimated to total about $140 million, not including what remedial costs will be needed for future operation and maintenance.

Cfwep.Org: What do you think the biggest challenge has been to date with the project?

Gregory Mullen: Attempting to restore such a severely injured ecosystem has been a great challenge. Over five million cubic yards of metal-laden tailings left from a century of mining virtually eliminated aquatic and terrestrial life along the 25 mile stream and over 1,500 acres of floodplain. Many meetings, discussions, and stream channel investigations have occurred to ascertain what specific aquatic and terrestrial improvements work best. We have certainly learned which remedy and restoration strategies are most effective over the last decade and proof of this success is evident today through intense monitoring that occurs throughout each year. Monitoring of sediments, birds, fish, vegetation, surface water and stream morphology has revealed that the quality of these resources has improved greatly compared to pre-cleanup conditions. However, there are still continuous metal impacts to Silver Bow Creek from upstream sources in Butte, especially during storm events, and nutrient impacts from Butte's waste water treatment plant. These upstream impacts are expected to be reduced through infrastructure improvements planned in the near future. The recovery process along all of Silver Bow Creek is expected to continue for decades.

Cfwep.Org: What is your favorite success story on the project so far?

Gregory Mullen: The successful remedial/restoration effort at Ramsay flats has been a significant achievement by many involved, most notably DEQ employees Tim Reilly and Joel Chavez. The Ramsay Flats area, which is about 300 acres in size and south of Ramsay, consisted of a bare moonscape with up to eight feet thick of tailings along an incised stream that was dead of all aquatic life. Remedy and restoration planners worked collectively starting in 2005 to develop a plan for the area that included removal of 1.2 million cubic yards of tailings and construction of a new Silver Bow Creek with numerous wetlands and a longer, more varied channel alignment. Rich Prodgers, with Bighorn Environmental Sciences, who has spearheaded the remarkable vegetation planning and implementation along all of Silver Bow Creek states that; "Two of the most gratifying aspects of remediation and restoration of the Ramsay Flats area, apart from the removal of more than one million cubic yards of mine waste, are the series of ponds with attendant bird use and the successful revegetation of saline coversoils. Wildlife from amphibians and waterfowl to songbirds and raptors now find good habitat here. Deer, elk, foxes, and coyotes now use the area regularly." At this time over 80 species of birds have been observed at the transformed Ramsay Flats area, a place where very few birds of any kind previously existed.

New Montana Tech Chancellor, Donald Blacketter preparing to release a trout in Durant Canyon.

Cfwep.Org: What do you see for the future of Silver Bow Creek?

Gregory Mullen: At this time much of Silver Bow Creek and its newly created floodplain is beginning to perform as a functioning ecosystem and has recreation potential for the first time in well over 100 years. Residents from Butte, Anaconda and Montana as a whole will be able to recreate along the Creek with picnics, bike riding, walking, wildlife viewing, hiking, and soon even fishing. That these opportunities are now, or within a few more years will be, available is truly remarkable.

Gregory Mullen

The Science of Silver Bow Creek
An Interview with Joe Naughton

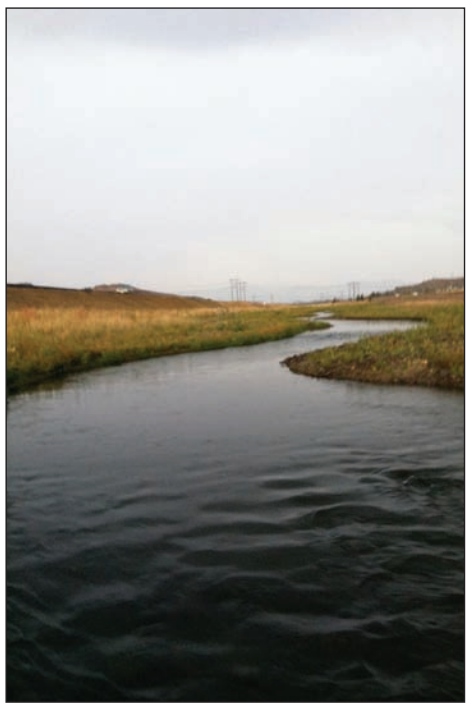
Joe Naughton is a Montana State University graduate student studying trout movement in Silver Bow Creek.

Cfwep.Org: Thanks for talking to us today- Please describe your project in general, as far as area covered, length of study, a few details if you would.

Joe: We are evaluating how effective the remediation has been in restoring lost fish populations in Silver Bow Creek. We are monitoring water quality factors (temperatures and heavy metal, ammonia, and dissolved oxygen concentrations) and habitat characteristics (pool depths and frequencies for example) to determine which factors coincide with high or low numbers of fish. We monitor the abundance of both trout species (brook trout and westslope cutthroat trout) and of longnose sucker. The presence of fish, trout in particular, is an indication that remediation has been successful. Trout are very sensitive to water and habitat quality. If trout are present, and if they are present in all of their life stages and in all seasons, that is powerful evidence that the water and habitat quality have been improved.

In the summer, we gather fish abundance data by capturing as many fish as we can with electricity and handheld dip-nets. This is a standard fisheries procedure known as 'electrofishing'. We then surgically implant all of the trout and some of the suckers with small radio-frequency ID tags (RFID or PIT-tags). We monitor the movements of the tagged fish at pass-through antenna stations and with portable antennas. The movement data allows us to see if any sudden or seasonal changes in water quality drive movements of fish in Silver Bow, or out of Silver Bow altogether. They also allow us to evaluate how the fish have redistributed themselves seasonally. In Silver Bow, water quality changes substantially from winter to summer and we hypothesize that fish respond to those changes by moving from places of poor water quality to places with better water quality.

We have focused on Silver Bow Creek from



the Fairmont Road impoundment reservoir up to the Metro Storm Drain (about 20 miles) and the lower 3 miles of the main Silver Bow tributaries; German Gulch, Browns Gulch, and Blacktail Creek. We have been really monitoring the stream full bore since June 2010 and will be wrapping things up in the next month or two. But we also conducted a brief pilot study in 2009. In total we tagged about 3,500 fish.

Cfwep.Org: What are your preliminary findings? What is the fish/trout population looking like in SBC? Are there limiting factors?

Joe: Overall the fish populations are doing remarkably well. Adults of both trout species (brook trout and westslope cutthroat trout) are present in the stream year round. Sucker adults are abundant in places and are reproducing successfully in Silver Bow. We have found a few juveniles of both trout species in Silver Bow, although generally they are only found near the tributary confluences. It is unlikely that any successful trout spawning is taking place in Silver Bow yet, with the exception of the Lower Area One (LAO) section In 2010, we found juvenile brook trout in LAO in numbers that suggest successful spawning occurred in that stretch. That is a very encouraging sign given that the LAO stretch was some of the most severely metal contaminated sections of the whole stream.

Trout numbers are relatively high through Butte and downstream for another 2-3 miles. But they mostly disappear from Rocker to Nissler, and then pick up gradually from Ramsay on down to Fairmont. We are convinced that the absence of trout is due to oxygen depletion in the stream caused by ammonia pollution from the Butte wastewater plant. Right now the ammonia pollution and oxygen depletion caused by the wastewater plant is a far bigger problem for the trout than the metal levels or the habitat quality.

Cfwep.Org: personal perspective (i.e. biggest challenge/greatest accomplishment; relate it to restoration, etc.)

Joe: When I started the project in the spring of 2009, we planned to monitor fish movement from the tributaries into Silver Bow. We thought if we were lucky we would find a handful of trout that would move into Silver Bow. But we were genuinely were concerned that we may never see a single trout migrate into Silver Bow – and what then? Most important of course, how would I get a degree then? Fortunately that has never been an issue. Whenever I talk about Silver Bow, the restoration, and the recovery of the fish populations I get to be the messenger of good news, which is nice. Folks at NRD, DEQ, ARCO, EPA… everyone seems thrilled that the fish have responded so well to the reclamation. It isn't often that you get to be involved in an environmental success story. I think there are a lot more success stories than we realize, but maybe those successes are not as well publicized as they need to be.

The logistics and the effort of the fieldwork involved in the project have at times been pretty difficult, especially because I have to be away from my wife and children for good parts of the summer. But I've really enjoyed working in Butte and the people I've met here. And I love the fieldwork which kind of gets in the blood. I used to work in a psychiatric hospital, and now I wade in a creek all day, so I know I'm pretty

How old is the upper Clark Fork River?

By Colleen Elliott PhD.
Montana Bureau of Mines and Geology

Until about 200 million years ago, western Montana lay beneath the ocean. River deposits as old as Jurassic (145-200 million years) between Garrison and Missoula tell us when the oceans receded. Some Cretaceous (65-145 million years old) and younger river deposits in the upper Clark Fork basin contain large well-rounded cobbles, evidence of large, fast-flowing rivers. Was one of them the Clark Fork? Probably not. Cobbles in 80 or 90 million year old river deposits near Garrison appear to have come all the way from western Idaho, which means that the river that carried them flowed towards the east. Indeed, geologists find evidence that rivers in the Clark Fork basin flowed east and south into the Missouri drainage until 15 million years ago.

So we can say that the upper Clark Fork River is as much as 15 million years old, but that doesn't mean it flowed exactly where it is now for 15 million years. Have you seen nice smooth, round, river rocks in places far from running water? Besides in human-made landscaping, that is. Those rocks are evidence that a river did once flowed there, even

Native Trout Revival: Westslope Cutthroat Trout, Silver Bow Creek, and Superfund

by Pat Munday PhD. Professional and Technical Communications at Montana Tech

When I have a good day fishing, I recall the wise words of Butte conservationist George F. Grant: we don't catch wild fish because we are so clever--after all, how smart do you have to be to fool a creature with a brain the size of a pea? No, we catch trout because they are there. And usually, in the modern world, they're there because of people who have helped to restore and protect them.

Well, I had a good morning on Silver Bow Creek just a few miles downstream from my home, catching wild, native Westslope Cutthroat Trout--many (like this one) fat & well over a foot long:

If you imagined a perfect small trout stream (average flow c. 20 cfs), it would look a lot like this Durant Canyon reach of the creek: And even better, there were riseforms of large trout slurping caddis flies and spruce moths:

For more than a century, there were no trout. Just a few years ago, Silver Bow Creek (at the headwaters of the Clark Fork River in southwest Montana) was still a lifeless, industrial sewer (NRDP photo):

Superfund changed that, and it's a great success story. The success came in two parts--remedy (i.e. clean-up) and restoration. On the remedy side, the U.S. Environmental Protection Agency mandated that the party responsible for a century of mining and smelting pollution -- Arco-British Petroleum -- clean up its mess. On the restoration side, the State of Montana settled for several hundred million dollars in a natural resource damage lawsuit against Arco-BP.

(Continued on Page 12)

Silver Bow Creek just downstream of Highway 1 near Anaconda during the 2011 flooding. Before restoration and remediation began in 1999, the entire 26-mile length of Silver Bow Creek looked like this...and worse. Massive deposits of historic mining wastes rendered the stream inhabitable for trout and devoid of most aquatic and riparian life.

Fishing Reports from Around the State of Montana

The StoneFly Fly Shop opened its doors in April of 2006 and is the result of hard work, determination, and the big dreams of Mike Marcum and Chris Bradley. Owning a small business is difficult, and starting one at the worst economic times since the depression, might be even harder. That did not stop Mike and Chris from chasing their dreams, and they have more determination than ever.

Butte, Montana may not be the first choice of some anglers, but both Mike and Chris think that this Southwest Montana mining town offers the best fishing in the state! One can travel in any direction from Butte and find blue ribbon fisheries galore. At the top of this list is the Big Hole River, which is just south of Butte about twenty five minutes. This river is one hundred and fifty nine miles of pristine freestone fishing water, and is one of the best in Montana and the United States. The headwaters of the Clark Fork River and the Warm Springs Management area is a quick twenty minutes to the west of here. Big fish in small water is a pretty exciting combination! The beautiful Boulder River can be accessed in about the same travel time from either heading north to get to the upper stretches, or heading east to hit the lower river. Traveling east will also lead you to the Jefferson River, and again, less than thirty minutes away. The Madison is just under an hour from here to the southeast. The Beaverhead River to the south and Missouri River to the north or east are fantastic tail waters that are reachable within an hours drive from Butte, as well. If that isn't enough, reaching just a little further with an hour to hour and a half drive, you can be fishing on Rock Creek, the Ruby River, the Blackfoot River, and many, many more. Big lakes, small lakes, high mountain stuff, and small creeks are far too numerous to list here. There is more water around Butte than you could fish in a lifetime, but don't let Mike and Chris know that, because they are hell bent on fishing it all.

The Stonefly co-owner, Mike Marcum with a hefty winter rainbow.

Winter fishing in southwest Montana can be a challenge, but it comes down to having the right equipment to make things more comfortable and easy for the angler. The StoneFly carries all the gear whether it is ninety degrees or zero degrees. The first thing to have is a good pair of waders and boots. Simms GORE-TEX® waders are preferred during the winter months because of there dependability. The pores in the GORE-TEX® membrane are 700 times bigger than a water vapor molecule, so perspiration can easily evaporate through and you can stay dry from the inside out. Breathability is an important component of comfort when you are active and you do not want moisture against your skin when it is cold out. The durability is much greater than any other product out there as well. Simms Vibram boots are a perfect choicefor winter fishing, because snow and ice will not build up on the soles. To keep warm, it is important to start with a base layer against your skin to wick moisture away. Next, a warm fleece, down, or insulated coat. The final layer would be a waterproof, breathable shell like the Simms GORE-TEX® Guide, G3, or G4 jacket to keep you protected from all the elements. It is important to wear an insulated pair of socks and warm pants like fleece underneath your waders. Simms half finger and fold over mitts offer some of the best protection for your hands during winter fishing. A warm hat is a must to keep that heat with you while fishing, as well. One important note is that cotton is one of the worst things to be wearing while you are out during the winter months. It holds moisture and does not dry or wick. One phrase The StoneFly likes to remember is that "Cotton Kills".

There are a number of products out there to make your winter fishing trips more enjoyable. One of those would be Stanley's Ice Off Paste from Loon. This is a paste that you can apply to your guides and line to help alleviate ice build up. There are other methods of doing this out there as well, like spraying Pam (vegetable spray) on your guides, but has never been tried by The StoneFly guys. Hand warmers and a thermos of hot coffee are always a good source of heat when needed out there as well.

Whether you are waiting for the summer months, or prefer to venture out during the quiet and solitude of the winter months, stop buy or call The StoneFly to get the gear and information to make that fishing trip enjoyable.

Yellowstone Angler
James Anderson

James Anderson of the Yellowstone Angler in Livingston, Montana, said they fish in the Yellowstone and Madison Rivers, Spring Creek, and in Yellowstone National Park.

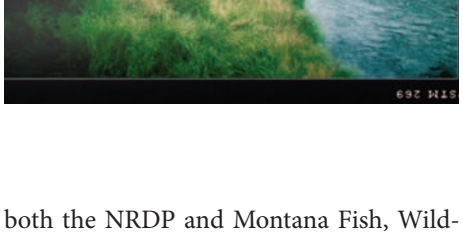
"Now that it's starting to turn toward the fall, the brown trout are getting aggressive," said Anderson. He added that people have been able to use streamers to catch the brown trout, and the rainbow trout are being caught with hoppers.

Anderson hasn't noticed any affect on the trout from the Yellowstone oil spill so far. They have been affected by the high water levels this year, though.

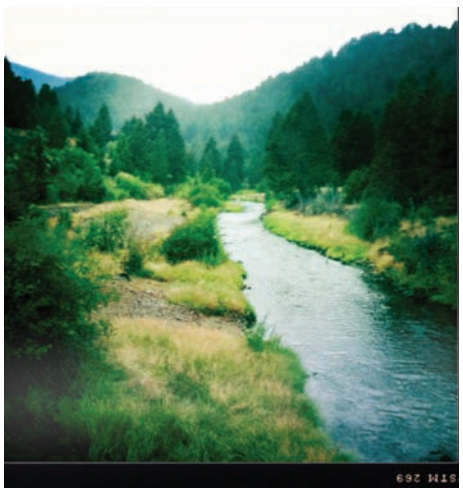
"The Yellowstone started fishing well in August – normally we're fishing in June and July," he said. "That very first week, a lot of big fish got caught because they hadn't seen a fly in a while, but if you average it out over the season, the fish aren't really bigger than any other year."

Native Trout Revival
Cont from page 12
by Pat Munday

In a unique approach that integrated remedy and restoration, the state took the lead in an $80 million project that included additional funds for enhancements such as restoration work in German Gulch Creek--a major tributary of Silver Bow Creek.



When Montana's Natural Resource Damage Program began developing a restoration vision for Silver Bow Creek, the program was very hesitant to us native trout as a restoration goal. Many thought the creek could never sustain native cutthroats, and even optimists like me thought it would take decades. It was a hard struggle, but thanks to the support of many good people and organizations (see list below), it came together and in a series of meetings in 1997



both the NRDP and Montana Fish, Wildlife & Parks agreed to embrace the goal of native fish. A big thank you from your most important client:

Folks who deserve special credit, in no particular order:
George F. Grant (1906-2008). George established Montana's first chapter of Trout Unlimited in 1972. He began campaigning to halt mine waste pollution of the Clark Fork River by the mid-1970s.

Board members of the George Grant Chapter of Trout Unlimited. They attended a lot of meetings and wrote a lot of letters in support of Silver Bow Creek restoration, and also directed a $1 million restoration project on German Gulch.

Trout Unlimited and the Clark Fork

By Bruce Farling
Executive Director
Montana Trout Unlimited

The Clark Fork is unique among Montana's trout rivers because no one alive in the last 50 years ever witnessed the river when it was healthy. Mining and smelting started in the 1870s, and subsequent damage to the river occurred for another century. As a restoration target, the Clark Fork is a river of opportunity. We can only guess what it was like originally. The bet here is that it was a great fishery.

Trout Unlimited national, state and chapter level (three TU chapters claim the Clark Fork or its tributaries as a "home river.") has long considered upper Clark Fork restoration a priority. Besides providing crucial support for years for Superfund cleanup and restoration along Silver Bow Creek, at the Warm Springs Ponds, along the upper river and at Milltown, TU has led many restoration efforts that address the primary habitat factors limiting the trout fishery: metals pollution, seasonal de-watering by irrigation, riparian area damage and impeded movement of fish by dams and irrigation structures.

TU staff and volunteers have been principals in a large restoration effort in German Gulch, developed an agreement that employed water from Silver Lake for instream flows in Warm Springs Creek, raised funds for riparian improvement projects on key tributaries, collected important fishery and flow data for instream flow rights, and removed barriers to fish movement. In 1999, Montana TU published the first blueprint for guiding basin-wide restoration. Last spring, TU national hired a staffer, Casey Hackathorn, to develop collaborative restoration projects along the upper river and its tributaries. Casey is working with other TU staffers, volunteers, the Clark Fork Coalition and agency biologists on an exciting array of projects that TU hopes will eventually lead to the Clark Fork taking its rightful place next to Montana's many