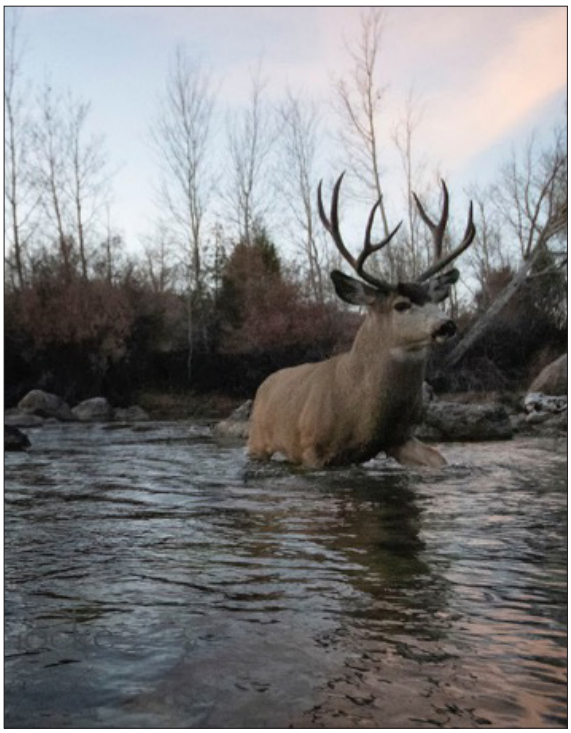
2019 Annual Report Strategic Habitat Plan Accomplishments

Annual Report 2019

Strategic Habitat Plan



Wyoming Game and Fish Department
April 2020

Conserving Wildlife
Serving People

Aquatic Habitat
Terrestrial Habitat
BioServices
Habitat and Access Branch
Lands Administration
Wyoming Landscape
Conservation Initiative

Message from the Director

Wyoming is known for its abundant and diverse wildlife resources. These resources provide top-notch fishing, hunting and wildlife viewing opportunities. If it wasn't for our state's high-quality, intact native ecosystems and freshwater, we would not be so fortunate. Habitat conservation is one of the most important tools the Wyoming Game and Fish Department uses to sustain wild and healthy populations of aquatic and terrestrial wildlife.

Game and Fish allocated nearly $3.4 million in funds for habitat projects and leveraged that for over $6.5 million more from the Wyoming Wildlife Natural Resources Trust fund, federal government funds, state funds, private landowners and our local conservation partners. That's $1.94 coming from external partners for every Game and Fish dollar allocated. With 800 species in the department's charge, we use each dollar in the most impactful and effective way. That's how we executed 185 projects in 2019.

The way these funds are spent is determined by the Strategic Habitat Plan (SHP) which is updated every five years. Since 2001,the SHP has remained the cornerstone of habitat management in the state. Projects found in this report were subject to intense scrutiny and planning in order to make a difference for wildlife. The plan directs our efforts to focus on projects that invest in the future of Wyoming.

Game and Fish and our partners united to work for a sustained future. Over the last year, the SHP helped direct restoration, monitoring and enhancement activities improving 58 stream miles and over 390,000 acres of terrestrial habitats. I'm especially proud of the work to control and prevent the spread of invasive plants, like cheatgrass, treating a notable 47,418 acres.

Wyoming invests in habitat because it's clear that the people who live and work here treasure wildlife. None of this would be possible without the wide-ranging support of people to ensure we leave Wyoming a better place. The willingness of private landowners and federal land managers to work cooperatively with the Department is pivotal to achieving these accomplishments. I want to thank all project partners who invested in Wyoming's wildlife habitats in 2019. We are proud to share these success stories with you and they would not have been possible without wide public support. The investment of time, money and resources from countless volunteers and folks who care about Wyoming's wild places is inspiring and encouraging.

In this year's annual report we profiled one of our crucial project partners, Ducks Unlimited. Ducks Unlimited is a common partner for wetland conservation across the state. Game and Fish biologists have a long history of working closely with Ducks Unlimited on numerous projects to benefit waterfowl and wetlands.

Enjoy reading about the projects making a difference for Wyoming's future. Together we are making an impact.

Brian Nesvik

Director, Wyoming Game and Fish Department

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Habitat Vision

The Wyoming Game and Fish Department (WGFD) is the steward of all Wyoming's wildlife, dedicated to the conservation of sustainable, functional ecosystems capable of supporting wildlife populations at least as healthy, abundant and diverse as they were at the dawn of the 21st century. The WGFD promotes a holistic approach to habitat management, integrating management and various land uses through collaborative efforts with the public, conservation partners, private landowners and land management agencies. The WGFD will increase public awareness of the need for managing for quality wildlife habitat today to ensure healthy and abundant wildlife populations in the future. Wyoming Game and Fish Commission (WGFC) lands will be managed to emphasize and maintain wildlife habitat and the public access values for which they were obtained.

Mission

Promote and maintain the availability of high quality habitat to sustain and enhance wildlife populations in the future.

Goals

Goal 1. Conserve and manage wildlife habitats that are crucial for maintaining terrestrial and aquatic wildlife populations for the present and future.

Goal 2. Enhance, improve and manage priority wildlife habitats that have been degraded.

Goal 3. Increase wildlife-based recreation through habitat enhancements that maintain or increase productivity of wildlife.

Goal 4. Increase public awareness of wildlife habitat issues and the critical connection between healthy habitat and abundant wildlife populations.

Goal 5. Promote collaborative habitat management efforts with the general public, conservation partners, private landowners and land management agencies.

Habitat Program Expenditures

I. WGFD funds (figures rounded to the nearest $1,000) expended for on-the-ground projects primarily directed at implementation of SHP goals and management on WGFC lands during calendar year 2019 (these figures do not include personnel salaries, supplies, materials, and equipment used for routine WGFD maintenance and operation and WGFC property tax and lease payments):

WGFD Funds Expended on SHP Goals: **$3,394,000**

II. Non-WGFD funds expended for implementation of SHP goals for calendar year 2019 from or in collaboration with various sources including: 1) Wyoming Wildlife and Natural Resources Trust Fund, 2) US Forest Service and Bureau of Land Management federal government funds, 3) other federal government funding programs, 4) other state and local government funding sources, 5) nongovernmental organizations, 6) Wyoming Governors Big Game License Coalition, 7) private landowner contributions, 8) corporations and businesses, and 9) private donors:

Non-WGFD Funds Expended on SHP Goals: **$6,582,000**

Grand Total for SHP Goals: $ 9,976,000

WGFD applied funding from outside sources amounting to approximately $1.94 for each WGFD dollar expended for on-the-ground fish and wildlife habitat activities. This outside funding is critical for implementing the SHP and conserving our wildlife resources. Overall, personnel directly involved in implementing SHP goals oversaw spending of approximately $9,916,000 of WGFD regular maintenance and operating funds, State Wildlife Grants from US Fish and Wildlife Service and WGFD Trust Fund monies. This figure includes wages, benefits, equipment, operation expenses, supplies and on-the-ground improvement material expenses allocated as follows: approximately 56% for personnel, which includes habitat inventories, monitoring, project contract oversight, project design and implementation and promoting collaborative habitat management efforts with the general public, conservation partners, private landowners and land management efforts with the general public, conservation partners, private landowners and land management agencies. Without the dedication and passion of field personnel, none of these habitat projects would happen. The remainder of the funding was allocated as follows: 4% for vehicles and heavy equipment and 40% for materials and supplies.

Personnel overseeing the Education, Information and Publications Programs spent approximately 12.5% of their time in 2019 on SHP goal 4 “habitat” activities totaling just under $295,000 of regular WGFD maintenance and operating funds. Information and education efforts are critical for maintaining current and future, social, political and financial support for wildlife habitat program related efforts.

Lastly, personnel within the Lands Administration Branch conduct WGFC property rights monitoring, property rights acquisition and disposal, payment of WGFC property taxes on each county and lease payments to the Office of State Lands and Investments (OSLI). Property taxes paid to counties by the WGFC in 2019 totaled approximately $660,000. These taxes include WGFC owned state offices, fish hatcheries, bird farms, houses, Wildlife Habitat Management Areas (WHMA) and Public Access Areas (PAA). During 2019, WGFD costs for leases totaled approximately $157,500. The majority of lease

payments were made to the OSLI involving State Land leases associated with the WHMAs and PAAs.

Habitat Program Accomplishments: The Numbers

Those activities resulting in on-the-ground accomplishments and promotion of collaborative habitat efforts, directed toward the habitat program during calendar year 2019 are summarized below:

Activity	2019 Accomplishments	5 Year Average Accomplishments
Watershed stream assessments	22 on 30.4 miles	12 on 27 miles
Detailed stream assessments	15 on 2.4 miles	17 on 5.2 miles
Survey or design for stream restoration	14 on 3.2 miles	13 on 6.7 miles
Stream restorations or bank enhancements	6 on 2.3 miles	11 on 2.9 miles
Instream structures	54	54
Instream flow studies	2	Not previously tracked
Instream flow segments	0	0
Fish screens installed	0	2
Fish barriers inventoried	114	Not previously tracked
Fish passage structures installed	4	8
Fish passage upstream miles connected	2 miles	33 miles
Fish passage structures monitored	8	9
Fish passage structures maintained	11	12
Fish tracking or entrainment investigations	3	5
Detailed stream channel monitoring	11 on 4.1 miles	11 on 4.2 miles
Detailed riparian monitoring	7 on 10.1 miles	6 on 2.8 miles
Stream temperature monitoring sites	37	Not previously tracked
Stream flow measurements	37	Not previously tracked
Beaver transplanted	10	6
BDAs installed	5	6
BDAs maintained	8	10
Riparian Rapid Habitat Assessment	61 on 1,319 acres	21 on 613 acres
Riparian protection and management	1 on 0.4 miles	7 on 5.6 miles
Private landowner contacts	267	423
Technical assistance requests	132	107
Conservation easements in process	0	4 on 9,238 acres
BLM, RMP, or USFS Cooperator Status	5	5
Trees or shrubs planted	12,572	31,064
Herbicide weed treatments	47,418 acres	34,455 acres
Herbicide vegetation to thin sagebrush	0 acres	520 acres
Mechanical tree removal	4,338 acres	4,273 acres
Aspen ripping	90 acres	286 acres
Fences maintained	6 covering 164 miles	28 covering 413 miles

Activity	2019 Accomplishments	5 Year Average Accomplishments
Mowing, chopping, ripping, aerator treatments	673 acres	3,642 acres
Upland grass, forb, and food plot seeding	268 acres	589 acres
Pre-veg treatment monitoring	75 sites; 22,319 acres	Not previously tracked
Post-veg treatment monitoring	198 sites; 160,711 acres	Not previously tracked
Water wells drilled	1	1
Water guzzlers or water tanks installed	3	8
Water pipelines installed	0 miles	1.3 miles
Spring developments	7	4
Water wells converted to solar pumps	0	2
Fences installed	0 miles	34 miles
Wetland development and renovation	2 on 67 acres	5 on 827 acres
Prescribed burns	2,385 acres	2,888 acres
USDA Farm Bill contract involvement	29	11
Livestock Grazing Management or Wildlife Habitat Stewardship Plans	12 on 20,009 acres	13 on 93,577 acres
Rangeland Rapid Habitat Assessment	102; 52,891 acres	Not previously tracked
Aspen Rapid Habitat Assessment	83; 4,941 acres	Not previously tracked
Special Rapid Habitat Assessment	10; 2,072 acres	Not previously tracked
Annual vegetation production/ utilization sites	29	53
Field cooperative research projects	18	11
WGFC managed lands prescribed burn	65	Not previously tracked
WGFC managed lands fence maintained	23 on 3,373 miles	33 on 1,227 miles
WGFC managed lands food plot	8 on 100 acres	6 on 246 acres
WGFC managed lands forage reserve	3 on 4,796 acres	3 on 4,845 acres
WGFC managed lands grazed	62,251 acres	81,313 acres
WGFC managed lands irrigation upgrades	10 on 4,100 feet	21 on 6,050 feet
WGFC managed lands noxious weed control	3,297 acres	3,533 acres
WGFC managed lands meadow mowed/ farmed	6 on 1,220 acres	4 on 1,865 acres
WGFC managed lands farming contracts	6 on 1,696 acres	5 on 1,621 acres
WGFC managed lands fences installed or converted	10.3 miles	11.2 miles
WGFC managed lands road maintenance	51 on 229 miles	Not previously tracked
WGFC property right monitoring	11 on 12,859 acres	63 on 103,667 acres
Public Fish Access projects	26	14
Funding sources/ contracts/ grants administered	175	165
Funding applications prepared for other entities	44	24

Miles of stream and riparian habitat and acres of riparian and upland habitat directly impacted by habitat work in 2019 are tallied below:

Stream and Riparian Activity	Stream Miles
Watershed stream assessments	30.4
Detailed stream assessments	2.4
Survey or design for passage or stream restoration	3.2
Stream restorations or bank enhancements	2.3
Beaver restoration	2.9
Beaver Dam Analogs	0.1
Instream flow segments	0.0
Fish passage upstream miles connected	2.0
Detailed stream channel monitoring	4.1
Detailed riparian monitoring	10.1
Riparian monitoring woody browse	0.4
Riparian protection and management	0.4
Total	**58.3**

Riparian and Upland Activity	Acres
Riparian aspen, cottonwood, willow browse monitoring	0
Riparian Rapid Habitat Assessment	1,319
Riparian protection, enhancement and management	0
Conservation easements in process and coordinated with partners	0
Herbicide weed treatments	47,418
Herbicide sagebrush thinning	0
Mechanical tree removal	4,338
Mechanical shrub treatment	2,082
Aspen ripping	90
Mowing, chopping, Lawson Aerator	673
Upland grass, forb, and food plot seeding	268
Pre-treatment monitoring	22,319
Post-treatment monitoring	160,711
Prescribed burns	2,385
Wetland development or renovation	67
Livestock grazing management and wildlife habitat stewardship plans	20,000
Upland exclosure development	5.8
Rangeland Rapid Habitat Assessment	52,891
Aspen Rapid Habitat Assessment	4,941
Special Rapid Habitat Assessment	2,072
WGFC managed lands food plot	100
WGFC managed lands forage reserve	4,796
WGFC managed lands prescribed burn	65

Riparian and Upland Activity	Acres
WGFC managed lands grazed	62,251
WGFC managed lands irrigated	62
WGFC managed lands noxious weed control	0
WGFC managed lands meadows mowed/ farmed	1,220
WGFC managed lands farming contracts	50
Total	**390,133**

Kudos to Our Partners!

The WGFD believes habitat is one of the keys to maintaining and sustaining wild and healthy populations of aquatic and terrestrial wildlife. Without the support and partnerships from private landowners, public land managers, conservation groups, elected officials and the public, these habitat management and enhancement projects would not be possible. WGFD greatly appreciates this financial assistance and project support and looks forward to continuing to work with partners to 'Conserve Wildlife and Serve People' in the years ahead.

The following lists major funding partners and approximate amounts the WGFD spent in 2019. Additionally, habitat projects where WGFD personnel were heavily involved or provided oversight or verification of expenditures are also listed. This is not a complete list, and may not reflect all partner contributions. We apologize for any partners who may have been inadvertently omitted.

Funding Partner	Approximate amount for 2019	Approximate In-Kind donation amount for 2019
Bighorn County Weed & Pest	$5,000	
Bowhunters of Wyoming	$2,000	
Bureau of Land Management	$697,123	$123,805
Bureau of Reclamation	$11,200	
Carbon County Weed & Pest	$0	$1,400
Clear Creek Conservation District	$23,112	
Federal USDA Farm Bill Program Funds (NRCS and FSA)	$82,200	
Fremont County Fire Protection	$48,110	
Greater Yellowstone Coalition	$2,000	
Jackson Hole One Fly	$10,861	
Jonah Interagency Office	$15,000	
Laura Jane Musser Fund	$8,000	
Mule Deer Foundation	$14,312	
Muley Fanatic Foundation	$39,467	
National Fish and Wildlife Foundation	$169,973	
National Park Service	$2,000	
National Resources Conservation Service	$266,945	
National Wild Turkey Federation	$5,000	
Park County Weed & Pest	$7,000.00	

Pheasants Forever	$10,000	
Pinedale Anticline Project Office	$312,883	$35,000
Popo Agie Conservation District	$5,000	
Private donors	$36,595	$386,002
Private landowners	$23,632	$3,000
QEP Energy and Development		$7,200
Rocky Mountain Elk Foundation	$144,549	$1,811
Russell Construction Mitigation Fund	$30,000	
Saratoga-Encampment-Rawlins Conservation District		$2,552
Sheridan County	$20,000	
Sheridan County Weed & Pest	$67,212	
Sublette County Weed & Pest	$182	
Teton County Conservation District	$6,362	
The Nature Conservancy	$45,000	
Theodore Roosevelt Conservation Partnership	$2,000	
Town of Dayton	$5,900	
Trout Unlimited	$43,480	$8,375
Uinta County Weed & Pest	$645	$3,780
Ultra Resources	$1,260	$100,000
USFWS - Private Lands Program	$148,919	
USFWS - State Wildlife Grants Program	$42,966	
USFWS - WNTI	$35,000	
US Forest Service	$972,089	$125,700
Water for Wildlife Foundation	$41,270	
Wyoming Community Foundation	$2,500	
Wyoming Department of Agriculture	$28,000	
Wyoming DEQ 205J	$55,923	
Wyoming DEQ 319	$308,786	
Wyoming Governor's Big Game License Coalition	$77,250	
Wyoming Landscape Conservation Initiative	$135,647	
Wyoming OSLI	$716	
Wyoming Sportsmen's Group	$20,000	
Wyoming Water Development Commission	$35,000	
Wyoming Wildlife and Natural Resources Trust Board	$1,710,607	$2,240
Wyoming Wildlife Federation	$2,000	
TOTAL	**$5,780,683.83**	**$800,865.85**
GRAND TOTAL	**$6,581,549.68**	

For additional information please contact any of the personnel listed at the end of this document. Also, please share this report with anyone who may be interested in the WGFD and the Commission's habitat efforts.

This report can be viewed on the WGFD website at: https://wgfd.wyo.gov/Habitat/Habitat-Plans/Strategic-Habitat-Plan-Annual-Reports.

2019 Partner Profile

We would like to make a special recognition of Ducks Unlimited and the many local DU Chapters across Wyoming. DU is a common partner for wetland habitat restoration across the state. WGFD biologists and managers have a long history of working closely with DU on numerous projects to benefit wetlands and waterfowl. DU has secured significant NAWCA funding to complete design and project implementation work in Wyoming.

Ducks Unlimited is currently working on wetland restoration projects with WGFD at South Park, Sand Mesa, Renner and Yellowtail WHMAs. In the past, they have helped with projects occurring at Table Mountain, Springer/Bump Sullivan and Ocean Lake WHMAs. The knowledge, passion and capacity DU possesses has increased the amount of wetland work occurring across the state. DU is always willing to help the Department with water rights, land negotiations and creation/restoration of wetlands. We thank DU for their tremendous support.

DUCKS UNLIMITED

Aquatic Habitat Program

The aquatic habitat program works to protect, restore and enhance Wyoming's water, watersheds, and waterways. The program consists of 12 permanent full time employees: 6 regional aquatic habitat biologists (AHABs), a statewide fish passage coordinator, a statewide fish passage biologist, a Wyoming Landscape Conservation Initiative (WLCI) coordinator, an aquatic habitat supervisor, an aquatic habitat program manager, and a water management instream flow biologist. One contract employee works for the section in Lander. Seasonal biologist technicians assist in the Laramie, Jackson, Cody and Sheridan Regions.

The Water Management Supervisor position was lost to the aquatic habitat section in 2019, re-assigned for higher priority work in the fish management section. Finally, the Green River Region aquatic habitat biologist position was moved to the Casper Region in response to a vacancy in the position and higher priority habitat needs in Casper. The position was last filled in Casper in 2007.

During calendar year 2019, the aquatic habitat section was involved in 36 projects involving funding from the Game and Fish Trust Fund, Department fish passage budget, the Wyoming Wildlife Natural Resource Trust (WWNRT), USFWS, Wyoming Landscape Conservation Initiative (WLCI) and other sources. These partners provided about $2.1 million toward aquatic projects. Department aquatic habitat dollars spent on contracts or grants in calendar year 2019 totaled over $2.0 million. These expenditure levels are at a record high level. The various partners and their contributions toward these projects are highlighted in the regional sections of this report.

Section personnel spend tremendous time planning, coordinating and developing habitat project funding applications throughout the year for efforts led by WGFD or partners. Regional AHABs and statewide personnel also work on SHP actions not directly related to funded projects including habitat protection, inventory and assessment, monitoring project function and habitat response, providing habitat education and training.

The number of on-going aquatic habitat projects involving significant funding (36) has been similar the last five years with project numbers ranging from 34 to 42. This level of project management and engagement likely represents a maximum effective level given the number of full time permanent aquatic habitat biologists engaged in project management. Approximately seven positions (six aquatic habitat biologists and one fish passage coordinator) are fully devoted to project development and management which equates to an average of about five to six projects involving significant funds per individual biologist (occasional additional aquatic habitat-related projects are coordinated by other individuals such as fisheries management biologists). Should permanent full time aquatic habitat biologist positions be added in Green River and Lander, an additional ten to twelve projects involving significant funding can be expected annually. Based on current percentages, these projects would involve about an additional $150,000 in Department expenditures matched against at least $370,000 in partner contributions.

Fish Passage Program

Granite Supplemental Ditch Entrainment (Goal 2) – Nick Scribner

The Granite Supplemental Ditch diverts water from the Snake River southwest of Moose, WY within Grant Teton National Park. The headgate is located in the Snake River levee on the river's west bank and consists of three, 36 inch culverts embedded into a concrete headwall. The river's elevation has decreased since the construction of the headgate thus necessitating a wing dike to gain enough hydraulic head for delivery of the 390 cfs water right. As of 2018, the wing dike extended roughly 570 yards upstream of the structure creating a side channel that captures approximately 10% - 15% of the Snake River's summer flow at the point of diversion.

In 2019, entrainment sampling occurred directly downstream of the headgate structure with the use of three nets that filtered all water passing through the culverts. Sampling occurred a total of 448.5 hours over 27 days between July 16 and October 15. All three culverts were sampled 11 days, while only two culverts were sampled the remaining 16 days because nets were being constructed early in the sampling period.

A minimum of 3,525 fish were captured with mountain whitefish, Snake River cutthroat, and non-game fish representing the majority of fish caught. Over 51% of Snake River cutthroat captured were ≥ 6 in long, weighed 0.128 pounds and represented 12.4% of the fish caught. At least 20 bluehead sucker, a Species of Greatest Conservation Need, were captured and 11 of them were captured during overnight sets. Similarly, all 371 fish identified as suckers were caught overnight, which suggests the number of bluehead sucker being entrained is biased low. A minimum of 27,342 fish are likely entrained each ir-

rigation season and could be over 100,000 fish using various calculation methods. Additional sampling will occur in 2020 to increase night sampling and further refine entrainment data.

Figure 1. *Wing dike and Snake River upstream of GSD headgate.*

Horse Creek Fish Passage (Goal 2) - Anna Senecal and Nick Scribner

Figure 2. *Current crossing conditions upstream.*

Work began on a large culvert crossing of Horse Creek located on USFS property that provides access to the Horse Creek WHMA. Project objectives are to allow all fish species and life stages to pass upstream, improve sediment transport, and maintain the irrigation diversion. Horse Creek supports a wild, native population of Snake River Cutthroat trout and the best available habitat for trout is located on and upstream of the WHMA. These areas are also seasonally open to walk-in public fishing. Currently, a 6 ft culvert exists on the main channel with an additional 3 ft culvert that activates at higher flows. In addition, a headgate exists just upstream of the crossing that provides irrigation water to 53 acres on the WHMA. Over time, the stream has aggraded upstream of the crossing while scouring a 3 ft deep pool downstream leaving the culvert perched. This drop coupled with water velocities at high flows likely impedes passage of most fish. Fish passage was completely lost during spring 2017 when high flows and debris caused the undersized culverts to fail, resulting in a 10 ft deep scour pool and washing out half of the road in the process. The crossing was rebuilt to original specification as an interim solution and engineered designs for improvement were sought.

Final designs were delivered in June 2019 that include a bottomless arch culvert, eight instream rock structures, bank stabilization measures, and improvements to the irrigation diversion. The project was let out to bid in June with three contractors providing bids. Costs came back much higher than available funding and the engineer's estimate with the lowest bid being $356,000, so plans were not implemented in 2019. In addition, USFS personnel brought forth additional requirements to the plans and specifications before they would sign-off and approve moving forward with designs. DOWL Inc., had a meeting with USFS to understand their needs and final revised plans were delivered in January 2020.

Horse Creek WHMA Riparian Exclosure (Goals 2 and 5) - Anna Senecal

Figure 3. *Horse Creek WHMA steel jack fence.*

Approximately 1,600 feet of steel jack fence were constructed around Horse Creek adjacent to the downstream property boundary fence line on the WGFD Horse Creek WHMA elk feedground. The fence was constructed with the assistance of Feedground, Habitat and Access, USFS personnel, and volunteers from TU and Backcountry Hunters and Anglers. The fence is constructed around the most unstable portions of Horse Creek. Creek instability is attributed to upstream water management and riparian browse. We are interested in the ability of the native vegetation community to regenerate in the absence of elk browse pressure. The fence was constructed over two days and a long-term monitoring site was installed with repeatable greenline transects.

Little Sandy Passage Inventory (Goal 2) - Nick Scribner

Flannelmouth, bluehead sucker and roundtail chub, commonly referred to as the three species, have declined in abundance and distribution throughout their native range. WGFD has been working to conserve the three species since 2002. Efforts first focused on identifying distribution and abundance in Wyoming. That information was then used to select three priority drainages for conservation efforts: Big and Little Sandy and Muddy Creek. From 2009-2011, non-native fish were removed from these drainages to reduce nonnative populations and impacts of competition, predation, and hybridization. The WGFD has since been working to design and install fish migration barriers to isolate segments of stream so non-native species can be chemically removed and the three species can be restored above barriers. Several small temporary barriers have been built on Muddy Creek and construction of a large barrier was completed on the Big Sandy River in 2016 upstream of the Big Sandy Reservoir.

Figure 4. *An irrigation diversion that restricts movement of fish.*

Work to further protect the three species remains in the Little Sandy drainage, which provides excellent habitat in the lower reaches for these fish. Inventory efforts were completed in 2019 to identify passage barriers within the drainage that could be addressed to improve movement opportunities and access to additional habitat. Eight sites were visited and assessed for passage including seven irrigation diversions and one road crossing. Of those eight sites, three are either a partial or complete barrier. Two of those sites are located lower in the drainage where the three species are found and improving these would reconnect roughly 40 miles of stream.

North Laramie Fish Passage (Goal 2) - Nick Scribner

Figure 5. *Burger diversion structure that needs improvements to block fish movement.*

In early 2019, HDR engineering was selected from three engineering firms to provide their services to improve passage at the North Laramie Canal and Wilson No. 2 Diversions while enhancing the barrier at Burger Diversion. Breaking small mouth bass movement is desired to protect upstream native fish populations. A conceptual design report with 10% plans and estimated costs was completed in December.

Based on literature, HDR used a maximum burst speed of 8.2 ft/s and 1.0 ft maximum jump height for smallmouth bass swimming capabilities to assess upstream passage of the Burger Diversion. Hydraulic modeling indicated the diversion is a barrier up to the 10-year flow event of 3380 cfs, but begins losing its barrier function as flows get higher, primarily due to flow conditions at the streambank margins. Recommendations to improve it as a barrier include removing debris and large rock directly below the weir, adding splash pads where the sluice pipe exits, and closing the headgate for the sluice pipe when flows range between 756 – 3380 cfs.

Two diversions upstream block native fish movement. Here, conversely, the objective is to enhance fish movement opportunities. Options to improve passage at the North Laramie Canal and Wilson No. 2 diversions included rock weirs, roughened channel, bypass channel, and a low-flow channel. Plans were shared with water users and WGFD personnel with a goal to select an alternative in early 2020 for 100% design.

North Laramie River Passage Inventory (Goal 2) - Nick Scribner

Figure 6. *An irrigation diversion seasonally passable for salmonids.*

The North Laramie River drainage supports many native prairie stream fish species, and also a high density of Species of Greatest Conservation Need. More recent surveys completed in drainages of Southeast WY documented up to 37 different species with 19 of them native. It is also recognized as a crucial habitat area within the WGFD's SHP.

Inventory work was conducted in association with the passage project that began on the North Laramie in 2019. Data were collected at nine sites, all irrigation diversions, and passage was possible at some level for all but one diversion, which we are enhancing to ensure it remains a barrier. Most of the diversions consisted of cobble push-up dams along with items such as large rock, old concrete pieces, tractor tires, gabion baskets, and sluice pipe at two sites. It appears most sites require annual maintenance to deliver water, so passage status may be better than what was recorded during 2019 site visits during higher flows. Future passage improvements should focus on five sites that restrict passage of non-salmonid species since there are no native salmonids, but there are

several native small-bodied fish in the North Laramie River.

Timber Creek PIT Tag Study (Goal 2) - Erin Sobel

Figure 7. *One of four concrete diversions in Timber Creek.*

Timber Creek is a tributary to the Greybull River located west of Meeteetse, WY. The Greybull River drainage is an important stronghold for Yellowstone cutthroat trout that supports genetically pure populations. Numerous passage projects focusing on Yellowstone cutthroat trout have occurred over the past ten years in the Greybull River drainage to improve connectivity and reduce entrainment in irrigation canals. The last completed fish passage improvement on Timber Creek consolidated four irrigation diversions into one and screened the irrigation diversion to prevent fish from going down the canal. The previous four points of diversion pulled water out of Timber Creek by using drop boards in concrete boxes located within the stream channel, which were passage barriers. Concrete boxes were left in place, but drop boards were removed and rock cross vanes were added downstream of all concrete boxes to assist with upstream passage for all aquatic organisms. Timber Creek is now free of fish barriers.

To determine if fish could move past the structures, monitoring began in 2017. A weir trap and backpack electrofishing were used to capture and implant PIT tags into the peritoneal cavity of fish greater than or equal to 5 inches. Sampling continued into 2018 and 2019 with only backpack electrofishing and will continue into 2020 for the final year. A total of 1,153 fish have been caught, measured (in) and weighed (lb) over the past three field seasons with 635 fish implanted with a PIT tag and adipose fin clipped. The average length and weight of the tagged fish are 7.7 in and 0.20 lb. We placed PIT tag antennas at four locations: near the confluence with the Greybull River, at the most downstream concrete structure and the other two on the most upstream concrete structure. Overall, 51 individual fish with an average length and weight of 7.9 in and 0.24 lb respectively were detected by one or more of the antennas in 2019. From the detection dates and where fish were originally tagged in 2019 we were able to document their travel direction. All readers detected fish between the months of May and October, but the antennas were washed out in early June and were back up and running by late July. Fish are successfully moving past all structures and it appears a large amount of detections are for fish moving out of Timber Creek into the Greybull River since the antenna near the confluence had the highest amount of detections. Monitoring will continue for one more field season in 2020.

Figure 8. *Fish Passage biologists measuring a Yellowstone cutthroat trout. This fish was weighed, measured and implanted with a PIT tag.*

Wood River Fish Ladder (Goal 2) - Nick Scribner

Figure 9. *Fish ladder will be located on the far side of the diversion structure.*

The Wood River Diversion is located 14 miles upstream of the Greybull River/Wood River confluence west of Meeteetse, WY. The diversion dam was built in 1972 and is operated by the Greybull Valley Irrigation District (GVID) to fill Lower Sunshine Reservoir as well as provide irrigation water to nearby agricultural lands. The concrete structure spans the entire channel and is a complete barrier to upstream fish movements. GVID operations personnel see countless numbers of fish, primarily Yellowstone cutthroat trout, stack up below the dam each year.

TU is leading the effort to construct a fish passage solution and together with WGFD held a meeting in early May with GVID to discuss conceptual designs and select an alternative to fully develop. A dual slot fish ladder on river right connected to the diversion dam abutment was determined to be the best option along with stream stabilization measures downstream. The ladder will have a 6% slope and target velocity of 5 ft/s, which should allow passage of most fish species and age classes.

Construction is anticipated in summer/fall 2020. This project will reconnect nearly 80 miles of stream that has been disconnected for 50 years. So far, funding has been secured from USFWS Fish Passage program with additional requests pending from WWNRT and WWDC.

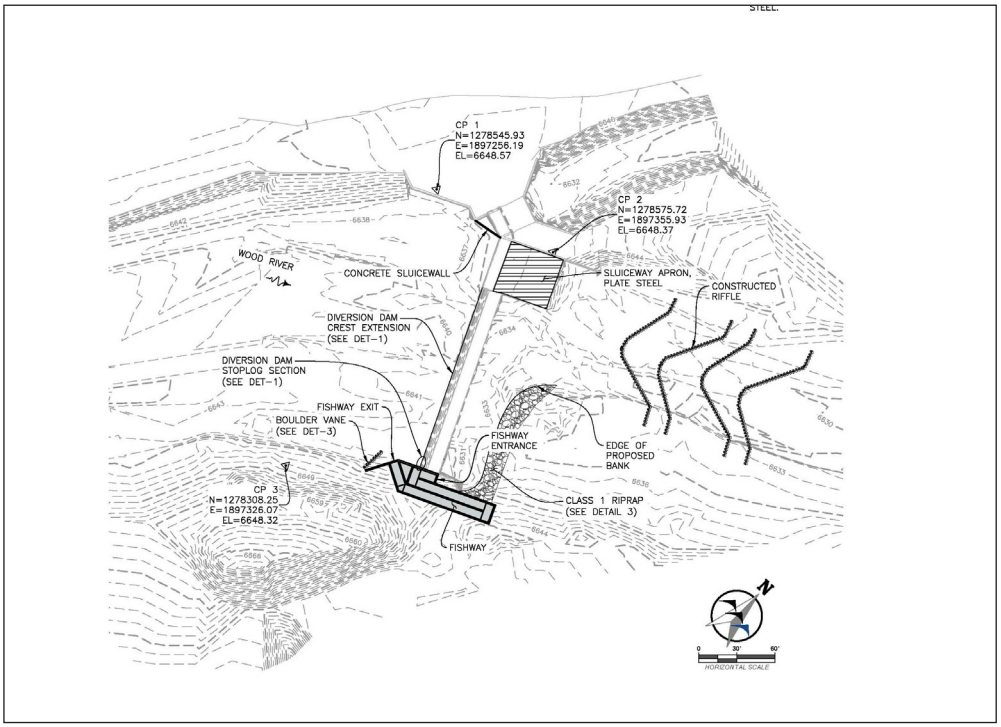


Figure 10. *Wood River fish ladder plans.*

Habitat and Access Branch

The Habitat and Access Branch is responsible for managing WGFD lands. Our mission is to manage WGFC lands to be the benchmarks for wildlife habitat while providing public access. The Habitat and Access Branch in 2019 consisted of a branch chief located in Cheyenne, four regional supervisors located in Lander, Cody, Pinedale and Laramie, one statewide crew supervisor located in Cheyenne, five coordinators located in Sheridan, Casper, Cheyenne, Jackson, twelve biologists located in Jackson, Dubois, Lander, Yoder, Cody, Lovell, Laramie, and Saratoga, and numerous seasonal employees stationed across the state.

The Habitat and Access Branch manages 43 WHMAs, 200 PAAs and 22 feedgrounds. In addition, a statewide crew assists with habitat development projects across the state. The WHMAs are managed for specific wildlife habitat purposes and are included within the SHP. The Habitat and Access Branch incorporates specific objectives and strategies from the SHP into regional work schedules.

The branch manages and maintains approximately 450,000 acres, 95 dams and wetlands, 140 miles of ditches/drains, 5,200 acres of irrigated meadows, 2,400 acres of farmland, 250 acres of food plots and more than 1,000 miles of fence for wildlife habitat purposes. To assist hunters and fishermen, another 1,100 miles of road, 395 parking areas, 67 boat ramps, 30 docks, 150 outhouses, and more than 6,000 signs are maintained.

During 2019, the branch also worked on other habitat development projects, including MDI projects, aeration, harrowing, mowing, meadow improvements, wetland developments and riparian projects. Grants provided projects with $852,239 in on-the-ground expenditures. These projects are highlighted in the regional sections of this report.

Statewide Habitat and Access

Clarks Fork Fish Hatchery Erosion Remediation (Goals 1 and 3) - Brandon Werner, Brad Sorensen, Kade Clark, Mac Foos, Rick Harmelink and Todd Grosskopf

Figure 11. *Completed erosion control work at Clark's Fork Fish Hatchery.*

To address erosion and runoff issues at Clarks Fork Fish Hatchery Spring #2, Habitat and Access personnel used grading, ditching, and road build up to prevent erosion. The crew also installed corrugated metal pipe (CMP), rock, and erosion control materials to divert snow runoff around the road and to prevent the spring box from silting in. Erosion control mats were also placed along disturbed soils. This project was a concerted effort between engineering, statewide Habitat and Access, and Clark's Fork Hatchery personnel. Similar projects on Spring #3 are to be completed in 2020.

Outlet Elbow Install at Dan Speas Hatchery (Goal 1) - Brandon Werner, Matthew Pollock and Statewide Habitat and Access Crew

Statewide Habitat and Access personnel assisted with the installation of two 24" elbows on the outflow from Dan Speas Hatchery. This required excavating existing pipe, cutting pipe, and installing the elbows to prevent New Zealand Mud Snails from entering the hatchery.

Figure 12. *Excavating pipe at Dan Speas Hatchery.*

Laramie Peak Gravel (Goal 3) - Brandon Werner, Mac Foos, Todd Grosskopf and Jerry Cowles

WGFD hauled and spread gravel on roads at Laramie Peak WHMA. The Vale Ranch provided gravel in exchange for improving roads. Three cattle guards were also installed.

Figure 13-14. *Spreading gravel on roads and installing three cattle guards at Laramie Peak WHMA.*

Yellowtail WHMA Irrigation Canal Maintenance (Goals 1 and 3) - Brandon Werner, Brad Sorensen, Eric Shorma, Mac Foos, and Todd Grosskopf

Statewide and Cody Habitat and Access personnel used statewide excavation equipment to remove sediment, trees, and other materials obstructing the Big Fork irrigation ditch. Removal of debris increases water use efficiency on WGFC owned lands and bolsters habitat for waterfowl, big game, and upland species.

Spence and Moriarity WMA Irrigation Ditch Maintenance (Goals 1 and 2) - Brandon Werner, Miles Proctor, Kade Clark, Rick Harmelink and Todd Grosskopf

Statewide and Lander Habitat and Access crews removed debris from the Wiggin's Fork irrigation canal on Spence and Moriarty WMA to improve water use efficiency on WGFC owned irrigated lands. Using a statewide excavator and equipment, the crew removed sediment, trees, and other materials obstructing the Wiggin's Fork irrigation ditch. This allows more efficient and effective water use on the WMA. These irrigated lands are critical winter range for elk, mule deer and bighorn sheep.

Figure 15. *Crews remove sediment, trees, and other materials from irrigation ditches.*

Lands Administration Branch

The mission of the Lands Administration Branch is to administer the Commission's property rights and work with other agencies, NGOs and the public to acquire and manage property rights for the benefit of wildlife conservation and public access. The Lands Administration Branch currently administers nearly 500,000 acres of property rights including Wildlife Habitat Management Areas (WHMAs), Public Access Areas (PAAs), conservation easements and administrative facilities. The Lands Administration Branch consists of a branch chief located in Cheyenne and two lands coordinators, with one located in Cheyenne and the other in Lander. The state is divided into two land administration regions with one coordinator assigned per four regions.

Branch personnel worked on numerous projects involving habitat conservation, monitored conservation easements and evaluating new areas for public access. The Lands Administration Branch completed a property exchange on the Spence/Moriarity WMA and a fee title acquisition adjacent to the Yellowtail WHMA. The Branch acquired property for the new Cody Regional Office and also acquired a new warden station in Elk Mountain, WY. Branch personnel also spent a large portion of 2019 monitoring property rights and communicating lands issues with coworkers, state and federal agencies, and various non-governmental agencies including Rocky Mountain Elk Foundation, The Nature Conservancy and others.

Tippetts Property Acquisition, Yellowtail WHMA (Goal 1) – Sean Bibbey

The WGFC acquired 86 acres of land in Big Horn County. This parcel borders the Yellowtail WHMA on the north, east, and a portion of the west property line. There are 86 acres of water rights associated with the parcel that will contribute to management of the farm ground including forage and cover for wildlife. The land has been historically used as farm land, producing hay annually. The land is well drained and as is flood irrigated through a series of gated pipe and ditches.

The 86 acres is easily accessible and provides WGFD additional acreage to manage for upland bird habitat. Bordering the Yellowtail WHMA, the parcel will also provide additional public hunting access and wildlife viewing.

CM Ranch, Spence Moriarity WMA Land Exchange (Goal 1) – Brian Rognon

The Whiskey Basin WHMA has a 2,060± acre isolated parcel of land known as Sheep Ridge which lacks legal access from a public road. There is an existing road that traverses private lands that the Department currently uses for administrative purposes which required obtaining permission from the land owner prior to each use of the road. The private land is owned by CM Ranch with whom the Department has a long standing working relationship. The Department and CM Ranch engaged in discussions about better managing their properties through the consolidation of land ownership boundaries. CM Ranch proposed acquiring 81.96 acres of Spence and Moriarity WMA land adjacent (north and south) to their private lands to provide additional hay production and to pasture their horses. In addition to the 81.96 acres of deeded property, CM Ranch also received the grazing rights to 19.81 acres of land owned by OSLI. This area is composed of the Garrison Meadow and Andy's Meadow which provide fishing access points for the public to access the East Fork of the Wind River.

CM Ranch proposed trading 810 acres of their deeded land adjacent to Spence and Moriarity WMA. A conservation easement, which is now held by the Commission, was placed on the 81.96 acres of Commission property to prevent future subdivision. Additionally, a public access easement along the East Fork of the Wind River was retained by the Commission for fishing and hunting. An appraisal of the two properties with the aforementioned conditions was ordered and received by CM Ranch. The Commission property of 81.96 acres was valued at $390,000 while the CM Ranch property consisting of 810 acres was valued at $430,000. The Department also received an administrative easement through CM Ranch property to access Sheep Ridge.

In April 2019,the Commission exchanged 81.96 acres of flood irrigated land for 810 acres of land located in Big Horn Sheep Crucial Winter Range and Elk Crucial Winter Range. Public access to the East Fork of the Wind River was retained through a permanent public access easement and gained 810 additional acres of hunting access through the exchange. The 81.96 acres exchanged to the CM Ranch are now protected from subdivision and development through a conservation easement held by the Commission.

Terrestrial Habitat

The Statewide Terrestrial Habitat Program is a component of the BioServices Section and consists of the Terrestrial Habitat Program Manager and Office Manager stationed in Cheyenne and the Migratory Game Bird and Wetland Habitat Biologist stationed in Lander. The Terrestrial Habitat Program works closely with regional personnel to track grants, contracts, agreements, and expenditures for all terrestrial habitat projects statewide.

During calendar year 2019, Terrestrial Habitat Program personnel were heavily involved with on-the-ground implementation, oversight or verification of expenditures on 97 projects with each project containing funding from multiple sources such as: Game and Fish Trust Fund, WWNRT, various conservation organizations, local, county, state and federal agencies, conservation districts, weed and pest districts, private landowners, and others. These sources provided approximately $3,862,300 toward on-the-ground expenditures.

The various partners and their contributions are highlighted in the regional sections of this report. In addition, regional Terrestrial Habitat Biologists (THBs) worked on other SHP actions not directly related to funded projects or projects funded through the standard maintenance and operational budgets. These actions included habitat protection, inventory and assessment work, monitoring previous project function and habitat response, habitat related education efforts, and training. Lastly, personnel spent a

considerable amount of time throughout the year planning, coordinating and developing future projects with a multitude of partners and preparing funding applications for the WGFD and other entities.

In 2019, Terrestrial Habitat personnel continued to oversee collection of "Rapid Habitat Assessments" (RHAs). This methodology serves as a landscape level assessment used to inform mule deer objective reviews as well as provide baseline data for habitat conditions statewide. The Terrestrial Habitat Program worked with other sections to finalize and implement a new database designed by the Wyoming Geographic Information Science Center (WYGISC) to store and query habitat data for all WGFD projects. Terrestrial Habitat personnel were also heavily involved in the development of an annual invasive grass implementation plan which is tiered to the Department's Strategic Plan. Statewide, THBs closely coordinated with Wildlife Division personnel to provide habitat presentations at season setting meetings. Terrestrial Habitat personnel are also responsible for coordinating annual meetings with federal and management agencies on wildlife habitat enhancements and larger federal projects that may affect wildlife habitat. They provided assistance at hunter check stations to collect biological information from harvested animals and participated in non-game surveys as well as sage-grouse and sharp-tailed grouse lek surveys. Most habitat personnel also serve on one or more WGFD species working groups (moose, bighorn sheep, sage-grouse, turkey, pronghorn and mule deer) and routinely serve on various habitat-related committees.

Wyoming Landscape Conservation Initiative

The Wyoming Landscape Conservation Initiative 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 received federal appropriations through the Healthy Lands Initiative (HLI) since its inception; however, in 2018 the HLI funding was removed from the appropriations bill. The BLM continued to support WLCI through their state budget. In 2019, WLCI was able to provide BLM funding of $342,000 to nine projects. In addition to the nine funded projects, we had additional project accomplishments using carryover funds from previous years. Unfortunately, WLCI funds were disbursed late in the year, limiting expenditures to $81,714. Partner contributions were about $400,000. For every dollar WLCI contributed, WLCI partners contributed an additional $4.90.

The WLCI met with its Executive Committee twice in 2019. Both meetings focused on highlighting WLCI's 10 years of success and exploring new funding models, grants, and future partnerships with nonprofit organizations. The second meeting concluded with a tour in Sublette County to highlight projects relating to cheatgrass treatments on winter range and migration corridors and restoration activities associated with the Fontenelle fire. The Local Project Development Teams (LPDT) met three times throughout 2019 and discussion topics focused on project funding and priorities. In December, there was an All LPDT meeting to discuss a potential partnership with WWNRT. The All LPDT meeting also touched on how WLCI could make improvements that better support LPDTs. Topics about meeting structure, formats and frequency were discussed. Other topics included how to make project tours more informative and efficient and if we should consider pairing our tours with WWNRT tours. The teams suggested they would like to hear more about USGS research.

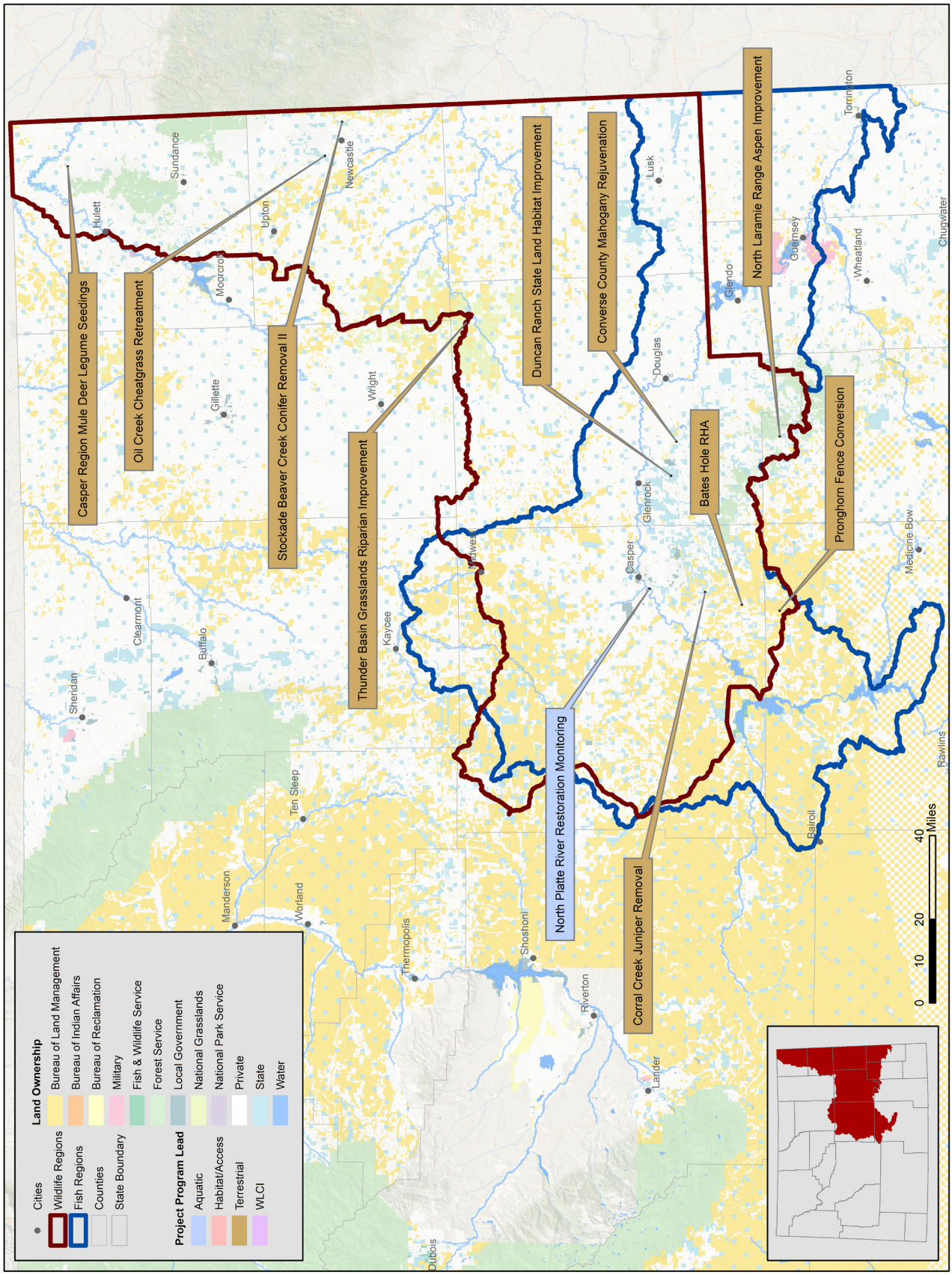
The WLCI Coordination Team worked with the Wyoming Mining and Natural Resource Foundation (WMNRF), for over a year and a half, to develop an instrument that would allow them to hold donat-

ed/granted funds for WLCI habitat projects and research. Unfortunately, due to legal circumstances WLCI was unable to sign the agreement with WMNRF. In July, at the WLCI Executive Committee meeting, State Senator Larry Hicks announced he would work with the Wyoming State Legislature to pursue funding for WLCI. He proposed the state would match federal contributions, dollar for dollar, up to $500,000, for habitat projects. The funds would be held by the Wyoming Wildlife and Natural Resource Trust. The proposal has been favorably received within the Appropriations Committee.

The Sweetwater County Commissioners invited WLCI and other government and non-governmental agencies to their annual State of the County meeting. The WLCI provided an update to the Sweetwater County Commissioners along with USFS, BLM, TU, and WGFD. The update highlighted the success of WLCI over the past ten years and the many and varied projects occurring within Sweetwater County.

The WLCI community said goodbye to four individuals who decided to pursue other dreams and aspirations. Three of the four have retired and the other is pursuing other interests. Mary-Jo Rugwell, BLM Wyoming State Director, Brad Rogers, USFWS Coordination Team member, Steve Germaine, USGS CT Member, and Angelina Pryich, BLM part-time Administrative Assistant to WLCI. All four members provided WLCI with leadership, dedication, guidance, thoughtful insights, and meaningful contributions.

Casper Region



Casper Region

The Casper Region spans from the plains of the North Platte River along the Laramie Range to the Black Hills of Wyoming and across many different habitat types. Habitat work across the region focused on removal, regeneration and relationships.

Due to a lack of historic fire regimes, many conifers, like junipers, are encroaching in areas where plant species more beneficial to wildlife once occurred. While junipers can provide good cover, they offer poor forage for wildlife. Mechanical removal of junipers allows for increased water availability and native forb and shrub regrowth with higher nutritional value for wildlife, especially mule deer. Hundreds of acres across the region benefited from conifer projects in 2019.

Cheatgrass treatment continued in the Oil Creek drainage in response to the Oil Creek fire of 2012. Following the wildfire, landowners and natural resource managers were concerned about cheatgrass infestations following the disturbance. Cheatgrass has the ability to out compete native grasses and reduce forage for livestock and wildlife. Herbicide treatments were applied between 2013 and 2014, however, monitoring conducted in 2018 showed cheatgrass density had climbed to or above pre-treatment levels. Over 1,000 acres were treated in 2019 with additional treatments planned for 2020.

Partnerships and cooperation were once again the foundation of the Casper Region habitat improvement projects, both aquatic and terrestrial. Without key partnerships with landowners, land management agencies, funding partners, local governments, sportsmen's groups, and NGO's, these diverse projects would not be possible.

Aspen Days 2019 (Goal 4) - Todd Caltrider and Travis Cundy

Figure 16. *Todd Caltrider and Travis Cundy provide an aspen monitoring demonstration.*

Aspen Days 2019 was jointly hosted by both the WGFD and South Dakota Game Fish and Parks and took place in the Black Hills of South Dakota and Wyoming. The purpose of the workshop is provide an opportunity for the public, natural resource managers and researchers to get together in the field to discuss aspen ecology and management. The workshop provides an excellent opportunity for field managers to learn about the latest research regarding aspen ecology and management, while researchers get the opportunity to interact with field managers working in aspen forests and learn about research needs. The three day event started off a with trek up the Sundance Trail to view a historic forest fire in the Bearlodge Mountains of Wyoming. Then the group made a stop to look at an aspen project in progress at the Badger Game Production Area near Spearfish, South Dakota before heading to Deadwood, South Dakota to listen to professional talks given by Paul Rogers (Western Aspen Alliance), Jim Blodgett (USFS), Nick Bowes (Eco Logical Research, Inc.), and Shelly Deisch (SDGFP).

On day two, participants toured various aspen projects conducted by the SDGFP and USFS on the South Dakota side of the Black Hills. Stops included various aspen projects conducted by the USFS and SDGFP on Forest Service and SDGFP managed lands. Topics of discussion on this tour included identifying aspen diseases, management prescriptions for aspen propagation and retention, and aspen management in the face of high ungulate populations.

Figure 17. *Dr. James Blodgett discusses aspen borne diseases in an infected aspen stand.*

Day three took place on the Wyoming side of the Black Hills north of Newcastle, Wyoming. Participants toured an example Beaver Dam Analog built by WGFD and Wyoming State Forestry in Parmlee Canyon, and then toured various aspen projects conducted by the BLM and Wyoming State Forestry. Topics of discussion during this portion of the tour included the role of beaver in aspen forests, aspen monitoring techniques, and the role of active forest management in relation to aspen propagation and retention. Approximately 40 people attended Aspen Days 2019. Funding was provided by the RMEF (SD chapter), WGFD, and SDGFP.

Bates Hole RHA (Goals 2 and 4) - Justin Binfet, Willow Bish and Heather O'Brien

RHAs are conducted annually across the state to assess condition of seasonal mule deer habitats. These data inform decisions on population objectives at each five-year review. Casper Region Biologists completed three Aspen RHAs, 21 Rangeland RHAs, and 12 Riparian RHAs in the Bates Hole Mule Deer Herd Unit. These data, along with previous years' data, will be summarized and included in the 2020 Bates Hole Mule Deer Herd Objective Review.

Corral Creek Juniper Removal (Goal 2) - Willow Bish

Juniper trees which were encroaching on big sagebrush and riparian communities were removed on 135 acres near Corral Creek. The project treatment site was comprised of state, BLM, and private lands. Hand crews were used to lop and scatter 122 acres and pile 13 acres in July of 2019. State Forestry will burn the piles at a later date.

Figure 18. *Corral Creek area before (left) and after (right) juniper removal.*

Casper PAAs (Goals 3 and 4) - Brian Parker and Matthew Pollock

The Casper Region Habitat & Access crew continued monitoring, annual maintenance, and improvements on twenty-five PAAs with thirty-nine parking areas. The crew maintained approximately twelve miles of fence; monitored and treated weeds; monitored for protection of WGFC property rights; maintained or contracted for the maintenance of access roads; maintained signs; and contracted for the maintenance of eighteen comfort stations.

Pronghorn Fence Conversion (Goals 2 and 4) - Heather O'Brien

An initial 12-mile stretch of interior pasture fence has been identified by local managers for conversion to wildlife-friendly standards along part of a suspected migration corridor. Goals are to document pronghorn movements pre- and post-treatment by using camera traps to identify specific migration corridors. Following any successful documentation of improved seasonal movements, this project may be expanded to adjacent pastures and right-of-way fences to further restore pronghorn movement corridors for the herd.

Figure 19. *Trophy doe crossing fence within a suspected migration corridor.*

Objectives are to improve, ease, and widen prong-

horn movement and habitat use by converting fences that impede movement in an area where managers believe it will have a high impact. Actions include: 1) Identifying fence crossing points currently used by pronghorn along 12 miles of interior pasture fence; 2) Document frequency/ease/difficulty of use by pronghorn prior to fence conversion using camera traps; 3) Convert fence from 5-strand barbed and woven wire, to 4-stranded wildlife friendly design; 4) Document frequency/ease/difficulty/changes in use by pronghorn after fence conversion using camera traps; 5) Analyze camera data using Before-After-Control-Impact design with the assumption that ease of pronghorn movement, frequency of crossing, and fence-crossing success will increase after conversion to wildlife-friendly standards.

Converse County Mahogany Rejuvenation (Goal 2) - Willow Bish

Figure 20. *Mahogany re-growth first growing season after treatment.*

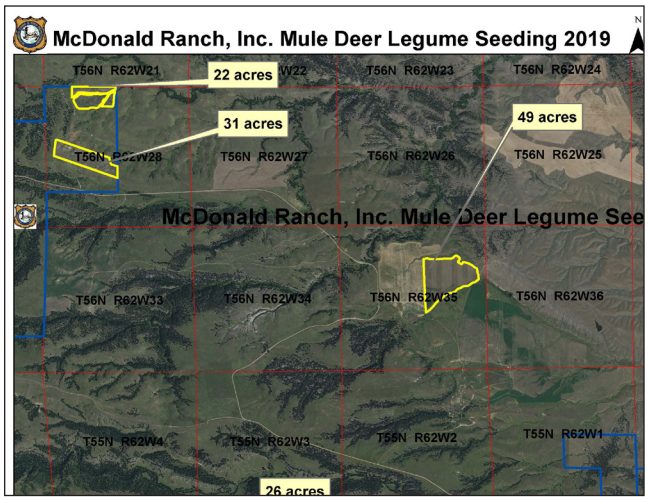
The objective of this project is to mechanically treat true mountain mahogany stands via mosaic mowing by reducing total cover of mahogany from >50% canopy cover to <30%. This will be accomplished by mosaic mowing approximately 50% of the area within treatment sites. True mountain mahogany is a re-sprouter, but requires a disturbance to activate this mechanism. Due to the loss of historic disturbance regimes, such as fire, many of these stands are very decadent. With the inherent costs, risks, and liabilities of conducting a prescribed fire, alternative treatment methodologies are warranted. The use of chemical treatment options, which are much less expensive, were trialed but did not meet objectives. Mechanical mowing will be used to rejuvenate mahogany stands by stimulating new, palatable and nutritious leader growth. Using mechanical methods creates a very predictable response and will allow the objectives to be met. Because topography limits the use of heavy equipment, we will use hand crews with brush saws to conduct the mowing. This work has been conducted on approximately 420 acres thus far, with another 480 acres planned in 2020.

Duncan Ranch State Land Habitat Improvement (Goal 2) - Willow Bish

Figure 21. *Juniper removal from a riparian area on Duncan Ranch state land.*

In 2019, 40 acres of juniper were cut by hand on Duncan Ranch. Remaining project components include aspen, sagebrush, and true mountain mahogany treatments. This work is intended to improve species diversity and hydrologic function within the site. The weed control and seeding components of this project were completed in 2018. Funding partners included NWTF, WGBGLC and WGFD Trust.

Casper Region Mule Deer Legume Seedings (Goal 2) - Todd Caltrider



A total of 128 acres of alfalfa were planted in the spring in Crook County on the McDonald Ranch, Inc. The plantings will provide high quality forage for mule deer. This project was funded in part through the statewide WGFD Shrub, Grass and Legume Seeding Program.

Figure 22. *McDonald Ranch mule deer legume seeding locations.*

North Laramie Range Aspen Improvement (Goals 2 and 5) - Willow Bish

In 2019, 154 acres of aspen stands in the Laramie Range were hand treated using a combination of lop and scatter, hinging, jackstrawing, select coppicing, and piling to provide herbivory protection. This occurred on USFS land near Devil's Pass and completed this phase which began in 2018 with 141 acres of OSLI land treated near Twin Peaks. The goal is to remove competing conifers and increase aspen rejuvenation. Funding came from the USFS, WWNRT, and the WGFD Trust Fund.

Figure 23. *Aspen recruitment at sites treated in 2018.*

Figure 24. *Aspen recruitment in conifer slash at sites treated in 2018.*

North Platte River Restoration Monitoring (Goal 2) - Del Lobb

The North Platte River is a valuable resource to the City of Casper and great river restoration efforts have been made in recent years to enhance the aesthetics and increase angling opportunities in the river through town. In addition to a large volunteer effort each year, a coalition of multiple private organizations and governmental agencies have secured funding to hire engineering and construction firms to complete restoration activities within the river corridor and improve river function. There are three focal areas for the restoration effort: improvement and stability of the stream channel characteristics, enhancement of fisheries, and restoration of native riparian vegetation. Seven restoration sites were

selected following an assessment by Stantec Consulting Services Inc. of 13.5 miles of the North Platte River through the Town of Mills and City of Casper. In 2016, restoration was completed at sites along Wyoming Boulevard and near the water treatment plant, with support from the City of Casper, Wyoming Business Council, WWNRT, WGFD, WGBGLC, Natrona County Weed and Pest, and Central Wyoming Regional Water System Joint Powers Board.

Figure 25. *The North Platte River in fall 2016 (top) and three years after restoration in summer 2019 (bottom). Healthy stands of willows and cottonwoods have established along the banks of the restored reach.*

Figure 26. *The North Platte River in fall 2016 (top) and three years after restoration in summer 2019 (bottom). The constructed floodplain and wetlands have been colonized by cottonwoods, willows, and other vegetation.*

Oil Creek Cheatgrass Retreatment (Goal 2) - Todd Caltrider

In 2012, the Oil Creek fire burned 62,000 acres in the Oil Creek drainage. Many of the acres burned contained important seasonal and yearlong habitat for a variety of big game species, including pronghorn (Yearlong and Winter/Yearlong seasonal range), elk (Winter/Yearlong seasonal range), mule deer (Crucial Winter/Yearlong and Winter/Yearlong seasonal range) and white-tailed deer (Crucial Winter/Yearlong and Winter/Yearlong seasonal range). Following the wildfire, many landowners and natural resource managers were concerned about cheatgrass infestations following disturbance. As result, the WGFD and the Weston County Weed & Pest collaborated on the Oil Creek Cheatgrass project to initiate a rangeland herbicide treatment for cheatgrass on rangelands affected or adjacent to the Oil Creek wildfire, with the goal of reducing cheatgrass density levels. Between 2013 and 2014, a total of 4,917 acres of rangeland were treated with imazapic herbicide for cheatgrass control. For four years following the initial herbicide treatment, cheatgrass density remained below pre-treatment levels. During summer 2018, cheatgrass density monitoring indicated densities had climbed to or above pre-treatment levels. A total of 5,385 acres of rangelands are slated for treatment with imazapic applied at a rate of 8 oz/acre with 6 gallons of water/acre as the deposition agent. Landowners participating have agreed to defer grazing following herbicide treatment for two growing seasons (April 1st -July 31st). This will allow native perennial grass recovery following herbicide treatments. During summer 2019, we treated a

total of 1,143 acres. Mechanical issues and weather conditions prohibited completion of all the planned acres in 2019. Herbicide treatment will resume in 2020. Funding was made possible by contributions from the WWNRT, WGFD Trust Fund, RMEF, MFF, and WGBGLC.

Figure 27. *Applying cheatgrass herbicide treatment near Oil Creek.*

Stockade Beaver Creek Conifer Removal II (Goal 2) - Todd Caltrider

Stockade Beaver Creek is a large drainage in Weston County that runs north to south from the Black Hills to the prairie near the Wyoming/South Dakota state line. This area serves as a major migration route for mule deer traveling between winter range at the base of the Black Hills in Wyoming to summer range at the highest elevations of the Black Hills in Wyoming and South Dakota. Transition/winter habitat for mule deer is currently threatened by conifer encroachment into mesic meadows and mountain shrub communities. In addition to conifer encroachment issues, a large percentage of the true mountain mahogany in the valley is mature and decadent. To improve nutritional condition for mule deer in the Stockade Beaver Creek drainage, WGFD initiated work with private landowners and Wyoming State Forestry to set back succession and create early seral habitats in the Stockade Beaver Creek drainage. To accomplish this, WGFD worked with landowners and Wyoming State Forestry to thin areas that are becoming dominated by both juniper and ponderosa pine to promote more herbaceous and browse habitat for mule deer. In addition to conifer removal, WGFD is also mowing stands of decadent and mature true mountain mahogany to increase leader growth and production.

Figure 28. *Photo monitoring displaying pre and post conifer removal.*

Phase I was completed in 2018, where 492 acres of conifer removal/thinning and mahogany mastication occurred on a mixture of private and state of Wyoming trust land. Phase II started in spring 2019, and to date a total of 187 acres of conifer removal/thinning was completed. There are 648 acres remaining to complete this phase of the project. Work on the remaining acres will occur during the winters of 2020-2022. Once these acres are completed another 1,361 acres are identified for treatment in the Stockade Beaver Creek drainage. Funding for this project was provided by the WGFD Trust, WWNRT, RMEF, MDF, MFF, WGBGLC, and NWTF.

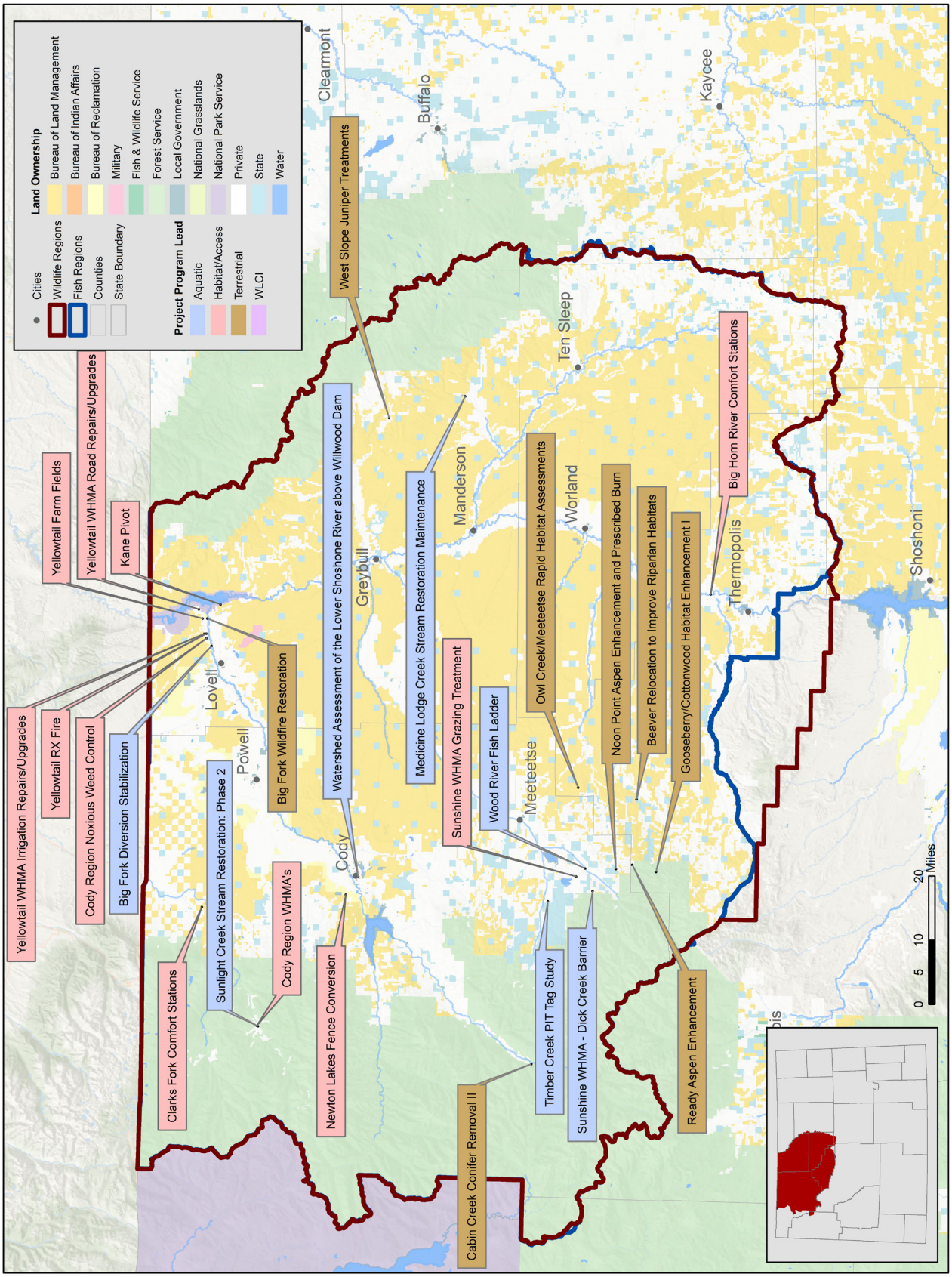
Thunder Basin Grasslands Riparian Improvement (Goal 2) - Willow Bish

Figure 29. *Newly planted native woody species on Antelope Creek.*

Antelope Creek and the Cheyenne River are located in northern Converse county in the Thunder Basin National Grasslands. The area hosts an improving cottonwood gallery but currently lacks woody understory diversity. It supports many nongame species of wildlife as well as mule deer, turkey, elk, and waterfowl. In 2019, we planted 7,100 native woody trees and shrubs within 43 exclosures along 11 miles of riparian habitat across a mix of federal, state, and private land. Species planted included native woody species such as cottonwood, peachleaf willow, chokecherry, golden currant, prairie rose, and buffaloberry. Over time these species will provide additional terrestrial forage and cover benefits, as well as assist with moderating stream temperatures and providing erosion protection.

The project has been developed based on lessons learned from similar projects implemented in Northeast Wyoming. Keys to planting success include reducing plant competition and providing protection from herbivory. Weed barrier, protection fencing, and protection tubes were used to increase the potential for success.

Cody Region


Land Ownership
Bureau of Land Management
Bureau of Indian Affairs
Bureau of Reclamation
Military
Fish & Wildlife Service
Forest Service
Local Government
National Grasslands
National Park Service
Private
State
Water
Cities
Wildlife Regions
Fish Regions
Counties
State Boundary
Project Program Lead
Aquatic
Habitat/Access
Terrestrial
WLCI
Clearmont
Buffalo
Kaycee
Ten Sleep
Manderson
Worland
Greybull
Lovell
Powell
Cody
Meeteetse
Thermopolis
Shoshoni
West Slope Juniper Treatments
Yellowtail Farm Fields
Yellowtail WHMA Road Repairs/Upgrades
Kane Pivot
Yellowtail WHMA Irrigation Repairs/Upgrades
Yellowtail RX Fire
Cody Region Noxious Weed Control
Big Fork Diversion Stabilization
Big Fork Wildfire Restoration
Watershed Assessment of the Lower Shoshone River above Willwood Dam
Medicine Lodge Creek Stream Restoration Maintenance
Sunshine WHMA Grazing Treatment
Wood River Fish Ladder
Owl Creek/Meeteetse Rapid Habitat Assessments
Noon Point Aspen Enhancement and Prescribed Burn
Beaver Relocation to Improve Riparian Habitats
Gooseberry/Cottonwood Habitat Enhancement I
Big Horn River Comfort Stations
Clarks Fork Comfort Stations
Sunlight Creek Stream Restoration: Phase 2
Cody Region WHMA's
Newton Lakes Fence Conversion
Cabin Creek Conifer Removal II
Timber Creek PIT Tag Study
Sunshine WHMA - Dick Creek Barrier
Ready Aspen Enhancement
0 5 10 20 Miles

Cody Region

The Cody Region lies in the foothills of the Absaroka Mountains stretching from the Montana state line south to the Owl Creek Mountains, flanked to the east by the Bighorn Mountains and by Yellowstone National Park to the west.

While diverse, efforts to manage and enhance wildlife habitats and improve Game and Fish Commission-owned lands in the Cody Region continue to have a common thread, they are collaborative efforts involving diverse partners including sportsmen, conservation partners, private landowners and land management agencies.

In 2019, terrestrial habitat efforts within the Cody Region focused on improving and managing wildlife habitats throughout the Big Horn Basin that have been degraded by fire, invasive weed species or encroachment of conifers. A joint effort near the upper Southfork River continued to remove conifers that were encroaching into crucial range for bighorn sheep, elk and mule deer. A Coordinated Resource Management team continues to focus on management of Russian olive and salt cedar on Yellowtail Wildlife Habitat Management Area near Lovell and as part of the ongoing Owl Creek/Meeteetse Mule Deer Initiative, over 900 native plants were planted in 2019 to revitalize the WHMA.

Aquatic habitat restoration efforts focused on improvement of Wyoming Game and Fish Commissioned-owned lands. In 2019, repairs were made to the Sunlight Creek to repair critical structures and stabilize the stream channel to protect the channel, habitat and Department cabins. Plans were also finalized for several high-impact projects to preserve and restore wetlands and fish passage.

Improvements to infrastructure on wildlife habitat management areas throughout the Big Horn Basin has also been a strong focus. Invasive annual weeds were treated with herbicide, annual fence maintenance was performed, and a historically flooded farm field was converted to a center pivot to distribute irrigation water more efficiently.

Beaver Relocation to Improve Riparian Habitats (Goal 2) - Jerry Altermatt

Between August and October, seven beavers were trapped and relocated within the Cody Region. Beavers were trapped by WGFD personnel from five different locations where they were causing problems with private landowners. All beavers were relocated to Grass Creek south of Meeteetse for the purpose of stream/riparian restoration. All beavers were weighed to determine an approximate age. Sex was determined on two beavers by expressing anal glands and on a third by observing lactation. Two female beavers were fixed with VHF tail tag transmitters after being anesthetized. The locations of these two beavers were determined approximately weekly until freeze-up, then approximately monthly thereafter. Beavers were temporarily held in a mobile holding facility until as many family members as possible were captured to enable family units to be released together. At the time of this report, one tagged beaver had moved approximately six miles downstream shortly after release and has occupied a bank den. The other tagged beaver moved approximately three miles downstream shortly after release and occupied a bank den before moving back upstream one mile and occupying several bank dens. Both of these beavers constructed food caches but no dams. Trail cameras at the bank den sites suggested that neither of these females had paired with a mate. A new dam and food cache was discovered a few hundred yards above the release site of the five non-tagged beavers about a month after release, and it is presumed to have been constructed by one or more of these beavers.

Figure 30. *Attaching a tail tag transmitter.*

Figure 31. *Beavers in a mobile holding facility waiting for relocation.*

Big Fork Diversion Stabilization (Goals 1 and 2) - Brad Sorensen and Laura Burckhardt

In 2019, the WGFD finalized design plans for stabilizing the Big Fork Diversion on the Shoshone River. The Shoshone River has a very high sediment load and has experienced lateral instability for many years. In addition to sediment build up, tree jams at the mouth of the feeder canal have been an annual maintenance issue. In 2019, debris jams resulted in ice buildup and severe damage to the Big Fork Diversion head gate.

Figure 32. *Big Fork Diversion on the Lower Shoshone River.*

Stabilization of the diversion and the continued delivery of a reliable water source is necessary to maintain habitat values associated with irrigated lands and wetlands on the Yellowtail WHMA and adjacent private lands. Over the years, the WGFD, with funding from several groups, including the WWNRT and Pheasants Forever, has invested $750,000

in the Big Fork Canal through piping of irrigation water and the installation of a siphon. Stabilization of the Big Fork Diversion is the latest step to ensure long-term delivery of water to these vital wildlife habitats. Construction of this stabilization project is anticipated in 2021.

Big Horn River Comfort Stations (Goal 3) - Brad Sorensen and Eric Shorma

Two new CXT type single vault comfort stations were installed on the Schaffer and Skelton PAAs. The new comfort stations replaced obsolete wooden structures that had become dilapidated over time.

Figure 33. *Schaffer PAA Comfort Station.*

Cabin Creek Conifer Removal II (Goal 2) - Jerry Altermatt

WGFD and Shoshone National Forest completed the second phase of a conifer removal project on the upper Southfork River. A private contractor removed juniper and other conifers using chain saws from the 60-acre project area. Conifers were lopped and scattered and will be broadcast-burned by Shoshone National Forest after needles turn red. This phase completes a larger project where over 600 acres of conifers were removed with the objective of eliminating conifers encroaching into crucial winter range for bighorn sheep, elk and mule deer. As conifers increase they out-compete sagebrush and grasses, critical forage components for wintering big game. Additionally, bighorn sheep generally avoid areas of conifer encroachment because of reduced visibility. The project was funded by WWNRT, RMEF, WWSF, Shoshone National Forest and the WGFD.

Figure 34. *In addition to removing all small diameter trees, larger trees were limbed up to 4 feet in preparation for broadcast burning.*

Clarks Fork Comfort Stations (Goal 3) - Brad Sorensen and Craig Swanson

Two new CXT type single vault comfort stations were installed at Germans Rest and Beartooth Ranch PAAs on the Clarks Fork River. The new comfort stations replaced obsolete wooden structures that became dilapidated over time.

Cody Region Noxious Weed Control (Goals 1 and 2) - Brad Sorensen, Craig Swanson, and Eric Shorma

Approximately 2,000 acres of invasive plants were treated by Habitat and Access biologists and local Weed and Pest Districts on WGFC managed properties in 2019. These invasive plants were treated using chemical, mechanical, and biological methods to stress the plants. Controlling these noxious plants will enhance habitat while allowing native plants to thrive.

Figure 35. *Weed spraying in early spring.*

Cody Region Public Access Areas (Goal 2) - Brad Sorensen, Craig Swanson, and Eric Shorma

Habitat and Access personnel performed annual maintenance and monitoring of Cody Region PAAs. All public access boundary fences were maintained and signed to protect WGFC property rights and protect habitat. Vandalized and weathered signs were replaced or ordered. In addition to maintaining PAA boundaries, Habitat and Access personnel oversaw maintenance contracts and noxious weed spraying. Access roads, parking lots, and public facilities at these sites were maintained as needed and maintenance contracts were fulfilled on the Big Horn River, Shoshone River, Clarks Fork River, Ten Sleep Creek, Newton Lakes and Upper and Lower Sunshine Reservoirs PAAs.

Figure 36. *Primitive boat ramp maintenance.*

Cody Region WHMAs (Goals 1 and 2) - Brad Sorensen, Craig Swanson and Eric Shorma

Figure 37. *Cody Region WHMA irrigation.*

Annual maintenance and improvements continued on the five WHMAs in the Cody Region in 2019. In this time, over 57,000 acres of WGFC managed property rights were monitored. The Sunlight, Yellowtail, and Medicine Lodge WHMAs received annual fence maintenance on a total of 70 miles to reduce trespass livestock. The Sunshine and Renner WHMAs received annual fence maintenance on a total of 45 miles of stock fence by lessee. A total of 1,486 acres of water rights were irrigated on the Yellowtail, Renner, Medicine Lodge, and Sunlight WHMAs. All Cody Region WHMAs received annual parking lot and road maintenance to ensure continual access. Noxious weed treatment was a key focus and approximately 2,000 acres of noxious weeds were treated.

Gooseberry/Cottonwood Habitat Enhancement I (Goal 2) - Jerry Altermatt

Figure 38. *A Shoshone National Forest crewman sawing conifer slash in an aspen stand.*

A multi-phase habitat enhancement project was initiated in the upper reaches of Cottonwood Creek and Gooseberry Creek on the Shoshone National Forest. Over 300 acres of conifer-encroached aspen and 2,400 acres of conifer-encroached sagebrush steppe were identified for treatment. Aspen treatments will consist of mechanical removal of conifers, followed by broadcast burning where feasible and sagebrush steppe treatments will consist of prescribed fire to eliminate conifer, enhance forage production and create a diversity of sagebrush age classes. A Shoshone National Forest saw crew began mechanical treatments in Cottonwood Creek in summer 2019, but were only able to complete two acres before being assigned to wildfires. The project is located within the Owl Creek/Meeteetse mule deer herd unit, a priority herd under the MDI, and addresses the issue of aspen decline as identified during collaborative public input.

Kane Pivot (Goals 1 and 2) - Brad Sorensen and Eric Shorma

A historically flood irrigated farm field was converted to a center pivot to distribute irrigation water more efficiently. The new pivot covers 60 acres. This field serves as a food source for wildlife on the Yellowtail WHMA.

Medicine Lodge Creek Stream Restoration Maintenance (Goals 2 and 3) - Laura Burckhardt

In 2017, the WGFD used natural channel design methodologies to repair channel degradation across approximately 0.73 mile of Medicine Lodge Creek. Year-round fish passage is now available at the Anthony and Betty Irrigation Diversions and a stable stream channel was constructed allowing for

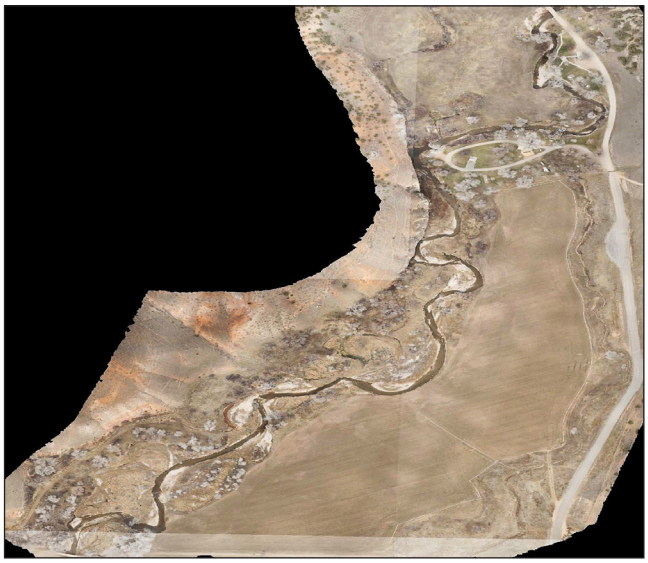


Figure 39. *Pre-construction (October 2015) stream restoration project area.*

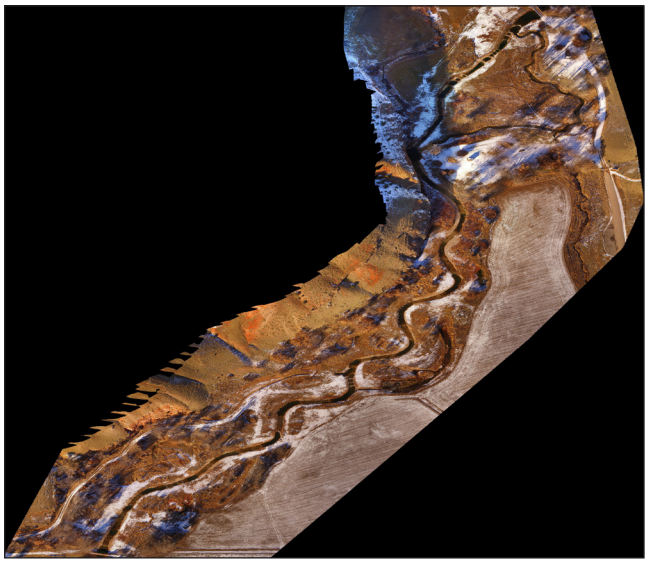


Figure 40. *Post-construction (December 2018) stream restoration project area.*

sediment transport, floodplain connectivity and fisheries habitat. This stream restoration reduced bank erosion by approximately 2,300 tons of sediment per year, eliminating non-point source sediment pollution from entering Medicine Lodge Creek.

In May 2019, the restoration area was planted with 750 shrubs and trees, including mountain alder, water birch, black cottonwood, chokecherry, currant, woods rose, silver buffaloberry, and western snowberry. Also in May, high flows resulted in bank erosion around some rock structures. The WGFD and North State Environmental responded immediately to restore irrigation water to private water users. Final repair of the damage was completed in October. All repairs were completed under the project warranty and at the expense of the contractor.

Newton Lakes Fence Conversion (Goal 2) - Brad Sorensen and Craig Swanson

The boundary fence on the east side of East Newton Lake was beyond repair. Approximately 4,620 linear feet of dilapidated stock fence was removed and replaced with a wildlife friendly pole-top fence. This fence will act as a barrier to trespass livestock while providing a visible barrier to migrating wildlife. Replacing these fences with wildlife friendly fencing will also improve public awareness by setting a good example of proper stewardship of public lands.

Figure 41. *Crews replace fencing.*

Yellowtail RX Fire (Goals 1 and 2) - Brad Sorensen and Eric Shorma

Habitat and Access personnel in cooperation with the BLM and the National Park Service conducted a prescribed burn of approximately 65 acres on ponds 1 and 2 on Yellowtail WHMA. Fire was used to reduce the amount of narrow leaf cattail cover on the ponds and increase open water, thus improving the quality of loafing and brood rearing habitat. The fire prescription called for approximately 80% consumption of emergent vegetation, which was achieved.

Figure 42. *Yellowtail RX fire.*

Figure 43. *Aerial image of fire.*

Noon Point Aspen Enhancement and Prescribed Burn (Goal 2) - Jerry Altermatt

In 2019, 176 acres of aspen were treated by removing conifers and 1,212 acres of conifer-encroached sagebrush steppe were treated with prescribed fire on BLM, state and private lands in the upper Gooseberry Creek watershed. Conifers were removed from aspen communities by a private contractor using chainsaws with a combination of lop-only and lop and scatter treatments on 176 acres. Prescribed burns were conducted by BLM in the spring and achieved a 35% mosaic of burned and unburned within the 1,212-acre treatment block. This was the second phase of a 3-phase project. In 2018, 16 acres of aspen were treated and 967 acres were burned. The project is located within the Owl Creek/Meeteetse mule deer herd unit, a priority herd under the MDI, and addresses the issue of aspen decline as identified during collaborative public input.

Figure 44. *Aspen stand with conifers felled in a jackstraw manner.*

Figure 45. *BLM fire crew with mosaic spring burn in the background.*

Owl Creek/Meeteetse RHAs (Goals 1 and 2) - Jerry Altermatt

RHAs are conducted annually across the state to assess condition of seasonal mule deer habitats. These data are used to inform decisions on population objectives at each five-year review. In 2019, three aspen, 11 rangeland and eight riparian assessments were conducted.

Figure 46. *Riparian RHA on Enos Creek.*

Sunlight Creek Stream Restoration: Phase 2 (Goals 2 and 3) - Laura Burckhardt

In 2018, the WGFD entered into a design-build contract with a contractor who estimated they could design and construct the project for $605,000. Construction was estimated to take approximately 3 months and began on August 8, 2018. Construction was stopped due to weather on January 3, 2019 and was only approximately 50% complete due to the incorrect construction of the stream channel. Unfortunately, the contractor underbid the project by approximately $800,000 and did not construct

the stream alignment or stream structures to design specifications. The WGFD canceled the contract in March 2019. From April through May 2019, WGFD used department personnel, and a new contractor to complete construction and repair critical structures prior to runoff. The WGFD Statewide and Cody Habitat and Access crews graded the floodplain and constructed the two floodplain ponds. In total the crew spent 6-weeks on site and moved 73,000 cubic yards of material. The new construction contractor rebuilt 400-feet of toewood on a critical bend and finalized grading of the bankful channel. The repairs held up during the 2019 runoff, however, the other incorrectly built structures from the previous contractor failed.

Figure 47. *Sunlight Creek during construction.*

Following runoff, Sunlight Creek was resurveyed and the design was adjusted to minimize the amount of regrading that would have to occur and maximize the area that could be repaired. The goal was to stabilize the first 2,800 feet of stream channel thus protecting the channel, habitat, and WGFD cabins. The construction of Phase 2 stream channel eliminated the unnatural rate of bank erosion that was occurring and added substantial trout habitat. The channel realignment eliminated the observed annual bank erosion of up to 150 feet and prevented 31,540 tons (1,855 dump truck loads) of sediment entering sunlight Creek each year. In addition to the construction of 2,800 feet of stream channel and 30 acres of riparian habitat, additional habitats were created from an unexpectedly high-volume of groundwater flow from the Painter Creek drainage. The steady ground water flow from Painter Creek created 4 acres of shrub-scrub wetlands and approximately 5 acres of open water wetland. In addition, a 4-acre pond was created that connects to Sunlight Creek and provides fish overwintering and rearing habitat. A new 600-foot long ephemeral stream channel was created for Painter Creek and connects Sunlight Creek to the pond. In addition, approximately 10,000 willows were planted in the floodplain and along Sunlight and Painters Creeks.

Ready Aspen Enhancement (Goal 2) - Jerry Altermatt

Private contractors removed conifers from 29 acres of aspen communities on the Roy Ready property in the Upper Gooseberry drainage. The aspen enhancement is part of a larger silvicultural project that will eventually treat over 100 acres of aspen. The project is a cooperative effort between State Forestry, the landowner and WGFD. The project is located within the Owl Creek/Meeteetse mule deer herd unit, a priority herd under the MDI, and addresses the issue of aspen decline as identified during collaborative public input.

Figure 48. *Aspen stand after felling conifers.*

Sunshine WHMA - Dick Creek Barrier (Goal 2) - Brad Sorensen and Erin Sobel

The Sunshine WHMA receives 12.82 cfs from a diversion located on private land on Dick Creek. The current Dick Creek diversion dam was installed in the 1990s. Since 2002, a large headcut has formed downstream of the diversion resulting in an 8 foot bed elevation difference. The diversion is at high risk of failure. When this occurs, the Sunshine WHMA will not receive water and brook trout will have access for upstream migration into a core conservation population of Yellowstone cutthroat trout. Great West Engineering (GWE) out of Montana is designing a permanent fish barrier and diversion to prevent the upstream migration of brook trout. Great West is also designing improvements for the water delivery system to Sunshine WHMA. Alternative designs were selected in December, but GWE has been requested to put the design process on hold due to easement concerns with private landowners. We are currently working with two landowners to get cooperative agreements in place before we continue drafting final designs. Funding applications for the project were submitted to the WGFD Habitat Trust Fund, WFW, WGBGLC and the RMEF, and we have been awarded $60,000 from the WGFD Habitat Trust to date. Work in 2020 will focus on easements, fundraising, and getting to 100% design.

Figure 49. *Failing diversion made of gabion baskets preventing a head cut from moving upstream.*

Figure 50. *Irrigation water goes through this corroded culvert over North Fork Dick Creek. Replacing this culvert with buried siphon will improve water delivery to the Sunshine WHMA.*

Sunshine WHMA Grazing Treatment (Goal 2) - Brad Sorensen and Craig Swanson

A spring, summer, and fall grazing treatment was conducted on the Sunshine WHMA in 2019. 1,256 AUMs were utilized for approximately 5 months in a high intensity short duration approach on a rotational schedule through the 4 pastures. This treatment will reduce litter and stimulate growth on the WHMA.

Figure 51. *Cow elk by Hevey Reservoir-Sunshine WHMA.*

Watershed Assessment of the Lower Shoshone River above Willwood Dam (Goals 2 and 4) - Laura Burckhardt

Figure 52. *Eroding bank on an ephemeral tributary to Sulphur Creek.*

In fall 2016, 96,000 cubic yards or 6,857 dump truck loads of sediment was released from behind Willwood Dam impacting downstream fisheries and aquatic habitat as well as downstream landowners. The WGFD is participating in working groups to develop alternatives for the long-term management of sediment behind the dam, identify sources of sediment to the Shoshone River upstream of the dam, and identify voluntary management measures to mitigate those sources. Working group 3's objective is to reduce the volume of sediment that accumulates at Willwood Dam through implementation of voluntary best management practices (BMPs) designed to reduce the introduction of sediment into the Shoshone River above Willwood Dam. The group is comprised of members from the Willwood Irrigation District, local agricultural producers, Wyoming Department of Environmental Quality, WGFD, BLM, Powell Clarks Fork Conservation District, Cody Conservation District, NRCS, Wyoming Association of Conservation Districts, East Yellowstone Chapter of TU, UW Extension, and TNC.

The working group met approximately monthly throughout 2017, 2018, and into 2019 to focus on identifying potential sediment sources to the Shoshone River and its tributaries, prioritizing the impact of those potential sediment sources, and identifying potential projects and funding sources that might be voluntarily applied with landowners and agencies to reduce sediment loading. Efforts of the working group also included identifying data gaps and monitoring needs, with some preliminary data collection efforts started in 2017 and continued in 2018 and 2019. In support of these planning efforts, group members completed on the ground habitat assessments on Lakeview Creek, Cottonwood Creek, Sage Creek, and Dry Creek/ Homesteader Creek.

Figure 53. *Eroding bank on Cottonwood Creek.*

In 2019, the group finalized the watershed plan and produced two Story Maps. The first Story Map provided a summary of the watershed plan and the collaborative efforts to develop the plan and the second provided additional watershed planning information, including detailed information and proposed management measures for each sub-watershed. The Cody AHAB assisted in the presentation of the watershed plan to the public, Park County Commissioners, East Yellowstone TU, and the irrigation districts.

West Slope of the Bighorns Juniper Treatments (Goal 2) - Jerry Altermatt

Juniper and other conifers were removed from 805 acres of crucial winter range for elk and mule deer and sage-grouse habitat on private lands on the west slope of the Bighorn Mountains in the Trapper Canyon area. Conifers were removed by a private contractor using chainsaws and a back-hoe where accessible. Additional areas are being identified for treatment in future years on adjacent BLM lands. The purpose of the work is to maintain the integrity of sagebrush/grassland and riparian habitats within big game crucial winter range and sage-grouse core area by eliminating conifer encroachment. The treatment areas were in an early phase of juniper encroachment, an opportune time for treatment since removal of junipers is less intensive, costs are reduced, and understory vegetation has not been significantly altered due to juniper competition. These treatments are part of a long-term effort to address conifer encroachment on the West Slope of the Bighorns.

Figure 54. *Junipers removed from riparian area.*

Big Fork Wildfire Restoration (Goals 2 and 5) - Jerry Altermatt

Figure 55. *Seedlings planted with a weed barrier to eliminate competition and retain moisture.*

On April 27, 2013, the Big Fork Fire burned over 1,500 acres on the Yellowtail Area CRM Area, including the Yellowtail Wildlife Habitat Management Area and adjacent private lands. Included in the burn area were 752 acres that had been treated to remove Russian olive between 2009 and 2013. These areas, because of the heavy biomass in the form of Russian olive slash, burned with high intensity and prolonged heat, causing severe fire effects. This has resulted in high herbaceous plant mortality and extensive areas of bare ground. Noxious weeds including white-top, Russian knapweed, and Canada thistle have proliferated throughout the burn area but especially in areas of highest fire severity.

In 2019, the CRM planted over 900 buffaloberry, red-osier dogwood and chokecherry plants in the wildfire area. Two and three-year-old containerized plants were contract grown and were planted out with a contracted planting crew. Plant survival was enhanced by using a 3 ft x 3 ft weed barrier. Plants were sprayed throughout the year with a blood-based deer repellent to discourage browsing.

Yellowtail Farm Fields (Goals 1 and 3) - Brad Sorensen and Eric Shorma

The Yellowtail WHMA has approximately 100 acres of farm fields that are farmed and irrigated for permanent cover and food plots. Barley, oats, milo, and millet were planted for food plots. These food plots benefit waterfowl, pheasants, wild turkeys, and deer by providing cover and a food source. These fields also provide hunting and wildlife viewing opportunities for the large number of recreationalists that utilize the WHMA.

Yellowtail WHMA Irrigation Repairs and Upgrades (Goals 1 and 2) - Brad Sorensen, Craig Swanson, Eric Shorma and Statewide Habitat and Access

Irrigation is a critical part of maintaining and improving wildlife habitat on the Yellowtail WHMA. Yearly maintenance and upgrades are necessary to facilitate the most efficient use of irrigation water. In 2019, a new head gate and pipe were installed on the big fork canal to supply water to the WHMA. A spill structure and concrete check were also installed to facilitate effective irrigation to permanent cover and farm fields.

Figure 56. *Big Fork Canal head gate replacement.*

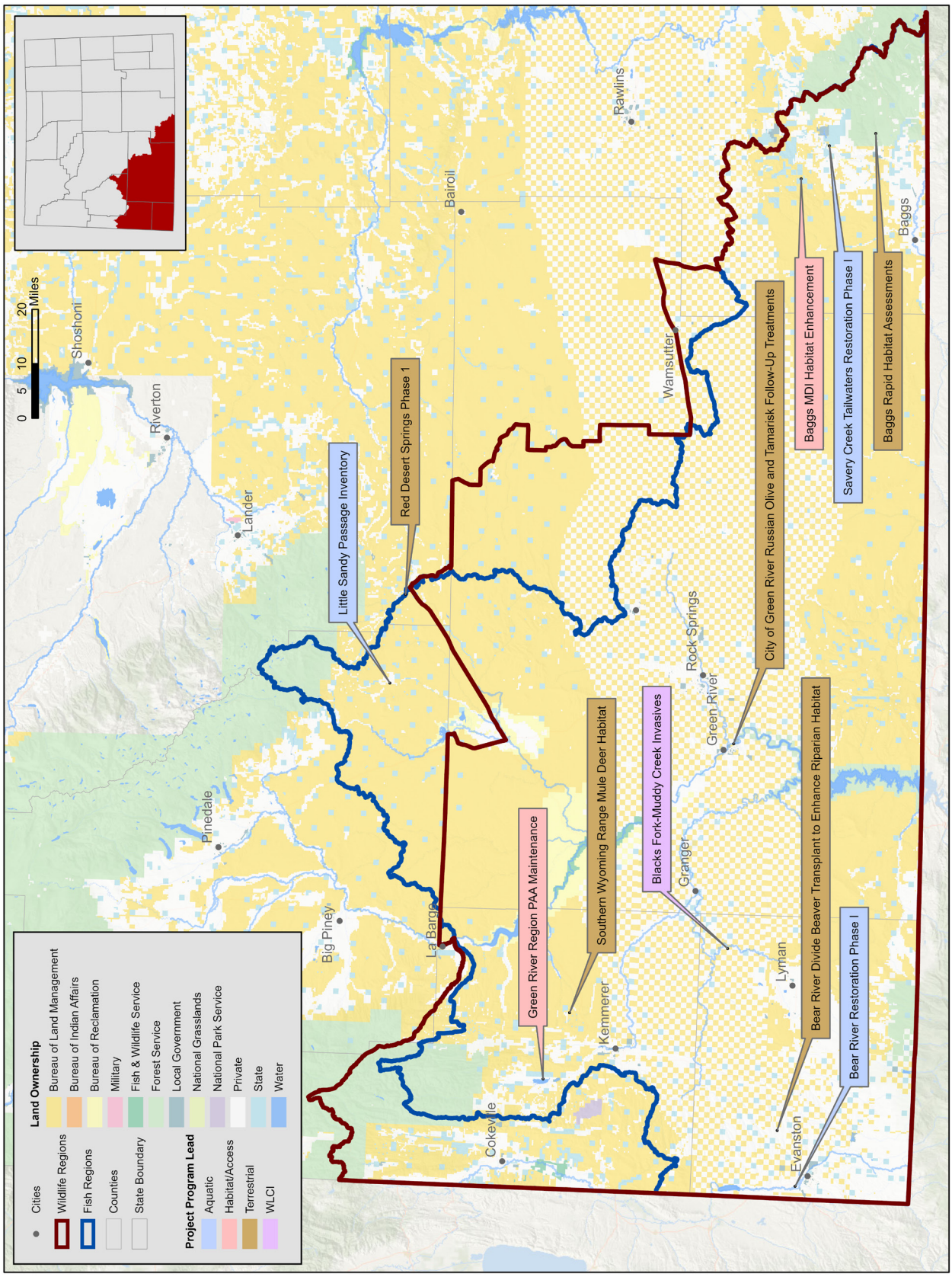
Figure 57. *Upper Merril check replacement.*

Yellowtail WHMA Road Repairs and Upgrades (Goal 3) - Brad Sorensen, Eric Shorma and Statewide Habitat and Access

Approximately 2,000 cubic yards of pit run, road base, and gravel were spread on 7 miles of roads within the Yellowtail WHMA. Proper road maintenance and repairs facilitate proper WHMA management and reduce resource damage.

Figure 58. *Road repairs in the WHMA.*

Green River Region



Green River Region

The strategic habitat efforts and accomplishments achieved during the 2019 field season in the Green River Region continued to be guided by a commitment to projects on a landscape-level, in multi-year phases, and projects completed via much collaboration with state, county and federal partners, as well as private landowners and non-governmental agencies. Habitat improvement continued to focus on: enhancing habitat for big game, beaver and sage grouse; improving fish passage and spawning; improving maintenance for PAAs; control of invasive species; developing upland springs and ditch diversions in our more-xeric habitats to benefit multiple bird and ungulate wildlife and improve fencing for livestock grazing management and stream restoration.

Focal areas continue to be delineated through priorities defined within the SHP, priority areas established by WLCI, the Wyoming Range and Baggs Mule Deer Initiatives, and plans developed by the Southwest and South-Central Sage-Grouse Local Working Groups.

Monitoring activities were increased in 2019, focusing on habitats within Mule Deer Initiative herd units (Wyoming Range and Baggs Deer within the Green River Region), with a significant number of RHAs completed. Biologists also continued to monitor aspen, mountain shrub and cottonwood communities. Sagebrush, aquatic and terrestrial habitat health assessments were also the norm, including some major tree planting and large-scale streambank stabilizations.

Habitat and access employees continued to treat noxious weeds and enhance public facilities at access points in the region, including new culverts and many miles of roads graveled to prevent further damage on WHMAs and PAAs.

Baggs MDI Habitat Enhancement (Goals 1 and 2) - Brandon Werner, Jerry Cowles, Mark Cufaude, Mac Foos, and Todd Grosskopf

The overall objective of the Baggs MDI habitat enhancement is to introduce disturbance to stimulate more productive habitat for mule deer and other wildlife. Due to the lack of natural disturbance on the Grizzly WHMA, large acreages of sagebrush are decadent, with sagebrush canopy cover well above 40%. With the high density of sagebrush, grass and forb availability and diversity is reduced. The density of sagebrush is also having negative effects on the hydrology within the WHMA as seen in decreased spring output and late season stream flows.

This project was completed in accordance with the Sage Grouse Executive Order 2019-3 and the Baggs MDI Goals of; mowing and aeration of sagebrush to decrease canopy density, reset age class structure, and increase nutritional value. Using a bulldozer with a ripper attachment, aspen regeneration and expansion was stimulated. This will also ultimately increase hydrologic functions. WGFD personnel used tractors, batwing mowers, rental equipment (bulldozer), and chainsaws to complete this work.

Figure 59. *Dozer ripping aspen.*

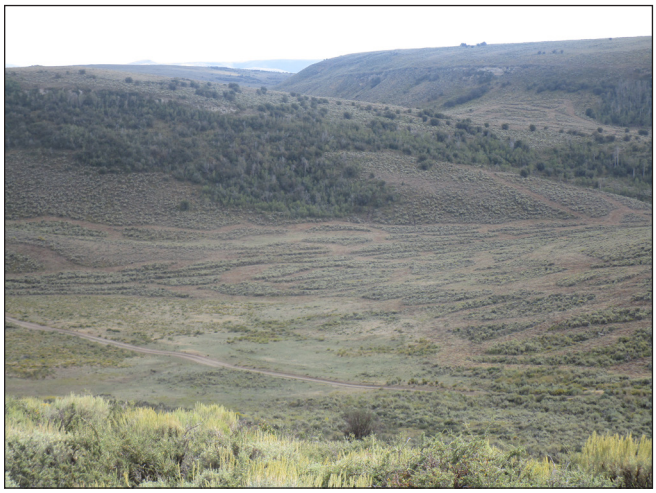


Figure 60. *Mosaic brush mowing.*

Baggs Rapid Habitat Assessments (Goal 2) - Katie Cheesbrough and Phil Damm

Figure 61. *Riparian RHAs in the Baggs MDI area.*

RHAs are conducted in MDI herd unit areas across the state to assess habitat conditions across mule deer seasonal ranges. Fewer RHAs were done in the Baggs herd unit this year as personnel were stretched over a larger area than in previous years. For the Baggs mule deer herd, two riparian assessments representing approximately 146.7 acres were conducted this year. The information from these assessments will be used for Herd Objective Reviews (conducted every five years) and annual data will be summarized in Job Completion Reports (compiled annually). These data provide population managers and the public with documentation of the current state of habitat conditions for the Baggs mule deer herd.

Bear River Divide Beaver Transplant to Enhance Riparian Habitat (Goal 2) - Kevin Spence and Jim Wasseen

Regional habitat personnel collaborated with USDA Wildlife Services in Uinta County to live trap nuisance beavers and transplant them to a site where they could restore riparian habitat function. A family of four nuisance beaver causing problems in irrigation ditches were live trapped from private lands along the Smith's Fork River near Mountain View, and transplanted to previously occupied habitat in the headwaters of Byrne Creek on the Bear River Divide on private land. The landowner requested the beavers, as he understands their role in restoring and maintaining watershed function for his riparian areas.

Figure 62. *Relocating beaver to enhance Byrne Creek riparian habitat.*

Bear River Restoration Phase I (Goal 2) - Kevin Spence

Funding and technical assistance was provided to UCCD and the USFWS' Wyoming Partners Program who led restoration efforts on a 4,100 ft reach of the Bear River on private lands north of Evanston. Restoration included channel realignment, channel reshaping, bank stabilization, and an irrigation diversion redesign for the identified river reach. The work resulted in a river channel with the appropriate dimensions for stable banks and balanced sediment transport, allowing for pools with desirable spacing and depths. Instream rock cross vanes and j-hook features have promoted self-sustaining deep pools and improved aquatic habitat complexity. Bankfull bench features were created to stabilize incised river banks and ideal locations for cottonwood, willow and other riparian shrubs to establish and grow to maturity. Aquatic improvements will benefit all life stage habitat needs for bonneville cutthroat trout, bluehead suckers, and other native fish. Stable river banks will encourage mature cottonwood stands to benefit nesting habitat for species such as bald eagles, while providing

Figure 63. *A wide, shallow, and eroding Bear River channel prior to restoration.*

Figure 64. *Bear River following phase I restoration with bankfull benches, and a narrower and deeper channel.*

bat roost sites. Riparian shrub species composition, density, and height class diversity will improve vertical and horizontal cover for everything present from passerine birds to moose. Project partners included UCCD, USFWS, Wyoming Department of Environmental Quality 319 program, WWNRT, and WGFD.

Blacks Fork-Muddy Creek Invasives (Goal 2) - Jim Wasseen and Chris Aimone

The UCWP reviewed treatment data and results and determined that an area north and south of interstate Highway 80 in the Blacks Fork Drainage needed re-treatment for noxious weeds. Discussions and planning with the BLM Kemmerer Field Office and landowners were conducted. Headwater Weed Control received the contract and did the work on the drainage in Uinta County. The contractor focused treatments on salt cedar (Tamarix spp.), perennial pepperweed (Lepidium latifolium), thistle complexes (Carduus spp.) and other invasive species occurring on the Blacks Fork River. The contractor also noted the presence of cheatgrass (Bromus tectorum) in areas that were scouted for salt cedar. The contractor began work on the Smiths Fork River and Cottonwood Creek, where they found new starts of salt cedar 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 salt cedar. In an area of 11,055 acres, nearly 16 acres were treated for tamarisk and 112 acres were treated for other noxious weeds. In all, eleven miles of the Smiths Fork and Cottonwood Creek drainages were surveyed and treated for invasive weed and shrub species to maintain more desirable vegetation along the riverbank and limit seed propagation further down the drainages.

Figure 65. *Applying herbicide to tamarisk.*

City of Green River Russian Olive and Tamarisk Follow-Up Treatments (Goal 2) - Kevin Spence and Jim Wasseen

Figure 66. *Follow-up Russian olive control treatments to maintain quality cottonwood galleries.*

Efforts to control Russian olive and tamarisk along the Green River from Fontenelle Dam to the confluence of Flaming Gorge reservoir began in 2010. Without control treatments, these non-native invasive trees would out-compete native tree and shrub species within riparian corridors causing poor habitat quality and quantity. WGFD re-granted WLCI funds to the City of Green River to conduct follow up control of Russian olive/tamarisk and rehabilitation with native tree/shrub plantings along the 5-mile urban reach of river associated with the city's greenbelt zone. Field Services and Weed Control, LLC was contracted in 2019 to perform foliar treatments on 490 riparian acres associated with this urban greenbelt reach of the Green River. Control work involved treating re-sprouts and seedlings, and a few older

trees missed in previous treatments. Most of the work was completed on city-administered property, and smaller portions of adjacent private lands in the Scott's Bottom area were treated.

Grizzly WHMA Forage Reserve Monitoring (Goals 1 and 5) - Katie Cheesbrough, Kevin Spence, Jerry Cowles and Mark Cufaude

Red Rim Grizzly WHMA is comprised of 38,000 acres; this includes 9,451 acres of OSLI land, which is leased by the WGFC, 26,920 acres of BLM which is under an Memorandum of Understanding (MOU) with the WGFC, and 1,664 acres of WGFC fee title lands. Three cattle operators utilized an annual rest rotational grazing plan at the Red Rim Grizzly WHMA, collectively consuming approximately 5,882 AUMs. In exchange for grazing on Red Rim Grizzly, the grazing lessees defer grazing on important wildlife habitat on private and BLM lands. In 2019 we monitored the lands that were rested and coordinated the grazing on the WHMA with cooperation from the BLM, SERCD, WGFD, and grazing operators.

Green River Region PAA Maintenance (Goal 2) - Miles Anderson and Kyle Berg

Habitat and Access personnel performed annual maintenance on Green River Region's many PAAs: Lake Viva Naughton, Woodruff Narrows, Hams Fork, Green River Blue Rim, Blacks Fork, and V-Cross. Maintenance included signs, parking areas, access roads, boat ramps, camp grounds, and comfort stations.

Figure 67. *Dock adjustments at Lake Viva Naughton PAA.*

Figure 68. *Campsite maintenance at Lake Viva Naughton PAA.*

Red Desert Springs Phase 1 (Goals 2 and 5) - Troy Fieseler and Kevin Spence

Within the northern portion of the Red Desert, numerous spring and aspen stands are in need of assistance to mitigate excessive grazing pressure which has resulted in the risk of these sites disappearing from the landscape. In a desert environment these sites are a rarity and are sought out by numerous species of wildlife and livestock. If these habitats are lost, there will be negative long-term impacts to resident and migrating wildlife.

In 2019, in cooperation with the Rock Springs BLM Field office, approximately 2,900 feet of steel-jack fencing was erected around three sites. Monitoring was conducted using photo points and aspen density circle plots to understand the appropriate time to relocate the fence. An additional 4,000 feet of fence has been built and will be erected around additional sites in future years. This project

was accomplished with the generous assistance of volunteers that helped erect the fence and our funding partners: WGFC MDI, BOW, WFW, JIO and MFF.

Figure 69. *Volunteers and WGFD employees at the Jack Creek Spring site.*

Savery Creek Tailwaters Restoration Phase I (Goal 2) - Kevin Spence, Brandon Werner, Jerry Cowles, Mark Cufaude, Paul Dey, Ray Bredehoft, Kade Clark, Mac Foos, Rick Harmelink and Todd Grosskopf

Figure 70. *Constructing a bankfull bench feature and channel alignment at Savery Creek Tailwaters.*

WGFD Habitat and Access crews completed the initial 2,300 linear feet of a multiple phased stream restoration for the immediate Savery Creek tailwaters below High Savery Reservoir. The restoration is a collaborative effort involving the BLM, LSRCD, WWDC, TU, and WGFD focusing on a 3.5 mile reach of the Savery Creek tailwaters located on BLM and state owned lands immediately downstream of High Savery Reservoir. This stream reach is a popular sport fish angling destination providing public access to the Savery Creek tailwaters. WGFD equipment and labor was used to provide access and mobilize rock and wood construction materials to the restoration reach. Habitat Access crews worked with project partners using natural channel design criteria and the use of rock barbs and vanes, toe wood, and channel shaping and realignment to stabilize approximately 2,300 ft of Savery Creek. In addition, assessment data were collected to run the Wyoming Stream Quantification tool over the reach to allow calculations of functional lift between subreaches where different restoration approaches were employed.

This work will result in a stream channel with the appropriate dimensions for stable banks and

Figure 71. *Cross vane creating a stable pool with desirable depths.*

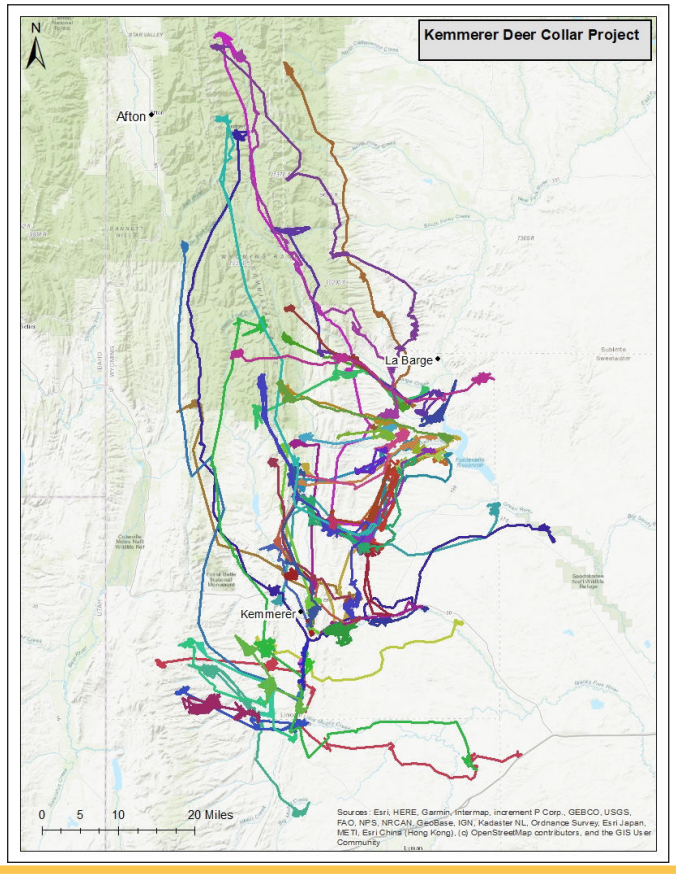
balanced sediment transport, allowing for pools with desirable spacing and depths. Bankfull bench features created to stabilize streambanks are ideal locations for riparian shrubs to establish and grow to maturity encouraging elevated water tables laterally to enhance riparian habitat for several species of terrestrial wildlife. Cumulative stream restoration improvements will benefit all life stage habitat needs for trout, promoting a productive recreational sport fishery and public angling opportunity.

Small House Remodel (Goal 1) - Mark Cufaude

In 2019, Habitat and Access crew members remodeled the small house on Red Rim Grizzly WHMA. With this remodel and update, the property will now better service WGFD employees needing housing while working on or near the WHMA. The updates included replacing floors and cabinets, updating the bathroom, updating all plumbing, and painting.

Figure 72. *Crews complete the Grizzly house remodel.*

Southern Wyoming Range Mule Deer Habitat (Goal 2) - Troy Fieseler and Kevin Spence



This cooperative effort between BLM and WGFD addresses advanced vegetative succession using multiple treatment types to enhance conditions of targeted mule deer transitional habitat for the southern portion of the Wyoming Range. Transitional habitat in good condition promotes doe fitness during critical periods, increasing fawn survival and ultimately herd recruitment.

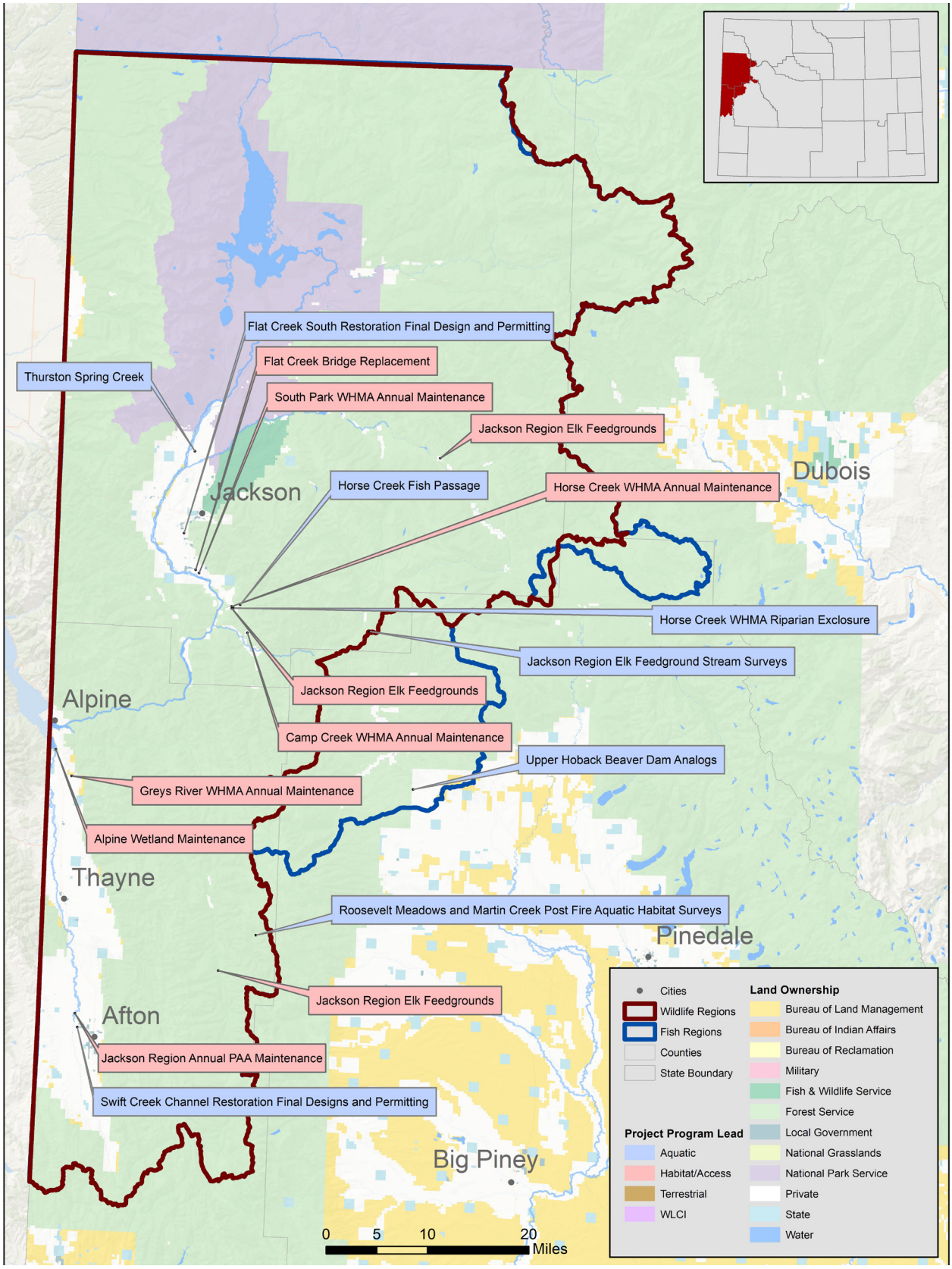
Planning efforts continued in preparation for implementation of mule deer habitat enhancements. The contracted consultant worked closely with the BLM through most of the year in developing a draft EA for habitat treatment implementation. Projected EA completion timeline and signed record of decision is early fall 2020. In addition to holding two initial public scoping meetings, BLM established a cooperating agency group consisting of Lincoln County Conservation District, WDA, and Wyoming OSLI to review and

Figure 73. *Mule deer GPS collar data showing seasonal habitat use in the southern Wyoming Range.*

provide recommendations regarding how the EA and project would proceed. The Department provided the public with preliminary habitat enhancement plans at Wyoming Range MDI update meetings in Kemmerer and Green River.

Potential treatments continued to be delineated throughout the project area. Funding was used to capture and fit GPS collars to 60 mule deer in the Kemmerer area to assist in defining specific mule deer habitat use areas, especially data gaps occurring in the eastern portion of the project area. These data will refine mule deer habitat use, and illustrate locations for potential future habitat treatments. Four additional rangeland RHA assessments were completed totaling 5,547 acres. RHA survey information will be used for Wyoming Range Mule Deer Herd Objective reviews and assist in determining locations of future habitat improvements.

Jackson Region



Jackson Region

The Jackson Region encompasses the area along the western border of the state, south of Yellowstone National Park, south to Star Valley and LaBarge.

Many regional aquatic habitat projects involve restoring stream function through bank stabilization while also facilitating fish passage. One such project in the works involves restoration of a 1.4 mile section of Flat Creek on private property south of Jackson. This project will address channel and riparian habitat limitations, livestock grazing with temporary electric fencing and fish passage issues at irrigation diversion structures, all benefiting local fish and other aquatic species.

A second aquatic habitat project involves restoration on Swift Creek, an east-side tributary to the Salt River near Afton, WY. The project aims to improve spawning habitat for Snake River cutthroat and wild brown trout populations. Designs and permit applications were finalized in 2019 with the assistance of landowners, Trout Unlimited, and the US Fish & Wildlife Service and work will begin in 2020.

A third aquatic habitat project focuses on restoring stream function and cutthroat trout habitat on Flat Creek near the town of Jackson. This project will improve stream connectivity and increase Snake River cutthroat trout spawning habitat throughout lower Flat Creek.

Other projects include, regular maintenance of fences and roads at regional WHMAs and PAAs and a haying operation was again conducted on the Horse Creek and South Park WHMAs in 2019. Approximately 120 acres were irrigated to produce 208 tons of hay that is fed to elk on the two elk feedgrounds. The primary goal of haying on the WHMAs is to produce more nutritional standing forage on the ground as well as to reduce the amount of hay that needs to be purchased to feed elk in the winter.

Alpine Wetland Maintenance (Goals 1 and 3) - Derek Lemon

Personnel from Habitat and Access performed annual maintenance and monitoring of the Alpine Wetland complex, focusing on both water and habitat. Approximately 1,875 feet of the main transport ditch was cleaned to maintain adequate water flows to the ponds. Water levels were also adjusted to provide sufficient habitat for waterfowl. To further improve habitat, the Alpine Wetlands received noxious weed treatments from LCWP.

Figure 74. *Alpine Wetland transport ditch.*

Flat Creek Bridge Replacement (Goals 1 and 2) - Derek Lemon and Miles Anderson

In 2019, Habitat and Access personnel replaced a dilapidated bridge spanning Flat Creek. Located on the South Park WHMA, the old bridge had become a safety hazard. The bridge is used for administrative access to the property Southwest of Flat Creek. The new bridge provides a variety of benefits and allows WGFD personnel to more effectively manage South Park WHMA; it is large enough to easily allow haying equipment across and safely get horse teams across to feed elk during the winter months.

Figure 75. *Bridge spanning Flat Creek.*

Camp Creek WHMA Annual Maintenance (Goals 1 and 3) - Derek Lemon

Camp Creek was purchased in 1958 to provide a feedground and winter range for elk. Annual maintenance is conducted on the 149 acre WHMA. This includes fence maintenance, feedground maintenance and weed management.

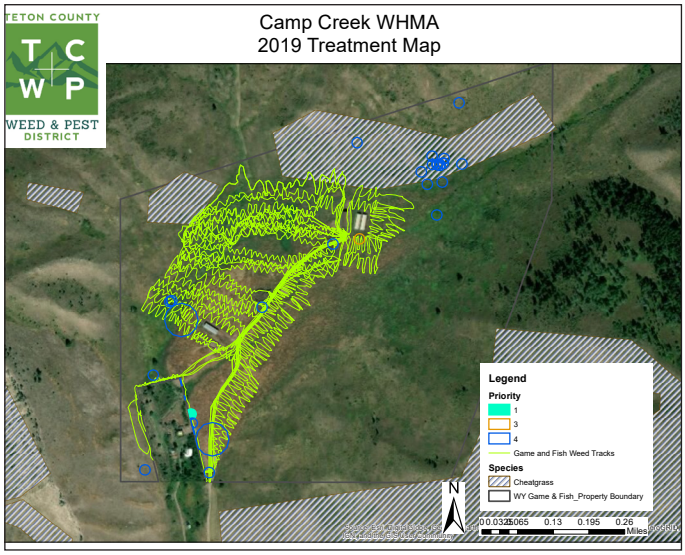


Figure 76. *Camp Creek weed treatment map.*

Flat Creek South Restoration Final Design and Permitting (Goals 2 and 5) - Anna Senecal

Flat Creek flows from its headwaters upstream of the NER, through the town of Jackson to eventually meet with the Snake River at the South Park Bridge, about 6 road miles south of town. Flat Creek is integral to the town of Jackson, the Snake River Cutthroat Trout fishery and the aquatic ecosystem. The creek provides multiple beneficial uses including fish habitat and water for irrigation, aquifer recharge and municipal drinking supplies. The creek also provides a corridor of vital wildlife habitat through town, serves as a visual and recreational amenity for residents and tourists, and provides access for the angling and floating public. The creek is 305(d) listed as "threatened" by Wyoming Department of Environmental Quality for water quality and habitat degradation. Development and grazing have reduced or entirely removed willows from the riparian corridor, straightened the creek and produced an over-wide and shallow channel lacking in spawning riffles and deep pools. These channel conditions reduce spawning activity and may restrict seasonal fish movement due to shallow depths, high summer temperatures, and the formation of unstable winter ice.

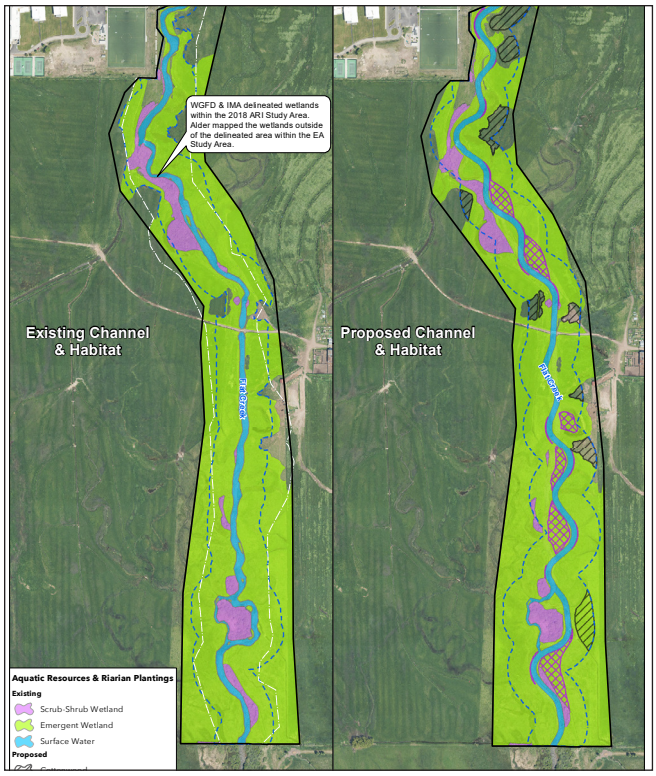


Figure 77. *Existing (left) and proposed (right) channel alignments.*

The WGFD is partnering with a private landowner south of Jackson to restore stream function and cutthroat trout habitat to 1.4 miles of Flat Creek. This project is entering the first of two construction phases. Winter and spring 2020 will be spent finalizing designs and securing permits for construction, which is slated to take place during the fall and winter of 2020-2021. This work will improve stream connectivity and increase Snake River cutthroat trout spawning habitat throughout lower Flat Creek.

Greys River WHMA Annual Maintenance (Goals 1 and 3) - Derek Lemon

The Greys River WHMA was purchased in 1942 and consists of 3,064 acres. This WHMA was acquired to provide winter range for big game animals and an area to feed elk. Greys River WHMA received annual fence maintenance on 13 miles of crucial winter range elk fence. It also received noxious weed treatment from LCWP.

Figure 78. *Maintenance on the Greys River WHMA.*

Horse Creek WHMA Annual Maintenance (Goals 1 and 3) - Derek Lemon

Figure 79. *Irrigating on Horse Creek WHMA.*

The Horse Creek WHMA, one of three WHMAs in the Jackson region, saw significant improvements and maintenance. The Horse Creek WHMA received annual maintenance on one mile of crucial winter range elk fence. In addition, 90 acres of grass meadows were irrigated before and after haying from May through August. The irrigation after haying provides nutritious natural forage for the elk when they arrive on the Horse Creek feedground prior to feeding in the winter. To further assist in forage utilization, Horse Creek WHMA received noxious weed treatment from the Teton County Weed and Pest District. Noxious weed treatment bolsters nutritious native plant species by eliminating noxious plants that compete with native plant species and provide minimal nutritional value for wildlife.

Jackson Region Elk Feedgrounds (Goals 1 and 3) - Derek Lemon, Miles Anderson and Kyle Berg

This encompasses the annual maintenance and improvements to 11 WGFD managed elk feedgrounds in the Jackson Region. Annual repairs and maintenance included work on feedground structures, corrals, stackyards, elk migration fences, and grounds. In addition, Habitat and Access crew members constructed a new hayshed at Forest Park feedground. At Horse Creek feedground, crew members widened approximately 1,000 feet of road and installed three new culverts. Dog Creek, South Park and Horse Creek elk feeding areas were also harrowed in spring 2019 to break up elk scat and promote new grass growth.

Jackson Hay Production (Goals 1 and 2) - Derek Lemon

The Horse Creek and South Park WHMAs were hayed in 2019. In all, approximately 120 acres were hayed and the WGFD produced 208 tons of hay which will be fed on the Horse Creek and South Park feedgrounds. The main goal of haying on the WHMAs is to produce nutritious forage for wintering big game during the late fall and early spring as they are migrating to and from the elk feedgrounds. Haying will continue on the Horse Creek and South Park WHMAs to provide forage for big game, reduce commingling between elk and cattle on private land adjacent to elk feedgrounds, and reduce the amount of hay that the WGFD needs to purchase.

Figure 80. *Haying the Horse Creek and South Park WHMAs.*

Jackson Region Elk Feedground Stream Surveys (Goals 1 and 2) - Anna Senecal

Surveys of Jackson region elk feedgrounds took place during August of 2019. Surveys followed the Wyoming Habitat Assessment Methodology and focused on documenting characteristics of the stream channel, riparian area and any impacts from development or recreation. Feedgrounds surveyed included Alkali and Patrol Cabin (Gros Ventre), as well as Dell and Camp Creeks. These data will provide useful baseline information on general aquatic and riparian habitat condition and potential future treatments. A similar analysis was conducted at the McNeel (upper Hoback) elk feedground and has resulted in the development of a floodplain restoration project, leaning heavily on partnerships with land managers and WGFD Feedground personnel. These data may also fulfill USFS permit requirements. Data have been entered into the WGFD Aquatic Habitat WHAM database.

Figure 81. *Shrub encroachment along Dell Creek.*

Jackson Region Annual PAA Maintenance (Goals 1 and 3) - Derek Lemon

Personnel from Habitat and Access performed annual maintenance and monitoring of Jackson Regional PAAs. All public access boundary fences were maintained to protect riparian habitat. PAAs on the Salt River received a variety of improvements to provide welcoming and well-maintained spaces for the public: entry doors were replaced on restroom facilities, leaking skylights were fixed, vandalized and weathered signs were replaced, and comfort stations were painted.

Figure 82. *Comfort stations were repainted on Jackson Regional PAAs.*

Upper Hoback Beaver Dam Analogs (Goals 2 and 5) - Anna Senecal

Muddy Creek is a tributary to the Hoback River that meets up with the river immediately downstream of the McNeel elk feedground. The creek passes through private and public lands and a large portion of the drainage was burned in the 2018 Roosevelt fire. The WGFD is partnering with USFWS, USFS and a private landowner to install a series of BDAs with goals of trapping sediment liberated during post fire spring runoff, encouraging the reestablishment of woody vegetation, and potentially supporting the reintroduction of beaver by way of natural expansion. Historical aerial imagery and beaver habitat modeling point to the area as having high potential for successful beaver reintroduction. Initial site visits and stream surveys (cross sections and longitudinal profiles) took place in August 2019. Planning and permitting is underway with the first wave of implementation slated for spring or summer 2020. Subsequent phases will progress downstream onto USFS lands in 2021.

South Park WHMA Annual Maintenance (Goals 1 and 3) - Derek Lemon

Annual maintenance and improvements continued on the South Park WHMA, home to crucial winter range for elk. The Habitat and Access crew performed annual fence maintenance, focusing on seven miles of boundary fence, one mile of crucial winter range elk fence and contracted weed treatments out to Teton County Weed and Pest.

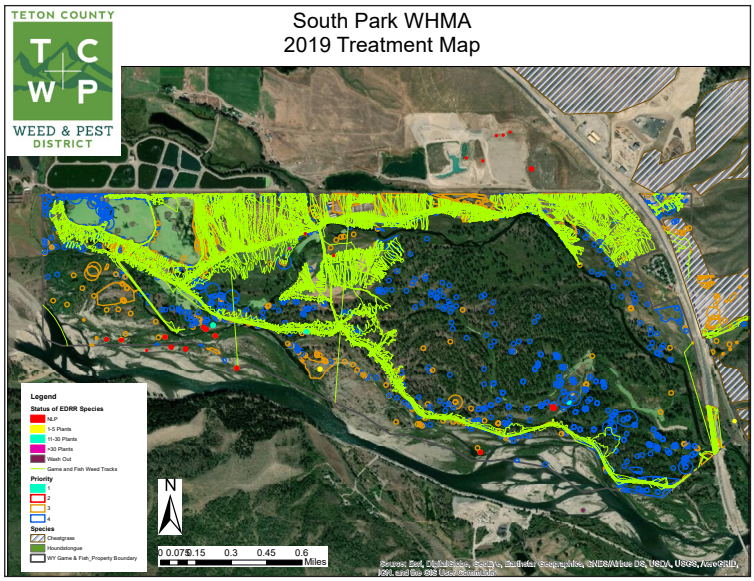


Figure 83. *South Park WHMA 2019 Treatment Map.*

Swift Creek Restoration Final Design and Permitting (Goals 2 and 5) - Anna Senecal

Swift Creek is an east-side tributary to the Salt River near Afton, Wyoming. Upper portions of the watershed are significantly impaired (on-channel hydropower dam, dewatering and channelization). Lower portions of the creek, however, provide seasonal trout habitat and connection to perennial spring creeks. The native Snake River cutthroat and wild brown trout populations found in the Salt River drainage are not maintained through hatchery culture and stocking. Therefore, maintenance and improvement of spawning habitats is very important for the persistence of these fisheries.

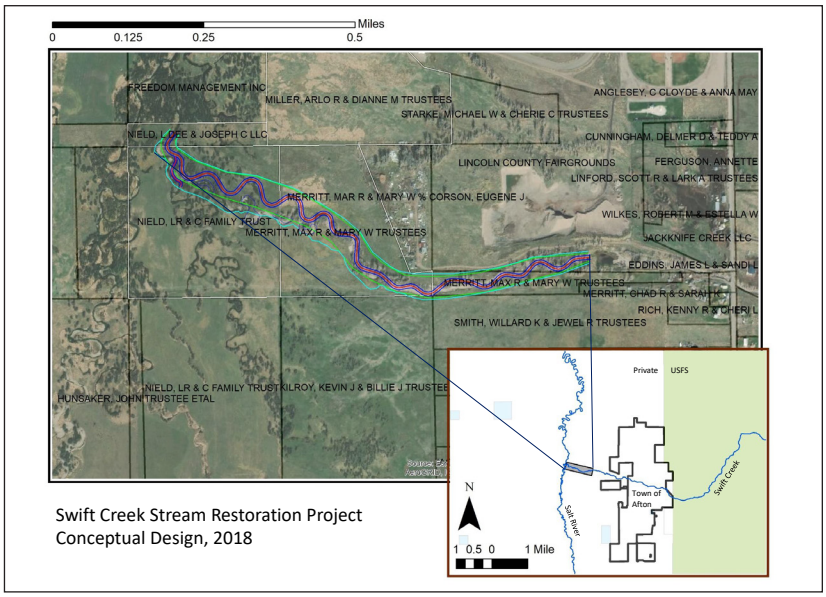


Figure 84. *Swift Creek Restoration design plan.*

In 2019, the WGFD partnered with TU (project lead), the USFWS, the NRCS, and four landowners to finalize designs and permit applications for stream restoration construction. Unfortunately, a worksite fatality postponed planned implementation. The project is shovel ready and construction is now slated for 2020.

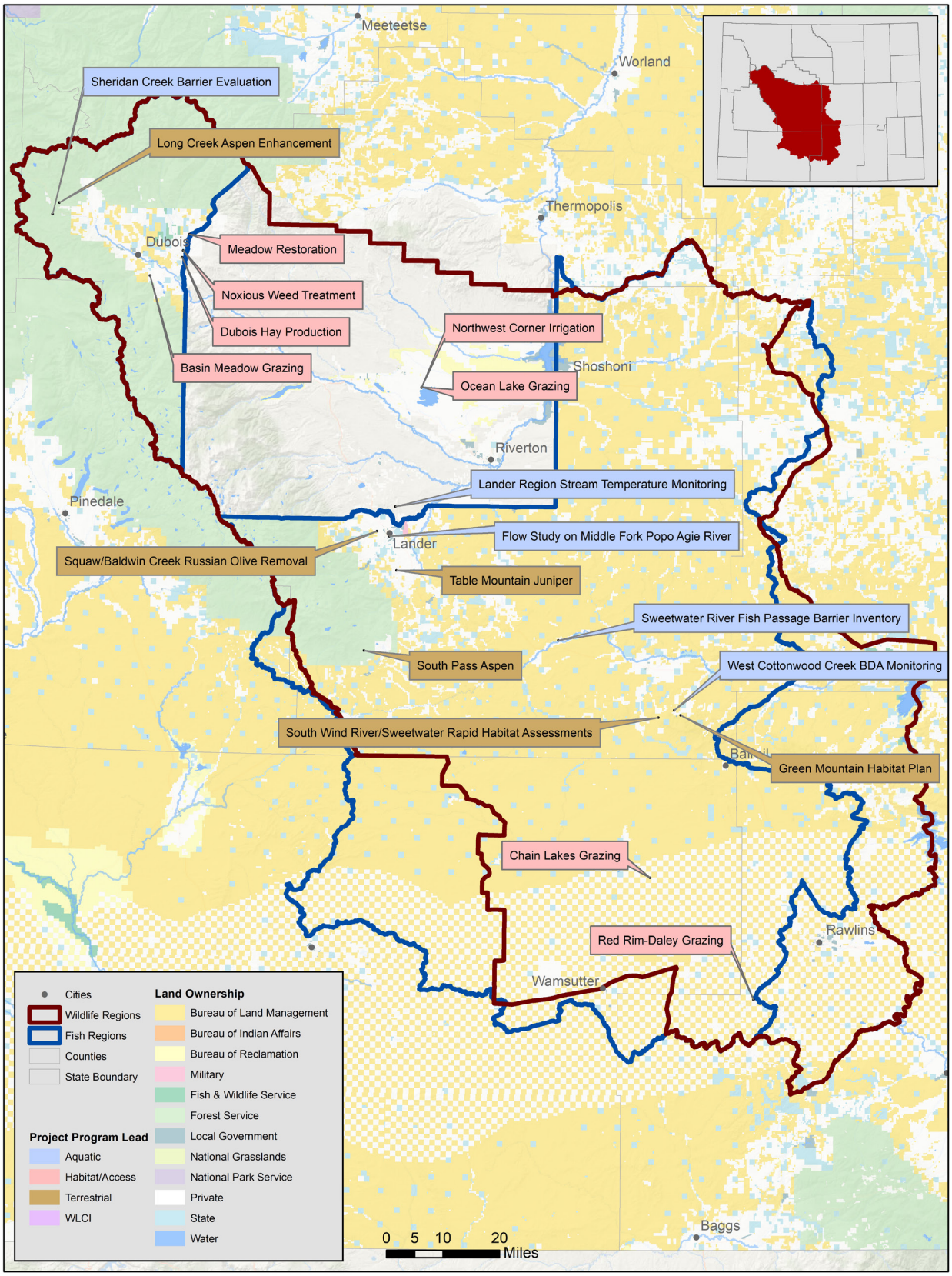
Thurston Spring Creek (Goal 2) - Anna Senecal

Thurston Spring Creeks, also known as Three Channel Spring Creek, are a series of spring fed tributaries to the Gros Ventre River. These systems offer important Snake River cutthroat trout spawning habitat, but have been repeatedly and significantly altered by human development. Changes to the eastern-most spring creek have included construction of on-channel ponds, pool dredging, installation

of log drop structures and floating islands, riparian grazing and bridge and culvert installation.
The landowner approached WGFD and TU about one year ago with interest in increasing redd construction and adult holding habitats. Survey data were collected and we are currently developing conceptual designs with emphasis on narrowing channel widths, establishing woody riparian vegetation and supplementing spawning gravels. Pending stakeholder approval, construction may take place fall/winter 2020/2021.

Figure 85. *Three Channel Spring is overwide, shallow and devoid of woody riparian vegetation.*

Lander Region



Lander Region

The Lander Region covers a stretch of Wyoming from the top of the Wind River Mountains to Boysen Reservoir and from Dubois to Rawlins with points between.

One focus of aquatic habitat personnel was identifying fish passage barriers on the Sweetwater River where diversions provide water to 24,000 acres and fish populations can be impacted during low flows. Of the 74 sites visited, 21 are diversions that pose a barrier to fish passage and 14 are complete barriers to small native fish species. This information will be used to prioritize projects to improve passage of native fish species.

The South Pass Aspen project saw its fifth year of work, treating a total of 709 acres across the project area. 2019 work aimed to improve aspen habitats on the south end of the Wind River Range. Follow-up monitoring has shown good response of aspen seedlings post treatment.

Another large effort was managing the 210,000 plus acres of Wyoming Game and Fish Commission administered lands in the region including lands around Dubois on the Spence and Moriarity Wildlife Management Area, on the Inberg/Roy WHMA, and on the Whiskey Basin WHMA, which are crucial winter range habitat for several big game species, including bighorn sheep.

On the Ocean Lake WHMA, improvements and efficiencies were made to irrigation efforts. Thanks to a partnership with Ducks Unlimited, a shallow wetland was created to provide crucial habitat for migrating ducks. Follow-up work was completed in 2019 to install a pump that will charge a buried pipeline that is capable of delivering water to each of the six cells.

Chain Lakes Grazing (Goal 1) - Brian Parker and Matthew Pollock

Domestic sheep graze on Chain Lakes WHMA from December through April each year. In 2018, along with our cooperative management partner, the BLM, we accepted applications for a new five-year grazing lease. During 2019, the grazing lessee utilized approximately 900 AUMs. In exchange for the 2019 grazing, the lessee re-developed an abandoned water well in the north central portion of the WHMA. Additional water resources allow for better utilization of the forage resources on the WHMA by both wildlife and livestock. Controlled overflows from the well create wetlands that serve as an oasis in the dry desert with concentrations of lush vegetation and abundant wildlife frequenting these areas.

Basin Meadow Grazing (Goals 1 and 5) - Brian Parker, Miles Proctor and Kevin Howard

Approximately 15 horses (37.5 AUMs) from the CM Ranch grazed the Basin Meadow on Whiskey Basin WHMA from November through December 2019. This agreement has historically allowed CM Ranch to graze an irrigated hay meadow in lieu of their BLM allotment on the face of Whiskey Mountain. CM Ranch's BLM allotment occupied a core area of crucial bighorn sheep winter range. The WGFD is currently working on a permanent administrative easement through CM Ranch property to access the Sheep Ridge area of Whiskey Basin WHMA in return for winter grazing use.

Dubois Hay Production (Goals 1 and 3) - Brian Parker, Miles Proctor and Kevin Howard

Figure 86. *Haying operations on WHMAs.*

Lander Habitat and Access personnel continued expanding farming and haying operations across Dubois area WHMAs, with specific focus on Spence and Moriarty WMA. During the 2019 field season, two 1,000 foot pivot sprinklers were constructed: One located on the basin meadow (90 acres) on Whiskey Basin WHMA and the second on Pease Meadow (75 acres) located on Spence & Moriarty WMA. These new pivots will increase water efficiency and effectively irrigate these fields for hay production that is used for feeding elk on the feedgrounds.

Dubois staff hayed 819 acres on Spence and Moriarty WMA and Whiskey Basin WHMA, producing 708 tons of hay, which was shipped to Pinedale and Jackson area elk feedgrounds. The hay operation allows WGFD to generate hay for use at elk feedgrounds, while simultaneously providing supplemental winter forage for elk in the Dubois area.

Dubois Production and Utilization Monitoring (Goal 5) - Amy Anderson and Greg Anderson

Annual herbaceous forage production and utilization transects are clipped twice each year to track the amount of forage produced and subsequently utilized on important bighorn sheep and elk winter ranges on Whiskey Basin WHMA, Spence-Moriarity WMA, and Inberg-Roy WHMA in Dubois. The 24 transects are clipped with assistance from BLM biologists, USFS biologists, and National Bighorn Sheep Center volunteers.

Spring precipitation (April-July) varied across the area, however it was near to slightly below average

in most areas. The overall average production across all Dubois WHMA/WMA's was down slightly, most likely mirroring the lower precipitation (Figures 87 and 88).
Utilization on Whiskey Basin bighorn sheep winter ranges continues to be well below average. The bighorn sheep numbers are down, their presence on normal winter ranges is down, both reflected in the markedly lower utilization rates of forage.

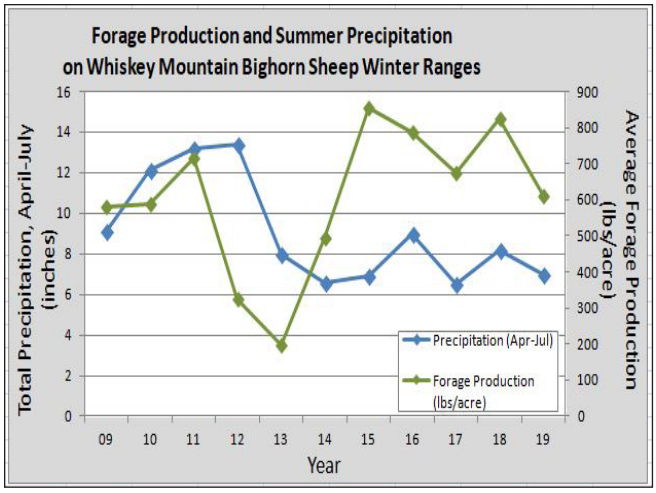


Figure 87. *Average herbaceous production and precipitation on Whiskey Basin WHMA.*

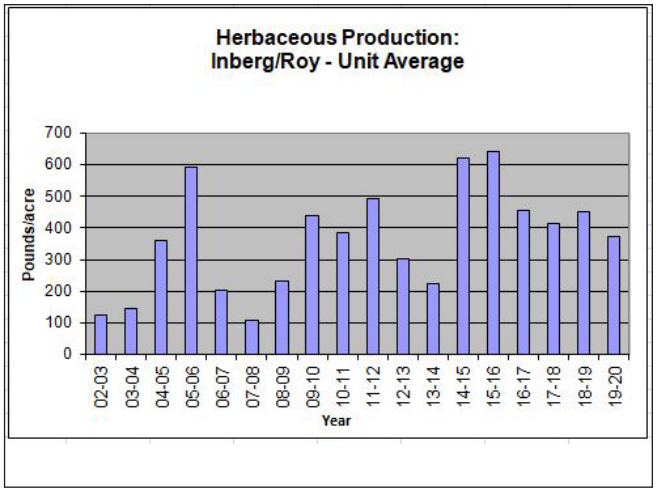


Figure 88. *Average herbaceous production on Inberg-Roy WHMA.*

Flow Study on Middle Fork Popo Agie River (Goals 1 and 2) - Joanna Harter and Del Lobb

The Healthy Rivers Initiative (HRI) is a working group of stakeholders that includes agencies, irrigators, and community members who share a mission to improve water quality, quantity, and the biological health of the Popo Agie River watershed. The Middle Fork Popo Agie River has been the focus of HRI work because the river is annually dewatered through Lander, with flows decreasing to 5-10 cfs for multiple weeks during late summer. In 2019, WGFD conducted a study to quantify late summer flow levels needed to maintain adequate habitat for rainbow and brown trout. HRI will use the flow recommendations to help guide project prioritization and evaluate progress in improving flows in the Middle Fork. Data were collected during July-September 2019 for the Habitat Quality Index and

Figure 89. *Instream Flow Technician Christian DeCelle measuring water velocity on the Middle Fork Popo Agie River.*

Figure 90. *The Middle Fork Popo Agie River in Lander, dewatered in late August 2019.*

the Habitat Retention Method.

Green Mountain Habitat Plan (Goals 2 and 5) - Amy Anderson

The WGFD and BLM partnered in hiring a technician to conduct an inventory of aspen, riparian and mixed mountain shrub habitats on Green Mountain. This inventory will inform a Habitat Management Plan and provide recommendations to the BLM for treatment of habitats, especially aspen and a tool to prioritize stands with the highest potential for success. RHAs were used to document condition of all aspen stands inventoried. The Habitat Management Plan is being used to inform a programmatic NEPA document to focus forest treatments on BLM lands across Green Mountain, Crooks Mountain and Whiskey Peak.

Also in 2019, 88 acres of aspen were treated using chainsaw crews to remove conifer from aspen stands. Exclosure fences on West Cottonwood Creek were maintained, and BDA's were monitored and maintained.

Figure 91. *West Cottonwood Creek before BDA installation.*

Figure 92. *West Cottonwood Creek two years after BDA installation.*

Lander Region Stream Temperature Monitoring (Goal 1) - Joanna Harter

Figure 93. *A case holding a HOBO temperature logger at a long-term stream temperature monitoring site.*

From 2018 through 2019, a total of ten HOBO water temperature loggers were deployed at established sites in streams in the Upper and Middle Popo Agie, Little Popo Agie, Sweetwater, Upper Wind, and East Fork Wind watersheds. Data were recorded every 30 minutes. Year-round data were downloaded from nine of them and one logger was lost at the Warm Springs Creek site. These data will be used to calculate the number of days the stream was ice covered and the maximum, minimum, and mean temperatures in July and August. Stream temperature data have been collected at these established sites for 2-19 years, depending on the site, to build upon a long-term data set to inform stream habitat and fish management decisions and to share with USGS scientists.

Long Creek Aspen Enhancement (Goals 2 and 5) - Amy Anderson

The Long Creek Aspen Enhancement Project is in its 5th year of implementation. In 2019, 17 acres of aspen were treated by mechanically removing conifer using USFS saw crews. The entire 649 acres treated over the five year span has shown tremendous aspen suckering response across all treatment types which includes; coppice cutting, lop and scatter, cut and pile, and prescribed fire. RMEF and USFS funds were utilized for the 2019 efforts. In 2020, an additional 200 acres of treatment are planned on OSLI and USFS lands.

Figure 94. *Aspen treatment on Long Creek adjacent to the Dunoir Valley near Dubois. Treatments to enhance transitional habitats for mule deer, elk and moose.*

Figure 95. *Long Creek Aspen Enhancement.*

Meadow Restoration (Goals 1 and 3) - Brian Parker, Miles Proctor and Kevin Howard

As part of the Spence & Moriarity WMA 10-Year Plan, irrigated fields/meadows have been farmed to increase forage palatability, combat noxious weeds and ultimately generate hay for use on the western Wyoming elk feedgrounds. Hay meadow farming is typically accomplished over a two-year period. In 2019, approximately 75 acres on the Thunderhead Meadow and 75 acres on the Fire-house Meadow were farmed and reseeded.

Figure 96. *Crews perform maintenance on the Spence & Moriarity WMA.*

Noxious Weed Treatment (Goal 2) - Brian Parker, Miles Proctor and Kevin Howard

Rocky Mountain Agronomy Center applied herbicide across approximately 400 acres of irrigated meadows on Spence & Moriarity WMA to control noxious weeds, largely white-top and Canada thistle, in early June and July. Additionally, Fremont County Weed & Pest sprayed a variety of noxious weed species on irrigated meadows and rangeland starting in July and continuing through fall 2019. Habitat and Access personnel also dedicated substantial AWEC time to noxious weed control.

Northwest Corner Wetlands (Goals 1 and 3) - Brian Parker and Justin Rhine

One of the limiting factors identified by DU in their 2012 survey was a lack of shallow seasonal wetlands within the Ocean Lake WHMA. Such wetlands provide diverse plant communities and abundant food resources critical to migrating birds. Most wetlands within the watershed are semi-permanent marshes with deep water that provide little food resources for dabbling duck species.

The northwest corner of Ocean Lake WHMA had several pieces of infrastructure already in place that was conducive to creating seasonal wetlands. Several earthen berms with relic water control structures were in place from preliminary work completed in the 1960s and 70s by WGFD personnel. The goal of this project was to upgrade, reconfigure, and rehabilitate this existing infrastructure to create six individual irrigated cells ranging from 2.5 to 9 acres in size. Objectives are to: Enhance vegetation and increase plant diversity, provide habitat needed for migrating waterfowl, provide additional hunting and wildlife watching opportunities for the public, and reduce sediment input to Ocean Lake.

Figure 97. *NW Corner Wetlands construction.*

Follow up work was completed in October 2019. DU retained and managed the contractor. WGFD personnel assisted DU by regulatory navigation and water right procurement. The project consisted of installing a pump which charges a buried pipeline that is capable of delivering water to each of the six cells. Each cell can be controlled independently of each other to allow the greatest flexibility for managing water levels to produce desirable food plants for waterfowl, control salinity, and maintain open water.

Ocean Lake Grazing (Goals 1 and 3) - Brian Parker and Justin Rhine

Approximately 260 AUMs were utilized on Ocean Lake WHMA to remove decadent vegetation and promote vigor and palatability of meadow vegetation to benefit waterfowl and pheasants. Grazing occurs during January on a five-year grazing rotation.

Red Rim-Daley Grazing (Goals 1 and 5) - Brian Parker and Matthew Pollock

Red Rim-Daley is comprised of OSLI, BLM, and WGFC owned property. Two operators annually graze the Red Rim-Daley WHMA, collectively consuming approximately 1,650 AUMs. Rotational grazing allows for optimal plant development and rangeland health, both on the WHMA and on rested pastures outside the boundaries of the WHMA that are also important wildlife habitats. The grazing lessees also perform fence maintenance, water well maintenance, and other infrastructure improvements and maintenance, as well as defer grazing on their private ground in exchange for grazing on the WHMA.

Figure 98. *Cattle grazing on the WHMA.*

Sheridan Creek Barrier Evaluation (Goal 1) - Nick Scribner and Joanna Harter

Figure 99. *Fin clipping a brook trout.*

Sheridan Creek, a tributary to the Wind River northwest of Dubois, maintains a genetically pure conservation population of Yellowstone cutthroat trout concentrated in the upper 3-5 miles of the drainage. Securing this population from threats of hybridization with rainbow trout from downstream waters and competition with co-existing brook trout has been explored over the past 10+ years. In 2008, the lower section of Sheridan Creek was identified as a possible location for a barrier to block upstream movement of non-native fish, which would allow protection of Yellowstone cutthroat trout and conserve 7 miles of Yellowstone cutthroat trout occupied habitat. In September 2018, USFS and WGFD personnel spent a week drilling, blasting, and removing rock to meet the objective of creating a 3 ft or greater waterfall. Approximately, 75% of the channel width was completed, but time ran out to redivert the stream and work on the remaining 25%. However, it was deemed unnecessary as there is currently a 2 ft drop at that section with very high velocities.

In 2019, velocities were measured throughout the year at the barrier site and 82 fish were collected and marked to assess passage of the new conditions at this site. A total of 45 brook trout, 23 rainbow trout, 13 mountain whitefish, and 1 Yellowstone cutthroat trout with an average length of 7.5 in were marked. The longest fish was a rainbow trout measuring 10.6 in. Sampling will occur in 2020 to determine if any marked fish made it upstream of the barrier site and to mark additional fish to further assess passage in 2021.

South Pass Aspen (Goals 2 and 5) - Amy Anderson

The largest undertaking within the South Pass Project aimed at improving aspen habitats on the south end of the Wind River Range occurred in 2019 on the Shoshone National Forest and State of Wyoming Lands in four distinct project areas - Twin Creek, Iron Mountain, along the Louis Lake Loop Road, and within the Pine Creek/Mill Creek Watershed. A total of 709 acres were treated across the project areas. A Good Neighbor Agreement initiated in 2018 between WGFD and USFS helped streamline the process of coordinating projects, contractors and funding.

Figure 100. *Iron Mountain area of South Pass Aspen Project after conifer removal.*

Follow-up monitoring has shown good response of aspen seedlings post treatment. Browse by ungulates can be an issue within some of the treatment areas and the WGFD, BLM and USFS range staff are working together to find ways to reduce browse use to protect the investment in South Pass Aspen. The 2019 effort was funded by MFF, RMEF, USFS, WGFC MDI, WWNRT and Fremont County Fire Protection.

South Wind River/Sweetwater Rapid Habitat Assessments (Goals 2 and 5) - Amy Anderson, Stan Harter and Brady Frude

Figure 101. *Assessing a very good condition true mountain mahogany stand on Crook's Peak.*

Personnel implementing the South Wind River/ Sweetwater MDI continue improving habitats across both herd units. Projects include: South Pass Aspen in its fifth year of implementation, Green Mountain Aspen and Riparian Enhancement, Squaw and Baldwin Creek Russian olive removal, and Table Mountain Juniper. These efforts address habitat loss associated with invasive species, fragmentation from development, encroaching conifers in aspen, sagebrush and riparian habitats, and generally degraded riparian areas. In addition to the habitat improvement projects, 120 RHA's were conducted in areas identified through mule deer collar data, or within planned habitat treatment areas. A technician, Shelby Weigand, was hired to develop a habitat management plan for Green Mountain in conjunction with BLM. She inventoried the majority of the aspen stands, and many of the rangeland and riparian habitats across Green Mountain. The management plan will help prioritize treatment areas to inform BLM's Integrated Vegetation Management Plan for Green Mountain.

Across both herd units, 3,427 acres of rangeland/shrub habitat, 3,837 acres of aspen habitat, and 280 acres of riparian habitat were assessed. The RHA's will ultimately inform the South Wind River and Sweetwater Mule Deer Herd Unit Objective Reviews occurring in 2020.

Squaw/ Baldwin Creek Russian Olive Removal (Goals 2 and 5) - Amy Anderson

The Squaw and Baldwin Creek Russian olive project was initiated through the Popo Agie Weed Management Association in 2017. The project is aimed at controlling Russian olive in riparian habitats within the Popo Agie River Watershed beginning in the upper tributaries. The goal is to remove Russian olive where the infestations are still manageable and restoration of native riparian plants is most probable.

Funding was provided by the Popo Agie Conservation District, WGFD, and Fremont County Weed and Pest. Participating landowners will be responsible for 25% of the cost of mechanical removal and herbicide stump treatments. Follow up herbicide treatments are part of the landowners' annual weed management plan. Infestations throughout the two identified drainages are very light with a few locations having heavy densities. Fremont County Weed and Pest is working with individual landowners to determine the best means of mechanical removal. Saw crews can likely complete most of the work, with some higher density areas requiring additional equipment. Work is scheduled to begin in January 2020, with a three-year plan to treat both drainages.

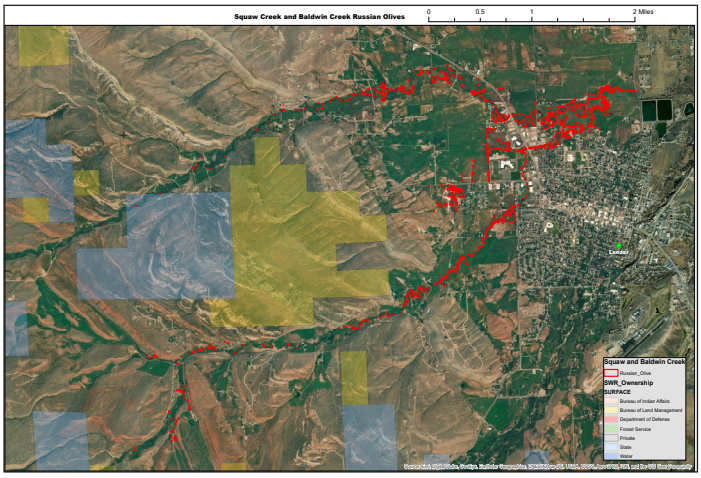


Figure 102. *Russian olive presence within the Squaw and Baldwin Creek drainages. Removal of Russian olive with participating landowners will begin in January 2020.*

Sweetwater River Fish Passage Barrier Inventory (Goal 2) - Joanna Harter

Diversions from the Sweetwater River drainage provide water for approximately 24,000 irrigated acres. Low flows and elevated water temperatures in portions of the Sweetwater River can impact fish populations. Additionally, numerous diversion dams in the river may be barriers to fish migration, especially during low flows. In 2017, aerial imagery and water rights data were used to identify 80 possible fish passage barriers throughout the entire mainstem Sweetwater River, including irrigation diversions and natural structures. Between 2017 and 2019, 74 of these sites were visited and evaluated as barriers to trout and other native fish species.

Of the 74 sites visited, 21 are diversions that pose a barrier to fish passage, at least seasonally. Of these 21 diversions, 14 are complete barriers to small native fish species and one is a complete barrier to all fish, including salmonids. The remaining seven diversions are only seasonal or partial barriers to fish passage. This information will be used to prioritize projects to improve passage of native fish species and enhance their populations in the Sweetwater River.

Figure 103. *A dam that is a barrier to all fish species and a high priority to maintain as a barrier to undesirable species invading from downstream.*

Figure 104. *A diversion dam is a barrier to all native fish species in the Sweetwater River.*

Table Mountain Juniper (Goals 2 and 5) - Amy Anderson

Figure 105. *Table Mountain Juniper- Before removal of encroached juniper to benefit sage grouse and mule deer habitat.*

Located in foothills sage steppe habitat, the Table Mountain area provides important nesting, brood rearing and migration habitat for sage grouse, and crucial winter range for mule deer. Invasive species were identified by the Wind River/Sweetwater River Sage Grouse Working Group as one of several threats to local sage grouse populations. Local radio collared birds and companion studies have demonstrated even small degrees of juniper encroachment can lead to sage grouse abandoning suitable habitat. Along with habitat fragmentation concerns, juniper expanding horizontally across the foothills create barriers to migration as birds follow the mountain green-up.

Approximately 340 acres of treatment were identified using historical imagery, followed by a ground truth exercise to determine areas of juniper encroachment into deeper soils, which are traditionally dominated by sagebrush/grass plant communi-

ties. Areas containing younger age class and lower density shrubs (less than 30%) were targeted for treatment to minimize grass reseeding needs and invasion by cheatgrass. A 12-person work crew conducted lop and scatter operations on 340 acres and lopped the downed material into less than 2-foot sections.

Figure 106. *Table Mountain Juniper- After removal of encroached juniper.*

Removing encroaching junipers in sage steppe habitat benefits sage grouse by improving degraded habitat, maintains migration corridors and reduces depredation rates by removing raptor perch sites. Secondary benefits include; improving site hydrology by removing juniper, reducing fuel loads thereby reducing risk of potential catastrophic fire, and maintaining intact plant communities which avoids a shift to invasive non-native plants.

Watershed Enhancement Through Beaver Transplants (Goal 2) - Amy Anderson and Joanna Harter

Figure 107. *Two adult beaver just released into a stream with a temporary lodge made of straw bales.*

Lander habitat personnel relocated a total of five beavers as part of a region-wide effort to improve stream and riparian habitat with beaver dams. One beaver was trapped at a location near Dubois where it was damming a culvert and flooding a road and was transplanted to the Spence & Moriarity WMA. Beaver trapping is closed at this transplant location, with the goal of improving beaver populations and enhancing in-stream habitat for Yellowstone cutthroat trout in the East Fork Wind River watershed.

A family of three beavers were trapped on private land in the town of Lander where they were damming an irrigation ditch and nearly flooding a campground. All three beavers were released together on Forest Service land where a beaver dam complex had been recently abandoned. There was evidence two months after the release that the beavers had remained at the site and built dams. An additional fourth beaver from a different trapping site was also transplanted to this location earlier in the summer, but there was no evidence that it remained.

West Cottonwood Creek BDA Monitoring (Goal 1) - Joanna Harter

In 2017, eight BDAs were constructed in West Cottonwood Creek to improve riparian vegetation and floodplain connectivity. A five-year monitoring plan was developed to monitor stream channel and riparian vegetation. In 2019, photo points were retaken and vegetation data were collected and compared with pre-project data.

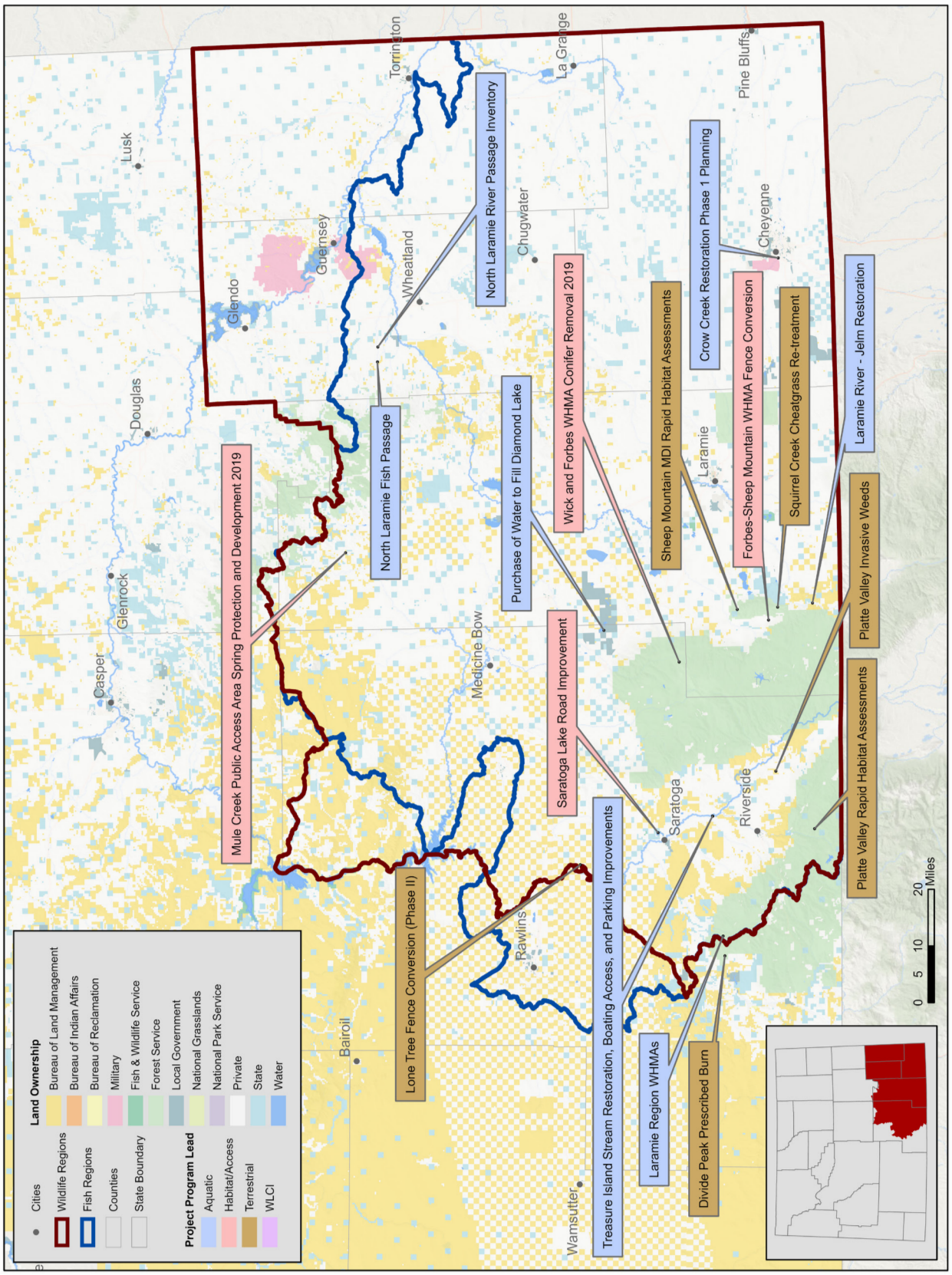
Unusually high spring runoff carried large sediment loads that were trapped behind the BDAs, as intended. BDAs slowed water velocity and directed water to spread onto the floodplain and soak into riparian soils. Nebraska sedge and other riparian plants expanded along the streambanks and colonized new sediment behind and next to the BDAs, which improved stream bank stability. Overflow

around all eight BDAs was observed and the riparian vegetation in these places prevented erosion around the structures. Riparian grasses, sedges, and other riparian plants are flourishing, stabilizing the stream banks, and overall improving stream function. Even where grazing was not excluded around BDAs, similar changes were observed, although grazing pressure was low compared to previous years. Because of the high flows and sediment loads in 2019, some maintenance of the structures will be required in 2020 including replacement of a few posts and re-weaving willows through most of the BDAs.

Figure 108. *BDAs 1 and 2 trapping sediment and spreading flow onto the floodplain in July 2019.*

Figure 109. *BDAs 5 and 6 trapping sediment, facilitating floodplain connectivity, and supporting healthy riparian vegetation.*

Laramie Region



Laramie Region

Wildlife in the Laramie Region will benefit from many habitat projects that were completed in 2019.

Aquatic habitat improvements include planning for revitalization of Crow Creek through Cheyenne, finalizing plans to address channel stability and aquatic habitat enhancements on the Laramie River - Jelm Restoration, and planning to rehabilitate the Treasure Island boat ramp on the North Platte River.

Several terrestrial habitat projects were completed in the Platte Valley, including a prescribed burn to improve habitat in the Sierra Madre Range, converting 26 miles of fence to wildlife friendly fencing throughout the Platte Valley, and treating 7,922 acres of cheatgrass within the Platte Valley.

Personnel in the Laramie Region maintained 11 Wildlife Habitat Management Areas and 40 Public Access Areas during 2019. Crews maintained more than 210 miles of fence, treated more than 420 acres of noxious weeds and irrigated more than 700 acres. Conifer were removed on over 500 acres from the Wick and Forbes WHMAs to regenerate and enhance aspen communities.

Purchase of Water to Fill Diamond Lake (Goals 2 and 3) - Del Lobb

In 2019, water delivery to Diamond Lake began June 5 and ended July 17. Prior to water delivery, WGFD staff installed a datalogger to monitor water level (stage) every 15 minutes in a stilling well adjacent to the water delivery channel. WGFD measured flow in the channel on four occasions. Measured flows ranged from 11.3 to 12.3 cfs. A stage-discharge relationship was calculated to convert stage readings to 15-minute discharge estimates, which were used to calculate that a total of 1,012 acre-feet of water was delivered to the lake. Wheatland Irrigation District (WID) and WGFD agreed that WID delivered 1,000 acre-feet of water, which WGFD purchased at $1,000 per acre-feet for a total of $100,000. The delivered water raised the lake level 4.4 feet.

Figure 110. *Diamond Lake on June 6, one day after water delivery began.*

Figure 111. *Diamond Lake on July 15, two days before the end of water delivery.*

Crow Creek Restoration Phase 1 Planning (Goal 2) - Christina Barrineau

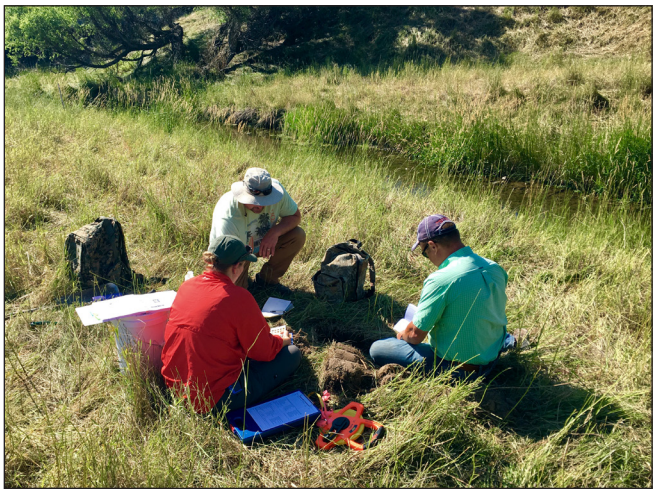


Figure 112. *WGFD and LCCD conducting Crow Creek wetland delineation.*

Planning efforts continued for Crow Creek restoration in 2019. The Crow Creek restoration effort seeks to restore, revitalize, and enhance the ecological values and functions of Crow Creek and its tributaries for public enjoyment. The Crow Creek Revival Committee met monthly throughout the year to draft funding applications, manage the Phase 1 design process through hired consultants, and coordinate with permitting agencies, city, county, and other property and infrastructure owners.

The Crow Creek Phase 1 reach is located on the west side of Cheyenne. The reach extends from the Happy Jack Rd/Highway 210 crossing downstream approximately 0.6 miles to Westland Road. A draft 60% design for the reach was delivered to the committee in late summer 2019. The committee continues to provide feedback to the design team for modifications. The final design is expected in spring 2020.

Restoration implementation on Crow Creek Phase 1 is expected to begin in summer/fall 2020. The committee will continue to raise funds for construction, solidify required permits, seek construction bids, and promote the restoration. Crow Creek Revival partners include Cheyenne Board of Public

Utilities, Laramie County Conservation District, City of Cheyenne, Curt Gowdy Chapter of TU, TNC, Cheyenne Chamber of Commerce, Laramie County, USFWS, FE Warren Air Force Base, Holly Frontier, Wyoming Department of Environmental Quality, WGFD, WYDOT, private citizens, Pathfinder Ranches, and USGS.

Divide Peak Prescribed Burn (Goal 2) - Katie Cheesbrough

Figure 113. *USFS personnel conduct prescribed burning operations on Divide Peak in fall 2019.*

The USFS continued work on the Divide Peak prescribed burn in the northern Sierra Madre Range on the Medicine Bow National Forest. The project area includes summer, winter, and parturition ranges for the Sierra Madre elk herd as well as Baggs and Platte Valley mule deer. Although the weather precluded burning during spring 2019, updated NEPA allowed fire crews to conduct operations in the fall and burned a 90 acre shrub unit in November 2019. With the implementation of the 2019 prescribed burn, a total of 150 acres of mixed mountain shrub habitats have been treated from 2016 to 2019 under the Divide Peak prescribed burn project. Mosaic burning in shrub communities increases age class diversity, shrub nutritive quality, and forage availability for both wildlife and livestock. Funding for 2019 work was provided by the USFS, RMEF, and the PVHP.

Forbes-Sheep Mountain WHMA Fence Conversion (Goals 1 and 2) - Jerry Cowles and Micah Morris

Figure 114. *Wildlife friendly fencing on the WHMA.*

This project focuses on an aggressive fence upgrade to replace WHMA boundary fence with wildlife friendly specifications that include a top-rail. Before this beneficial and much-needed upgrade, a boundary fence on the southeast border did not exist. Special considerations and planning were incorporated into this new addition; due to the rugged terrain found in the southeastern portion of the WHMA, running animals may not easily identify the new fence. Consequently, high visibility fence markers were placed along the top rail of the fence segment. Although the wildlife friendly design of the fence should provide improved animal passage, specific wildlife crossings were designed for areas with cumbersome terrain. These crossings may be especially important for seasonal wildlife movement when fawns and calves are small. The crossings will also hopefully reduce wildlife damage to fences and decrease maintenance costs.

Landscape Vegetation Analysis (LaVA) (Goals 2 and 5) - Katie Cheesbrough and Mark Conrad

The WGFD continued to work with the Medicine Bow National Forest and other cooperating agencies to carry out the planning process for the conditional NEPA based Landscape Vegetation Analysis (LaVA) project. Although the Final EIS was released in April 2019, the Draft Record of Decision was withdrawn in June 2019 following USFS administrative review. By withdrawing the Draft Record of Decision, the USFS hoped to more adequately clarify certain areas of the project as well as address public concerns before issuing a modified Final EIS and new Record of Decision in 2020. WGFD personnel continued to work collaboratively to address public concern and review NEPA documents for the modified FEIS and began steps to prioritize projects for future implementation under LaVA.

Laramie Region PAAs Annual Maintenance (Goals 3 and 4) - Jerry Cowles, Micah Morris, Jacob Sorensen and Mark Cufaude

Figure 115. *South Douglas PAA sign overlay.*

PAAs serve as critical recreational areas for the public who enjoy hunting, fishing, birding, biking, boating, and many other activities. Yearly maintenance and upkeep is necessary to preserve the habitat and provide access for sportspersons. Habitat and Access personnel performed annual maintenance and monitoring of Laramie Region PAAs. All 33 miles of boundary fences within the Laramie region were maintained to reduce trespass livestock and be as wildlife friendly as possible. The Laramie crew installed, maintained, or replaced 620 signs to inform the public of WGFC land boundaries, rules, regulations, cautions, warnings, and travel management information on 40 PAAs. In addition, the crew maintained or provided contract oversight on 60 miles of roadways with 66 parking areas. Laramie personnel provided oversight on 11 contracts for comfort station services with litter removal at the popular recreational sites. Noxious weeds were spot spayed by various contractors as well as the Habitat and Access crew. Several times throughout the year, the crew made adjustments to the area's 11 boat docks for enjoyment of sportspersons.

Laramie Region WHMAs (Goals 1 and 2) - Jerry Cowles, Micah Morris, Jacob Sorensen and Mark Cufaude

The Laramie Region Habitat and Access Crew continued monitoring, annual maintenance, and improvements on 11 WHMAs. The crew maintained 210 miles of boundary and pasture fence and reconstructed seven additional miles. In 2019, 720 acres were irrigated several times throughout the irrigation seasons across the Laramie Region, which included hay meadows, food plots, and dense nesting cover for wildlife. Along with irrigation, 15 water control structures were installed at various WHMAs. With assistance from the contract farmer at Springer WHMA, 286 acres were planted for wildlife nesting cover, food plots, and crop fields. These were harvested with 15% remaining for wildlife benefits. Barley and alfalfa crops were planted, irrigated and harvested through a barter contract at Rawhide WHMA.

The crew worked with several private contractors and county weed and pest districts to eradicate or control 421 acres of state designated noxious weeds on the region WHMAs. Road maintenance included installing three cattle guards, cleaning out an additional six cattle guards, installing four

culverts, and maintaining or overseeing 297 miles of roads with 64 parking areas. The crew installed 152 new signs to inform the public and provide legal compliance on the region's WHMAs. The crew provided contract oversight on comfort station and parking area sites as well as facility maintenance on 13 structures and 64 parking areas. WGFD facility improvements included improvements to structures like roof replacement, siding, kitchen remodel, and building repairs at multiple WHMAs and WGFD properties: Springer WHMA, Red Rim Grizzly WHMA, Saratoga Shop, Wick Brothers WHMA, Laramie Peak WHMA and the Laramie Regional Office.

Laramie River - Jelm Restoration (Goals 2 and 3) - Christina Barrineau

The Laramie River - Jelm Restoration is located on the upstream (south) public fishing easement portion of the Jelm WHMA. Over the years, several landowners along the fishing easement have expressed concern over bank erosion, channel instability, and trout habitat. In spring 2018, the Laramie River cut-off a large meander bend on the upstream end of the fishing easement. In addition, a large wildfire (Badger Creek) occurred in the watershed and has increased fine sediments into the reach.

Figure 116. *Bank erosion marks where the Laramie River cut a new channel.*

WGFD is working with the landowner and partners including the Laramie Rivers Conservation District, NRCS, and USFWS to address channel stability and aquatic habitat enhancements throughout a 3,000 linear foot reach of the river along the public fishing easement. In addition to stabilizing the meander cutoff area, an irrigation diversion at the upstream end will be re-activated to provide water to an adjacent pasture. Overall, the project calls for some channel realignment, grade control, toe wood bank stabilization, and increased bedform diversity.

In 2019, the landowner and partners refined the restoration design, provided by WWC Engineering. The landowner also worked with NRCS to solidify requirements of EQIP funding, such as adjacent landowner permissions and leases. The NRCS conducted a preliminary wetland delineation and USFWS assisted with archaeological surveys. WGFD assisted with permitting by conducting a stream quantification tool assessment. Partners also sought additional funds for implementation. The project is on track for construction in 2020.

Mule Creek Public Access Area Spring Protection and Development 2019 (Goals 1 and 2) - Jerry Cowles and Micah Morris

Seven naturally occurring springs on the Mule Creek Ranch are currently prone to heavy livestock use. This heavy use impacts riparian and wet meadow vegetation as well as affects overall hydrologic function. Spring sources are important to wildlife and livestock for the forage and water they provide; these spring sources help support the sub-irrigated function of several wet meadow habitats. Removing livestock grazing pressure on these important spring sources is expected to help increase water flow and water holding capacity, reduce erosion caused by excessive trampling, and reduce hummocking of vegetation. Elk, sage grouse, and mule deer all utilize these spring sources throughout the spring, summer, and fall. Large herds of elk are often seen congregating in the wet meadow habitats. If properly functioning, the excluded spring sources should help provide a steady flow of water outside of the spring source area and will provide sub irrigated flow to wet meadow habitats found in the

Figure 117. *Spring enclosure on Mule Creek PAA.*

area. These meadows have the potential to produce large quantities of high quality forage for big game and brood rearing habitats for sage grouse. The spring exclosure areas encompass two acres, but the spring protection is expected to have indirect benefits to over 35 acres of wet meadow habitats.

WGFD, with the assistance of volunteers, completed the protection of five of the seven natural springs with fencing, installed two water diversion boxes, and two tire tanks. The fencing materials consisted of 42" high continuous panels and 72" steel jack to keep cattle off the springhead but still allow wildlife to utilize the natural spring. Two of the springs had one diversion box installed to divert water to tire tanks or let it continue to flow down the natural channel. Polyethylene piping was then trenched underground from the diversion boxes to the 10' tire tanks, and then from the tanks back to the wet meadow for small game birds and other species to utilize as well as increase forage growth. Escape ramps were installed to assist small animals to remove themselves from the tanks.

Treasure Island Stream Restoration, Boating Access, and Parking Improvements (Goals 2 and 3) - Christina Barrineau

Figure 118. *Conducting wetland delineation at Treasure Island PAA.*

The Treasure Island boat ramp is one of the busiest boating access points on the North Platte River. The popularity of the ramp creates a safety hazard as the ramp is often congested and boaters floating down the river cannot see the ramp as they approach it from the south due to a bend in the river. Additionally, the access point at Treasure Island is subject to significant variations in flow depth. To use the boat ramp when the river level is low, boaters must drive into the river and over a gravel bar before they reach adequate depths to launch their boats. At high flow, boaters may have to back paddle for extended periods if the ramp is congested. Floaters may also miss the ramp entirely and float down the west channel, which is much smaller than the main east channel.

WGFD began planning in 2019 to rehabilitate the North Platte River at the Treasure Island PAA. Biota Research and Consulting, Inc. was selected through a competitive process to lead the design efforts for river restoration and boating access improvements. Additionally, WGFD requested Biota to incorporate improved parking to take into account increased use and traffic flow.

Biota collected preliminary hydrologic and geomorphic data to develop 10% design alternatives, as well as have the necessary data to develop 60% designs once an alternative has been selected by WGFD. WGFD conducted a wetland delineation for the project area. One approximately two acre wetland was identified south of the existing park lot. WGFD also conducted a boundary survey of the PAA to update property records and to provide property boundaries to Biota for design purposes. Design alternatives are expected in early 2020. The WGFD Treasure Island planning team (Aquatic

Habitat, Habitat and Access, Fish Management, and Conservation Engineering) will select one design alternative for Biota to develop into a 60% design in 2020. The team will also develop a reasonable timeline incorporating design, fundraising, permitting, and construction. The project is anticipated to be constructed in 2021 at the earliest.

Lone Tree Fence Conversion (Phase II) (Goal 2) - Katie Cheesbrough

Figure 119. *Hazardous woven wire fence prior to wildlife friendly fence conversion within the Platte Valley Migration Corridor.*

Approximately 26 miles of fence throughout the Platte Valley mule deer herd unit have been collaboratively identified for conversion to wildlife friendly design with WGFD, BLM, USFS, and SERCD. The fences proposed for conversion are all in mule deer high-use areas, migration corridors, and stopovers as identified by GPS collar data. These fence conversions are intended to increase overall habitat connectivity, decrease big game mortalities, and maintain proper grazing systems. In 2019, approximately 4.5 miles of hazardous fence within designated mule deer migration corridors were converted to wildlife friendly design just southeast of Walcott Junction along the North Platte River in the Lone Tree Allotment.

Platte Valley Invasive Weeds (Goal 2) - Katie Cheesbrough

During fall 2019, over 7,900 acres of important wildlife habitats that were significantly impacted by cheatgrass were aerially treated within the Platte Valley. Through collaborative efforts of the Carbon County Weed and Pest, USFS, BLM, and WGFD, large-scale cross-landownership cheatgrass treatments were implemented on 463 acres of state, 2,902 acres of USFS, 3,238 acres of BLM, and 1,319 acres of private land. Pre-treatment data were collected in 2018 and post-treatment data will conducted in spring 2020. Additionally, the Carbon County Weed and Pest continued leafy spurge treatments on the North Platte River and affected tributaries throughout the Platte Valley, completing 28 stream miles of treatment in summer 2019.

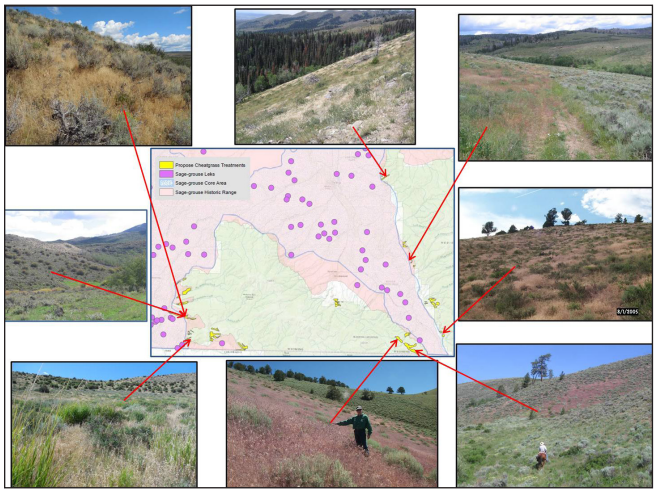


Figure 120. *Habitat identified for cheatgrass treatment in the Platte Valley and Baggs mule deer herds.*

Figure 121. *Collaborative cheatgrass monitoring in the Platte Valley.*

Platte Valley Rapid Habitat Assessments (Goal 2) - Katie Cheesbrough

Figure 122. *Post-treatment piles after mechanical conifer removal on Taylor property.*

RHAs are conducted in MDI herds across the state to better assess habitat conditions across mule deer seasonal ranges. The summer of 2019 is the fifth year of RHA data collection in the Platte Valley. Fewer RHAs were done in the Platte Valley this year as personnel were stretched over a larger area than in previous years. For the Platte Valley mule deer herd, seven rangeland assessments (186 acres), two aspen assessments (54.5 acres), and seven riparian assessments (108.6 acres) were conducted this year. The information obtained from these assessments will primarily be used for Herd Objective Reviews (conducted every five years) and annual data will be summarized in Job Completion Reports (compiled annually). These data will provide population managers and the public with documentation of the current state of mule deer habitat conditions in the Platte Valley.

Saratoga Lake Road Improvement (Goal 3) - Mark Cufaude

Saratoga Lake is a popular destination all four seasons of the year. A two mile road goes from the City of Saratoga campground around the lake to the city beach. Most of this crosses WGFC land. This road is used by recreational users twelve months out of the year. To increase accessibility during wet periods and make maintenance more efficient, WGFD personnel added 3 inches of road base to 1.44 miles of the road. Two 10-yard dump trucks, one 12-yard dump trailer and truck, one backhoe, and one 100-horsepower tractor, and six Habitat and Access personnel were needed to complete the project.

Figure 123. *Road maintenance near Saratoga Lake.*

Sheep Mountain MDI Rapid Habitat Assessments (Goal 2) - Katie Cheesbrough and Lee Knox

RHAs are conducted in MDI herds across the state to better assess habitat conditions across mule deer seasonal ranges. Fewer RHAs were done in the Sheep Mountain herd unit this year as personnel were stretched over a larger area than in previous years. For the Sheep Mountain mule deer herd, four rangeland assessments (132.9 acres), one aspen assessment (4.3 acres), and three riparian assessments (38.7 acres) were conducted. The information obtained from these assessments will primarily be used for mule deer herd objective reviews (conducted every five years) and annual data will be summarized in Job Completion Reports (compiled annually). These data will provide population managers and the public with documentation of the current state of habitat conditions for the Sheep Mountain mule deer herd.

Squirrel Creek Cheatgrass Re-treatment (Goal 2) - Katie Cheesbrough and Ryan Amundson

Figure 124. *Helicopter prepares for cheatgrass treatment application on the southeast face of Sheep Mountain.*

The Squirrel Creek fire burned in summer 2012, at which time the USFS did not have NEPA clearance to conduct large-scale aerial herbicide treatments. By the time a forest-wide EIS for invasive treatments was completed, the Squirrel Creek burn area had a major cheatgrass infestation. In conjunction with researchers from Colorado State University, the USFS and WGFD worked together to prioritize treatment areas with a satellite imagery model. The first large-scale aerial cheatgrass herbicide treatment was implemented in 2016. Extensive post-treatment monitoring was conducted annually and showed that the treatments were extremely successful, but also indicated that it was time to re-treat as the effects of the herbicide had started to wear off in 2019. Re-treating the Squirrel Creek Fire area became even more important given its proximity to the Badger Creek Fire area that had been treated the year previous. With funding and logistics help provided by the RMEF, MFF, Carbon County Weed and Pest, and Albany County Weed and Pest, approximately 3,156 acres within the Squirrel Creek Fire area were aerially re-treated with imazapic herbicide at a rate of 6 oz/acre in August 2019.

Rise to the Future Award (Goals 2 and 5) - Christina Barrineau

Figure 125. *Receiving the national Rise to the Future Award.*

Beginning in 2011, WGFD, TU, and SERCD began implementing stream restoration and fish passage efforts throughout the Upper North Platte River watershed on both public and private lands. Over the past nine years, these entities have reconnected approximately 111 miles of wild trout habitat through the removal of 13 barriers. Additionally, four miles of stream habitat have been restored. WGFD, TU, and SERCD have engaged numerous landowners and provided project tours and learning opportunities to a variety of stakeholders. In 2019, the USFS recognized the efforts of WGFD, TU, and SERCD with a national Rise to the Future Award. Representatives from the three entities traveled to Washington, D.C. for the award ceremony. A few of the projects the team worked on include Big Creek Fish Passage, East Fork Encampment/Coon Creek Weir Removals, and North Platte River - Ryan Ranch Restoration.

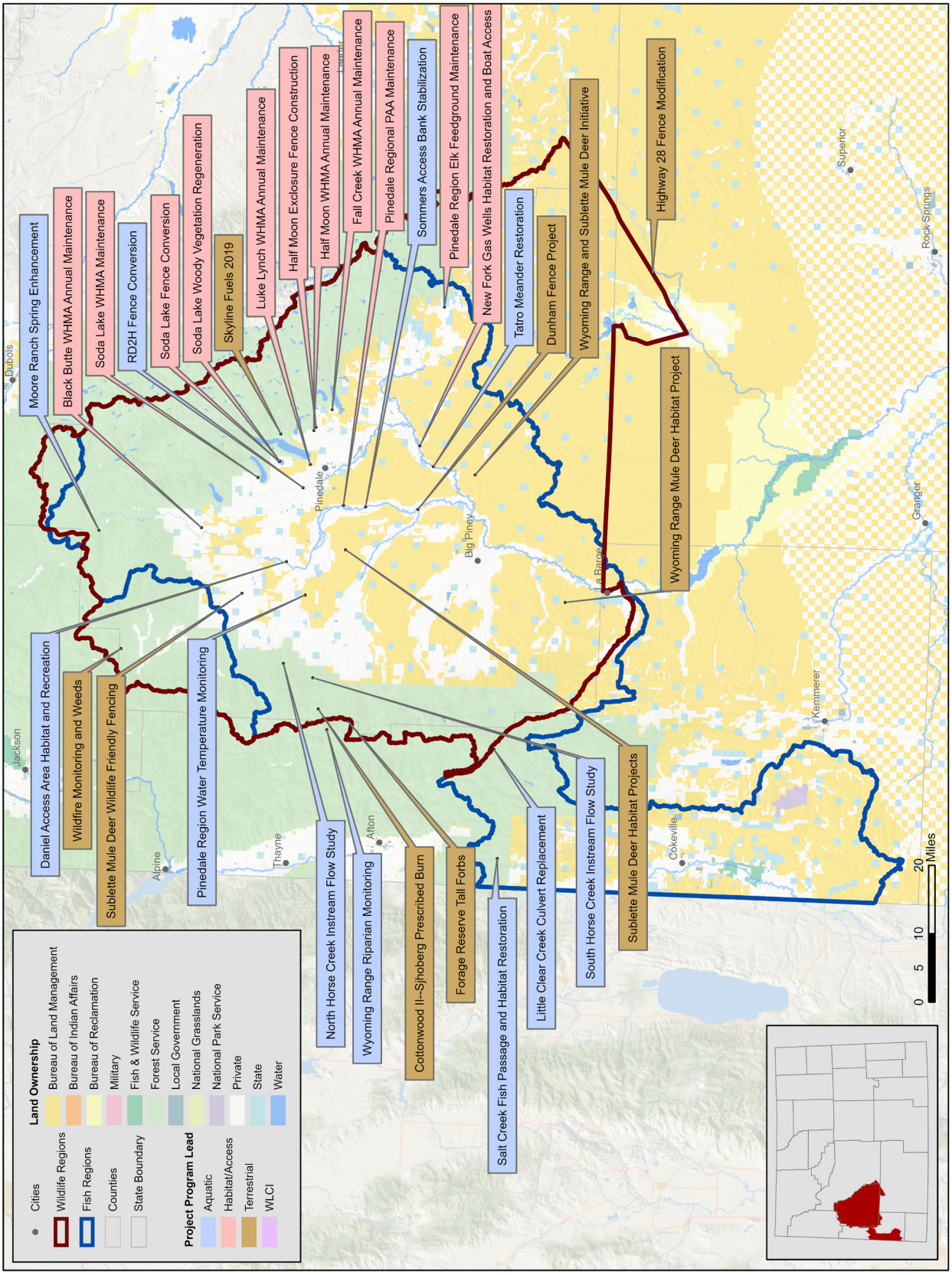
Wick and Forbes WHMA Conifer Removal (Goals 1 and 2) - Jerry Cowles and Micah Morris

This project focused on removing conifer to regenerate and enhance aspen communities on the Wick WHMA and Forbes WHMA. The areas proposed for treatment included 300 acres on the Wick WHMA and 250 acres on the Forbes WHMA. Conifers on both WHMAs were cut from identified habitats with intentions of follow-up prescribed burning. Within the selective cutting scheme 63 acres, all standing live conifer < 12" DBH drainage were cut to create fuel bed for follow-up prescribed fire in 2019-2020. Slash depth was not to exceed two feet and lop and scatter methods were used to prepare the area for future broadcast burning. Within the total conifer cutting scheme, 506 acres, all standing live and dead conifers regardless of DBH were cut from designated polygons in aspen communities.

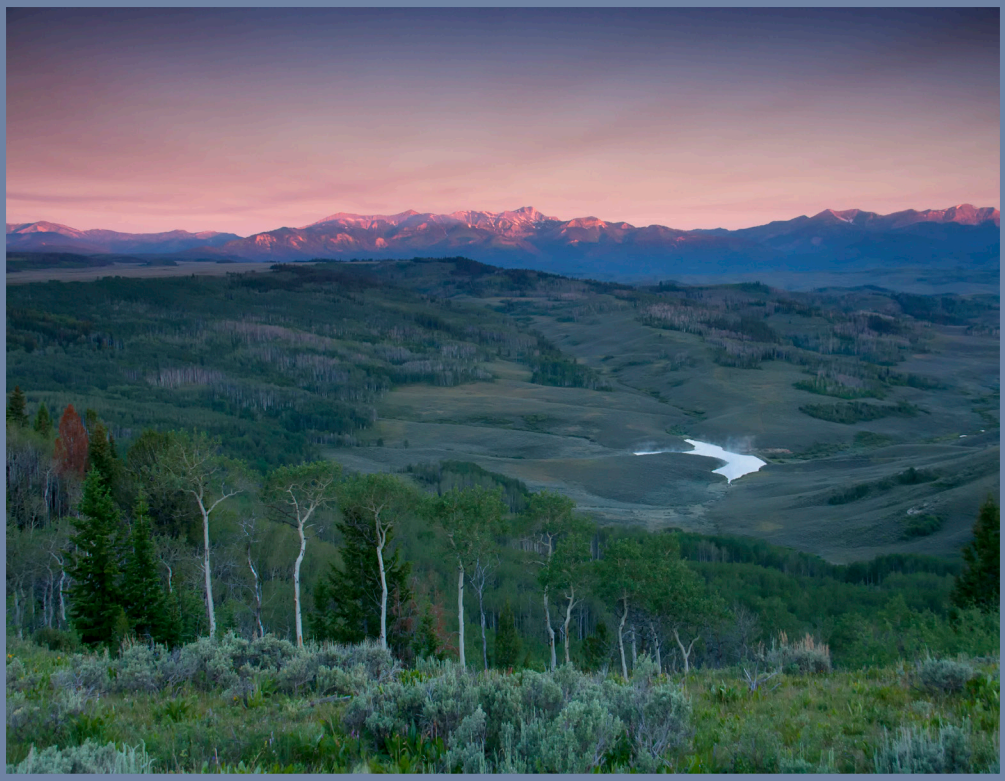
Figure 126. *Wick WHMA conifer removal.*

Figure 127. *Forbes WHMA conifer removal.*

Pinedale Region



Pinedale Region



The Pinedale Region essentially encompasses the area between the Wyoming, Gros Ventre and Wind River mountain ranges in western Wyoming.

The Wyoming Mule Deer Initiative is a statewide framework designed to address declining mule deer populations, particularly over the last decade. Both the Wyoming Range and Sublette Mule Deer Initiatives have since been developed under the statewide initiative. Habitat improvement is a major component of both plans and it continues to be the focus for a large portion of the terrestrial habitat work being done in the Pinedale Region.

There have been several projects completed to improve grasses, forbs, shrubs and aspen on both public and private lands. The Skyline Fuels project completed its third year of work to reduce fuels within lodgepole pine forests and conifer encroached aspen communities. 190 acres were broadcast burned, 259 acres containing piled material were burned, and 496 acres were mechanically prepped for future prescribed burns. Work will continue in 2020.

Much of the aquatic habitat related activities focus on riparian habitat improvements and the development of wetlands. One such project involved bank stabilization and sediment reduction in Coal Creek. Phases I and II focused on replacing undersized culverts and addressing habitat and road access. 2019 efforts worked to ensure project success through revegetation, disturbed site fencing, and in-channel structure maintenance.

Annual maintenance continued on Pinedale Region PAAs and WHMAs. Maintenance included pipe boundary fence repairs, installation of new drill pipe wildlife friendly fence, treating annual invasive grass, and improving access by graveling roads.

Black Butte WHMA Annual Maintenance (Goals 1 and 3) - Miles Anderson and Kyle Berg

Pinedale Habitat and Access personnel performed annual maintenance on the 525 acres on Black Butte WHMA, 4.1 miles of pole top fence, and elk feedgrounds. Feedground maintenance encompassed a variety of duties: pasture harrowing, staining feedground outbuildings, hay shed repairs, corral cleaning and corral repairs. In addition to crew maintenance, livestock grazing of 335 AUMs was used to improve range land health and forage quality. Planning activities and contracts were also coordinated in 2019 to replace 3.1 miles of pole-top boundary fence in 2020 and complete Black Butte WHMAs boundary fence replacement.

Figure 128. *New spring tank on Black Butte WHMA.*

Coal Creek Bank Stabilization and Sediment Reduction (Goal 2) - Luke Schultz

Figure 129. *Coal Creek Site 8 (full channel reconstruction) following runoff in 2019.*

Coal Creek is a primary perennial tributary to the Thomas Fork River, and the watershed contains a conservation population of Bonneville Cutthroat Trout as well as a relatively intact assemblage of native fishes. Aquatic habitats and stream function in Coal Creek have been degraded by high sediment levels from various sources. In particular, the Coal Creek Road has been identified as a major contributor because portions of the road were constructed within the active floodplain. Additionally, fish passage at several locations in Coal Creek is impaired by undersized and perched culverts at road crossings. In addition, road access in this area is limited by poor road conditions near the stream during inclement weather.

To address these habitat and road access issues, this project was initiated in the early 2000's and was completed in two phases. The first phase replaced two undersized culverts on Coal and Little Muddy creeks in 2015, and Phase II was completed in 2018. Phase II addressed habitat and road access maladies by restoring riparian and upland vegetation, constructing bankfull benches and/or toe wood along stream banks, completing necessary borrow ditch and road drainage upgrades, and reducing bank angles at ten sites along a 2-mile section of Coal Creek Road. Additional revegetation, disturbed site fencing, and in-channel structure maintenance was completed in 2019 to ensure project success. Maintenance will be continued into the future until adequate vegetation is established at project sites.

Funding contributions for this project were provided by WWNRT, WGFD, the Wyoming Landscape Conservation Initiative, and the Western Native Trout Initiative. In-kind contributions from WGFD and BLM have been critical for project success.

Cottonwood II--Sjhoberg Prescribed Burn (Goal 2) - Jill Randall

The Sjhoberg prescribed burn is located in the Cottonwood Creek Drainage on the Big Piney Ranger District of the Bridger Teton National Forest, approximately 30 miles west of Pinedale, WY. It is a 155 acre unit within the greater Cottonwood II project area, with the western 80 acres being the area prescribed burned in June 2019. The broader purpose of the project as outlined in the Cottonwood II Vegetation Management EIS is to maintain aspen stands in younger age classes and maintain the forest structure to promote natural regeneration, big game habitat and improved tree growth and health. Before project implementation, the unit consisted of conifer encroached, mature aspen stands. Between 2015 and 2018 the unit was logged and slashed to create a continuous fuel bed throughout the aspen stands. Evening and nighttime operations were conducted in order to mitigate high winds and operate in the prescribed burn window. Operations were considered initially successful and future post-burn monitoring will help inform managers about vegetation response to the mechanical preparation and burn window prescriptions. WGFD has financially contributed to previous years' work; 2019 was completed with USFS funding.

Figure 130. *Nighttime burning on the Sjhoberg Aspen Prescribed Burn.*

Figure 131. *Fire behavior during the Sjhoberg Aspen Prescribed Burn.*

Daniel Access Area Habitat and Recreation (Goals 2 and 3) - Luke Schultz and Kyle Berg

The Daniel (40-Rod) Access area is 80 acres of WGFC-owned land on the Green River northwest of Pinedale. The property contains about 1800' of river access as well as a boat ramp, parking area and toilet facility. This boat ramp is the most heavily used access in the Pinedale region, but launching/loading a boat is challenging at the site for a number of reasons. In addition, river habitat is deteriorated and the property contains a +300' long, 15' high vertical eroding bank that loses upwards of 300 tons of sediment annually. This restoration will address this instability, reduce sedimentation, improve fish habitat, and upgrade the boat access facility at this access area.

Figure 132. *Large eroding bank at the 40-Rod Access Area.*

Project plans are also being developed for a broader recreation plan at the access area to include (potentially) improved parking facilities, new boundary fencing, and camp sites. Site assessments were completed in 2019, designs will be assembled in winter 2020 and revised later in the year, and additional preparation will occur in summer 2020. We hope to do construction in 2021.

Dunham Fence (Goals 2 and 5) - Troy Fieseler

Figure 133. *Newly modified fence on the Dunham Ranch.*

The Dunham Ranch spans both the Sublette and Wyoming Range mule deer herd units and lies within the Sublette mule deer migration corridor. Within each of these herd units, fence modifications have been prioritized to improve the movement of wildlife across the landscape and have been implemented for over ten years with dozens of miles already completed. The focus of this project has been to identify stretches of fence to modify to wildlife friendly design or completely remove while still meeting the needs of the owners for livestock management. With approximately 15 miles of fence identified, this will be a multi-year project. In fall 2019, the landowners permanently removed 2.36 miles of fence and converted over a mile through riparian habitat.

Funding has been provided by PFW and NFWF.

Fall Creek WHMA Annual Maintenance (Goals 1 and 2) - Miles Anderson and Kyle Berg

Annual maintenance on 682 acres of Fall Creek WHMA included pipe boundary fence repairs. Habitat and Access personnel added several expansion sleeves for the pipe top rail to slide back and forth and expand and contract. There was a fire that burned the unit but did not damage our new pipe fence! Survey of damage was conducted and planning for weed spraying contract after wildfire to control possible invasive grasses like cheatgrass. Travel management plans to keep folks on established roads were completed, with implementation planned for 2020.

Figure 134. *Post fire - Fall Creek pipe fence.*

Forage Reserve Tall Forbs (Goal 5) - Jill Randall and Troy Fieseler

During 2019, monitoring continued within the Wyoming Range Allotment Complex and Triple Peak Forage Reserve which were created in 2004 and 2006. To better understand the effects of management change on plant communities, this monitoring has occurred over the last 13 years. In 2019, a total of nine benchmark sites were monitored with methods including nested frequency, LPI and line-intercept. In addition to these sites, several areas with established green-lines were also monitored. Focal plant communities are tall forb communities - dense, diverse wildflower communities

that provide high quality forage for many wildlife species including mule deer, elk, and moose. This endeavor was successfully carried out due to the key partnerships with the BTNF and the SCCD. Funding was provided by WGBGLC and WWSF.

Figure 135. *Partners collected data in a tall forb community in the Wyoming Range.*

Half Moon Exclosure Fence Construction (Goals 1 and 2) - Miles Anderson and Kyle Berg

Habitat and Access personnel installed a new drill stem pipe wildlife friendly fence exclosure surrounding a spring development at Half Moon WHMA. The exclosure protects the spring and water source from wildlife and livestock degradation and the spring is channeled to water tanks and ponds on the WHMA.

Figure 136. *Half Moon spring exclosure fence replacement.*

Half Moon WHMA Annual Maintenance (Goals 1 and 2) - Miles Anderson and Kyle Berg

Habitat and Access personnel performed annual maintenance on the 3742 acre Half Moon WHMA. The WHMA provides crucial winter range for elk and hosts the Mule Deer Red Desert to Hoback migration route. Maintenance included 11.6 miles of boundary fence and biologists worked with neighboring Fayette Ranch for drill pipe pole top fence construction and a 440 AUM grazing barter to remove excess vegetation in preparation for cheatgrass spraying on the south facing slopes of the WHMA. The main access roads were graveled and the Half Moon spring development road was graveled and parking area constructed for the public. One culvert was replaced at the WHMA entrance and two culverts installed on the spring development road. The solar well and tank system was maintained which provides water for wildlife and for livestock during grazing treatments. Grants, contracts, and planning were completed for the remaining 10.7 miles of drill

Figure 137. *Gate and parking area improvements Half Moon WHMA.*

pipe pole-top fence boundary fence for the WHMA. Construction will start in spring 2020.

Highway 28 Fence Modification (Goal 2) - Jill Randall

Figure 138. *Modifying the Highway 28 right-of-way fence to improve permeability for pronghorn and mule deer.*

In 2019, WGFD and WYDOT partnered with several NGOs to modify 18 miles of highway right-of-way fence along Wyoming Highway 28 east of Farson. Additionally, seven paired gates were installed to provide a 32 foot wide opening for herds of pronghorn and mule deer who move across this highway in winter and migration seasons. During tough winter months when deep snow covers the sagebrush forage, pronghorn on the north side of the fence often struggle to cross the highway to easier foraging conditions found further south in the Red Desert. Additional gate openings and modified wire spacing on the fence should resolve this issue. This project has been very collaborative with planning and implementation led by WGFD, WYDOT and the Sweetwater County Commissioners. Funding has also been provided by WWF, MFF, Theodore Roosevelt Conservation Partnership and Greater Yellowstone Coalition. Phase 2 is set to begin in 2020 and will include an additional 37.2 miles of fence modifications to improve permeability for pronghorn and mule deer on Highway 28.

Little Clear Creek Culvert Replacement (Goals 2 and 5) - Nick Scribner and Nick Walrath

Upper LaBarge Creek has been a focal area for Colorado cutthroat trout restoration efforts over the past 10-15 years. Eleven passage improvement projects have occurred within the drainage on USFS land since 2009. In 2019, construction was completed at Little Clear Creek, a tributary to Labarge Creek, where an undersized culvert was replaced with larger squash culvert. This structure spans the bankfull width and will improve stream function and allow year round fish passage. This crossing improvement reconnects access to three miles of habitat upstream for fish.

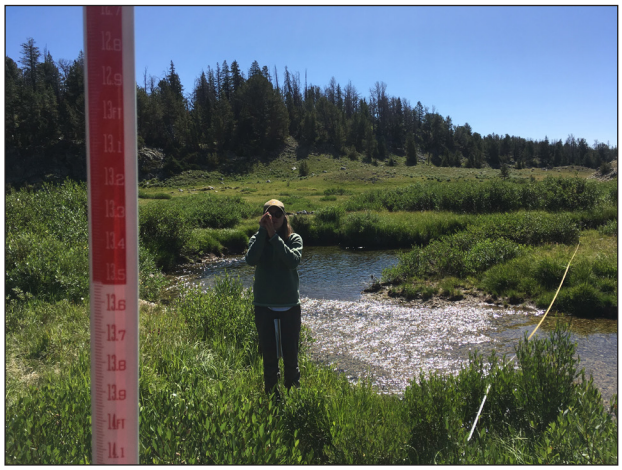
Figure 139. *Little Clear Creek culvert before replacement.*

Figure 140. *Little Clear Creek culvert after replacement.*

Each of the previous project sites was visited to take photos and repeat freeboard measurements taken immediately after construction at recently installed bridges. This provides a quick way to document aggradation or downcutting since most sites have had two years of runoff since completion. The Indian Creek site has remained similar while Shafer Creek and Guard Station have downcut 0.5 ft and 1.1 ft, respectively, since construction. However, overall the stream channel appeared stable through those structures with no passage concerns or impairments to stream function. Downcutting is likely due to improved sediment transport processes post-construction that have reduced previous channel aggradation upstream of the crossing.

Passage improvement work in the Labarge Creek drainage is now complete except for two sites that have no immediate plans for improvements. Overall, these 11 sites reconnected 31 miles in the drainage that will assist with efforts restoring Colorado cutthroat trout populations.

Lower New Fork Riverscape Restoration Plan (Goals 1 and 2) - Luke Schultz



The New Fork River downstream of Pinedale is one of the most popular river fisheries in western Wyoming, and fishing pressure has increased substantially in the last decade. However, due to a variety of different stressors, degraded in-stream and riparian conditions define much of this section of the river. A watershed plan was developed to identify restoration approaches to address habitat limitations in the Lower New Fork over the next 10-25 years.

Figure 141. *Shooting an elevation on the Falls Creek reference reach.*

Luke Lynch WHMA Annual Maintenance (Goals 1 and 2) - Miles Anderson and Kyle Berg

The Luke Lynch WHMA has been identified by researchers and the Wyoming Migration Initiative as the most threatened portion in the internationally-significant bi-annual Red Desert to Hoback Mule Deer Migration. With such significance, this WHMA is managed to conserve mule deer migration and preserve open space for big game winter range habitat. In 2019, Habitat and Access maintained 1.25 miles of elk fence and 1.25 miles of pole top boundary fence. In addition to fence maintenance, the access road was bladed and all signs around the 364 acre WHMA were maintained.

Figure 142. *Wildlife friendly fence maintenance at Luke Lynch WHMA.*

Moore Ranch Spring Enhancement (Goals 2 and 5) - Luke Schultz

Figure 143. *Project personnel and the landowner survey the spring creek at the Moore Ranch.*

Tepee Creek is a conservation area for Colorado River cutthroat trout in the upper Green River Basin. A small spring creek (<1 cfs) on the Moore Ranch historically flowed for about 1500' from the base of Tepee Creek Ridge and into Tepee Creek. However, manipulations to the stream channel near the ranch headquarters resulted in the loss of about 600' of the historical channel when a culvert shunted the spring creek into Tepee Creek. Along the spring creek, remnant beaver dams are common, but active beaver ponds are absent.

The landowner at the Moore Ranch is very interested in improving the health of this spring creek and has offered in-kind excavating work on improvements. Proposed habitat changes include excavating several historical beaver ponds and reactivating the relict channel by plugging the current culvert. Excavated ponds will be ~ 6-8' in depth and will provide over-winter habitat for Colorado River cutthroat trout. At the downstream end of the reactivated stream channel, a small barrier will be constructed to isolate the spring creek from immigrating non-native fishes to establish a small population of Colorado River cutthroat trout. Implementation is expected to occur in 2020 with assistance from the landowner, the USFWS Partners for Fish and Wildlife, SCCD, and WGFD.

New Fork Gas Wells Habitat Restoration and Boat Access (Goals 2 and 3) - Luke Schultz

Figure 144. *Collecting bug samples on the New Fork River.*

The New Fork River provides one of the best river fisheries and most popular boatable waters in the Pinedale region, and angler pressure across the New Fork has increased considerably in recent years. However, stream habitat for sport fishes (cutthroat, brown and rainbow trouts) is degraded in the Lower New Fork relative to other portions of the basin. Hence, there is considerable interest in expanding the productive portions of the river, while also increasing angler access points to spread fishing pressure across more of the river and throughout the entire Pinedale region.

The lower New Fork River also passes through an area of high density natural gas fields downstream from the East Fork River. One of these gas wells is situated within a few hundred feet of the river near a historical boat access area known as the "Gas Wells" site; the site is located on BLM land along approximately two miles of river. However, the boat ramp and many of the stream banks have eroded into the river as the channel has migrated laterally since the site was established. Currently, the eroding bank approaches 6 feet high in many areas along this site, and low quality habitat is the norm. In addition to contributing enormous amounts of sediment to the river, the historical boat access here has been lost and the stream channel is currently migrating into the former parking area at the site, creating a non-point pollution area of concern.

In 2019, additional fund raising, project planning (NEPA), and material mobilization, were completed for the Gas Wells site. Phase I will reconstruct the boat ramp and associated access facilities and restore stream habitat in approximately 0.6 miles of river. Funding partners include WGFD, the Wallop-Breaux Boat Access Fund, three DEQ 319 Non-point Pollution Reduction grants, Jonah Interagency Office, and in-kind contributions from BLM, WGFD, and industry partners.

Pinedale Region Elk Feedground Maintenance (Goals 2 and 3) - Miles Anderson and Kyle Berg

The Pinedale elk feedground maintenance encompasses 11 of the 22 WGFD managed elk feedgrounds. Habitat and Access's 2019 activities included annual repairs and maintenance to feedground structures, corrals, stackyards, elk migration fences, stock fences, and feedgrounds. Fourteen upright poles where replaced this year on various hay sheds and one horse pasture fence was rebuilt at the Upper Green Feedground. In addition, access roads to feedgrounds were maintained and roads resurfaced or otherwise improved at Muddy Creek and Bench Corral feedgrounds during this time.

Pinedale Regional PAA Maintenance (Goal 3) - Miles Anderson and Kyle Berg

Regional personnel performed annual maintenance on PAAs in the Pinedale Region including all PAAs on the Green River: Daniel Access Areas; Sommer's Grindstone and Boat Launch; Fear Access Areas; Huston Access Area; Warren Bridge Access Areas; Mesa Bridge; Boulder Bridge; Remmick on the New Fork River; and Duck Creek, Pine Creek, and Fall Creek. PAA maintenance activities included road blading, gravel hauling, replacing signs, repairing fences and painting comfort stations.

Figure 145. *Parking lot improvements Green River Fear PAA.*

Pinedale Region Water Temperature Monitoring (Goals 1 and 2) - Luke Schultz

Water temperature data are routinely collected in Wyoming, and each Aquatic Habitat Biologist collects annual stream temperature records from at least two sites in each region. These records provide an informational baseline and allow periodic analysis for water temperature changes. In the Pinedale Region, we deployed 4 temperature loggers in 2019 to monitor general trends in thermal patterns across the region, but also included locations in stream systems with Colorado River cutthroat trout to evaluate thermal conditions in systems where this species has persisted. Information from these reaches will help evaluate potential restoration reaches in addition to a generally better understanding of the thermal ecology of this species of greatest conservation need.

Figure 146. *Temperature Logger deployment on Apperson Creek.*

RD2H Fence Conversion (Goal 2) - Jim Wasseen

Annual planning meetings were held with the SCCD, NRCS, TNC, Greater Yellowstone Coalition, WWF, Wyoming Migration Initiative, Western Landowners Alliance, private landowners, and various other partners. These meetings were to provide project updates and identify additional opportunities, as well as to determine funding status and needs. In 2019, approximately seven-tenths of a mile of fence was modified on private lands.

Figure 147. *4-Strand wildlife friendly fence converted fence.*

Salt Creek Fish Passage and Habitat Restoration (Goals 2 and 3) - Luke Schultz

Collaboration between the USFS, TU and WGFD will address habitat and passage on Salt Creek. This tributary to the Bear River provides valuable Bonneville cutthroat trout habitat and is an easily accessible and highly-visible fishery along US Highway 89. However, numerous past and on-going practices impact fish habitat and water quality in the area, and the creek is crossed by a Forest Service road with an undersized and perched culvert. The site also has an active salt mine within the floodplain, and has in-stream structures spanning approximately two miles upstream of the salt mine/culvert that were constructed beginning in 1982. While these structures helped resolve many of the habitat issues they were intended to address when they were constructed, some have outlived their life expectancy and are currently impairing stream function.

Figure 148. *USFS hydrologist Kelly Owens maps wetland area at Salt Creek.*

The purpose of this project is to address all of these issues and improve fish passage and habitat along this 2-mile reach of Salt Creek. Addressing the interaction between the river and the salt mine will also improve water quality and reduce sedimentation downstream in Salt Creek and the Bear River. Biota Research and Consulting, Inc. was hired in 2017 to complete a full assessment at the site and draft designs.

Skyline Fuels 2019 (Goals 2 and 5) - Troy Fieseler

This fuels reduction project is continuing to move forward and is ahead of schedule. In 2019, 190 acres were broadcast burned, 259 acres containing piled material was burned and 496 acres was mechanically prepped for future prescribed burns. The project also consisted of 17 acres that were commercially harvested as well as several acres that were mechanically thinned by the USFS, providing approximately 300 cords of firewood to the local public.

The Skyline Fuels project will be in its 4th full year of implementation in 2020. In total, the project includes over 2,200 acres on BTNF lands near Pinedale with the goal of reducing fuels within lodgepole pine forests and conifer encroached aspen communities. This project is expected to provide

benefits to aspen and shrub communities by setting back succession and improving the overall quality of habitat available for wildlife. Funding partners include USFS Joint Chiefs, WWNRT, WGFD MDI and RMEF.

Figure 149. *Slash carrying fire through a conifer encroached aspen stand.*

Soda Lake WHMA Maintenance (Goals 1 and 3) - Miles Anderson and Kyle Berg

To increase recreational use on the Soda Lake WHMA, Pinedale Habitat and Access constructed six additional designated campsites, which now include fire rings and picnic tables for public use. These amenities will also help prevent resource damage and reduce the chance of man made wildfires.

Figure 150. *Installing fire pits at Soda Lake WHMA.*

Soda Lake Fence Conversion (Goals 1 and 2) - Miles Anderson and Kyle Berg

Soda Lake Fence Conversion was a two year effort to convert WHMA boundary stock fences to steel drill stem pipe top rail and wire fence. Fence conversion to wildlife friendly fencing improves the Hoback to Red Desert Migration Corridor and protects winter forage for wildlife on Soda Lake WHMA. Drill pipe materials were donated by Ultra Resources and Pinedale Energy Partners. The seven miles of remaining fence for a total of eight miles was completed in 2019.

Soda Lake WHMA Maintenance (Goals 1 and 3) - Miles Anderson and Kyle Berg

Annual maintenance and improvements of Soda Lake WHMA encompass 3,750 acres including facilities, roads, fences, signs, wetlands, habitat improvements, and 25 miles of elk migration fencing. Soda Lake winters up to 1,000 elk annually on the feedground and winter range. The Hoback to Red Desert annual migration route for mule deer and antelope passes through the WHMA. The WHMA is home to the popular Soda Lake fishery and has 165 acres of wetland habitat.

Figure 151. *Installing a guard at Soda Lake WHMA.*

South Horse Creek Instream Flow Study (Goal 1) - Del Lobb

Figure 152. *Measuring depths and velocities along a transect across South Horse Creek at 59 cfs.*

Data for an instream flow analysis was collected at a site on South Horse Creek in the Bridger National Forest during summer 2019. Depth, velocity, substrate, cover, water temperature, nitrate-nitrogen, macroinvertebrate, stream stage, stream bed elevation, and water surface elevation data were collected at three stream flows. Measured flows during June, July, and August were 59 cfs, 22 cfs, and 3.5 cfs. Maximum water temperature was 65.3 F on August 3. Collected data will be used with habitat modeling and hydrologic analysis to identify appropriate flows for Colorado River cutthroat trout spawning, late summer habitats, overwintering, and passage.

Sublette Cheatgrass (Goal 2) - Jill Randall and Troy Fieseler

In 2019, cheatgrass management in Sublette County included extensive aerial application of herbicide on the west slope of the Wind River Range and the east slope of the Wyoming Range. Additionally, smaller patches and roadside treatments were conducted within the interior of the county. In total, 18,827 acres were aerially treated as well as 181 acres treated from the ground. 2019 projects include retreating acres treated in 2017 as well as treating newly detected infestations on BLM, private and OSLI lands and roadside treatments on USFS land. The collaborative treatment strategy includes prioritizing new infestations and the leading edge of invasion as well as protecting the investment already made by re-treating areas previously treated. Treatments were funded by a multitude of partners including BLM/WLCI, NRCS, Sage Grouse Local Work Group, WWNRT, and USFS-Joint Chiefs.

In addition to treatments, extensive monitoring (n=27) was conducted in 2019 to inform management including determination of treatment effectiveness, understanding changes in annual cheatgrass productivity due to climate variables and determining when re-treatment is required. Additionally, in preparation for treating on USFS land, we installed 16 new monitoring locations in areas that will be

Figure 153. *A contracted helicopter re-fuels and loads herbicide for a cheatgrass control project near Boulder.*

Figure 154. *WGFD and Teton Interagency Fire Effects personnel cooperatively monitor cheatgrass prior to herbicide treatment.*

treated on the Pinedale Ranger District once an EIS analysis is complete (anticipated early 2020). Lastly, research plots including Esplanade and other herbicide combinations were also collaboratively evaluated with a Colorado State University graduate student.

Sublette Mule Deer Habitat Projects (Goals 2 and 5) - Kerry Gold

Sublette Mule Deer Habitat projects are a direct response to cumulative declines across the Sublette Mule Deer Herd range in addition to declines associated with natural gas development in the PAPA near Pinedale, WY (a segment of the Sublette Herd). Cooperators and funders include BLM, private landowners, PAPO, JIO, and WWNRT. Projects consist of roughly 6,000 total acres of habitat treatments on public and private lands, primarily in decadent sagebrush, mountain shrub, and aspen communities, with primary goals of improving habitat forage quality and quantity for mule deer in summer and winter ranges within the Sublette Mule Deer migration corridor. 2019 featured several treatment applications and substantial post-treatment monitoring on public and private lands. Projects under the umbrella NEPA planning effort for BLM lands commenced in 2016 and will continue through 2020. Projects on private lands are ongoing, and additional projects are likely to occur as relationships with new landowners develop.

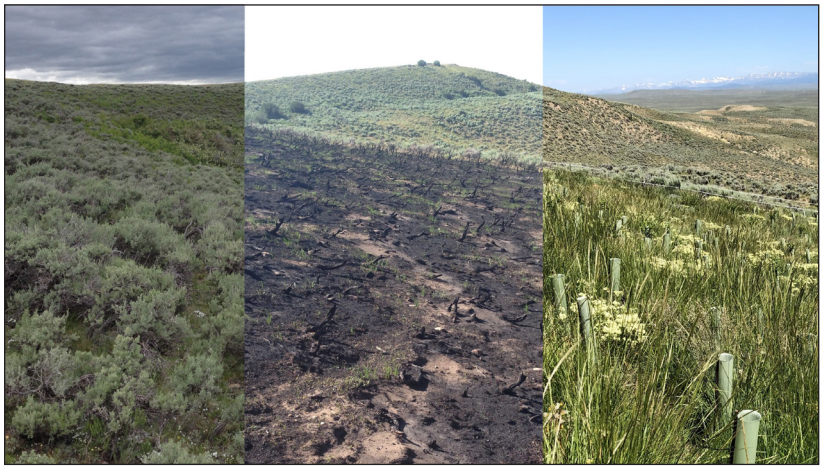


Figure 155. *Prescribed burn treatment on Ryegrass BLM. From left to right: pretreatment, immediately post burn, two years post-burn with transplanted shrubs in protective containers.*

307 acres of land administered by the BLM were subjected to pretreatment monitoring and mechanically treated with mowers to reduce decadent sagebrush cover and allow sunlight and moisture to reach lower canopy levels to promote higher abundances of bunchgrasses, forbs, and younger shrub age classes. This is in addition to nearly 3,900 acres of big sagebrush mechanically treated since 2016. Livestock grazing on treatments from 2017 and 2018 was managed using electric fencing, two riders, and deferment in 2019. Livestock grazing on treatments completed in 2018 and 2019 will continue to be managed in 2020 with similar strategies. 21 previous treatments from 2017 and 2018 that were monitored in 2019 included mowing, pipeline installation, prescribed burns, Dixie harrowing, and aerator treatments. Monitoring consisted of photopoints, line point intercept (LPI) macroplots, shrub density belts, and/or modified shrub LPIs in treatment polygons and designated control plots. Preliminary two-year post monitoring results indicate treatments have positive effects on grass and forb species richness, reducing decadent sagebrush cover, and reducing bare ground susceptible to erosion. Field observations also indicate container shrubs of chokecherry and serviceberry planted after prescribed burns have a survival rate of roughly 60-70%. Ongoing work will continue to monitor treatments until objectives for grass cover, forb cover and shrub age class diversity are met.

Private land treatments were also monitored in decadent big sagebrush/mixed mountain shrub habitats in the Sublette Mule Deer Migration corridor. About 930 acres of private land habitat treatments (mowing and Spike herbicide) with similar objectives as the public land component implemented in 2017 were observed for two-year post monitoring in 2019. Surveys included LPI macroplots, shrub density belts, and production/utilization surveys. One Spike treatment's preliminary results indicate implementation reduced sagebrush cover from 46% to 28%, increased forb richness by four species,

increased grass cover from 34% to 54%, and reduced bare ground from 7.2% to 4%. Additional mechanical treatments are planned for about 1,200 acres of private lands in 2020, as well as implementation of about 1,500 acres of Spike herbicide treatments.

Sublette Mule Deer Wildlife Friendly Fencing (Goals 2 and 5) - Kerry Gold

Figure 156. *Doe mule deer using a wildlife friendly modification within the Jackson Fork Ranch bison-proof fence during the fall 2019 migration.*

Sublette mule deer fencing projects, like the Sublette mule deer habitat projects, are a direct response to cumulative population declines associated with the Sublette Mule Deer Herd, and declines in the Sublette mule deer segment associated with energy development in the PAPA near Pinedale, WY. Cooperators and funding partners include PAPO, JIO, WWNRT, private landowners, Hoback Ranches Services and Improvement District, NRCS, USFS, and BLM. 2019 projects included about 28 miles of wildlife friendly fence construction and/or modification to wildlife friendly specifications in the Sublette Mule Deer Migration Corridor. Goals are to enhance habitat connectivity by reducing negative wildlife-fence interactions and easing fence crossings for migrating mule deer and other big game species. About five miles of wildlife friendly fencing are currently planned for installation in 2020 on private and public lands. About 15 miles of wildlife friendly fencing were installed on private lands in the Hoback Rim area in 2019, much of which was reconstructed after being lost in the 2018 Roosevelt Fire. This adds to the 43 miles of wildlife friendly fencing already constructed in the interest of Sublette mule deer migration.

To ease mule deer and big game passage to summer range in the Hoback Basin, Jackson Fork Ranch in Bondurant, WY had 25 custom modifications installed in their 70" tall woven wire bison fence. Modifications removed sections of woven wire fencing and installed three drill stem pipes at 16", 30" and 42", with a removable top pole at 60". Fence sections ranged from 7.5 feet to 18 feet wide. During spring and fall migrations, ranch managers remove the top pipe to allow mule deer and elk to easily jump the structures while bison remain contained. Additional modifications are planned for 2020.

Tatro Meander Restoration (Goals 2 and 5) - Luke Schultz

A landowner on the Lower New Fork has been working with Game and Fish for several years to address bank instability on an outside bend approximately 1 mile downstream of the Remmick Access Area. A 5-7' vertical eroding right bank annually loses 1-2' laterally to instability and channel erosion. The 1600' bank was estimated to contribute 290 tons of sediment annually, and the landowners have offered substantial in-kind contributions to address these issues. In 2019, project designs were refined and a wetland delineation was conducted to facilitate permitting.

Figure 157. *Personnel conducting a soil profile survey.*

Materials were also mobilized to the site to prepare for construction in 2020. Additional funding will be sought in winter 2019-20 to hire a contractor for implementation.

Black Butte WHMA Spring Tank Installation (Goals 1 and 2) - Kyle Berg

An additional tire tank was installed to increase storage volume and improve water availability on Black Butte WHMA. This spring improvement will facilitate the WHMA grazing plan and provide additional water for wildlife.

Figure 158. *Spring tank construction.*

Wildfire Monitoring and Weeds (Goals 2 and 5) - Troy Fieseler

Over the last decade the Wyoming Range and Hoback Basin have experienced numerous large-scale wildfires totaling approximately 168,000 acres. The Roosevelt Wildfire was the most recent and occurred in 2018 over 62,000 acres. All of these fires have and will continue to result in many vegetation benefits for wildlife and overall watershed health. Many management actions have already been implemented through key partnerships with the BTNF, SCCD, BLM, SCWPD, WGFD, Livestock Permittees and private landowners. Actions include noxious weed control, grazing management, fire line rehabilitation and erosion control efforts. These actions encourage successful restoration improving overall quality of habitat for wildlife as well as for livestock.

Figure 159. *Immediately after the Roosevelt Wildfire which occurred in fall 2018 compared to 1 year after.*

In 2019, one-year post fire monitoring was conducted within the Roosevelt Wildfire in addition to two-year post fire monitoring in the Cliff Creek wildfire totaling 31 monitoring locations. Sites were established throughout various habitat types including aspen, sagebrush, riparian, and conifer stands. The goal of monitoring is to better understand how various habitats respond after fire to help guide future management actions. Also completed in 2019 was additional noxious weed treatments throughout the various wildfires. These treatments, many of which are ongoing since the inception of each wildfire, are critical for proper restoration of the affected areas. In the Cliff Creek wildfire, over seventeen acres of weeds were treated across a 500 acre area with the use of UTV, backpack, and horseback sprayers. These noxious weed treatments, in addition to other management actions, have been made possible with the following funding partners: JIO, PAPO, BLM, SCCD, SCWP, RMEF, WWNRT, and WGFD.

Soda Lake Woody Vegetation Regeneration (Goals 2 and 4) - Kyle Berg, Pete Cavalli and Luke Schultz

Figure 160. *WGFD employees and volunteers install steel jack fencing at Soda Lake, June 2019.*

Woody vegetation around Soda Lake has been heavily impacted by wintering elk, draft horses used on elk feedgrounds, and trespass cattle. Approximately 2,000 feet of steel jack fence was constructed to protect four patches of willow and aspen vegetation along the shoreline in 2018. A total of 320 feet of cattle panels were also used to protect three small patches of vegetation that year. This project was expanded in May 2019 when six more small patches of vegetation were protected with cattle panels. Approximately 2,000 additional feet of steel jack was erected in June 2019 to protect three more large patches of vegetation located along the northern arm of the lake. The new fences were constructed by Department personnel and a large crew of volunteers. All fences will be moved to new locations when the protected plants are large enough to withstand the grazing pressure that is currently keeping the plants from maturing.

Wyoming Range and Sublette Mule Deer Initiative (Goals 2 and 5) - Jill Randall, Troy Fieseler and Kerry Gold

Efforts continued in 2019 using the RHA methodologies across the Wyoming Range and Sublette Mule Deer Herds. In the Sublette Herd a total of five aspen, nine rangeland, four riparian, and six special RHAs were completed totaling 6,766 acres within the Pinedale region. Throughout the Wyoming Range Herd four aspen, 14 rangeland and four special RHAs were completed across 4,066 acres. New for this year were the addition of Special RHAs which were created to be used in unique habitat types such as tall forb communities. In addition to conducting habitat assessments, WGFD personnel assisted researchers with the Monteith Shop conducting the Wyoming Range Mule Deer Project. This project is investigating factors that influence deer using a nutritional ecology framework and has allowed managers to better answer on-the-ground management questions.

Figure 161. *Tall Forb community in the Wyoming Range where a RHA was conducted in 2019.*

Winter range shrub transects were monitored near Big Piney within the Wyoming Range mule deer herd. Five sites have been monitored in true mountain mahogany stands for over 20 years on an annual basis. In 2019, production experienced a relative increase compared with the previous year, though it may be considered average in the context of the previous 22 years. This increase in productivity may be attributable to the increased snowfall associated with this year's late spring, effectively increasing the amount of soil moisture available to the plants not accounted for by precipitation.

Leader production in 2019 for true mountain mahogany increased from an average of 2.07 inches in 2018 to 3.79 inches across the five monitored transects, though not quite as high as the 2017 production of 5.13 inches. The WGFD resumed monitoring other shrub species with the cooperation of

the Monteith Shop to assess the influence of production in habitat treatments and untreated areas on mule deer. The goal when implementing treatments within shrub communities is to both increase the production and age-class diversity of plants by creating favorable conditions for younger shrubs. This contributes to the viability of shrub communities, which help to sustain deer populations through the difficult winter months.

Wyoming Range Mule Deer Habitat Project (Goal 2) - Jill Randall and Troy Fieseler

The Wyoming Range Mule Deer Habitat Project is a cooperative project between WGFD and Pinedale BLM targeting improvements to mule deer habitat in the Big Piney and LaBarge areas. This habitat project is intentionally landscape-scale and will be conducted over a 10 year period, which started in 2014. Winter and transitional ranges are targeted, totaling over 30,000 acres of vegetation treatment and over 45,000 acres of cheatgrass control. The treatments target many vegetation types including: Wyoming and mountain big sagebrush, antelope bitterbrush, true mountain mahogany, salt desert shrub, and aspen. Implementation techniques have included mowing, lawson aerator, seeding, pitting, spike, herbicide application, fencing, conifer thinning, and prescribed burning.

Figure 162. *Sagebrush mowing conducted by WGFD Habitat and Access personnel west of Big Piney.*

In 2019, accomplishments included: 1,662 acres of sagebrush mowing and Lawson aerator treatments, 9,340 acres of cheatgrass herbicide application, and hiring three livestock riders to manage livestock distribution post-treatment. Several hundred acres of prescribed burns were planned in 2019; however, weather conditions did not present an optimal burn window. These units are slated to be burned in 2020. Cumulative accomplishments (2014-2019) include: 14,490 acres of sagebrush thinning, 3,149 acres of aspen mechanical preparation, 1,401 acres of aspen prescribed burns, 45,014 acres of cheatgrass herbicide application, 2,032 acres of cheatgrass hand grubbing, 12 livestock riders, 11 miles of fence construction, and one reservoir renovated to influence livestock distribution.

Extensive vegetation monitoring has been conducted throughout the area, with 16 habitat treatments monitored in 2019. Since inception, a total of 70 monitoring locations have been established including BFH macro plots and LPI transects, shrub density and age-class belts, production and utilization transects, aspen density circular plots, and photo points. Generally, vegetation has responded very well to disturbance with increased aspen density in the prescribed burns, improved leader length on sagebrush plants, increased production of herbaceous species, reduction of cheatgrass, and establishment of seeded species in treatments.

Approximately $4.2 million has been secured with over $200,000 of in-kind support contributed by the WGFD and BLM. Partner funding includes WWNRT, WLCI, Denbury Energy, Exxon, MFF, RMEF, WGBGLC, BLM and WGFD MDI.

Wyoming Range Riparian Monitoring (Goal 2) - Luke Schultz

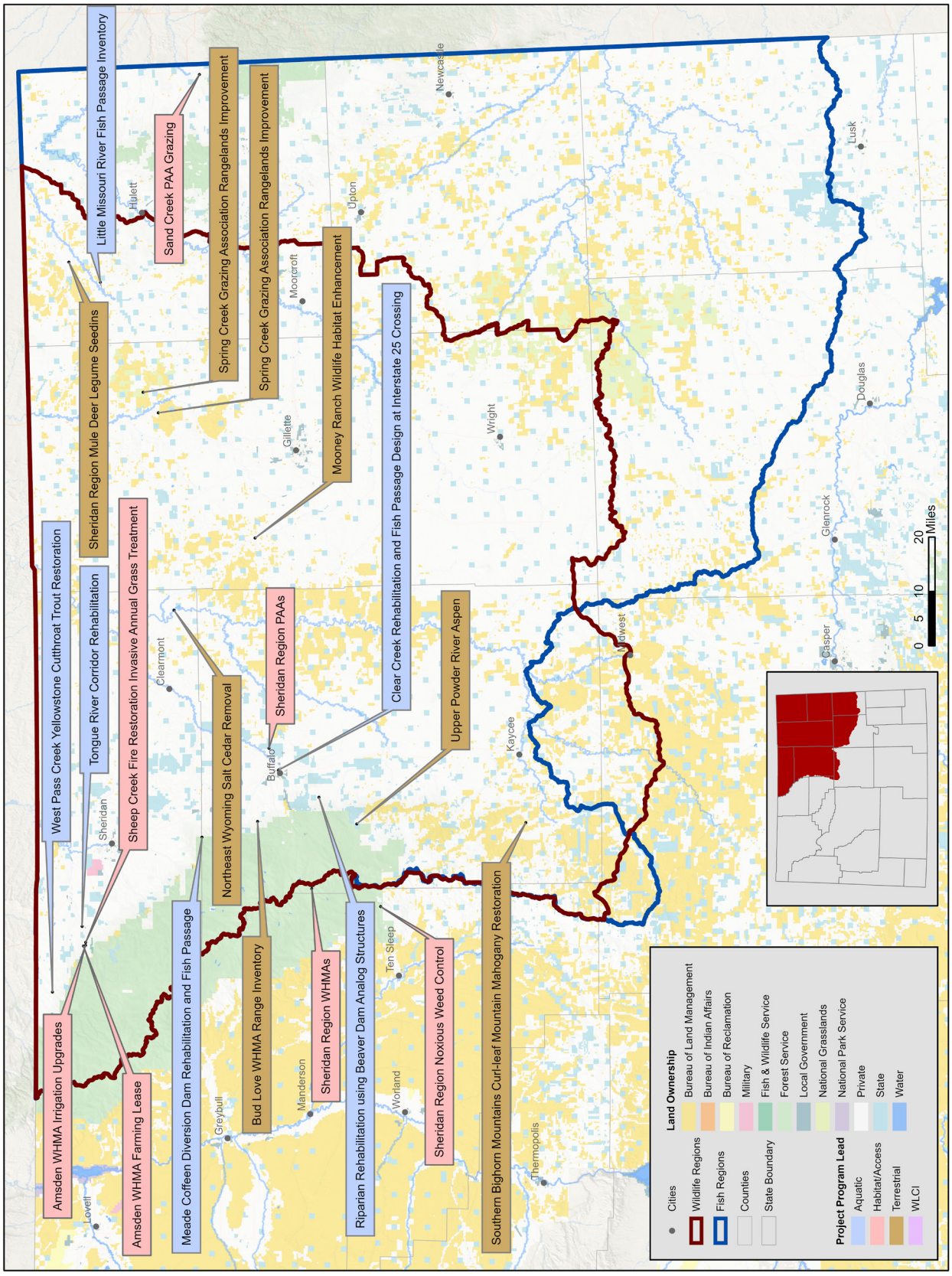
Portions of some livestock allotments in the Wyoming Range were historically overgrazed by domestic cattle and sheep. In recent years, two forage reserves have been established in the Wyoming Range to help restore vegetative communities to these sensitive alpine habitats. In these allotments, WGFD has observed expanded distribution of many fishes following the initiation of these forage

Figure 163. *North Horse Creek MIM location.*

reserves, including Colorado River cutthroat trout, a state species of greatest conservation need.

There has been considerable interest in understanding whether habitat changes in streams and riparian areas are driving these expanded distributions of fishes, as tall forb (upland vegetation) monitoring has suggested some recovery of these communities. In 2019, two sites were measured using the Multiple Indicator Monitoring (MIM) framework in conjunction with tall forb (upland) monitoring that has been conducted by the terrestrial counterparts. The MIM framework allows a suite of riparian and in-stream variables to be tracked relative to management changes and will allow us to assess the recovery of each of these components of the alpine system over many years.

Sheridan Region



Sheridan Region

The Sheridan Region extends from the top of Bighorn Mountains east to the Black Hills and from the Montana/ Wyoming state line south to northern Natrona and Converse Counties. This area includes the Powder, Tongue, Little Bighorn, Belle Fourche, Little Missouri and Cheyenne River drainages.

Aquatic and terrestrial wildlife habitat enhancements in northeast Wyoming focus on streams and their associated riparian areas. Reconnecting streams with structures to aid fish passage and attention toward managing rangelands to meet the needs of mule deer and sage-grouse for food and cover are given high priority.

Maintaining the diverse habitat quality of riparian areas in northeast Wyoming is critical. Major concerns for riparian habitats are lack of native grass and forb communities, weed infestations, loss of woody species that stabilize stream banks and shade stream corridors, and alterations that reduce the capacities of riparian areas to retain water. Many perennial streams have several irrigation diversions, which have fragmented the stream courses into sections where fish movements are restricted or eliminated. As opportunities become available, efforts are made to restructure irrigation diversions so landowners can get the water they have a right to divert while allowing fish passage through the diversions. Fish passage around barriers expands habitat available for fish to meet their seasonal needs such as spawning and seeking thermal refuges during low flow conditions - meaning healthier fish populations and better angling.

Other rangeland habitat concerns associated in this region include the decline or loss of sagebrush stands, invasion of non-native grasses and weeds, conifer encroachment, and wildfire. Efforts to deal with these concerns involve maintaining rangelands that provide a diversity of native grasses and forbs, as well as an intact sagebrush component that is essential for numerous wildlife species.

Amsden WHMA Farming Lease (Goals 1 and 2) - Seth Roseberry

The Amsden Creek WHMA has historic hay meadows and a gravity fed irrigation system that allows for successful growing of alfalfa/grass crop. To fully benefit and utilize these lands and water rights, WGFD has determined it most beneficial to lease the farming/hay rights to a single annual cutting. On 50 acres of the WHMA, the lessee irrigates and harvests a single hay cutting annually and irrigates for a second growth of forage left for wildlife.

Figure 164. *Amsden WHMA farming lease irrigation.*

Amsden WHMA Irrigation Upgrades (Goals 1 and 2) - Seth Roseberry

Forage production on the Amsden WHMA directly relates to the amount of time and effort WGFD personnel must manage and mitigate elk issues on neighboring private lands. Increasing forage production through irrigation improvements and water right utilization increases the ability of the Amsden WHMA to provide sufficient forage for wintering wildlife. In 2019, irrigation upgrades were started and will continue into 2020.

Figure 165. *Amsden WHMA irrigation upgrades.*

Riparian Rehabilitation using Beaver Dam Analogue Structures (Goal 2) - Todd Caltrider, Travis Cundy and Seth Roseberry

Regional habitat personnel collaborated with BNF and State Forestry Division personnel to complete 10 BDA grade control structures in two separate complexes on Grommund Creek, two separate complexes on Sourdough Creek and one demonstration structure on state land along Parmlee Canyon Creek in Weston County. The willow or woody debris lattice (weave) structures provide temporary grade control that raise the streamside water table, promote riparian vegetation development, and entice dam building by beaver to promote further water table and riparian vegetation development. Sourdough Creek is a candidate release site for a beaver transplant in the future.

Figure 166. *BDA grade control structures located on Sourdough Creek.*

Bud Love WHMA Range Inventory (Goal 2) - Todd Caltrider and Seth Roseberry

Figure 167. *Conducting range inventories on Bud Love WHMA.*

In 1971, WGFD completed a baseline rangeland inventory on Bud Love WHMA. Since this initial inventory, no other in-depth rangeland inventory has been conducted on Bud Love WHMA. In order to evaluate current management and identify potential habitat improvements, WGFD has begun re-surveying the original inventory sites first evaluated in 1971. Since 1971, some significant changes have the potential to affect rangeland conditions on the WHMA. This includes increases in elk populations and decreases in the mule deer population. During summer 2018, 50% of the original 1971 inventory sites were sampled. The remaining rangeland monitoring sites were completed during summer 2019. Results from the range evaluation will be available in 2020.

Clear Creek Rehabilitation and Fish Passage Design at Interstate-25 Crossing (Goal 2) - Travis Cundy

Figure 168. *Grade control structure and fish barrier located upstream of the Interstate 25 culvert crossing on Clear Creek.*

A 12-ft tall concrete grade control structure occurs upstream of the Interstate 25 box culvert crossing on Clear Creek. The structure is a barrier to upstream fish movements. A design phase was undertaken to examine options to eliminate the fish barrier. Our leading design option entails re-grading the channel and floodplain corridor between County Road 252 and Interstate-25, and constructing a series of riffle to pool transitions to stabilize the channel and facilitate fish passage through the stream reach. The rehabilitation will allow adult life stages of brown and rainbow trout, and native suckers isolated downstream to access upstream habitats and thermal refuges along 9.7 miles of Clear Creek. The work will also improve stream habitat available to the public along two acres of Clear Creek owned by WYDOT. The Clear Creek Conservation District and WYDOT are partners assisting with design development. Funding for implementation is either available or being sought from WYDOT, WWDC Small Water Project Program, WGBGLC and other nonprofit organizations.

Mooney Ranch Wildlife Habitat Enhancement (Goal 2) - Todd Caltrider

The Mooney Ranch is a family ranch located in northwestern Campbell County. Along with managing the ranch for livestock production, the Mooney family has a great interest in improving habitat for wildlife. The Mooney Ranch has a terrific mixture of sagebrush grasslands and juniper forests that provide excellent habitat for a variety of wildlife, including sage grouse, mule deer, elk, and pronghorn. Like many ranches in the area, cheatgrass density appears to be increasing due to increasing occurrence of fall moisture and hot dry summers. This is cause for concern for the Mooney Ranch, as increases in cheatgrass contribute to declines in forage production for wildlife and livestock alike.

Figure 169. *Aerial herbicide applicator conducting cheatgrass herbicide treatment on the Mooney Ranch.*

Another concern for the Mooney Ranch is increasing juniper density on the west side of the ranch. This juniper provides terrific hiding cover for elk and mule deer, but due to landscape scale fire suppression, the juniper has become overabundant, resulting in increased fuel loads and increased competition for resources with more palatable forage species for big game.

This project entails treating cheatgrass on a pasture located in the northwest end of the ranch and a retreatment of acres that were treated by WGFD in 2015 on the east end of the ranch. In addition to cheatgrass treatments, the Mooney Ranch would also like to experiment with juniper thinning on the northwest end of the ranch.

During summer 2019, 1,134 acres of cheatgrass herbicide treatment occurred the Mooney Ranch. Rangeland was treated with imazapic herbicide via helicopter at 8 oz/acre. Juniper removal will commence winter 2020. This project was made possible by contributions by WGFD, WWNRT, WGBGLC, RMEF, and the BLM.

Meade Coffeen Diversion Dam Rehabilitation and Fish Passage (Goal 2) - Travis Cundy

The Meade Coffeen Crossover Diversion Dam on South Piney Creek is the primary water supply for the Story Hatchery. The grouted riprap dam was at risk of breaching due to toe degradation. Aquatic Habitat, Hatchery and Conservation Engineering personnel worked with WWC Engineering and Wild Fish Engineering to reconstruct the dam and improve passage by adult trout over the structure. North State Environmental completed the reconstruction of the dam during April.

Figure 170. *Upstream view of the new grouted dam and fishway structure at the Meade Coffeen Crossover Diversion on South Piney Creek.*

Sheridan Region Mule Deer Legume Seeding (Goal 2) - Todd Caltrider

A total of 140 acres of alfalfa were planted in spring 2019 in Crook County on the McDonald and Jolley Ranches. The plantings will provide high quality forage for mule deer. This project was funded in part through the statewide WGFD Shrub, Grass, and Legume Seeding Program.

Little Missouri River Fish Passage Inventory (Goals 1 and 2) - Travis Cundy and Erin Sobel

The Little Missouri River is home to several fishes of greatest conservation need including Plains Minnow, Western Silvery Minnow and Goldeye. Aquatic habitat and fish passage personnel conducted a fish passage inventory to document obstructions to stream connectivity in the drainage. Twenty-three survey sites were entered in the fish passage database. Partial or complete obstructions to connectivity were identified at four sites. Most obstructions involved culvert crossings along roads.

Figure 171. *Culvert crossing on the Little Missouri River Road that obstructs fish passage in Sage Creek.*

Northeast Wyoming Salt Cedar Removal (Goal 2) - Todd Caltrider

Salt cedar (Tamarix spp.) is a highly invasive plant that is gaining a foothold in the Powder River drainage. Salt cedar removal started in the upper Powder River Basin in Johnson County. Since 2007, Johnson County Weed & Pest District has removed a total of 3,350 acres of salt cedar between Kaycee, WY and the Sheridan county line through a mixture of mechanical mowing and chemical herbicide treatments. In conjunction with Johnson County, Sheridan County Weed and Pest District began salt cedar removal in 2010. Salt cedar density increases greatly downstream of Johnson County. Due to limited funding and increasing density of Salt cedar farther downstream on the Powder River, the Sheridan County Weed & Pest has been limited in the number of acres of salt cedar removal that can be completed each year. In 2018, WGFD partnered with the Sheridan County Weed & Pest to seek grant funding to treat more acres per year. With increased funding, it is anticipated that salt cedar removal can be completed on the Powder River in 10 years. During winter 2019, 285 acres of salt cedar were removed. Additional acres are planned for treatment during winter 2020. Funding was provided by the NWTF, WGFD, WWNRT, and the Sheridan County Weed & Pest.

Figure 172. *Salt cedar mastication and herbicide treatment along the Powder River, Sheridan County.*

Figure 173. *Sheridan County Weed & Pest removing salt cedar.*

Sheridan Region PAAs (Goals 1 and 3) - Brad Sorensen and Seth Roseberry

Figure 174. *Muddy Guard PAA road maintenance.*

Habitat and Access personnel performed annual maintenance and monitoring of Sheridan Region PAAs. PAAs serve as critical recreational areas for the general public and sportsmen alike. Consequently, yearly maintenance and upgrades are necessary to preserve these habitats and PAA infrastructure. All public access boundary fences were maintained and signed to protect Commission property rights and protect habitat. Vandalized and weathered signs were replaced or ordered. Noxious weed spraying occurred where weeds were present. In regards to infrastructure, access roads, parking lots, and public facilities at these sites were maintained as needed, and maintenance contracts were fulfilled on the Tongue River Canyon and Sand Creek PAAs.

Sand Creek PAA Grazing (Goals 2 and 3) - Brad Sorensen and Seth Roseberry

A spring grazing treatment was conducted on the Sand Creek PAA in 2019 to manage noxious weeds; this is the 5th year of this agreement. Spring grazing in conjunction with a summer herbicide treatment helps to manage noxious weeds and facilitate growing opportunities for preferred plant species. This treatment encompassed a high-intensity, short duration approach of 142 AUMs for approximately 11 days. This treatment will reduce litter and stimulate growth on the PAA. It will also assist Habitat and Access personnel in the management and reduction of noxious weeds. In exchange for grazing, the neighboring ranch allows 2.5 miles of public fishing access. While fitting into the cooperators seasonal grazing plan, this grazing exchange is a great example of the many beneficial partnerships WGFD fosters with private landowners.

Figure 175. *Sand Creek PAA grazing.*

Sheep Creek Fire Restoration Invasive Annual Grass Treatment (Goals 1 and 2) - Brad Sorensen and Seth Roseberry

The Sheep Creek Wildfire started in August 2015 brought concern of habitat loss by the invasion of invasive annual grasses, specifically cheatgrass. Funding was provided by a variety of partners to protect the vulnerable native habitats from becoming infested with invasive annual grasses. Through the next four years annual treatments were conducted to manage invasive weeds threatening this crucial habitat. In 2019, the final funding for the Sheep Creek Fire Restoration Project was expended on invasive annual grass treatment, ventenata specifically, through aerial and ATV application; 144 acres were treated. Future treatments and funding options are currently in the planning process so WGFD and partners can continue invasive grass management in the area.

Sheridan Region Noxious Weed Control (Goals 1 and 2) - Brad Sorensen and Seth Roseberry

Approximately 120 acres of invasive plants were treated by Habitat and Access personnel and contractors on WGFC managed properties in 2019. These invasive plants were treated using chemical, mechanical, and biological methods to stress the plants. Controlling these noxious plants will enhance habitat while allowing native plants to thrive.

Figure 176. *Sheridan region noxious weed treatment.*

Sheridan Region WHMAs (Goals 1 and 2) - Brad Sorensen and Seth Roseberry

Annual maintenance and improvements continued on the four WHMAs in the Sheridan Region in 2019. The Kerns, Amsden, Bud Love and Ed O. Taylor WHMAs received annual fence maintenance on a total of 64 miles to reduce trespass livestock and minimize wildlife conflicts with private landowners. 104 acres of irrigation water rights were spread on the Amsden and Bud Love WHMAs. Annual parking lot and road maintenance was also performed by Habitat and Access personnel. In sum, over 20,000 acres of WGFC managed property rights were monitored. Approximately 120 acres of noxious weeds were also treated by WGFD personnel and contract applicators.

Figure 177. *Irrigation on Sheridan WHMAs.*

Figure 178. *Fence repairs on Sheridan WHMAs.*

Southern Bighorn Mountains Curl-leaf Mountain Mahogany Restoration (Goal 2) - Todd Caltrider

The Southern Big Horn Mountains Curl-leaf Mahogany Restoration project is a long term effort initiated by the WGFD and the BLM. This project was started in 2011 as a response to the Outlaw Cave fire in 2006, where 815 acres of curl-leaf mountain mahogany stands were lost due to wildfire. Although wildfire is a natural part of the ecosystem, increased conifer encroachment in curl-leaf mountain mahogany stands increased the ability of wildfire to effectively burn and kill large stands of curl-leaf mountain mahogany. Following the fire, there has been regeneration of curl-leaf mountain mahogany, but recruitment is slow and sparse in density compared to the original stands. Curl-leaf

mountain mahogany provides crucial winter forage for mule deer within the Middle Fork Powder River Management Area. Protecting curl-leaf mountain mahogany stands from catastrophic wildfires is critical to protecting mule deer winter forage resources in the southern Bighorn Mountains. Since 2011, a total of 3,542 acres of mountain mahogany habitat has been treated by removing conifer encroachment in the southern Bighorn Mountains by both the BLM and WGFD. Conifers have been mechanically removed by chainsaw hand crews. This project is a continuation of past efforts to reduce fuel loads in curl-leaf mountain mahogany stands. During summer 2018, the BLM Worland fuels crew removed 256 acres of conifer encroachment along the Slip Road area. In summer 2019, WGFD hired contractors to remove conifers from 532 acres of curl-leaf mountain mahogany on the south end of Gardner Mountain. Additional conifer removal is planned on Gardner Mountain and the adjacent EK Mountain in 2020. This project was made possible by contributions from WSG, WWNRT, WGFD MDI, BLM, and WGBGLC.

Figure 179. *Contractors removing conifers from curl-leaf mountain mahogany stands on south Gardner Mountain..*

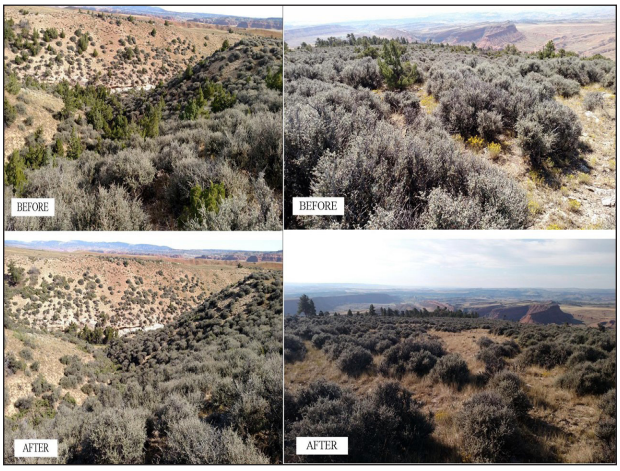


Figure 180. *Pre and post conifer removal in curl-leaf mountain mahogany stands.*

Southern Johnson County I-25 Wildlife Fencing and Connectivity (Goal 5) - Todd Caltrider

Figure 181. *Mule deer utilizing existing below grade structures along I-25 between Kaycee and Buffalo, WY.*

WGFD and WYDOT have been collaborating on research to assess the effects of installing game proof fencing on big game movement patterns across I-25 between Kaycee and Buffalo. Mule deer mortality due to vehicle collisions on I-25 between Kaycee and Buffalo is one of the highest in the state and a high priority for mitigation as identified by the public during the Upper Powder River MDI public input meetings. To assess the potential effects of game proof fencing along I-25 on big game movement patterns, a Before-After-Control-Impact study design was developed by the Western Transportation Institute. This study will look at big game movements along I-25 for the next five years. Trail cameras will be installed at existing below grade structures currently used by big game to monitor movements. The study will monitor big game movements before game proof fencing is installed and then after to see if there is any change in big game movements

as result of the fencing. This spring, 23 trail cameras were installed along I-25 to collect preliminary data. The study began January 2019 and continues through 2023, if funding can be obtained for wildlife fencing along I-25. Funding was provided by the BLM.

Spring Creek Grazing Association Rangeland Improvements (Goals 2 and 5) - Todd Caltrider

Figure 182. *Well and water tank installed on the Spring Creek Grazing Association.*

This project is to assist the Spring Creek Grazing Association (SGCA) with rangeland improvements to facilitate better grazing management and improve wildlife habitat and connectivity in Thunder Basin National Grasslands (TBNG). The SGCA is a collaborative of private landowners in the Spring Creek drainage that lease USFS land northeast of Gillette, WY. The Spring Creek portion of the TBNG lies in the Gillette Sage Grouse Core Area and Connectivity Area. In addition to providing valuable habitat for sage grouse, this area also hosts large numbers of big game animals and is a popular hunting area. Activities include providing cost share to the SGCA for livestock water development and associated pipelines and materials for building new wildlife friendly cross fences. With the addition of supplementary livestock water facilities and cross fencing, permitees can better manage livestock grazing in their pastures and address problem areas that were previously over utilized. Decreasing utilization on highly productive areas, such as mesic draws, will benefit wildlife by increasing hiding cover and increasing production of forage available for wildlife. Other activities include assisting the SGCA with retrofitting existing woven wire fences to a wildlife friendly four wire fence design. This will increase habitat connectivity for a variety of wildlife species, especially big game. During summer 2019, one water well was drilled, one livestock watering tank was installed, 3,744 feet of cross fencing was constructed, and 4.58 miles of existing fence was modified to a wildlife friendly design. Funding was provided by BLM, NFWF, USFWS PFW, and WGFD. Work will continue in 2020 and 2021.

Tongue River Canyon Cave Bat Gate (Goals 1 and 5) - Seth Roseberry

Figure 183. *Tongue River Canyon Cave bat gate.*

Through a cooperative project between USFS and WGFD, efforts were made to protect hibernating bat populations in the Tongue River Canyon Cave. A new bat friendly gate was installed in the cave opening in 2018 to prevent un-permitted access. In 2019, we assisted the USFS and the WGFD Non-Game Section with maintenance and repairs to the Tongue River Canyon Cave bat gate on an as-needed basis.

Tongue River Corridor Rehabilitation (Goal 2) - Travis Cundy

Figure 184. *Before and after views of the Tongue River rehabilitation.*

Stream and riparian floodplain rehabilitation was completed along a reach of the Tongue River upstream of the Highway 14 Bridge in Dayton, WY. The Sheridan County Conservation District led the effort. Other partners included TNC, WDA, Wyoming Department of Environmental Quality, WWNRT, Sheridan County, the Town of Dayton, NRCS and private donors. Sixteen landowners own property along the reach. Rehabilitation included grading elevations along 1,725 feet of river channel and floodplain, and installing three constructed riffles, five J-hook vanes and about 500 feet of toe wood revetment. The purpose was to define the low flow channel and reduce the overall width of the channel course, reestablish riffle to pool sequences that were eliminated during past channelization efforts, stabilize eroding streambanks, and increase instream and riparian cover available to hold trout. Defining the low flow channel or inner berm feature and reducing the overall width of the channel course will help route sediment during high flows and eliminate sediment accumulation along the reach. Reestablishing riffle to pool sequencing will increase pools available to dissipate the energy of high flows and provide cover for fish. Reducing eroding streambanks with J-hook vanes and floodplain benches with toe wood revetments will increase riparian floodplain plant communities with dense root systems, protect property values and improve cover for fish.

Upper Powder River Aspen (Goal 2) - Todd Caltrider

Aspen communities are highly productive habitats that provide ample forage and cover for mule deer and a variety of wildlife species. Like many areas throughout the west, aspen communities are threatened by many different factors such as climate change, over-browsing, and lack of disturbance. This project is focusing on improving aspen forests located in spring, summer, and fall seasonal range in the Upper Powder River Mule Deer Herd Unit. A large portion of the mule deer in this herd unit migrate to upper elevations in the Bighorn Mountains during the spring, summer and fall seasons to capitalize on the productive vegetation that occurs here. Currently, aspen stands in the Upper Powder River appear to be older age class and recruitment is struggling to reach maturity due to excessive ungulate herbivory and increased conifer shading. In order to perpetuate aspen communities on the landscape, action must be taken to reduce conifer encroachment and shading and decrease ungulate herbivory.

Figure 185. *Conifer removal in aspen stand with jackstraw slash treatment.*

The majority of the aspen stands in the Upper Powder River Mule Deer Herd Unit are located just off the Hazelton road in the north portion of the herd unit. Land ownership is a mixture of state, BLM and private land and some of the largest aspen stands in the southern Bighorn Mountains can be found here. This project is a cooperative effort between Wyoming State Forestry and private landowners to enhance and perpetuate aspen stands into the future. Conifer encroachment will be removed from aspen stands and slash will be managed to reduce ungulate herbivory (i. e. jackstrawing, coarse slash treatment, slash barriers). In 2019, 192 acres were completed. Additional acres are planned for treatment next year. Funding was provided by the WGFD MDI, RMEF, WGBGLC, and WWNRT.

West Pass Creek Yellowstone Cutthroat Trout Restoration (Goal 1) - Travis Cundy

A fish barrier was completed on West Pass Creek to prevent other trout species from moving upstream and mixing with Yellowstone cutthroat trout. The barrier secured six miles of stream corridor along the North and South forks, and main stem of West Pass Creek for the restoration of native Yellowstone cutthroat trout. Native trout currently persist only in the South Fork of West Pass Creek. Additional maintenance was completed on the temporary barrier located on the North Fork of West Pass Creek. This barrier was built in 2018 to help phase the removal and placement of native cutthroat trout in the watershed during the restoration efforts.

Figure 186. *Fish barrier located on West Pass Creek.*

Figure 187. *Temporary fish barrier located on the North Fork of West Pass Creek.*

WGFD would like to recognize Chelsea Ramage for her diligence in compiling the 2019 SHP.

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List of Acronyms

AHAB – Aquatic Habitat Biologist
AIPA – Area Improvement Project Agreement
AMA – Agricultural Management Assistance
AMP – Allotment Management Plan
AUM – Animal Unit Month
BDA – Beaver Dam Analogue
BEHI – Bank Erosion Hazard Index
BLM – Bureau of Land Management
BNF – Bighorn National Forest
BOR – Bureau of Reclamation
BOW – Bowhunters of Wyoming
BPS – Budget Planning System
BTNF – Bridger-Teton National Forest
CCRP – Continuous Conservation Reserve Program
CE – Conservation Easement
CMR – Cokeville Meadows Refuge
CRM – Coordinated Resource Management
CRP – Conservation Reserve Program
DU – Ducks Unlimited
EA – Environmental Assessment
EIS – Environmental Impact Statement
EQIP – Environmental Quality Incentive Program
FSA – Farm Services Agency
GIS – Geographic Information System
GPS – Global Positioning System
GTNP - Grand Teton National Park
GVID – Greybull Valley Irrigation District
I&E – Information and Education
JCWPD – Johnson County Weed and Pest District
JIO – Jonah Interagency Office
L-D – Live-Dead Index
LCWP – Lincoln County Weed and Pest
LDCD – Lake DeSmet Conservation District
LSRCD – Little Snake River Conservation District
MDF – Mule Deer Foundation
MDI – Mule Deer Initiative
MFF- Muley Fanatic Foundation
MIM – Multiple Indicator Monitoring
NEPA – National Environmental Policy Act
NER – National Elk Refuge
NRCS – Natural Resources Conservation Service
NWR – National Wildlife Refuge
NWTF – National Wild Turkey Federation
OSLI – Office of State Lands and Investments
PAA – Public Access Area
PAPA – Pinedale Anticline Project Area
PAPO – Pinedale Anticline Project Office
PIT – Passive Inductive Transducer
RHA – Rapid Habitat Assessments
RMEF – Rocky Mountain Elk Foundation
RMP – Resource Management Plan
SCCD – Sublette County Conservation District
SCWPD – Sublette County Weed and Pest District
SEO – State Engineers Office
SERCD – Saratoga-Encampment-Rawlins Conservation District
SGI – Sage Grouse Initiative
SHP – Strategic Habitat Plan
SDGFP – South Dakota Game, Fish, and Parks
TCD - Teton Conservation District
THB – Terrestrial Habitat Biologist
TNC – The Nature Conservancy
TSS – Teton Science School
TU – Trout Unlimited
UCCD – Uinta County Conservation District
UCWP – Uinta County Weed and Pest District
USDA-ARS – United States Department of Agriculture -Agriculture Research Service
USFS – US Forest Service
USFWS – US Fish and Wildlife Service
USGS – US Geological Survey
UW – University of Wyoming
WDA – Wyoming Department of Agriculture
WFW – Water For Wildlife Foundation
WGBGLC – Wyoming Governor's Big Game License Coalition
WGFC – Wyoming Game & Fish Commission
WGFD – Wyoming Game & Fish Department
WHAM – Watershed Habitat Assessment Methodology
WHMA – Wildlife Habitat Management Area
WIA – Walk-in Area
WID – Watershed Improvement District
WLCI – Wyoming Landscape Conservation Initiative
WMA – Wildlife Management Area
WRP – Wetland Reserve Program
WSA – Wilderness Study Area
WSG – Wyoming Sportsmans' Group
WSGALT – Wyoming Stock Growers Agricultural Land Trust
WWDC – Wyoming Water Development Commission
WWNRT – Wyoming Wildlife and Natural Resource Trust
WWSF – Wyoming Wild Sheep Foundation
WYDOT – Wyoming Department of Transportation