Blacktail Creek & Basin Creek Watershed Resiliency Project

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Watershed Restoration Coalition for the Upper Clark Fork (WRC)

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Project Summary

Climate change has altered the framework of effective watershed restoration. The proposed project goes beyond the traditional restoration approach by melding restoration of human and ecological uses of water, for present and future conditions, and using the restoration effort as a tool to raise public awareness about the impacts of climate change and the importance of watershed resiliency.

The proposed project builds upon the existing restoration efforts taking place in the Blacktail watershed, which supplies drinking water for Butte, and the potential for substantial funding from a National Wildlife Conservation Society (WCS). The watershed is within the High Divide Linkage priority landscape and more locally provides important habitat connectivity across the Continental Divide from the Upper Clark Fork watershed on the west slope to the Big Hole and Jefferson watersheds on the east side.

Wetland restoration and monitoring projects have been initiated in the headwaters of Blacktail Creek, adjacent to a large upland forest restoration project, but current funding does not apply to Basin Creek, the primary tributary of Blacktail Creek and Buttes primary water supply. We are requesting funds to expand restoration to the headwaters of Basin Creek, focusing on the degraded beaver pond meadows upstream of Buttes drinking water reservoirs and on private lands further downstream.

The funds provided by the BNRDC would be matched by an $111,455 WCS grant which is contingent upon receiving the requested matching BNRDP funds. The requested funds would be used to match the WCS funds to coordinate restoration efforts throughout the watershed and among all of the already agreed to restoration partners including; Butte Silver Bow Public Works (BSB), Beaverhead-Deer lodge National Forest(BDNF), Montana Fish Wildlife and Parks (FWP), Montana Department of Environmental Quality (DEQ),and the Natural Resources Damage Program (NRDP).

In addition the WCS funds will also fund an educational initiative in conjunction with the Clark Fork Watershed Education Program (CFWEP) and instructors at Montana Tech, to develop long-term watershed monitoring program for high school and college students and participate in multiple environmental education classes using project sites in the watershed as outdoor laboratories to document outcomes of restoration projects as climatic conditions change.

The proposed restoration effort approach addresses the impacts of climate change by reversing the loss of wetland habitat on source water tributaries in the Blacktail watershed, a trend affecting water availability on most streams in southwest Montana. By improving natural water storage we can capture early runoff of the more limited snowpack predicted under future climatic conditions, and can make more water available to sustain late- season flows and wetland habitats. By restoring headwater wetlands and involving local youth in restoration efforts we can protect threatened source water supply and wetland habitat, improving watershed and community resiliency to climate change, while laying the foundation for improved water management.

Several influences have converged to make this project a unique opportunity to create a real and lasting benefit to watershed resilience:

1) Momentum from a group of motivated and informed landowners, who wish to restore historic wetland areas and want to provide opportunities for research and environmental education,

2) A high degree of coordinated participation by agencies and local government on existing restoration efforts in the watershed,

3) Strategic project location for restoring diverse habitat within a large continuous area of undeveloped upland and stream corridor, and which can improve linkage to other watersheds,

4) Site conditions conducive to achieving high-quality restoration of wetlands, natural water storage, and riparian corridors using cost-effective , nature- based approaches,

5) Presence of established and innovative environmental education programs and an existing headwaters restoration and monitoring effort that together can be leveraged and expanded to educate multiple generations about the importance of watershed restoration to protect water supplies under changing conditions; and

6) The potential major funding by the WCS to implement a project in the Blacktail watershed.

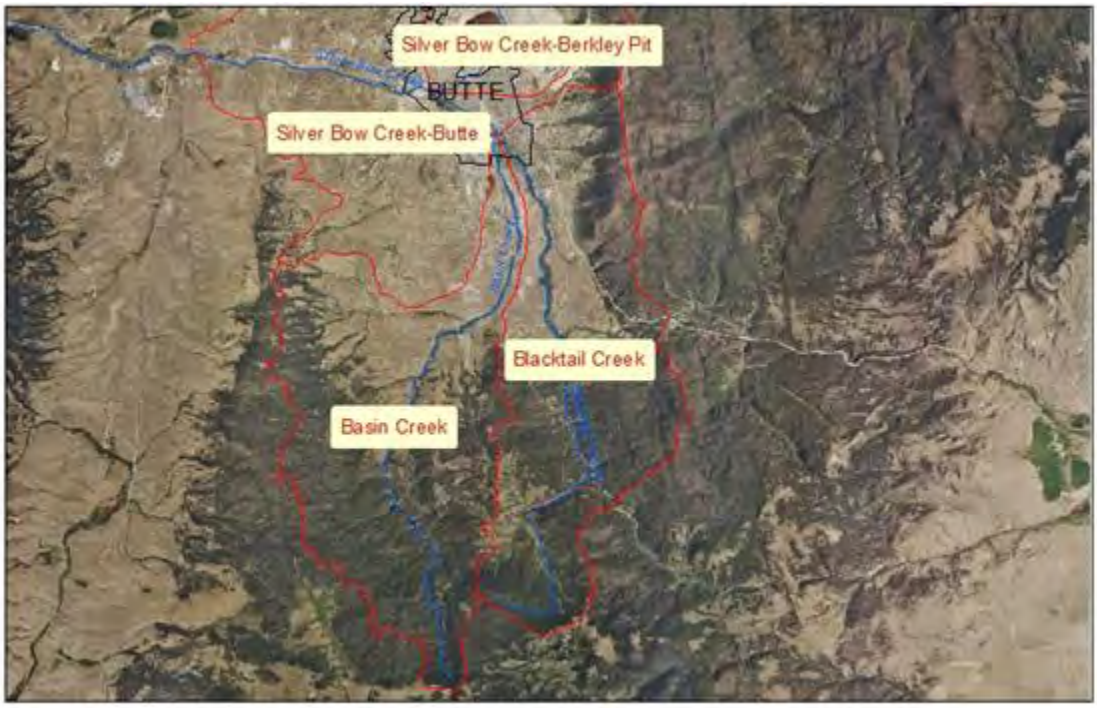

Figure 1. Blacktail Creek, Silver Bow County, Montana.

Project Goals and Objectives

This project is designed to address multiple climate change impacts, focusing primarily on resiliency of water supply under expected increases in drought severity and duration and smaller snowpacks. The project will establish connections between urban water supply headwater stream and wetland resiliency and targeted outreach to improve adoption of headwaters protection as a climate change adaptation tool for future generations and in other areas of Montana and the High Divide landscape.

The need to offset climate change impacts has guided our approach to place greater emphasis on targeting streams and wetlands that have been showing evidence of a drying trend and loss of stream complexity; we also have selected a project site that has great potential to increase habitat connectivity with other tributary headwaters in the watershed, and which will improve natural water storage and source water resiliency above the Basin Creek water supply reservoir. We are focusing on methods that mitigate more extreme storm runoff and peak flows be slowing stream energy and reconnecting the stream and floodplain, and mitigate earlier runoff by capturing early flows and improving groundwater recharge.

We are including some sites on private land lower in the watershed, particularly those areas adjacent to large public land parcels, to improve habitat connectivity at lower elevations to facilitate range shifts of species in response to climate change. Because water supply also is dwindling in lower elevations, we are focusing part of our restoration efforts on re-watering streams that have become ephemeral in recent decades, and will share monitoring results with the Wetland Program at DEQ to support their study of ephemeral stream restoration using beaver mimicry in other areas.

The magnitude and extent of climate change impacts on water supply throughout the High Divide landscape have prompted us to work with the Butte Public Works Department to demonstrate better urban source water management and leverage this effort by emphasizing outreach at multiple levels.

Project Goal: Support policy working under a new paradigm of considering the entire watershed as water supply, getting cities to look uphill when making management decisions, and to foster water management that results in restoration of habitat resiliency that can support wildlife adaptation to higher temperatures and greater drought under changing but complex and variable future climate conditions**.**

Objective 1: Restore at least 2.5 miles of stream corridor in the headwaters of Basin Creek above the Basin Creek Reservoir

Objective 2: Restore an additional 0.9 miles of ephemeral stream, headwaters in the Blacktail watershed

Objective 3: Work closely with restoration partners in the entire watershed to maximize habitat connectivity and benefit to stream resiliency.

Objective 4: Coordinate with other monitoring efforts in southwest Montana to develop a network of sites with consistent monitoring to document results across the landscape and,

Objective 5: Conduct outreach at multiple levels and to multiple audiences about water resource resiliency and the need for broad-scale headwaters restoration to reverse drying trends throughout the high divide landscape.

Project Benefits

Western Montana's climate has been changing, with trends toward higher temperatures and less winter snowfall (TNC N.d . Pederson et al, 2010}. Average spring temperatures in western Montana have increased over 4.5 degrees Fin the last 30 years (NOAA 2016b}. Average annual temperature has increased approximately 1.5 degrees (NOAA 2016}. According to Saunders et al. (2005}, the most recent five-year period was the hottest in the past 110 years in each Western U.S. river basin studied. Annual and seasonal temperatures are expected to increase at a greater speed in the future (TNC N.d}. Climate change research relevant to western Montana and the western United States predicts earlier snowmelt and ,longer, more severe drought season, due to increases in average winter and spring temperatures (NOAA National Climatic Data Center, 2016a: Pederson et al.201 o; Rieman and lsaaK, 2010}. Climate data for the Butte, M- area predict variable precipitation patterns in the future ranging only slightly higher and lower than current levels, but with more precipitation occurring in extreme storm events (TNC N.d., Saunders et al. 2005}.

Recent beaver habitat suitability modeling and related field observations conducted in the Blacktail Creek watershed identified lack of appropriate riparian shrub cover as a limiting factor for beaver colony re-establishment, but also noted widespread loss of beaver created wetland and drying trends in headwaters of many tributaries (Chadwick 2014}. Decreased water supply is one of the primary impacts of predicted climate change (Saunders et al 2005, TNC N.d} but recent beaver habitat research demonstrates that loss of headwaters wetlands is not just a water supply problem; it also is a problem related to lack of water storage in wetlands and floodplains.

Restoring and protecting wetlands, riparian areas, and floodplain connectivity are recognized as restoration tools to improve resiliency under climate change (Perry et al 2015, TNC N.d.}. Our restoration approach addresses impact of climate change by mimicking beaver damming activity in order to trap early runoff and slow water to improve groundwater recharge, and elevate the water table and channel to restore floodplain connectivity. This restoration also will sub irrigate riparian and wetland vegetation and will include temporary browse exclosures fencing to allow shrub growth outpace ungulate browse and allow riparian recovery. We have already held preliminary planning meetings with restoration partners and are focusing on areas that will provide maximum benefit for water supply for wildlife and human uses, and which will maximize habitat connectivity to support migration as species adapt to rising temperatures. The large outreach component of this project addresses climate change by educating multiple generations about the importance of resilient headwaters and by informing policy that will support projects merging source water management and habitat restoration in other areas.

Anticipated Outcomes

Specific climate change impacts this project is designed to address	Deliverables during the grant period(max 2 years)	Expected near-term (3-10 years) conservation outcomes	Expected long-term (10-50 years) adaptation gains
Drying trend in headwaters & loss of water and wetland habitat under increasing drought	Improved natural water storage, restored riparian and wetland habitat by October 2018 on 2.5 miles of headwaters tributaries above Basin Creek reservoir and .09 ephemeral and intermittent streams on private lands: Baseline monitoring established at three project sites in Basin Creek by September 2107;coordinated monitoring on all of Blacktail watershed; coordination with other initiatives in southwest Montana by October 2017	Basin Creek headwater streams improved flood plain recharge and natural water storage; riparian restoration links habitat corridors on Basin and Blacktail Creek, within the upper watershed, improving the linkage to the Big Hole and Pipestone watersheds; restored beaver habitat throughout headwaters allowing beavers to recolonize leading to expand area supporting ponds and wetlands	Large network of riparian migration corridors within the upper watershed maintained by beavers providing connectivity and thermal refuge for species adapting to rapidly-changing temperatures; extensive network of beaver complexes and related wetlands in headwaters mitigates floods, captures early runoff and protects Buttes water supply under predicted increased drought and climate variability
Headwaters habitat and water supply are at risk due to predicted increases in drought; education focusing on adaptation and watershed resiliency is needed to give future generations the tools needed to protect and restore water supplies and watersheds	Work with CFWWEP and local schools to develop long-term watershed monitoring program by may 2017, expand outreach program about watershed resiliency under climate change and present this information to 600 children and their parents and 400 high school students	Approx. 7,000 children and 5,000 parents taught about the watershed resiliency (based on current CFWEP program attendance); established long-term monitoring program documents benefits of riparian restoration and natural water storage	Students educated in the importance of functioning headwaters apply that knowledge in natural resources management careers and pass the ethic to future generations; watershed education program continues to teach thousands of students and their families about habitat and water supplies under changing climatic conditions.
Predicted drought and loss of headwaters threatens urban water supply, but current urban water management does not focus on the entire source watershed	Conduct tours, & meet with local state and federal policy makers throughout the project to present information and explore inclusion of headwaters wetland and beaver habitat restoration in future policy, incentive payments, and sourcewater projects for other urban areas	BSB staff recognizes value of headwaters wetlands to for water supply; MT.DEQ sourcewater protection and DNRC use the project to secure program funding for natural water storage projects. Other Montana cities adopt watershed restoration as a tool for sourcewater protection and resiliency	Montana has established source watershed protection and restoration polices & incentives for urban areas, State policy has an emphasis on restoring beaver populations and habitat as vital tools for maintaining water supply under changing climate

Project implementation

The project will be administered and coordinated by the Watershed Restoration Coalition of the upper Clark Fork (WRC). WRC currently oversees the restoration of Blacktail Creek for the NRDP & has been the lead local organization in securing WCS grant funds and other local match,.

Upon receipt of all grant funds the WRC will Contract with Great West Engineering for the services of Amy Chadwick, Senior Ecologist for project lead. Great West is also under an existing contract to the NRDP for low impact restoration /beaver mimicry on Blacktail Creek.

After securing the initial contract the project implementation will occur in the following order:

Year 1, 2017

Tasks

1) Project Kickoff

1) Review roles, objectives and project timelines; develop communication plan and Memorandums of Understanding (MOUs) with the project partners including: BSB Public Works, CFWEP, BNRDP, DEQ, FWP, and Montana Tech.

2) Long –Term Effectiveness Monitoring Program Development & Coordination

1) Work with CFWEP, Montana Tech & FWP's on final monitoring program design and implementation schedule.
2) Coordinate with other headwaters wetland/riparian habitat recovery monitoring efforts in south west Montana (e.g. The Nature Conservancy, MSU, Clark Fork Coalition, DEQ & USGS) to develop network of sites with consistent monitoring.

3) Permitting

1) Identify all additional project sites on Blacktail & Basin Creek, complete and submit all required permits
2) Schedule projects & coordinate volunteer assistance

4) Equipment Procurement & Contracting

1) Purchase additional stream gauges and instruments to carry out monitoring activites
2) Secure any additional contracts required for project implementation

5) Securing Baseline Information at Project Sites

1) Instillation monitoring equipment and infrastructure
2) Collect baseline Information at project sites

6) Educational Materials and Public Information Outreach Materials

1) Work with CFWEP to develop educational l and outreach materials.

Years 1 & 2, 2017-2018

Tasks

1) Implement restoration project in Basin Creek and Blacktail Creek

1) Oversee contracted crews and volunteers on instillation of projects on 2,5 miles on 5 tributaries into Basin Creek above the Basin creek reservoir and on .09 miles of newly ephemeral streams on private lands on Basin Creek below the reservoir.

2) Conduct Baselines and Preliminary Monitoring and Data Analysis

1) Coordinate with local high schools, Montana Tech, other volunteers and agency partners to conduct scheduled monitoring activities based on final monitoring plan design

2) Catalog and analysis data for coordination with other headwaters beaver mimicry/riparian restoration initiatives.

3) Public Outreach

1) Communicate project methods, named preliminary monitoring results to local public and project partners; develop media releases, presentations, and webpage maintenance

4) Conduct tours and meetings with state & local policy makers and agencies

1) Provide information to key policy makers and agencies to gain support for low-cost restoration techniques as a viable tool for source water protection and climate change adaptation**.**

5) Interim and final project reporting

Project Schedule	**Timeline**
Project kickoff; review roles objectives, tasks, and timelines with project partners	January 2017
Continue to develop long-term effectiveness monitoring program with CFWEP and local high schools and Montana Tech and FWP: coordinate with other headwaters wetland /riparian, habitat recovery monitoring efforts in southwest Montana(e.g. TNC,MSU,CFC, DEQ, and USGS) to develop network of sites with consistent monitoring of watershed resiliency at a landscape scale (first steps of this task underway in 2016)	January-April 2017
Complete project permitting, procurement of equipment and materials, and contracting; schedule projects and coordinate volunteer assistance	February.-August 2017
Install monitoring equipment and infrastructure and collect baseline data	April-September 2017
Work with CFWEP to develop educational materials about watershed resiliency and Butte water supply	April.-August 2017
Conduct baseline and preliminary effectiveness monitoring and data analysis	April 2017- October 2018
Provide instruction about watershed resiliency at public events	May – October 2017 and 2018
Implement restoration of riparian habitat and natural water storage on 2.5 miles on 5 tributaries in Basin Creek headwaters above Basin creek reservoir and on 0.0 miles of newly ephemeral streams on private lands	September 2017 –June 2018

Communicate project methods and preliminary monitoring results to local public and partners; develop media releases, presentations, and webpage materials	September 2017- December 2018
Work with policy makers/resource managers at BSB, MACO, MACD,DNRC, NRCS, and DEQ Source Water program to support low- cost restoration techniques as a viable tool for source water protection and climate change adaptation	September 2017-December 2018
Interim and final project reporting	December 2017, December 2018

Monitoring Activities

The primary objectives of the project are centered on beaver habitat restoration, restoration of important riparian corridors and stream resiliency under climate change, and effective outreach to improve public awareness about watershed resiliency and to support watershed ecosystem-based water management policies. The monitoring therefore focuses on components of beaver habitat and watershed condition that are susceptible to the influence of changing climate. Baseline monitoring is already established at current and pending restoration sites on Blacktail Creek. The monitoring program was designed with feedback from professors at Montana Tech., who hope to use the sites for student research projects and natural resource monitoring camps. The baseline monitoring to date has included the following components:

1) Monitoring groundwater elevation using intersecting transects of pedometers,
2) Baseline topographic survey of the stream and floodplain,
3) Current water and sediment surface elevations using staff gauges installed at primary beaver pond restoration sites,
4) Shrub height in wildlife exclosures relative to unprotected areas,
5) Monumented photopoints, and
6) Vegetation transects to capture expansion of wetland dominated plant communities and wetland shrub cover and height.

An example survey and monitoring design at one of the pending restoration sites is attached.

We have also worked with a MWP fish biologist to conduct baseline surveys of fish populations at established project sites, and will do the same at the new sites on Basin creek. Up to this point we have not had budget to install sufficient surface monitoring networks. The WCS grant will allow us to install pressure transducers and additional staff gauges and to support regular monitoring by local students, working with Montana Tech. and CFWEP.

The WCS grant will also install the same monitoring systems on Basin creek and conduct preliminary post-restoration data. The project success will be measured by the degree to which we see expansion of wetland vegetation, recovery of riparian shrubs, an increase in groundwater elevation, a positive response by native fish populations, and re-elevated stream channels where streams are currently incised. Eventual re-establishment of beavers and increases in other wildlife at previously-degraded habitat will be a qualitative indicator of project success.

The response of surface water temperature and flow is a key area of uncertainty related to beaver damming and beaver mimicry. While beaver dams and beaver dam analogs are expected to improve natural water storage by retaining early runoff, the total annual flow could decrease at some sites because

of increased evapotranspiration due to shrub cover and predicted climate trends. We expect late season flows to improve which would be considered beneficial even if total yield is slightly lower. Water temperatures are expected to exhibit different effects at different scales.

Funding this project in conjunction with the WCS grant and other partner's contributions would allow us to establish a local monitoring effort with local students and their technical advisors at Montana Tech. to gather sufficient data to track the response of surface water through the course of restoration and under changing climatic conditions.

The restoration and monitoring effort also has ties to other areas of Montana. The restoration currently underway in Blacktail Creek is similar to restoration occurring in other areas of southwest Montana, and the monitoring framework established for our existing work has been influenced by feedback from colleagues on other projects and at USGS and Montana Tech. Our project lead participates in a beaver mimicry monitoring committee through which we are helping to standardize monitoring for beaver mimicry and other passive restoration projects, with the goal of establishing a large cohesive data set for documenting the benefits of beaver habitat restoration under changing climatic conditions.

This grant along with the WCS funds and funds from our other partners will allow us to continue to coordinate with other monitoring efforts and integrate our data into the larger body of data to a greater degree. We are also working with the DEQ to compile information from scientific literature and restoration efforts in Montana determine the cost effectiveness of beaver mimicry to increase natural water storage change resulting from beaver mimicry projects. The restoration and monitoring projects we have established on Blacktail Creek and the larger restoration and monitoring effort we are proposing on Basin Creek through this grant and the WCS grant will constitute a major portion of the data needed to fill that data gap.

Project Budget

The project will be administered and coordinated by the WRC. The WRC is also the grantee for the WCS grant and has oversight responsibilities for the NRDP restoration of Blacktail Creek. Requested funds will assist in covering time and materials for Basin Creek portion of the project as the NRDP funds only cover Blacktail Creek.

	BNRDC GRANT	**Match Cash**	**In-kind**	**Total**
Project Administration /Project Coordination				
WRC Executive Director $50/hr. (240 hrs)	$ 2,000	$ 9,000		$ 11,000
Bookkeeper /Accountant $25.00 /hr. (120 hours)	$ 2,000	$ 1,000		$ 3,000
Indirect		$ 7,291		$ 7,291
Contracted Services				
Great West Engineering Project lead, 59 days ($696/day)	$16,000	$41,064		$ 57,064
Subcontractors project implementation, 17 days $800/day	$10,000	$13,600		$ 23,600
Outreach/monitoring, CFWEP, 32 days ($250/day)		$ 8,000	$12,000	$ 20,000
Travel (Great West & WRC)		$ 4,500		$ 4,500

Capital expenses (supplies/material/equipment)		$10,000	$27,000		$37,000
BDNF Aspen recovery & riparian restoration Materials labor and NEPA documentation on adjacent BDNF lands				$30,000	$30,000
Volunteer person hours 7 project maintenance landowners, 100 hours(@$23.50/hr.)				$2,350	$ 2,350
	Totals	$40,000	$111,455	$44,350	$195,805

Budget Notes:

Cash match all WCS grant funds
In-kind funds, CFWEP, BDNF, & volunteers
Note: NRDP funds for WRC & Great West on Blacktail Creek not included in project budget

Attachments

- Example of Water storage Loss above Basin Creek Reservoir 1995-2014 (Google Earth)
- Examples of Low cost Restoration Techniques
- Example Monitoring Design
- Letters of Support for WCS grant
- References