

ANNUAL REPORT

2018



**Wyoming Landscape
Conservation Initiative**

"Conserving world-class wildlife resources. Facilitating responsible development."



2018



CONTENTS

Mission	1
About WLCI.....	2
Members.....	3
Letter from the Chair.....	4
Introduction.....	5
Accomplishments	
Coordination and Partnerships	6
2018 WLCI Funding and Partner Contributions	7
Conservation Project Accomplishments by Conservation Themes	
<i>Maintaining and Reconnecting Wildlife Corridors</i>	
<i>and Passages.....</i>	9
<i>Improving Resilience and Function of Priority Habitats.....</i>	13
<i>Maintaining, Enhancing, and Restoring Sagebrush</i>	
<i>Communities.....</i>	18
<i>Improving Aquatic Habitat and the Distribution of</i>	
<i>Native Fish Assemblages.....</i>	22
<i>Controlling Invasive Plant Species and Restoring Ecosystem</i>	
<i>Integrity and Landscape Connectivity.....</i>	30
<i>Re-establishing Native Riparian Plant Communities</i>	
<i>and Developing Wetlands</i>	38
USGS 2018 Science Accomplishments and Products.....	42
Project Cooperators.....	46
WLCI Teams	48

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2018

MISSION

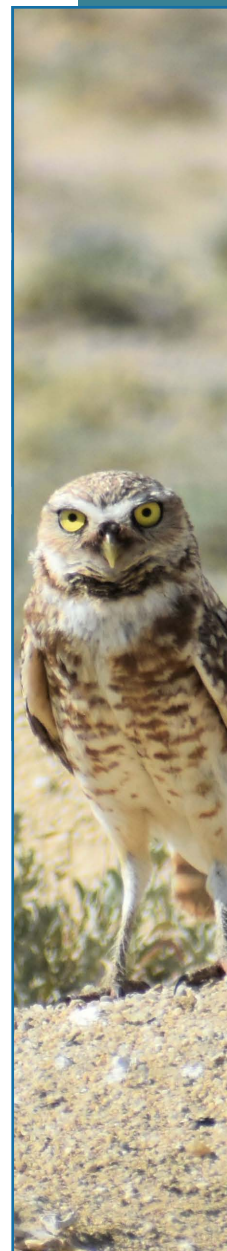
The Wyoming Landscape Conservation Initiative (WLCI) is a long-term, science-based effort to assess and enhance aquatic and terrestrial habitats at a landscape scale in southwest Wyoming, while facilitating responsible development through local collaboration and partnerships.

The WLCI...

- Exchanges information, data and research findings among partners, industry and stakeholders to improve habitat conditions and long-term viability of species at a landscape scale.
- Complements existing habitat reclamation and mitigation efforts.

WLCI Members and Cooperators...

- Conduct efficient science-based species monitoring and habitat enhancement.
- Integrate existing data with new knowledge and technologies to forecast future development of energy resources and assist in conservation planning.
- Conduct restoration and habitat enhancement activities in all habitat types with a special focus on the sagebrush, mountain shrub, aspen, riparian and aquatic communities.
- Ensure management practices support a viable livestock industry and associated open spaces.





ABOUT WLCI



The WLCI was established in February 2007 after discussions between directors of the Bureau of Land Management, the U.S. Geological Survey, the State of Wyoming, the U.S. Fish and Wildlife Service, and the Wyoming Game and Fish Department about the need for a landscape-scale approach to ensure healthy wildlife populations in areas with proposed energy development.

The WLCI program entails inventory and assessment of species and habitat to determine what habitat enhancement projects, such as vegetation treatments, are necessary. The collaborative effort represented by the WLCI is unique as it provides a means to address multiple concerns at a scale that considers all activities on the landscape, incorporates multiple needs in project implementation, and can leverage resources that might not be available for single agency projects.

An Executive Committee composed of government executives and elected officials provides the guidance and decision-making authority for the WLCI. The interagency Coordination Team (CT) manages the daily operations of the Initiative and provides oversight of the Initiative's landscape priorities and conservation implementation.

The CT works with Local Project Development Teams (LPDTs) to identify fish and wildlife habitat issues and cooperatively create projects and set conservation priorities. LPDTs include biologists, range managers, conservation districts, landowners, county commissioners and interested parties, including members of the public. Four geographically based LPDTs meet quarterly:

- Carbon County
- Lincoln/Uinta Counties
- Sublette County
- Sweetwater County



2018

M E M B E R S

Signatories on the WLCI Memorandum of Understanding

Bureau of Land Management (BLM)

The BLM administers approximately 9.3 million of the WLCI's 19 million acres. It implements and monitors on-the-ground actions to enhance habitats.

US Fish and Wildlife Service (FWS)

The FWS develops conservation measures for wildlife, plants and habitats on lands within the National Wildlife Refuge System, Wetland Management Districts and on non-federal lands through the Partners for Fish and Wildlife Program. It provides assurances for engaging in conservation and expedites environmental reviews to ensure timely project completion.

US Forest Service (FS)

The FS administers 2.8 million acres of WLCI's 19 million acres. It implements and monitors on-the-ground actions to enhance habitats.

US Geological Survey (USGS)

The USGS provides integrated science, methodology, research and monitoring, and advances scientific knowledge and information and provides technical support.

National Park Service (NPS)

The NPS provides technical assistance to the WLCI effort.

Natural Resources Conservation Service (NRCS)

The NRCS provides technical assistance to the WLCI effort.

Wyoming Department of Agriculture (WDA)

The WDA acts as a liaison between the WLCI and the agriculture community for project planning and provides assistance and technical support.

Wyoming Game and Fish Department (WGFD)

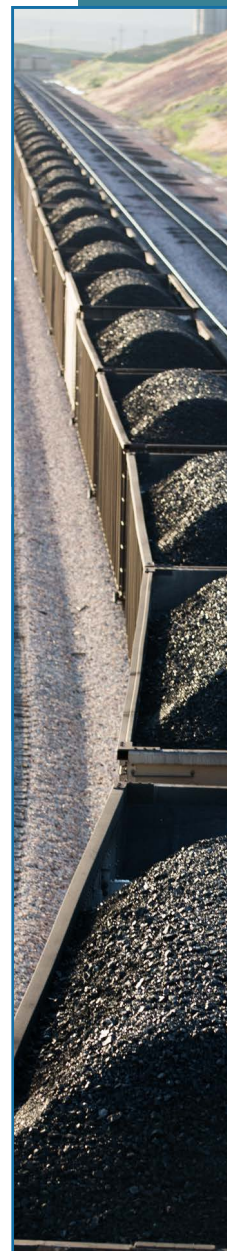
The WGFD inventories and monitors over 250 wildlife species to prioritize, plan and implement on-the-ground actions to conserve habitat and improve land management.

Southwest Wyoming County Commissions

The commissions provide local representation and direction to the WLCI.

Southwest Wyoming Conservation Districts

The districts provide local representation to the WLCI and help with technical expertise and project development at the ground level.



2018



FROM THE CHAIR



Dear Members, Partners, Cooperators, and Friends,

The year 2018 marked another extremely busy and successful year for WLCI. In addition to our remarkable on-the-ground conservation accomplishments, we paid a very worthwhile visit to the U.S. Department of the Interior and Department of Agriculture leadership and congressional representatives; completed and disseminated the WLCI 10-year report; completed the WLCI Conservation Tracking Database; and organized and presented WLCI science at the second joint science conference between WLCI and the Wyoming Chapter of The Wildlife Society.

WLCI partners developed and implemented conservation actions in sagebrush, aspen, riparian and other high priority focal habitats. BLM WLCI Project funding included over \$462,000 and partner contributions were over \$1.5 million. For every dollar WLCI contributed, there was an additional \$3.32 through partner contributions. We continued to address our landscape level priorities through projects designed to control invasive plant species, improve fish access to high quality habitat, reduce impediments to big game movement and migration corridors, and improve seasonal wildlife habitat for Greater sage-grouse and numerous other wildlife species.

A big “Thank You” to Mary Thoman (representing Conservation Districts and the WLCI Executive Committee), Zack Bowen (USGS Science Lead), and Jim Wasseen, (WGFD, WLCI Coordination Team) for traveling to Washington D.C. in order to inform new federal agency leaders about WLCI and to share our exciting 10-year success story. Over the course of three days they met with agency leadership within the BLM, NRCS, USFWS, USGS, and the USFS and with U.S. Senators John Barrasso and Mike Enzi and U.S. Congresswoman Liz Cheney.

WLCI also celebrated another very rewarding science milestone: our second joint science conference with the Wyoming Chapter of the Wildlife Society held in Laramie. The conference highlighted diverse information and findings on priority species and habitats important to WLCI. Over 200 people participated in the conference and workshops.

It has been a great privilege and honor to serve as the Chair of WLCI’s Executive Committee over the past two years. We accomplished a lot of important on-the-ground conservation and we successfully shared the WLCI story across the broader conservation community. I appreciate the hard work and diligence of the Coordination Team, Local Project Development Teams and other WLCI teams and committees, and the myriad state and local partners without whose support WLCI could not succeed. Finally, I’d like to extend a warm welcome to Kent Connelly as our next Executive Chair: Kent represents County Commissioners within WLCI and has the breadth of knowledge and experience to ensure the continued success of WLCI.

Respectfully,

Tyler A. Abbott
WLCI Executive Chair



2018

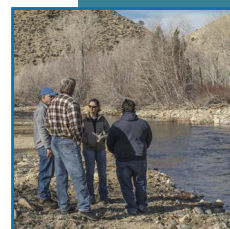
INTRODUCTION

The WLCI established ecologically based landscape priorities as part of the development of its Conservation Action Plan. Starting with this annual report, WLCI is organizing its conservation accomplishments by its landscape priorities. These priorities reflect a consensus among WLCI partners developed over WLCI's 11-year history and are based on the conservation issues and actions necessary for long-term sustainability of Wyoming's landscapes. WLCI landscape priorities are rooted in ecological principles, which include habitat and species diversity, habitat integrity, ecosystem resistance and resilience, species connectivity and movement, species interactions, and population dynamics. WLCI has three primary Landscape Priorities:

1. Maintaining, Enhancing, and Restoring Priority Habitats
2. Maintaining and Improving Habitat Connectivity for Fish and Wildlife Movement and Migration
3. Managing Invasive Plant Species. WLCI implements conservation actions to address these landscape priorities across focal habitats to benefit priority species.

Focal habitats include sagebrush, mountain shrub, aspen, riparian, and aquatic systems. Examples of priority species include sage-grouse, sagebrush obligates, mule deer, pronghorn, pygmy rabbits, Colorado River cutthroat trout and other native fish species. WLCI implements their activities at select geographic priorities that are aligned with Wyoming Game and Fish Department's Strategic Habitat Plan. This year we are reporting accomplishments for our coordination and partnership activities and our conservation accomplishments which are organized by the following themes:

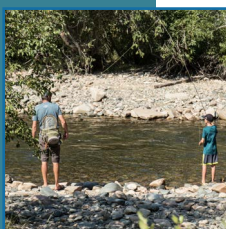
1. Maintaining and reconnecting wildlife corridors and passages in southwest Wyoming;
2. Improving the resilience and function of priority habitats to address drought, development, and other transforming events;
3. Maintaining, enhancing and restoring sagebrush communities that support sage-grouse and other sagebrush obligate species;
4. Improving aquatic habitat and the distribution of Colorado River Cutthroat Trout and other important native fish species;
5. Controlling invasive plant species and restoring ecosystem integrity and landscape connectivity;
6. Re-establishing native riparian plant communities and developing wetlands in the Upper Green River Basin.





ACCOMPLISHMENTS

Coordination and Partnerships



In 2017, WLCI hit a milestone worth celebrating - its first ten years successfully implementing high priority conservation actions in southwest Wyoming. In light of this momentous occasion the Coordination Team (CT) produced an informative brochure during 2018 that highlights WLCI's accomplishments over its first 10 years. These successes were also shared with leaders in Washington DC. A small delegation composed of the US Geological Survey (USGS), Conservation District Executive Committee representatives and the Wyoming Game and Fish Department's Coordinator spent a week in Washington DC to meet with the Bureau of Land Management, Natural Resource Conservation Service, US Fish and Wildlife Service, USGS, US Forest Service, and Wyoming's congressional delegation. We shared information on our many conservation and science accomplishments and discussed how bureau/agency level support helped us with these accomplishments and our plans for the next 10 years.

During 2018, WLCI welcomed the new BLM Coordination Team member. In June, BLM hired Ms. Erica Husse to fill the role. She brings a wealth of experience and knowledge from the fire and rehabilitation side of the BLM and state office programs. We also welcomed the Wyoming Mining and Natural Resources Foundation (WMNRF) as a local partner. The Coordination Team will continue to identify common issues and priorities with them and identify collaborative projects and work on conservation activities together. We also celebrated our second joint science conference with the Wyoming Chapter of The Wildlife Society in November (see more on this USGS accomplishments on page XX).

Despite funding challenges, WLCI had another successful year with BLM WLCI funds covering just over \$462,000 and partner contributions (which includes BLM State Program funds) covering over \$1,500,000. In other words, for every dollar WLCI contributed, partners contributed an additional \$3.32. During 2018, WLCI had 17 active projects which addressed issues in aspen, mountain shrub, riparian and sagebrush focal communities. Five projects were primarily designed to control of invasive species; two projects erected wildlife friendly fencing to reduce barriers to pronghorn and mule deer movement and to protect aspen from excessive browsing. Six riparian projects included stream bank enhancements, riparian tree and shrub plantings, fencing to protect riparian areas, and improving fish passage by replacing undersized, perched culverts with bridges or larger culverts. Four other projects enhanced the aspen, mountain shrub, and sagebrush ecosystems through the removal of conifer trees, herbicide applications, masticating brush to encourage new growth, and ripping aspen roots to stimulate sprouting. These projects and associated activities were accomplished through numerous coordination meetings, field trips, and work sessions. The WLCI CT members met with NGOs, permittees, landowners, other agencies, and entities to coordinate WLCI activities.

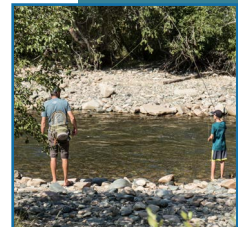
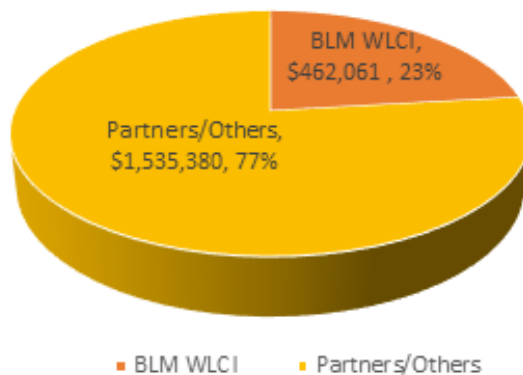


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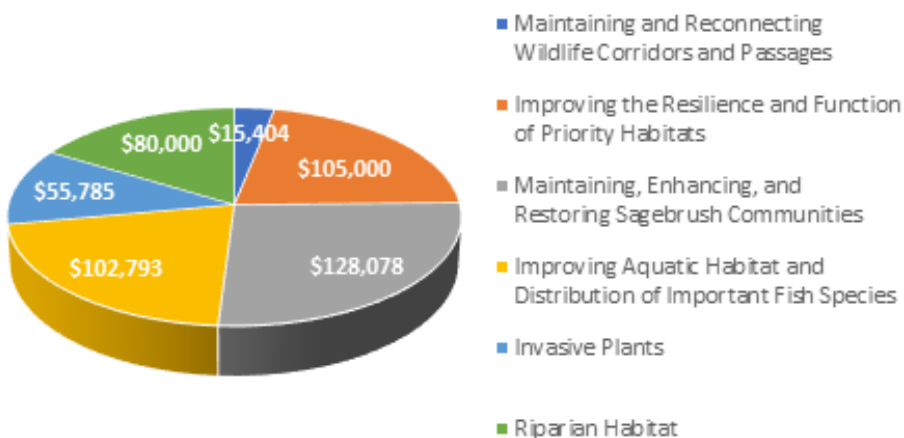
ACCOMPLISHMENTS

2018 WLCI Funding and Partner Contributions

\$1,997,440 - Total 2018 WLCI Project Expenditures
(\$3.32 Leveraged Funding)



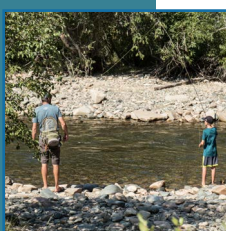
WLCI 2018 Funding: BLM Funds by Themes



2018



ACCOMPLISHMENTS



WLCI Funding for FY2018 (by Conservation Theme)

Project Name	Lead Agency	BLM Funding	Partner's Contributions
Maintaining and Reconnecting Wildlife Corridors and Passages			
Red Rim- Daley Wildlife Habitat Management Area (WHMA) Improvements	WGFD	\$15,404	\$6,639
TOTAL		\$15,404	\$6,639
Leveraged \$0.43			

Improving the Resilience and Function of Priority Habitats			
Aspen Conservation Joint Venture	LSCD	\$25,000	\$238,023
Little Mountain Aspen	WGFD/BLM	\$30,000	\$55,700
Wyoming Range Mule Deer Habitat-South	WGFD/BLM	\$50,000	\$200,000
TOTAL		\$105,000	\$493,723
Leveraged \$4.70			

Maintaining, Enhancing, and Restoring Sagebrush Communities			
Red Creek Habitat Enhancement Project	BLM	\$108,078	\$5,000
Upper Platte Valley Weed Management Area	BLM	\$20,000	\$30,820
TOTAL		\$128,078	\$35,820
Leveraged \$0.28			

Improving Aquatic Habitat and Distribution of Important Fish Species			
Bitter Creek Restoration	SWCCD	\$30,000	\$335,816
Coal Creek Stabilization	WGFD	\$3,066	\$296,591
La Barge Creek Fish Passage	TU	\$22,227	\$39,200
Riverbend Ranch/McNeel Feedground	USFWS	\$25,000	\$119,262
Beaver Creek Fencing	TU	\$22,500	\$149,628
TOTAL		\$102,793	\$940,497
Leveraged \$9.15			

Controlling Invasive Plant Species			
Blacks Fork/Muddy Creek Invasives	UCWPD	\$35,243	\$2,660.44
Ferris Mountain WSA Leafy Spurge Treatment	BLM	\$10,000	\$17,197
Sand Creek Salt Cedar Control	BLM	\$10,542	\$3,842
TOTAL		\$55,785	\$23,699
Leveraged \$0.42			

Re-establishing Native Riparian Communities and Developing Wetlands			
Narrow Leaf Cottonwood Stand Replacement	USFWS	\$80,000	\$35,000
TOTAL		\$80,000	\$35,000
Leveraged \$0.44			



2018

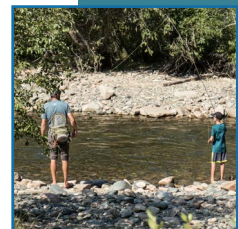
ACCOMPLISHMENTS

Maintaining and Reconnecting Wildlife Corridors and Passages

Some of the most spectacular big game migrations in North America takes place in the WLCI area. This includes one of America's longest known mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*) migration routes. Wildlife migration routes and corridors are paths ungulates use to travel between seasonal ranges and typically includes stop over sites that provide food and rest during migration. Big game animals use migration as a survival strategy, in the spring and summer they maximize access to peak food sources and access to parturition areas; then in the fall they travel milder climates to escape extreme winter conditions. Seasonal movement patterns and long distance migrations reduce the risks from drought, severe weather, and fire by moving to ranges with better conditions. WLCI is interested in migration routes and passages for all species, but its primary focus for landscape-scale conservation actions are focused on mule deer and pronghorn. The health and maintenance of mule deer and pronghorn herds rely on the effective maintenance and management of migration corridors and seasonal ranges.

Maintaining migration and seasonal movement corridors are difficult, especially if managers do not have detailed information about the habitats associated with these corridors or specific movement patterns of pronghorn and mule deer. However, recent studies from WLCI partners and others have improved our knowledge and understanding of mule deer and pronghorn seasonal movement patterns and long distance migration patterns. New GPS technologies are showing mule deer do not deviate much from their paths from year to year. These studies also identified numerous impediments that restrict or disrupt seasonal movement patterns and long distance migration. Restrictions or disruptions are often associated with changes in timing, rate, and direction of movement, passageway bottlenecks, and altered or limited stop over periods for rest and food. The most common impediments in southwest Wyoming are related to roads, fences, residential development, and energy development.

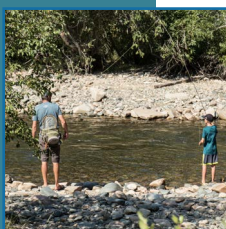
WLCI supports numerous projects and activities that are designed to reduce issues associated with movement impediments, maintaining and improving seasonal ranges and stopover sites along migration routes, and using easements to ensure future connectivity. Removal of obsolete fences and converting fences to wildlife standards was identified by local project development teams (LPDTs) as one of the most effective ways to link big game to migration corridors and crucial seasonal habitats, reduce adverse ecological effects of habitat fragmentation, and reduce wildlife stress, injury, and mortality. Fencing is also used to restrict movement of wildlife. This is usually done to guide big game to use underpasses and overpasses to cross roads. Monitoring of these crossings indicate that they are effectively allowing mule deer, pronghorn and



2018



ACCOMPLISHMENTS



other wildlife to safely cross roadways to access their seasonal ranges.

Summary of 2018 Activities:

During 2018, two ongoing fence projects were continued to help improve mule deer and pronghorn access to seasonal ranges and long distance migration routes. Two of the ongoing fence projects focused on removing woven wire fences that were barriers to movement by mule deer and pronghorn. Over 2.5 miles of fence were removed and 0.5 mile of fence was converted to meet wildlife standards on public lands.

Detailed Project Activities:

Red Rim - Daley Wildlife Habitat Management Area (WHMA) Improvements

Project Objectives: The objective of the project is to improve wildlife habitat structure and resilience by addressing noxious weeds, making improvements to water infrastructure, and eliminating woven and five-wire fencing and building new fences that meet wildlife friendly standards improve access to important habitat for all wildlife, especially pronghorn.

Partners: Partners include the Wyoming Game and Fish Department (WGFD), Bureau of Land Management (BLM) Rawlins Field Office, and grazing permittees.

2018 WLCI Contributions: \$15,404 (WLCI Total Contributions since 2009: \$218,404)



Figure 1. New fencing installed in the Red Rim Daley WHMA project area.



2018

ACCOMPLISHMENTS

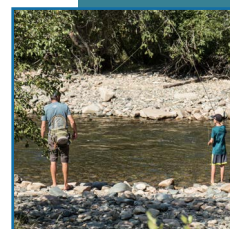
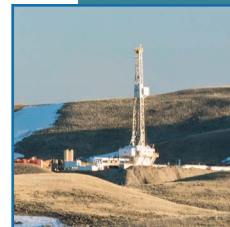
2018 Project Accomplishments & Implementation: Progress continued with the BLM and the grazing lessee on finding solutions to provide stock water into the shipping pasture. Initially, a pipeline was considered, but the artesian well from which the water would come, may not have the necessary capacity. The removal of 2.65 miles of unnecessary fencing in the western part of the shipping pasture was completed via contract. A half mile of new fence was constructed to make the shipping pasture smaller and more “user-friendly” as well as to alleviate some erosion issues created by the old fence line. The new, re-routed fence incorporates a three-wire design which is more wildlife-friendly than the original fence. WGFD contributed to contract oversight and provided all the materials for the new fence. Also, in 2018, WGFD Habitat and Access personnel completed repairs to wildlife/livestock watering projects completed via contract with WLCI funding in 2016. Three leaking water tanks were repaired and two above-ground water storage tanks were re-plumbed.

Red Rim - Grizzly WHMA Fence Conversion

Project Objectives: This project is designed to improve big game access and to move and migrate across the Red Rim Grizzly WHMA. This project will replace existing woven-wire and 6-strand barbed wire fence to 4-strand wildlife-friendly fencing along the Upper Muddy Creek within the Red Rim Grizzly WHMA.



Figure 2. Four-strand fence installed to replace woven fence in the Grizzly WHMA project area.



2018



ACCOMPLISHMENTS



Partners: WGFD

2018 WLCI Contributions: \$0 (WLCI Total Contributions since 2008: \$228,000)

2018 Project Accomplishments & Implementation: No accomplishments were completed, materials were purchased in FY 2017. There is enough fencing materials to complete one and a half miles on fencing conversion in mule deer migration corridors within the Grizzly unit scheduled to be implemented in FY 2019.



Project Monitoring: Newly constructed fences are monitored following construction to ensure they meet wildlife friendly WGFD design specifications. Converted fences are monitored in the spring for maintenance issues following the winter, and again in the summer and fall for potential damage caused by livestock or wildlife. Photos are taken pre and post conversion and monitored for any wildlife issues.





2018

ACCOMPLISHMENTS

Improving Resilience and Function of Priority Habitats

Sagebrush steppe, aspen, and mountain shrub communities are focal habitats in the WLCI area. Aspen stands are hotspots of biodiversity, providing shelter and forage for elk, moose and mule deer, stopover habitat for dozens of species of migrating songbirds during spring and fall, and providing cool, moist microclimates that support amphibians, reptiles, and many invertebrates, such as snails. Aspen in the WLCI area are susceptible to sudden aspen decline, a term referring to the fact that some aspen stands are not regenerating, while others are not recovering from natural disturbances such as fire. In other places, there is concern about the levels of fir and spruce encroaching into stands of aspen. Heavy browsing by large ungulates, drought (moisture and heat) related stress, and disruption of the natural fire regimen have all been cited as contributing factors to priority habitat decline.

Mountain shrub communities are transitional areas that lie between sagebrush habitats and conifer forest habitat at higher elevations. Mountain shrub provides parturition cover for mule deer and other large ungulates cover and forage during ungulate seasonal migrations, and early winter browse for these same animals. In addition, mountain shrub habitats support unique bird and small mammal assemblages. Like aspen, mountain shrub habitats are also susceptible to climate changes, energy development, heavy browsing by ungulates, and altered fire regimens. WLCI partners are working in all three of these habitat types to improve vegetative health and reduce stress that better-enable these communities to be resilient to fire, invasive plant species, heavy browsing, drought conditions, and disturbances from development.

Summary of 2018 Activities:

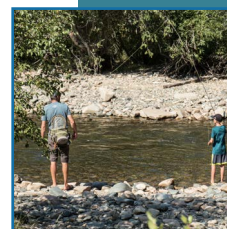
Habitat improvements occurred throughout the Wyoming Range, Little Mountain, and the Sierra Madres to improve habitats for Mule Deer and Sage Grouse. Treatments included a 10-acre enclosure to protect aspen, over 600 acres of aspen ripping to stimulate new tree growth, 2,748 acres of mechanical tree/shrub removal, and nearly 500 acres of prescribed burning.

Detailed Project Activities:

Little Snake Aspen Joint Venture

Project Objectives: The Little Snake River Conservation District (LSRCD) is working to improve and enhance habitat conditions and resiliency in critical aspen, sagebrush, mountain shrub, and wet meadow habitats for sage grouse, mule deer, and other wildlife species.

Partners: Little Snake River Conservation District, H&C, LLC, Baggs Mule Deer Working Group, WGFD, Wyoming Wildlife and Natural Resource Trust (WWNRT),





ACCOMPLISHMENTS

Warren E&P, and BLM

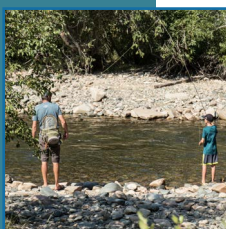


Figure 3. Juniper thinning in the Little Snake Aspen Joint Venture project area.

2018 WLCI Contributions: \$25,000 (WLCI Total Contributions since 2009: \$107,000)

2018 Project Accomplishments & Implementation: The LSRCD met with Baggs Mule Deer Working Group and the BLM Juniper Treatment ID team to coordinate habitat treatments and priorities consistent with Baggs Mule Deer Habitat Plan and to tour proposed juniper treatment locations and other scopes of work on BLM lands. Accomplishments include: ripping 628 acres of aspen and masticating & cutting 526 acres of juniper on Mule Deer winter range; brush beating 366 acres of decadent mixed mountain shrub/sagebrush communities; and applying herbicides to 2,795 acres of cheatgrass in mule deer winter range.

Project Monitoring: Established and initiated project photo-points.

Little Mountain Aspen and Riparian

Project Objectives: Summer concentrations of ungulates in Little Mountain aspen stands encourage excessive browsing of young aspen regeneration. Browsing impacts to aspen suckers at many locations continue to impede vertical growth, and some sites exhibit browsing severe enough to cause retrogression and death of aspen suckers.



2018

ACCOMPLISHMENTS

Ungulate browsing not only limits vertical growth, but also weakens vigor and subjects aspen regeneration to losses from disease and insects. The cumulative effects of ungulate browsing likely are preventing enough young aspen trees from growing to maturity and being able to replace older trees in a stand when they die, and ultimately reducing the amount of aspen habitat present on the Little Mountain landscape.

Project partners completed temporary fencing of 3 aspen stands on Little Mountain in the upper Carrant Creek watershed between 2015 and 2016. BLM has completed NEPA analysis and approved 12 more aspen stands for temporary fencing. Phase III proposes to purchase and erect 3,800 additional feet of modified steel jack fencing to preclude elk, moose and cattle use at an additional 10 acres aspen stand. The purpose of excluding most ungulate use is to encourage unimpeded vertical growth of aspen regeneration for stand replacement and promote healthy aspen habitat conditions. Once monitoring shows young aspen trees have grown to a height where they are no longer susceptible to browsing, the fencing will be dismantled and moved to another identified aspen stand nearby in need of protection. Additional phase III fencing is needed to expedite moving fence through the rotation of all 12 aspen stands identified for protection in a timely manner, so that aspen regeneration at a given stand is not lost to browsing before the site can be protected.

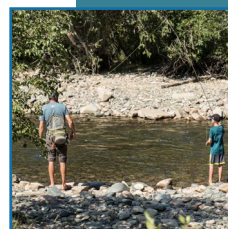
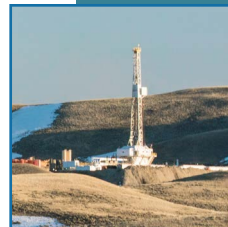


Figure 4. Project members work to install steel jack fence near Little Mountain aspen stands to exclude ungulate use and promote unimpeded vertical regeneration.

Partners: Muley Fanatic Foundation (MFF), WGFD, BLM, Seedskaadee Chapter of Trout Unlimited (TU), R&M Welding, Bowhunters of Wyoming, and Sweetwater County Corrections.



ACCOMPLISHMENTS

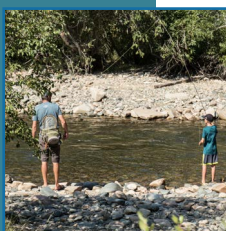


2018 WLCI Contributions: \$30,000 (WLCI Total Contributions since 2015: \$205,000)

2018 Project Accomplishments & Implementation: The MFF and WGFD representatives met with R&M Welding to coordinate fence fabrication during the winter months. The BLM completed NEPA review and approved the project. Coordination occurred with project partners for fence delivery and construction.



Through a collaborative effort between MFF, WGFD, BLM, Seedskaadee TU, R&M Welding, Bowhunters of Wyoming, and inmates from Sweetwater County Corrections on a community work release program installed 3,800 ft of temporary steel jack fencing to protect 10 acres of severely browsed aspen regeneration on Little Mountain. This is the final phase of an initial three phased effort to protect aspen regeneration and promote healthy aspen stands in the upper Currant Creek watershed.



Project Monitoring: The WGFD established an aspen regeneration Live Dead Index survey transect inside the enclosure to evaluate aspen response to protection from ungulate browsing and determine when the temporary fence will be dismantled and moved to another location.

Wyoming Range North Mule Deer Habitat Improvements

Project Objectives: The purpose of this project is to improve overall vegetation health in crucial mule deer winter, transition and parturition ranges. The project will benefit the landscape by increasing sagebrush vigor and stand structure, seed production and regeneration. Forb diversity and biomass is also expected to increase, as well as grass diversity and percent composition, and aspen regeneration. This project supports the Pinedale RMP objective to maintain and enhance big game habitats. In particular, this project addresses declining mule deer habitat conditions and supports big game populations at WGFD planning objective levels.

Partners: WGFD, BLM, WVNRT, MFF, Rocky Mountain Elk Foundation (RMEF), Exxon, Private Landowners, and Permittees

2018 WLCI Contributions: \$0 (used remaining funds from 2017), (WLCI Total Contributions since 2012: \$340,000)

2018 Project Accomplishments & Implementation: The project successfully treated 1,200 acres of sagebrush, as well as 263 acres of conifer encroached aspen. Slash piles from 2016 were burned across 490 acres. Cheatgrass control across 6,000 acres was completed, with 2,500 acres of that being hand picked by a field crew. Additionally, 3 range riders were hired to assist with resting the previously treated areas from livestock use.



2018

ACCOMPLISHMENTS

Project Monitoring: Pre-monitoring of the vegetation was conducted at representative sites for the treatments implemented this year. Post treatment monitoring was conducted on 2017 treatment sites.

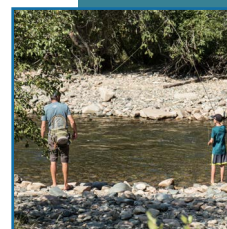
Wyoming Range Mule Deer Initiative South Mule Deer Habitat Improvements

Project Objectives: The objectives of this project are to inventory, enhance, protect, and restore Mule Deer Habitat.

Partners: WGFD and BLM

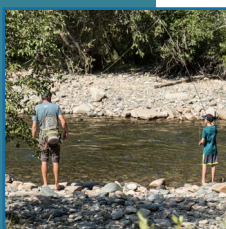
2018 WLCI Contributions: \$50,000 (WLCI Total Contributions since 2018: \$50,000)

2018 Project Accomplishments & Implementation: In the project planning phase the BLM continued to work with cooperators including the Wyoming Game and Fish Department, Uinta County Weed and Pest, Lincoln County Weed and Pest, and Private Landowners to map, prioritize, and determine treatment areas regardless of ownership within the Kemmerer Field Office. The project mechanically treated 100 acres of conifer encroached sagebrush, within mule deer crucial winter range.





ACCOMPLISHMENTS



Maintaining, Enhancing, and Restoring Sagebrush Communities

Sagebrush habitats in southwest Wyoming support a wide variety of sagebrush-obligate wildlife. Perhaps best-known sagebrush obligate is the sage-grouse, which was successfully kept off of the Endangered Species list after coordinated efforts by state and federal resource management agencies to conserve sage-grouse habitat in all states where it occurs. Other Species of Greatest Conservation Need (SGCN) that inhabit sagebrush in the WLCI area include Wyoming pocket gopher (*Thomomys clusius*), sagebrush (formerly sage) sparrow (*Artemisiospiza nevadensis*), Great Basin spadefoot toad (*Scaphiopus Intermontanus*), and northern sagebrush lizard (*Sceloporus graciosus graciosus*), to name just a few. Each of these species either spends their entire life or at least one critical season (e.g., breeding, winter) in sagebrush habitats.

Within WLCI, the Wyoming Game and Fish Department designated priority areas of sagebrush habitat based on the occurrence of these and other SGCN. Many of these and other areas are affected by competing resource-use activities, invasive plant species, and changing precipitation and temperature patterns, all of which may impact SGCN and other wildlife. Maintaining, enhancing, and restoring these areas requires a suite of management activities, many of which require substantial commitment of resources.

The WLCI Coordination Team prioritizes work in crucial sagebrush habitats through solicitation of work proposals from Local Project Development Teams, then evaluates each proposal based on merit in the form of acres treated and direct benefit to the target resource or species.

Summary of 2018 Activities:

Ongoing projects are designed to maintain or improve the quality of sagebrush habitat. Activities include treating numerous acres of invasive plant species and removing junipers from sagebrush communities. Leafy spurge, thistle, and spotted knapweed treatments were treated on 620 acres on the Upper Platte Valley weed management project, and 81 acres of fir and juniper removal treatments were completed on the Red Creek Habitat Enhancement project.

Detailed Project Activities:

Red Creek Habitat Enhancement

Project Objectives: The Red Creek Enhancement project is a continuation of efforts to protect, maintain and enhance sagebrush communities within the Little Mountain and Pine Mountain areas. Historically the Little Mountain ecosystem has shown resilience during and after wildfire events; however the exclusion of fire taking its natural role



2018

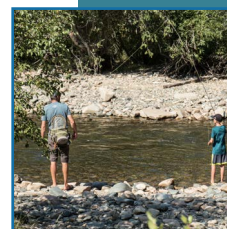
ACCOMPLISHMENTS

within the ecosystem has allowed conifer to expand into the landscape. This expansion of conifers alters the vegetative characteristics and composition within the landscape, which provides critical habitat (terrestrial and aquatic) that many species depend on. As these conifers mature, their canopies encroach into the surrounding areas. As a result, understory herbaceous species and sagebrush communities continue to decline. This shift of vegetative composition can result in, erosion, reduced seasonal stream flows, reduction of forage, loss of habitat, habitat cover, introduction of invasive species, and increased risk of uncharacteristic fire behavior.

Partners: BLM, MFF, RMEF, WWNRT, and WGFD

2018 WLCI Contributions: \$29,000 (WLCI Total Contributions since 2018: \$108,078)

2018 Project Accomplishments & Implementation: NEPA and Utah BLM permission was received in 2016. The State of Utah's Trust Lands Administration granted permission to treat conifer in 2018. The BLM Fire Staff treated 81 acres in fir and juniper (lop and scatter). Most of the subalpine fir was done on BLM land while horizontal juniper thinning was done on WY State land. Limited work was scheduled and accomplished due to the severity of the fire season and timing restrictions within the Little Mountain and Red Creek area. The other projects within The Red Creek Enhancement project area are still in the NEPA phase.



Upper Platte Valley Weed Management

Project Objectives: The Upper Platte Valley Weed Management Area project includes the inventory, monitoring, and treatment for noxious weeds; mainly leafy spurge, musk thistle, Canada thistle, and spotted knapweed. Treatment consists of herbicide applications and manual removal. One of the main objectives is to prevent weed encroachment onto the adjacent Forest Service and private lands and restrict weed infestation to the currently affected landscape. The other objective is to remove or contain other noxious weeds where possible to prevent further degradation of, and to improve wildlife habitat quality and livestock forage.

The Upper Platte Valley area provides crucial winter habitat and seasonal habitat for elk, deer, antelope, and bighorn sheep. Most of this area falls within core habitat for the Greater sage-grouse, is used for livestock grazing, and is heavily used for recreation and hunting.

This project is an informal partnership between the BLM, Carbon County Weed and Pest District (CCWPD), and multiple land owners. Each landowner implements treatments on their private land. Not all private landowners reported their activities, so actual treatment acreages and funds spent are under-represented. There are several



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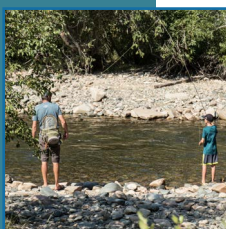
other ongoing projects in the area including; the Platte Valley Mule Deer Initiative, cheatgrass treatment projects, the Riparian Habitat Improvement & Wildlife Friendly Fence Conversion in Platte Valley WLCI, and juniper management and fuels reduction (including School & Moore's Creeks). Timber sales are also proposed in the future to enhance forest health.

Partners: BLM, CCCWPD, Platte Valley Habitat Partnership (PVHP), and Private Landowners



2018 WLCI Contributions: \$25,000 (WLCI Total Contributions since 2014: \$177,500)

2018 Project Accomplishments & Implementation: NEPA was completed for this project previously. The ranch owners were contacted for access and to discuss priority areas for treatments. Contractors were hired through the Carbon County Weed & Pest District (CCWPD) via BLM Cooperative Agreement. Inventory for weeds, chemical treatments of known and new infestations, and monitoring of past treatments were carried out on state, federal, and private lands in June, July, September, and October of 2017.



Regularly treating this area in the past has thinned infestations to the point that most locations do not need aerial treatments. In order to continue to reduce infestation density, on the ground infestation maintenance must continue.



Figure 5. Mature leafy spurge treated with herbicide.



2018

ACCOMPLISHMENTS

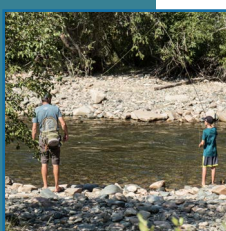
Treatments were also completed by the ranch owners and CCWPD. There are landowners that conduct their own treatments on their private lands; these treatments, typically, are not reported, so the actual treatment acreages and funds spent are under-represented.

In 2018, three quarters of the known infestations (500 acres) on BLM land were treated and/or monitored. Only one new musk thistle location was identified within the Bennett Peak area. Most of the treatments conducted were in the Bennett Peak area, which continues to have the greatest concentration of known weed infestation sites. Treatments conducted in the Encampment River Campground and Miner Creek area were completed by BLM staff and CCWP contractors. This allows the staff to treat and monitor their treatment and the extent of the thistle infestation and lifecycle to promote more extensive future monitoring.





ACCOMPLISHMENTS



Improving Aquatic Habitat and the Distribution of Native Fish Assemblages

Numerous rivers and streams in the WLCI area support sensitive fish populations. The primary conservation objective being addressed by the local project development teams (LPDTs) is to ensure sensitive fish species have access to as much suitable habitat as possible for seasonal and reproductive needs. This is primarily being accomplished through the removal of pilings, removing or replacing diversion structures, reducing bank erosion, increasing the number and quality of pools, balancing pool to riffle ratios, and reducing the temperature of water at select locations. Other activities are directed at increasing juvenile fish habitat, preventing hybridization between sucker species, and increasing water quantity and fish use in transitional areas (between cool water and warm water fish zones).

The LPDTs have prioritized fish species identified by WLCI partners as species of greatest conservation need. These include bluehead sucker (*Catostomus discobolus*), flannemouth sucker (*Catostomus latipinnis*), roundtail chub (*Gila robusta*), Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*), Bonneville cutthroat trout (*Oncorhynchus clarkii utah*), and northern leatherside chub (*Snyderichthys copei*).

Treatment approaches and treatment areas largely address issues and needs identified for Aquatic Priority Areas in the WGFD Basin Management Plan. Project locations have been identified by the BLM, USFS, County Conservation Districts, Trout Unlimited (TU), and USFWS Partners Program.

Proposed treatment objectives include removing barriers and impediments to fish movement; creating or maintaining fish barriers where beneficial to specific species; protecting genetics; developing rock sills to improve hydrologic function and increase water flow to side channels; increasing fish population numbers and maintaining their diversity; removing or treating unwanted invasive fish species; reducing impacts from sedimentation resulting from erosion; reducing salinity and environmental contamination; and increasing the resilience of aquatic habitats to buffer against prolonged droughts and climate change.

Summary of 2018 Activities:

During 2018, WLCI partners moved forward on planning, permitting, and design-related issues to improve stream habitats, and many will improve habitat for native cutthroat trout. The Coal Creek Stabilization project completed stream improvements on 2 miles of Bonneville Cutthroat trout habitat. The Beaver Creek Fence project utilizes high tensile electric fence to improve riparian habitat for Colorado Cutthroat Trout. LaBarge Creek Fish Passage installed one bridge and two culverts on tributaries to LaBarge Creek to open nearly 4 miles of stream for Colorado Cutthroat Trout. The



2018

ACCOMPLISHMENTS

Riverbend McNeel project is working to improve habitat for Snake River Cutthroat as well as improve irrigation infrastructure. Finally, the Bitter Creek Headcut is completed with the planting of native trees and shrubs and minor streambank enhancements.

Detailed Project Activities:

Coal Creek Stabilization

Project Objectives: This project was designed to address stream channel instability, fish passage and road access issues in the Thomas Fork watershed on BLM, State, and private lands. Phase I in Fall 2015 completed culvert installation and improved fish passage at two sites on Coal and Little Muddy creeks. Phase II of this project was completed Summer 2018 with construction of the instream and road drainage work for this project.

Partners: WGFD, BLM, Private Landowners, and Permittees

2018 WLCI Contributions: \$0 (used remaining funds) (WLCI Total Contributions since 2012: \$114,006)

2018 Project Accomplishments & Implementation: Final planning, designs, and permitting was completed in winter/spring 2018 prior to construction. Phase II of the project occurred in summer 2018 with project construction, revegetation, re-seeding of project sites and exclosure fencing construction. The Coal Creek project utilized remaining WLCI funds to complete the project. Communication of project objectives and timelines were agreed upon by all the partners, and the primary landowner (3Y Livestock) has been very pleased with construction results.

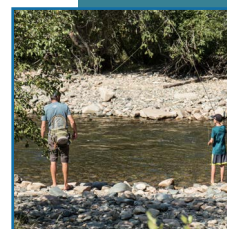


Figure 6. (Left to right) Before and after photos of bank stabilization on Coal Creek

Project Monitoring: Pre-implementation monitoring was completed in summer 2017 to document sediment contributions from project banks that will be addressed in 2018. Prior to construction in 2018, longitudinal profiles were surveyed on select project sites to monitor channel changes.



ACCOMPLISHMENTS

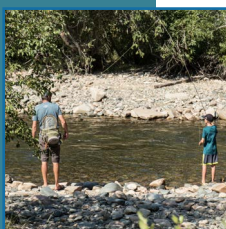


Beaver Creek Fencing

Project Objectives: The objective of this project is to restore healthy riparian vegetation conditions along Beaver Creek and subsequently improve stream habitat. Beaver Creek is a major tributary to the Henry's Fork River. Currently, Colorado River cutthroat trout (CRC) occupy the headwaters of Beaver Creek with reduced connectivity with the Henry's Fork River because of limited habitat in the lower reaches.



TU and WGFD electro-shocked the creek for presence of CRC and evaluated riparian vegetative cover. They observed many pastures had little riparian vegetative cover and eroding banks.



Pressure from cattle grazing appeared to be a major contributing factor to these issues. The lower reach of Beaver Creek has historically been grazed and is now straight, widened and has incised banks causing higher water temperatures in the summer and little habitat for trout. The bank erosion also contributes to a higher sediment load in the creek.

After working with the landowner on several other conservation projects, it was agreed that installing riparian fence with water gaps on the ranch would not only benefit the fishery and wildlife, but also allow more flexibility to manage cattle operations.

This fence will provide riparian habitat and channel stability on approximately 134 acres on the private lands that will benefit CRC in Beaver Creek. This project will also improve and open up new habitat for trout in the Henry's Fork River and promote connectivity among populations, as well as restore cover and habitat for riparian obligate species, such as the yellow-billed cuckoo, mule deer, waterfowl and moose.

Partners: TU, WGFD, WWNRT, National Fish and Wildlife Foundation, USFWS, and Private Landowners

2018 WLCI Contributions: \$22,500 (WLCI Total Contributions since 2018: \$22,500)

2018 Project Accomplishments & Implementation: TU collaborated with the ranch owners on Beaver Creek, a tributary to the Henry's Fork River near the Utah state line on the North Slope of the Uinta Mountains, to install riparian corridor fencing with livestock water gaps along 3.5 miles of Beaver Creek. The WGFD and WLCI partnered with the effort by contributing Habitat Trust Fund and WLCI cost share funding.

The corridor fencing defers livestock grazing from 103 riparian acres, which is expected to improve degraded stream habitat to benefit trout and enhance cottonwood/willow riparian habitat conditions to benefit moose, mule deer, elk, and numerous other wildlife species. The landowner has committed to routine fence maintenance and repair over the 20-year life expectancy of the fence project.

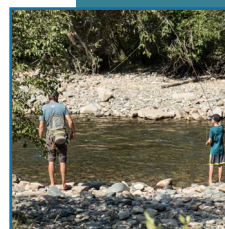
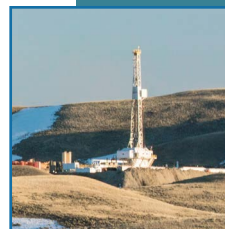


2018

ACCOMPLISHMENTS



Figure 7. Fencing installed in the Beaver Creek project area.



Bitter Creek Restoration

Project Objectives: The Sweetwater County Conservation District (SWCCD) along with agencies and funding partners installed an engineered diversion structure and replaced the failing Pierotto Ditch Diversion Structure. The failing structure was in place to prevent a 20-ft high head cut from moving up the channel. Replacing the structure will conserve water, decrease chloride concentrations, and reduce soil erosion and prevent the headcut from moving up the stream.

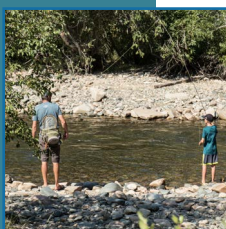
The SWCCD conducted three on-site reclamation tours with Sweetwater County, BLM, Engineers, and the landowner during the reclamation portion of the project. Native plant species (Buffalo Berry trees) were planted and an engineered seed mix was used during the reclamation phase of the project. Plant species were selected to improve bank stabilization, provide habitat for sensitive native fisheries (flannel mouth sucker), migratory bird species, and other wetland dependent wildlife.

The SWCCD, Sweetwater County, and landowner are committed to annual photo-point monitoring up to eight years post-construction. Photo-point data will include riparian plantings, vegetative growth, structure condition, erosion, sediment accumulation, and indications of scour. The objective of the photo-point monitoring will be to manage, analyze, and report the performance of the drop structure and any notable changes

2018



ACCOMPLISHMENTS



to the vegetation, soil condition, and structure directly upstream, downstream and at the drop structure. The project helped raise public awareness about the importance of water quality, erosion, flooding concerns and uses.

Partners: SWCCD, LSRC, Wyoming Department of Environmental Quality, Desert Fish Habitat Partnership, WWNRT, Sweetwater County, and BLM

2018 WLCI Contributions: \$0 (WLCI Total Contributions since 2010: \$275,000)

2018 Project Accomplishments & Implementation: Updates and discussions were held at the SWCCD Monthly Board Meetings and WLCI project team meetings. Conference calls were conducted between the SWCCD Board, engineer, contractor, US Army Corps of Engineers (COE), Wyoming Department of Agriculture (WDA), and BLM over the course of the past year. Numerous site visits with COE, Little Snake River Conservation District, SWCCD Board, WDA and BLM have taken place.

A new contractor began work in the fall of 2017 to complete the irrigation ditch, grade the diversion ditch, complete final grouting, and to place riprap downstream of the stilling basin. This completed the first phase of the project.

In 2018, crews excavated a new creek channel upstream of the drop structure and placed a turf reinforcement mat in the new channel. Site grading of previously damaged areas and seeding/reclamation was completed. Three on-site reclamation tours were held and attended by SWCCD Board members staff and engineer, project funding partners, BLM, Sweetwater County, WDA, and landowner.



Figure 8. (Left to right) The Pierotto headcut and replacement structure installed in 2016.

Project Monitoring: The project was monitored by SWCCD, Sweetwater County, Michael Brown, Inberg Miller Engineers, BLM, WDA, WDEQ and the landowner. Site



2018

ACCOMPLISHMENTS

visits were conducted and included the SWCCD Board/Engineer/Staff, Little Snake River Conservation District, BLM, WDA, Sweetwater County, and BLM.

LaBarge Creek Fish Passage

Project Objectives: La Barge Creek has been a focus watershed for the restoration of native Colorado River cutthroat trout (CRC) for over a decade. La Barge Creek Watershed is located in a WGFD Crucial and Enhancement Area and holds a conservation population of CRC. Previously, nine culverts in the drainage did not provide adequate fish passage and stream function. In 2016, project partners replaced two of the culverts and surveyed 7 (Phase I).

Trout Unlimited (TU) and the US Forest Service want to replace seven stream crossings to allow CRC to access miles of tributary habitat. Replacing these culverts will provide CRC populations in the LaBarge Creek watershed the best chance to survive into the future. TU hired an engineer to replace the remaining culverts in the drainage. The objective of this project is to replace the remaining culverts including: Crystal Creek (1), Spring Creek (2), Coyote Park x2 (3 and 4), Indian Creek (5), Little Clear Creek (6) Witherspoon Creek (7). The new culverts will restore natural flow regimes and fish passage.

The LaBarge Creek CRC population continues to recover after the chemical treatment in 2009. This project will reconnect 14.5 miles of tributary habitat to aid in the recovery of CRC in the drainage. Tributary habitat is important for CRC because they provide spawning habitat, provide young fish refuge, and they provide refuge during catastrophic events: wildfire, and floods. The more continuous habitat a population has, the more resilient they are to these events, and can recolonize naturally.

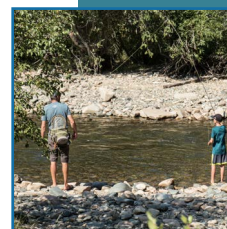
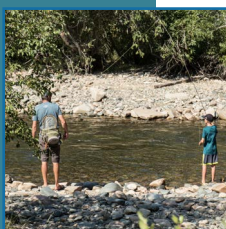


Figure 9. (Left to right) Indian Creek outlet before and after construction.



ACCOMPLISHMENTS



Partners: US Forest Service Bridger Teton National Forest (USFS), TU, and WWNRT

2018 WLCI Contributions: \$22,227 (WLCI Total Contributions since 2007: \$172,227)

2018 Project Accomplishments & Implementation: Phase II activities implemented in 2017, included the replacement of two culverts with bridges. The new bridge on Crystal Creek opened 1.5 mile of tributary habitat; and the new bridge on Spring Creek opened 5 miles of habitat to CRC. During 2018, Phase III began by installing a bridge on Indian Creek which provided 2.5 miles of additional trout habitat. Additionally, two new culverts properly sized to accept the range of flows on Coyote Park Creek were installed, which opened an additional 1.4 miles of trout habitat.

Project Monitoring: Each project will be monitored for road and stream function.

Riverbend Ranch/McNeel Feedground

Project Objectives: The Hoback River provides habitat for the Snake River Cutthroat Trout. The Hoback River is an important, wild fishery; meaning the fishery is self-sustained through wild recruitment, (no stocking). Maintenance of the Hoback River fishery for future generations therefore requires that functioning instream and riparian habitats be conserved, and degraded habitats restored or improved. Tributaries, such as Willow and Cliff Creeks, along with the Hoback headwaters, provide conditions conducive to cutthroat spawning and rearing. Maintenance of spawning grounds, regardless of their location or land status, is important for sustaining wild fish populations and the recreational fisheries they support.

The aquatic and riparian habitats along the Riverbend Ranch have been heavily degraded. Improving habitat quality through this portion of the drainage will benefit the public fishery by increasing spawning activity and reducing erosion so that sediment is not carried downstream and deposited on redds (spawning nests). The objectives of this project are to:

- Identify and stabilize eroding banks to reduce local sediment supply.
- Restore a meander pattern and sinuosity appropriate for stream type.
- Through the use of plantings and fencing, establish native riparian vegetation of a species composition, width, and longitudinal extent appropriate for site's elevation and land use.
- Increase channel complexity and diversity evidenced by deeper scour pools and appropriate pool-pool spacing.
- Develop habitat feature sequences (pool-riffle-run) that are maintained by the



2018

ACCOMPLISHMENTS

creek's geometry through multiple runoff seasons.

- Provide an alternative to the two gravel push up dams that satisfies land managers' irrigation needs. This alternative may include consolidation of points of diversion and construction of a permanent rock diversion structure keyed into a bedrock feature.

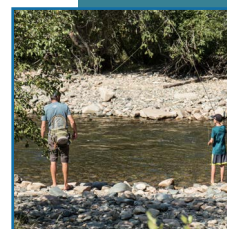
Partners: USFS, Jackson Hole Chapter of TU, RMEF, WGFD, Wyoming Water Development Commission, WWNRT

2018 WLCI Contributions: \$25,000 (WLCI Total Contributions since 2018: \$25,000)

2018 Project Accomplishments & Implementation: The majority of the instream work to replace the two gravel pushup dams with a consolidated rock diversion and headgate structure was completed in fall 2018. In addition to the installation of a new headgate (3 x 48" metal headgate) and rock cross-vane diversion, eroded areas were repaired, bankfull benches constructed, toewood installed, and j-hook structures were installed.

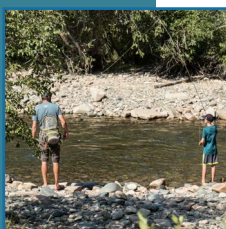
As part of the ditch consolidation work, the irrigation canal delivering water from the new structure was moved slightly, enlarged, and repaired. Given the timing, WLCI money was not put towards the replacement of the diversion structure in 2018, but the funds will be used for the design and/or construction of Phase II, which will focus on stabilizing banks and restoring riparian vegetation to protect the hay shed for the McNeel Feedground.

In spring 2019, the ditch consolidation/irrigation canal rehabilitation portion of Phase I of the project will be completed through additional repair and enlargement of irrigation canals and headgate installation.





ACCOMPLISHMENTS



Controlling Invasive Plants to Restore Ecosystem Integrity and Landscape Connectivity

Addressing invasive plant species is typically a major component of many of the proposed conservation actions with WLCI partners. WLCI local project development teams (LPDTs) are focused on the most aggressive or threatening invasive plants, which include cheatgrass (*Bromus tectorum*), toadflax (*Linaria spp.*), leafy spurge (*Euphorbia esula*), saltcedar (*Tamarisk spp.*), and perennial pepperweed (*Lepidium latifolium*). Particular attention is given to invasive plants in sensitive areas, such as crucial winter habitats, migration transition areas, riparian corridors, and areas adjacent to rare and endemic plant species. Invasive plants near wilderness areas and important locations, such as Areas of Critical Environmental Concern, are also a priority. Invasive plant species just entering the WLCI area are also targeted if they pose a risk.

Species such as saltcedar, cheatgrass, and knapweeds are becoming more densely populated and expanding their distribution. There have been numerous recent studies emphasizing the importance of controlling these species as an effective approach to address prolonged droughts and climate change.

A focus group was formed by LPDT members to develop strategies to evaluate saltcedar distribution and treatment needs from Seedskaadee NWR to Flaming Gorge. This effort aims to strategically inventory, prioritize, plan, implement, rehabilitate, and monitor multiple phased control projects. WLCI monitoring indicates that this approach is successfully controlling saltcedar and Russian olive while promoting sustainable native riparian tree and shrub communities along stream and river corridors.

Since 2008, WLCI has funded numerous projects designed to control or remove saltcedar in the WLCI area. These have predominantly been associated with larger lower elevation streams and rivers in Lincoln, Sweetwater, and Carbon counties. Geographic areas to control saltcedar and Russian olive are based on assessments and surveys by WLCI partners and resource specialists.

In another WLCI area, an invasive species task force was organized to address cheatgrass at landscape scales. Cheatgrass has become the most widespread problematic invasive plant affecting sage-grouse core habitats and crucial habitats for elk (*Cervus canadensis*), mule deer, pronghorn and numerous other non-game species. This task force is assessing the distribution of cheatgrass, prioritizing treatment locations, and actively engaged with its partners to control cheatgrass. Post-treatment monitoring information is being used to identify the most effective methods to control cheatgrass.



2018

ACCOMPLISHMENTS

Summary of 2018 Activities:

Cheatgrass, saltcedar, perennial pepperweed, leafy spurge, Canada thistle, and knapweed were the primary species that were treated, inventoried, and monitored during 2018. Treatments occurred primarily on sagebrush and riparian habitats associated with the Green River, its tributaries, and associated wetlands. Reducing invasive species on these crucial habitats is intended to benefit sage-grouse, mule deer, pronghorn, songbirds, and other desired wildlife.

In 2018, approximately 10,000 acres were treated to control invasive species across the WLCI area. Close to 3,000 acres were monitored and over 1,500 acres were inventoried for the presence or absence of invasive species. saltcedar treatments were applied within the Blacks Fork and Green River drainages, Sand Creek, and Upper Platte Valley areas. Private landowners, county weed and pest districts, conservation districts, non-government organizations, state, and federal agencies all participated in 2018 activities once again.

Detailed Project Activities:

Blacks Fork/Muddy Creek Invasive Plants

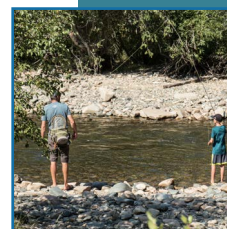
Project Objectives: A large component of the headwaters for the Colorado River starts in Uinta County, the very southwest corner of the state. The project area includes multi-drainages with several small tributaries that feed into the Blacks Fork River. This is a long-term project to minimize saltcedar from spreading on the stream banks, preserve existing riparian habitat and to improve native vegetation capacities. Also, this project involves controlling and decreasing invasive species along the drainage to protect, preserve and maintain the native ecosystem.

Partners: Uinta, Lincoln, and Sweetwater weed and pest districts, BLM, Wyoming Office of State Lands and Investment (OSLI), and Private Landowners

2018 WLCI Contributions: \$47,500 (WLCI Total Contributions since 2008: \$391,243)

2018 Project Accomplishments & Implementation: The Weed and Pest Board reviewed qualifications and pricing for the contractors bidding on the project prior to bidding. Discussion and planning with the BLM Kemmerer District and landowners was conducted. Review of past treatment areas was analyzed and determined that retreatment of the southern end of the drainage was necessary.

Headwater Weed Control received the contract and did the work on the drainage in Uinta County to the Lincoln County border. The contractor focused treatments on saltcedar, perennial pepperweed, thistles and other invasive species occurring on the Blacks Fork River. The contractor began work on the Smiths Fork River and





ACCOMPLISHMENTS



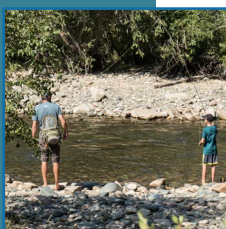
Cottonwood Creek, where they found new starts of saltcedar and mature parent trees up dry drainages. Many mature trees were as far as 1 mile from the drainage and providing a seed source for the reestablishment of saltcedar in the drainage. Treatment on noxious weeds was targeted to maintain more desirable vegetation along the riverbank and limiting seed propagation down the drainage.

Project Monitoring: GPS data and photo points were collected. Shape files were provided to WLCI regarding treatment points. Herbicide application records were included.



Ferris Mountain Leafy Spurge

Project Objectives: The Ferris Mountain Wilderness Study Area (WSA) Leafy Spurge project involves an informal partnership between the BLM, the State of Wyoming, WLCI, Carbon County Weed & Pest District (CCWPD) and the owners of the 47 Ranch and Ferris Mountain Ranch. This project entails the inventory, monitoring, and controlling the WSA area and the adjacent hogback ridges for invasive weeds through herbicide applications; mainly leafy spurge, whitetop, and Russian knapweed. The primary objective is to restrict weed infestations to the currently affected landscape. The secondary objective is to remove or contain new noxious weed infestations where possible to prevent further degradation and improve the quality of wildlife habitat and livestock forage.



This project area is topographically diverse and scenic with very few vehicle access points. This restricts most inventory and treatment to air or foot access and increases costs over other areas that are more readily accessible.

The Ferris area is unique in providing seasonal and some winter habitat for elk, deer, and antelope, as well as bighorn sheep. The majority of the project area contains Greater Sage-Grouse habitat, with some core area in the northern end. Livestock grazing occurs throughout the area. There is a landscape-scale timber enhancement project proposed on Ferris Mountain which includes part of this project area. The eastern end of Ferris Mountain was burned in a wildfire during the summer of 2012, and cheatgrass treatments were conducted on portions of the burned area in the fall of 2012, 2014, and 2015.

Partners: BLM, CCWPD, OSLI, and Private Landowners

2018 WLCI Contributions: \$15,000 (WLCI Total Contributions since 2007: \$212,126)

2018 Project Accomplishments & Implementation: NEPA was completed for this project previously. The ranch owners were contacted for access and to discuss priority areas for treatments. Contractors were hired through the CCWPD via a BLM Cooperative



2018

ACCOMPLISHMENTS



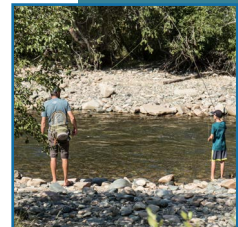
Figure 10. A leafy spurge infestation with the Ferris Mountains in the background.

Agreement. Chemical treatments, inventory, and monitoring were carried out on state, federal, and private lands in June of 2018. Regularly treating this area in the past has thinned infestations to the point that aerial treatments are not needed at many sites but on the ground applications will need to continue. Treatments were also implemented by the ranch owners. Two new infestation locations were found during the 2018 treatment season and were subsequently treated.

Project Monitoring: Previously treated sites are monitored and photographed by treatment crews and noted on their application records. This is an ocular method but works well for tracking density and extent of patches from year to year. Many sites are also visually inventoried and monitored by BLM staff prior to treatment to avoid sending crews into an area that does not need treatment. Some monitoring was also conducted by ranch owners.

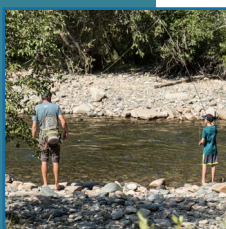
Green River Russian olive and Saltcedar Control

Project Objectives: This is a continuing project to control Russian olive and saltcedar throughout the Green River drainage. This project was initiated in 2010 and occurs from the Green River at Fontenelle Dam to the confluence with the Flaming Gorge Reservoir. The WGFD had the Teton Science School provide an assessment of the





ACCOMPLISHMENTS



entire area depicting the levels of infestation by both species. The Sweetwater County Weed and Pest and the City of Green River completed the initial control of Russian olive and saltcedar.

The previous WLCI agreement with WGFD expired in 2016, and it took until FY2018 to complete a new agreement. The new agreement, which has \$62,878 that were not spent in the previous agreement will be used to treat Russian olive and saltcedar along the Green River in the City of Green River and to also plant native tree and shrub species along the city's Greenbelt.

Partners: WGFD, BLM, City of Green River, and Private Landowners

2018 WLCI Contributions: \$0.00 (WLCI Total Contributions since 2011: \$144,500)

2018 Project Accomplishments & Implementation: Met with the Sweetwater County Weed and Pest District to ascertain their level of support for the project. The weed and pest district did not feel there was much cause for concern and did not want to participate. Met with the City of Green River to continue with control efforts along the floodplain of the Green River. The City is willing to continue with the project, and the WGFD provided an agreement in September, 2018. No other activities during 2018. There are plans to begin control efforts in 2019.

Project Monitoring: No formal monitoring protocols have been established. Monitoring that has occurred has been mainly ocular observations. Previously the project utilized the City of Green River Schools to assist with monitoring two sites.

Sand Creek Saltcedar Control

Project Objectives: The Sand Creek Saltcedar Control project includes approximately 65 miles of stream bottom, and all known infested reservoirs/sites within the BLM checkerboard portion of the Colorado River watershed. The primary infestation is saltcedar. Saltcedar, a native to Eurasia, dramatically reduces available surface and groundwater, dries up wetlands, reduces stream flows, and alters channel widths. Saltcedar roots extract salt from deep soil layers and excrete the salt with leaf drop in the fall.

The Sand Creek area is home to wild horses, deer, elk, antelope, and Greater Sage-Grouse among other wildlife species. Sand Creek encompasses the headwaters for many sensitive fish species. This project directly reduces water loss, erosion, sedimentation, and salt loading into the Little Snake River; a tributary of the Colorado River.

The project objectives are to inventory for new infestations, treat existing infestations,



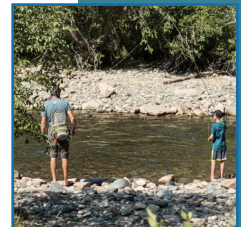
2018

ACCOMPLISHMENTS

and monitor to evaluate treatment effectiveness. Inventory consists of checking reservoirs and creek bottoms for saltcedar. Treatment consists of cutting and applying herbicide to the stump, as well as foliar herbicide treatment to reduce and eliminate saltcedar plants. Monitoring consists of returning the same year to confirm herbicide effectiveness and returning at a later date (3-5 years) to ensure there aren't any seedlings or resprouts.



Figure 11. Young saltcedar foliar treatment.



Partners: BLM and Carbon County Weed and Pest District (CCWPD)

2018 WLCI Contributions: \$9,668.93 (WLCI Total Contributions since 2008: \$205,842)

2018 Project Accomplishments & Implementation: Project Planning - NEPA and a Pesticide Use Proposal were completed for this project in previous years. Contractors were hired through the CCWPD via a BLM Cooperative Agreement. Inventory and treatments from last year continued through mid-October 2017.

In the fall of 2017 and spring of 2018, 47 reservoirs were inventoried, treated, and monitored. Of the 47 reservoirs, 17 had never been inventoried for weeds before; 30 reservoirs were last inventoried in 2010, 2011, and 2012. None of the 47 reservoirs



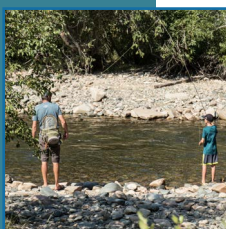
ACCOMPLISHMENTS



had saltcedar; however, two reservoirs had other noxious weeds, consisting of black henbane, houndstongue, and perennial pepperweed and were chemically treated. The saltcedar infestations inventoried in November 2016, April 2017, and May 2017 were treated chemically in 2018. This year we focused on monitoring past treatments and the inventory of new saltcedar or other important weed infestations.



Project Monitoring: Overall, chemical treatment for saltcedar has shown to be successful. Other weed infestations are slower to respond, but population sizes are reduced. The 47 known weed locations ranging from 0.1 to 10 acres were monitored with the option for retreatment. Eleven of the 47 locations were treated chemically, and the 36 previously treated sites were free of saltcedar resprouts. One area that had been treated chemically seven times since 2002 was found to be clean, with many dead stumps visible but no new growth.



Upper Platte Valley Weed Management

Project Objectives: The Upper Platte Valley Weed Management Area project includes the inventory, monitoring, and treatment of noxious weeds, mainly leafy spurge, musk thistle, Canada thistle, and spotted knapweed. Treatment consists of herbicide applications and manual efforts to control weeds. The main objective is to prevent weed encroachment onto the adjacent Forest Service and private lands and restrict weed infestation to the currently affected landscape. The second objective is to remove or contain other noxious weeds where possible to prevent further degradation of, and to improve wildlife habitat quality and livestock forage.

The Upper Platte Valley area provides crucial winter habitat and seasonal habitat for elk, deer, antelope, and bighorn sheep. Most of this area falls within core habitat for the Greater Sage-Grouse, is used for livestock grazing, and is heavily used for recreation and hunting.

This project is an informal partnership between the BLM, WLCI, CCWPD, and multiple land owners. Each landowner conducts treatments on their private lands. Not all private treatments are reported, so the actual treatment acreages and funds spent are under-represented.

There are several other ongoing projects in the area including; the Platte Valley Mule Deer Initiative, cheatgrass treatment projects, the Riparian Habitat Improvement & Wildlife Friendly Fence Conversion in Platte Valley WLCI, and juniper management and fuels reduction (including School & Moore's Creeks). Timber sales are also proposed in the future to enhance forest health.

Partners: BLM, CCWPD, PVHP, and Private Landowners



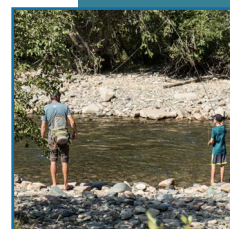
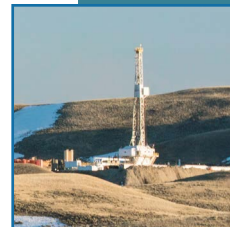
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ACCOMPLISHMENTS

2018 WLCI Contributions: \$25,000 (WLCI Total Contributions since 2014: \$177,500)

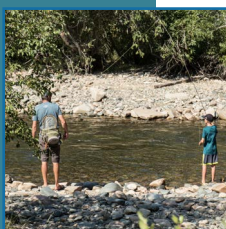
2018 Project Accomplishments & Implementation: NEPA was completed for this project previously. The ranch owners were contacted for access and to discuss priority areas for treatments. Contractors were hired through the CCWPD via BLM Cooperative Agreement. Inventory for weeds, chemical treatments of known and new infestations, and monitoring of past treatments were carried out on state, federal, and private lands in June, July, September and October of 2017. Regularly treating this area in the past has thinned infestations to the point that the majority of locations do not need aerial treatments. In 2018 we continued on the ground herbicide applications on 500 acres. Treatments were also completed by the ranch owners and Carbon County Weed & Pest.

Project Monitoring: In 2018, three quarters of the known infestations (500 acres) on BLM land were treated and/or monitored. Only one new musk thistle location was identified within the Bennett Peak area. Most of the treatments conducted were in the Bennett Peak area, which continues to have the greatest concentration of known weed infestation sites. Treatments conducted in the Encampment River Campground and Miner Creek area were completed by BLM staff and CCWP contractors. This allows the staff to treat and monitor their treatment and the extent of the thistle infestation and lifecycle to promote more extensive future monitoring.





ACCOMPLISHMENTS



Re-establishing Native Riparian Plant Communities and Developing Wetlands

Riparian areas provide important functions across their entire watershed. While riparian habitats make up only a small proportion of the land, they support many invertebrate and wildlife species with food, cover, reproductive and other life stages, and support the ability to move across the landscape. Proper functioning riparian zones help control water temperature, reduce erosion and stream sedimentation, control flooding, and recharge ground water, which in turn recharges stream flows that support many aquatic and wildlife species during dry periods. Degraded riparian areas typically have less vegetation to protect and stabilize stream banks. This results in lowered water tables reducing summer stream flows and green zones. This in turn reduces more riparian vegetation for wildlife and livestock.

The priority issues related to riparian function identified by local project development team (LPDT) members are: loss of vegetation and loss of connectivity of corridors; increased invasive species such as saltcedar and perennial pepperweed; increased bank erosion and stream downcutting; increased sediments; loss or degraded adjacent wetland habitats; and reduced in-stream water flows.

The selection of geographic areas to address these issues were driven in part by WGFD aquatic enhancement and/or crucial priority areas identified in their strategic habitat plan. These include areas where riparian obligate species occur where species of greatest conservation needs are located. Other criteria used to select these areas include locations where issues could be comprehensively addressed at watershed scales and where there is a strong conservation need and an interest by private landowners to be involved with conservation activities or strategic locations that would benefit from habitat leasing and conservation easements.

Priority treatments are designed to promote a diverse and healthy riparian vegetation community by planting native trees and shrubs and reducing and controlling invasive plant species. These activities will connect important riparian areas with other important habitats and improve movement corridors.

While wetland habitats are somewhat limited in southwest Wyoming, they also support many species of wildlife. Many of these species are designated as wetland obligates and are often regarded as sensitive or listed as species of concern. This includes many residential and migratory bird species and amphibians.

WLCI LPDT members have been implementing wetland projects to increase trumpeter swan (*Cygnus buccinator*) population numbers and habitat; enhancing and maintaining wetland water quantity and woody vegetation; improving wetland function associated with fish and riparian projects; using fencing to protect wetland vegetation and



2018

ACCOMPLISHMENTS

controlling saltcedar and other invasive plant species.

Summary of 2018 Activities:

Many of our previous projects within this heading are listed as complete, including Circle B, Cottonwood Creek Reservoir, Sibert Ranch, and Trumpeter Swan projects. The Narrowleaf Cottonwood Stand Replacement project on Seedskaadee National Wildlife Refuge (SNWR) is the only project under this category during 2018. The SNWR and its partners planted over 2,000 cottonwood trees and willows along 2,250 feet of the Green River.

Detailed Project Activities:

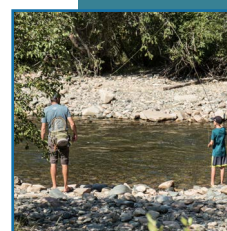
Narrowleaf Cottonwood Stand Replacement

Project Objectives: The project objective is to replace narrowleaf cottonwood and five species of native willow through active plantings of live poles within the floodplain. Narrowleaf cottonwood, native willows, and other riparian shrubs provide important migratory habitat for many passerine birds, habitat for moose and mule deer, nesting and roosting for bald and golden eagles, nesting habitat for threatened yellow billed cuckoo, and improved conditions for sportfish.

This riparian habitat is affected by Fontenelle Dam, located above Seedskaadee NWR, by regulating the Green River's flows. Flooding rarely occurs, which is needed to propagate narrowleaf cottonwood and many other riparian plants. Active stand replacement is needed over time to ensure this critical riparian habitat is renewed and maintained.

Our approach involves cutting a branch (pole) from an established narrowleaf cottonwood or native willow. A skid steer-mounted, powered auger is used to auger holes up to 6 feet deep. Then, the pole is inserted, backfilled with coarse material, and watered to compact the soils around the pole. The depth of the planting is set to allow the pole to reach the water table during the driest part of the year, typically in August. A ventilated tree shelter is placed around the top of the pole. A wood stake is used to hold the ventilated tree shelter in place. The tree shelters protect the young plant from browsing by big game, rabbits, voles, and other wildlife that might eat the growing stems and leaves or rub the bark off. The tree shelters also aid in regulating the temperatures and reduce evapotranspiration. Another benefit of the tree shelters is that they prevent lateral branching, thus producing a tree like growth form, rather than a bush like form which have been found naturally occurring throughout the refuge. Once established, the narrowleaf cottonwoods will live 150 to 300 years, and willow stands could potentially replace themselves over time.

Partners: Partners have included the WGFD, Trout Unlimited (TU), Seedskaadee



2018



ACCOMPLISHMENTS



Chapter of TU, BLM, WLCI, Intermountain West Joint Venture, and North American Wetlands Conservation Act funding. This long term (10+ years) project is in year six and efforts will continue through future partnerships, field work days and grant funding to hire contract work.

2018 WLCI Contributions: \$80,000 in prior years, no funding in FY2018. (WLCI Total Contributions since 2010: \$305,000)

2018 Project Accomplishments & Implementation: Funding provided in 2017 was contracted and completed in the spring of 2018. In 2018, funding from the Wyoming Landscape Conservation Initiative - BLM, Wyoming Game and Fish Trust Fund – Habitat, and the US Fish and Wildlife Service was used to contract the work.

A contractor began work on March 19, 2018 and was completed by April 6, 2018. The contractor planted 1,400 Narrowleaf Cottonwoods and 651 willows (Coyote Willow - 158) (Yellow Willow - 338) (Whiplash Willow - 160), for a total of 2,051 live cuttings of cottonwood and willow that were planted. A visual inspection was completed in July 2018 by looking down each ventilated tree shelter, and an estimated 90% had healthy looking green leaves and stem elongation or new shoot growth indicating root establishment. Low precipitation levels occurred July through September 2018 and may affect future establishment survival to some degree, especially for cottonwoods planted off channel.

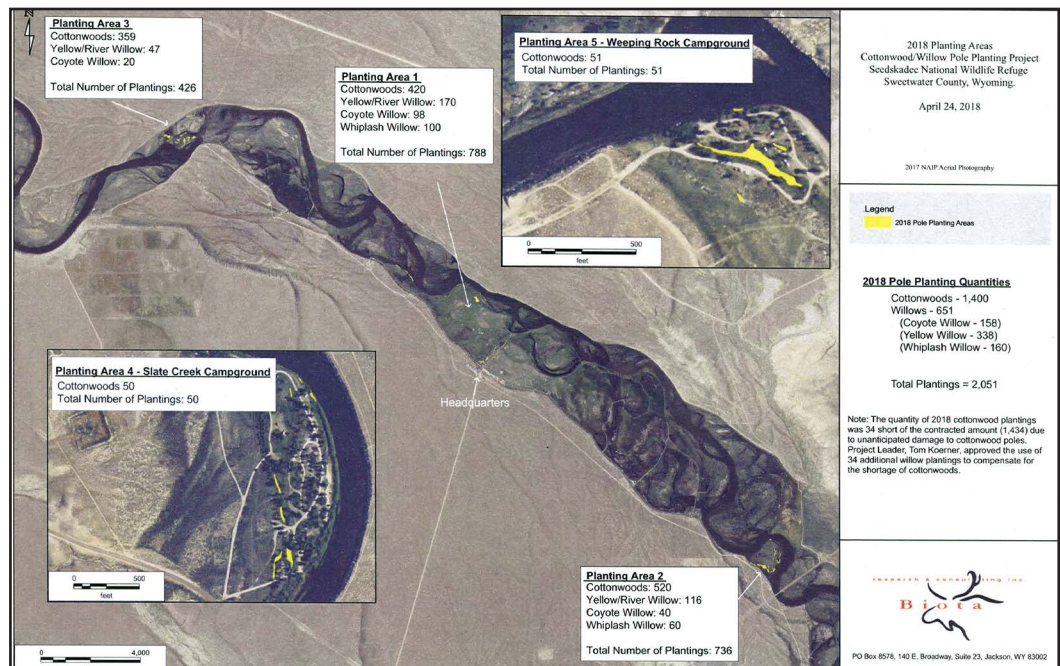


Figure 12. Seedskaadee National Wildlife Refuge Narrowleaf Cottonwood stand replacement project map.



2018

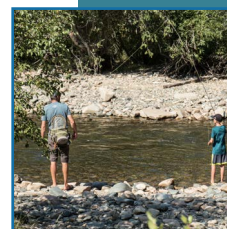
ACCOMPLISHMENTS

Project Monitoring: Establishment has ranged from 50% to 85% between plantings. Each year, techniques are refined through previous experiences to increase establishment, lower labor time and costs, and reduce the wear and tear on volunteers and partners. The first phase of this multi-year effort emphasized narrowleaf cottonwood pole plantings. In 2014 and 2015, funding from a North American Wetland Conservation Act grant covered the cost of a contractor to plant 3,900 poles. Results from 2014 showed that about 50% had very healthy stems and leaves growing from the poles. Some had even grown out of the tube by the end of the summer. About 25% grew leaves and were looking good, but started to fade, with the remaining 25% not growing any leaves or stems by the end of the summer. The results of the 2014 plantings suggest there is a “sweet spot” in the floodplain that is not too wet and not too dry, but that changes every year depending on runoff and river flows.

Once the trees are established with a good root system, they can tolerate variability in the weather and river flows. After applying this knowledge in 2015, our results improved with 70% of the poles (out of 2,500) having very healthy stems and leaves with some growing out of the tube by the end of the summer. In 2016, work continued with refuge staff, partners, and volunteers to evaluate previous years plantings and refine the technique. Approximately 1,000 native willow cuttings were planted in the spring, summer, and fall to evaluate the effect of using cuttings pre and post leaf out and during the growing season. The majority were installed in augured holes with some simply shoved into the bank as far as possible. Spring and fall plantings had the best establishment rate (75%) with summer plantings dropping to an estimated establishment rate of 30%.

In 2017, Seedskaadee NWR staff, partners, and volunteers continued to plant live willow cuttings in 6-foot-deep augured holes. Some utilized willow cuttings had all lateral branches trimmed, and the remainder were left with multiple stems. Multiple willow cuttings were inserted into each augured hole. Work was completed in November 2017 and April 2018. A visual inspection in July 2018 gave an estimate of 85% establishment for planted willows. Although an exact count on the number of holes and cuttings is not known, we estimate that the following: Willows - 1,750 (Coyote Willow - 1,250) (Yellow Willow - 250) (Whiplash Willow - 250).

In 2018, we began using a skid steer bucket to deliver coarse backfill material to speed up the process and reduce the wear and tear on staff and volunteers. We also began to plant coyote willow (*Salix exigua*) along the river bank where we did not need support stakes and ventilated tree shelters. This reduced costs and labor allowed harvest of local plant materials onsite, increased the number of plantings, and eliminated follow-up needed later to remove ventilated tree shelters and support stakes.





ACCOMPLISHMENTS

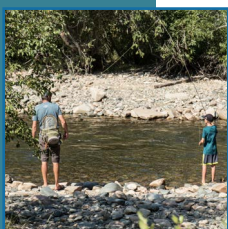
USGS 2018 SCIENCE Accomplishments and Products



The USGS had another banner year supporting WLCI with three new science activities and continued efforts on twenty-one ongoing science and web-development projects. The first new project uses approaches developed from USGS WLCI studies and mapping efforts of big game migration to support other western states with a comprehensive, standardized approach to map big game migration corridors.



During 2018, the USGS Wyoming Cooperative Research Unit hosted a workshop about these approaches in Laramie, Wyoming. Over 70 state and federal wildlife experts from Wyoming, Colorado, New Mexico, and Texas participated. The second new project was designed to better understand sedimentation and hydrogeomorphic processes in cold-desert headwater streams. During the Fall of 2018, USGS scientist setup instruments to monitor baseflow, stream depth, snowfall, snow melt, rainfall, runoff and channel physical process (such as bank erosion and ice-jamming in the Littlefield Creek headwater priority area and collect bed sediments. This information will help WLCI partners incorporate information about the hydrogeomorphic processes into Littlefield Creek's management and restoration plans. The third new project was designed to improve our approach for people to access, manage, and analyze WLCI data and WLCI resource information.



USGS was busy with drafting, publishing numerous science manuscripts and presenting study findings at numerous conferences and meetings. Some examples of our 2018 studies and findings include:

- Developing an energy footprint model that simulates well, pad, and road patterns for oil and gas recovery options that vary in well types (vertical and directional) and number of wells per pad. This framework was used to simulate scenario tradeoff assessments between oil and gas field development and wildlife needs and to identify approaches that best achieve both energy and conservation goals.
- Investigating trends for Greater sage-grouse populations at multiple spatial scales across Wyoming instead of using single scale estimates which is commonly done. We found at broad spatial scales most populations of sage-grouse were declining, however at finer spatial scales, we found some interspersed populations increasing. These results indicate that broad-scale population trends can mask trends occurring at local scales.
- Investigating how disturbances from oil and gas development affects native fish species assemblages. We learned that some species (trout and mottled sculpins) were associated with conditions associated with less disturbance and other species (mountain sucker) could persist at more degraded sites. Degraded conditions were found to be similar to other watershed level disturbances (invasive plants,



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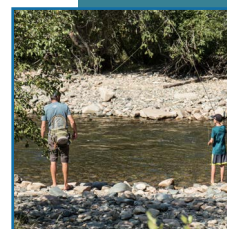
ACCOMPLISHMENTS

fire, drought) which are known to have been successfully addressed through best management practices.

- Evaluating changes in vegetation after sagebrush treatments. In this case we used satellite imagery to quantify effects of prescribed-fire, herbicide, and mechanical treatments on vegetative cover, productivity, and phenology. Most treatments appeared to increase cover of grasses and forbs which was the primary objective for most treatments. The successful implementation of using this approach indicates that the use of satellite imagery is a very effective approach to monitor vegetation change in sagebrush ecosystems.

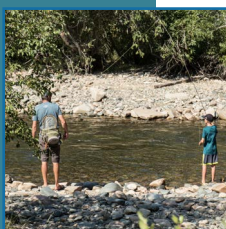
USGS was also busy in 2018 releasing numerous data sets and data products. One such data tool is a viewable quick reference chart of a standardized precipitation evapotranspiration index (SPEI) summarized for the Upper Green River Basin. The SPEI index which incorporates both precipitation and temperature data to determine their combined effects of drought, was calculated for each water year (Oct–Sept) between 1896 and 2017. In addition to this being a quick reference for wildlife and habitat biologists, the underlying data can be used to determine how temperature and drought influenced treatment responses in sagebrush habitat.

The highlight of 2018 for USGS and WLCI was our very successful joint science conference with the Wyoming Chapter of the Wildlife Society which was held during November 6-8 in Laramie. Over 200 people participated in the conference representing restoration practitioners, resource specialists, researchers and scientists, managers and planners, students, industry, and policy staff. The Conference included 45 oral presentations and 27 poster presentations that addressed six themes relevant to both WY-TWS and WLCI. Student posters were judged by WY-TWS and WLCI representatives, with top poster and oral presentations receiving awards. Thirteen oral papers and five poster papers were presented by USGS scientist or affiliated students.





ACCOMPLISHMENTS



2018 USGS Publications

- Carter S.K., Manier D.J., Arkle R.S., Johnston A.N., Phillips S.L., Hanser S.E., Bowen Z.H. 2018. Annotated bibliography of scientific research on greater sage-grouse published since January 2015: U.S. Geological Survey Open-File Report 2018-1008, p. 183. <https://doi.org/10.3133/ofr20181008>
- Edmunds, D.R., C.L. Aldridge, M.S. O'Donnell, and A.P. Monroe. 2018. Greater sage-grouse population trends across Wyoming. *Journal of Wildlife Management* 82:397-412. <https://doi.org/10.1002/jwmg.21386>.
- Edmunds, D.R., C.L. Aldridge, M.S. O'Donnell, and A.P. Monroe. 2018. Erratum: Greater sage-grouse population trends across Wyoming. *Journal of Wildlife Management* 82: 1808. <https://doi.org/10.1002/jwmg.21560>.
- Garman, S.L. *Environ Model Assess* (2018) 23: 39. <https://doi.org/10.1007/s10666-017-9559-1>
- Girard, C.E. and A.W. Walters. 2018. Evaluating relationships between fishes and habitat in streams affected by oil and natural gas development. *Fisheries Management and Ecology* 25: 366-379. <https://doi.org/10.1111/fme.12303>.
- Johnston, A.N., Beever, E.A., Merkle, J.A., and Chong, G., 2018, Vegetation responses to sagebrush-reduction treatments measured by satellites: *Ecological Indicators*, v. 87, p. 66–76, accessed February 22, 2018, at <https://doi.org/10.1016/j.ecolind.2017.12.033>.
- Sanders, L. E., and Chalfoun, A. D. 2018. Novel landscape elements within natural gas fields increase densities of an important songbird nest predator. *Biological Conservation* v. 228, pp.132-141. <https://doi.org/10.1016/j.biocon.2018.10.020>.

USGS Manuscripts in Review

- Heinrichs, J.A, M.S. O'Donnell, C.L. Aldridge, S.L. Garman, C.G. Homer, and N.H. Schumaker. Simulating the influences of future climate and oil and gas development on Sage-grouse population outcomes. *Ecological Applications* (In Press).
- Monroe, A.P., C.L. Aldridge, M.S. O'Donnell, D.J. Manier, C.G. Homer, and P.J. Anderson. Using remote sensing to quantify recovery of vegetation across space and time following energy development. *Ecological Indicators* (In Revision)
- O'Donnell, M.S., D.R. Edmunds, C.L. Aldridge, J.A. Heinrichs, P.S. Coates, B.G. Prochazka, and S. E. Hanser. Designing hierarchically nested and biologically relevant monitoring frameworks to study populations across scales. *Ecosphere* (In Revision).
- Sanders, L. E., and Chalfoun, A. D. Mechanisms underlying increased nest predation near natural gas development: A test of the mesopredator release hypothesis. *Ecosphere*. (In Press)



2018

ACCOMPLISHMENTS

Walters, A.W., C.E. Girard, R.H. Walker, A. Farag, and D. Alvarez. 2019. Multiple approaches to surface water quality assessment provide insight for small streams experiencing oil and natural gas development. Integrated Environmental Assessment and Management 9999:1-13. doi.org/10.1002/ieam.4118 (In Review)

USGS Released Data Products

Assal, T.J., 2018, Bighorn Mountains, Wyoming Forest Mapping, 2013-2017: U.S. Geological Survey data release, <https://doi.org/10.5066/P98OS2XK>.

Assal, T.J., 2018, Standardized Precipitation Evaporation Index for the Upper Green River Basin (1896-2017): U.S. Geological Survey data release, <https://doi.org/10.5066/P9VLM7Z6>.

Girard, C. and Walters, A., 2018, Habitat and fish field survey data from Wyoming Range streams in 2012 and 2013: U.S. Geological Survey data release, <https://doi.org/10.5066/F78S4P7Z>.

Mikle, N.L., Graves, T.A., and Olexa, E.M., 2018, West Green River elk herd locations in southwestern Wyoming, 2005-2010: U.S. Geological Survey data release, <https://doi.org/10.5066/F70K27SF>.

Real-Time and Water-Quality Data:

New Fork River, Big Piney, WY: http://waterdata.usgs.gov/wy/nwis/uv/?site_no=09205000,

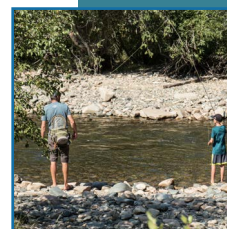
Green River near Green River, WY: http://waterdata.usgs.gov/wy/nwis/uv/?site_no=09217000
http://waterdata.usgs.gov/nwis/wys_rpt/?site_no=09217000

Muddy Creek above Olson Draw, Dad, WY: http://waterdata.usgs.gov/wy/nwis/uv/?site_no=09258050,

Muddy Creek below Young Draw, Baggs, WY: http://waterdata.usgs.gov/wy/nwis/uv/?site_no=09258980
http://waterdata.usgs.gov/nwis/wys_rpt/?site_no=09258980

Real-Time Groundwater- Streamgage Site Data:

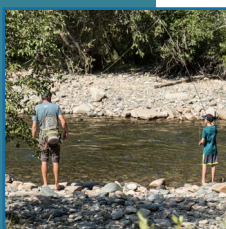
New Fork River, Big Piney, WY, Water-surface elevation- <https://go.usa.gov/xnFAe>,
temperature - <https://go.usa.gov/xnFAe> at Green River near Green River, WY
<https://go.usa.gov/xnFAF>



2018



PROJECT COOPERATORS



Baggs Mule Deer Working Group

Big Creek Ranch

Bureau of Land Management

Carbon County Weed and Pest District

Circle B Ranch

Circle Nine Ranch

The Conservation Fund

Currant Creek Ranch

Denbury Energy

Desert Fish Habitat Partnership

Ducks Unlimited

Exxon/Mobil

Ferris Mountain Ranch

Grazing Lessees and Permittees

Greater Yellowstone Coalition

Great Northern Landscape Conservation
Cooperative

Green River Valley Land Trust

Lazy River Ranch

Lincoln County Conservation District

Lincoln County Weed and Pest District

Little Snake River Conservation District

Lone Tree Ranch

Medicine Bow Conservation District

Mule Deer Foundation

Muley Fanatic Foundation

National Fire Plans Operating Service

National Fish and Wildlife Foundation

Natural Resource Conservation Service

The Nature Conservancy

North American Wetlands Conservation
Act Grant Program

Office of State Lands & Investments

Overland Trail Ranch

Pew Charitable Trusts

Platte Valley Habitat Partnership

Private Landowners

Questar Gas Company

R & M Welding

Ramsay Ranch

Rim Fire Ranch

Rocky Mountain Elk Foundation

Rolling Thunder Ranch

Saratoga, Encampment, and Rawlins
Conservation District

Seeds-kadee National Wildlife Refuge

Southern Rockies, LCC

Sublette County Conservation District

Sublette County Weed and Pest District

Sweetwater County Conservation District

Sweetwater County Weed and Pest
District

Teton Science School



2018

PROJECT COOPERATORS

Theodore Roosevelt Conservation
Partnership

Trout Unlimited

Trust for Public Lands

Uinta County Conservation District

Uinta County Weed and Pest District

Upper Green River Basin Sage-Grouse
Local Working Group

U.S. Fish and Wildlife Service – Partners
for Fish and Wildlife Program

U.S. Forest Service

U.S. Geological Survey

Walton Foundation

Warren Energy

The Wilderness Society

Western Landowners Alliance

Wyoming Department of Agriculture

Wyoming Department of Environmental
Quality

Wyoming Game and Fish Department

Wyoming Governor's Big Game License
Coalition

Wyoming Migration Initiative

Wyoming Outdoor Council

Wyoming Water Development
Commission

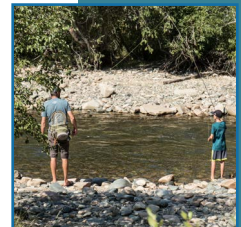
Wyoming Wildlife Federation

Wyoming Wildlife – The Foundation

Wyoming Wildlife and Natural Resource
Trust

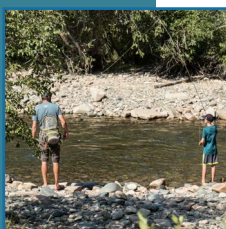
ZN Ranch

47 Ranch





W L C I T E A M S



Executive Committee

Provides guidance and decision-making authority.

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2018

WLCI TEAMS

Coordination Team

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Communications Team

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Cindy Wertz, BLM
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Science and Technical Advisory Committee

Provides science and technical advice and support to WLCI teams and committees.

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Jill Frankforter, USGS
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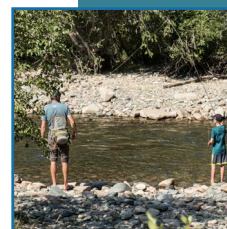
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WLCI TEAMS



USGS Science Team

Provides science information, expertise, and integration of science to support WLCI.

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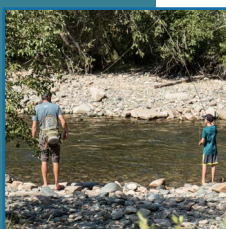
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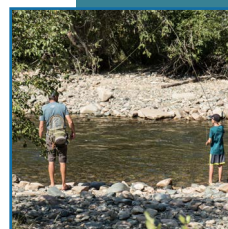
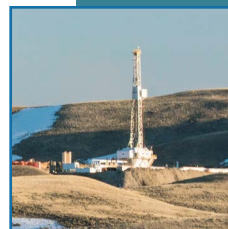
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2018

NOTES





**Bureau of Land Management • Fish and Wildlife Service • Forest Service
 US Geological Survey • National Park Service • Natural Resources Conservation Service
 Wyoming Department of Agriculture • Wyoming Game and Fish Department
 Wyoming County Commissioner Association • Southwest Wyoming Conservation Districts**