

2020 Annual Report Statewide Habitat Plan Accomplishments

Annual Report 2020

Statewide Habitat Plan



Wyoming Game and Fish Department

April 2021

*Conserving Wildlife
Serving People*

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

Message from the Director

In 2020, more than ever, people needed the Wyoming outdoors. Our state's unparalleled fishing, hunting and wildlife viewing opportunities offered people a piece of mind when many things in our world were uncertain. I'm proud that our outdoor spaces and wildlife are so comforting and abundant, and that is because of Wyoming's high-quality stewardship of land and water resources. 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 over \$3.3 million in funds for habitat projects and leveraged that for over \$9.6 million more from the Wyoming Wildlife Natural Resources Trust fund, federal government funds, state funds, private landowners and our local conservation partners. That's \$2.88 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 213 projects in 2020.

The way these funds are spent is determined by the Statewide Habitat Plan (SHP), and we just finalized the 2020 plan that will guide our work for the next 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 271 stream miles and over 712,896 acres of terrestrial habitats. Battling invasives is a priority of Game and Fish and I'm especially proud of the work to control and prevent the spread of invasive plants, like cheatgrass, treating a notable 85,186 acres. We will keep this work going; bettering wildlife habitat is part of our long game and these efforts take years to produce measurable results.

In this year's annual report we profiled one of our crucial project partners, USFWS Partners for Fish and Wildlife Program. Partners Program staff are frequently "partners" on aquatic stream restoration, fish passage, wetland development and other projects. Game and Fish has a long history of working with the Partners Program to benefit fish and wildlife across Wyoming. The Partners Program has identified focal areas throughout the state of Wyoming in their 2017-2021 Strategic Plan and they are in the process of updating that plan with input from collaborators like Game and Fish. In the last couple years, Partner's biologists have focused on work along the Bear River near Evanston where great gains have occurred in wetland, riparian and fish habitats. Projects throughout the watershed are truly team efforts involving roles for landowners, Trout Unlimited, the Uinta County Conservation District, Game and Fish, Wyoming Wildlife Natural Resource Trust, Water 4 Initiative under the Intermountain West Joint Venture and the Western Native Trout Initiative. Partners Program leadership has provided the vital spark to make substantial improvements to the Bear River that will benefit fisheries for generations to come.

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 protect crucial aquatic and terrestrial wildlife habitats.
- Goal 2. Restore aquatic and terrestrial wildlife habitats.
- Goal 3. Conserve, enhance, and protect fish and wildlife migrations.

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 2020 (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: **\$3,328,000**

- II. Non-WGFD funds expended for implementation of SHP goals for calendar year 2020 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: **\$9,595,000**

Grand Total for SHP Goals: \$ 12,923,000

WGFD applied funding from outside sources amounting to approximately \$2.88 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 \$9,661,000 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 57% 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: 5% for vehicles and heavy equipment and 38% for materials and supplies.

Personnel overseeing the WGFD Education, Information and Publications Programs spent approximately 12.5% of their time in 2020 on “habitat” activities totaling just under \$299,000 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 2020 totaled approximately \$748,000. During 2020, WGFD costs for leases totaled approximately \$157,600. 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 2020 are summarized below:

Activity	2020 Accomplishments	5 Year Average Accomplishments
BDAs installed	32	6
BDAs maintained	17	18
Beaver transplanted	30	12
Detailed stream assessments	22 on 2.8 miles	14 on 5 miles
Detailed stream channel and riparian monitoring	17 on 14 miles	13 on 6 miles
Fish barrier installed	1	1
Fish barriers inventoried	32	73
Fish passage structures installed	9	9
Fish passage structures maintained	8	12
Fish passage structures monitored	6	9
Fish passage upstream miles connected	70 miles	34 miles
Fish screens installed	1	1
Fish tracking or entrainment investigations	5	5
Instream flow segments	7 on 27 miles	1 on 5 miles
Instream flow studies	1	2
Instream structures installed	17	41
Post-stream project reach channel/riparian monitoring	14 miles	8 miles
Public Fishing Access projects	11	14
Riparian protection and management	6 on 1.6 miles	5 on 4 miles
Stream flow measurements	28	56
Stream restoration projects maintained	5	7
Stream restorations or bank enhancements	36 on 6 miles	12 on 3 miles
Stream temperature monitoring sites	32	19
Survey or design for stream restoration	15 on 4.8 miles	14 on 6 miles
Watershed stream assessments	11 on 137 miles	12 on 51 miles
Annual vegetation production utilization sites	0	37
Aspen Rapid Habitat Assessment	72; 4,501 acres	78; 4,721 acres
Aspen, cottonwood, willow browse monitoring	0	15
BLM, RMP, or USFS Cooperator Status	2	5
Conservation easements in progress and acquired	0	3 on 7,049 acres
Exclosures maintained	62	78

Activity	2020 Accomplishments	5 Year Average Accomplishments
Fences installed	74 miles	44 miles
Fences maintained	121 covering 182 miles	59 covering 336 miles
Funding applications prepared for other entities	15	24
Funding sources/ contracts/ grants administered	236	188
Group training and continuing education	16	9
Herbicide vegetation to thin sagebrush	487 acres	434 acres
Herbicide weed treatments	85,186 acres	45,502 acres
Land management plan participation	1	2
Livestock Grazing Management or Wildlife Habitat Stewardship Plans	9 on 161,365 acres	11 on 87,943 acres
Mechanical shrub treatments	905 acres	1,494 acres
Mowing, chopping, ripping, aerator treatments	5,058 acres	3,857 acres
Noxious weed control	456 acres	4,582 acres
Post-management prescription monitoring	7 on 31,709 acres	4 on 15,855 acres
Post-vegetation treatment monitoring	99 sites; 25,062 acres	149 sites; 92,887 acres
Pre-vegetation treatment monitoring	43 sites; 61,411 acres	59 sites; 41,865 acres
Prescribed burns	84 acres	1,520 acres
Private landowner contacts	211	385
Private landowner/ permittee contacts yielding projects	82	88
Rangeland Rapid Habitat Assessment	45; 9,160 acres	74; 31,026 acres
Riparian Rapid Habitat Assessment	12 on 474 acres	23 on 101 acres
Riparian research studies	6	Not previously tracked
Special Rapid Habitat Assessment	10; 4,286 acres	10; 3,179 acres
Spring developments	0	3
Technical assistance requests	80	106
Trees or shrubs planted	3,453 on 3,858 acres	22,112 on 2,195 acres
Upland exclosure developed	11	7
Upland grass, forb, and food plot seeding	884 acres	599 acres
USDA Farm Bill contract involvement	5	11
Upland habitat inventories (e.g. GIS)	18 on 71,119 acres	45 on 46,073 acres
Water guzzlers or water tanks installed	3	7
Water pipelines installed	3 miles	1.9 miles
Water wells converted to solar pumps	0	2
Water wells drilled	0	1
Wetland delineations	2 on 6 acres	6 on 27 acres
Wetland development and renovation	0	4 on 747 acres
Wildlife crossing assessment	2	Not previously tracked

Activity	2020 Accomplishments	5 Year Average Accomplishments
Wildlife crossing monitoring	5	Not previously tracked
Wildlife crossing structure installed	13	Not previously tracked
Wildlife field cooperative research projects	110	33
Feedgrounds maintained	19	18

Accomplishments on Wyoming Game and Fish Commission Owned Land

The Department accomplished the following metrics on Wyoming Game and Fish Commission owned land in 2020:

Activity	2020 Accomplishments	5 Year Average Accomplishments
Access improvements	7	Not previously tracked
Farming contracts	6 on 1,335 acres	5 on 1,493 acres
Fence maintained	72 on 255 miles	46 on 1,124 miles
Fences installed or converted	1 mile	8 miles
Food plot	6 on 247 acres	6 on 426 acres
Lands grazed	95,396 acres	86,007 acres
Irrigated	1,015 acres	4,206 acres
Irrigation upgrades	2 on 4,800 feet	14 on 5,900 feet
Livestock/forage reserve/ meadow rejuvenation grazing	19 on 108,119 acres	20 on 77,983 acres
Meadow enhancement	1 on 18 acres	4 on 12.5 acres
Meadow mowed/farmed	19 on 1,142 acres	9 on 1,609 acres
Noxious weed control	3,996 acres	3,437 acres
Prescribed burn	78 acres	72 acres
Property right monitoring	47 on 31,195 acres	54 on 77,497 acres
Road maintenance	83 on 129 miles	67 on 179 miles
Sign installation	184	145
Spring development	1	1
Water control structures	2	7
Weed treatments	98,332 acres	52,915 acres
Wells converted	1	Not previously tracked

Habitat Program Accomplishments: Acres and Miles

Miles of stream and riparian habitat and acres of riparian and upland habitat directly impacted by habitat work in 2020 are tallied below:

Stream and Riparian Activity	Stream Miles
Watershed stream assessments	136.6
Detailed stream assessments	2.8
Survey or design for passage or stream restoration	4.8
Stream restorations or bank enhancements	6.0
Beaver restoration	3.9
Beaver Dam Analogs	4.8
Instream flow filing segments	27.0
Fish passage upstream miles connected	69.7
Post-stream project channel/ riparian monitoring	14.10
Riparian protection and management	1.6
Total	271.3

Riparian and Upland Activity	Acres
Aspen Rapid Habitat Assessment	4,501
Aspen, cottonwood, willow browse monitoring	0
Conservation easements in process and acquired	0
Fee title acquisition	0
Herbicide vegetation to thin sagebrush	487
Herbicide weed treatments	85,186
Livestock grazing management plans or wildlife habitat stewardship plans	161,365
Mechanical shrub treatment	905
Mechanical tree removal	7,350
Mowing, chopping, and Lawson aerator treatments	5,058
Noxious weed control	456
Post management prescription monitoring	31,709
Post-vegetation treatment monitoring	25,062
Pre-vegetation treatment monitoring	61,411
Prescribed burns	84
Rangeland Rapid Habitat Assessments	9,160
Riparian habitat protection, enhancement, and management	1
Riparian Rapid Habitat Assessments	474
Special Rapid Habitat Assessments	4,286
Trees or shrubs planted	3,858
Upland enclosure developed	1
Upland grass, forb, and food plot seeding	884

Riparian and Upland Activity	Acres
Upland habitat assessment (e.g. GIS)	71,119
Wetland development or major renovation	0
WGFC managed lands farming contract	1,335
WGFC managed lands food plot	247
WGFC managed lands forage reserve	38,000
WGFC managed lands grazed	95,396
WGFC managed lands irrigated	1,015
WGFC managed lands meadow mowed/farmed	1,142
WGFC managed lands noxious weed control	3,996
WGFC managed lands weed treatment	98,332
WGFC managed lands prescribed burns	78
Total	712,898

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 2020. 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 2020 Amount	Approximate 2020 In-Kind Donation
Bighorn County Weed & Pest	\$5,000	
Bowhunters of Wyoming	\$12,500	
Bureau of Land Management	\$696,542	\$12,520
Clear Creek Conservation District	\$14,388	
Federal USDA Farm Bill Program Funds (NRCS and FSA)	\$419,491	\$1,500
Fremont County Fire Protection	\$107,331	
Fremont County Government	\$10,580	
Fremont County Weed and Pest	\$15,074	\$15,074
Jackson Hole One Fly	\$19,138	
Jonah Interagency Office	\$23,646	
Little Snake River Conservation District	\$27,539	
Mule Deer Foundation	\$25,500	
Muley Fanatic Foundation	\$43,025	
National Association of Conservation Districts	\$482	

National Fish and Wildlife Foundation	\$976,740	
National Park Service	\$5,000	
National Resources Conservation Service	\$334,657	\$5,760
National Wild Turkey Federation	\$2,500	
Northern Great Plains Joint Venture	\$15,000	
Park County Recreation Board	\$7,500	
Pheasants Forever	\$8,000	
Pinedale Anticline Project Office	\$837,538	\$162,280
Platte County Weed and Pest District	\$88,981	
Private donors	\$2,000	
Private landowners	\$387,229	\$119,860
Rocky Mountain Elk Foundation	\$172,332	
Saratoga-Encampment-Rawlins Conservation District	\$2,000	
Sheridan County Weed & Pest	\$55,666	
Snake River Fund	\$25,000	
Sublette County Conservation District		\$6,738
Sweetwater County Conservation District		\$10,229
Teton County Conservation District	\$63,122	
Teton County Weed and Pest District	\$66,713	\$9,230
The Nature Conservancy	\$10,312	
Trout Unlimited	\$28,975	\$2,900
Uinta County Weed and Pest	\$5,131	
Ultra Resources		\$2,800
US Department of Agriculture APHIS	\$27,740	
US Department of Interior SO 3362	\$487,907	
US Fish and Wildlife Service - Boating Access	\$69,598	
US Fish and Wildlife Service - Fish Passage	\$202,557	
US Fish and Wildlife Service - National Wildlife Refuge	\$10,000	
US Fish and Wildlife Service - Private Lands Protection	\$63,500	\$1,374
US Fish and Wildlife Service - State Wildlife Grants Program	\$2,411	
US Fish and Wildlife Service WNTI	\$35,000	
US Forest Service	\$793,414	\$110,099
Water for Wildlife Foundation	\$14,950	
Wyoming Department of Transportation	\$5,000	\$7,740
Wyoming DEQ 319	\$76,815	
Wyoming Governor's Big Game License Coalition	\$145,284	
Wyoming Landscape Conservation Initiative	\$136,755	\$676
Wyoming Office of State Lands and Investments	\$96,909	
Wyoming Outdoorsmen's Group	\$10,000	
Wyoming Sportsmen's Group	\$30,000	
Wyoming Water Development Commission	\$93,519	

Wyoming Wild Sheep Foundation	\$5,000	
Wyoming Wildlife and Natural Resources Trust Board	\$2,245,941	
Wyoming Wildlife Federation	\$59,927	
TOTAL	\$9,126,678	\$468,780
GRAND TOTAL	\$9,595,458	

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>.

2020 Partner Profile



We would like to offer special recognition for the USFWS Partners for Fish and Wildlife Program. This group is led by Mark Hogan out of Lander with additional staff in Laramie and Green River. Partners Program staff are frequently “partners” on aquatic stream restoration, fish passage, wetland development and other projects. The Wyoming Game and Fish Department has a long history of working with the Partners Program to benefit fish and wildlife across Wyoming.

The Partners Program has identified nine focal areas throughout the state of Wyoming in their 2017-2021 Strategic Plan. The areas are Bear River, Green River, Upper Sweetwater River/Red Desert, Wind River Reservation, Little Snake River/Upper North Platte River, Laramie Plains, Powder/Tongue rivers, Black Hills, and Goshen Hole. These areas do not preclude the Partners Program from working in other areas of the state. The Partners Program, working with Non-Government Organizations (Trout Unlimited, Ducks Unlimited, The Nature Conservancy, etc.) federal, state, and local governments, and private landowners has provided habitat for aquatic and terrestrial wildlife, some of which are on the endangered and threatened species list.

The partners program has improved habitat for the four native Cutthroat Trout species, Leatherside Chub, Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker, through riparian restoration and management, and river and stream restoration. In the last few years, Partners biologist David Kimble has spearheaded many improvement efforts on the Bear River near Evanston. This involves working with water users and landowners to improve irrigation infrastructure while improving fish passage. He

recently outlined an excellent plan to tackle several projects in the coming years like replacing traditional irrigation pushup dams in the Bear River with rock structures that Bonneville cutthroat trout and other fish species can easily navigate. Meanwhile, river restoration work is done to address eroding stream banks and improve riparian vegetation. Projects throughout the watershed are truly team efforts involving roles for landowners, Trout Unlimited, the Uinta County Conservation District, WGFD, and others. Other players with vital roles include the Wyoming Wildlife Natural Resource Trust, Water 4 Initiative under the Intermountain West Joint Venture, and the Western Native Trout Initiative. Partners Program leadership has provided the vital spark to make substantial improvements to the Bear River that will benefit fisheries for generations to come.

Often the Partners Program accomplishes habitat work through incentives with private landowners. Irrigation diversions are upgraded to improve water delivery to their crops and hay meadows. Fences are also upgraded or reconstructed to wildlife friendly fencing standards to benefit mule deer and other big game species along migration routes. Wetland obligate species, such as the Wyoming Toad, Trumpeter Swan, Curlews, White-faced Ibis, American Bittern, Sandhill Crane, American Avocet, Wilson's Phalarope and waterfowl also benefit from the efforts of the Partners Program, through wetland restoration, creation, and enhancements. The Partners Program has plugged irrigation ditches and diverted return flows to abandoned oxbows to increase wetland habitat, as well as many other techniques. Upland species like the Sage-grouse, Columbian sharp-tailed grouse, Mountain Plover, Pygmy Rabbit, Burrowing Owl, black tailed prairie dog, and black footed ferret also benefit from the Partners Program efforts to restore grasslands and help landowners with grazing management plans. The Partners Program has provided the vital spark to make substantial private land improvements for fish and wildlife populations that will benefit Wyomingites for generations to come.

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. An aquatic habitat project biologist under an annual contract worked for the section in Lander. Seasonal biologist technicians assisted the section out of the Laramie, Jackson, Cody, and Sheridan offices.

During calendar year 2020, the aquatic habitat section was involved in 41 projects involving funding from the WGFD Trust Fund, Department fish passage budget, the WWNRT, USFWS, WLCI and other sources. All services provided nearly \$2.1 million toward aquatic projects. Department aquatic habitat dollars spent on contracts or grants in calendar year 2020 totaled over \$779,000, down slightly from a record \$941,000 in 2019. These expenditure levels are higher than previous typical levels. This is partly due to construction activities on a few large projects. The various partners and their contributions toward these projects are highlighted in the regional sections of this report.

Section personnel plan, coordinate and develop habitat project funding applications throughout the year for efforts that may be 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, assessment, and monitoring habitat response to projects and providing habitat education and training. In 2020, Aquatic Habitat personnel assisted with the revision of the Statewide Habitat Plan.

The number of on-going aquatic habitat projects involving significant funding (41) 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. The 271 miles of habitat work logged on Wyoming’s rivers and creeks in 2020 represents the highest total since we’ve been actively tracking this measure (see Appendix 1 for information about how miles are summarized). Many (137) of these miles are from assessments (Watershed Habitat Assessment Methodology or WHAM surveys) on waterways contributing sediment to the Shoshone River. By identifying the highest sediment sources, projects can be developed to reduce those sources and ultimately benefit Shoshone River fisheries. Another benchmark was the nearly 70 miles of stream opened up for fish movement through work on Horse Creek, Salt Creek, Game Creek and elsewhere. The 27 miles of stream segments protected with instream flow water right applications help secure the future of Yellowstone Cutthroat Trout in the upper Wind River basin and is the first time we’ve completed instream flow filings in a few years. Finally, the total of six miles of stream restoration and bank work seems like a small number given the many miles of streams in the state, but this intensive and expensive work offers lasting improvements and wholesale functional benefits that improve fish and wildlife survival and productivity for generations. Details on these projects follow throughout the report.

Fish Passage Program

Bar BC Fish Passage (Goal 3) – Anna Senecal and Nick Scribner



Figure 1. *Bar BC channel enhancement.*

to enable species restoration and develop sport fisheries. The culvert connecting Bar BC to the Gros Ventre River was recently discovered to be a partial fish barrier. Only the largest of Snake River Cutthroat Trout are able to travel upstream through the culvert. Smaller size classes (i.e. younger fish) and other native, non-game fish are not able to access the tributary habitats. Levee maintenance increased the length of the culvert in 2019, making it even more difficult for fish to navigate. This was the impetus for replacing the undersized culvert with one sized to maintain water velocities navigable by the full

Bar BC Spring Creek is an important cutthroat trout spawning tributary to the Gros Ventre River. It has been intensively monitored via redd counts and utilized for fish management purposes since the 1960s. For example, for many years eggs and most recently milt have been collected to supplement Snake River Cutthroat Trout brood stock with native genetics. Annual trends in Bar BC cutthroat spawning productivity inform management decisions on spring creeks throughout the Snake River Valley. The Snake River Cutthroat Trout brood stock is of great conservation value in that it is the main brood stock for this subspecies. Eyed eggs from this brood stock are traded across state lines



Figure 2. *Bar BC culvert replacement looking upstream.*

suite of fish species and size classes native to Bar BC Spring Creek.

The work was led by Trout Unlimited with funding, monitoring and technical support from the Department. Construction was completed during fall and winter 2019-2020. Continued monitoring will shed light on the impacts of this work and the importance of the spawning tributary.

Game Creek Fish Screen (Goal 3) – Anna Senecal and Nick Scribner

Game Creek is located about six miles south of Jackson and provides important spawning and juvenile rearing habitat for Snake River Cutthroat Trout. Recent improvements to the Highway 89 crossing were completed by WYDOT in 2018 that dramatically improved conditions for upstream fish passage. Given that Snake River fish could now access the stream, obstacles further upstream warranted attention. An irrigation diversion operated by WGFD personnel is located less than a mile upstream of Highway 89 on USFS land that provides irrigation water to lands within South Park WHMA. In fall 2020, the diversion had several improvements added including a headgate with trashrack, a fish screen, and an in-stream rock structure. Prior to these additions, WGFD personnel had little control of flows within the ditch and during late season irrigation a majority of the stream flow would be diverted. This would entrain many fish including Snake River Cutthroat Trout that negatively impacts their population. With improved connectivity at Highway 89, reducing negative impacts from this lone irrigation diversion on Game Creek was a high WGFD priority. This work will ensure safe passage of fish year-round and reduce WGFD annual maintenance at the diversion.



Figure 3. *New Game Creek diversion and screen.*

Granite Supplemental Ditch Entrainment (Goal 3) – Anna Senecal and Nick Scribner

Entrainment sampling occurred in 2019 and 2020 on Granite Supplemental Ditch located in Grand Teton National Park near Teton Village. This large canal diverts nearly 400 cfs from the Snake River and supplements late season flows into Lake Creek and Granite Creek. Trout Unlimited, National Park Service, and WGFD personnel initiated entrainment sampling of this ditch in 2019 and expanded efforts significantly in 2020. During 2020, all flows coming into the canal passed through trap nets for 24-48 consecutive hours per week throughout the irrigation season. Nets were pulled every one to three hours depending on debris and all fish were recorded. Nearly 8,000 fish were documented in 2020 with Snake River Cutthroat Trout, Mountain Whitefish, and Dace being the most abundant species entrained. Extrapolating out over the entire irrigation season, there may be 50,000-70,000 fish a year becoming entrained. Though there may be opportunities for these fish to eventually make it over to Fish Creek via Lake Creek or Granite Creek, it's highly unlikely due to several irrigation diversions downstream and Lake and Granite creeks go to subsurface flow once irrigation water is turned off. Escaping back upstream into the Snake River is almost impossible due to high velocities and the three perched cul-

verts. Work will begin in fall 2021 to rehab the inlet to improve conditions for water users and fish. The three, four foot diameter round culverts will be removed and replaced with three, eight foot wide concrete open channel bays. Furthermore, the invert of the inlet will be dropped by two feet and the ditch regraded to reduce the dike length needed in the Snake River to bring water to the headgate. This will reduce maintenance and improve conditions for fish to move back into the Snake River from the ditch.

Horse Creek WHMA Fish Passage (Goal 3) – Anna Senecal and Nick Scribner

Construction began in September 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. Construction crews worked from late September through the end of November and completed 80% of the work. The six foot culvert was removed and replaced with a bottomless aluminum arch, 20 feet long by 24 feet wide. Aluminum wingwalls and headwalls were installed that tie the culvert to the irrigation headworks. A new headgate, trash rack, and sluiceway were installed for irrigation. A roughened ramp approximately 125 foot long was built within the channel using a mixture of large boulders, cobbles, and existing native streambed material. Final items to be completed in spring 2021 include grouting the upper portion of the rock ramp and irrigation sluiceway, removal of the existing three foot culvert, installation of a toe-wood bank, seeding and willow plantings, and removal of the coffer dam to put water back into the newly built channel.



Figure 4. Looking downstream at bottomless arch crossing and rock ramp.

The rock ramp will maintain channel elevations needed to provide irrigation water to 53 acres on the WHMA and removes a long time fish barrier. The wider culvert and reconfiguration of the irrigation infrastructure will reduce annual maintenance for department personnel and withstand large runoff events that had put the previous structure at risk for failure.

Numerous partners contributed funding and technical support including the WWNRT, USFS, Snake River Fund, Teton Conservation District, WWDC, WFW, RMEF, and USFWS.

North Laramie River Passage Inventory (Goal 3) – Nick Scribner

The North Laramie River is an important drainage for native prairie fish, especially Hornyhead Chub. Passage inventory work has been completed over the past two years at 31 different sites. Work in 2019 focused on irrigation diversions (12 sites) in the lower part of the drainage. Engineering work is underway at three of those sites to address fish passage and reduce the threat of Smallmouth Bass colonization. Installation of those designs is anticipated in 2021. Inventory work in 2020 focused on road crossings with 19 different sites visited. Ten of those sites had detailed information collected and sev-

eral were determined to be candidates for improvements to assist fish passage. Upstream passage is unlikely to occur except at low flows for larger fish due to long culverts and high stream velocities. Several of the structures are concrete or in adequate condition, so complete replacement is not recommended. Installation of baffles to create resting pools and slower stream velocities are a potential solution to improve passage at significantly reduced costs compared to structure replacement. Work will continue in 2021 to conduct additional inventory work and install baffles to improve fish passage.



Figure 5. *Irrigation diversion considered passable by most fish.*

Pitchfork Ranch Entrainment Study (Goal 3) – Erin Leonetti



Figure 6. *Entrainment net in the Greybull Ditch.*

The Pitchfork Ranch is located west of Meeteetse, WY in the Greybull River drainage, a stronghold for Yellowstone Cutthroat Trout. The ranch has many irrigation diversions that are known to entrain fish during the irrigation season (April through October). In 2020, entrainment studies were initiated on the Greybull, Jevon, and Pitchfork Ditches to estimate entrainment of all fish species, especially Yellowstone Cutthroat Trout, to determine if fish screens are warranted.

The Greybull and Jevon Ditches divert water from the Greybull River and the Pitchfork Ditch diverts from Pickett Creek. All of the ditches are upstream from the Upper Sunshine diversion and fish ladder. Entrainment

nets were set in Greybull, Pitchfork and Jevon ditch for 50, 46 and 42 hours respectively. Twenty-one fish were entrained in all ditches sampled but data are too limited to draw any conclusions at this time. Sampling will continue in 2021.

Spread Creek Fish Passage (Goal 3) – Anna Senecal and Nick Scribner

Spread Creek is a Snake River tributary that supports not only Snake River Cutthroat Trout, but also Bluehead Sucker. An irrigation diversion on the creek, which is jointly managed by the National Park Service, National Forest Service, and a private landowner has been the focus of management efforts for over a decade. The original structure, a low-head dam, was a barrier to upstream fish passage and was removed by TU in 2010. Since that time, unfortunately, entrainment of native and sensitive fish into

the irrigation canal has been documented. Additionally, grade and water control structures installed to retrofit the original dam have not been durable. As a result, additional efforts spearheaded by TU are underway to reconstruct a diversion structure that will reduce or eliminate entrainment and be able to withstand the harsh and unstable conditions of Spread Creek.

Entrainment information is derived from salvage operations conducted once per year following irrigation season. Since salvage operations began in 2012, over 1,000 Snake River Cutthroat Trout and over 100 Bluehead Sucker have been removed from the ditch. These numbers do not represent the total fish lost to entrainment, as the ditch is sampled only once per year. Rather, these data are a snapshot and indicate high fish loss.



Figure 7. *Spread Creek canyon upstream of diversion structure.*

In 2020, TU and project partners worked to assemble funds and refine designs toward adding a screen and stabilizing the channel. The proposed design will improve vertical channel stability and reduce bank erosion. Excessive aggradation and bank erosion, coupled with annual in-channel manipulation to maintain desired diversion flow volumes, have created an extremely unstable site. Downcutting and lateral channel migration threaten the function of the diversion, its access road, and local aquatic habitats. The complexity of the site necessitates a complex engineering solution to stabilize the stream channel. Extensive grade control and bank protection are necessary to provide sediment transport and channel stability necessary for the irrigation and fish screen to function properly. A corrugated horizontal panel screen will be installed. Construction is slated for fall and winter of 2021 - 2022.

Sunshine WHMA - Dick Creek Barrier (Goal 1) – Brad Sorensen, Erin Leonetti

The Sunshine WHMA has a water right for 12.82 cfs from a diversion located on private land on Dick Creek. The current Dick Creek diversion dam was installed in the 1990's. Since 2002, a large headcut has formed downstream of the diversion resulting in an eight foot bed elevation difference and a high risk of failure. If this occurs, Sunshine WHMA will not receive water and Brook Trout will have access to upstream habitat into a core conservation population of Yellowstone Cutthroat Trout. Great West Engineering out of Montana is designing a permanent fish barrier and diversion to prevent the upstream migra-



Figure 8. *Dick Creek diversion dam. The dam continues to decline after the 2020 runoff and irrigation season.*

tion of Brook Trout and improve the water delivery system to Sunshine WHMA. A design approach was identified in December 2018, but Great Western Engineering was requested to put the design process on hold due to easement concerns with private landowners. Since 2018, we have received one cooperative agreement and are still working on the other. Great West Engineering was requested to start design again and delivered 60% designs in December 2020. Final designs are on hold again until further notice. Funding partners include WGBGLC and RMEF. Work in 2021 will focus on finalizing a cooperative agreement, potentially fundraising, completing 100% designs, and permitting.

Timber Creek Yellowstone Cutthroat Trout Movement Study (Goal 3) - Erin Leonetti

Timber Creek is a tributary to the Greybull River located west of Meeteetse. 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 to reduce entrainment in irrigation canals. The last completed fish passage project on Timber Creek consolidated four irrigation diversions into one and screened the irrigation diversion to prevent the entrainment of fish down the canal. The previous four points of diversion pulled water out of Timber Creek by using drop boards



Figure 9. *The most downstream antenna on Timber Creek, near the confluence with the Greybull River.*

in concrete boxes located within the stream channel, which were passage barriers. Concrete boxes were left in place, but drop boards were removed and instream rock cross vanes were added downstream of all concrete boxes to assist with upstream passage for all aquatic organisms. These 2014 modifications made Timber Creek free of fish barriers.

The overall monitoring goal is to determine the effectiveness of the rock cross vane fish passage structures in allowing Yellowstone Cutthroat Trout movement. This was done by identifying the proportion of tagged fish making it upstream past all four modified diversions and determining if fish from the Greybull River are migrating upstream in Timber Creek to spawn. We also estimated the proportion of tagged, resident fish emigrating below the most downstream antenna. To track fish, we installed solar powered PIT tag readers, and antennas in spring 2018 in Timber Creek. Tagging began in 2017 with a weir trap and backpack electrofishing to capture and implant a PIT tag into the peritoneal cavity of fish greater than or equal to five inches. Sampling continued in 2018, 2019 and finished in 2020.

A total of 1,530 fish were sampled over the four field seasons with 818 fish implanted with a PIT tag. Over the last three years only 20% of the tagged fish have been detected by one or more of the antennae. Of that 20% less than 1% have swam upstream from the confluence and past the most upstream antenna and only 0.5% have emigrated. Therefore, fish do not appear to be migrating in substantial numbers from the Greybull River upstream to Timber Creek. Similarly, substantial numbers are not leaving.

Overall, 80 individual fish were detected by one or more antennas in 2020. The majority of fish detected were Yellowstone Cutthroat Trout tagged in 2020. All readers detected fish between May and October. Most movements occurred during May and June when fish would be migrating upstream to spawn. Few fish were detected during the warmer and lower water months. This could be because the fish are staying higher in Timber Creek where there is more water and cooler temperatures than below the irrigation diversion where water is being diverted. Below the diversion the creek is lower and temperature is warmer creating less suitable habitat for fish. There were no antenna detections in August, but several fish were detected again in September when fish are likely moving downstream. Work in 2021 will be the final year of monitoring fish movements.

Tribasin Fish Passage (Goal 3) - Anna Senecal and Nick Scribner

The Tribasin Fish Passage project was a collaboration to protect, reconnect, and restore streams on USFS lands associated with a commercial timber sale and its access routes. The Tribasin project area lies at the headwaters of three basins and encompasses three native cutthroat trout species distributions (Snake River, Bonneville, and Colorado River Cutthroat Trout). The majority of the timber sale (250 acres) is located in the Greys River drainage, in the Snake River watershed, whereas the primary access route travels up the Smiths Fork drainage, in the Bear River watershed, as well as a short section in the LaBarge Creek drainage, in the Green River watershed.

Trout Unlimited, who was the project lead, and other partners replaced four undersized culverts with three larger culverts and one bridge in 2020 to reconnect over 21 miles of stream in the Greys River drainage. These improved crossings built upon work completed in fall 2018 that included approximately ten miles of regrading and recontouring of roads to improve drainage and reduce sedimentation in nearby waterways, and installation of three low water crossings and ten culverts. In addition, extensive road upgrades were also completed in fall 2018 to improve access for emergency resources associated with the Marten Creek Fire. This unplanned road work opportunistically improved drainage on an additional 15 miles of road and decreased sediment loading to an additional 16 miles of the Greys River. Surfacing material was augmented with gravel, road surfaces were re-graded, drainage ditches were cleaned out, and sections of the road in close proximity to the Greys River were stabilized.



Figure 10. *Before (left) and after (right) photos of the Shale Creek/ Greys River crossing.*

TU led the effort for this work that included contributions from USFS, USFWS, WGFD, WWNRT, local TU volunteers, Patagonia, Orvis, and the Trout and Salmon Foundation.

High Lonesome Ranch Fish Passage (Goal 3) - Nick Scribner



Figure 11. *Little Cottonwood Creek culvert after construction.*

South Cottonwood Creek supports a native population of Colorado Cutthroat Trout in the upper reaches of the drainage. Over the past several years WGFD has partnered with TU and USFS personnel to improve connectivity and inventory potential barriers and entrainment concerns. In 2020, work was completed at two sites on High Lonesome Ranch property that borders USFS and BLM lands. A ranch road culvert was replaced that crosses Little Cottonwood Creek just upstream of where it meets South Cottonwood Creek. This round culvert was perched nearly one foot, and spanned less than 50% of the bank-full width (12 feet). The replacement culvert is a squash culvert, approximately 13 feet

wide and ten feet tall. This new structure will improve sediment transport, stream stability, and fish passage to over 20 miles of stream habitat. Roughly four miles upstream on South Cottonwood Creek is another diversion called Fredel Ditch. This diversion was first improved in 2016 with the installation of two rock weirs that eliminated a two foot high pushup dam. A third rock weir was added in 2020 and maintenance completed on the lower weir installed in 2016. This work further reduced the elevation drop between structures to improve fish passage for more species and age classes compared to conditions after 2016 construction.

Habitat and Access Branch

The Habitat and Access Branch is responsible for managing WGFD lands. Our mission is to manage Commission lands to be the benchmarks for wildlife habitat while providing public access. The Habitat and Access Branch in 2020 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, Coder, Lovell, Laramie, and Saratoga, and numerous seasonal employees stationed across the state.

The Habitat and Access Branch manages 44 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 wetlands, 140 miles of ditches/drains, 5,100 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, 28 docks, 199 outhouses, and more than 10,000 signs are maintained.

During 2020, the branch also worked on other habitat development projects, including Mule Deer Initiative (MDI) projects, aeration, harrowing, mowing, meadow improvements, wetland developments and riparian projects. Grants provided projects with \$404,000 in on-the-ground expenditures, which is down from 2019 due to projects being completed and new ones in the design phase. These projects are highlighted in the regional sections of this report.

Statewide Habitat and Access

Beartooth Ranch PAA Road Improvement (Goal 2) - Brandon Werner, Brad Sorensen, Kade Clark, Rick Harmelink, and Todd Grosskopf

The Beartooth Ranch PAA area road was in extremely poor condition causing difficult or impossible access in periods of precipitation. The road also had large ruts and plugged culverts. The road was bladed, ditches shaped, culverts cleaned, and approximately six miles of gravel was added to improve public access.

Bush Draw Irrigation Upgrades (Goal 2) - Brandon Werner, Brad Sorensen, Eric Shorma, Kade Clark, Mac Foes, and Todd Grosskopf

An open irrigation ditch in bush draw on Yellowtail WHMA was converted into 15in irrigation pipe. The 1,030 foot pipeline was then buried. The irrigation pipe will increase water efficiency on the 85 acres it irrigates for wildlife.

Bud Love WHMA Sayles Reservoir No. 2 AgriDrain Installation (Goal 2) - Brandon Werner, Seth Roseberry, and Mac Foes

Bud Love Sayles Reservoir No.2 had a failed drain structure that required replacement for the reservoir to properly hold and manage water levels for fish, wildlife and irrigation. The new AgriDrain structure will allow the reservoir to be filled again and provide water level control to best manage for fisheries and irrigation. There are three reservoirs on Sayles Creek on the Bud Love WHMA, all three reservoirs play a key role in providing angling opportunities, maintain the riparian corridor for wildlife and provide stored water for an increased yield of standing forage meadows.



Figure 12. *AgriDrain installation on Sayles Reservoir No. 2.*

Bump Sullivan Reservoir Fish Habitat Improvement (Goal 2) - Brandon Werner, Mac Foos, and Steve Gale

Cottonwood trees that were cut down on the Springer/Bump Sullivan WHMA were cabled and weighed down with concrete blocks and placed in the reservoir using an excavator within rod and reel casting distance from shore. This increases shoreline habitat for Black Crappie and other game species in Bump Sullivan Reservoir. Increasing shoreline complexity can benefit all life stages of game fish present in the reservoir and will enable increased bank angling success.

Clark's Fork Hatchery Erosion Remediation Phase II (Goal 1) - Brandon Werner, Kade Clark, Rick Harmelink, Todd Grosskopf, Loren Woodin, and Darby Schock

Erosion and runoff have caused silting issues at spring box number three of the Clark's Fork Fish Hatchery. The spring provides crucial water to the raceways in the hatchery and facilities for the hatchery. Personnel used grading and ditching techniques to elevate the road and then the team installed corrugated metal pipe, rip-rap, native seed mix, and erosion control materials to divert snow runoff around the road to prevent the spring box from silting in.

Muddy Creek Wetland Dike Improvement (Goal 1) - Brandon Werner, Mac Foos, and Todd Grosskopf

The Muddy Creek Wetland complex is located north of Baggs. The complex is home to many different wetland flora and fauna. The wetland is made up of many marshes, and ponds. Water control structures placed on the dikes help regulate water levels. Originally, the dikes lacked proper wave erosion control, which could compromise the dikes resulting in loss of water and ultimately habitat. Matting and rip rap were placed along approximately 3,500 feet of dike to reduce wave erosion and reduce the risk of dike failure.



Figure 13. Muddy Creek Wetland complex.

Mule Creek Headgate Installation (Goal 2) - Brandon Werner, Jerry Cowles, Mac Foos, Todd Grosskopf, Loren Woodin, and Darby Schock

A concrete headgate was constructed to pull water out of Mule Creek located next to the Wick/Bueme WHMA. The headgate diverts water down a ditch irrigate an additional 400 acres of ungulate winter range. A cross vane structure was constructed for fish passage and habitat improvement in Mule Creek to mitigate native fish habitat disruption.



Figure 14. Mule Creek headgate.

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 approximately 500,000 acres of property rights including WHMAs, PAAs, conservation easements, and administrative facilities. The Lands Administration Branch consists of a branch chief located in Cheyenne and two lands coordinators located in Cheyenne and 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, conservation easements, and public access. The Gateway South transmission line project was presented and approved by the Commission traversing the Red-Rim Daley WHMA and Ft. Steele PAA.

The Lands Branch, partnering with Ducks Unlimited, Pheasants Forever, and the 2-Shot Goose Hunt, completed the acquisition of 344 acres of habitat and water rights that will be added to the Commission’s Springer Bump Sullivan WHMA.

The Lands Branch also completed the Raymond Mountain Public Access Area Acquisition, partnering with Rocky Mountain Elk Foundation and onX Maps. The project will provide a permanent access easement to the western slope of Raymond Mountain in the western portion of the state near Cokeville, WY. This easement provides access to over 30,000 acres of public land.

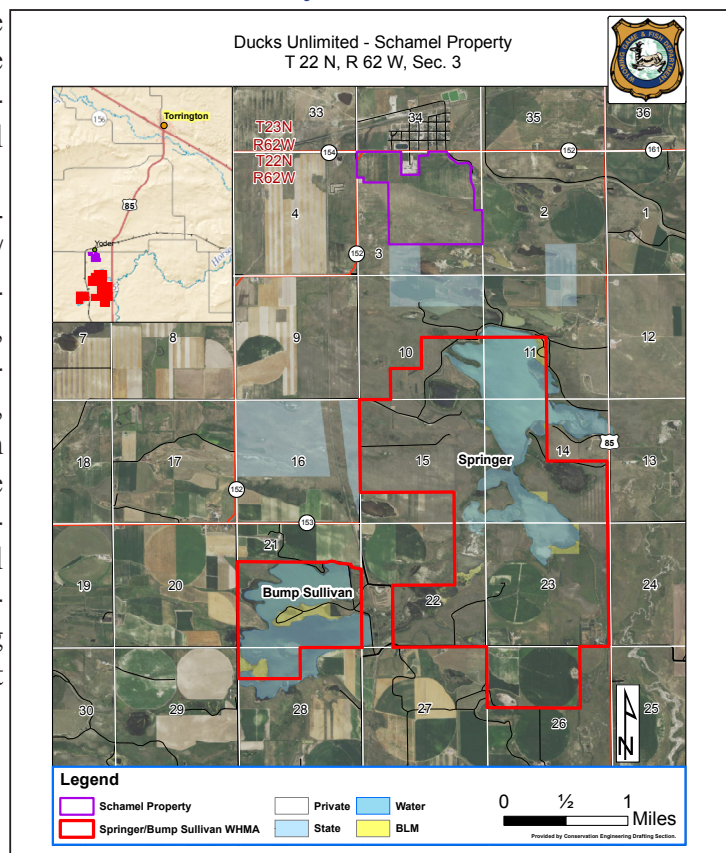
Branch personnel also spent a large portion of 2020 monitoring property rights and communicating lands issues with coworkers, state and federal agencies, and various non-governmental agencies including RMEF, TNC and others.

Springer Bump Sullivan WHMA Addition - Sean Bibbey

Ducks Unlimited was able to purchase the Schamel property in 2017 for a total purchase price of \$650,000, with the intention of conveying the property to the WGFC upon full reimbursement of the purchase price.

This acquisition perpetually conserves 344 acres that will become part of the Springer/Bump Sullivan WHMA. Potentially more important than the added acres to the WHMA, is the acquisition of the water rights associated with the subject property. Approximately, one third of the water rights associated with Bump Sullivan Reservoir, which is part of the Springer/Bump Sullivan WHMA, are connected to this property. This acquisition will not only increase acres of ground open to public use, but it will secure water rights, putting wildlife habitat and recreation as the highest priority.

Figure 15. Schamel Property.



Raymond Mountain PAA Acquisition - Sean Bibby

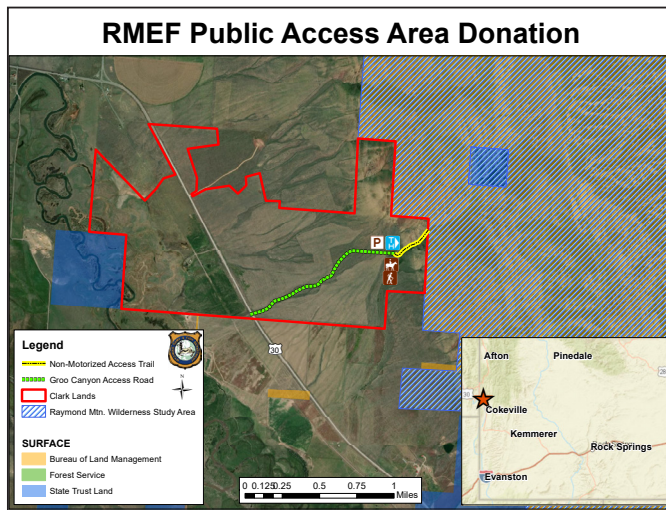


Figure 16. RMEF Public Access Area Donation

The WGFC accepted the donation of a permanent public access easement from RMEF that they were able to acquire from Mr. Kim Clark. The property separates the Groo Canyon access trail from US Highway 30 north of Cokeville, WY. This permanent easement to Groo Canyon trail provides access to over 30,000 acres of Bureau of Land Management property known as the Raymond Mountain Wilderness Study Area. This would create the only public access to the southern half of Raymond Mountain on the western side of the range.

This area has been identified by the Green River region as the highest priority for acquiring hunter access for elk, deer, moose, mountain lion, and black bears. Improved public hunting access for these species will improve the Department's ability to attain population management objectives along with improving hunter opportunity. This area is adjacent to the Idaho state line where elk population management has been particularly challenging due primarily to limited public access.

Terrestrial Habitat

The Statewide Terrestrial Habitat Program works to protect and actively enhance Wyoming's vast array of terrestrial habitats. The program is a component of the Bio Services section within the Wildlife Division and consists of the Terrestrial Habitat Program Manager and Office Manager stationed in Cheyenne and the Migratory Game Bird and Wetland Biologist located in Lander. In addition, the Terrestrial Habitat Program works closely with regional personnel to administer grants, contracts, agreements, and expenditures for all terrestrial habitat projects statewide.

During calendar year 2020, Terrestrial Habitat Program personnel were heavily involved with on-the-ground implementation, oversight or verification of expenditures on 93 projects concerning Game and Fish trust funds and funds granted to or from the WGFD from sources such as: WWNRT, various conservation organizations, local, county, state and federal agencies, conservation districts, weed and pest districts, private landowners, and others. These sources provided approximately \$7,936,000 toward on-the-ground expenditures for terrestrial projects.

The various partners and their contributions toward these projects 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 2020, Terrestrial Habitat personnel continued to implement a new inventory and assessment methodology for the WGFD. Rapid Habitat Assessments are a landscape level assessment that are used to

inform mule deer objective reviews as well as provide baseline data for habitat conditions statewide. A new implementation plan for Invasive Annual Grasses (IAGs), which is tied to the Department's Strategic plan, was jointly developed by Terrestrial Habitat personnel and others in the Department. In addition, new Commission funding for IAGs was awarded for on-the-ground projects. Terrestrial Habitat Program personnel worked with Aquatic and Services Division(s) to revise the Statewide Habitat Plan in 2020. 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 state agencies concerning wildlife habitat enhancement projects and large 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, pronghorn and mule deer) and routinely serve on various habitat-related committees.

Wyoming Landscape Conservation Initiative

The WGFD is a founding member of the Wyoming Landscape Conservation Initiative (WLCI), which began in 2007. The WLCI is instrumental to WGFD in its effort to assess and enhance aquatic and terrestrial habitats at a landscape scale in southwest Wyoming. Many of WLCI's accomplishments are a testament to its effective partnerships and local collaboration. In addition, the US Geological Survey supports WLCI by conducting science activities that help WGFD and other WLCI partners better understand fish and wildlife and their habitats.

In 2020, Wyoming's legislature recognized the accomplishments and importance of WLCI. In an effort to strengthen WLCI's funding capacity, they provided one million dollars, for two years (July 2020 - June 2022), to be administered through the WVNRT Board. These funds were matched with federal dollars from the BLM and USFWS. The WLCI Coordination Team has been working with the director of WVNRT and the WLCI Executive Committee to distribute the funds to partners improving habitats for fish and wildlife, while supporting both organization's missions and goals. Initially, the additional funds from the state were a challenge to align WLCI and WVNRT processes and schedules, but we successfully managed this during 2020. The WLCI is thankful for its partners' determination to see WLCI succeed in its mission.

The WLCI and its partners completed eight projects during 2020. The Red Desert to Hoback project converted 13 miles of fence to improve movement and migration of antelope and mule deer in Sublette County. The Little Snake Habitat Enhancement project completed 545 acres of juniper tree removal in sagebrush communities. The Red Rim Daley project was designed to maintain, enhance, and restore sagebrush communities within the WGFD's WHMA, by improving fences and providing alternate water sources away from Separation Creek. During 2020, the WGFD lead collaborated with the permittee and the BLM resource specialist to provide an alternate water source in the Shipping Pasture. Minor repairs were made to wells #1 and #3 while observing that previous fence modifications and well upgrades are functioning properly.

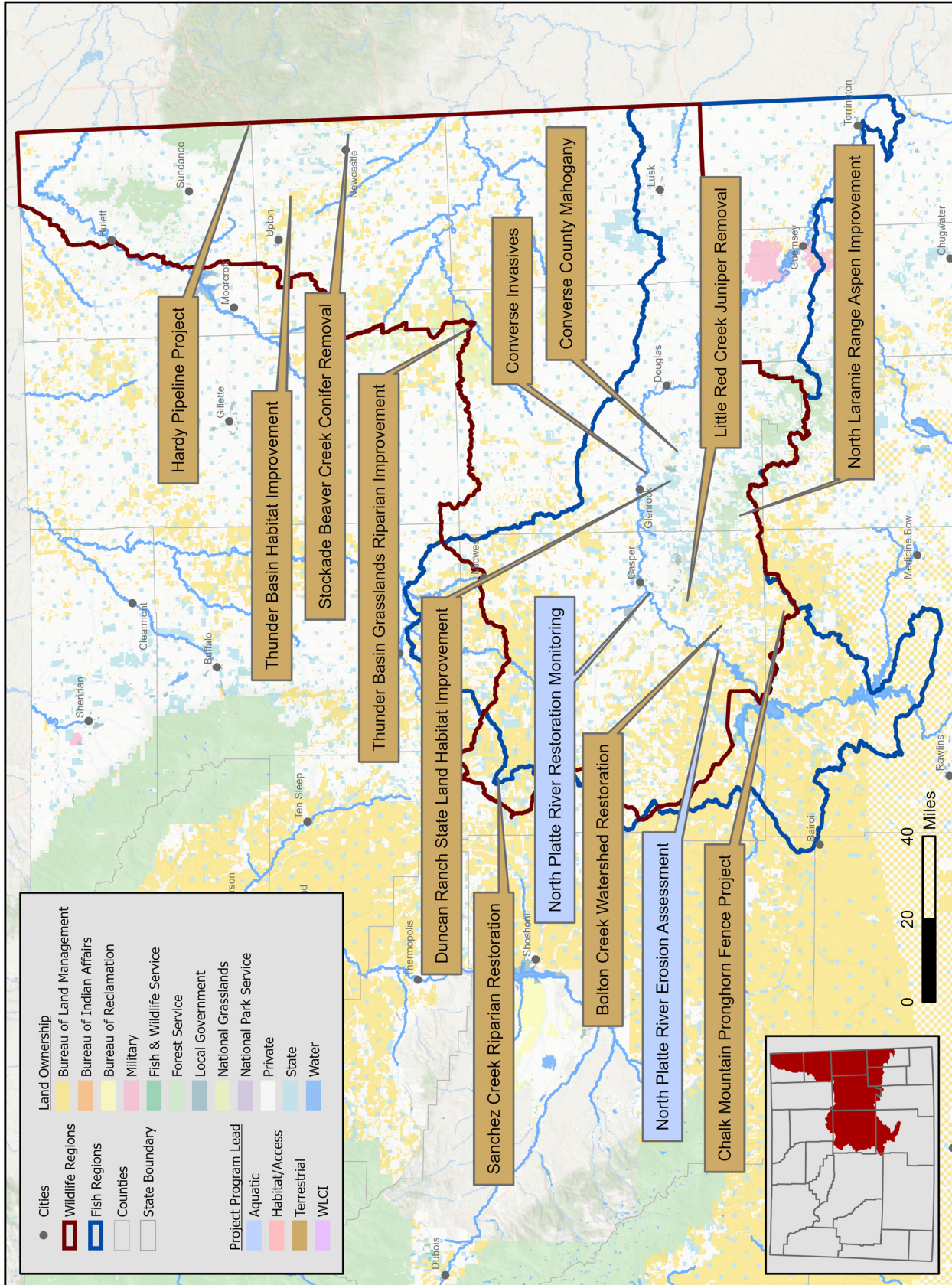
Three projects focusing on improving aquatic habitat and native fish distribution (Snake River and Colorado River Cutthroat Trout) were completed in 2020 or will finish in 2021. The three-phased En-

campment River project restored 800 feet of streambank to decrease erosion; an irrigation diversion was re-located upstream to a more stable location; and several instream structures were built to protect the streambanks and provide habitat for fish. The New Fork Gas Wells project moved forward with planning and design; a contractor was hired, and materials were hauled to the site. The first construction phase will be completed in spring 2021. The Swift Creek project in the Star Valley is restoring 800 feet of streambank on the lower portion of the creek. Construction began late in 2020 and will be completed in spring 2021.

Two projects focused on controlling invasive plants to restore ecosystem integrity and habitat connectivity. The Black's Fork Russian olive and Tamarisk Control project is working on the Muddy and Black's Fork drainages in Uinta, Lincoln, and Sweetwater counties. In 2020, the Uinta County Weed and Pest District treated approximately 38 acres of Russian olive and tamarisk, and 140 acres of perennial pepperweed, knapweed, thistles, etc. within a 26,805 acre area along the Black's Fork from Granger to Carter. The City of Green River Parks and Recreation Department purchased 18 trees and shrubs and planted them in June along the riparian greenbelt in Memorial Park between the Trona Bridge and the Highway 530 Bridge. These tree/shrub plantings focused on replacing the vertical/horizontal riparian structural habitat lost from the removal of larger Russian olive and tamarisk plants.

According to the reports received, the total WLCI funds expended on these eight projects was \$293,052 and partner contributions were \$773,300. This means that every dollar of WLCI funds involved \$2.64 from partners. The state's matching funds were not available for these eight projects during 2020 as anticipated. Members of WLCI Coordination Team, Executive Committee, and WWNRT are revising proposal deadlines and agreements to incorporate these funds into WLCI 2021 projects.

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 fence conversions.

Due to 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 removal projects in 2020.

The Casper Region continued work on Bolton Creek with the planting of approximately 1,900 native woody species and continued maintenance on 17 of the 25 BDAs. To mediate barriers to pronghorn movements, approximately 13 miles of woven wire pasture fence was converted to wildlife friendly fence. 4,320 feet of steel jack fencing was installed on Sanchez Creek to protect the riparian area from over grazing and an additional 5,000 feet is planned for 2021. Many areas of true mountain mahogany were mechanically treated to promote new leader growth and new plants.

The Casper Region continues to excel at relationships with multiple partners and funding sources. Partnerships with landowners, land management agencies, funding partners, local governments, sportsmen's groups, and NGOs are critical to these diverse projects or they would not be possible. The Wyoming Game and Fish Department also gives many thanks to the volunteers who were on the ground helping wildlife across the Casper Region.

Bolton Creek Watershed Restoration (Goal 2) - Matthew Pollock, Willow Bish, and John McCoy

Bolton Creek is a tributary to the North Platte River which contributes high levels of sediment. For many years, riparian habitat efforts have sought to reduce sedimentation and channel incision by employing channel plugs and BDAs. Bolton Creek efforts in 2020 included BDA maintenance and monitoring as well as riparian plantings. Where necessary, new untreated posts were added to BDAs and willows were re-wove around new posts. Willows were collected from Bolton Creek and nearby Bates Creek. Seventeen of the original 25 BDAs received maintenance. Monitoring efforts continued to document the efficacy of the structures. Prior to maintenance, photographs pointing upstream, downstream and across were taken at each structure. General observations about each structures condition were also noted. After repair, a longitudinal profile and cross-section survey were measured in the general area of a channel monitoring effort completed in 2010, prior to any restoration efforts. About 1,900 native woody species were planted within the Bolton Creek riparian area in fall 2020. Species included cottonwood, chokecherry, buffaloberry, wood and prairie rose, snowberry, and golden currant.



Figure 17. *BDA maintenance on Bolton Creek.*

Chalk Mountain Pronghorn Fence (Goal 3) - Heather O'Brien

Approximately 13 miles of pasture fence were converted to wildlife-friendly standards from August to December 2020. Trail cameras recording pronghorn behavior at movement bottlenecks were removed during fence construction and replaced following conversion. Monitoring of pronghorn movement will continue post-treatment in 2021. GPS collar data of pronghorn movement will be compared pre- and post-treatment as well.

This project will mediate barriers to daily and seasonal pronghorn movements. Pasture fences will be converted from woven-wire or five-strand to four-strand wildlife friendly fence. This conversion should improve daily and seasonal movements of pronghorn to and from winter ranges, remove bottlenecks, and allow pronghorn to move more freely across associated habitats. Changes in pronghorn movement will be quantified using camera trap data, and paired with an adjacent GPS collar study.



Figure 18. *Pre-fence conversion photo demonstrating the difficulty fawns have with non-wildlife friendly fencing.*

True Mountain Mahogany Rejuvenation (Goal 2) - Willow Bish



Figure 19. *True mountain mahogany re-growth following treatment.*

Mosaic mowing was used to reduce true mountain mahogany stands from >50% canopy cover to <30%. 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 the objectives of the project. 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. Approximately 480 acres were treated in 2020, with a total of 900 acres treated to date.

North Platte River Riparian Restoration (Goal 2) - Willow Bish

The Dave Johnston Power Plant was enrolled in the WGFD Walk-In-Area program for many years. It is currently not open to sportsmen due to efforts to eradicate medusahead, but is expected to return to the program next year. Russian olive was removed from the area in 2015. The Converse County Weed & Pest District has been conducting following-up treatment every year. The WGFD has been planting native woody riparian species in recent years to assist in the recovery of this area to a desirable habitat type. In fall 2020, 1,300 tree and shrub type willows were planted to compliment previous efforts which included planting chokecherry, golden currant, wood's rose, and buffaloberry.



Figure 20. *Native woody species plants 1 year post-planting.*

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

In 2020, 250 acres of juniper were removed from riparian areas on Duncan Ranch. Approximately 75 acres of mountain big sagebrush were thinned to enhance vegetative production and diversity. True mountain mahogany stands were treated across about 200 acres using brush cutters to trigger leader growth in decadent plants. Conifers were jackstrawed in 160 acres of aspen stands to reduce competition. Lastly, 2 miles of old, unnecessary fencing were removed to facilitate wildlife movements.

Hardy Pipeline (Goal 2) - Todd Caltrider



Figure 21. Elk drinking out of a recently installed livestock water tank.

The USFS Stovehole and Lost Canyon allotments located near the Wyoming/South Dakota state line lack reliable, well distributed, water sources. As a result, livestock utilization is heavy around the few reliable water sources (springs and stock dams) and light in other areas. Rangeland condition is noticeably degraded near these reliable water sources as a result of continuous heavy use. The Hells Canyon Ranger District is currently working on a long term plan to improve grazing distribution and rangeland conditions in these allotments. The first step in improving livestock distribution and subsequently rangeland condition is to develop a reliable livestock watering system. Providing reliable water sources and locating these across

the allotment will allow the permittees to get better distribution of cattle across the entire allotment. Improving livestock distribution through the addition of reliable water will greatly improve wildlife habitat by improving rangeland conditions in key productive habitats that currently seeing heavy livestock utilization (such as mesic areas).

The USFS range program with the Hells Ranger District has a limited budget for rangeland improvements. To complete these water projects in a timely manner, the USFS partnered with the South Dakota Game, Fish, and Parks and the WGFD to secure additional funding. This project will install a total of 50,500 feet of pipeline, ten livestock tanks, one storage tank, and a solar pump to move water from the water source (Cold Springs Creek). In addition to the livestock water system, three wildlife guzzlers will also be installed to provide a year round water source for wildlife.

All livestock water tanks and pipelines were installed during summer 2020. The guzzlers will be installed during summer 2021.

Little Red Creek Juniper Removal (Goal 2) - Willow Bish

In 2020, 405 acres of juniper were lopped and scattered on state land. The removal was focused on riparian areas but also included adjacent mixed shrub habitats. This work expanded efforts that began in 2018 and complimented adjacent BLM efforts which masticated juniper from 350 acres of mixed shrub habitat. An additional 400 acres of juniper removal are planned.



Figure 22. Little Red Creek juniper cutting near creek.

North Laramie Range Aspen Improvement (Goal 2) - Willow Bish

This project built upon on-going efforts to improve aspen stands in the North Laramie Range. In 2020, a 43 acre aspen stand along Upper Deer Creek was targeted for treatment. This stand occurred on private land enrolled in the Department's Access Program as a Hunter Management Area. This stand was severely encroached by conifers. The junipers were cut with chainsaws and left in a "jackstraw" pattern to deter browsing on aspen.



Figure 23. *Aspen stand pre-treatment (left) and post-treatment (right).*

North Platte River Erosion Assessment (Goal 2) - John McCoy

Impaired North Platte River conditions from Alcova Reservoir downstream through the City of Casper have been correlated with high sediment loads. For example, degraded salmonid spawning in the Gray Reef reach has been associated with excessive sediment deposition. Sediment sources include tributaries and eroding banks within the North Platte River. To understand the contribution from bank erosion and identify key banks, a 12.4 mile reach from Gray Reef Dam to Government Bridge was floated in late spring to conduct a semi quantitative visual assessment. The Bank Assessment for Non-point source Consequences of Sediment (BANCS) method was used to rate fourteen stream



Figure 24. *BANCS assessment along the North Platte River.*

banks for erosion potential. The assessment revealed an estimated 62,800 tons (~4,500 dump truck loads) of sediment entering the North Platte River from eroding banks. These results will help us identify key banks for erosion reduction.

North Platte River Restoration Monitoring (Goal 2) - Joanna Harter, Del Lobb, and John McCoy

Extensive efforts have been made in recent years to enhance the aesthetics, stream function, and angling opportunities in the North Platte River through the City of Casper. Led by the City of Casper, restoration work has been completed in three reaches of the river near Morad Park with support from the Wyoming Business Council, WWNRT, WGFD, WGBGLC, Natrona County Weed and Pest, and Central Wyoming Regional Water System Joint Powers Board.

Following restoration work in 2016, WGFD began annual monitoring to evaluate progress toward three goals: 1) improvement and stability of stream channel characteristics, 2) enhancement of fisheries, and 3) restoration of native riparian vegetation. Monitoring of the three restored reaches continued in 2020 and included photos taken at established photopoints. The results of monitoring efforts from 2016-2019 were presented in 2020 to the City of Casper, members of the North Platte Advisory Committee, and engineers of Stantec Consulting Services Inc. who contributed to restoration designs. The group discussed maintenance needs in the restored reaches and made recommendations to improve riparian vegetation establishment. A final year of the full suite of monitoring data will be collected in 2021 to complete WGFD's 5-year monitoring schedule. Restoration work began in 2020 at a fourth reach (First Street) and WGFD will begin collecting monitoring data at this site following completion of the restoration.



Figure 25. *Wyoming Blvd. restored reach after construction in 2015 (left) and in July 2020 (right).*

Sanchez Creek Riparian Restoration (Goal 2) - Willow Bish and John McCoy

In 2020, 4,320 feet of steel jack fencing was assembled on Sanchez Creek. This fencing will protect the riparian area from over-browsing by elk and livestock. Sanchez Creek is a perennial spring-fed creek. Due to continuous over-browsing, very little woody species remain. Pipe for the fence was donated by Tuboscope, Inc. and the assembly and hauling were conducted by WGFD employees with assistance from the landowner. An additional



Figure 26. *Assembly of steel jack fence on Sanchez Creek.*

5,000 feet of fence will be installed in both 2021 and 2022. Additional planning for future Zeedyk and BDA structures as well as conifer removal is occurring.

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 and 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, a large percentage of the true mountain mahogany in the valley is mature and decadent. In an effort 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 has worked with landowners and Wyoming State Forestry to thin areas dominated by 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. 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 spring 2019, and to date a total of 348 acres of conifer removal/thinning has been completed. Work on remaining acres will occur during the winters of 2021-2022. Funding was provided by the WGFD Habitat Trust, WWNRT and BOW.



Figure 27. *Before and after conifer removal.*

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

Antelope Creek and the Cheyenne River were targeted for riparian plantings in 2019 and plant survival from those efforts is currently at ~75%. 2020 efforts compliment those treatments by focusing on Sheep Creek, which flows into the Cheyenne River downstream of Antelope Creek. The USFS and Converse County Weed & Pest treated Russian olive along Sheep Creek in 2018, and native riparian species were

lacking.

About 500 plants including cottonwood, willow, chokecherry, buffaloberry, golden currant, and wood's rose were planted along Sheep Creek. Plantings include weed barrier, tree tubes, and exclosure fencing to improve survivability. Additionally, about 200 willows were planted in Antelope Creek as replacement plants in areas where losses were higher than anticipated due to excessive moisture.

Figure 28. *Thunder Basin riparian planting exclosure.*



Clay Spur Juniper Treatment (Goal 2) - Willow Bish

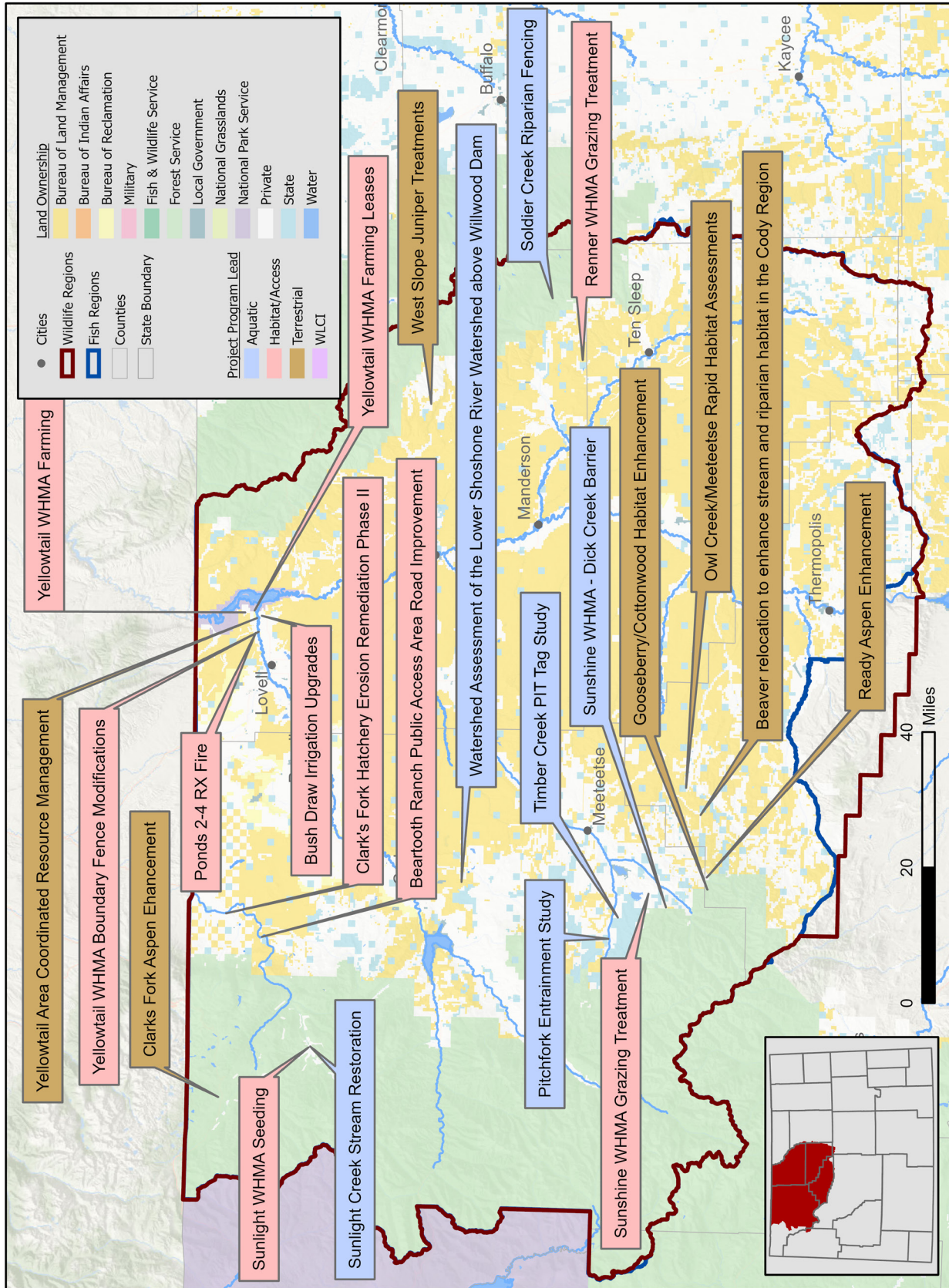
Juniper encroachment has been identified as an issue within the Thunder Basin Grasslands by conservation partners. The USFS has identified over 8,500 acres of habitat with juniper encroachment near Osage, WY in Weston County. The USFS recently signed a record of decision to allow active management practices. The USFS will be utilizing a variety of tools to reduce junipers but given the scale of the work involved, the WGFD is providing funding and implementation assistance. Funding granted to the Weed & Pest District was used to cost-share this project. Given the scale of the work, the acreage shown in this report is only a portion of the habitat which will be worked on in the coming years. Removing encroaching juniper from sagebrush grassland habitats at a large scale maintains these systems with the appropriate forage and cover components for sagebrush grassland obligate species, reduces fire potential, increases site visibility for species that prefer open habitats to avoid predators, and assists in maintaining functional mesic habitats on the landscape. Conifers will be left in mosaic patterns on the landscape in areas where they are not competing with more desirable forage/cover species. Junipers will also be left within areas of the ponderosa communities where winter cover is an important factor. However, reducing the density of junipers within the ponderosa communities is an important management action to help reduce fire risk and maintain the longevity of the ponderosa communities.

In 2020, 1,080 acres of state and USFS lands were lopped and scattered or cut and piled, depending on the site.



Figure 29. *Pre-treatment, Junipers encroaching on riparian area and adjacent sagebrush/grassland (left); Post-juniper treatment in ponderosa pine community (right).*

Cody Region



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 2020, 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. As part of the ongoing Owl Creek/Meeteetse Mule Deer Initiative, a treatment to remove conifers from 114 acres of aspen in the upper reaches of Gooseberry Creek was completed. Juniper and other conifers were removed from crucial winter range for elk, mule deer and sage grouse on private lands on the west slope of the Bighorn Mountains.

Aquatic habitat restoration efforts focused on improvement of Wyoming Game and Fish Commission-owned lands. In 2020, stream restoration continued on Sunlight creek within the Sunlight Wildlife Habitat Management Area. 1,200 feet of the creek channel was reconstructed, 520 feet of toewood was installed, 3 riffles were constructed and over a 11,000 cubic yards of material were moved. This is providing much-needed improvements to ensure public access, address eroding banks and improve brook trout habitat.

Improvements to infrastructure on wildlife habitat management areas throughout the Big Horn Basin have also been a strong focus. Most notably, ponds 2-4 on Yellowtail were burned to reduce cattails and increase open water for migrating waterfowl. The Department also treated over 2000 acres of weeds on Department managed lands in 2020, converted fences to wildlife friendly designs and started a trial project on Sunlight WHMA to see what seeds will grow best and be selected to be foraged on by wildlife.

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



Figure 30. *Trailer-mounted holding facility.*

Between April 24 and September 30, 2020, a total of 13 beavers were trapped and relocated within the Cody Region. Beavers were trapped by WGF D personnel from six different locations where they were causing problems on private lands and at one public fishing access. Beavers were relocated to Breteche Creek, Enos Creek, Grass Creek and the Wood River for riparian restoration. Beavers were caught using Hancock and Comstock traps. One beaver was released at the trap site in May when it was observed she was lactating. Beavers were held in a trailer-mounted holding facility until release, with holding time ranging from one to eight days. When efforts to trap other family

members were unsuccessful, one kit was released at the trapping site after being held in the holding facility for 17 days with no apparent ill effect. No known target and non-target mortalities resulted from the permitted activities.

Most 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. One pair of beavers were fixed with VHF tail tag transmitters after being anesthetized and were released at the Double D Meadows on the Wood River. The locations of these two beavers were determined approximately weekly through mid-December. At the time of this report, one transmitter had gone off air and the other was consistently located at a bank den site $\frac{3}{4}$ mile below the release site. No dams had been constructed.

New dam activity was observed near the locations of the other release sites. Three dams were constructed on Enos Creek 1.5 miles below the release site, and two dams were constructed 1.5 miles above the Grass Creek release site. Both beavers released in Breteche Creek, as evidenced by trail camera photos, occupied an old beaver pond and lodge 0.5 miles upstream of the release site.

Bighorn National Forest Invasives and Sagebrush EIS (Goal 2) - Jerry Altermatt

The Terrestrial Habitat Biologist assisted Bighorn National Forest personnel in drafting an EIS for aerial application of herbicides for invasives and sagebrush on the Forest. Several field tours of old sagebrush prescribed fire and wildfire areas were visited to determine the level of sagebrush re-establishment. The Terrestrial Habitat Biologist helped draft sections of the EIS pertaining to sagebrush treatments to help ensure that considerations were made for wildlife needs.



Figure 31. *An 8-year-old herbicide treatment visited during one of the field tours conducted on the Bighorn National Forest.*

Carter Mountain Pronghorn GPS Collaring Project (Goal 3) - Corey Class and Sam Stephens

As part of Secretarial Order 3362 issued by the Department of Interior in 2018, wildlife agencies in 11 western states were tasked with developing State Action Plans that identify their top big game research priorities. The WGFD identified the Carter Mountain pronghorn herd as one of their top priorities - a population of nearly 8,000 animals that rely on a mix of private and public lands in the eastern Greater Yellowstone Ecosystem, ranging from the South Fork of the Shoshone east to the Bighorn River. While segments of this herd are known to summer near Carter Mountain and migrate up to 40 miles east to various winter ranges, specific movement and distribution patterns remain unclear. We put GPS collars on 100 pronghorn in November 2019, 11 in August 2020, and 12 in December 2020. These data will be used to: 1) document migratory patterns and seasonal ranges and 2) to inform management and conservation efforts, including fence modifications and highway 120 crossing mitigation. A majority of the collars will drop off and be collected in November of 2022, but some that were deployed later will be collected in 2023.

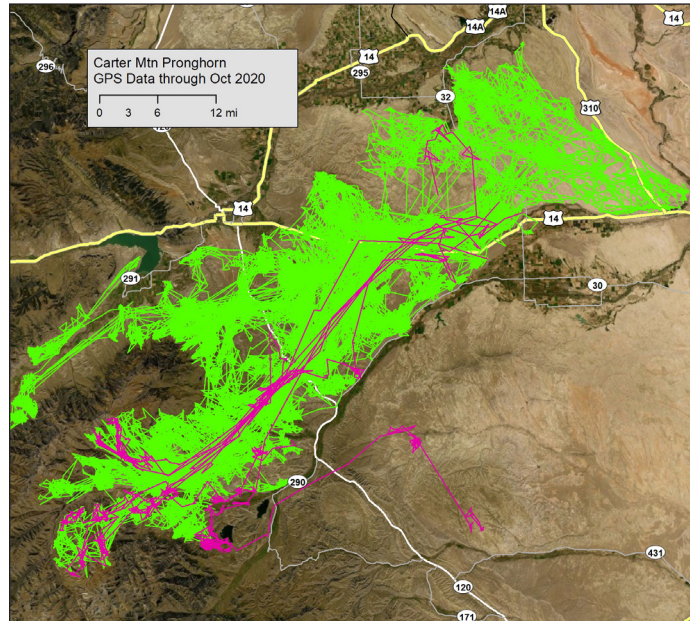


Figure 32. Pronghorn locations collected since November 2019 in the Carter Mountain pronghorn herd.

migratory patterns and seasonal ranges and 2) to inform management and conservation efforts, including fence modifications and highway 120 crossing mitigation. A majority of the collars will drop off and be collected in November of 2022, but some that were deployed later will be collected in 2023.

Clarks Fork Aspen Enhancement II (Goal 2) - Jerry Altermatt



Figure 33. Typical conifer-encroached aspen stand inventoried in the Upper Clarks Fork.

In summer 2020, the Terrestrial Habitat Biologist and Shoshone National Forest inventoried 418 acres of aspen communities in the Upper Clarks Fork watershed. Aspen stands were delineated and RHAs were conducted to determine seral state. All of the stands inventoried were in late seral condition and at risk of being replaced by conifers. These aspen communities will be proposed for treatment in conjunction with the High Lakes Timber Sale which is currently in the planning phases and expected to be implemented in 2023

Cody Predation Study (Goal 3) - Corey Class and Tony Mong

The purpose of our multi-year project is to contribute to understanding among scientists, wildlife and land managers, and the public of carnivore-prey interactions and carnivore-livestock conflicts in multiple-use landscapes around Cody by 1) documenting seasonal patterns of wolf movement and predation, 2) evaluating patterns of cattle depredation, 3) better understanding cattle responses to predation risk and 4) identifying calving locations/areas for the Cody elk herd. In early 2019 and 2020 we deployed GPS

collars on both wolves and elk for the Cody Predation study investigating seasonal patterns of wolf movement and predation through a protocol called cluster searching in the winter and summer seasons. In 2019 we deployed 11 GPS collars on wolves and 60 GPS collars on elk, as well as 50 vaginal implant transmitters (VITs) in pregnant cows to identify calving locations. In 2020 we deployed ten GPS collars on wolves (four of which replaced failed GPS collars from 2019) and 31 GPS collars on elk, as well as 23 VITs in pregnant cows. In 2021 we are only collaring wolves and deployed three GPS collars after our first round of captures at the end of January 2021. We plan to deploy more GPS collars on wolves in our second



Figure 34. *Elk transported by helicopter as part of collar deployment in the Cody Predation research project.*

round of captures scheduled for the end of February 2021. Our current total of GPS collars deployed in wolves is 24 (nine are currently active due to mortalities and collar malfunctions), and our total number of elk collared is 91 (72 are currently active due to mortalities and collar malfunctions).

In 2019 our VIT success was limited by technological setbacks and we only were able to identify 23 birth sites of the 50 VITs deployed. But in 2020 we were able to identify 16 birth sites from the 23 VITs deployed after switching to another collar/VIT company. On the cattle depredation and survivability side of the project, efforts from 2019 pilot studies were very successful in informing how to deploy transmitters in 2020. In 2019 100 VHF ear-tag transmitters and 55 GPS ear-tag transmitters were deployed and tested on two different ranches. In 2020 we deployed 524 GPS and VHF ear-tag transmitters on adult and juvenile cattle across three ranches to track cattle movement and survival. These efforts will be replicated in 2021 from May to October. For both the Cody predation study and the cattle depredation and survivability project, 2021 will be the last year of data collection in the field, and therefore the last year of capturing and collaring wildlife and cattle. Completion of the project is expected to occur in the following years as the graduate students working on these projects analyze the data and publish their findings.

Cody Region Elk Movement in Relation to Brucellosis (Goal 3) - Corey Class and Eric Maichak

From 2012-2015, WGFD documented seven hunter-harvested elk that tested seropositive for brucellosis in elk Hunt Areas 39-41 in the northwestern Bighorn Mountains. To help determine movements of elk, seasonal habitat use (parturition), and possibly the origin of brucellosis in and around the Bighorn Mountains, WGFD initiated a movement study of elk in 2016. Target herds have included North Bighorns (321), Medicine Lodge (211), Cody (Lower Greybull River, 216), South Bighorn (322), and Gooseberry (214). Since 2016, 275 elk have been captured, bled, and fitted with a GPS collar. To date, no elk collared in this study were documented as crossing the Bighorn Basin to or from the Bighorn Mountains. Approximately 10% of seropositive collared elk in the Cody and Gooseberry herds crossed out of the Wyoming Brucellosis Designated Surveillance Area (DSA) boundary which runs north to south from the center to the southwest corner of the Bighorn Basin. However, these elk returned to within the DSA as movements were generally less than 5 miles from the boundary and appeared to be related to seasonal migration. Two elk captured in Hunt Area 40 in 2016 that tested positive for brucellosis were euthanized and sampled; *Brucella abortus* could not be cultured and isolated from these elk. Prelimi-

nary delineation of elk parturition areas using these GPS data suggest moderate overlap with areas delineated previously. GPS data from this study were used by the Wyoming Livestock Board to facilitate development of livestock management plans, and coupled with hunter-harvested serology, to reduce the livestock brucellosis Area of Concern from Bighorn and Sheridan Counties to HA 39-41. Additional uses of these GPS data have included preliminary assessment of elk response to shed antler hunters and migration, and use of habitat treatments, security cover, and livestock mineral feeders (CWD study). This study is anticipated to continue through 2023 with the deployment of several new and refurbished collars in February 2021. Funding was provided by USDA-APHIS, BLM, RMEF, WGFD, University of California-Berkeley, Sheridan County Sportsman’s Association, UW, and USGS. Project occurs in both the Cody and Sheridan regions.

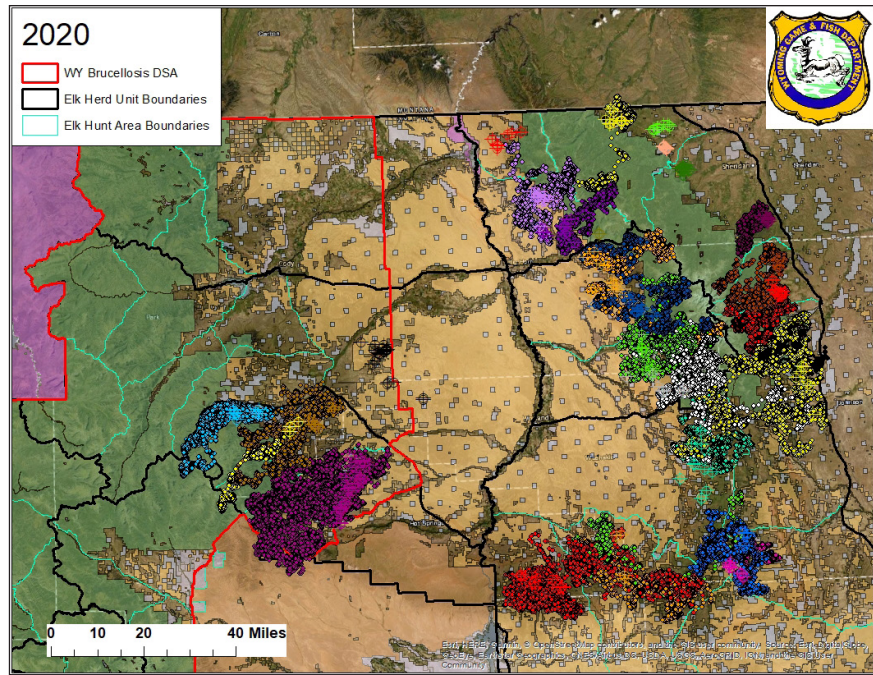


Figure 35. Locations of 85 elk in 2020 with corresponding capture locations (crosshairs) since 2016.

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

Approximately 2,000 acres of invasive plants were treated by Cody Region and local Weed and Pest Districts on WGFC managed properties in 2020. These invasives 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.

Cody Region WHMA Annual Maintenance (Goal 1) - Brad Sorensen, Craig Swanson, and Eric Shorma

Annual maintenance and improvements continued on the five WHMAs in the Cody Region in 2020. 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. 1,486 acres of irrigation water rights were utilized on the Yellowtail, Renner, Medicine Lodge, and Sunlight WHMAs. Annual parking lot and road maintenance was performed. Over 57,000 acres of WGFC managed property rights were monitored.

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

In July, 2020 a private contractor removed conifers from 114 acres of aspen in the upper reaches of Gooseberry Creek on the Shoshone National Forest. Conifers were lopped and scattered in preparation for broadcast burning in 2021 or 2022. The project is part of a multi-year effort that will eventually mechanically treat and burn over 300 acres of aspen communities and 2,400 acres of conifer encroached sagebrush steppe. Aspen treatments will consist of mechanical removal of conifers, followed by broad-



Figure 36. Chainsaw crews lopping and scattering conifers in aspen.

cast 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. 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.

Meeteetse Moose Project (Goal 3) - Corey Class and Bart Kroger

The Meeteetse Moose Project began in 2020 with captures in March. We captured 16 moose (ten females and six males) in the Wood River, Greybull River, and adjacent drainages. The purpose of the study is to build our understanding of factors contributing to declines in moose across the southern extent of their range. We will examine how the thermal landscape impacts moose movement, diet, survival, and reproductive success. Specifically, we aim to 1) disentangle how access to thermal refuge impacts foraging and therefore nutritional condition, 2) compare how male and female moose interact with the thermal landscape, and 3) investigate factors influencing moose rutting movements. Our next round of captures will occur in February and March 2021. We aim to deploy GPS collars on 15 males and 15 females. The anticipated conclusion of fieldwork is 2023.



Figure 37. Moose collared during capture operations for the Meeteetse Moose Project.

Newton Lakes Parking Area (Goal 1) - Brad Sorensen and Craig Swanson

In 2020 a 20,000 square foot parking area was developed to address parking concerns at the two lakes. Approximately 1,000 cubic yards of road base was hauled in and leveled to create this much needed parking area.

Owl Creek/ Meeteetse Rapid Habitat Assessments (Goal 2) - Jerry Altermatt

Rapid Habitat Assessments 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 5-year review. In 2020, seven aspen and seven rangeland assessments were conducted.

Yellowtail WHMA Ponds 2 - 4 RX Fire (Goal 2) - Brad Sorensen and Eric Shorma

Yellowtail WHMA is an important stop-over point for waterfowl during spring and fall migration. Increasing open water provides important loafing areas for migrating waterfowl. Prescribed fire was used to increase wetland plant species diversity and open water areas by reducing existing cattails and allowing opportunities for more desirable marsh and grass species to become established.



Figure 38. Prescribed fire on ponds 2 - 4.



Figure 39. Rx fire implementation.

Renner WHMA Grazing Treatment (Goal 2) - Brad Sorensen and Eric Shorma

A spring/summer/fall grazing treatment was conducted on the Renner WHMA in 2020. Three hundred eighty-three AUMs were utilized for approximately five months in a high intensity short duration approach on a rotational schedule through the eight pastures. This treatment will reduce litter and stimulate growth on the WHMA.

Soldier Creek Riparian Fencing (Goal 2) - Joe Skorupski and Laura Burckhardt

Soldier Creek is a tributary to the Nowood River located in the Bighorn River Drainage. Soldier Creek is occupied by a Core Conservation population of Yellowstone Cutthroat Trout. Habitat in Soldier Creek has been impacted by wildlife and cattle, and in many areas woody vegetation is lacking along the stream channel. Project partners (USFS and grazing permittee) are taking steps to improve and monitor associated grazing allotments. Improvements have been observed, but willow establishment and regeneration continues to be impeded. In 2018, East Yellowstone Chapter of TU with assistance from the



USFS and WGFD, repaired the pasture fence bordering Soldier Creek. This fence repair will exclude cattle from the riparian area. However, willow monitoring suggests that wildlife use is high and impeding growth and establishment in new areas. To allow for the establishment and regeneration of willow communities and improvement of riparian species community composition an enclosure fence is needed.

An enclosure fence was constructed along a 1,500-foot section of Soldier Creek. The enclosure

Figure 40. Soldier Creek fence installation.

sure was constructed from 3,000 feet of modified steel jack fencing to preclude elk, moose and cattle use on Soldier Creek. Total impacted project area is approximately two miles of stream and riparian habitat. The enclosure will remain for three to five years, and then will be moved upstream systematically every three to five years to benefit approximately one mile of Soldier Creek.

Sunlight Creek Stream Restoration (Goal 2) - Laura Burckhardt

Sunlight Creek, within the WGFC owned Sunlight WHMA, has experienced unnatural stream channel movement and severe bank erosion for at least the last 40 years. These channel movements have resulted from changes in land use practices and have been accelerated by subsurface irrigation return flows. The unnatural rate of change in Sunlight Creek:

- 1) Degrades fish habitat due to sedimentation and over widening of Sunlight Creek,
- 2) Results in excess sediment deposition in Sunlight Creek downstream of the project area
- 3) Has closed and threatened public access roads to WGFC and USFS lands on Trail Creek and Painter Creek.



Figure 41. Sunlight Creek stream restoration.

The channel instabilities and erosion near the Sunlight WHMA are being addressed through river restoration across a 0.82-mile stretch of the creek from 2017 through 2020.

In 2020, the WGFD finalized the reconstruction of the remaining 1,200 feet of Sunlight Creek channel. Repairs were made to three previously constructed structures and surrounding stream channel that were damaged during spring runoff. Due to the extents of channel movement and the required repairs, the design was optimized to allow construction and repairs to occur within the budget. Construction started on August 10 and ended September 30. The contractor moved approximately 11,644 cubic yards of material and constructed three riffle structures, 520-linear feet of toewood, and spent 66-hours repairing structures and stream channel erosion.

WGFD crews will be installing 720-feet of log floodplain sills, seeding the construction area, and planting willows in April and May 2021.

This phase was completed using additional funds from the WWNRT and the WGFD.

Sunlight WHMA Seeding (Goals 1 and 2) - Brad Sorensen and Craig Swanson

In 2020 approximately 18 acres of land was seeded with Falcata, Alfalfa, Sainfoin, Small Burnet, Orchardgrass, Timothy, Fescue, and Bluegrass. This seeding is a trial to see which species will germinate and if wildlife will selectively forage on these species. In future years we will replant all the meadows on Sunlight WHMA.

Sunshine WHMA Grazing Treatment (Goals 1 and 2) - Brad Sorensen and Craig Swanson

A summer/fall grazing treatment was utilized on the Sunshine WHMA in 2020. Approximately 1,200 AMUs are allowed to graze on the WHMA. This treatment will reduce litter and stimulate forage growth for ungulates to utilize in the spring and winter months. The permittee works on irrigation improvements in exchange for grazing.

Watershed Assessment of Lower Shoshone River (Goal 2) - Laura Burckhardt

In 2007 and 2016, large quantities of sediment were released from the Willwood Dam on the Shoshone River downstream from Cody, which resulted in fish kills, loss of aquatic invertebrates, release of debris, and deposition of large amounts of sediment downstream of the dam. Following the 2016 release, the WGF D assisted with drafting a watershed plan that identifies potential sediment sources to the Shoshone River and its tributaries, prioritizes the impact of those potential sediment sources, and identifies potential projects and funding sources that might be voluntarily applied with landowners and agencies to reduce sediment loading. The watershed planning information, including detailed information and proposed management measures for each sub-watershed, is available in Story Map format (<https://arcgis.com/storymaps/viewer/1ymq19>).



Figure 42. Dry Creek.

In 2020, the Wyoming Habitat Assessment Methodology Level 1 was used to summarize existing conditions throughout three subwatersheds: Dry Creek Watershed, Sage Creek Watershed, and Sulphur Creek Watershed. The objectives were to inventory streams, assess current habitat conditions, identify areas of concern and provide recommendations for habitat management to decrease sediment loads, monitor areas with high erosion, and improve erosion control in high priority tributary streams. The information gathered during these assessments is being used to plan restoration projects to address accelerated rates of erosion.

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



Figure 43. Chainsaw-cut junipers.

Juniper and other conifers were removed from 250 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 Black Mountain area. Conifers were removed by a private contractor using chainsaws. The purpose of the project 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.

Yellowtail WHMA Dike Maintenance (Goal 2) - Brad Sorensen and Eric Shorma

The Yellowtail WHMA contains approximately 12 dikes that require yearly maintenance. Woody vegetation removal is required to maintain these dikes. Annual mowing, blading, and some chainsaw work is required to stay within the Safety of Dams Act.

Yellowtail WHMA Boundary Fence Modification (Goal 2) - Brad Sorensen and Eric Shorma

On Yellowtail WHMA, boundary fence modifications are necessary to keep trespass livestock off the WHMA. In 2020, approximately 3,430 feet of boundary fence were completely rebuilt and modified to a wildlife friendly fence to allow wildlife to move freely in and around the WHMA.

Yellowtail WHMA Farming (Goal 1) - Brad Sorensen and Eric Shorma

The Yellowtail WHMA north farm fields were tilled and seeded as follows:

- 109 acres planted to Oats
- 16 acres planted to Oats, Milo, and Millet
- 12 acres planted to Milo, Oats, Sunflower, Millet, Buckwheat, Sorghum, Mustard, Flax, Clover, and Phacelia

These food plots provide a diverse, yearlong food source necessary for wildlife survival.



Figure 44. Standing crop of oats.

Yellowtail WHMA Farming Leases (Goal 2) - Brad Sorensen and Eric Shorma

The Yellowtail WHMA has approximately 1,200 acres of farm fields and permanent cover fields. Contract farmers are utilized on a yearly basis to irrigate and farm approximately 1,000 of these acres and are required to leave portions of these crops standing for wildlife. Two contract farmers irrigate and farm.

Big Fork Wildfire Restoration (Goal 2) - Jerry Altermatt

On April 27, 2013, the Big Fork Fire burned over 1,500 acres on the Yellowtail Area Coordinated Resource Management 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 2020, the contract crews planted over 900 buffaloberry, golden current and chokecherry plants in the wildfire area. Two-year-old containerized plants were contract grown and were planted utilizing a contracted planting crew. Plant survival was enhanced by planting two rows into an eight foot wide weed barrier. A gravity-fed drip irrigation system was installed and fed by a 1,000 gallon water tank. The tank was filled with water and hauled to the site six times during the growing season in 2020. Plants were sprayed once in June and once in November with a blood-based deer repellent to discourage



Figure 45. *Planting shrubs through weed barrier.*

browsing.

In September, National Wild Turkey Federation, in partnership with Mossy Oak, collected film footage of the Yellowtail Coordinated Resource Management area, highlighting Russian olive treatments that have been conducted over the last 13 years. WGFD Terrestrial Habitat and Habitat and Access personnel were interviewed for the film which will be released in 2021.

Ready Aspen Enhancement (Goal 2) - Jerry Altermatt

Private contractors removed conifers from 31 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.

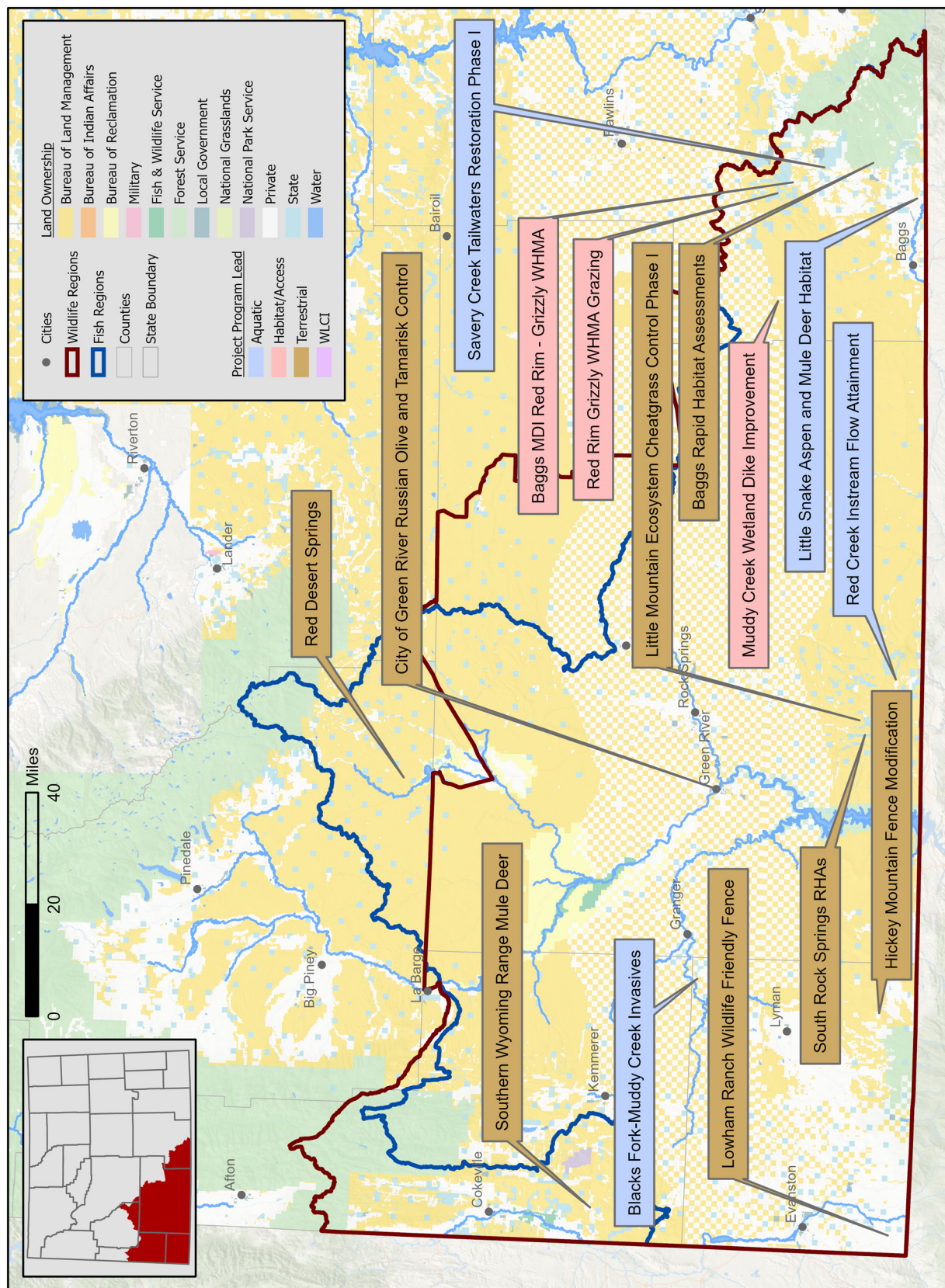


Figure 46. *Lop and scatter treatment of aspen.*

Cody Region PAAs (Goal 2) - Brad Sorensen, Craig Swanson, and Eric Shorma

Public Access Areas serve as critical recreational areas for the general public and sportsmen alike. Yearly maintenance and upgrades are necessary to preserve these habitats. Yearly upgrades include: treating noxious weeds, adding gravel and blading roads, installing new cattle guards, replacing dilapidated fences, and replacing signs.

Green River Region



Green River Region



The strategic habitat efforts and accomplishments achieved during the 2020 field season in the Green River Region continued to be guided by a commitment to landscape level, multi-year, collaborative efforts. Habitat improvement continued to focus on: enhancing habitat for big game, beaver and sage grouse; improving fish passage and spawning; improving maintenance for PAAs; controlling invasive species; developing and protecting upland springs in xeric habitats and improved 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 2020, 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 conducted, including forage reserve monitoring. Habitat and access personnel continued to treat noxious weeds and enhance public facilities at access points in the region.

Goal 3 efforts included the continuation of Wyoming Range mule deer research, which has been ongoing since 2013.

Baggs Rapid Habitat Assessments (Goal 2) - Katie Cheesbrough, Phil Damm, Britt Brito

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, four aspen assessments (149 acres) and two rangeland assessments (125 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.



Figure 47. *Conducting rangeland RHAs in the Baggs mule deer herd unit.*

2020 Blacks Fork Invasive Vegetation Treatments Carter to Granger (Goal 2) - Jim Wasseen

Contracts were bid to treat tamarisk, perennial pepperweed, knapweed, thistle and other invasive species occurring on the banks of the Blacks Fork River. The contractor also marked cheat-grass presence while scouting for Tamarisk. The UCWP reviewed qualifications and pricing for the contractors bidding on the project and selected Headwater Weed Control. The UCWP conducted planning and discussions with the BLM Kemmerer District and landowners. Past treatment areas were analyzed to identify a retreatment area north of Interstate 80 from the Uinta County line north into Lincoln County and east to Granger. The UCWP crews continued working on drainages south of I-80 in the fall. The UCWP has an agreement with the Sweetwater County Weed and Pest District that allows them to treat weeds within Sweetwater County. The contractor began work on the Black's Fork River north of the railroad tracks, near Carter, WY, and followed the river east to Granger. New sprouts of Tamarisk and mature parent trees were found along dry drainages up to two miles from the Black's Fork and providing a seed source for Tamarisk reestablishment. Noxious weed treatments were targeted to maintain desirable vegetation along the riverbank and limit seed propagation down the drainage. Several Russian olive and Tamarisk trees were re-treated in the Granger area as it had been a considerable amount of time since the initial treatments in this area. The contractor noted that gravel pits were the sites where many new seedlings and a few mature trees were discovered.



Figure 48. *Tamarisk treatments on the Black's Fork. Note blue green vegetation is the tamarisk that was treated with herbicide.*

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Monitoring was completed using photo points and GPS. The partnership includes Uinta County, Lincoln County, and Sweetwater County weed and pest districts, private landowners, BLM, OSLI and WGFD.

2020 City of Green River Russian Olive and Tamarisk Control - Tree Planting (Goal 2) - Kevin Spence and Jim Wassen

The City of Green River Parks and Recreation Department purchased 18 trees and shrubs from nursery stock, and planted them during June 2020 along the riparian greenbelt in Memorial park between the Trona Bridge and the Highway 530 Bridge. These plantings focused on replacing the vertical/horizontal riparian structural habitat lost from the removal of Russian olive and tamarisk plants.



Figure 49. *Newly planted cottonwood along the Green River in Memorial Park.*

Green River Public Access Area Annual Maintenance (Goals 1 and 2) - Miles Anderson, Kyle Berg, and Christopher Evans

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

Hickey Mountain Fence Modification (Goal 2) - Kevin Spence and Allen Deru



Figure 50. *Grazing permittees, BLM, and WGFD collaborate to modify the Hickey Mountain fence.*

A 1.7 mile five-wire stock fence located on both BLM and private lands at the top of Hickey Mountain serves as a boundary between two BLM grazing allotments, and the administrative boundary between the Kemmerer and Rock Springs BLM Field Offices. Late season elk hunters reported finding at least five elk calves entangled and dead in this fence. During January, BLM and WGFD personnel removed and laid the fence wires on the ground as an immediate action to allow elk to move unimpeded through the location while using winter range. Later in March, a meeting was held between the manager of the private lands, grazing permittees, a Uinta County Commissioner, BLM representatives from both field offices, and WGFD to discuss wildlife friendly fence specifications and possible options of moving the fence to a new location to benefit elk movement while still meeting needs of each livestock operation.

BLM indicated moving the fence to a new location would require additional analysis and review, and would not occur before a fence was needed for the beginning of the summer grazing season. It was decided to rebuild the fence at the same location using wildlife friendly specifications. BLM, grazing permittees, and WGFD personnel rebuilt the fence during early June, removing a strand and converting to a four-wire with appropriate height and spacing for improved big game passage.

Little Mountain Ecosystem Cheatgrass Control Phase 1 (Goal 2) - Kevin Spence

Cheatgrass threatens key aspen, sagebrush-grassland, juniper, and mountain shrub habitats within



Figure 51. *Treatment to control cheatgrass invasion to protect key habitats in the Little Mountain Ecosystem.*

the Little Mountain Ecosystem important to mule deer, sage grouse, pronghorn, elk and several other species of terrestrial wildlife. Increasing cheatgrass dominance also has a negative effect on watershed function and streamflow for Colorado River cutthroat trout inhabiting these headwater drainages.

The BLM Rock Springs Field Office has implemented treatments in recent years to control cheatgrass, which has gradually become established in recent and historic burn areas on this landscape. The Department joined this effort in 2020 by contributing Habitat Trust Fund dollars with BLM fire fuels funding to aerially treat 1,615 acres with Imazapic (Plateau) in the Currant, Sage, and Red Creek watershed(s) during early fall. A series of additional annual treatment phases are planned to

strategically control cheatgrass at the leading edge of invasion to buffer and protect the most ecologically important terrestrial and aquatic wildlife habitats on the Little Mountain landscape.

Little Snake River Habitat Enhancements (Goals 2 and 3) - Jim Wasseen

This project seeks to improve and enhance habitat condition and resiliency in critical, sagebrush, and mountain shrub communities for mule deer, and other wildlife species.

The planning phase included meetings with private landowners, on location, to discuss types of treatments and acreages. Public meetings and tours were conducted to review and discuss juniper treatments on mule deer winter range. Finally a coordination meeting with private contractors and Little Snake River Conservation District staff was held. The 2020 field season proved to be very challenging; large snowpack delayed the initiation of the treatments in early summer but by mid-summer fire bans were in place on most public lands throughout Carbon County. The BLM issued notice to suspend work on BLM land due to potential ignition from machinery being used to conduct mastication treatments. Consequently, the contractor was not able to commence work until October. Early snow suspended operation on November 7. In the five week period of operation 545 acres of Juniper treatments were completed. Monitoring included establishment and retaking of photo-points.



Figure 52. *Juniper mastication to improve mule deer habitat in Baggs, WY area. Credit Larry Hicks, Little Snake River Conservation District.*

Lowham Ranch Wildlife Friendly Fence (Goal 2) - Kevin Spence

The Lowham Ranch is located about 18 miles south of Evanston, WY in the Yellow Creek drainage providing 2,590 acres of habitat for multiple big game species, sage grouse, Northern Leatherside Chub, and other wildlife. The landowners have the property enrolled in the WGFD's Walk-In Hunter Access Program, affording continued public access to hunt elk, deer, antelope, sage grouse and rab-

bits. All of the property is located within designated elk winter range. One of the essential interior pasture fences included older net wire with three strands of barbed wire positioned above it with a top wire height of 50+ inches. This fence was an impediment to big game movement, and caused big game and sage grouse mortalities.

Through a collaborative funding effort between RMEF, the Southwest Chapter of MFF, WGFD, and the landowners, the existing 1.1 mile fence was removed and replaced with a newly constructed wildlife friendly fence during the 2020 field season. The new fence was constructed on the same line with new posts and four wires (three barbed and bottom smooth) built to wildlife friendly specifications of top wire height 42", a top and second wire spacing of 12", and smooth bottom wire spaced 16" above the ground. Fence markers were added to the wires to avoid sage grouse collisions. The replacement wildlife friendly fence is expected to facilitate better big game passage and reduce wildlife mortalities, while maintaining infrastructure to manage for rangeland health.



Figure 53. *Netwire pasture fence at Lowham Ranch impeding wildlife movements.*



Figure 54. *Completed Lowham Ranch pasture fence reconstructed to wildlife friendly specifications.*

Red Creek Instream Flow Attainment Assessment (Goal 1) - Del Lobb



Figure 55. *Red Creek flow measurement.*

Water levels and temperatures in Red Creek Instream Flow Segment No. 1 were monitored from June 2nd through October 1st. In addition, discharge was measured four times during the monitoring period. Analysis was done to assess attainment of the June through September in-stream flow water right flows. Estimated average daily flows exceeded the permitted flows on three of the 122 days of the assessment period. Average daily flows in June ranged from 0.72 cfs (June 28) to 2.74 cfs (June 7) and did not exceed the permitted instream flow water right of 4.8 cfs. July-September average daily flows ranged from 0.37 cfs (September 6) to 1.12 cfs (July 1), exceeding the permitted instream flow water right of 0.9 cfs during July 1-3. The maximum instantaneous temperature of 68.5 F occurred on July 11 at a discharge of 0.7 cfs. The maximum average

daily water temperature was 58.3 F on August 18, which had an average daily discharge of 0.43 cfs.

Red Desert Springs (Goal 2) - Kevin Spence

This project occurs within the northern portion of the Red Desert in southwest Wyoming which is home to one of the largest desert elk herds in addition to serving as the corridor for the historical Red Desert to Hoback mule deer migration. This high desert ecosystem also provides habitat for Greater sage grouse, Pronghorn, raptors, and a host of other non-game mammal, bird, and herpetile species. Scattered across this xeric landscape are isolated seeps and springs supporting riparian vegetation. In addition to providing essential water needs, many of these mesic sites provide aspen and riparian shrub stands serving as critical habitat components for most of the wildlife species present. Mesic sites also include locations of high snowpack accumulation where aspen and other mountain shrubs grow. These oases are heavily used by both wildlife and livestock, resulting in severely degraded conditions and threatening sustainable aspen and riparian vegetation. Continued degradation and loss of these mesic habitats would have long-lasting negative consequences for this high desert ecosystem and associated wildlife species assemblage.

Steel jack fencing was used to create exclosures at priority sites to reduce ungulate impacts, and promote spring/seep integrity while enhancing vigor and productivity of aspen and riparian plants. The steel jack fence was constructed of used drill stem pipe and is semi portable. The fence is a 4 rail design with a maximum height of 6.5 ft. and bottom rail 18 inches above the ground, which discourages access by large ungulates but allows use by most wildlife species.

Two sites were steel jack fenced during 2020: Palmer Draw, where 330 ft. of steel jack was used to replace deteriorated fence on an existing exclosure protecting 3 miles of riparian and adjacent upland habitat on the Sweetwater River, and a new 4-acre exclosure to protect a spring source and riparian vegetation at Juel Springs in the western Red Desert. Funding was provided by MFF, RMEF, and MDI.

An additional 4,300 ft. of fabricated steel jack fencing will be erected at 2-3 sites during 2021. BLM is currently working to complete the required NEPA review and approval.

Baggs MDI Mechanical Treatment on Red Rim-Grizzly WHMA (Goals 1 and 2) - Katie Cheesbrough, Brandon Werner, Jerry Cowles, Mark Cufaude, Mac Foons, and Todd Grosskopf

Lack of natural disturbance has caused increased sagebrush canopy cover and reduced available grasses and forbs. The sagebrush has also become old and less nutritious for wildlife. In a mosaic pattern, tractors attached with mowers reduced the sagebrush canopy by 40%-50% on 375 actual acres, making 650 treated acres. This will allow for grasses, forbs, and a younger age class of sagebrush to return.



Figure 56. Steel jack replacement of old Palmer Draw exclosure fence near the confluence of Lander Creek and the Sweetwater River.

Red Rim Grizzly WHMA Forage Reserve Monitoring (Goals 1 and 3) - Katie Cheesbrough, Kevin Spence, Jerry Cowles, 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 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 2020 we monitored the lands that were rested and coordinated the grazing on the WHMA with cooperation from the BLM, SERCD, WGFD, and grazing operators.

Savery Creek Restoration and Stream Qualification Tool Monitoring (Goal 2) - Paul Dey

The Savery Creek stream restoration is a collaborative effort led by TU and involving BLM, LSRC, WWDC, and WGFD focusing on the tailwaters located on BLM and State 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. The multi-year and multi-phase effort to restore Savery Creek below High Savery Dam and Reservoir began with assessment and design in 2017-18 of a roughly 3.5 mile reach starting immediately below the dam. The channel through this reach contains a series of fourteen sheet pile grade control structures installed as part of dam construction mitigation.

These structures divide the stream into sub reaches numbered from 1” near the dam through 13” at the downstream end. The channel exhibits actively eroding banks and is wider and shallower than reference conditions. Portions of the channel are incised and disconnected from a somewhat constrained floodplain. Trout habitat is not optimal. In 2019, WGFD Habitat and Access crews completed the initial 2,300 linear feet of stream restoration in reaches 10 and 11. In 2020, TU contracted restoration of 2,000 feet in reaches 8 and 9. The contractor used natural channel design criteria and rock barbs and vanes, toe wood and channel shaping and realignment to stabilize Savery Creek. This work results in a stream channel with the appropriate dimensions for stable banks and 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.

In addition to stream restoration construction in 2019-2020, this effort provided an opportunity to apply the Wyoming Stream Quantification Tool (SQT) to testy the tool and quantify functional improvements. In 2019 pre-project assessment data were collected on reaches 8-11. SQT analysis revealed that the designs for all four sub reaches yielded functional improvements. Much of this improvement was associated with the addition of woody material and the most degraded reach (11) yielded the



Figure 57. *Measuring bankfull elevation, a key element of the Stream Quantification Tool.*

most potential improvement. The time (and cost) to perform SQT analysis was less than \$5,000 and less than 1% of total project cost. In 2020, post-construction data were collected on reaches 10 and 11. Key SQT insights were: 1) the benefits from woody debris additions were less than predicted, 2) bedform diversity is complicated to measure when many structures are added and functional improvement is limited when the channel planform is not adjusted, and 3) riparian vegetation is tricky to measure post-construction and needs several years to recover before functional improvements are realized. Further monitoring in 2021 is planned to fully evaluate this restoration effort and the SQT.

South Rock Springs RHAs (Goal 2) - Kevin Spence and Patrick Burke



Figure 58. *RHA at a deteriorated aspen stand with heavy browsing on Little Mountain.*

These data will be summarized in the annual Job Completion Report, and provide current habitat condition information for assisting with population management decisions.

Southern Wyoming Range Mule Deer (Goal 2) - Kevin Spence

The BLM Kemmerer Field Office and SWCA Environmental Consultants continued preparation of the environmental assessment (EA) for the Southern Wyoming Range Mule Deer Habitat Project throughout 2020, however the timeline for completion was delayed due to agency personnel turnover and the societal effects of the coronavirus pandemic. Completion of the EA is now expected in spring 2021. PaleoWest was contracted to complete a Class II Cultural Assessment of habitat treatment focus areas, with the study design being closely coordinated with the Kemmerer BLM Archaeologist and the Wyoming State Historic Preservation Office. Field work for the cultural assessment began during fall 2020, and assessment completion is anticipated during spring 2021. Even with the shifting timeline for the completion of NEPA, planning activities continued working towards delineating treatments in anticipation of project implementation.

The South Rock Springs Mule Deer Herd is not currently one of the state's MDI herds, however it is very popular with the hunting public and has been experiencing issues with population recruitment and retention for several years. This mule deer herd has been the focus of the University of Wyoming's Elk and Deer Ecology Research Project (D.E.E.R.) to better understand the issues and challenges this population faces. Habitat conditions are a key component for the health of the South Rock Springs Herd, and RHA data collection has become a priority for this landscape. Nine RHAs were completed for the Rock Springs Mule Deer Herd in 2020. Four rangeland assessments, four aspen assessments, and one riparian assessment were completed totaling 1,362 acres.



Figure 59. *Productive and diverse understory vegetation observed during an aspen RHA assessment in the Coal Creek drainage.*

\$240,000 from the BLM grant were used by Lincoln County Weed and Pest District for cheatgrass and weed control treatments on large acreages allowed under an existing programmatic BLM EA. Approximately 19,300 acres of key mule deer crucial winter range and transitional habitats near Sage Junction were treated with 7.25 oz/acre of Imazapic (Plateau) to control cheatgrass during late summer and early fall. These treatments were not only designed to generally control cheatgrass to enhance native vegetation, but many sites were also targeting cheatgrass control to encourage favorable sagebrush mowing results anticipated during the next few years. Line Point Intercept (LPI) vegetation surveys were completed at five representative sagebrush-grassland sites in the Sage Junction areas at Sillem Ridge, Boulder Ridge, Leed's Creek drainage, South Nugget Canyon, and Collett Creek drainage. Data from LPI transects served as pre-treatment baseline for determining percent composition of invasive cheatgrass which occurred in the plant community, and will be re-read again in 2021 to evaluate initial results and effectiveness of cheatgrass control efforts.

Rapid Habitat Assessments are conducted annually in MDI herds across Wyoming to better evaluate conditions of mule deer seasonal habitats. Ten additional RHA assessments totaling 338 acres were completed for the Southern Wyoming Range within transitional and summer ranges, including one riparian habitat assessment, two rangeland habitat assessments, and six aspen habitat assessments. RHA survey information will be used for Wyoming Range Mule Deer Herd Objective reviews, annual Job Completion Reports, and assist in determining locations of future habitat improvements.

Wyoming Range Mule Deer Research (Goal 3) - Jill Randall, Jeff Short, and Gary Fralick

On-going mule deer studies have taken place in the Wyoming Range herd for the past 7 years with two collaring efforts underway - one being led by the Monteith Shop at the University of Wyoming and the other a WGFD/BLM led project. The motivation behind this research is to better understand the mechanisms that drive this particular herd, including factors influencing migration and habitat selection, and why it has remained stagnant for so long with only moderate recovery after population declines.

The Wyoming Range Mule Deer Project, spearheaded by Dr. Kevin Monteith, first started in 2013 with the collaring of 70 adult females. This project is multifaceted taking a longitudinal look at factors influencing mule deer through the lens of nutritional ecology. Utilizing this strategy, they are able to evaluate and begin to understand how the relationship between an individual and their environment, such as food and space, can influence overall population dynamics. To date, the study has tracked and monitored the survival, behaviors, reproduction, habitat conditions and migratory routes of well over 200 adult females, over 340 juveniles and more than 30 adult males.

Additionally, in March 2019 the WGFD and BLM initiated a collaring project to fill in gaps where data had not been previously captured. A total of 45 females and 15 males were collared with the objective to understand migratory seasonal use and to inform locations for habitat enhancement opportunities.

Both projects have taken a long-term look at mule deer in the Wyoming Range and the data collected will be instrumental for understanding this diverse herd and will be utilized to inform management decisions.

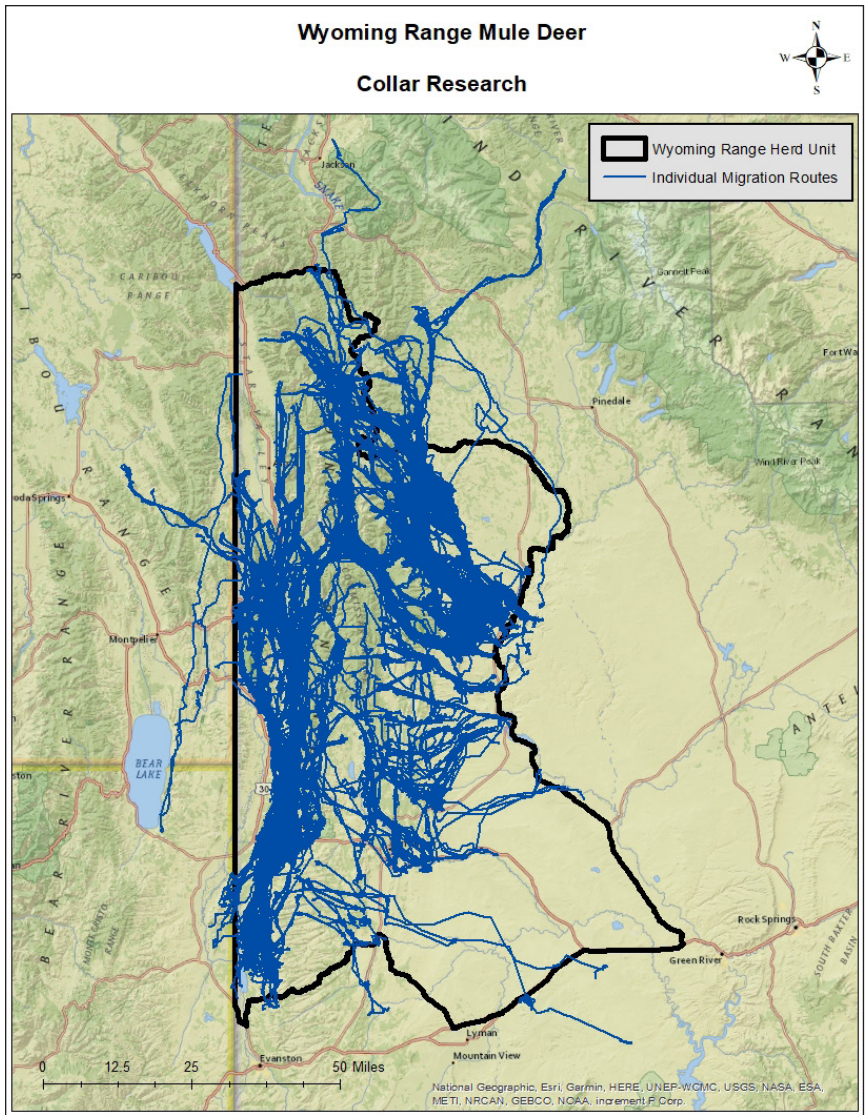
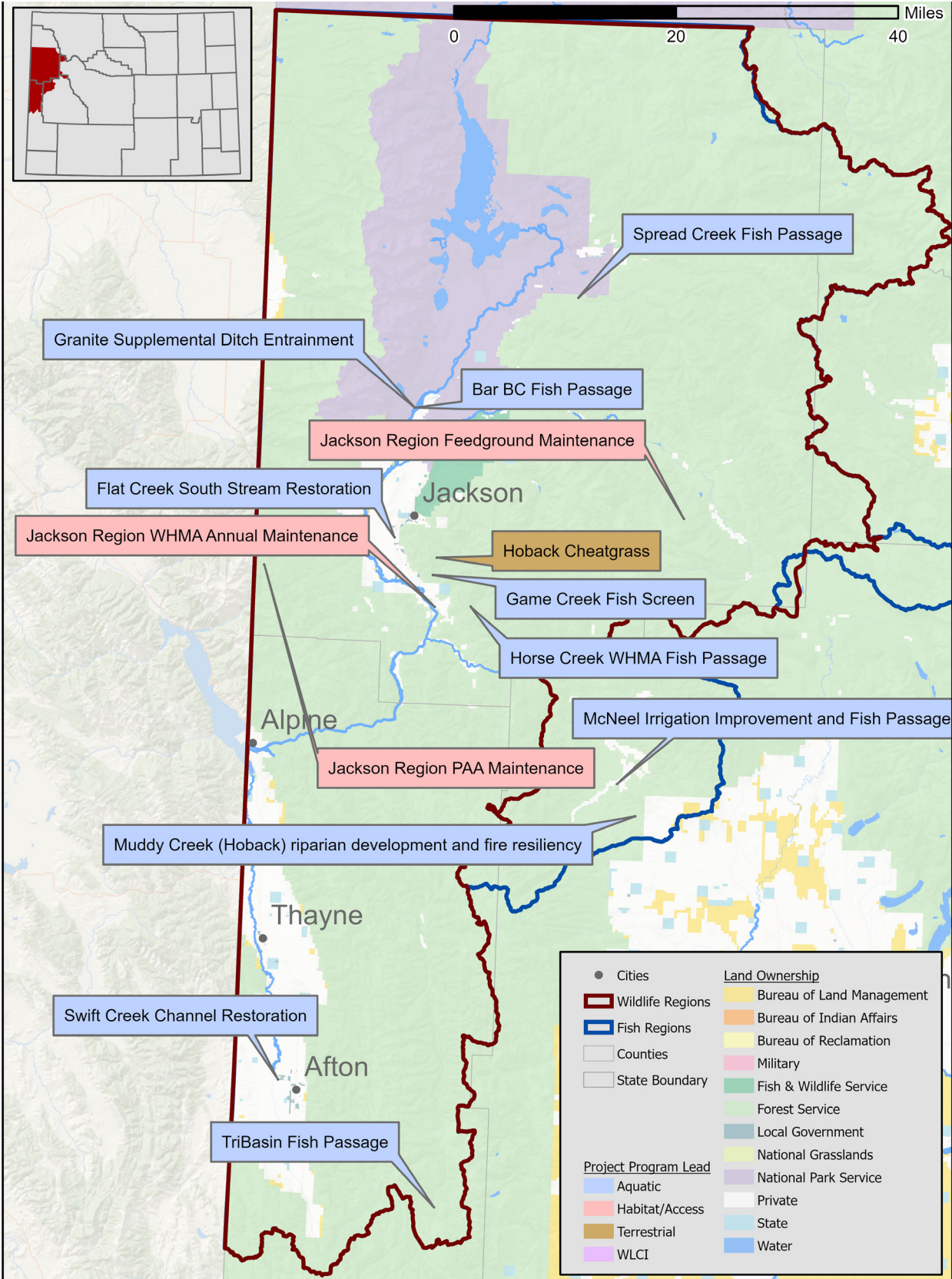


Figure 60. Individual migration routes of collared mule deer in the Wyoming Range Herd.

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. Habitat work in 2020 involved spraying for cheatgrass, maintaining Commission properties, stream restoration, and improving fish passage.

Many regional aquatic habitat projects involve restoring stream function by manipulating channel dimension, pattern and profile 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, and benefiting local fish and other aquatic species. Complications with floodplain permitting and contractor bidding delayed construction, originally planned for fall 2020. Construction bidding and implementation are now set to take place during spring and fall 2021, respectively.

A second aquatic habitat project involves installing BDAs on Muddy Creek, a tributary to the Hoback River. The goal is to emulate the positive aspects of beaver ecology by constructing BDAs on private lands along Muddy Creek, and to compare conditions in Muddy Creek to those in Coyote Gulch that were not treated with BDAs. Conditions monitored include fish populations, riparian vegetation, channel morphology, and stream temperature.

Another project involved spraying thousands of acres to treat cheatgrass and other invasive annual grasses on native rangelands within the Hoback and Snake River drainages. Regional personnel performed annual maintenance on PAAs in the Jackson Region including all 16 PAAs on the Salt River, von Gontard's Landing and Coco Belle PAA's. PAA maintenance activities included replacing signs, replacing fences, spraying noxious weeds and painting comfort stations.

Flat Creek South Stream Restoration (Goal 2) - Anna Senecal

Flat Creek flows from its headwaters upstream of the National Elk Refuge, through the town of Jackson to eventually meet with the Snake River at the South Park Bridge, about six 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, 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 points of 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 movement through shallow depths, high summer temperatures, and the formation of unstable winter ice.

Work initiated in 2014 to improve stream and riparian function through 1.4 miles south of the Town of Jackson continued in 2020. Accomplishments include final design and permitting, fundraising and materials staging. Project partners include the Community Foundation of Jackson Hole, Jackson Hole One Fly, the NRCS, Teton Conservation District, TU, Wyoming Department of Environmental Quality, and the WWNRT. Complications with floodplain permitting and contractor bidding delayed construction, which was originally planned for fall 2020. Construction bidding and project implementation are now set to take place during spring and fall 2021, respectively.

Hoback Cheatgrass (Goal 2) - Troy Fieseler

This project started in 2011 utilizing hand sprayers to treat cheatgrass on various landownerships, including BTNF, and over the last eight years has included re-treatment of these initial project locations in addition to monitoring to better understand treatment effectiveness. This next phase includes expansion onto additional BTNF land through the completion of an EIS allowing for aerial application of herbicide, expanded treatment on the National Elk Refuge, and the incorporation of treatment on private lands throughout Teton County.

In 2020, approximately 4,365 acres of cheatgrass and other invasive annual grasses were treated on native rangelands within the Hoback and Snake River drainages. These areas provide critical habitat for both migrating wildlife and yearlong residents, including elk, mule deer, and bighorn sheep. Overall, the goals and objectives are to manage cheatgrass and other invasive annual grasses across all land ownership types to ensure a dominance of native vegetation to provide wildlife forage needs and ensure natural fire regimes are intact. Furthermore, these treatments will have long-term benefits to

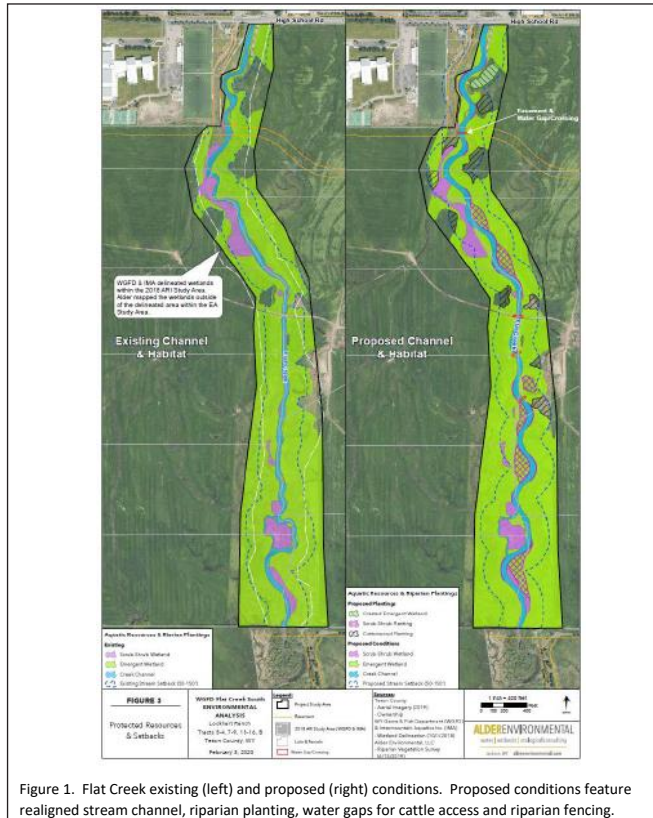


Figure 61. Flat Creek design overview.



the watersheds and their resources for years to come.

Figure 62. *Contract helicopter crew re-fueling for cheatgrass treatments in the Jackson area.*

Jackson Region Feedground Maintenance (Goal 1) - Derek Lemon, Miles Anderson, Kyle Berg, Christopher Evans

Annual maintenance and improvements to 11 WGFD managed elk feedgrounds in the Jackson Region occurred. Annual repairs and maintenance included work on feedground structures, corrals, stackyards, elk migration fences, and grounds. Dog Creek, South Park and Horse Creek elk feeding areas were also harrowed in spring 2020 to break up elk scat and promote growth of new grasses.



Figure 63. *Forest Park feedground.*

Jackson Region Temperature Monitoring (Goal 1) - Anna Senecal



Two long-term temperature loggers were deployed along the Salt River corridor. One at Clark's Barn, downstream from Afton, and one at Salt River-Miller's, downstream from Etna. Both sites are located on WGFD-maintained public access areas. Loggers will be maintained annually and provide an index to regional water temperature trends.

Figure 64. *Deploying temperature loggers on the Salt River.*

Little Horse Creek BDAs (Goal 2) - Anna Senecal



Three BDA's were installed on Little Horse Creek upstream from the WGFD WHMA in an area of historical beaver activity. BDA's were installed with the intent of providing release habitat for beaver translocated from Game Creek. The translocation did not happen in 2021. Nevertheless, BDA's will be maintained in anticipation of future management use.

Figure 65. WGFD and Bridger Teton USFS crew installs a beaver dam analog on Little Horse Creek.

McNeel Irrigation Improvement and Fish Passage (Goal 2) - Anna Senecal

The Hoback River flows through leased lands operated by the WGFD as the McNeel winter elk feedground. Historical land uses associated both with cattle ranching, agriculture and elk feeding have resulted in a stream channel that is excessively unstable, highly erosive, a threat to human development and operations, and a poor source of quality Snake River Cutthroat Trout habitat. Annual maintenance and operation of two gravel push up dams for irrigation was one source of degradation and channel instability. This problem was addressed in 2018 with the construction of one permanent irrigation structure and enlarged-capacity headgate and ditch network to accommodate the irrigator's entire water right. This work reduced the need to continuously manipulate the channel bed and banks to feed water to the irrigation system, improving localized stream channel stability and land manager satisfaction.

Now that this issue has been addressed, however, it is time to address other functional deficits of this system. Erosion and channel instability continues, albeit at a reduced rate. Site survey and analysis indicates that the problem is largely due to floodplain degradation, as opposed to issues within the stream channel itself.

Decades of willow removal and subsequent bank erosion and channel downcutting have resulted in a denuded, disconnected and vulnerable floodplain. Partner efforts, led by Trout Unlimited, aim to restore roughness to the floodplain and introduce bank stability to the stream channel in select locations. During 2020, partners constructed eleven experimental 100 feet circumference, eight feet high exclosures using T posts and woven wire as a pilot effort. These fencing units are intended to eliminate or deter elk herbivory of young willow and cottonwood plants, allowing the woody vegetation to grow to above the browse height of elk and begin to return structure and stability to the floodplain. Partners will monitor the effectiveness and



Figure 66. Whiplash willow and narrow leaf cottonwood protected from ungulate browse on the Hoback River floodplain.

longevity of these structures.

Additionally, TU has contracted a consulting firm, River Design Group, to produce survey-based designs for constructing floodplain assemblages and select channel enhancements, namely toewood, placed in sections of the river which experience erosion but have shown little tendency to avulse. These efforts, which focus largely on the floodplain and incorporate long-term, passive restoration techniques, are different than stream restoration work regularly conducted by the Department. Such an approach is appropriate in a situation where traditional stream restoration and river management may be at odds with other Department priorities, namely elk feeding. This work is intended to be adaptive and long-lived. Partners share the hope that successes experienced at McNeel may be transferred to other feedgrounds experiencing similar issues with stream instability and riparian degradation.

Muddy Creek BDAs (Goal 2) - Troy Fieseler, Anna Senecal, and Luke Schultz

The Roosevelt Fire burned over 50,000 acres across the headwaters of the Hoback River drainage in 2018, and contained many locations of high-intensity burns. In this steep and highly erosive landscape, denuded slopes were expected to create localized landslides and other mass wasting events and generally elevated sediment transport across the watershed. In addition, historical overuse by livestock and, in some cases, artificially elevated wildlife populations led to deteriorated upslope and riparian conditions, and historical localized channel incision associated with these conditions. Muddy Creek and its tributary to Coyote Gulch near the Hoback Rim are such streams that display these impairments.



Figure 67. *A completed and impounded BDA on Muddy Creek.*

Historically, beaver would have had a strong mediating effect on these riparian systems by constructing dams that slowed flood flows, vertically stabilized stream beds, and inundated floodplains to support vigorous vegetation that resisted erosion. However, with the loss of many beaver populations over the last two centuries, stream systems have suffered. The goal of this project was to emulate the positive aspects of beaver ecology by constructing BDAs on private lands of Muddy Creek, and to compare conditions in Muddy Creek to those in Coyote Gulch that were not treated with BDAs. Conditions monitored included fish assemblages/populations, riparian vegetation, channel morphology, and stream temperature.

Crews constructed 18 BDAs in Muddy Creek along approximately 0.5 miles of the Muddy Creek floodplain (~1 mile of stream channel) in June 2018 and collected pre construction data on both the control (Coyote Gulch) and treatment reaches (Muddy Creek) to evaluate changes in upcoming years. BDAs were constructed of aspen and pine poles cut from within the Roosevelt Fire perimeter and woody slash material from nearby conifer removals. As aspen stands regenerate following the fire, it is anticipated that beavers might colonize these reaches using BDAs as temporary sheltering habitat and expand the footprint of inundated areas in the watershed.

Partners included USFWS Partners Program, BTNF, and the Rolling Thunder Ranch.

Swift Creek Channel Restoration (Goal 2) - Anna Senecal

Swift Creek is a first order tributary to the Salt River which flows through Afton, Wyoming. Few Salt River tributaries have suitable temperature and hydrologic regimes to support trout spawning. Those that do are prioritized for protection and enhancement. Swift Creek is an example of such an opportunity. However, the creek is significantly degraded by human activities, namely dewatering, channelization and riparian conversion. As a result, the creek is highly unstable with massive bank erosion and channel avulsions. Restoration of the creek was pursued to safeguard existing Cutthroat Trout spawning habitat and demonstrate for appropriate river restoration, enhancement and bank stabilization techniques. The Restoration of Swift Creek was initiated in 2017. Construction began in 2020 and will continue in 2021, to be followed by at least three years of monitoring.

In 2020, the WGFD partnered with TU (project lead), the USFWS, the NRCS (USDA), and four landowners to finalize designs and permit applications and oversee stream restoration construction. Construction began in October 2020. Within the upstream half of the reach, the stream dimensions were adjusted in place and, throughout the downstream extent, a new channel was constructed on top of the historical floodplain. Floodplain grading, channel reconstruction and structure installation were completed by year's end. While construction is complete, water is still flowing down the old channel. This channel will be filled in and water diverted to the new channel next summer, following spring runoff. Waiting to divert stream flows into the newly-constructed, raw channel will give the vegetation more time to establish and stabilize banks, preventing erosion



Figure 68. Swift Creek soil lifts.



Figure 69. Swift Creek stream restoration.

Jackson Region PAA Maintenance (Goal 1) - Derek Lemon, Miles Anderson, Kyle Berg, and Christopher Evans

Regional personnel performed annual maintenance on Public Access Areas in the Jackson Region including all 16 PAAs on the Salt River; von Gontard's Landing and Coco Belle PAA's. PAA maintenance activities included replacing signs, repairing fences, spraying noxious weeds and painting comfort stations. We removed trash, downed brush and timber from Coco Belle PAA's fence line. Many of the downed trees were chipped on site. A new comfort station was installed at the Diversion PAA along the Salt River.

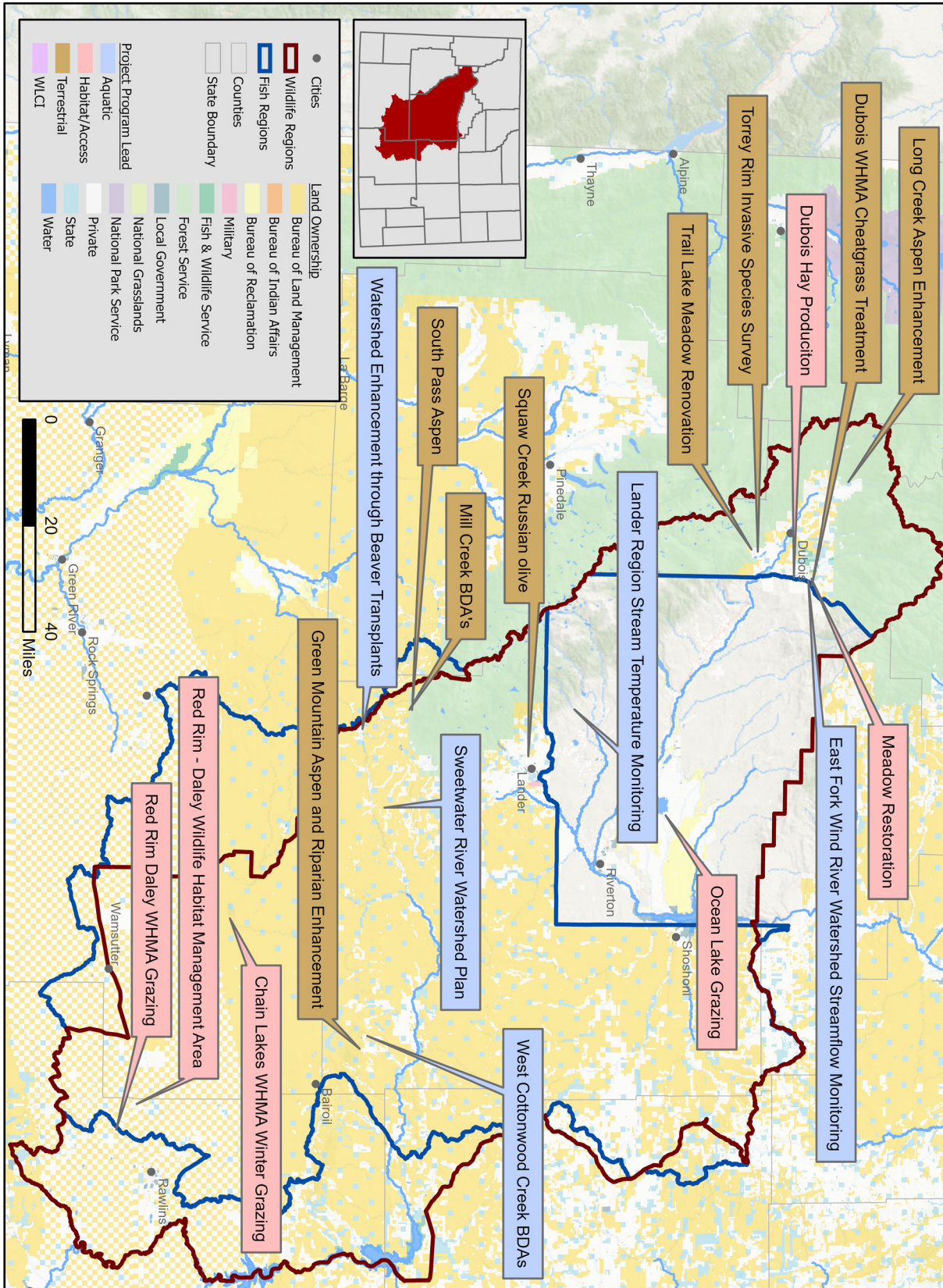
Jackson Region WHMA Annual Maintenance (Goal 1) - Derek Lemon, Miles Anderson, Kyle Berg, and Christopher Evans

Annual maintenance and improvements continued on the seven WHMAs in the Jackson Region in 2020. The Horse Creek, South Park and Greys River WHMAs received annual fence maintenance to reduce trespass livestock and commingling of elk and livestock in the winter. 100 acres of irrigation water rights were spread on Horse Creek WHMA. Horse Creek and South Park were hayed to feed elk in the winter and promote new growth for fall and spring forage; 190.5 tons were produced between the two WHMAs. Annual parking lot and road maintenance was performed on South Park and Horse Creek WHMAs. 40 yards of gravel was used to fix the road at Patrol Cabin WHMA. Noxious weeds were treated by WGFD personnel and contract applicators on all Jackson WHMAs. Signs were inventoried and new opening date signs were installed on all WHMAs.



Figure 70. *Moving hay bales off of the field.*

Lander Region



Lander Region



The Lander Region stretches from the top of the Wind River Mountains to Boysen Reservoir and from Dubois to Rawlins with important wildlife habitats spread throughout the region.

Aquatic habitat personnel continued work assessing the Sweetwater River, conducted in stream flow studies, transplanted beaver and conducted streamflow and temperature monitoring.

The South Pass Aspen project saw its sixth year of work, treating a total of 263 acres across the project area. 2020 work aimed to improve aspen habitats through a combination of conifer removal and BDA installation. Additional work to improve aspens stands occurred on Green Mountain and in the Long Creek drainage. Plans for Russian olive removal occurred close to Lander on Squaw and Baldwin Creeks and cheatgrass was assessed and sprayed near Dubois.

Continuous efforts to managing the 210,000 plus acres of Wyoming Game and Fish Commission administered lands in the region occurred 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. Additional work on Red Rim Daley and Chain Lakes WHMAs occurred related to grazing management and infrastructure development.

Goal 3 migration efforts centered on Highway 26 near Dubois. Phase II efforts entailed identification of additional mitigation opportunities to reduce Wildlife/Vehicle Collisions and improve habitat connectivity.

Chain Lakes WHMA Sheep 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 partners, the BLM, we accepted applications for a new five-year grazing lease. During 2020, the grazing lessee utilized approximately 900 AUMs. In exchange for the 2020 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 resultant wetlands that serve as oasis in the dry desert with concentrations of lush vegetation and abundant wildlife frequenting these areas.

Horse Grazing on Whiskey Basin WHMA (Goals 1 and 3) - 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 2020. 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. 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 WHMA/ WMA Hay Production (Goals 1 and 2) - Brian Parker, Miles Proctor, and Kevin Howard

Lander Habitat and Access continued expanding farming and haying operations across Dubois area WHMAs, with specific focus on Spence and Moriarty WMA. During the 2020 field season, Firehouse and lower Bear Creek Meadows were farmed and irrigation infrastructure expanded. Dubois staff hayed 616 acres on Spence and Moriarity WMA and Whiskey Basin WHMA, producing 943.8 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 WHMA Cheatgrass Treatment (Goal 2) - Amy Anderson

On June 26th, 2020 a fixed wing airplane was used to apply Indaziflam (Rejuvra®) herbicide on 795 acres of WGFC owned lands on Duncan Bench, an area within the Spence-Moriarity Wildlife Management Area. Fremont County Weed and Pest along with WGFD biologists prescribed an application of 5 ounces of Rejuvra herbicide with 5 gallons of water per acre. Additionally, Fremont County Weed and Pest District applied Plateau herbicide to all of the main roads within Spence-Moriarity WMA, Inberg-Roy WHMA, and Whiskey Basin WHMA. A total of 1,000 acres were treated, which includes acres adjacent to the main roads in all three WHMAs, which were treated in both 2018, 2019, and 2020.



Figure 71. *Fixed-wing aircraft application of Rejuvra Herbicide on Duncan Bench on Spence-Moriarity WMA.*

Dubois Highway 26 Wildlife Crossings Phase II (Goal 3) - Daryl Lutz

Roadways and wildlife are both extraordinarily important to Wyoming. However, there are many cases where roadways and wildlife have negative interactions resulting in significant wildlife mortality, partial to complete barriers that impede wildlife migrations or seasonal movements and hazards for traveling motorists.

Mule deer migrations in the Dubois area are infamous with thousands of deer descending onto their winter range in the upper Wind River Valley and around U.S. Highway 26. During winter, deer move across the highway daily. As a result there are at least hundreds of deer hit on the highway during the peak of migration and throughout the winter.

Bighorn sheep frequent the highway right-of-way throughout the year but more frequently during the winter months. Elk and moose are also a concern as they move across the highway though relatively infrequently.

This phase of the project will evaluate and identify mitigation opportunities to reduce Wildlife/Vehicle Collisions (WVCs) and maintain or enhance habitat connectivity along an approximate 33-mile long segment (about milepost 40 to 73) of U.S. Highway 26. This section of highway has been identified as a statewide priority for addressing WVCs, particularly with mule deer. The outcome of this work will be a mitigation strategy detailing site specific recommendations to reduce WVCs and maintain migration and habitat connectivity. Recommendations will be based on the best-available science, data and information on WVC reduction strategies. This is phase II of the plan to address WVC on this stretch of highway. Phase I was the purchase and deployment the Variable Messaging Signs (VMS) completed in 2019/2020. This planning effort has considerable public interest in the Dubois, River-ton, Lander, and Jackson communities and is a collaborative effort between WGFD, WYDOT, USFS, BLM, USFWS, Wind River Reservation, and various NGOs. In addition, this stretch of highway was identified as a high priority for WGFD and WYDOT to address at the 2017 Wyoming's Wildlife and Roadways Summit.



Figure 72. Dubois Highway 26 assessment map.

East Fork Wind River Watershed Streamflow Monitoring (Goal 1) - Joanna Harter

The East Fork Wind River watershed is the largest, contiguous, intact watershed in the Lander region that is primarily under public land management and is designated a crucial habitat area for Yellowstone Cutthroat Trout under Wyoming's recently updated Statewide Habitat Plan. Instream flow water rights exist in both Bear Creek and the East Fork Wind River to protect habitat for Yellowstone Cutthroat Trout



Figure 73. Measuring discharge on Bear Creek.

and the WGFC holds water rights from these streams for irrigation use to support wildlife needs. To help the WGFD balance water needs for wildlife and fisheries, in 2020, stream flow in Bear Creek was measured throughout the summer to determine when the stream was nearing the 20 cfs level deemed necessary to support Yellowstone Cutthroat Trout in late summer. A stage-discharge rating curve was updated for the Bear Creek location to allow quicker and simpler stream flow estimates. In many years, streamflow drops rapidly from 30 cfs to 20 cfs, sometimes within one week. A staff gage was also installed in the East Fork Ditch and a rating curve was developed to allow measurement of stream flow through the ditch to improve water use monitoring.

Green Mountain Aspen and Riparian Enhancement (Goal 2) - Amy Anderson

This project is a private landowner driven initiative to improve habitat for a declining mule deer herd. The landowners are concerned with the loss of water in the stream, increases in invasive weed species, risk of catastrophic wildfire, and declines in habitat productivity. The partnership with Wyoming State Forestry and Fremont County Fire Protection has been very productive, and plans are in place to continue working together over the next several years on both private and state lands on Green Mountain.

In 2020, the WGFD, Wyoming State Forestry, and Fremont County Fire Protection conducted 88.3 acres of aspen improvement using contracted saw crews to reduce conifer encroachment within existing aspen habitat. The crews cut trees and left them in a jack-straw array to deter browsing ungulates and feral horses from damaging young aspen sprouts in the 36 acre Cooper Creek Unit. All other units totaling 52.3 acres were cut and hand-piled on private land and adjacent to the County Campground.



Figure 74. *Private land before (left) and after (right) conifer removal from aspen stands.*

Stream Temperature Monitoring (Goal 1) - Joanna Harter

From 2019 through 2020, 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 Torrey 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 3-20 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 and Riparian Enhancement (Goal 2) - Amy Anderson



The Long Creek aspen enhancement is part of an integrated vegetation management project that directly and indirectly benefits more than 7,500 acres of habitat through aspen enhancement, precommercial thinning, prescribed fire and commercial timber harvest.

During summer 2020, 220 acres of aspen were treated. All treatments included mechanical removal of conifer from aspen stands by contracted hand crews, and material was piled using heavy machinery-feller bunchers.

Figure 75. *A Timbco feller buncher stacking felled material.*

Firehouse Meadow Restoration (Goals 1 and 2) - 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 2020 we farmed and replaced approximately 100 acres on the Firehouse and lower Bear Creek Meadows.

Mill Creek BDAs (Goal 2) - Amy Anderson and Joanna Harter

In July 2020, the Shoshone National Forest in partnership with the WGFD built 10 BDA's in Mill Creek, a small headwater stream on the southern tip of the Wind River Mountains. These BDA's were installed prior to conifer removal from the surrounding aspen habitat to help raise the incised channel and reconnect the stream with its floodplain. By improving water holding capacity of the riparian area, the hope is for increased aspen suckering and survival after removing conifer from the aspen community.

Mill Creek is one of the targeted drainages where both strategies are in place to improve the water holding capacity of the riparian area, invigorate willow and aspen communities, and maintain water in the stream later into the season to benefit wildlife. By constructing the BDAs, and improving riparian vegetation, we hope to entice beaver back into the area, over time. Relict beaver evidence, including old dams and chewed tree stumps, indicate a population of beavers once inhabited Mill Creek. Beavers provide



Figure 76. *Installation of BDA's on Mill Creek in the Shoshone National Forest.*



Figure 77. *Two bull moose making use of ponding created by newly installed BDAs on Mill Creek.*

amazing benefits to these small headwater streams simply by spreading water out across the drainage allowing deciduous trees and healthy understory vegetation to flourish. After the beavers move on, the resilience of the riparian area decreases, conifers encroach into the drainage bottom which causes aspen and willow to decline and soils to dry out. By constructing BDAs and reducing conifer canopy cover, we hope a short term fix will help restore previous habitat conditions until beavers can move in and do the work for us. Trail cams placed in the drainage post-construction show a large diversity of wildlife using Mill Creek, including moose, elk,

mule deer, red-tailed hawk, red fox, pronghorn, black bear, chipmunks and squirrels. All seemed to appreciate the ponding attributed to the BDAs. We hope to expand the use of BDAs across the Lander Region due to the relative ease of installation, inexpensive materials, and visible benefits achieved in a short period of time.

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

Rocky Mountain Agronomy Center applied herbicide across approximately 400 acres of irrigated meadows on Spence and 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 2020. Habitat and Access personnel also dedicated substantial contract personnel time to noxious weed control.

Ocean Lake WHMA Grazing (Goal 1) - Brian Parker and Justin Rhine

Approximately 260 AUMs were utilized on Ocean Lake WHMA in order 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 WHMA Improvements (Goal 2) - Matthew Pollock and Jim Wasseen

In 2019, a non-functioning well, in the Shipping Pasture, was planned for upgrades, but this well was found inoperable due to the proximity of the railroad. Currently the BLM, permittee, and WGFD are working together to find a solution to provide water to the Shipping Pasture. The partners are working with the BLM to obtain approval for a water pipeline across BLM land to stock tanks in the Shipping



Figure 78. *Permittee's cattle utilizing forage on the Shipping Pasture.*

Pasture. Previous fence modifications and well upgrades are functioning properly, but all improvements need occasional minor maintenance from time to time. Wells 1 and 3 required maintenance and repairs.

Red Rim Daley WHMA Grazing (Goal 2) - 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.

South Pass Aspen (Goal 2) - Amy Anderson

Aspen treatment continued on South Pass in 2020 with the removal of conifer from 263 acres of aspen habitat, and the installation of ten BDA's on Mill Creek. The combination of the two practices is intended to increase aspen suckering and survival by improving water holding capacity of the riparian areas.



Figure 79. *South Pass Aspen cut and hand pile treatment.*

Squaw Creek Russian Olive (Goal 2) - Amy Anderson

In 2020, planning for Squaw Creek Russian olive removal was initiated. A sub-committee of the Popo Agie Weed Management Association was formed consisting of representatives from the WGFD, Popo Agie Conservation District, and Fremont County Weed and Pest. The committee contacted all landowners within the Squaw and Baldwin Creek Watersheds to gauge interest in the removal of Russian olive. Squaw Creek was selected as the pilot drainage, with the intention of moving to



other tributaries of the Popo Agie in future years. Ten landowners expressed interest which included most of the landowners from the top of the Russian olive infestation on Squaw Creek down the watershed to the city limits of Lander. The Russian olive team acquired funding from WGFD, Popo Agie Conservation District, Fremont County Weed and Pest, and NWTF - Northern Plains Riparian Restoration Initiative.

Figure 80. *Removing Russian olive from Squaw Creek.*

A Wyoming based contractor was hired to complete the tree removal. Total mapped acreage from the head of the drainage to where Squaw Creek flows into Lander was approximately 30 acres. Nine landowners agreed to remove Russian olive from their property at an 80% cost shared rate, and Fremont County Weed and Pest will conduct follow-up stump treatments to prevent re-sprouting. Sixteen acres of actual Russian olive canopy cover will be cut and hand piled on the 9 properties in early 2021. This is the first phase of Russian olive removal within the Popo Agie Weed Management Area. The goal is to preserve the excellent native tree and shrub component in these vital riparian areas for the benefit of fish and wildlife species.

Sweetwater River Watershed Assessment (Goals 2 and 3) - Joanna Harter



Figure 81. *Sweetwater River bank erosion and low willow recruitment.*

The Sweetwater River valley has experienced extensive human use and modification since the mid-1800s including pioneer travel along the Oregon Trail, livestock grazing, cultivation in the floodplain, construction of irrigation diversions and dams, and stream channel modification and sedimentation due to gold and iron mining in the upper reaches. Cattle ranching continues along almost the entire length of the river and at least 21 irrigation diversion dams have been classified by the WGFD as not passable for small-bodied fishes like Iowa Darter, Bigmouth Shiner, and Hornyhead Chub, which are all SGCN in Wyoming. Iowa Darter and Bigmouth Shiner

occupy approximately 60% of the length of the mainstem Sweetwater River and Hornyhead Chub were transplanted to the river by the Department in 2020 to restore the historically extirpated population. Habitat fragmentation (i.e., fish passage barriers) is one of the main factors limiting Hornyhead Chub and Bigmouth Shiner populations. Land use impacts that contribute to increased turbidity and wetland drainage can diminish instream habitat for Iowa Darter.

In 2020, an assessment of the Sweetwater River watershed was begun to describe the current stream and riparian habitat, identify major issues in the watershed, describe appropriate restoration approaches, and outline projects to improve habitat for SGCN fish and other wildlife that rely on riparian habitat. The Wyoming Habitat Assessment Methodology was used to document current conditions along approximately 60 miles of the mainstem Sweetwater River from the confluence with Crooked Creek upstream to the confluence with Fish Creek. Excessive lateral streambank erosion was common, in addition to decadent willow communities with very low recruitment and significant streamside grazing impacts. Several landowners in this segment have taken steps to improve and protect stream habitat and are interested in future collaboration. In subsequent years, habitat evaluations will continue in tributaries and the remainder of the mainstem Sweetwater River to develop a full watershed restoration plan and prioritize stream restoration efforts.

Torrey Rim Invasive Species Survey (Goal 2) - Amy Anderson



Figure 82. *Volunteers walking transects on Torrey Rim surveying for cheatgrass.*

On a snowy June morning, 34 volunteers from the Dubois community, Fremont County Weed and Pest, Shoshone National Forest, BLM, National Bighorn Sheep Center, and WGFD gathered on Torrey Rim. These volunteers spent the day walking transects across the entire 800 acres of winter range, covering more than 89 miles, looking for patches of cheatgrass and other invasive species. Each volunteer walked 50 feet apart from the next person to ensure complete visual coverage of this important winter range site. This is an important exercise in preparation for the Torrey Rim Rx being planned for the timber in the Fitzpatrick Wilderness. In order for the USFS to burn the timber, they will first develop a

black line by burning the grassy winter range area. This will provide protection for the Torrey Valley should embers emanate from the fire. It is well known that cheatgrass is invigorated by a disturbance such as fire. During the survey one patch of cheatgrass was located and was immediately treated by Fremont County Weed and Pest. A treatment plan will be developed in the event additional cheatgrass is found in the area. This survey also prompted WGFD to plan a larger scale cheatgrass treatment project for the Torrey Rim slope above the Conservation Camp in 2021.

Trail Lake Meadow Renovation (Goal 2) - Amy Anderson, Brian Parker, Miles Proctor, and Kevin Howard

Trail Lake Meadow is located near the Whiskey Basin Conservation Camp and is part of the crucial winter habitat used by the Whiskey Basin Bighorn Sheep Herd. Currently the meadow consists of mostly smooth brome and basin wildrye. These species have very little benefit for bighorn sheep or mule deer which also frequent the Torrey Valley.

Through the Whiskey Basin Bighorn Sheep Management Plan, a renovation of this meadow is planned. The renovation will consist of a prescribed burn conducted by Shoshone National Forest personnel to remove the dense residual grasses, followed by a herbicide treatment to remove the remaining smooth brome and basin wildrye. After the application of herbicide, the meadow will be drill seeded to a mixture of native grasses and legumes to provide forage for wintering wildlife.



Figure 83. *Trail Lake Meadow in the Torrey Creek Valley will be renovated to improve winter forage for bighorn sheep and mule deer as part of the Whiskey Basin Bighorn Sheep Management Plan.*

The majority of the planning for this project occurred during 2020. Implementation of the prescribed

burn will occur in early 2021, and seeding is planned for May 2021.

Upper Wind River Basin Instream Flow Filings (Goal 1) - Del Lobb



Figure 84. *Instream Flow study data collection in Burroughs Creek.*

To help ensure the persistence of Yellowstone Cutthroat Trout populations, five stream segments totaling approximately 20 miles in the Upper Wind River Basin were proposed for instream flow water rights. The proposed instream flow segments included portions of Burroughs Creek (4.34 mi.), Sheridan Creek (6.85 mi.), Stonefly Creek (0.64 mi.), and the Middle Fork (4.05 mi) and West Fork (4.15) of Long Creek. Instream flow study reports were completed in 2019 shortly before the instream flow applications were submitted. In 2020, the instream flow biologist participated in a scoping meeting for WWDC’s hydrologic feasibility study. If the instream

flow applications advance to permit status, approximately 20 miles of critical stream habitat will be protected by maintaining flows for Yellowstone Cutthroat Trout spawning, passage, and year-round survival.

Beaver Transplants to Enhance Riparian Areas (Goal 2) - Amy Anderson and Joanna Harter

Lander habitat personnel relocated two adult beavers as part of a region-wide effort to improve stream and riparian habitat with beaver dams. One adult beaver was trapped in an irrigation ditch near Kinneer and transplanted to a tributary of the North Fork Popo Agie River with the goal of maintaining existing beaver dams and large ponds that provide high-quality wildlife habitat. Another adult beaver was trapped in an irrigation ditch near Crowheart and transplanted to the Sweetwater River where a landowner was interested in improving beaver populations. The beaver was released near recent-



Figure 85. *Preparing for beaver transplant by cutting willows.*



Figure 86. *Beaver released on the Sweetwater River.*

ly abandoned dams and provided with several stashes of willow cuttings placed along the stream banks. The Lander region received over 13 calls in 2020 from landowners interested in assistance with nuisance beaver. To encourage landowners to live with beaver on their property, a resource with step-by-step instructions on protecting trees from beaver was developed and distributed to interested landowners.

West Cottonwood Creek BDA Monitoring (Goal 2) - Amy Anderson and Joanna Harter



Figure 87. Willow plantings on West Cottonwood Creek in the reach where BDAs were installed.

The Green Mountain Riparian Enhancement is in its third year of active habitat manipulations. In 2017, in West Cottonwood Creek, eight BDAs were constructed to improve riparian vegetation and floodplain connectivity. This project occurred on both BLM and private lands and was initiated by the private landowner who was concerned about the decline of mule deer on Green Mountain. A steel jack fence was constructed around a 700-foot long section of stream and riparian area including three of the BDAs to exclude grazing by cattle and wild horses but enable grazing by mule deer and pronghorn. A five-year monitoring plan was developed to monitor changes in

the stream channel and riparian vegetation with data collected every year since 2017.

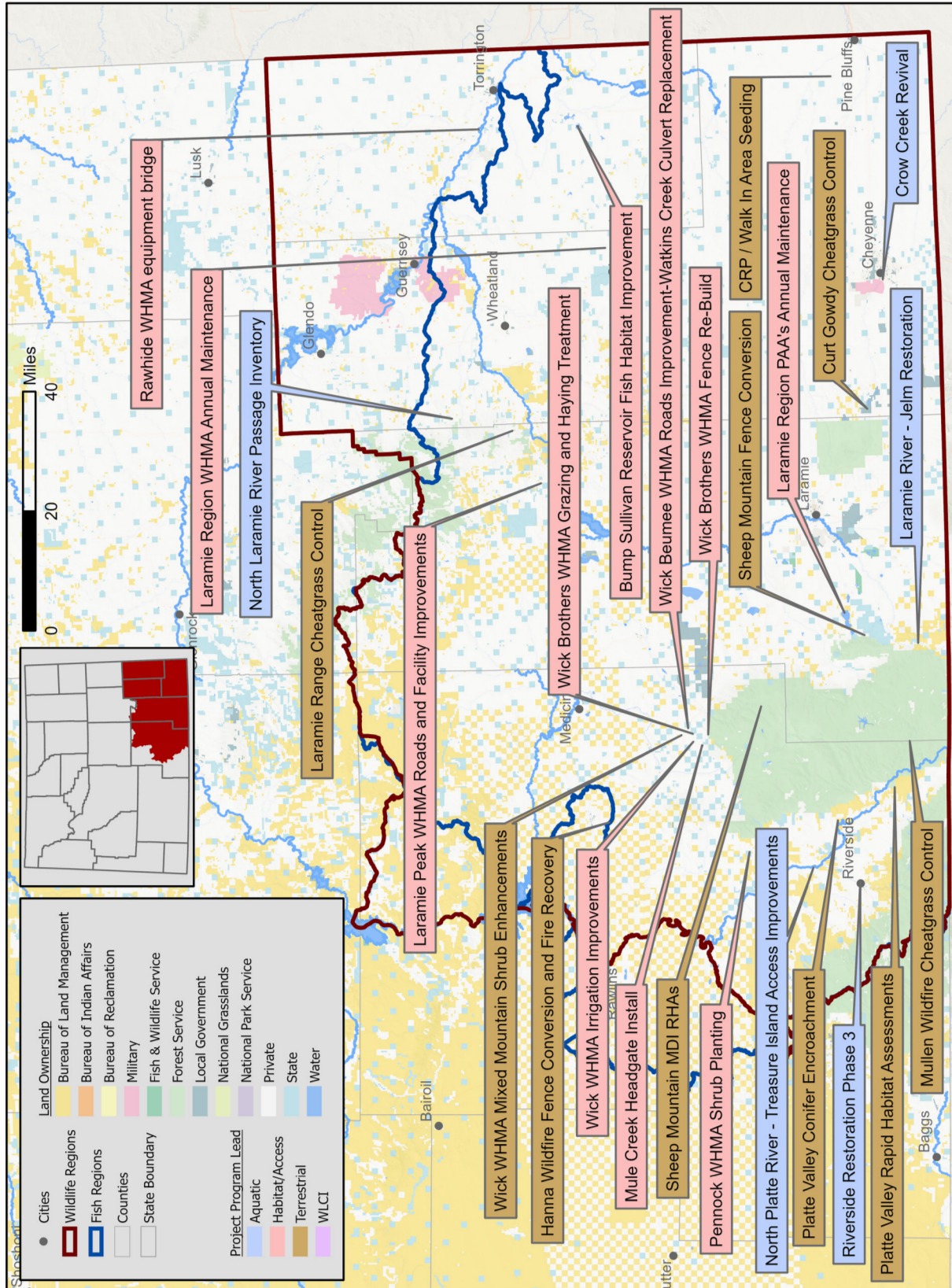
BDAs continue to slow water velocity and trap sediment to allow high flows to spill onto the floodplain. Riparian vegetation within the steel-jack fenced reach has expanded and become more robust. In the unfenced reach, stubble height of grasses and sedges along the stream banks of the unfenced reach in late August was 0.5% to 3%, highlighting the importance of grazing management in riparian area improvement projects. Some maintenance will be required in 2021 including re-weaving willows through several BDA structures and potentially replacing loose posts in two structures.

The previous year's monitoring revealed that although herbaceous vegetation was improving in the riparian area, willow growth was minimal. Thus, in mid-May 2020, approximately 500 dormant willow stakes were planted in the stream banks adjacent to the BDAs. Willow stakes were evaluated for survival based on presence of leaves in late August 2020, with 58% survival in the fenced reach and 73% survival in the unfenced reach. Overall, the BDAs are functioning as intended, trapping sediment, reconnecting the channel with its floodplain, and improving irrigation of the riparian area.



Figure 88. Typical condition of banks and stream in the fenced reach of West Cottonwood Creek where BDAs were installed in 2017.

Laramie Region



Laramie Region



Wildlife in the Laramie Region will benefit from the diversity of habitat projects completed in 2020.

Aquatic habitat improvements included work on the Encampment river, additional planning for revitalization of Crow Creek through Cheyenne, securing additional water for Diamond Lake, improvements to the Laramie River at Jelm WHMA, and planning to rehabilitate the Treasure Island access on the North Platte River.

Several terrestrial habitat projects were completed in the region, including cheatgrass control at Curt Gowdy State Park and in the Laramie Range, planning for post-fire efforts near Hanna and in the Snowy Range, converting fence to wildlife friendly specifications near Sheep Mountain, masticating juniper in the Platte Valley and mowing shrubs on the Wick WHMA to stimulate resprouting.

Projects for the newly developed SHP Goal 3 (Migration) were initiated including a pronghorn study in the Shirley Basin, an elk study near Camp Guernsey, a moose study in the Snowy Range, a bighorn sheep study near Douglas Creek and mule deer collaring studies near Saratoga and Sheep Mountain.

Personnel in the Laramie Region maintained 11 Wildlife Habitat Management Areas and 40 Public Access Areas during 2020. Crews maintained more than 210 miles of fence, treated 976 acres of noxious weeds and irrigated more than 900 acres. In addition, a new partnership with the Wyoming Army National Guard resulted in benefits to Department roads, infrastructure and facilities.

Crow Creek Revival (Goal 2) - Christina Barrineau



Figure 89. *Crow Creek near I-25.*

Crow Creek Revival is a group of local, state, and federal governmental agencies, non-governmental organizations, and interested individuals who lead revitalization efforts along Crow Creek in Cheyenne. The group formed in 2017. Crow Creek Revival's mission is to promote, enhance, restore, and revitalize the ecological values and functions of Crow Creek and its tributaries for public enjoyment. Crow Creek and Dry Creek are the main focus for restoration activities.

Planning for the restoration of Crow Creek Revival Phase 1 continued in 2020. The reach extends from the Happy Jack Rd/Highway 210 crossing downstream approximately 0.6 miles to Westland Road. Additional information and requirements from property and infrastructure owners (i.e.,

Black Hills Energy and WYDOT) was gathered and relayed to the project designer, River Design Group, for the final design. The final design is expected in 2021.

CRP/ Walk-In Area Seeding (Goal 2) - Ryan Amundson

Herbicide application occurred and planning for future planting of 500 acres of dense nesting cover in Laramie County to provide habitat for upland game birds, big game, grassland birds and small mammals occurred in 2020. Once the stand is established, the WGFD plans to release pheasants for sportsmen on this site.



Figure 90. *Smooth brome dominated CRP tract.*

Curt Gowdy Cheatgrass Control (Goal 2) - Ryan Amundson

1,100 acres of cheatgrass invaded mixed mountain shrub and Ponderosa pine savanna habitats were treated within the Curt Gowdy State Park in September 2020. The herbicides, Plateau and Rejuvra, were used in tandem and applied with helicopter. In addition to spraying, Curt Gowdy State Park and partners are ramping up efforts to educate the public about noxious weeds through signage, boot cleaning stations at trailheads, and other outreach tools.

Diamond Lake Water (Goals 1 and 2) - Jerry Cowles, Micah Morris, and Del Lobb

The WGFD and Wheatland Irrigation District formed a partnership to provide Diamond Lake water



Figure 91. *Diamond Lake dock.*

each year if it is available. Since 2016, approximately 1,000 acre foot of water has been filling the lake each year along with stocking Rainbow Trout in 2016, Bonneville Cutthroat, Yellowstone Cutthroat, Snake River Cutthroat, and Brook Trout to allow anglers more species to catch. In 2017 the WGFD’s Engineering and Habitat and Access crews installed 5,750 feet of 24 buried pipe, 24” headgate flume and outfall structure that connects the Canon Ditch with Diamond Lake. For the first time in nearly 20 years Diamond Lake hit the full line in late June and is returning back to a very productive fishery. The pipeline minimizes habitat degradation and

reduces water evaporative loss. Providing cold mountain water into the fishery decreases the water temperature which helps the overall health of the trout.

Sportsman’s dollars to develop fishing opportunities for anglers and important relationships with supportive entities such as Wheatland Irrigation District make fisheries like Diamond Lake a possibility. Funds from the Sport Fish Restoration Program were used to maintain water levels.

Douglas Creek Bighorn Sheep Collar Study (Goal 3) - Ryan Amundson

In winter 2018-2019, ten bighorn sheep were fitted with GPS collars as part of a statewide bighorn sheep disease sampling effort. The collars were programmed to collect data every three hours for two to three years depending on battery life. We are starting to see low voltage warnings for some of the collars indicating they are reaching the end of their life. To date there has only been one mortality. Data collected from these collars will inform and prioritize future habitat projects, compare dispersal from home ranges pre and post Mullen fire, update seasonal ranges, and provide annual survival data.



Figure 92. *Bighorn sheep in Douglas Creek.*

Encampment River Bighorn Sheep Research (Goal 3) - Britt Brito, Embere Hall, and Teal Cufaude

Over the last four winters (2017-18, 2018-19, 2019-20, 2020-21) four helicopter/net-gun capture and collar efforts have occurred in the Encampment River bighorn sheep herd unit. As of February 2021, there were 21 collared bighorn sheep within this herd. These collared sheep will be monitored until November 2023. The original purpose of this work was to provide a credible estimate of the number of bighorn sheep that utilize winter range in this herd unit. Additionally, a full array of disease samples were collected from captured bighorn sheep as part of a statewide disease surveillance effort. Since the original capture effort, the objectives for this work have evolved. Fine-scale movement data

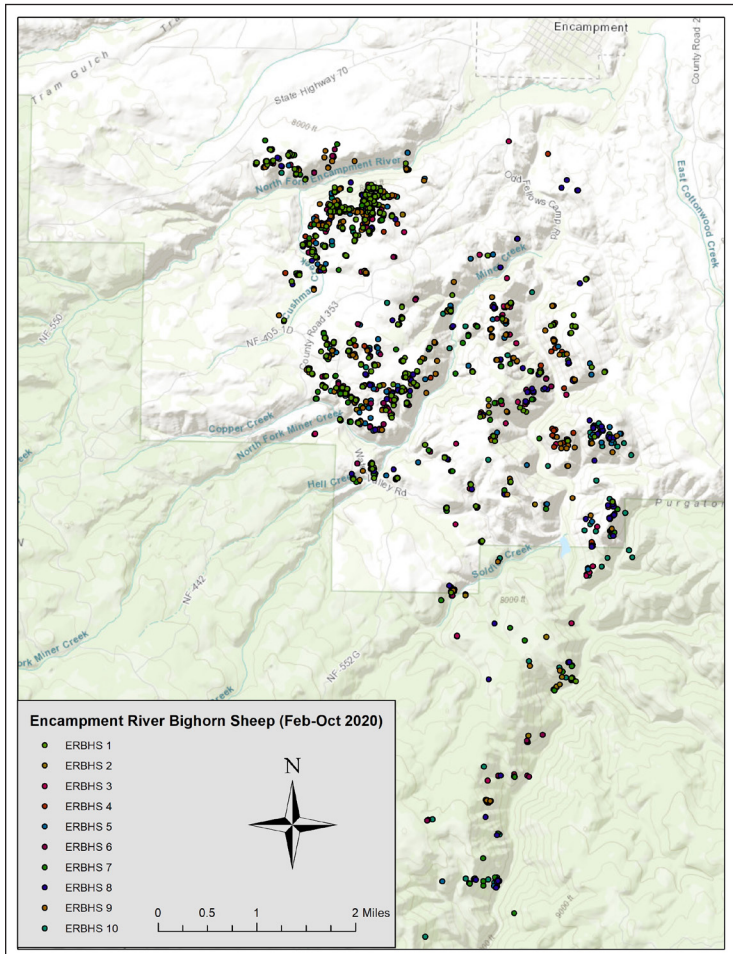


Figure 93. Encampment River bighorn sheep GPS collar data from February to October 2020.

collected from the GPS collars will help managers to both more fully understand the movements of this herd, and to delineate the habitats these bighorn sheep select. Managers will use these data to determine high-use ranges and movement routes and to better quantify the habitat attributes that might limit the expansion of this herd. This work may also provide insights on habitat components that are important to the resilience and expansion of other small, isolated bighorn sheep herds across the state. From location data collected thus far, it appears the bighorn sheep are using an approximately 12.75 square mile area in shrub-dominated slopes within the Encampment River drainage and avoiding dense conifer stands. Coarse, qualitative habitat analyses show that bighorn sheep movement seems to be constrained by habitat type and Highway 70, despite the availability of suitable habitat to the northwest and southeast of their current area of use.

Hanna Wildfire Fence Conversion and Fire Recovery (Goal 2) - Ryan Amundson

The RR316 Wildfire burned 14,200 acres outside of Hanna, Wyoming in late summer 2020. High fire severity resulted in loss of substantial sagebrush cover, affecting sage grouse core area, as well as spring, summer, fall ranges for pronghorn and mule deer. To assist with vegetation recovery, fences and water developments need to be repaired to accommodate proper rest, as well as help facilitate rotational grazing systems going forward. Over ten miles of woven wire/barbed combination fence was burned and is planned to be replaced with four-wire wildlife friendly fence. Pronghorn movements through this area will be significantly improved.



Figure 94. Wind erosion post-wildfire.

Landscape Vegetation Analysis (Goal 2) - Katie Cheesbrough, Mark Conrad, and Britt Brito

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. WGFD personnel continued to work collaboratively to address public concern and review NEPA documents for the modified EIS and began steps to prioritize projects for future implementation under LaVA. The Final Record of Decision was released on August 13, 2020. Under the Final Record of Decision, the LaVA Project allows for up to 360,000 acres to be treated over the next 15 years. In September 2020, the Mullen Fire burned across approximately 176,800 acres in the southern portion of the Snowy Range on the Medicine Bow National Forest and burned portions of six of the 14 accounting units that make up the LaVa project area. LaVA project implementation is on hold in these six accounting units while USFS personnel assess post-fire conditions.

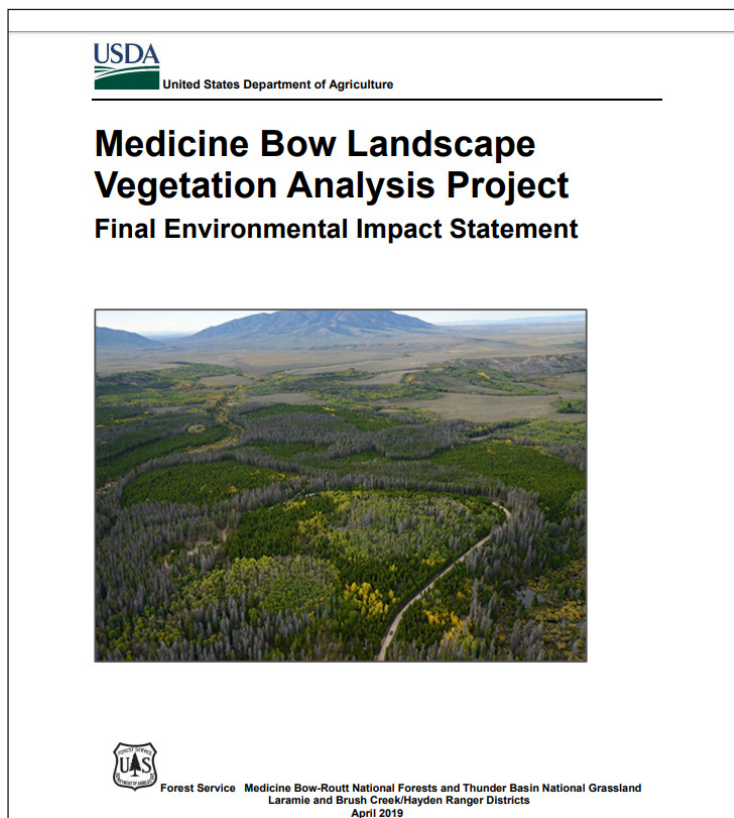


Figure 95. *The USFS Landscape Vegetation Analysis Project EIS.*

Laramie Peak Bighorn Sheep Herd (Goal 3) - Ryan Amundson and Martin Hicks



Figure 96. *Sybillie Canyon bighorns foraging within a cheatgrass treatment site.*

This project is part of the statewide bighorn sheep disease surveillance effort, to garner baseline information on the various pathogens within Wyoming's wild sheep populations as well as identify seasonal movement patterns, crucial winter range, habitat selection, lambing areas, and generate mortality and survival estimates. The project started in March 2017 with six female wild sheep captured, biological samples were collected and GPS collars were deployed on all six sheep within Iron Mountain sub-herd. Then in January 2019, 16 female bighorn sheep were captured and 15 were deployed with GPS radio collars within the Sybillie Canyon and Duck Creek sub-herds. Finally in February 2021 an additional seven female sheep were captured and all seven were deployed with GPS radio collars. Three sheep were captured in the Sybillie Canyon sub-herd and the other four sheep were captured within the Duck Creek sub-herd. The total number of marked sheep from 2017-2021 is 28

and the collars were all scheduled to be deployed for three years. Within the Iron Mountain sub-herd there were four mortalities over the duration of deployment. Within Sybille Canyon and Duck Creek sub-herds there have been seven mortalities to date. Within the three sub-herds there have been wild and prescribed fires.

Wyoming Army National Guard Assistance (Goals 1 and 2) - Jerry Cowles, Ray Bredehoff, Todd Grosskopf, and Robin Kepple

More than 70 soldiers from the 133rd Engineer Company worked on the project for their annual two-week training exercise. As an Engineer Support Company, the 133rd can accomplish a wide array of earthmoving and vertical construction projects; the team actively seeks community projects to practice field skills they may need in the future, when called upon.

The soldiers tackled the work with military flair and fury. A Horizontal Crew worked on the roads, installing, five cattle guards, eight 24-inch culverts, adding 502 yards of gravel, grading roads, adding water bars, and raising the roadbeds to aid in runoff. A Vertical Crew worked on updating the regional patrol cabin to meet current building codes. The work involved replacing old plumbing and adding new wiring and fixtures throughout the cabin, reframing some interior walls, and adding an egress window in the basement. They also installed interior and exterior lights, new circuit breakers, breaker panel and a new 220-volt line in the barn.

Harnessing the ability to display combined work force efforts between the two agencies will provide lifelong training opportunities for soldiers, enhance wildlife habitat, and increase public trust.



Figures 97 and 98. *Fire and might stand at attention.*

Laramie Range Cheatgrass Control (Goal 2) - Ryan Amundson



Approximately 6,000 acres of wildfire burned areas in the Laramie Range were treated aerially with herbicide to control cheatgrass. Important seasonal ranges for elk, mule deer, and bighorn sheep were located within treatment polygons. Controlling cheatgrass post-fire is necessary to provide native, perennial vegetation a competitive advantage.

Figure 99. *Sybille Canyon cheatgrass treatment.*

Laramie Region PAA's Annual Maintenance (Goals 1 and 3) - Jerry Cowles, Micah Morris, Jacob Sorensen, and Mark Cufaude

Public Access Areas serve as critical recreational areas for the hunting, fishing, birding, biking, boating, and many other activities. Yearly maintenance and upkeep is necessary to preserve the habitat for aquatic and terrestrial species as well as 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 on sensitive habitat, provide access with improvements for sportspersons, and be as wildlife friendly as possible. The Laramie crew installed, maintained, or replaced 243 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 and repairs for 11 contracts to service comfort station, litter removal and other needs at the high use recreational sites. Noxious weeds were spot spayed, documented with various contractors and Habitat and Access crew. Additional biological controls were strategically placed to assist with the eradication of noxious weeds. Several times throughout the year the crew made adjustment to 11 boat docks for enjoyment of sportspersons.

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

The crew maintained 210 miles of boundary and pasture fence and reconstructed five additional miles to meet wildlife friendly specifications. In 2020, 915 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. Many of the irrigated acres are harvested for hay or grain crop with the benefits to include wildlife nesting cover, food plots, and standing forage for wintering wildlife. These grain crops are harvested with 20% remaining for wildlife benefits. Alfalfa, Barley, Corn, and other small grain crops were planted, irrigated and harvested through a Barter contract to improve habitat or irrigation systems on the WHMA.



Figure 100. *Laramie regional office.*

The crew worked with several private contractors and county weed and pest districts to eradicate or control 976 acres of state designated noxious weeds on the region WHMAs. Road maintenance included installing four cattle guards, cleaning out an additional 13, installing 12 culverts, and maintaining or overseeing contracts to improve 297 miles of roads with 64 associated parking areas. The crew installed 176 new signs while inspecting the 12,357 signs in the region that provide information for the public. The crew provided contract oversight and hands on repairs for comfort station and parking area maintenance at all the region WHMA's.

The WGFD WHMA's have several facilities that require annual maintenance. Facility improvements included structural needs, roof replacements and repairs, siding, kitchen remodel, electrical, plumbing, HVAC, and annual inspections or testing. These WGFD facilities are located at: Springer WHMA,

Red Rim Grizzly WHMA, Saratoga, Wick Brothers WHMA, Laramie Peak WHMA and the Laramie Regional Office.

Laramie River - Jelm Restoration (Goal 2) - Christina Barrineau



Figure 101. Completed toewood and bankfull bench along new channel alignment.

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 channel realignment, grade control, toe wood bank stabilization, and increased bedform diversity.

Restoration construction began summer 2020. Approximately 1,205 linear feet of channel was restored. Toe wood with sod mat bankfull benches was installed along 750 feet of streambank. One boulder constructed riffle was installed. Excess material from the new channel was moved to fill portions of old channel and create a floodplain. Construction will continue in 2021 with completion expected in the fall.

The Laramie River - Jelm Restoration is located on the upstream (south) public fishing easement portion of the Jelm WHMA. Over the last ten 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. WGFD is working with the landowner and project partners including the LSRCD, NRCS, and USFWS to address channel stability and aquatic habitat enhancements

Mullen Wildfire Cheatgrass Control (Goal 2) - Ryan Amundson

In fall 2020, the Mullen Wildfire burned 176,800 acres in the Snowy Range west of Laramie. Through post-wildfire mapping efforts, an estimated 17,000 acres is at high risk or probability of cheatgrass invasion, based on slope, aspect, fire severity, and known infestations. Herbicide application via helicopter is planned for summer 2021, encompassing up to 14,680 acres. Bighorn sheep, moose, elk, and mule deer seasonal ranges have all been affected by the wildfire. Controlling cheatgrass in the year following fire will aid in recovery of native, perennial vegetation. Efforts are underway in Winter 2021 to secure funding for the project. USFS BAER funding in the amount of \$578,000 has been allocated, with numerous other applications submitted.



Figure 102. Mullen Wildfire - October 2020.

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

The Treasure Island Stream Restoration, Boating Access, and Parking Improvements is an effort to improve North Platte River stability and enhance boating access and parking conditions at the heavily utilized Treasure Island PAA. Design efforts got underway in 2019. Further design efforts occurred in 2020 along with fundraising. The project is anticipated to be constructed in 2021.

The design consultant, Biota Research and Consulting Inc., provided 10% conceptual design alternatives in February for WGFD to consider. WGFD personnel met with angling outfitters in Laramie and Saratoga for their feedback on the alternatives.

The alternative selected for design features moving the existing boat ramp slightly upstream from its present location and creating better parking organization and traffic flow. River manipulations include narrowing the channel and building a floodplain bench along the west bank. An additional design meeting between WGFD and Biota was held at the 60% level. In addition to design efforts, the Laramie Aquatic Habitat Biologist completed steps for the permitting process.

Wetland delineation information was compiled for an Aquatic Resource Inventory report. The report will be submitted with the design and other project information to the Army Corps of Engineers for permitting. Also, project leaders met with personnel from the WY Department of Environmental Quality and Army Corps of Engineers for a pre-project on-site meeting. The meeting allowed the regulators an opportunity to visit and learn about the proposed project.

The Treasure Island Stream Restoration, Boating Access, and Parking Improvements is planned for construction in summer and fall 2021.



Figure 103. Gravel bar next to boat ramp making boating access to river difficult at low flows.

Pennock WHMA Shrub Planting (Goals 1 and 2) - Mark Cufaude



Figure 104. Planting shrubs on Pennock WHMA.

1450 shrubs were recently planted on Pennock WHMA near Saratoga. The shrubs were planted near riparian areas to increase cover and forage for wildlife species. The shrubs consisted of wax currant, golden currant, skunkbush sumac, and caragana. Each species planted flowers annually attracting bugs and birds, they then will produce fruit for foraging in the fall by birds and mammals. Each shrub was placed in a shrub shelter to prevent premature browsing by wildlife.

Platte Valley Mule Deer Migration Corridor Draft Biological Risk and Opportunity Assessment (Goal 3) - Katie Cheesbrough, Britt Brito, Embere Hall, and Teal Cufaude

The Platte Valley Mule Deer Migration Corridor was developed based on results from a movement study led by the University of Wyoming Cooperative Fish and Wildlife Research Unit. In the study, conducted from 2011-2013, 55 female mule deer in the Platte Valley herd unit were fitted with GPS collars to document important areas used for seasonal migration. In 2018, following a broad public outreach effort, the Platte Valley Mule Deer Migration Corridor was designated through the Wyoming Game and Fish Commission Migration Corridor Strategy (2016). This designation was then codified when Governor Mark Gordon included the corridor in Executive Order 2020-1 Wyoming Mule Deer and Antelope Migration Corridor Protection”. The Order also provided a framework for the WGFD to work with partners to complete a biological risk and opportunity assessment for the migration corridor.

The Platte Valley Mule Deer Migration Corridor Draft Biological Risk and Opportunity Assessment uses the best available spatial data to identify existing and potential threats to mule deer movement within the migration corridor footprint. This includes data retrieved from within the Department and data collected from numerous collaborators including USFS, BLM, WYDOT, and Carbon County. The Platte Valley Mule Deer Migration Corridor was partitioned into five segments in the draft Biological Risk and Opportunity Assessment to facilitate more site-specific analyses and to focus recommendations on meaningful sections of the herd. This comprehensive review identifies conservation challenges and opportunities within the corridor such as protected areas, zoning and exurban development, fences, roads, energy development, trails and recreation, invasive species, and habitat improvement initiatives.

Platte Valley Conifer Encroachment (Goal 2) - Katie Cheesbrough and Britt Brito



As part of the collaborative Platte Valley Habitat Partnership effort, the BLM is continuing their large-scale conifer encroachment efforts in the Platte Valley. Using heavy equipment masticators, 146.2 acres of dense juniper encroachment was cleared in the North Corral Creek Unit. Work completed since 2018 has brought the total acres of juniper removed to over 1,200 acres. This work was conducted in sage grouse core area and much of the work was conducted within the Platte Valley mule deer migration corridor.

Figure 105. *Juniper mastication conducted in the Bennett Peak area.*

Platte Valley Mule Deer Research (Goal 3) - Britt Brito, Embere Hall, and Teal Cufaude

Forty-seven Platte Valley mule deer does were fitted with GPS collars in February 2020. The project area encompasses Deer Hunt Areas 78, 79, 80, and 81. The primary objective is to evaluate detailed movement data. The movement data will be analyzed using a Brownian Bridge Movement Model (BBMM) to quantify and delineate important areas used for Platte Valley mule deer migration. The

BBMM results will be refined in accordance with the WGFD’s Ungulate Migration Corridor Strategy to update the designated migration corridor, stopover areas, and bottlenecks. Through the course of the project, managers will also collect information on timing of migration and doe survival. Data will be used to inform priority opportunities for habitat improvement projects including fence conversions, shrub enhancements, roadway crossings, and invasive species mitigation. The collars are programmed to release from the deer in November 2022.

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

RHAs are conducted in MDI herds across the state to better assess habitat conditions across mule deer seasonal ranges. The summer of 2020 is the sixth 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 range-land assessments (997 acres), six aspen assessments (143 acres), and three riparian assessments (85 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.



Figure 106. Riparian RHA conducted at South French Creek.

Rawhide Elk Collar Project (Goal 3) - Ryan Amundson and Martin Hicks



Figure 107. Cow elk with collar.

The WGFD partnered with the Wyoming Military Department (Camp Guernsey) to capture 29 female elk during January and February of 2018. All 29 cow elk from the Rawhide Herd were fitted with GPS collars. Animals were captured from and on lands adjacent to Camp Guernsey, Platte County, WY. Collars were programmed to collect a GPS location every two hours and to drop off after three years. As elk died, collars were collected and redeployed the following January. Some of the collars malfunctioned and dropped off early, these were also redeployed. During 2020, the sample size was maintained and data analysis is anticipated to begin in 2021.

This project will analyze the spatial data collected from these collars by using a resource selection function to determine what habitat variables influence habitat use and movement in the Rawhide elk herd. Habitat characteristics that will be assessed include standard habitat variables in addition to

recent fire history, rural residential development, livestock grazing, presence of irrigated crops (pivots), hunter use, and military training. Unique types of military training may also be used to evaluate effects of disturbance relative to different activities.

Rawhide WHMA Equipment Bridge (Goals 1 and 2) - Brandon Werner, Jerry Cowles, Jacob Sorensen, Kade Clark, Mac Foos, Rick Harmelink, Todd Grosskopf, and Loren Woodin

The WGFD replaced a dilapidated footbridge spanning an irrigation canal on the Rawhide WHMA. The footbridge was a safety hazard for the public users and replaced with a larger prefabricated equipment bridge that is 40' X 14' with safety railings. Replacement of the bridge required installing a new precast concrete bridge sills to support the new bridge with fully loaded heavy equipment. The installation of the bridge comes with an array of benefits for first responders, private contractors, irrigation districts, WGFD personnel, and now the ability for ADA users to access the WHMA island section.



Figure 108. *Rawhide WHMA Bridge installation.*

Rawhide WHMA riparian area is a mixed cottonwood and willow gallery with encroaching Salt Cedar and Russian Olives. The North Platte River runs through three miles of the WHMA and at bank full these irrigation canals scour around bridge structures and creating new hazards both upstream and downstream.

With this new bridge crews can complete an additional 267 acres of noxious weed control including Salt Cedar and Russian olive to restore the Cottonwood gallery. Crews now have the ability to access the island to repair the excessive degradation along the floodplains.

Encampment River Riverside Restoration Phase III (Goal 2) - Christina Barri-neau



Figure 109. *Installing soil lifts along toewood treatments.*

The Encampment River Riverside Restoration Phase 3 is the final phase of the Riverside Restoration which began in 2017. The restoration occurred through 2,700 linear feet of channel near Riverside, Wyoming. Overall restoration goals included 1) decrease streambank erosion, 2) decrease riffle bankfull widths, 3) increase riffle bankfull depths, 4) redirect the river to flow under the middle of the Highway 230 bridge, and 5) move irrigation point of diversion upstream to more stable location. The Encampment River Riverside Restoration Phase 3 was completed in 2020. Located downstream of the Highway 230 in Riverside, the restoration was 800 feet in

length and included moving an irrigation point of diversion slightly upstream to a more stable location. Several structures were installed to aid in irrigation water delivery and design channel dimensions. Two rock j-hooks and one rock constructed riffle were installed. Additionally, approximately 150 feet of toewood was placed along the outside bend for bank protection and trout habitat enhancement.

Sheep Mountain Fence Conversion (Goal 3) - Ryan Amundson

Two miles of woven wire/barbed combination fence was replaced with four-wire (three barbed, one smooth) on the east face of Sheep Mountain. Pronghorn, mule deer, and elk have all experienced difficulties crossing these property boundary fences. The conversion will allow wild ungulates to utilize key shrubs within the property, and move along the face of Sheep Mountain. Twenty volunteers assisted with fence removal in Summer 2020, followed by hiring a private contractor to install two miles of fence utilizing wildlife friendly specifications.



Figure 110. *Fencing before (left) and after (right) conversion from woven wire/barbed wire to four-wire fencing.*

Rapid Habitat Assessments - Sheep Mountain Mule Deer Herd (Goal 2) - Ryan Amundson

Fifty-one RHAs were completed throughout the Sheep Mountain Mule Deer herd unit, encompassing 3,274 acres. The 2020 focal areas were the northern end of the Snowy Range, with many assessments being completed in transition and winter ranges on private lands south of Interstate 80. Twenty-four aspen RHAs on 905 acres, 19 rangeland RHAs on 2,033 acres, six Riparian RHAs on 319 acres and two special RHAs on 15 acres were conducted.



Figure 111. *True mountain mahogany shrub stand.*

Sheep Mountain Mule Deer Collar Study (Goal 3) - Ryan Amundson, Lee Knox, and Embere Hall

During winter 2020/2021, 30 doe mule deer were fitted with GPS collars in the Sheep Mountain mule deer herd, which encompasses Hunt Areas 74, 75, 76 and 77. Collars are programmed to collect data every two hours for three years. This project is an extension of the 2017-2019 GPS collaring project to fill data gaps. Brownian Bridge analysis will be conducted in accordance with the WGFD's Ungulate Migration Corridor Strategy to designate migration corridors, stopover areas, and bottlenecks within the herd unit. Additionally, data will inform and prioritize future habitat projects, update seasonal ranges, and provide annual survival data.

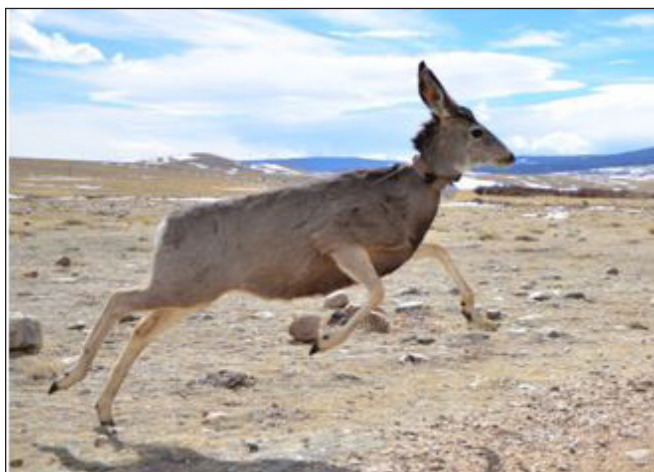


Figure 112. Mule deer released after capture.



Figure 113. Mule deer being fitted with GPS collar.

Snowy Range Moose Research (Goal 3) - Britt Brito, Embere Hall, and Teal Cu-faude

A moose research project was initiated by the Wyoming Cooperative Fish and Wildlife Research Unit and the WGFD in the Snowy Range herd during spring 2017. The objectives were to assess survival and cause-specific mortality of adult female moose and evaluate patterns of habitat use of female moose as a function of habitat conditions, with specific reference towards understanding the balance between thermal refuge and forage acquisition. In March 2018, 28 adult female moose were collared as part of this project. This work has pointed to the importance of small wet meadow complexes for not only forage but also behavioral thermoregulation in moose. It highlights the importance of conserving these riparian corridors and wet meadow complexes.

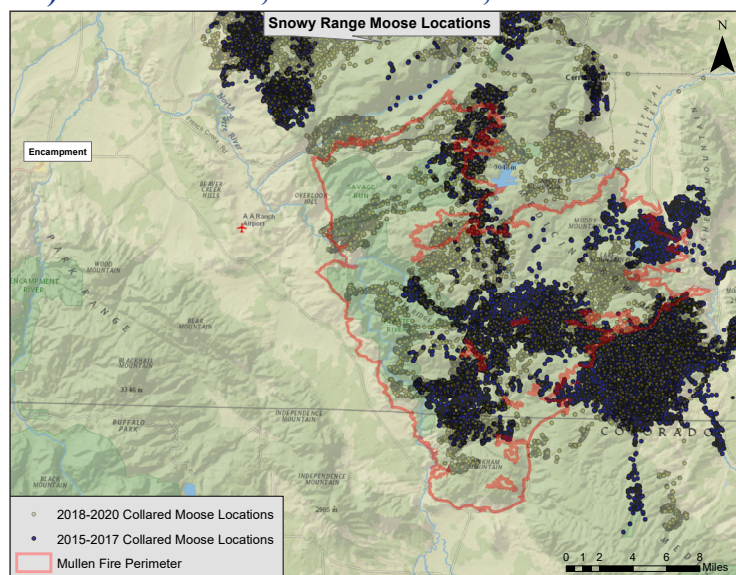


Figure 114. Snowy Range moose GPS collar data collected from 2015 - 2020.

As of February 2021, there were 12 collared female moose in the Snowy Range herd unit. These collars will stop transmitting data in March 2021. WGFD will be pursuing additional funding to collar several of these moose to monitor pre-/post-Mullen Fire habitat selection and distribution. WGFD managers also plan to use location information

to inform selection of habitat monitoring transects beginning in summer 2021.

Wick Beumee WHMA Roads Improvement (Goals 1 and 3) - Brandon Werner, Jerry Cowles, Micah Morris, Mac Foos, Rick Harmelink, and Todd Grosskopf



Figure 115. *Statewide crew installing new cattle-guard where an electric fence will go.*

Habitat & Access crews continued maintenance and completed upgrades to approximately 13 miles of public access roadway within the Wick Brothers and Beumee Wildlife Habitat Management Area. Approximately six culverts were re-set including two 42' diameter along the Watkins Creek crossing. Additionally, four cattle guard crossings were installed to minimize gate application and/or trespass cattle entry. Road improvements are crucial for public access, wildlife and fishery passage and also domestic and livestock control. Regional and statewide Habitat & Access personnel complete annual maintenance and upgrades to the road system within WGFC

owned wildlife habitat management and public access areas to optimize public access for a variety of outdoor endeavors.

Wick WHMA Grazing and Haying Treatment (Goals 1 and 2) - Jerry Cowles and Micah Morris

Wick WHMA Grazing treatment began in 2019 and during that field season 482 animal unit months were utilized. During the 2020 field season, approximately 994 animal unit months were utilized. The annual haying project was utilized from 2016 to 2020 under the stewardship agreement to hay and transport a minimum of 300 to 350 acres of grass hay meadows.

Grazing lessees perform fence maintenance, water developments, other infrastructure needs for the WHMA, and rest grazing on private land that provide summer range habitat for wildlife. The haying operation is in place to remove weed growth and thatch to provide sunlight for establishing native species and to help control woody plants in prairies and wetlands. Haying is also used as a management tool to help maintain diversity levels.



Figure 116. *Cattle grazing on Wick Meadows.*

Wick Brothers WHMA South Boundary Fence Re-Build (Goals 1 and 2) - Brandon Werner, Jerry Cowles, Micah Morris, Mac Foes, and Todd Grosskopf



Regional and statewide Habitat & Access crews tore down and re-built approximately 1 mile of high mountain forest WHMA boundary fence during the 2020 season to prevent trespass cattle during the 2020-2021 grazing project. The remaining half mile will be completed during the 2021 season.

Figure 117. *Statewide crew rebuilding fencing.*

Wick WHMA Irrigation Improvements (Goal 1) - Brandon Werner, Jerry Cowles, Micah Morris, and Mac Foes

The regional and statewide Habitat & Access crew installed approximately 4,800 feet of gated pipe, 16 navigator valves and four diversion boxes to the Upper 18 meadow to upgrade water delivery system to more efficiently capture and distribute allocated water rights. Upgrades were also made to Bull and Johnson Oleson Pasture which included three diversion boxes, four navigator valves, and one agri-drain.



Figure 118. *Clearing irrigation ditch and installing diversion box.*

Wick WHMA Mixed Mountain Shrub Enhancements (Goal 2) - Ryan Amundson and Micah Morris

Brush mowing of mixed mountain shrubs on winter range habitats for elk, mule deer, and moose was completed on over 150 acres. Following mowing, shrubs will resprout from the base and provide nutritious regrowth and increased annual leader production. Approximately eight miles of perimeter was mowed in preparation for prescribed burning activities to be conducted in fall 2021 and 2022.



Figure 119. *Skid steer with brush mower attachment.*

Understanding Pronghorn Responses to Wind Energy Development (Goal 3) - Ryan Amundson, Justin Binfet, and Embere Hall

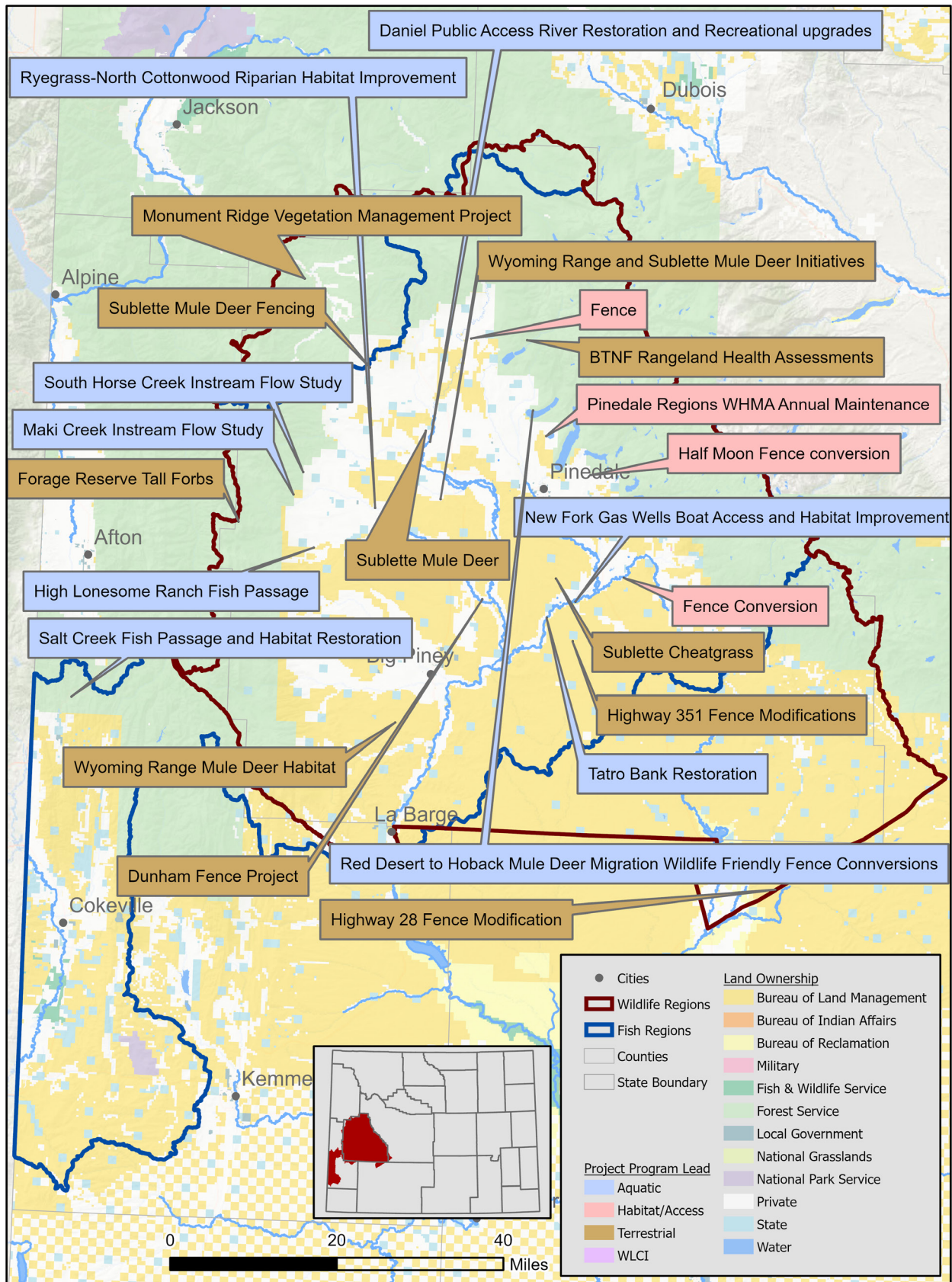
Wind energy development is a growing, landscape-scale use in Wyoming. Much remains to be learned, however, about the degree to which development may influence pronghorn movement, behavior and demography. In March 2018, helicopter capture crews deployed 80 GPS collars on does in the Shirley Basin to quantify the effects of wind energy development on habitat use, seasonal movements and survival. The project leverages a before / after design and will run for six years, ending in 2024. In addition to helping the WGFD understand the influence of wind development on pronghorn, results will guide efforts to improve habitat including potential fence conversions, water development and enhancement opportunities, and invasive species management.



Figure 120. *Collaring a pronghorn.*

An additional 40 collars were deployed in March 2020 on adult female pronghorn in the northern portion of this herd unit and partially within the original wind energy study area. The goal of this additional collaring effort is to elucidate potential pronghorn migration corridors from summer range in northern Shirley Basin to winter range in Bates Hole. While substantial seasonal pronghorn migrations have long been known to occur in this herd, there is a need to better delineate actual movement corridors. Seasonal migrations from seven collared pronghorn associated with the original wind research helped inform this additional effort. Understanding these movements will guide ongoing and future efforts to facilitate migration via habitat enhancement and fence modification efforts. The research is a joint effort between the WGFD and the Wyoming Cooperative Fish and Wildlife Research Unit.

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 were several fencing projects completed within the migration corridors this year to convert fences to wildlife friendly. This included projects on Black Butte and Half Moon WHMA, Boulder PAA, along Highway 28 and on private ranches throughout the region. The Wyoming Range and Sublette Range Mule Deer initiatives involved herbicide cheatgrass control, sagebrush mowing, prescribed fire and aeration. All of this is to improve grasses, forbs, shrubs and aspen on both public and private lands. 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 on the Tatro Meander on the Lower New Fork River. This restoration focused a 600-foot bankfull bench with root wads and rock vanes. Phase I of the Ryegrass-North Cottonwood riparian habitat project was also completed with 26 constructed riffles and 19 aggradation structures along 3.9 miles of the creek. In 2021 another stream restoration and boating access project will take place on Daniel Forty Rod PAA.

Annual maintenance continued on Pinedale Region PAAs and WHMAs. Maintenance included pipe boundary fence repairs, wildlife friendly fence conversions, installation of new drill pipe wildlife friendly fence, treating annual invasive grass, Soda Lake wetland restoration and improving access.

Bridger-Teton National Forest Rangeland Health Assessments (Goal 2) - Troy Fieseler

The SCCD, USFS, permittees and WGFD cooperatively monitored within two BTNF allotment complexes during the 2020 field season across approximately 41,120 acres. Fifteen separate sites were monitored including historic benchmark sites and newly established transects. Various techniques for data collection were employed including; nested frequency, LPI, line-intercept, MIM, green-line, photo documentation and soil pits. The main goal of this project is to provide a stronger level of data collection which will help in determining vegetation objectives, establish trend and inform adaptive management objectives. Furthermore, with these data a clearer picture of the overall rangeland and ecological health within these areas will be formed. Performing this monitoring effort as a group has fostered a collaborative relationship between all parties involved.



Figure 121. Partners packing in to perform monitoring over multiple days.

Daniel/40-Rod Access Area River Restoration (Goal 2) - Kyle Berg and Luke Schultz

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. Project plans are also being developed for a broader recreation plan at the access area to include improved parking facilities, new boundary fencing, and camp sites. Site assessments were completed in 2019 to inform designs that were reviewed and revised in 2020, and a wetland delineation was completed in 2020 to facilitate permitting. Additional fundraising was completed in 2020, and contractors were hired to haul rock and trees to the site in early 2021. We anticipate construction on the site will occur in August 2021.



Figure 122. Vertical eroding stream bank at the Daniel/40-Rod Access.

Dry Piney Wildlife Crossing (Goal 3) - Jill Randall

The Dry Piney Wildlife Crossing project is a collaboration between WYDOT and WGFD to reduce collisions between motorists and wildlife in an area just north of LaBarge along Wyoming Highway 189. Collaboration between the agencies began over ten years ago for this project but funding was not available for final engineering and construction. In 2019 the WGFC committed \$1.25 million



Figure 123. *Mule deer crossing a highway near Pinedale, WY.*

benefit mule deer in the Wyoming Range herd but pronghorn in the Sublette herd also use this project area. The majority of collisions have occurred in winter months as wildlife make daily movements across the highway to move between forage and water resources. GPS collars are in place to assess the effectiveness of the project in addition to changes in carcass counts post construction. Other projects similar to these have resulted in an 80-90% reduction in collisions.

Dunham Fence (Goal 3) - Troy Fieseler

The Dunham Ranch spans both the Sublette and Wyoming Range mule deer herds and lies within the Sublette mule deer designated migration corridor. Within each of these herds, 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 completed. The focus of this project has been to identify stretches of fence to modify to wildlife-friendly design or completely remove portions while still meeting the needs of the owners for livestock management. During 2020, landowners continued modifying fences on the property by adjusting wire spacing on existing stretches and also completing the removal and reconstruction of a fence to a pole-top wildlife-friendly design to aid in visibility. In total, 8.76 miles of fence has been either removed or converted on the property

which helped WYDOT secure a BUILD grant from federal Department of Transportation for \$14.5 million. With these funds secured, WYDOT was able to move forward with final engineering plans for this project in 2020. WWNRT, various NGOs and private foundations also contributed significant funding. The Wyoming's Wildlife and Roadways Summit in 2017 helped revive public energy towards completion of this project. Throughout this 17 mile stretch of highway wildlife exclusion fence will be constructed to funnel wildlife to one of eight proposed new underpass structures. Plans are in place to solicit bids in spring 2021. Construction will take a minimum of two summer seasons and will likely begin in late 2021 or early 2022. This project will primarily



Figure 124. *Addition of a smooth bottom wire and raising height to 18 inches off the ground.*

Boulder Rearing PAA Boundary Fence (Goals 1 and 3) - Miles Anderson, Kyle Berg, and Christopher Evans

Wildlife friendly boundary fence was built to protect riparian and terrestrial habitat while enhancing migration through Boulder Rearing PAA and East Fork River. 3.6 miles of wildlife friendly pressure treated pole top fence and drill pipe boundary markers were installed on the Boulder Rearing PAA and adjacent BLM Chalk Butte grazing allotment to protect riparian and terrestrial habitat and enhance the migration corridor.

Forage Reserve Tall Forbs (Goal 2) - Troy Fieseler

In 2020, monitoring continued within the Wyoming Range Allotment Complex and Triple Peak Forage Reserve which were initially created in 2004 and 2006. To better understand the effects of management change on plant communities, this monitoring has occurred over the last 14 years. Four benchmark sites were monitored using nested frequency, LPI and line-intercept methods. In addition to these sites, several areas with established green-lines were also monitored. The focal plant community for this project is tall forbs - dense, diverse wildflower communities that provide high quality forage for a suite of wildlife species ranging from mule deer to pollinators. The SCCD, BTNF and NRCS have been key partners bringing in expertise and resources to successfully accomplish project goals and objectives.



Figure 125. *Partners collecting data on a Tall Forb site.*

Half Moon WHMA Wildlife Friendly Boundary Fence Conversion (Goals 1 and 3) - Miles Anderson, Kyle Berg, and Christopher Evans



12.6 miles of boundary fence was replaced and converted to wildlife friendly drill pipe fencing to enhance the migration corridor and protect habitat on Half Moon WHMA.

Figure 126. *New drill stem wildlife friendly fence.*

Highway 28 Fence Modification (Goal 3) - Troy Fieseler and Dean Clause

The WGFD has been spearheading a partnership with the WYDOT, BLM and several volunteers to make sure migrating pronghorn and mule deer can safely get across Pinedale area highways to their crucial winter ranges. Several problem areas have been identified and worked on the past couple summers, including a significant project on Wyoming Highway 28 east of Farson where fencing along the highway has prevented pronghorn from migrating further south to areas of less snow, unfortunately causing several animals to perish during hard winters.

Agency personnel and numerous volunteers have installed a smooth bottom wire at a height of 18 inches allowing pronghorn to pass under, installed wire clips that allow strands to be raised or lowered depending on when livestock is present and also installed double-paired gates that can be opened in high volume pronghorn crossing locations during migration and winter seasons.

To date, double-paired gates have been installed at seven locations and approximately seven miles of

fence have been modified with another nine miles to go in 2021. This project adds to approximately ten miles of fence along Wyoming Highway 191 north of Farson which was modified previously so it can be laid down for migrating wildlife.



Figure 127. Installation of clips and ability to raise the bottom stand of the fencing.

Highway 351 Fence Modifications (Goal 3) - Troy Fieseler and Dean Clause



In 2020, the WGFD along with the BLM and WYDOT worked cooperatively to install six paired gates on Highway 351 south of Pinedale to help facilitate pronghorn movement. Gates are positioned across from each other on both sides of the highway and are designed to be left open during high volume pronghorn movement seasons, allowing for more efficient movement. Within the first year of implementation, observations have shown that pronghorn have successfully used the new gates minimizing fence entanglements and improving access to winter range. Due to the success of the project, more gates are planned to be installed in the future.

Figure 128. Trail created by pronghorn utilizing new paired gate.

Reconnaissance of Potential Instream Flow Study Sites (Goal 1) - Del Lobb

Potential instream flow study sites were visited on two creeks in the Upper Green River Basin, two sites on Rock Creek and one on Klondike Creek. Data collected included measuring discharge and geo-referencing possible locations for cross-sections on Klondike Creek. Discharge at the downstream end of the potential instream flow segment was 0.22 cfs on September 20.



Figure 129. Flow measurement transect on Klondike Creek.

Maki Creek Instream Flow Study (Goal 1) - Del Lobb



Figure 130. *Counting invertebrates for Upper Maki Creek Instream Flow study.*

Data for an instream flow analysis were collected at two sites on Maki Creek during summer 2020. The upper site is in the Bridger National Forest and the lower site is on BLM land. Depth, velocity, cover, stream stage, and water surface elevation data were collected at three stream flows at the upper site and at four flows in the lower site. Substrate, nitrate-nitrogen, water temperature, macroinvertebrate, and stream bed elevation data also were collected at each site. Measured flows at the upper site during June, July, and September were 2.6 cfs, 1.5 cfs, and 0.2 cfs. Lower site flows measured during those months were 3.2 cfs, 1.7 cfs, 0.9 cfs, and 0.3 cfs. Maximum instantaneous water temperatures were 60 F on July 23 at the upper site and 71 F on August 18. Maximum average

daily temperatures were 53 F and 62 F at the upper and lower sites. 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.

Monument Ridge Vegetation Management (Goal 2) - Troy Fieseler

In 2016, the Sublette County Forest Collaborative was formed to prioritize project areas to improve management of forested habitats to mutually benefit a wide variety of stakeholders including wildlife, fire/fuels, recreation, livestock, private landowners, and others. The Monument Ridge area was identified as a high priority to collectively move forward with due to the significant conifer encroachment in older age aspen stands that are critically important to the wildlife that utilize the area. The project occurs entirely on BTNF, near Bondurant. The importance of the area to wildlife is significant with treatment locations providing critical transitional and summering habitats for mule deer within the Sublette Herd, parturition and crucial winter-yearlong habitat for elk, and crucial winter-yearlong habitat for moose.

The project will primarily rely upon prescribed fire to reach desired objectives. Treatment units will



Figure 131. *Pre-treatment conditions and mechanical slashing of conifer.*

be prepped through mechanical slashing of conifer to accomplish fire behavior necessary to meet vegetation restoration goals. The second significant type of treatment identified for implementation includes chainsaw felling of scattered conifers encroaching into sagebrush communities to improve habitat for sage grouse and other sagebrush obligates. Implementation began in 2020 with approximately 2,000 acres of mechanical slashing and 85 acres of hand-thinning and piling. It will take seven to ten years to complete all treatments with additional noxious weed inventory and control post-implementation.

This project has been developed in collaboration with the BTNF, BLM, SCCD, Sublette County Commission, Sublette County Unified Fire, Wyoming State Forestry, NRCS, Sublette County Weed and Pest, TNC, WGFD, and private individuals and livestock permittees.

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

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 River 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 six feet high in many areas along this site, and low quality habitat is the norm in the general vicinity of this site. 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 2020, a contractor was hired to complete Phase I construction of the boat access and ~2/3 mile of stream habitat upstream of the boat ramp. This phase will reconstruct the boat ramp and associated access facilities but due to the selected contractor's schedule construction will not begin until March/April of 2021. Additional funding was sought for this restoration from several new partners. Currently, funds from the WGFD Trust Fund, the Wallop-Breaux boat access fund, four DEQ 319 Non-point Pollution reduction grants, the WGBGLC, WWNRT, the Central Utah Project, and in-kind contributions from BLM, WGFD, and TU are supporting the project.



Figure 132. *The site of the boat ramp at the New Fork Gas Wells where a new boat ramp will be constructed.*

Migration Fencing Enhancement at Black Butte WHMA (Goal 3) - Miles Anderson, Kyle Berg, and Christopher Evans

On Black Butte WHMA a contractor replaced 4.1 miles of boundary fence with pressure treated pole-top wildlife friendly fencing to enhance wildlife migration through the WHMA. Black Butte is also a feedground and hundreds of elk cross this fence.

Pinedale Elk Feedgrounds Maintenance (Goal 1) - Miles Anderson, Kyle Berg, and Christopher Evans

Pinedale elk feedground maintenance encompasses 11 of the 22 WGFD managed elk feedgrounds. Habitat and Access's 2020 activities included annual repairs and maintenance to feedground structures, corrals, stackyards, elk migration fences, stock fences, and grounds. Fourteen upright poles were replaced this year on various haysheds and one horse pasture fence was rebuilt at the Upper Green Feedground. One new steel hayshed and stack yard was constructed at Scab Creek feedground. One stack yard was enlarged at Franz feedground. In addition, access roads to feedgrounds were maintained and roads resurfaced or otherwise improved at Jewett, Muddy, and Bench Corral feedgrounds during this time.



Figure 133. *New hayshed and stack yard at Scab Creek feedground.*

Pinedale Region PAA Maintenance (Goals 1 and 2) - Miles Anderson, Kyle Berg, and Christopher Evans

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



Figure 134. *Resetting a boat dock due to seasonal weather fluctuations.*

Pinedale Region WHMAs (Goal 2) - Miles Anderson, Kyle Berg, and Christopher Evans

Annual maintenance on Soda Lake, Half Moon, Black Butte, Fall Creek, and Luke Lynch WHMA's was performed by Habitat and Access personnel in 2020. Activities included, sign replacements, road maintenance and repairs, fence maintenance. Comfort stations, boat ramps, parking areas, wetlands, WHMA structures, watering systems, and campsites were maintained and improved. The Soda Lake wetlands enhancements began and a wetlands viewing hut structure was constructed.

RD2H Wildlife Friendly Fence Conversions (Goal 3) - Jim Wasseen

In 2014, the mule deer's longest migration ever recorded in the lower 48 states was documented; connecting the Red Desert (Sweetwater County) with meadows in the Hoback basin area of Sublette County, Wyoming (referred to as Red Desert to Hoback (RD2H) migration route). The area boasts

some of the largest ungulate populations in Wyoming. Sustaining these herds' seasonal migration pathways from low-elevation winter ranges to higher-elevation summer ranges is critical. This project continues efforts by many partners to identify, inventory, and modify fencing. This corridor coincides with a large portion of the "Path of the Pronghorn," a migration route used by pronghorn to travel between the upper Green River Basin and Grand Teton National Park for over 6,000 years. Older fences may restrict wildlife passage and contribute to mortality, injury and wildlife stress. Partners are proceeding with identification and implementation of wildlife friendly fence modification as landowner interest and funding allows.

Funds are currently slated for at least two to four more wildlife friendly fence projects in 2021. Partners have an on-going list of interested landowners and projects to track modifications. Planning meetings are held annually to provide project updates and identify additional opportunities, as well as funding status and needs.

In 2020, 13 miles of fence conversions were completed on four different ranch properties (Murdock Cattle Company, TLC Ranch, Bar Cross Ranch, and Jensen State Section).

No direct monitoring has occurred on the properties, however WGFD continues to follow collared animals and various partners have placed game cameras on other properties allowing for documentation of passage through fences.



Figure 135. Conditions before (left) and after (right) the fence was converted to wildlife friendly standards.

Rock Creek and Trail Ridge Creek Instream Flow Filings (Goal 1) - Del Lobb



To help ensure the persistence of Colorado River Cutthroat Trout populations, two stream segments totaling approximately seven miles in the Upper Green River watershed were proposed for instream flow water rights. The proposed instream flow segments include portions of Rock Creek (2.73 mi.) in the LaBarge Creek Basin and Trail Ridge Creek (4.23 mi) in the South Piney Creek Basin. Instream flow study reports were completed and water right applications were submitted. If the applications advance to permit status, approximately seven miles of critical stream habitat will

Figure 136. Instream flow study data collection in Trail Ridge Creek.

be protected by maintaining flows for Colorado River Cutthroat Trout spawning, passage, and year-round survival.

Ryegrass-North Cottonwood Riparian Habitat Improvement (Goal 2) - Darren Rhea

Phase I of the Ryegrass-North Cottonwood Riparian habitat improvement project was completed in 2020. This project represents a cooperative effort involving the Ryegrass Ranch, LLC, the WGFD, TU, and the USFWS. The project treated 3.9 miles of North Cottonwood Creek and the associated floodplain. Construction included 19 aggradation structures and 26 constructed riffles to increase riffle habitat and raise the stream surface elevation. Strategically located structures activated dry side channels and effectively increased the amount of wetted streambed by 1,100 feet. A total of 4,072 feet of bankline treatments, including bank matrices and sod banks, were completed to arrest severe bank erosion (vertical bankline heights of four to eight feet).



Figure 137. North Cottonwood Creek riparian restoration.

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



Figure 138. A new aluminum box culvert installed in Salt Creek to replace a perched and undersized culvert.

Salt Creek is a tributary to the Bear River that supports a valuable Bonneville Cutthroat Trout conservation population. The fishery is also easily accessible and highly-visible along US Highway 89. However, numerous past practices impacted fish habitat and water quality in the watershed, and the creek was crossed by a Forest Service road with an undersized and perched culvert. Adjacent to the culvert, a small, active salt mine occurred within the river's floodplain, and in high water the river flowed across the denuded footprint of the salt mine. Lastly, channel degradations were evident from a series of instream structures constructed in the 1980's in the approximately two miles upstream of the salt mine/culvert. While these structures helped resolve many of the habitat issues they were intended to address when they

were constructed, some had outlived their life expectancy, were impairing stream function, and were in need of maintenance or remediation.

This project was initiated in 2017 to address all of these issues on the two mile reach of river, and was a joint effort between WGFD, the BTNF, and TU. Biota Research and Consulting, Inc. was hired in summer 2017 to complete an assessment of the reach and develop designs. Additional planning (fundraising, wetland delineations) and NEPA development occurred in 2018-19, and a contractor (Oxbow Earthworks) was hired in spring 2020 to complete the work around the salt mine and at the newly-designed stream crossing. The WGFD statewide Habitat and Access crew completed restoration of the

impaired stream structures upstream of the salt mine.

Construction was initiated in late September and continued until late November 2020. Oxbow Earthworks relocated the river channel to a single thread away from the salt mine and completed a vegetated berm between the salt mine and a bankfull bench around the stream channel to keep water from inundating the salt mine footprint in all but the highest water years. The undersized culvert was replaced with an aluminum box culvert and associated floodplain relief culverts to improve stream function and fish passage at the site. Non-functioning historical structures were removed and replaced with bankfull benches with willow transplants.

Funding from the WGFD trust fund was utilized for designs, and implementation was funded by the WWNRT, Western Native Trout Initiative, USFWS Fish Passage funds, and a Wyoming DEQ 319 non-point pollution reduction grant.

Skyline Fuels Reduction (Goal 2) - Troy Fieseler



The skyline fuels project completed its 4th full year of implementation during 2020. In total, the effort 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 mountain shrub communities by setting back succession and improving the overall quality of habitat available for wildlife while also reducing the chance for large-scale wildfires.

Figure 139. *Piling of conifers to be burned.*

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

Hydraulic habitat, water quality, macroinvertebrate, and water surface elevation data were collected at various stream flows at a site on South Horse Creek within the BTNF. The data will be used in habitat models to assess the relationship between stream flows and quantity and quality of habitat for Colorado River Cutthroat Trout. Model results will be used to develop seasonal flow recommendations and an instream flow water right application for a segment of South Horse Creek. Stream flows were measured near the downstream end of the potential instream flow segment. Discharges of 22 cfs, 10 cfs, and 2.6 cfs were measured on July 7, July 22, and September 3rd.



Figure 140. *Low flow measurement in South Horse Creek.*

Sublette Cheatgrass (Goal 2) - Troy Fieseler



Figure 141. *Project partners discussing cheatgrass monitoring techniques and protocols.*

Cheatgrass management in Sublette County continued during 2020 and included extensive aerial application of herbicide on the west slope of the Wind River Range and the east slope of the Wyoming Range. Additionally, treatments along roadsides and in isolated patches occurred throughout the region. New for 2020, was the ability to aerially treat on USFS land due to the completion of an EIS in early 2020. This was a tremendous accomplishment and has added to the overall effectiveness of the project allowing managers to treat across all landownerships. In total, 37,568 acres were treated both in newly identified areas as well as the re-treatment of previous locations. The collaborative treatment strategy includes prioritizing new infestations and the leading edge of invasion as well as protecting the investment

already made by circling back and re-treating areas where previous work has taken place. In addition to treatments, the WGFDD along with partners extensively monitored cheatgrass treatments totaling close to 50 different sites. These monitoring sites were established and are read on an annual basis to determine treatment effectiveness, understand changes in annual cheatgrass abundance due to climate variables and to determine when re-treatment is required. This project would not be successful without the key partnerships that are in place thanks in large part to the Sublette County Invasive Species Task Force and our numerous funding partners.

Sublette Mule Deer Habitat 2020 (Goal 2) - 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 Pinedale Anticline Project Area and Jonah Natural Gas Field near Pinedale, WY. Projects consist of over 7,400 acres of habitat treatments and monitoring on federal, state, and private lands, mainly in decadent sagebrush, mixed mountain shrub, and aspen communities. Treatments are designed to enhance successional diversity on a landscape scale while improving habitat forage quality and quantity for mule deer in summer and winter ranges within the Sublette Mule Deer Herd Migration Corridor. 2020 featured habitat treatments, pretreatment monitoring, post-treatment monitoring and maintenance of native seedlings planted for habitat restoration. Projects under the umbrella NEPA planning effort for BLM lands commenced in 2016 and will continue through 2021. Projects on private lands are ongoing, and additional projects are likely to occur as

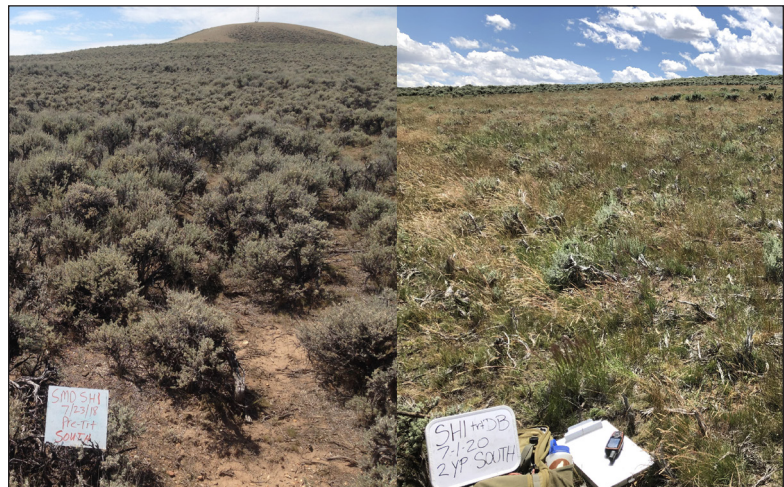


Figure 142. *Mowing treatment on Soaphole BLM: (left) Pretreatment site conditions, (right) two years post mowing treatment.*

relationships with new landowners develop.

Pretreatment surveys for impending habitat improvements were conducted on federal, state, and private lands in 2020. On the Mesa south of Pinedale, an upcoming mixed mountain shrub restoration project on BLM lands we conducted pretreatment shrub LPIs. Results indicate excessive canopy cover of Wyoming big sagebrush (38%). Treatment is anticipated in early fall 2021 and will involve mechanical reduction of sagebrush cover and hand planting between 2,000 - 3,000 native shrub seedlings with volunteer help. Improvements will provide greater mountain shrub quantity and quality for mule deer in important migration and winter habitats.

Pretreatment surveys were also conducted on about 1,150 acres of state and private lands in the Hoback Rim area, directly in the Sublette Mule Deer Herd Migration Corridor using LPIs, shrub production surveys, browse surveys, and shrub density belts.

Treatments in fall 2020 were focused on reducing mountain big sagebrush cover, improving herbaceous plant cover and density, improving shrub age class diversity, and promoting mountain shrub species such as antelope bitterbrush. Using a fixed wing aircraft, Tebuthiuron 20P herbicide was applied to 287 acres of private land and 200 acres of state land in early October. In September, 660 acres of private land were mowed. All of the aforementioned treatment areas are subject to two growing seasons of livestock rest. Post-treatment monitoring will be ongoing until composition objectives are reached.

Livestock rest and post-treatment monitoring was conducted on both private and public lands in 2020. Approximately 1,107 acres of 2018 and 2019 mowing, aerator and harrowing treatments on lands administered by the BLM were rested from livestock

grazing in 2020. Rest was achieved through electric fencing and riders. The same treatment sites were also subject to post-treatment monitoring in 2020, consisting of LPIs, shrub density belts, annual shrub production surveys, browse surveys, and photopoints. Maintenance was conducted on 49 acres containing 4,000 shrub seedlings planted in association with this project. Field observations indicate roughly 60-70% survival of seedlings since 2017. 2020 is the final year of rest for about 800 acres of treatments. Post-treatment monitoring of all project sites is ongoing until objectives for grass cover, forb cover and shrub age class diversity are met.

Two-year post monitoring was conducted for treatments implemented on Willow Creek Ranch in Sublette County. Over 375 acres were treated either by aerator or Spike herbicide in 2018. Treatments were focused on improving antelope bitterbrush health and age class diversity, reducing mountain big sagebrush cover, and improving grass and forb cover and diversity for mule deer and antelope. Cooperators and funders include: PAPO, JIO, WWNRT, MDI, PFW, BLM, SCCD, NRCS, and private landowners.

Sublette Mule Deer Fencing (Goal 3) - Kerry Gold

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 sub-herd associated with energy development on the Pinedale Anticline and Jonah natural gas fields near Pinedale, WY. Fences for pastures and property boundaries can be a significant hindrance to habitat connectivity if they are not updated to a wildlife friendly design. Goals are to enhance habitat



Figure 143. *Electric fencing used to achieve livestock rest. The left side of the fence was harrowed in 2018 and rested from grazing for two years, the right side of the fence was not treated or rested.*

connectivity by reducing negative wildlife-fence interactions and easing fence crossings for migrating mule deer and other big game species.

In 2020, projects included construction/modification of six miles of wildlife friendly fencing on private lands in the Sublette mule deer designated migration corridor. At least ten miles of wildlife friendly fence conversion is planned in 2021 along with additional removal of defunct fence lines in Sublette County.

The second year of installing drill stem pipe modifications on Jackson Fork Ranch in Bondurant, WY was completed in 2020. The ranch uses a robust woven wire fence design to contain their domestic bison operation, however its location in the Sublette mule deer migration corridor poses risks and challenges to big game species. Nine wildlife friendly modifications were installed in the highest use areas along the fence line in 2020, in addition to 25 modifications installed in 2019. Trail cameras used to monitor wildlife use of the modifications show most adult deer and elk use the modifications, though younger deer have taken longer to adjust to the updates. More modifications are planned for 2021. Cooperators and funding partners include PAPO, JIO, WWNRT, NRCS, WGBGLC, MDI, Hoback Ranches, Ricketts Conservation Foundation and private landowners

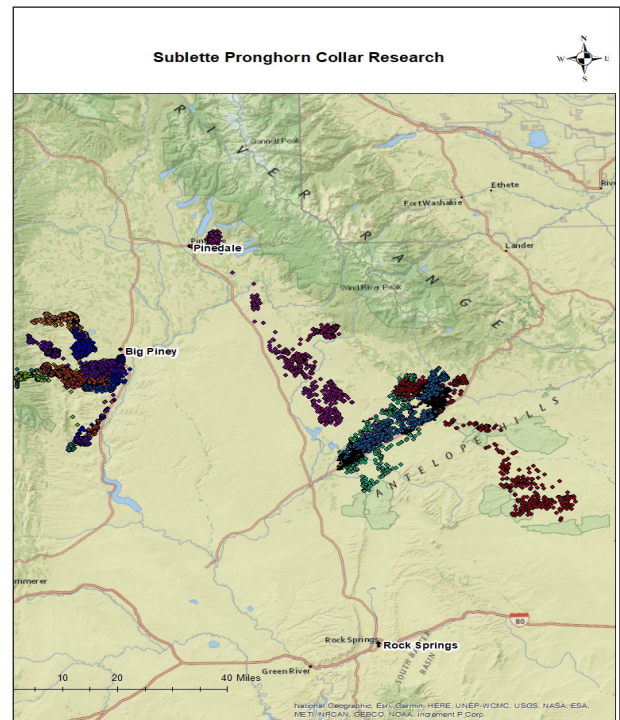


Figure 144. (Left image) Pre-modification Jackson Fork Ranch bison fence with mule deer barely able to squeeze underneath during spring migration, (middle and right images) one year later, migrating deer using wildlife friendly modifications installed in fall 2019.

Sublette Pronghorn Research (Goal 3) - Troy Fieseler and Brandon Scurlock

Nearly 600 individual pronghorn were fitted with GPS collars in the Sublette herd between 2004 and 2017 yielding one of the longest intact ungulate migration routes in North America. Pronghorn in the Sublette herd move up to 180 miles between summer ranges in Grand Teton National Park and winter ranges north of Rock Springs. However, the identification and mapping of migration routes and stopovers for Sublette pronghorn are currently incomplete due to 1) the limited distribution of collars during previous studies (i.e., nearly all collars have been deployed either within Grand Teton National Park or near the Pinedale Anticline), and 2) the infrequent (i.e., four to six hours) fix intervals of previously deployed GPS collars create challenges for delineating stopover areas. Several existing large-scale energy developments are located within the Sublette pronghorn herd unit, including the

Figure 145. Map showing individual locations for collared pronghorn in the Sublette Herd.



Pinedale Anticline, Jonah Field and the Normally Pressured Lance that have disturbed (or will disturb) thousands of acres of sagebrush steppe that was winter and migration habitat for pronghorn. Additionally, a growing human population and associated residential development along with an unprecedented rate of oil and gas leasing of State and Federal lands threaten to block migration corridors and reduce head carrying capacity.

We deployed 95 GPS collars on adult female pronghorn throughout the Sublette herd; 20 were deployed during March 2020 and an additional 75 during February 2021. Collars collect fixes at two hour intervals and will fall off in 2024 and 2025. Further defining migration routes in the Sublette pronghorn herd will assist future land-use planning and siting of infrastructure while enabling managers to better focus conservation efforts, such as fence modifications and improved highway wildlife crossings.

Lower New Fork River: Tatro Meander Restoration (Goal 2) - Luke Schultz, Kyle Berg, and Christopher Evans

A landowner on the Lower New Fork River has been working with Game and Fish for several years to address bank instability on an outside bend approximately one mile downstream of the Remmick Access Area. An approximately five to seven feet vertical eroding right bank annually lost one to two feet laterally to instability and channel erosion. Annual sediment contributions were estimated to be 290 tons along the approximately 1,600 foot long bank.

In 2018, a site assessment was conducted to develop restoration designs for this bank, and designs were drafted and revised throughout 2019. Wood and rock materials were also mobilized to the site in summer 2019.

Construction was completed in August 2020 with WGFHD Habitat and Access crews working alongside two contracted heavy equipment operators from Taylor Construction in Pinedale. Work proceeded smoothly with the construction of a single rock vane and an approximately 600 foot long bankfull bench with rootwads on the upstream end of the reach. Along the bankfull bench, an existing pool was excavated to dissipate stream energy and provide holding cover for sport fishes. On the downstream end of the project, four rock vanes were constructed to push the thalweg towards the middle of the river and alleviate near bank stress. Following construction, the bankfull bench and areas around the rock vanes were seeded and hydromulched, and willow cuttings were planted in the fall to help reestablish vegetation on the site.

In-kind contributions from WGFHD and the landowner were instrumental in planning and completing this project. Personnel from Habitat and Access, Fish Management, multiple AHAB regions, the landowner, and USFWS visited the site during the week to help out with different aspects. Funding contributions from the WGFHD Trust Fund, USFWS Partners for Fish and Wildlife, and WWNRT were instrumental.

Wyoming Range and Sublette Rapid Habitat Assessments (Goal 2) - Troy Fieseler

Throughout the Pinedale and Jackson regions, RHAs are conducted within the Wyoming Range and Sublette Mule Deer herd units to assess habitat conditions across seasonal ranges. In 2020, 8,090 acres were assessed between the two herd units in these regions and consisted of eight aspen, six



Figure 146. *A bankfull bench being constructed on the Tatro Meander; a moose and calf look on at the new changes.*

special and two rangeland surveys. The information from these assessments will be used for Herd Objective Reviews 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 mule deer habitat conditions for the Sublette and Wyoming Range mule deer herds.

Wyoming Range Mule Deer Habitat (Goal 2) - Troy Fieseler



Figure 147. *Aspen prescribed burns conducted west of Big Piney.*

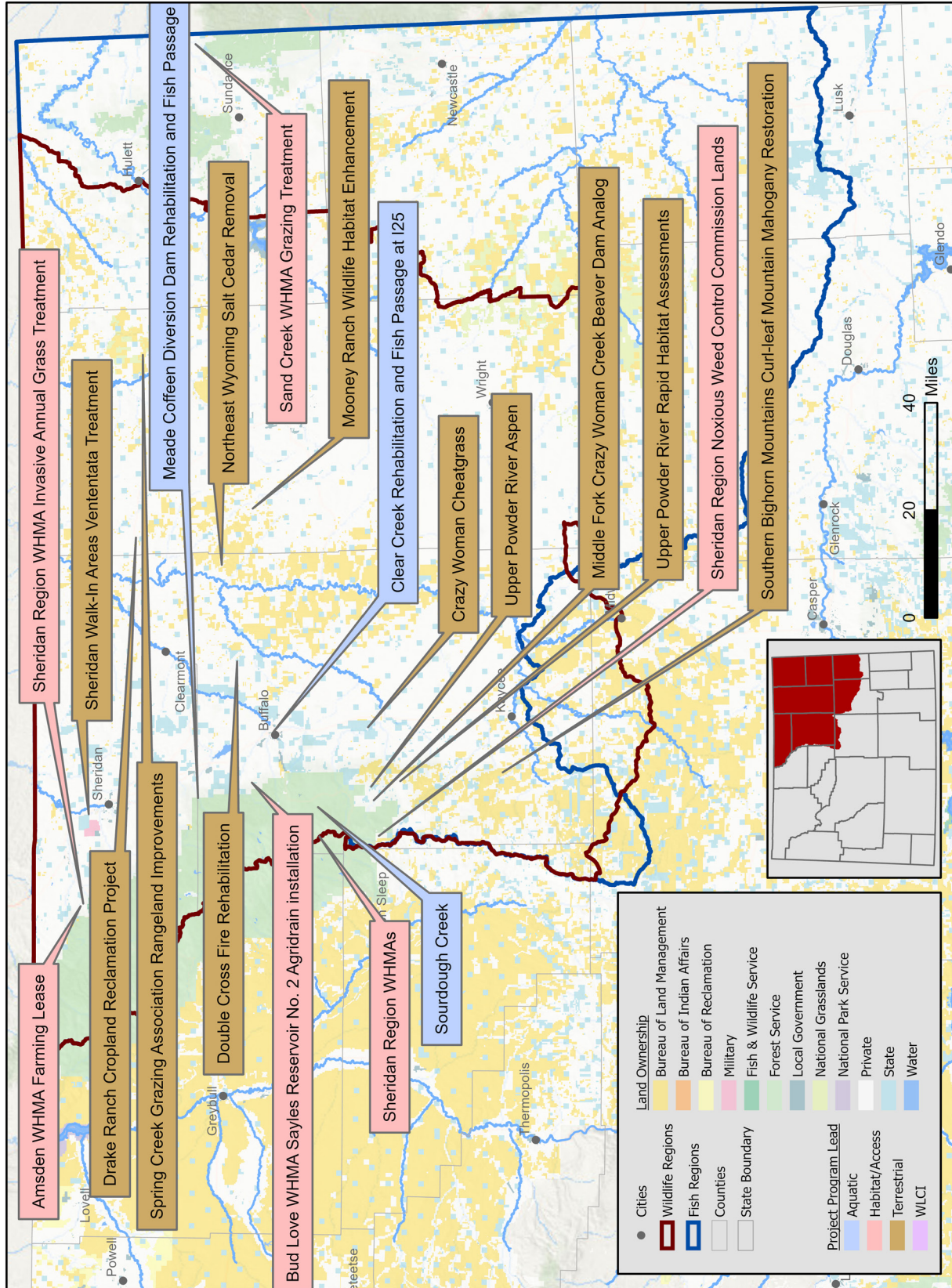
The Wyoming Range Mule Deer Habitat project is a cooperative effort between WGF and Pinedale BLM targeting improvements to mule deer habitat in the Big Piney and LaBarge areas. This habitat project is intentionally landscape-scale and has been conducted since 2014 with several more years of implementation planned. Winter and transitional ranges are targeted over 30,000 acres of vegetation treatment and over 50,000 acres of cheatgrass control. The treatments have targeted 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.

In 2020, accomplishments included: 4,023 acres of sagebrush mowing, 7,285 acres of cheatgrass herbicide application, 50 acres of prescribed burning in conifer encroached aspen stands, and hiring three livestock riders to manage livestock distribution post-treatment. Several hundred acres of prescribed burns were planned; however, weather conditions did not present an optimal burn window. These units are slated to be burned in 2021. Cumulative accomplishments (2014-2020) include: 18,513 acres of sagebrush thinning, 3,149 acres of aspen mechanical preparation, 1,451 acres of aspen prescribed burns, 52,299 acres of cheatgrass herbicide application, 2,032 acres of cheatgrass hand grubbing, 15 livestock riders, 11 miles of fence construction, and one reservoir renovated to influence livestock distribution.

On top of implementation, extensive vegetation monitoring has been conducted throughout the area to gauge the effectiveness of treatments and monitor when objectives are met. Since inception, a total of 75 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 both prescribed burns and conifer thinning stands, improved leader length on sagebrush plants, increased production and species diversity of herbaceous plants, and a reduction of cheatgrass cover.

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. Re-connecting 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.

In 2020, one effort among many exemplifies the region's efforts toward riparian restoration. Habitat biologists worked together on a riparian restoration project on the headwaters of Middle Crazy Woman Creek. Large mesic meadows historically supported large riparian aspen and willow communities, and concurrently, large beaver populations. Currently, there are some willows and aspen on the property, and through installation of BDAs they anticipate increased growth and canopy cover of willow and aspen, thus increasing habitat suitability for beaver. If beaver can eventually be restored into this section of the stream, they will maintain the water table and provide high quality riparian areas and habitats for a wide variety of wildlife species.

Other rangeland habitat concerns 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 (Goal 1) - Seth Roseberry and Brad Sorensen



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 148. *Amsden WHMA farming lease irrigation.*

Bighorn Moose Study (Goal 3) - Cheyenne Stewart, Tim Thomas, and Sam Stephens

A total of 74 GPS collars have been deployed on adult female moose in the Bighorn Mountains starting in March 2017. Collars are dropping off moose at the end of 2020 and into early 2021, based on battery life. The overall objectives include 1) evaluate population performance of moose in the Bighorn Mountains; 2) evaluate seasonal range use of Bighorn moose; and 3) evaluate moose browse intensity. This is the first collar study for moose in the Bighorn Mountains and will be used to improve population management by WGFD and land management by partners.



Figure 149. *Sheridan wildlife biologist Tim Thomas deploys a collar on a moose.*



Figure 150. *USFS biologist Tracy Pinter, Game Warden Dustin Shorma, and WGFD Commissioner Pete Dube assist with collaring efforts.*

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

A 12 foot tall concrete grade control structure occurs on Clear Creek upstream of the Interstate 25 box culvert crossing. The structure is a barrier to upstream fish movements. Engineering designs were completed during 2020 to replace the concrete grade control structure with a series of riffle-like boulder grade control structures spaced in a series and separated by pools. The resultant riffle to pool



Figure 151. *Grade control structure and fish barrier located on Clear Creek upstream of Interstate-25.*

sequencing within the channel between County Road 252 and Interstate-25 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 three and one half acres of Clear Creek owned by WYDOT.

Funding partners for this rehabilitation include the Clear Creek Conservation District, WYDOT, WWN-RT, WWDC Small Water Project Program, WG-BGLC, Wyoming Sportsmans Group and Powder River Flycasters. Stayed tuned for implementation of the stream rehabilitation and fish passage project in 2021.

Crazy Woman Cheatgrass (Goal 2) - Todd Caltrider

The area surrounding the lower Crazy Woman/Poison Creek drainages is very important for the management of mule deer in the Upper Powder River Herd Unit. This area contains a mixture of native grassland, sagebrush steppe, riparian areas, and agricultural fields. The combination of these habitat types allows for a high density of mule deer to live year around in this area. In addition to high quality habitat, this area contains large tracts of publicly accessible state land, which allow for public mule deer and other big game hunting opportunities.

In 2016, WGFD conducted RHAs in the southern portion of the project area. Generally, the rangeland assessed appeared to partially meet mule deer habitat needs. Rangeland diversity was low with less forbs than expected based on NRCS ecological site definitions. Cheatgrass density appeared to be limiting rangeland productivity. It is suspected that the increase in cheatgrass density contributed to decreased species diversity and increased grazing pressure on native perennial grasses.

Late summer 2020, a total of 4,133 acres of cheatgrass were treated aerially (helicopter) with a combination of indaziflam and imazapic. Indaziflam was applied at a rate of 5 oz/acre and imazapic was applied at a rate of 8 oz/acre with 5 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 treatment.



Figure 152. *Crazy Woman Creek drainage mule deer habitat.*

Double Cross Fire Rehabilitation (Goal 2) - Todd Caltrider

In July 2020, a lightning strike resulted in a 1,118 acre wildfire near the head of Double Crossing Creek. This wildfire burned within three miles of six occupied sage grouse leks. Before the wildfire, the area contained a mosaic of sagebrush grasslands with low to moderate invasive annual grass infestation. This wildfire lies in the Buffalo Sage Grouse Core Area. The fire was treated with imazapic

herbicide at a rate of 6 oz/acre via helicopter on September 19th, 2020. This recent wildfire is located less than a mile from the Cato Fire, which burned approximately 27,000 acres in 2012. Following the Cato Fire, multiple natural resource agencies treated the majority of the wildfire area for invasive annual grass and leafy spurge. To date, these treatments have maintained low invasive annual grass density. This wildfire also occurs in the Double Cross project, which was initiated in the late 90s/early 2000s, and involved natural resource management agencies working together to reduce the spread of leafy spurge, invasive annual grasses, and improve sage grouse habitat. The invasive grass herbicide treatment in the Double Cross fire will help restore the native grassland community and contribute to ongoing restoration efforts.



Figure 153. *Aerial photo of the Double Cross Fire.*

Drake Ranch Cropland Reclamation (Goal 2) - Todd Caltrider

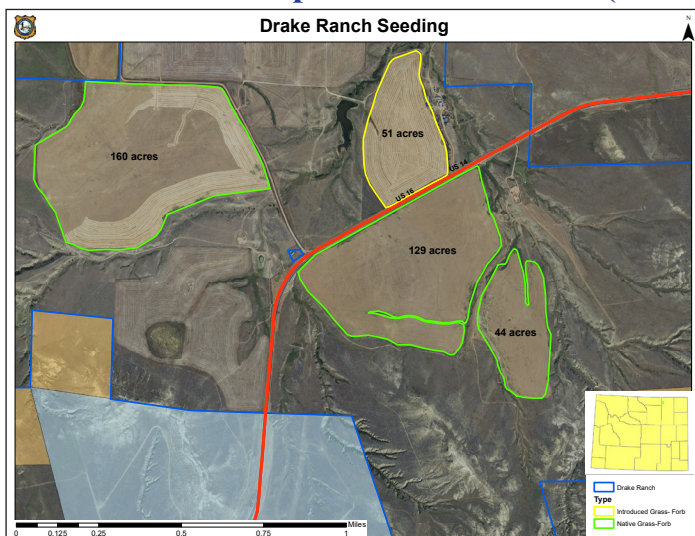


Figure 154. *Drake Ranch reclamation seeding.*

The Drake Ranch is a family ranch located in the northwest portion of Campbell County. Historically, the Drake Ranch’s operation revolved around wheat farming and cattle grazing. Due to a mixture of grain prices, overhead costs, and production potential of the currently farmed ground, the Drake ranch is looking to convert their operation primarily to a grazing operation. In 2020, the Drake Ranch began the process of converting 384 acres of retired cropland back to grassland. Cropland has limited value to wildlife, and reclaiming cropland back to native grassland and/or an introduced grass/alfalfa grass mix has high value to wildlife. Reclamation of retired farm ground can be a costly, especially with native seed. By providing cost share to landowners

reclaiming retired cropland, WGFD can incentivize planting mixes that have high value to wildlife, such as native mixes of high quality forage plants. WGFD provided cost share to the Drake Ranch for the purchase of native seed mix for the native grass/forb planting, and provided cost share for the alfalfa seed for the introduced grass/alfalfa planting. Three hundred thirty-three acres were planted to a native grass/forb mixture, while 51 acres were planted to an introduced grass/alfalfa mixture. This project was funded by the Northern Great Plains Joint Venture and the WGFD Habitat Trust fund.

Meade Coffeen Diversion Dam Rehabilitation and Fish Passage Maintenance (Goal 3) - Travis Cundy

The Meade Coffeen Crossover Diversion Dam on South Piney Creek is the primary water supply for the Story Hatchery. The failing dam was replaced in 2019 with a grouted riprap ramp to improve



passage by adult trout over the structure. North State Environmental, who completed the reconstruction in 2019, returned in 2020 to complete warranty repairs along an eroding segment of the South Piney Creek pedestrian trail beside the diversion.

Figure 155. Bank stability repairs completed along the South Piney Creek trail and Meade Coffeen Crossover Diversion abutment.

Middle Fork Crazy Woman Creek Beaver Dam Analog (Goal 2) - Todd Caltrider, Travis Cundy, and Seth Roseberry

The headwaters of the Middle Fork of Crazy Woman creek consist of large mesic meadows that historically supported large riparian aspen and willow communities, and concurrently, large beaver populations. Throughout time, riparian aspen and willow has declined in this watershed, and so have the beaver. The decline of beaver in the system reduced the riparian area and diminished mesic habitats available for willow or aspen regeneration. These riparian aspen and willow communities provide high quality habitat for a variety of wildlife species, especially mule deer. This area is valuable summer range for mule deer in the Upper Powder River mule deer herd. A portion of the population of this mule deer herd migrate to this area every summer to capitalize on the high quality forage at the upper elevations of the Middle Fork of Crazy Woman creek. Currently, the decline in mesic habitat along the Middle Fork of Crazy Woman creek limits the habitat value of this area to mule deer. Beavers, due to their dam building behavior, can have a large impact in water distribution in mountain meadows. Beaver dams are able to slow floodwater and distribute it throughout the riparian system, thus reconnecting riparian floodplains, increasing the size of mesic areas, and providing habitat for aspen and willow trees. On the Rueb Ranch, on the Middle Fork of Crazy Woman Creek, the possibility of restoring beavers is low due to the limited amount of deciduous woody plants. In efforts to restore riparian floodplain connectivity and increase desirable conditions for aspen and willow growth, the WGFD completed ten BDA treatment complexes along the Middle Fork of Crazy Woman Creek. The purpose of these structural treatments is to emulate beaver dams, and to detain and redistribute water during high flows to increase the size of the mesic riparian area which should increase aspen and willow growth. Currently, there are willows and aspen on the property, and through installation of the BDAs, we anticipate increased growth and canopy cover of willow and aspen, thus increasing habitat suitability for beaver. If beaver can eventually be restored into this section of the stream, they will maintain the water table to provide high quality riparian areas and habitats for a wide variety of wildlife species. Funding was provided by the WGFD Habitat Trust.



Figure 156. Installing a BDA structure.

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. One habitat concern for the Mooney Ranch is increasing juniper density on the west side of the ranch. Juniper provides hiding cover for elk and mule deer, but due to landscape scale fire suppression, it has become overabundant, resulting in increased fuel loads and competition for resources with more palatable forage species for big game. The Mooney Ranch was interested in a small scale treatment to experiment with juniper thinning on the northwest end of the ranch to inform future management actions regarding the juniper forests on the ranch. During spring 2020, the Mooney Ranch thinned 26 acres of juniper, which reduced fuel loading and improved wildlife habitat.



Figure 157. Post-treatment juniper thinning on the Mooney Ranch.

North Bighorn Mule Deer Study (Goal 3) - Tim Thomas and Sam Stephens

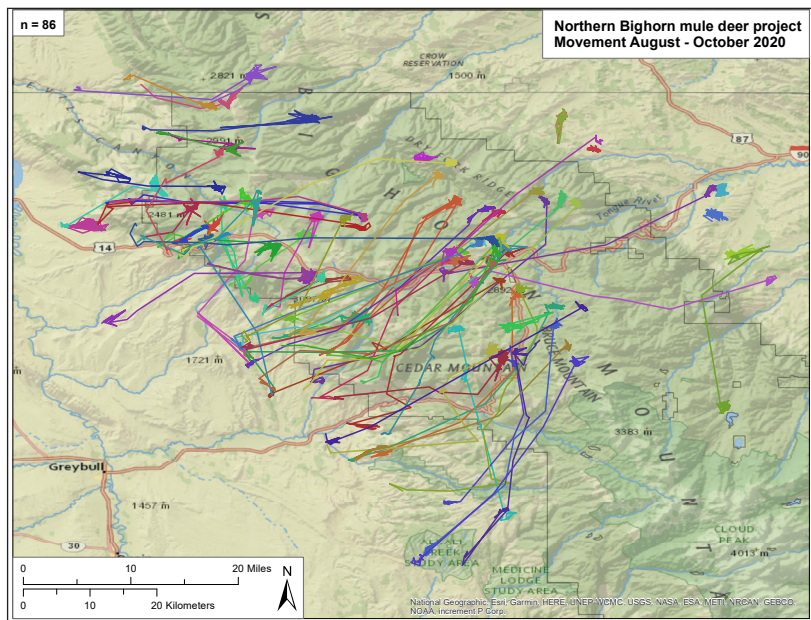


Figure 158. Movement lines of collared mule deer in the North Bighorn mule deer collar study, as of October 2020.

The North Bighorn mule deer GPS collar study began in 2020. A total of 120 collars were deployed on adult female mule deer during three captures events in March, August and December 2020. Collars will be redeployed when mortalities occur for the duration of study to maintain the desired sample size. The overall project objectives include: 1) identify and delineate mule deer migration patterns in the northern Bighorn Mountains; 2) evaluate season range and habitat use; 3) identify habitat improvement and conservation opportunities; and 4) document vital rates for North Bighorn mule deer herd. Field data collection will be completed in 2023.

Northeast Wyoming Salt Cedar Removal (Goals 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 of 3,350 acres of salt cedar between Kaycee, WY and the Sheridan county line through a mixture of mechanical mowing and chemical herbicide treat-

ments. In conjunction with Johnson County, Sheridan County Weed and Pest District began the process of 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 the winter of 2020, 214 acres of salt cedar were treated. Phase II of this project will start winter of 2021 and 600+ acres of salt cedar removal are planned for the next three years.

In addition to the work on the Powder River, salt cedar removal has also been conducted on Beaver Creek in Campbell and Johnson County, a tributary of the Powder River. A large infestation of salt cedar was found in Beaver Creek and WGFD worked with the Iberlin Ranch to provide cost share to the landowner to remove the salt cedar infestation from Beaver Creek. In 2020, the Iberlin Ranch mechanically and chemically treated 73 acres of salt cedar infestation from Beaver Creek. Additional acres are planned for treatment during winter 2021.



Figure 159. Treating recently cut salt cedar on the Powder River.

Sand Creek WHMA Grazing Treatment (Goal 1) - Brad Sorensen and Seth Roseberry

A spring grazing treatment was conducted on the Sand Creek WHMA in 2020 to manage noxious weeds; this is the sixth 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 WHMA. 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 160. Sand Creek WHMA grazing treatment.

Powder River and Pumpkin Buttes Mule Deer Movement Study (Goal 3) - Chyenne Stewart

This study was identified through the cooperative work between the WGFD and WYDOT through the Wyoming Wildlife and Roadways Initiative in 2017. The areas targeted for this project correspond to areas identified with high rates of mule deer-vehicle collisions resulting in significant mule deer mortality. Goals include identifying seasonal movement patterns to better understand deer behavior

related to the roadways and therefore provide better information to consider and propose management solutions. The study will assess seasonal movement patterns, survival rates, causes of mortality and identify important habitats. Outcomes of the study include management actions to facilitate wildlife movement, mitigate motor vehicle caused mortality and improve important habitats.

This project was designed to radio-collar 85 adult doe mule deer and to collect data for three years, beginning in November 2019. Additional deer have been sampled through the re-deployment of radio-collars retrieved from mortalities. Data analysis and reporting will be conducted by Hall Sawyer, West Inc. To date, we have already learned important and unexpected information about these deer. The annual survival rate is below expected levels and potentially low enough to be a concern for the long-term viability of these deer that live in close proximity to the interstate highways. We have also observed seasonal movements north of Lake Desmet to the southeast, which were not expected. Specifically in 2020, we re-deployed five radio-collars in February and another seventeen in December on naïve deer following mortality recoveries.

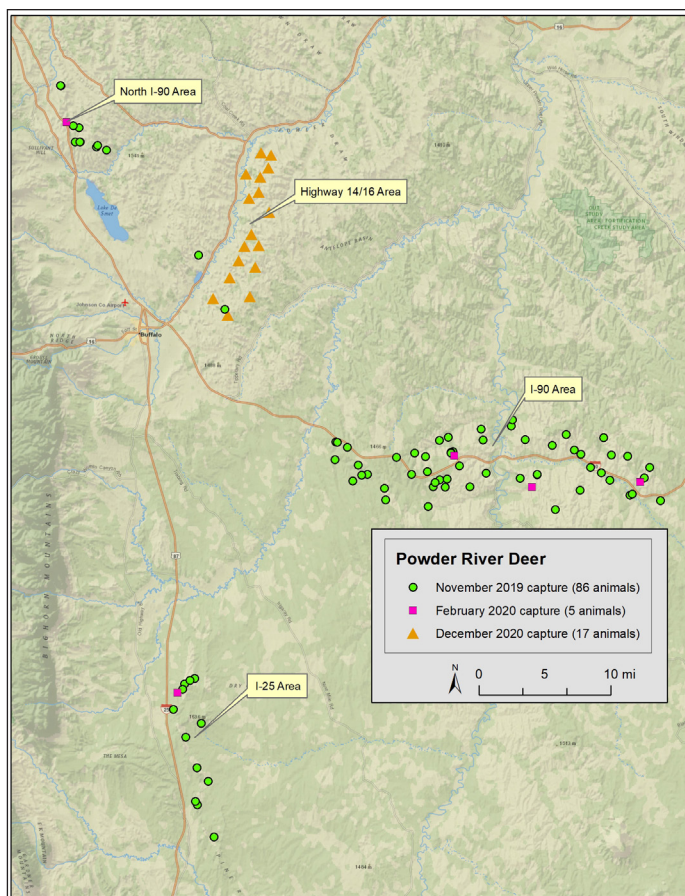


Figure 161. Powder River mule deer capture locations.

Sheridan Region Noxious Weed Control on Commission Lands (Goals 1 and 2) - Seth Roseberry

Approximately 108 acres of invasive plants were treated by Sheridan Region and contractors on WGFC managed properties in 2020. 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 162. Sheridan region noxious weed control on Amsden WHMA.



Sheridan Region WHMA Invasive Annual Grass Treatment (Goals 1 and 2) - Todd Caltrider and Seth Roseberry

There are four WHMAs on the east side of the Bighorn Mountains within the Sheridan Region: Kerns, Amsden, Bud Love and Ed O. Taylor. These areas provide crucial habitat for wildlife along with key

public access points to adjacent state and federal lands. In 2016, Sheridan County and northeast Wyoming became ground zero for two highly invasive annual grasses, *Ventenata* and *Medusahead*. Managers quickly realized the threat to forage production and utilization these two species posed and began to map and treat known acreages. WHMAs in the Sheridan Region quickly became areas of concern for both treatment and prevention to protect critical big game habitats. Utilizing ground and aerial application of Indaziflam and Imazapic to control *Ventenata*, cheatgrass, and *Medusahead* WGFD began efforts to minimize the spread and impact on native ranges. Areas of treatment were prioritized by invasive grass species and infestation scale in efforts to protect the most threatened habitat first. Treatment locations include large acreages of native rangeland along with access routes that are likely vectors for species spread. Controlling invasive annual grasses requires a long-term commitment, which includes monitoring, and multiple re-treatments. The total project is anticipated to last 10+ years through several phases depending on eradication success and total over 2,700 acres of WHMA lands.

With funding contributions from RMEF, WGBGLC, WGFD and cooperation with Sheridan County Weed and Pest over 400 acres of *Ventenata* and cheatgrass were treated on the Amsden WHMA through aerial applications.



Figure 163. *Ventenata* on Amsden WHMA.

Sheridan Region WHMA Maintenance (Goal 1) - Brad Sorensen and Seth Roseberry



Figure 164. *Bud Love WHMA fence pull.*

Annual maintenance and improvements continued on the five WHMAs in the Sheridan Region in 2020. The Kerns, Amsden, Bud Love, Ed O. Taylor and Sand Creek WHMAs received annual fence maintenance on a total of 40 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 performed. Over 20,000 acres of WGFC managed property rights were monitored. Approximately 108 acres of noxious weeds were treated by WGFD personnel and contract applicators.

Sheridan Walk-In Areas *Ventenata* Treatment (Goal 2) - Todd Caltrider

The WGFD's Walk-In hunting program provides thousands of acres of public hunting access on private land. Recently, *Ventenata* was discovered in Sheridan and Campbell Counties, and has been found in many of the Walk-In areas in both counties. *Ventenata* is a highly invasive annual grass that is a huge concern to land managers in the west. Similar to cheatgrass, it is a winter annual that reproduces rapidly, decreases rangeland productivity and increases the risk of wildfire. What separates Ven-

tenata from invasive brome grasses is its extremely aggressive rate of invasion and limited palatability. Ventenata has been known to outcompete monoculture stands of cheatgrass and quickly become the dominant species. Ventenata has very limited forage value to livestock or wildlife, due to its high silica content. The purpose of this project is to reduce the spread of Ventenata in Sheridan County in an effort to maintain quality wildlife habitat and reduce the risk of sportsmen carrying the seed to other areas of Wyoming. During summer 2020, WGFD treated 12,076 acres of publicly accessible private, state, and BLM lands. Treatments occurred via helicopter with indaziflam (Rejuvra) herbicide applied at a rate of 5 oz/acre. An additional 10,804 acres is planned to be treated in summer 2021.



Figure 165. *Aerial contractor treating Ventenata infestation on a Walk-In area east of Sheridan.*

Sourdough Creek Beaver Transplant (Goal 2) - Travis Cundy



Figure 166. *Beaver release site on Sourdough Creek.*

Five beavers, all part of a family group, were caught on Piney Creek per the landowners request and relocated to Sourdough Creek on the Bighorn National Forest where they can help raise the stream-side water table and promote greater riparian vegetation growth through their dam building activities. In preparation for the release during 2019, the Bighorn National Forest and WGFD constructed a series of three post-line and brush wicker-weave beaver dam analog structures at the transplant site to provide a foundation for additional dam building activity by beaver. The transplanted beaver dispersed from the transplant site and did not use the foundation structures by the onset of winter.

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

The Southern Big Horn Mountains Curl-leaf Mahogany Restoration is a long term project initiated by the WGFD and the BLM. Work 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, curl-leaf mountain mahogany regenerated, 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 (part of this project 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 re-



Figure 167. *Before and after conifer removal on Gardner Mountain.*

from 532 acres of curl-leaf mountain mahogany on the south end of Gardner Mountain. Additional conifer removal was completed in 2020 on Gardner Mountain, with a total of 167 acres of Curl-leaf mountain mahogany treated for conifer encroachment. Future work is planned on the adjacent EK Mountain in 2021. This project was made possible by contributions from WWNRT and BLM.

moved 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

Southern Johnson County I-25 Wildlife Fencing and Connectivity (Goal 3) - Todd Caltrider

WGFD and WYDOT have been collaborating on a monitoring project 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 Mule Deer Initiative public input meetings. To assess the potential effects of game proof fencing along I-25 on big game movement trail cameras, which were provided by the Western Transportation Institute, have been collecting images of big game movement along I-25 for the past two and a half years. The trail cameras are installed at existing below grade structures currently used by big game to pass under I-25. Funding for this project was provided by the BLM. Future fundraising efforts are underway to implement game-proof fencing along several miles of I-25 and force wildlife to use these structures, with the overall objective of reducing highway collisions.



Figure 168. *Mule deer utilizing a bridge crossing below I-25 on the North Fork of the Powder River.*

Spring Creek Grazing Association Rangeland Improvements (Goal 2) - Todd Caltrider

This project assists the Spring Creek Grazing Association with rangeland improvements designed to facilitate better grazing management and improve wildlife habitat and connectivity in Thunder Basin National Grasslands. The Spring Creek Grazing Association is a collaborative comprised of private

landowners in the Spring Creek drainage who lease grazing on USFS land northeast of Gillette, WY. The Spring Creek portion of the Thunder Basin National Grasslands lies in the Gillette Sage Grouse Core and Connectivity Area(s). 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 for the public. Project activities include providing cost share to the Spring Creek Grazing Association for livestock water development and associated pipelines and materials for building wildlife friendly cross fences. With the addition of supplemental livestock water facilities and cross fencing, permittees can better manage livestock grazing within these 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 Spring Creek Grazing Association 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. In 2020, two livestock watering tanks were installed along with 5,094 feet of water pipeline, 1.6 miles of cross fencing, and 4.79 miles of existing fence was modified to a wildlife friendly design. Funding was provided by BLM, NFWF, and WGFD. Work will continue in 2021 and 2022.



Figure 169. *Installed livestock water tank.*

Upper Powder River Mule Deer Population Dynamics and Movement Project (Goal 3) - Cheyenne Stewart

The goal of this study is to better understand mule deer survival, seasonal movement patterns, recruitment, body condition, and habitat use patterns in the Upper Powder River Mule Deer Initiative herd. This will be accomplished by maintaining a sample size of 70 radio-collared adult doe mule deer over three years, with four annual captures. The project was initiated in December 2018, field data collection will be complete in January 2022, and data analysis and reporting is expected to be completed in 2023. The data collection phase continued in 2020 which included mortality recovery and determination of cause of death when possible, as well as maintaining a sample of 70 radio-collared mule deer does through recapture efforts. In February we captured and deployed 8 radio-collars on naïve deer using GPS collars recovered from previous mortalities. Then again in December we captured and collected biological measurements and data from 66 deer (48 recaptures and 18 naïve deer with re-deployed collars from mortalities). We removed all collars to download the fine-scale GPS data stored on the collars and then re-affixed them to the deer. Throughout the term of this study, we have tracked a total of 119 individual deer. Within 2020, we have recovered 23 mortalities, nearly all within 1 day of the mortality notification, and were able to determine cause of death for 19 of those mortalities (83% success rate).

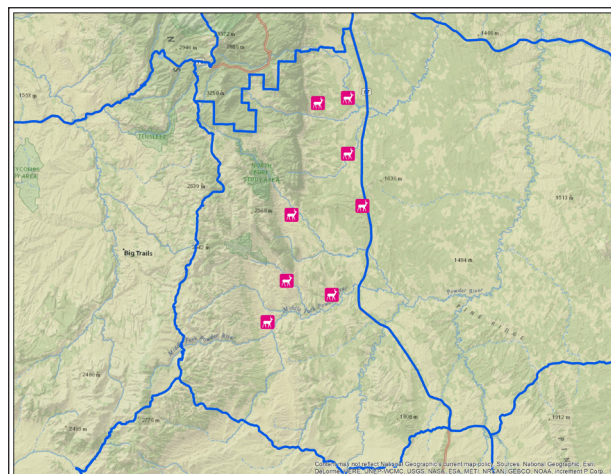


Figure 170. *Capture locations of Upper Powder River mule deer*

Upper Powder River Rapid Habitat Assessments 2020 (Goal 2) - Todd Caltrider

Sheridan regional personnel completed a total of four RHAs in key mule deer habitats in the Upper Powder River mule deer herd unit in 2020. One riparian RHA (16 acres), two shrub/rangeland RHAs (1,296 acres), and one special RHA (866 acres) were completed. 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 provides population managers and the public with documentation of the current state of mule deer habitat conditions in the Upper Powder River mule deer herd.



Figure 171. *Evaluating riparian habitat along the North Fork of Crazy Woman Creek.*

Upper Powder River Aspen (Goal 2) - Todd Caltrider



Figure 172. *Aspen treatment involving jackstrawing and hinging encroaching conifers.*

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 productive vegetation. 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. To perpetuate aspen communities on the landscape, action must be taken to reduce conifer encroachment and shading and decrease ungulate herbivory.

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. 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 2020, 49 acres were completed. Additional acres are planned for treatment next year. Funding was provided by the WGFD MDI and WWNRT.

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

A fish barrier was completed on West Pass Creek in 2019 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. Final site rehabilitation, which included seeding, mulching and temporarily fencing the site, was completed in 2020. Trout restoration work within the creek upstream of the barrier is ongoing.



Figure 173. *Herbaceous cover growing at the West Pass Creek fish barrier site.*

Sheridan Region PAAs (Goal 2) - Brad Sorensen and Seth Roseberry



Figure 174. *Osage Pond PAA fishing pier.*

Public Access Areas serve as critical recreational areas for the public and sportsmen alike. Yearly maintenance and upgrades are necessary to preserve these habitats and infrastructure. The year 2020 was unique to say the least; outdoor recreationist visited many PAAs at record levels. Sheridan Region PAAs as a whole required increased frequency of site visits and maintenance, along with heightened practices to help maintain sanitary conditions amidst Covid19. In addition, boat docks and floating fishing docks were installed on Healy, Osage Pond and LAK PAAs. Muddy Guard 1 &2, LAK, Healy and Red horse received road repairs and road blading to improve drivability and manage water runoff.

APPENDIX A

SHP Report Miles and Acres Summary

Methodology

Miles and acres summaries reported in the annual statewide habitat plan report, and used for reporting progress toward department strategic plan goals, are generated from information provided by aquatic, terrestrial and habitat and access biologists. Biologists, as part of their annual reporting duties, enter information into the SHP Habitat Plan project database (also referred to as the Project Viewer). This web-based database was developed and is maintained by the Wyoming Geographic Information Science Center at the University of Wyoming. Project data entry occurs in February and covers activities from the previous calendar year. Entries are solicited via an early January email request, typically from the Statewide Habitat Manager Office Manager, to employees who work on habitat issues. Biologists enter information about projects (project defined as an effort requiring at least three days effort), and “widgets” (efforts less than 3 days or items that are not project-related). The entry information for projects includes text and photos to use in the annual printed report. Other entered information identifies the project lead, funding partners and amount expended in the calendar year, and goals.

Source data for miles and acres is from project activities and widgets entered by biologists. Biologists identify a category for each project entry: Assessment and Inventory, Habitat Protection, Maintenance, Monitoring, Project Implementation, Research, and Technical Assistance. Within each category, biologists choose project activity type. The entry is completed by entering a point, or drawing a line or polygon indicating project location and extent. Depending on activity type, the user is prompted to indicate a count (e.g. number of structures), and an amount (e.g. stream miles of restoration). The program also calculates counts and amounts from the number and extent of points, lines or areas. Most miles and acres come from projects; however, there are a few monitoring activities under widgets that also contribute. These include: “Post-stream project reach channel/riparian monitoring” (miles), “post-management prescription monitoring” (acres), “post-vegetation treatment monitoring” (acres), and “post-treatment monitoring” (acres).

Three individuals, consisting of the aquatic and terrestrial program managers, and the habitat and access section chief, review all entries from the employees in their respective programs. Reviewers edit report text and ensure all the fields are fully completed. This includes ensuring adequate photos are attached and shape files were created or attached. Entries are examined to ensure the proper category and activities are identified for the given project. For example, if a project is entered under the “Project Implementation” category, but no on-the-ground work occurred in the calendar year, the category might be changed to “Assessment and Inventory”. For individual biologists, program managers review projects and widgets to ensure that the same activity is not counted twice. When done reviewing, program managers either send the project back to the biologist for further editing or approve it. Approving the project signals the Office Manager that the report text is ready for compilation into the annual report, and the funding and activity information is ready for summarization.

The terrestrial and aquatic program managers perform independent summaries of miles and/or acres activities, focused on the activities that largely occur within their respective programs. The terrestrial program manager compiles the acres summary and the aquatic program manager completes the miles of stream summary. Summaries are generated through a reporting feature in the SHP database that

generates a CSV file containing all project and widget activities.

For compilation of aquatic miles, the CSV file is sorted by the Aquatic Habitat Program manager to isolate the ten stream length activities to be summed (Table 1). Entered stream distances, rather than stream distances calculated from traced line segments, were used to determine overall total stream mileage. Ideally, calculated values would be used because they can easily be verified. However, biologists commonly already have previously measured stream distances that accurately represent lengths. In fact, these are often directly measured in the field. Therefore, only entered values were used.

For compilation of riparian and upland habitat acres, the CSV file is sorted by the Terrestrial Habitat Program manager to isolate the 27 activities to be summed (Table 2). Entered acres, rather than acreage calculated from traced polygons, were used to determine overall total acres treated.

Table 1. Categories and activities summed to generate miles of stream habitat activity.

Category	Activity
Assessment and Inventory	Stream reach assessment (Rosgen survey, HQI, etc.)
	Stream restoration or passage design
	Watershed assessment (WHAM)
Project Implementation	Beaver dam analogs installed (stream distance influenced)
	Beaver restoration (stream distance influenced)
	Fish passage miles connected
	Stream restoration or bank enhancement
	Riparian protection, enhancement or management (<0.5 mile wide along stream)
Monitoring	Post-stream project reach channel/riparian monitoring
Habitat Protection	Instream flow filing segments

Use the following table for acres.

Table 2. Categories and activities summed to generate acres of riparian and upland habitat activity.

Category	Activity
Assessment and Inventory	Aspen Rapid Habitat Assessment
	Rangeland Rapid Habitat Assessments
	Riparian Rapid Habitat Assessments
	Special Rapid Habitat Assessments
Project Implementation	Herbicide treatment to thin sagebrush
	Herbicide weed treatments
	Livestock grazing management plans or wildlife habitat stewardship plans
	Mechanical shrub treatment
	Mechanical tree removal
	Mowing, chopping, and Lawson aerator treatments
	Noxious weed control
	Prescribed burns
	Riparian habitat protection, enhancement, and management
	Trees or shrubs planted

	Upland exclosure developed
	Upland grass, forb, and food plot seeding
	Upland habitat assessment (GIS)
	Wetland development or major renovation
	WGFC managed lands farming contract
	WGFC managed lands food plot
	WGFC managed lands forage reserve
	WGFC managed lands grazed
	WGFC managed lands irrigated
	WGFC managed lands meadow mowed/farmed
	WGFC managed lands noxious weed control
	WGFC managed lands weed treatment
	WGFC prescribed burns
Monitoring	Aspen, cottonwood, and willow browse monitoring
	Post-management prescription monitoring
	Post-vegetation treatment monitoring
	Pre-vegetation treatment monitoring
Habitat Protection	Conservation easements in process and acquired
	Fee title acquisition

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List of Acronyms

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