Annual Report 2018

Strategic Habitat Plan

Wyoming Game and Fish Department
April 2019

Conserving Wildlife
Serving People

Aquatic Habitat
Terrestrial Habitat
Statewide Wildlife and Habitat Management
Habitat and Access Branch
Lands Administration
Information, Education and Publications Programs
Wyoming Landscape Conservation Initiative

Message from the Director

Habitat conservation is easily one of the most important tools the Wyoming Game and Fish Department uses to sustain wild and health populations of aquatic and terrestrial wildlife. It's an on-the-ground effort that isn't always visible to the public but is crucial to the 800 species of fish and wildlife this department is charged with conserving. Game and Fish allocated over $1.6 million in funds for habitat projects and was able to leverage that for over $6.4 more from the Wyoming Wildlife Natural Resources Trust fund, federal government funds, state funds, private landowners and our local conservation partners. That's $3.72 from external partners for every Game and Fish dollar. With such a diversity of species, the care to use each dollar allocated to habitat projects in the most impactful and effective way possible is how we executed 167 projects in 2018.

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

In this report you will see how Game and Fish and our partners unite to work for a sustained future. Over the last year, the SHP helped direct restoration, monitoring and enhancement activities aimed at improving 101 stream miles and over 299,000 acres of terrestrial habitats including planting nearly 13,306 native trees and shrubs. I'm especially proud of the work done to control and prevent the spread of invasive plants, like cheatgrass, treating a notable 34,263 acres.

Wyoming invests in habitat because it's clear that the people who live and work here treasure wildlife, and that starts on the ground. None of this would be possible without the wide-ranging support of the people of this state to ensure we leave Wyoming a better place. I want to thank all project partners who invested in Wyoming's wildlife habitats in 2018. We are proud to share these success stories with you and they would not have been possible without wide public support. The investment of time, money and resources from countless volunteers and folks who care about Wyoming's wild places is inspiring and encouraging.

In this year's annual report we profiled one of our crucial project partners, Trout Unlimited's Wyoming Water Project. Trout Unlimited (TU) is a common partner for aquatic habitat restoration efforts across the state. Game and Fish aquatic habitat biologists and fisheries managers have a long history of working closely with TU on numerous projects to benefit cold water fisheries.

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

Brian Nesvik

Director, Wyoming Game and Fish Department

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Habitat Vision

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

Mission

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

Goals

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

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

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

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

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

Habitat Program Expenditures

I. WGFD funds (figures rounded to the nearest $1,000) expended for on-the-ground projects primarily directed at implementation of Strategic Habitat Plan (SHP) goals and management on WGFC lands during calendar year 2018 (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: **$1,684,600**

II. Non-WGFD funds expended for implementation of SHP goals for calendar year 2018 from or in collaboration with various sources including: 1) Wyoming Wildlife and Natural Resources Trust Fund (WWNRT), 2) USDA Farm Bill federal government funds, 3) other federal government funding programs, 4) other state and local government funding sources, 5) non-governmental organizations, 6) Wyoming Governors Big Game License Coalition (WGBGLC), 7) private landowner contributions (including in-kind), 8) corporations and businesses, 9) private donors, and 10) Wyoming State Legislative Capitol Construction funds:

Non-WGFD Funds Expended on SHP Goals: **$6,475,700**

Grand Total for SHP Goals: $ 8,160,300

WGFD applied funding from outside sources amounting to approximately $3.72 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 $10,725,000 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 50% 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 agencies. Without the dedication and passion of field personnel, none of these habitat projects would happen. The remainder of the funding was allocated as follows: 4% for vehicles and heavy equipment and 46% for materials and supplies.

Personnel overseeing the WGFD Education, Information and Publications Programs spent approximately 12.5% of their time in 2018 on SHP goal 4 “habitat” activities totaling just under $315,000 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 right acquisition and disposal, payment of WGFC property taxes in each county and lease payments to the Office of State Lands and Investments (OSLI). Property taxes paid to counties by the WGFD in 2018 totaled approximately $588,600. These taxes include WGFC owned state offices, fish hatcheries, bird farms, houses, Wildlife Habitat Management Areas (WHMA) and Public Access Areas (PAA). During 2018, WGFD costs for leases totaled approximately $157,500. The majority of lease payments were made to the OLSI 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 2018 are summarized below:

Activity	2018 Accomplishments	5 Year Average Accomplishments
Watershed stream assessments	2 on 15.3 miles	10 on 26 miles
Detailed stream assessments	5 on 2.1 miles	16 on 5.4 miles
Survey or design for stream restoration	12 on 10.1 miles	Not Previously Tracked
Stream restorations or bank enhancements	9 on 4.5 miles	12 on 2.8 miles
Instream structures	40	47
Stream structures maintained	35	Not Previously Tracked
Instream flow segments	0	0
Fish screens installed	3	3
Fish passage structures installed	15	7
Fish passage upstream miles connected	48.6	34
Fish passage structures monitored	5	9
Fish passage structures maintained	25	11
Fish tracking or entrainment investigations	2	6
Project monitoring - detailed stream channel	10 on 5.4 miles	11 on 3.5 miles
Management monitoring - detailed riparian	4 on 1.2 miles	6 on 0.9 miles
Stream temperature or flow monitoring sites	141	66
Aspen/cottonwood browse monitoring	11 for 6400 acres	28 on 2.8 miles
Beaver transplanted	34 influencing 3.4 miles	13 influencing 1.3
BDAs installed	5 on 1 mile	Not Previously Tracked
BDAs maintained	12	Not Previously Tracked
Riparian assessment	11 on 3.0 miles; 1 on 208 acres	8 on 6.9 miles; 1 in 436 acres
Riparian protection, enhancement, management	1 on 3.2 acres; 1 on 3.5 miles	9 on 6.9 miles; 1 on 452 acres
Private landowner contacts	922	434
Technical assistance requests	141	98
Conservation easements in process	1 on 397 acres	6 on 15,800 acres
BLM RMP or USFS Cooperator Status	2	5
Trees or shrubs planted	13,306	29,632
Herbidice weed treatments	42,205 acres	30,200 acres
Herbicide vegetation to thin sagebrush	1,113 acres	820 acres
Mechanical tree removal	5,332 acres	4,053 acres
Aspen ripping	1,189 acres	335 acres
Mowing, chopping, ripping, aerator treatments	2,763 acres	4,413 acres
Upland grass, forb and food plot seeding	783 acres	819 acres
Water wells drilled	2	1
Water guzzlers or water tanks installed	5	9
Water pipelines installed	0.3 miles	2.1 miles

Activity	2018 Accomplishments	5 Year Average Accomplishments
Spring developments	2	3
Water wells converted to solar pumps	1	2
Fences installed	8 on 38.5 miles	49 miles
Wetland development or major renovation	4 on 303 acres	6 on 988 acres
Prescribed burns	4 on 1,147 acres	2,567 acres
USDA Farm Bill contract involvement	10	6
Livestock Grazing Management or Wildlife Habitat Stewardship Plans	20 on 104,605 acres	13 on 92,107 acres
Upland and rangeland inventories, intensive scale	118 on 64,394 acres	44,178 acres
Upland vegetation/habitat treatment monitoring sites	90	134
Annual vegetation production/utilization sites	41	71
Field cooperative research projects	14	8
WGFC managed lands intensive livestock/forage reserve/meadow rejuvenation and grazing administered	58 on 105,868 acres	20 on 89,668 acres
WGFC managed lands fence maintained	43 on 458.3 miles	597 miles
WGFC managed lands food plot	4 on 392 acres	Not Previously Tracked
WGFC managed lands forage reserve	3 on 4,894 acres	Not Previously Tracked
WGFC managed lands grazed	100,375 acres	Not Previously Tracked
WGFC managed lands irrigated	5,090 acres	4,161 acres
WGFC managed lands irrigation upgrades	31 on 8,800 feet	Not Previously Tracked
WGFC managed lands meadow enhancement	7 on 207 acres	Not Previously Tracked
WGFC managed lands noxious weed control	40 on 3783 acres	3,182 acres
WGFC managed lands meadow mowed/farmed	2 on 160 acres	1,977 acres
WGFC managed lands farming contracts	4 on 682 acres	1,869 acres
WGFC managed lands fences installed or converted	11 over 12.1 miles	Not Previously Tracked
Public fish access projects	15	11
Public hunting access projects	1	3
WGFC property right monitoring	19 on 36,785 acres	87 on 134,504 acres
Funding sources/contracts/grants administered	237	150
Funding applications prepared for other entities	19	24
Fences maintained	50 covering 662 miles	Not Previously Tracked

Miles of stream and riparian habitat and acres of riparian and upland habitat directly impacted by habitat work in 2018 are tallied below:

Stream and Riparian Activity	Stream Miles
Watershed stream assessments	15.3
Detailed stream assessments	2.1
Survey or design for passage or stream restoration	10.1
Stream restorations or bank enhancements	4.5
Beaver restoration	3.4
Beaver dam analogs	1.0
Instream flow segments	0
Fish passage upstream miles connected	48.6
Project monitoring - detailed stream channel	5.4
Management monitoring - detailed riparian	1.2
Riparian assessment	3.0
Riparian monitoring woody browse	3.0
Riparian protection, enhancement, management	3.5
Total	**101.1**

Riparian and Upland Activity	Acres
Riparian aspen, cottonwood, willow browse monitoring	6,400
Riparian assessment	208
Riparian protection, enhancement, management	3.2
Conservation easements in process and coordinated with partners	397
Trees or shrubs planted	532
Herbicide weed treatments	42,205
Herbicide sagebrush thinning	1,113
Mechanical tree removal	5,332
Aspen ripping	1,189
Mowing, chopping, Lawson Aerator	2,763
Upland grass, forb, and food plot seeding	783
Prescribed burns	1,147
Wetland development or renovation	303
Livestock grazing management and wildlife habitat stewardship plans	104,605
Upland habitat inventory, landscape evaluation scale (e.g. GIS)	57,658
Upland and rangeland intensive inventory (e.g. Rapid Habitat Assessments)	64,394
WGFC managed lands forage reserve/ meadow rejuv. grazing administered	4,894
WGFC managed lands irrigated	5,090
WGFC managed lands noxious weed control	3,783
WGFC managed lands meadows mowed/ farmed	160
WGFC managed lands farming contracts	682
Conservation easements acquired	397
Fee title acquisition	0
Total	**304,038**

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 2018. Additionally, habitat projects where WGFD personnel were heavily involved, provided oversight or verification of expenditures are also listed. This is not a complete list, and may not reflect all partner contributions. We apologize for any partners who may have been inadvertently omitted.

Funding Partner	Approximate amount for 2018 (rounded to the nearest $100)
Bowhunters of Wyoming	$4,300
Black Hills Energy	$4,800
Bureau of Land Management	$385,700
Capital Lumber-Cheyenne	$500
Carbon County Weed and Pest District	$10,500
Cheyenne Lions Club	$500
Federal USDA Farm Bill Program Funds (NRCS and FSA)	$592,700
Fremont County Weed and Pest	$7,000
Jackson Hole One Fly	$5,000
Jackson Hole Trout Unlimited Chapter	$8,900
Jonah Interagency Office	$64,000
Little Snake River Conservation District	$4,900
Mule Deer Foundation	$8,000
Muley Fanatic Foundation	$42,600
National Fish and Wildlife Foundation	$35,700
National Wild Turkey Federation	$3,000
North American Waterfowl Conservation Act	$60,000
Pheasants Forever	$2,500
Pinedale Anticline Project Office	$72,400
Pinedale Energy Partners	$76,500
Popo Agie Conservation District	$4,900
Private Landowners	$523,900
Resource Legacy Foundation - Open Rivers Fund	$30,000
Rocky Mountain Elk Foundation	$131,200
Sage Grouse Local Working Group – State of Wyoming Funds	$34,700
Saratoga-Encampment-Rawlins Conservation District	$16,300
The Nature Conservancy	$16,300
Trout Unlimited	$46,800
Ultra Resources	$195,500

US Fish and Wildlife Service - Fish Passage	$183,500
US Fish and Wildlife Service - National Wildlife Refuge	$25,000
US Fish and Wildlife Service – Private Lands Program	$104,500
US Fish and Wildlife Service – State Wildlife Grants Program	$2,900
US Fish and Wildlife Service – WNTI	$30,000
US Forest Service	$389,900
Water for Wildlife Foundation	$39,500
Wild Sheep Foundation Midwest Chapter	$5,000
WY Department of Agriculture Water Quality	$19,500
Wyoming Community Foundation	$2,400
Wyoming Department of Transportation	$194,200
Wyoming Governor's Big Game License Coalition	$136,600
Wyoming Landscape Conservation Initiative	$194,700
Wyoming Sportsmen's Group	$5,000
Wyoming Wild Sheep Foundation	$32,700
Wyoming Wildlife and Natural Resources Trust	$2,721,200
GRAND TOTAL	**$6,475,700**

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.

2018 Partner Profile

We want to make a special recognition of Trout Unlimited's (TU) Wyoming Water Project and many local TU Chapters across Wyoming. TU is a common partner for aquatic habitat restoration efforts across the state. WGFD aquatic habitat biologists and fisheries managers have a long history of working closely with TU on numerous projects to benefit cold water fisheries.

Trout Unlimited's Wyoming Water Project began about fifteen years ago and has grown to have project managers today located in Lander, Green River, Saratoga, and Jackson. The energy and capacity they bring has vastly increased the amount of aquatic conservation work occurring across the state. From water rights issues to fish passage to stream restoration to aquatic education, TU water project staff have become a valued partner. In one notable and recent example of this collaboration, WGFD has been working for several years with Saratoga-based project manager Jeff Streeter on projects throughout the upper North Platte River Valley. Together with WGFD, the local Conservation District, and Forest Service partners, the collaborative group received the prestigious 2018 "Rise to the Future" award from the Forest Service and will receive recognition in Washington, DC in June 2019.

Local chapters too are active conservation partners with recent joint habitat efforts and financial contributions on Soldier Creek in the Big Horn Mountains, Horse Creek, Game Creek, Flat Creek and the Hoback River in the Jackson Region, and Crow Creek in Cheyenne. TU volunteers and staffers have conducted numerous and popular Adopt-a-Trout campaigns where they work with school children to track tagged fish and learn about fish and habitat in the process.

Aquatic Habitat Program

The aquatic habitat program works to protect, restore and enhance Wyoming's water, watersheds, and waterways. The program consists of 13 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, a water management supervisor and a water management instream flow biologist. One contract employee worked for the section in Lander. Seasonal biologist technicians assisted the section out of the Laramie, Jackson, Cody and Sheridan offices.

During calendar year 2018, the aquatic habitat section was involved in 34 projects involving funding from the WGFD Trust Fund, Department fish passage budget, the WWNRT, USFWS, WLCI and other sources. These partners provided over $3.65 million toward aquatic projects. Department aquatic habitat dollars spent on contracts or grants in calendar year 2018 totaled over $941,000. These expenditure levels are over twice normal levels and are 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 spend tremendous time planning, coordinating and developing 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 and assessment, monitoring project function and habitat respons and providing habitat education and training.

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

Fish Passage Program

Labarge Creek Culverts (Goal 2) – Nick Scribner

Upper Labarge Creek has been a focus area over the past decade for Colorado cutthroat trout (CRC) restoration. Chemical treatments were conducted in 2005 and 2006 to remove non-native fish and a barrier was completed in 2009-10 to protect the upper 58 miles of habitat from invasion of non-native trout from downstream. Above the barrier lie 11 road crossings of Labarge Creek and its tributaries that are being improved to allow fish passage and enhance stream function. Eight of the crossings have been improved since 2009. In August 2018, an undersized and perched culvert at Indian Creek was replaced with a bridge (Figures 1-2) while two crossings of Coyote Park Creek were replaced with larger culverts to allow for fish passage, improve stream function, and reconnect five miles of habitat. Tentative plans for 2019 include removal of a culvert on South Labarge Creek, replacement of an undersized and perched culvert on Little Clear Creek with a larger culvert, and stabilizing a headcut on Witherspoon

Figures 1-2. *Before (left) and after (right) construction at Indian Creek.*

Creek. Nearly all 58 miles of habitat upstream of the barrier will be reconnected after 2019 that will significantly assist with CRC restoration efforts in Labarge Creek.

Project partners include TU and the US Forest Service (USFS), with assistance from WGFD and WLCI. Newly connected tributary habitat is important for CRC in that it provides spawning habitat, refugia for young fish, and shelter from catastrophic events like wildfire, floods, and prolonged drought.

Harmony Ditch Fish Passage (Goal 2) – Nick Scribner

The Harmony Diversion is located on the Nowood River east of Manderson in Big Horn County. Construction was completed in 2018 on this large effort to improve fish passage and sediment transport, reduce fish entrainment and maintenance by the water user, and stabilize approximately 1,200 ft of streambank. Contractors installed a new intake structure with fish screens and trash rack, 1,500 ft of buried pipe, 1,500 ft of dirt ditch construction, and reclaimed nearly 1,700 ft of irrigation canal no longer needed. In addition, significant river work consisting of a large grade control structure, removal of the old diversion dam, and 1,200 ft of channel grading/bank stabilization measures were completed (Figure 3).

Figure 3. *Overview of Harmony Diversion at its new location.*

The previous diversion point was directly downstream of the HWY 31 bridge, had significant maintenance issues and was beginning to erode the toe of the highway embankment. Nine design options were considered and moving the diversion point upstream away from the bridge was selected as this option had several benefits including reduced maintenance for the water user and WYDOT, improved sediment transport and would eliminate fish entrainment and allow passage of all fish species in the river. Construction began in November 2017 and was completed in June 2018 by JR Civil, LLC. The Nowood River experienced a 25 year flood event in June 2018 and recent work held up great with minimal maintenance needed. In addition, when the water user put a call on the river to fulfill his water right it was the first time channel work was not needed to direct water to the headgate after a call was made.

Sunshine WHMA - Dick Creek Diversion (Goal 2) – Erin Leonetti

Figure 4. *Dick Creek diversion gabion baskets are close to failure.*

The Dick Creek diversion is located on Dick Creek, a tributary to the Wood River west of Meeteetse, WY in the Greybull River watershed. The Dick Creek diversion delivers water to WGFD's Sunshine WHMA. The WHMA provides important habitat for elk, mule deer, antelope, and moose, as well as many birds and nongame species. However, the two mile long ditch has significant seepage loss before reaching the WHMA and the diversion is at high risk of failure due to a large headcut that has migrated upstream. This has created an eight foot bed elevation difference between upstream and downstream of the diversion dam causing the gabion baskets to severely lean downstream (Figure 4). Losing this diversion would eliminate irrigation water from reaching Sunshine WHMA and also increase upstream access for Brook Trout that have been blocked since 2002. Currently, upstream of the diversion exists a robust conservation population of Yellowstone Cutthroat Trout (YSC) and opening up the 6+ miles of stream to Brook Trout would negatively impact this YSC population.

WGFD plans to replace the gabion basket diversion with a fish barrier and diversion in 2020 along with improving the water delivery system. The project has been split into 3 phases. Phase 1 includes surveys and design work by Great West Engineering (GWE) to design a permanent fish barrier and diversion to prevent upstream migration of Brook Trout and a reliable water source for the WHMA. Additional components include about 9,000 feet of 24" buried pipe and two siphons. Phase 2 will implement the fish barrier and diversion, replacing old pipe, converting open ditch to buried pipe and replacing the North Fork Dick Creek aerial crossing to a buried siphon. The old 24" cmp pipe from the headgate to the measuring flume will be replaced with a new 24" irrigation pipe. The 633 ft of open irrigation ditch from the flume to the North Fork Dick Creek aerial span crossing will be converted to a buried 24" irrigation pipe. The aerial span on North Fork Dick Creek ditch crossing will be converted into a buried siphon. Phase 3 includes piping the remaining 8,305 ft of open ditch to a buried 24" irrigation pipe and will be completed by Habitat and Access personnel.

Sheridan Creek Barrier Enhancement (Goal 1) – Nick Scribner

Sheridan Creek, a tributary to the Wind River northwest of Dubois supports a conservation population of YSC. This population is under threat from hybridization with Rainbow Trout that are present in the Wind River and lower Sheridan Creek. Stream surveys were conducted from 2008-2010 to identify potential sites to create a barrier to block upstream fish movements to protect cutthroat from hybridization with Rainbow Trout. A potential natural barrier was identified and further evaluated in 2011-2012 that would conserve seven miles of cutthroat occupied habitat.

In fall 2011, Brook Trout, cutthroat, and Mountain Whitefish were captured, fin clipped and released directly below the potential barrier. Sampling was repeated in fall 2012 to determine if any fin clipped fish moved upstream past the suspected barrier. Results documented one of the 121 fish clipped in 2011 made it upstream of the potential barrier, while three additional fin clipped fish were found directly downstream of the barrier. Data suggested the site may be a partial fish barrier, but modifications of

Figure 5. *Debris being cleared on Sheridan Creek post-blasting to create a fish barrier.*

the streambed would be needed to ensure a complete fish barrier. As a result, additional site visits and planning occurred with US Forest Service personnel to enhance the site to become a complete barrier. Implementation of those plans began in fall 2018 with the use of rock drills and explosives (Figure 5). The goal was to create a 3 ft bed elevation difference across the entire channel. Only 75% of the channel width was able to be addressed because of time constraints, so additional work is planned in 2019 to complete the project.

Alkali Creek Culvert Replacement (Goal 2) – Nick Scribner

Alkali Creek is located in the upper East Fork Wind River watershed and has roughly six miles of seasonal trout habitat. However, upstream passage was partially impeded by the East Fork County road 100 ft upstream of the confluence with the East Fork. This crossing was the last known culvert barrier (Figure 6) in the entire East Fork Wind River watershed that provides critical habitat for YSC. The crossing reduced upstream fish movements since it was perched and undersized causing high velocities at higher flows. Sampling in spring 2017 revealed only large fish could navigate upstream.

DOWL Engineering was contracted in 2016 to survey and develop designs to improve this crossing. Stream surveys documented aggradation upstream of the culvert because of channel constriction at the crossing. Hydraulic models revealed a 5-yr storm event overtops the roadway, which corroborates with Fremont County maintenance personnel experience. In addition, road safety standards were not met due to very steep embankments off the roadway. A preferred design was selected in December 2016 that would remove existing culverts and replace with an 18 ft wide bottomless arch culvert that could handle a 100-yr storm event and allow year round fish passage (Figure 7). Implementation occurred in summer 2018 and post-construction sampling will occur in spring 2019 to compare with pre-construction data.

Figure 6. *Crossing before construction.*

Figure 7. *Crossing after construction.*

Trout Creek Flow Monitoring (Goal 2) – Erin Leonetti

Flow data were collected on Trout Creek, a tributary to the North Fork of the Shoshone River in both 2017 and 2018. Trout Creek runs through Trout Creek Ranch located west of Cody, WY. Stream flows were monitored to document the frequency of flow levels that would maintain adequate habitat for trout, while still irrigating (Figure 8). The Ranch maintains three fish screens on their three diversions and strives to balance water needs of the stream and their irrigated meadows and will use this information to inform their water management strategy.

The flow monitoring was conducted for both sampling seasons by placing two staff gages in the stream; upstream (site 1) and downstream (site 2) of the three diversions. In 2018 seven flow measurements and gage readings were taken throughout July, August, and September at both sites compared to eight measurements taken in 2017. A stage-discharge table was developed from these measurement using an exponential correlation equation. Flow estimates between measured values were determined using the linear correlation equation from the regression analysis.

Figure 8. *Flow monitoring site on Trout Creek on August 3, 2018 when flows supported trout habitat.*

An instream flow study was completed in 2004 on Trout Creek just upstream from Trout Creek Ranch on Forest Service land. The report provides flow recommendations to maintain trout habitat in two miles of Trout Creek (Dey and Annear 2006). During the irrigation season (April to mid October), flows between 15 - 26 cfs were determined to maintain adequate aquatic habitat for the fishery. At site 1, 15-26 cfs corresponds to stage readings of about 0.06 ft - 0.19 ft. At site 2, 15-26 cfs corresponds to stage readings of about 0.16 ft - 0.32 ft. Overall, 2018 flows were adequate above Site 1 (above diversions) for trout habitat until mid-September and remained below the recommended flow of 18 cfs to the end of irrigation season. At Site 2 (below diversions) the recommended flow fell below 18 cfs in mid-August and remained below the recommended flow until the end of the irrigation season (Figure 9). Flow monitoring has ended and the Ranch will be provided an accurate stage discharge table and report so they can adjust their irrigation diversions as needed to provide the recommended habitat for trout.

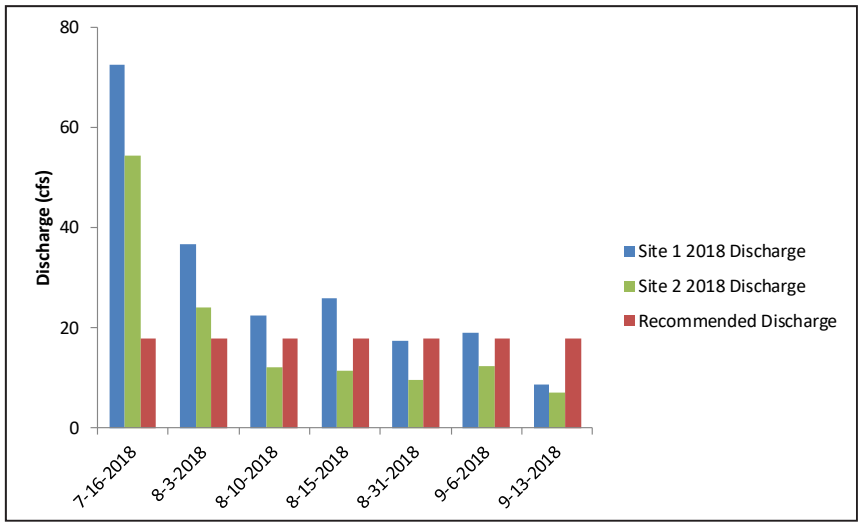


Figure 9. *Date and discharges for Trout Creek at Sites 1 and 2.*

Habitat and Access Branch

The Habitat and Access Branch is responsible for managing WGFC lands. Our mission is to manage Commission lands to be the benchmark for wildlife habitat while providing public access. The Habitat and Access Branch in 2018 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 and Jackson, twelve biologists located in Jackson, Dubois, Lander, Yoder, Cody, Lovell, Laramie and Saratoga, and numerous seasonal employees stationed across the state.

The Habitat and Access Branch manages 39 WHMAs, 198 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 6,000 signs are maintained.

During 2018, 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 $898,254 in on-the-ground expenditures. These projects are highlighted in the regional sections of this report.

Lands Administration Branch

The mission of the Lands 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 Branch currently administers over 400,000 acres of property rights including WHMAs, PAAs, conservation easements, and administrative facilities. The Lands Branch generally 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. Two large transmission line projects were presented and approved by the Commission traversing the Red Rim-Daley WHMA and Ft. Steele PAA. Branch personnel also spent a large portion of 2018 monitoring property rights and communicating lands issues with coworkers, state and federal agencies, and various non-governmental agencies including Rocky Mountain Elk Foundation (RMEF), The Nature Conservancy (TNC) and others.

Lander Front Conservation Easement (Goal 1) – Brian Rognon and Amy Anderson

Figure 10. *View of crucial mule deer winter range.*

Figure 11. *New conservation easement along the Lander Front conserving crucial mule deer winter range from future development.*

Carl Asbell is a Fremont County landowner who approached WGFD to discuss the donation of a conservation easement on property he owns along the Lander Front (Figures 10-11). The property consists of seven parcels totaling approximately 396 acres within the Popo Agie Crucial Habitat Area and provides high-value ungulate habitat, including crucial winter range for mule deer, elk, and summer range for mule deer. The property also has high-value habitat for upland bird species including chukar and Hungarian partridge. Mr. Asbell donated the conservation easement restricting future development of the 396 acres and allowing only one building envelope for the existing residential dwelling. Portions of the donated conservation easement adjoin an existing large conservation easement held by The Nature Conservancy (TNC). This new conservation easement further adds to the protection of these natural areas from poorly planned residential growth for future generations.

Ocean Lake Exchange (Goal 1) – Brian Rognon

The new Table Mountain Conservation Easement is 5 miles south of Lander including 1,882 acres within the Popo Agie Crucial Habitat Area and provides crucial winter range for mule deer and habitat for game birds, including hungarian partridge and sage grouse. Table Mountain is considered the most important mule deer winter range along the Lander Front. Permanent public, non-motorized, big game hunting access has also been included. The landowner granted the conservation easement in exchange for a 240-acre isolated parcel of the Ocean Lake WHMA known as the Maxon parcel. The Maxon parcel was transferred in fee title with reservations for a permanent public bird, deer, and small game hunting access easement. Additionally, administrative access has been retained for WGFD's pheasant release program.

Terrestrial Habitat

The Statewide Terrestrial Habitat Program is a component of the Statewide Wildlife and Habitat Management Section (SWaHM) and consists of the Terrestrial Habitat Program Manager and Office Manager stationed in Cheyenne. The Terrestrial Habitat Program works closely with regional personnel to track grants, contracts, agreements and expenditures for all terrestrial habitat projects statewide.

During calendar year 2018, Terrestrial Habitat Program personnel were heavily involved with on-the-ground implementation, oversight or verification of expenditures on 100 projects concerning Game and Fish trust funds and funds granted to 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 $2,671,400 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 2018, Terrestrial Habitat personnel continued to refine and implement a new inventory and assessment methodology for the Department. “Rapid Habitat Assessments” (RHAs) are a landscape level assessment that will be used to help inform mule deer objective reviews as well as provide baseline data for habitat conditions statewide. The Terrestrial Habitat Program continued to collaborate on the development of a new database designed by the Wyoming Geographic Information Science Center (WYGISC) to store and query habitat data for all WGFD projects. 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 land management agencies on wildlife habitat enhancement projects and larger federal projects that may affect wildlife habitat. They provided assistance at hunter check stations to collect biological information from harvested animals and participated in non-game surveys as well as sage-grouse and sharp-tailed grouse lek surveys. Most habitat personnel also serve on one or more WGFD species working groups (moose, bighorn sheep, sage grouse, turkey, pronghorn and mule deer) and routinely serve on various habitat-related committees.

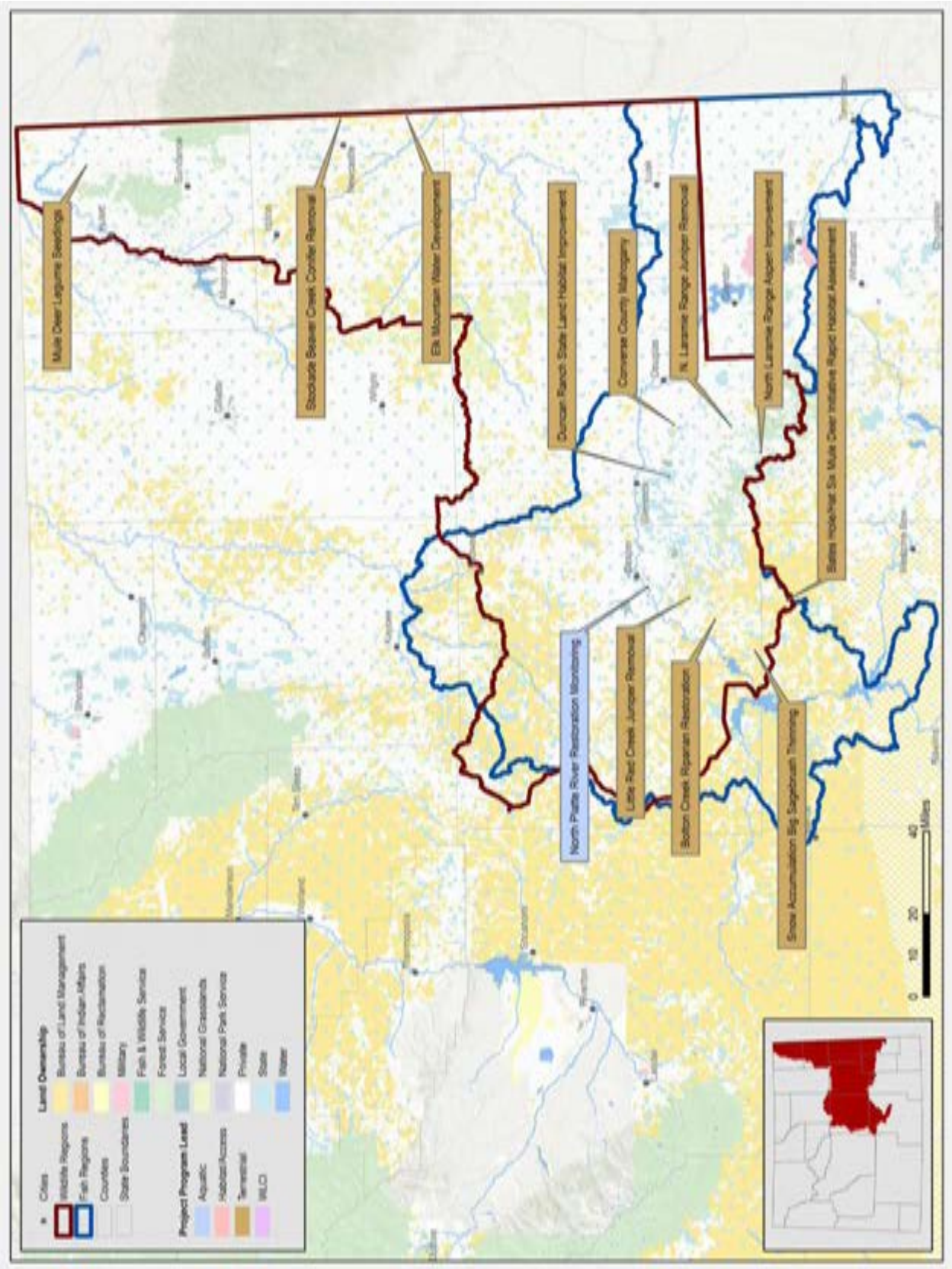
Wyoming Landscape Conservation Initiative

The WLCI is a long-term science-based effort to assess and enhance aquatic and terrestrial habitats at a landscape scale in southwest Wyoming, while facilitating responsible development through local collaboration and partnerships. WLCI hit a milestone worth celebrating in 2018-it has now been in existence for ten years. In light of this momentous occasion the Coordination Team (CT) produced an informative brochure highlighting WLCI's accomplishments over the previous ten years. A small delegation composed of US Geological Survey (USGS), CD Executive Committee representatives and the WGFD Coordinator spent a week in DC to meet with the Bureau of Land Management (BLM), Natural Resource Conservation District (NRCS), USFWS, USGS, USFS, and Wyoming's congressional delegation. Time was spent informing WLCI's partners of the many accomplishments over the past ten years; they were one of the reasons for the success of WLCI; and WLCI is looking forward to celebrating an additional ten years.

WLCI faced numerous challenges in 2018. The first was to find a replacement for BLM's CT member. In June, BLM hired Ms. Erica Husse to fill the role. She brings a wealth of experience and knowledge from the fire and rehabilitation side of BLM. The BLM imposed an evaluation of grants, which meant that a grant modification over $50,000 required approval from the state office and over $100,000 required approval from Washington DC. Also, a grant could not have two modification during the fiscal year. This rule increased complexity for WLCI; for instance, WLCI typically has an operating budget awarded to various projects. Then, WLCI receives "end of year" funding which is also applied to projects. This year we could not apply "end of year" funds due to the new rule which stated a grant couldn't have two modifications during the fiscal year. Another issue WLCI faced related to budgets is that all of BLM Wyoming had a short window in which to make modifications. The BLM received their appropriations mid June to early July and by late July BLM issued directives that they couldn't spend anymore until the next fiscal year beginning in October. The WLCI Executive Committee approved a grant steward position to coordinate, write, submit and manage external grant funding opportunities for WLCI in 2017. The CT has been working with the Wyoming Mining and Natural Resources Foundation (WMNRF) to hold the grant monies from outside sources and essentially be the bank for WLCI. The agreement has been through many iterations and is seeking approval from the State of Wyoming and the WMNRF Board. The agreement process has been ongoing for over a year.

In spite of the challenges, WLCI had another successful year working with partners. Again, WLCI found itself operating on a reduced budget. In 2018, according to WLCI project reports, project proponents spent $463,233 of WLCI funds and partner contributions were about $1,600,000. In other words, for every dollar WLCI contributed, there was an additional $3.45 in matching funds through partner contributions. WLCI received 17 project reports, however three of the 17 did not expend WLCI funds and, these projects were not used in the calculations of the funding, and will not be reported upon. The 13 projects encompassed all but one of WLCI's focus communities: aspen, mountain shrub, riparian and sagebrush (no projects within the aquatic community). Four projects addressed control of invasive species. Two projects involved erecting wildlife friendly fencing to reduce barriers to pronghorn and mule deer, or involved steel jack fence to protect aspen vegetation. Five projects in riparian communities included stream enhancements, riparian tree and shrub plantings, fencing to protect riparian areas, and improving fish passage by replacing undersized, perched culverts with bridges or larger culverts. Three other projects enhanced the aspen, mountain shrub, and sagebrush ecosystems through conifer removal, herbicide applications, masticating brush to encourage new growth, and ripping aspen. These projects and associated activities were accomplished through numerous coordination meetings, field trips, and work sessions. WLCI CT members met with NGOs, permittees, landowners, other agencies, and entities to coordinate WLCI activities.
In November, WLCI partnered with the Wyoming Chapter of TWS for our fourth joint conference. The conference was organized into five themes (Conservation and Research of Sensitive Species; Costs of Creature Comforts: Wildlife and Development; Mitigating Habitat Change, Adapting Management; Movement and Migration of Fish and Wildlife; and New Tricks: Methods, Models, and More), that covered diverse topics and taxa such as, bees, bats, sage-grouse, habitats, disease, migration corridors, and much more. The conference brought over 200 people to Laramie to learn about issues affecting wildlife in Wyoming and the world.

Casper Region



Casper Region

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

Due to 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 2018.

Willows, aspen stands and true mountain mahogany were all regenerated in 2018. Many areas of true mountain mahogany are decadent or dying with no new plants growing. This shrub is very important as mule deer forage during the winter, and therefore it is critical to regenerate these shrubs. Mountain mahogany was mechanically mowed to rejuvenate both leader and new plant growth. The Casper Region also continued work on Bolton Creek with the planting of willow clumps. A local flood event displaced many of these efforts, but those willow clumps that remain may start to grow, trap sediment and change the habitat to the desired willow and cottonwood plant community

The Casper Region continues to excel at relationships with multiple partners and funding sources for all of their projects. Without key partnerships with landowners, land management agencies, funding partners, local governments, sportsmen's groups and NGO's, these diverse projects would not be possible. WGFD also gives many thanks to the volunteers who were on the ground helping wildlife habitat across the Casper Region.

Bolton Creek Riparian Restoration (Goal 2) – Keith Schoup

Figure 12. *Memorial Day weekend flood event on Bolton Creek.*

In May 2018, we planted approximately 120 willow clumps along Bolton Creek. The willow clumps were placed in sediment trapped by the man-made beaver dams that we have created over the past several years. It is our intention the willows will become established and hold the sediment in place for years to come. In addition to holding sediment, the willows will start to change the Bolton Creek riparian area from the undesired big sagebrush, greasewood and rabbitbrush dominated plant community to the desired willow and cottonwood plant community. Shortly after planting the willow clumps, an extended rain event occurred within the Bolton Creek watershed and many of the willow clumps were displaced downstream (Figure 12).

Casper Region Mule Deer Legume Seeding (Goal 2) – Todd Caltrider

A total of 250 acres of alfalfa were planted in spring 2018 in Crook County on the McDonald and Jay Ranches. The plantings will provide high quality forage for mule deer (Figures 13-14). This project was funded, in part through the statewide WGFD Shrub, Grass, and Legume Seeding Program.

Figure 13. *Jay Ranch mule deer legume seeding 2018.*

Figure 14. *McDonald Ranch, Inc. mule deer legume seeding 2018.*

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

Mechanical treatments were completed on 141 acres of State of Wyoming land near Twin Peaks in fall 2018. This project primarily focused on removing encroaching conifers from aspen stands. Immediately following this work, the contracted crew began work on USFS lands which were pending cultural clearances and silviculture prescriptions. The crew completed 71 acres of conifer lop and scatter and hinging treatments (Figure 15). In addition, the crew completed some select aspen coppicing and piled cut material around the stand for herbivory protection. The remaining 90 acres of USFS treatments will likely be completed in 2019.

Figure 15. *Post treatment conifer removal from aspen stands in the North Laramie Range.*

Little Red Creek Juniper Removal (Goal 2) – Keith Schoup

Figure 16. *Juniper mulching with Tigercat equipment along Little Red Creek.*

In August 2018, we mulched eight acres of juniper encroached big sagebrush communities (Figure 16), hand-cut 62 acres of juniper encroached true mountain mahogany communities and mechanically removed junipers within 12 acres of a riparian system (Figure 17). The riparian area is being invaded by junipers, which are replacing cottonwood and willow communities. If the juniper is allowed to dominate the riparian corridor, the amount of water in Little Red Creek will gradually decrease, impacting both aquatic and terrestrial wildlife. The true mountain mahogany plants are decadent and/or dying with very little recruitment of young plants into the community. This plant is very important to mule deer as winter forage. By removing the juniper and cutting some of the true mountain mahogany, we are not only removing the competition but also improving the vigor of this important shrub.

Figure 17. *Hand crews cutting juniper along Little Red Creek.*

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

Aspen, sagebrush, and mahogany stands on the Duncan Ranch State Land are in a late successional state which is typical in many stands throughout the Laramie Range. Lack of historic disturbance regimes, such as fire, has resulted in decadent communities with reduced forage quality. The area is classified as crucial winter range for mule deer and is used year-round by mule deer. Therefore improvements to mahogany and sagebrush stands, in particular, will have a direct positive influence on the South Converse Mule Deer herd. Other components of this project include juniper removal, weed control, and forb seeding. Juniper removal in the riparian areas will assist in ensuring functioning riparian areas which are readily used by turkeys. In 2018, approximately 100 acres of forb seeding was completed by the statewide habitat and access crew (Figure 18) and over 100 acres of herbaceous weeds were treated. This project will continue through 2020.

Figure 18. *WGFD Habitat and Access interseeding forbs on the Duncan Ranch State Land.*

Snow Accumulation Big Sagebrush Thinning (Goal 2) – Keith Schoup

Figure 19. *Mountain big sagebrush mulching within snow accumulation areas.*

During the 2018 field season, WGFD mechanically mulched 125 acres of mountain big sagebrush within microsites on the landscape to reduce sagebrush canopy cover and density. This will allow existing native grasses and forbs to use additional resources, primarily water, for increased production, plant composition, canopy cover, density and diversity (Figure 19). The mountain big sagebrush communities immediately adjacent to these areas were not treated resulting in a mosaic of treated and untreated mountain big sagebrush communities. Even though these areas are small relative to the landscape they inhabit, they are very important to the diversity of plant and animals across the landscape, and are very important when it comes to hydrology within the watershed.

Public Access Areas (Goal 3) – Matt Pollock

The Casper Region habitat and access crew continued monitoring, annual maintenance, and improvements on 25 PAAs with 39 parking areas. The crew maintained approximately 12 miles of fence; monitored and treated weeds; monitored for protection of Commission property rights; maintained or contracted for the maintenance of access roads; maintained signs; and contracted for the maintenance of 18 comfort stations.

Stockade Beaver Creek Conifer Removal (Goal 2) – Todd Caltrider

Figure 20. *Pre- and post-treatment conifer removal in Stockade Beaver Creek.*

Stockade Beaver Creek is a large drainage in Weston County that runs north to south from the Black Hills to the prairie near the Wyoming/South Dakota state line. This area serves as a major migration route for mule deer traveling between winter range at the base of the Black Hills in Wyoming to summer range at the highest elevations of the Black Hills in Wyoming and South Dakota. Transition/winter habitat for mule deer is currently threatened by conifer encroachment into mesic meadows and mountain shrub communities. In addition to conifer encroachment issues, a large percentage of the true mountain mahogany in the valley is mature and decadent. 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 that are becoming dominated by both juniper and ponderosa pine to promote more herbaceous and browse habitat for mule deer (Figure 20).

Figure 21. *Completed unit containing both conifer removal and mahogany mastication in the Stockade Beaver Creek Drainage.*

In addition to conifer removal, WGFD is also mowing stands of decadent and mature true mountain mahogany to increase leader growth and production (Figure 21). In 2016, 123 acres of conifer removal/mountain mahogany mowing was completed. In 2017, an additional 318 acres of conifer removal/mountain mahogany mowing was completed. During winter 2018, 51 acres of conifer removal/mountain mahogany mowing was completed which completes phase one of this project. Phase 2 will begin during winter/spring 2019, with another 2,196 acres identified for treatment. Funding was provided by the Wyoming Sportsmans' Group, WGFD, WWNRT, RMEF, Bowhunters Of Wyoming (BOW), Mule Deer Foundation (MDF), WGBGLC and National Wild Turkey Federation (NWTF).

Figures 22-23. *Deciduous draw near Fred's Draw in Converse County before (left) and after (right) juniper removal.*

North Laramie Range Juniper Removal (Goal 2) – Willow Bish

Approximately 180 acres of junipers were mechanically removed from riparian habitats in Rabbit Creek, Fred's Draw and Blue Nose Creek (S. Converse County) in 2018 (Figures 22-23). Blue Nose Creek has an additional 20 acres scheduled to be completed in 2019, pending appropriate weather conditions to allow access. These sites are all located on accessible State Trust Land. Junipers are fire intolerant and have encroached due to the loss of historic fire regimes. They then compete with more desirable species for wildlife and livestock, such as cottonwoods, fruit-bearing trees and shrubs, and understory forbs and grasses. Junipers are aggressive plants which can out-compete these species for water, space, sunlight, and available soil nutrients. Once junipers occupy sites like these, they will slowly, but consistently increase. While junipers provide some cover value, their forage value is very low, and they displace vegetation that provides high forage value for livestock and wildlife, particularly mule deer. The goal of this project is to improve habitat quality and water availability, and to protect the long-term integrity of the site by addressing the issue at an early stage.

Bates Hole/Hat Six Mule Deer Initiative Rapid Habitat Assessment (Goal 2) – Keith Schoup

Casper Region Wildlife Division personnel collected three aspen, 43 rangeland and 11 riparian rapid habitat assessment surveys totaling 41,133 acres. This information will be compared to the ecological site descriptions that describe the potential habitat conditions given pristine, undisturbed conditions. The potential habitat conditions are primarily determined by soil characteristics, but also provide possible habitat condition changes if environmental conditions change. These environmental conditions include, but are not limited to, precipitation amounts, timing of precipitation, and temperature fluctuations. Moreover, the ecological site descriptions provide a synopsis of possible outcomes if various vegetation treatments were to be implemented, which may be beneficial to managers as they collaborate on means to modify existing habitat conditions for mule deer. Therefore, it is our intention to collect as many surveys as possible, in as many different vegetative communities across the entire herd unit so that when the Bates Hole/Hat Six mule deer herd unit review process is implemented, managers will have the most up to date habitat condition information available.

Elk Mountain Water Development (Goal 2) – Todd Caltrider and Seth Roseberry

Figure 24. *Elk Mountain guzzler installation crew.*

Figure 25. *Bighorn sheep utilizing the new guzzler (located just out of the frame to the right).*

Figure 26. *New culvert tank installed in bighorn sheep winter range on Elk Mountain.*

Two guzzlers were installed in conjunction with a new waterline on Elk Mountain during the summer of 2018. Elk Mountain (near Newcastle) is a large mountain divided almost equally between Wyoming and South Dakota. USFS surface on Elk Mountain contains four grazing allotments with limited dependable water sources. To better distribute grazing on Elk Mountain and improve water sources for wildlife, the USFS and the South Dakota Game, Fish and Parks contributed funds to build a waterline. Water will only be available when livestock are in the allotments, so to provide a year round water source for wildlife, WGFD obtained grant money from the Water For Wildlife (WFW), WGBGLC, MDF, and WWSF to purchase guzzlers that could be added to the pipeline. When the pipeline is in use, the guzzlers will be filled with water. Once the pipeline is shut off, the guzzlers will remain functional due to their ability to catch and store precipitation. Two guzzlers were installed in 2016, and after completion of the second half of the water line in 2017, these guzzlers were installed in 2018 by WGFD, South Dakota Game, Fish & Parks (SDGF&P), USFS, and volunteers (Figure 24). Trail cameras were put up near the newly installed guzzlers, and within a short time wildlife on Elk Mountain found the guzzlers (Figure 25). In addition, WGFD worked with the LAK Ranch to retrofit a non-functional windmill with a solar pump located within bighorn sheep winter range. This reactivated well will provide a reliable water source for livestock in this pasture in the summer. Through the addition of a culvert tank adjacent to the stock tank, an ice free water source is now available for bighorn sheep wintering in the pasture (Figure 26).

Converse County Mahogany (Goal 2) – Willow Bish

True mountain mahogany is a re-sprouting shrub but requires a disturbance event to activate this mechanism. Due to the loss of historic disturbance regimes, such as fire, many mahogany stands are very decadent. With the inherent risks and liabilities of conducting a prescribed fire, alternative treatment methodologies are warranted. Mechanical mowing to rejuvenate mahogany stands by stimulating new, palatable and nutritious leader growth is the new method of choice (Figure 27). Using mechanical methods creates a very predictable response and allows for objectives to be met. Given that topography and terrain limits the use of equipment, hand crews with brush saws will be used to conduct the mowing. This project covers a total of 956 acres, targeting treatment on 75% of the acres to achieve a mosaic pattern. Contractors began mechanical treatments in 2018 and completed about 40 acres of work which is anticipated to be on-going through 2020 (Figure 28).

Figure 27. *Contractors using brush saws to mechanically treat True Mountain Mahogany in Converse County.*

Figure 28. *Assessing and mapping True Mountain Mahogany stands for treatment in Converse County.*

Wildlife Habitat Management Areas (Goal 2) – Matt Pollock

The Casper Region habitat and access crew continued monitoring, annual maintenance, and improvements on three WHMAs. The crew maintained or ensured maintenance on approximately 101 miles of fencing. The crew maintained 18 water wells and associated storage facilities. The crew oversaw the development of oil and gas production facilities on Chain Lakes WHMA to ensure minimal impact to wildlife habitats and populations. The crew monitored noxious weeds. The crew maintained signs, and monitored for protection of Commission property rights.

North Platte River Restoration Monitoring (Goal 2) – Joanna Harter

In 2012, restoration strategies were proposed for the North Platte River in a 13.5-mile stretch that flows through the City of Casper. Areas of mass bank erosion were documented where the river had over widened and contributed to braided stream flow. Quantity and quality of fish habitat was lacking in long sections where riffle pool complexes were absent. Seven individual sites were identified for restoration, which will involve stabilizing stream banks, enhancing riparian vegetation, and improving trout habitat.

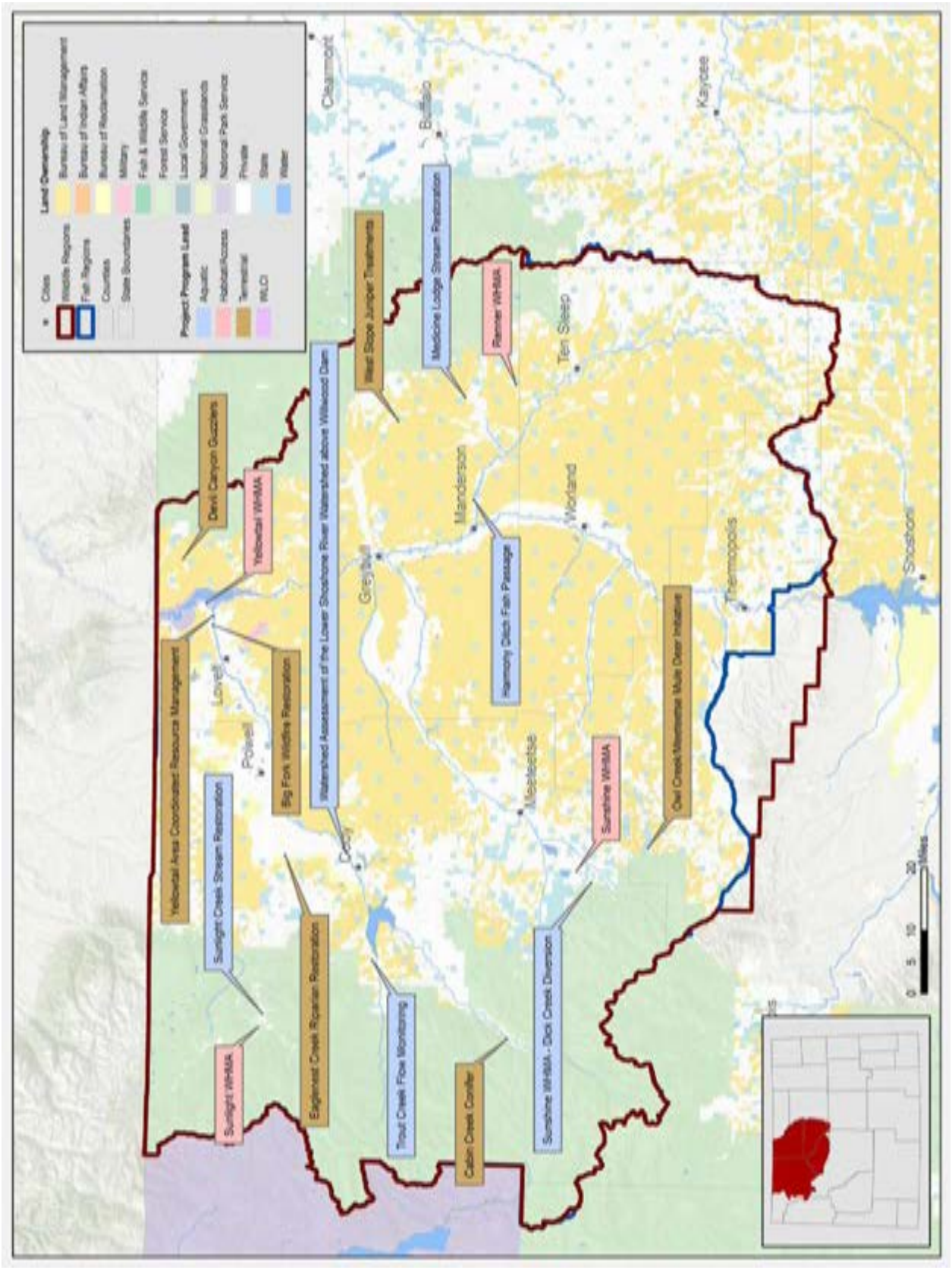
Figure 29. *A toe wood structure constructed along a bend in the Wyoming Boulevard restoration site protects the bank from erosion and provides cover for trout. Willows have established well above the structure and will improve long-term bank stability.*

Between 2015 and 2016, restoration was completed at the first three sites near Morad Park, and in 2016, the Department began annual monitoring to evaluate effects of the restoration projects. Each site is monitored for five years to evaluate long-term stability of the stream channel and vegetation establishment and also to identify maintenance needs. In 2018, WGFD continued monitoring the three sites where restoration had been completed (Figure 29).

Figure 30. *The Morad Park restoration site shows improvement in bank stability and riparian vegetation establishment. The bank was re-constructed to narrow the over-widened channel and to reduce the slope of the bank to reduce erosion potential. Willows and cottonwoods were planted to stabilize the new bank and were thriving by July 2018.*

Survey data from the three restored stream reaches reveal that the channel has maintained its dimensions three years after construction (Figure 30). Mid-channel bars and islands were removed and stream banks were reconstructed with gentler slopes to reduce erosion and narrow the channel. The constructed riffles and rock vanes remain largely intact and function to direct flow away from stream banks and improve habitat diversity for trout. Root wads installed on outer bends remain largely intact and continue to protect banks from erosion and also to provide trout cover. Despite vandalism and heavy foot traffic in some areas, cottonwood and willow plantings have established on several banks, which improves long-term stability of stream banks. Survey data also indicate that stream bank erosion in all restored sites has shifted toward low severity, compared to more moderate and high severity before restoration. WGFD will continue to monitor these sites for three more years.

Cody Region


Land Ownership
Bureau of Land Management
Bureau of Indian Affairs
Bureau of Reclamation
Military
Fish & Wildlife Service
Forest Service
Local Government
National Grasslands
National Park Service
Private
State
Water
Project Program Lead
Aquatic
Habitat/Access
Terrestrial
WLD
Cities
Wildlife Regions
Fish Regions
Counties
State Boundaries
Clearmont
Buffalo
Kaycee
Ten Sleep
Manderson
Worland
Greybull
Lovell
Powell
Cody
Meeteetse
Thermopolis
Shoshoni
Devil Canyon Guzzlers
Yellowtail WHMA
Yellowtail Area Coordinated Resource Management
Sunlight Creek Stream Restoration
Sunlight WHMA
Big Fork Wildfire Restoration
Englemark Creek Riparian Restoration
Watershed Assessment of the Lower Shoshone River Watershed above Willwood Dam
Trout Creek Flow Monitoring
Cabin Creek Conifer
West Slope Juniper Treatments
Medicine Lodge Stream Restoration
Renner WHMA
Harmony Ditch Fish Passage
Sunshine WHMA
Sunshine WHMA - Dick Creek Diversion
Owl Creek Wintering Mule Deer Initiative
0 5 10 20 Miles

Cody Region

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

While diverse, efforts to manage and enhance wildlife habitats and improve WGFC-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 2018, terrestrial habitat efforts within the Cody Region focused on improving and managing wildlife habitats throughout the Big Horn Basin that have been degraded by fire, invasive weed species or encroachment of conifers. A Coordinated Resource Management team continues to focus on management of Russian olive and salt cedar on Yellowtail WHMA near Lovell and as part of the ongoing Owl Creek/ Meeteetse MDI, a treatment to remove conifers from 140 acres of aspen in the Grass Creek drainage south of Meeteetse was completed. Work in 2019 for the mule deer initiative will be conducted in the nearby Gooseberry drainage.

Aquatic habitat restoration efforts focused on improvement of WGFC-owned lands. In 2018, construction began on stream restoration and meadow enhancement project on Sunlight WHMA. One mile of the creek is getting some 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, work on Renner Reservoir was initiated to improve fish habitat and reduce the possibility of winter kill and allow personnel to control the water level in the reservoir.

Devil Canyon Guzzlers (Goal 2) – Jerry Altermatt

Figure 31. *One of two guzzler tanks installed along the rim of Devil Canyon.*

WGFD recently teamed up with the BLM to install two guzzlers on the rim of Devil Canyon in the Bighorn Mountains east of Lovell, WY. The guzzlers will provide water for bighorn sheep and other wildlife in an otherwise dry area within the range of the Devil Canyon bighorn sheep herd.

The two tanks were placed about a mile apart on the east rim of Devil Canyon (Figure 31). The tanks were located on narrow benches just below the canyon rim to eliminate the need to fence out cattle. The location of the tanks will also allow sheep to use the water sources without venturing far from escape terrain.

Figure 32. *A Type III helicopter slings a guzzler to its new location.*

The rugged terrain of the tank locations made foot access difficult and vehicle access impossible. WGFD personnel leveled the rocky sites with pick axes and shovels in preparation for the 8 ft x 16 ft tanks. BLM contracted a helicopter to sling the tanks in from the Cottonwood Trailhead, six miles away (Figure 32). WGFD's habitat and access crew will install the two 25 ft X 100 ft poly aprons above the rim and approximately 1,300 ft of pipe in 2019 to complete the project.

The new water sources will expand the habitat bighorn sheep can effectively use east of Devil Canyon. The water will be particularly important during lambing, when ewes seem to prefer the rugged canyon rims. Funding for was provided by Wyoming Wild Sheep Foundation, Midwest Chapter of the Wild Sheep Foundation, BOW, BLM and WGFD.

Public Access Areas (Goal 3) – Brad Sorensen, Craig Swanson and Eric Shorma

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

Medicine Lodge Creek Stream Restoration (Goal 2) – Laura Burkhardt

Figure 33. *Aerial imagery of the pre-construction (October 2015) stream restoration area.*

Figure 34. *Aerial imagery of the post-construction (December 2018) stream restoration area.*

In 2017, WGFD used natural channel design methodologies to repair channel degradation across approximately 0.73 mile of stream (Figures 33-34). Year-round fish passage is now available at the Anthony and Betty Irrigation Diversions and a stable stream channel was constructed allowing for sediment transport, floodplain connectivity and fisheries habitat. This stream restoration reduced bank erosion by approximately 2,300 tons of sediment per year, eliminating non-point source sediment pollution from entering Medicine Lodge Creek.

In April 2018, the restoration area was planted with 2,000 willow cuttings and 4,000 riparian and upland shrubs and trees. On May 28, 2018 stream flows at Medicine Lodge spiked from 300 cfs to 650 cfs within a few hours of a large rain event. The high flows resulted in three significant channel adjustments which resulted in significant bank loss and damage to multiple stream structures installed in 2017. WGFD and North State Environmental responded immediately to restore irrigation water to private water users and to redesign and repair the damage. All repairs were completed under the project warranty and at the expense of the contractor. Geomorphic structure monitoring was completed before and after repairs.

This project was possible due to major funding from WWNRT as well as funding and support from Wyoming State Parks, DEQ, WGFD, a private landowner, and East Yellowstone Chapter TU. North State Environmental performed construction based on designs by Green Watershed Restoration and Five Smooth Stones Restoration.

Control of Knapweed with Goats Study (Goal 2) – Eric Shorma and Jerry Altermatt

Department personnel, in cooperation with University of Wyoming (UW) Extension and Bighorn Canyon National Recreation Area continued the third year of a long term study to evaluate the effectiveness of targeted goat grazing in reducing the noxious weed Russian knapweed. The research is being conducted on the Yellowtail WHMA, where goats have been used since 2004 to manage noxious weeds. Fenced enclosures provide four sets of five experimental plots to receive five different treatments: goat grazing pre-bloom, goat grazing pre-bloom and regrowth, goat grazing pre-bloom and herbicide, herbicide only and non-treated. Pre-treatment monitoring was conducted before goats were brought into the enclosures in June. Goats were held in each grazing treatment plot until approximately 70-80% utilization of knapweed was obtained (Figure 35).

Figure 35. *Goat grazing on Russian knapweed in study enclosures.*

Yellowtail WHMA (Goal 2) – Brad Sorensen, Eric Shorma and Craig Swanson

A new concrete check, headgate, and transport pipe were installed on a 30 acre permanent cover field (Figure 36). Irrigation is a critical part of maintaining and improving wildlife habitat on the Yellowtail WHMA. These irrigation improvements will allow habitat and access personnel to supply water to the field resulting in more efficient use of irrigation water (Figure 37). The transport pipe was purchased and donated by Pheasants Forever and the gated pipe it feeds was purchased and donated by Wyoming Outdoorsmen.

Figure 36. *New concrete check and headgate.*

Figure 37. *Habitat and access personnel install transport pipe to the 30 acre permanent cover field.*

Sunlight WHMA Campground Delineation (Goal 2) – Brad Sorensen and Craig Swanson

Boulders that were hauled by the statewide habitat and access crew in September 2017 from the Beartooth Mountains were placed as boundaries in the two campgrounds on the WHMA. Expanding camping pressure was becoming detrimental to riparian areas causing habitat damage (Figure 38).

Figure 38. *Boundary boulders placed in west campground to reduce resource damage.*

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 (CRM), including the Yellowtail WHMA 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.

Figure 39. *A freshly planted buffaloberry seedling with weed barrier on the Yellowtail CRM.*

In 2018, the CRM planted over 2,500 buffaloberry plants in the wildfire area. One-year-old containerized plants were contract grown from seed collected on Yellowtail previously and were planted by a contracted planting crew. Plant survival was enhanced by using a 3 ft X 3 ft weed barrier and a browse protection tube (Figure 39). In July, youth from TNC's Leadership in Environmental Action for the Future hand watered the buffaloberry plants.

Cody Region Noxious Weed Control (Goal 2) – Brad Sorensen, Craig Swanson and Eric Shorma

Approximately 1,000 acres of invasive plants were treated by Cody Region habitat and access personnel during 2018. The invasives were treated using chemical and mechanical methods to stress the plants. Controlling these noxious plants will enhance habitat while allowing native plants to thrive (Figures 41-42).

Figure 42. *Habitat and access personnel mulching Russian olives at Yellowtail WHMA.*

Figure 41. *Habitat and access personnel treating noxious weeds on Renner WHMA.*

Yellowtail WHMA Roads (Goal 3) – Craig Swanson, Eric Shorma and Brad Sorensen

Approximately 2,200 tons of gravel and road base were hauled onto nearly four miles of roads on Yellowtail WHMA. Proper road maintenance is necessary to facilitate proper WHMA management. Upgrading existing roads will keep the public from "off roading" and causing unnecessary resource damage (Figure 40).

Figure 40. *Gravel being dumped in a large sink hole on a Yellowtail WHMA road.*

Watershed Assessment of the Lower Shoshone River above Willwood Dam (Goal 2) – Laura Burckhardt

In fall 2016, 96,000 cubic yards, or 6,857 dump truck loads, of sediment was released from behind Willwood Dam impacting downstream fisheries and aquatic habitat as well as downstream landowners. In response, three work groups comprised of representatives from local, state, and federal agencies and interested organizations were formed to mitigate the impacts of the 2016 release and find solutions to prevent future releases. WGFD is participating in these working groups to develop alternatives for the long-term management of sediment behind the dam, identify sources of sediment to the Shoshone River upstream of the dam, and identify voluntary management measures to mitigate those sources (Figure 43). Additional members of the working groups include the Willwood Irrigation District,WYDEQ, BLM, Cody Conservation District, Powell Clarks Fork Conservation District, NRCS, Wyoming Association of Conservation Districts, East Yellowstone Chapter of TU, UW Extension, TNC and local agricultural producers.

Figure 43. *WGFD and DEQ staff collecting suspended sediment and bedload data from Idaho Creek, a tributary to the Lower Shoshone River.*

In 2018, WGFD assisted with public education and outreach activities intended to help educate participants on watershed characteristics and sources of sediment, including natural/background sources. WGFD assisted with conducting and drafting a watershed assessment on the Lower Shoshone River and its tributaries to identify sediment sources and best management practices that could be used to reduce erosion. WGFD conducted aquatic habitat assessments on Sulphur, Sage Creek, and the mainstem of the Lower Shoshone to identify areas with accelerated rates of sediment inputs. WGFD also collected field data at 11 sites through 2018, to quantify the amount of sediment entering the Shoshone River from tributary streams. The watershed assessment will be completed and released to the public in 2019.

Sunlight WHMA Seeding Disturbed Canal and Pipelines (Goal 2) – Brad Sorensen and Craig Swanson

The Sunlight canal was dozed in and leveled off to facilitate center pivot travel. The canal and pipelines for the five pivots were seeded with timothy, Idaho fescue, Arizona fescue, cicer milkvetch, alsike clover, mountain bromegrass, orchardgrass, tall fescue and small burnet. These species varied from last year's test plots to test viability, desirability to wildlife and potential weed encroachment. This information will be used in the future on larger habitat improvements.

West Slope Juniper Treatments (Goal 2) – Jerry Altermatt

Juniper and other conifers were removed from 350 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 Weber Canyon and Black Mountain areas (Figure 44). Conifers were removed using chainsaws. The purpose of the project was to enhance big game crucial winter range and sage-grouse habitats 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 and understory vegetation has not been significantly altered due to juniper competition.

Figure 44. *Conifers have been removed from the area in the foreground. The slope seen in the background is slated for treatment in 2019.*

Sunlight WHMA Fence Conversion (Goal 2) – Craig Swanson

Approximately 700 linear feet of stock fence was converted to wildlife friendly pole top fence to allow migrant elk and mule deer to move on and off the WHMA with ease (Figures 45-46).

Figures 45-46. *Newly constructed pole top boundary fence on the Sunlight WHMA.*

Wildlife Habitat Management Areas (Goal 2) – Brad Sorensen, Eric Shorma and Craig Swanson

Annual maintenance and improvements continued on the five WHMAs in the Cody Region in 2018. 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 WHMA received annual fence maintenance on a total of 45 miles of stock fence by the lessees. One thousand, two hundred eighty-six acres of irrigation water rights were spread on the Yellowtail, Renner, and Medicine Lodge WHMAs. Annual parking lot and access road maintenance was performed. Over 56,000 acres of WGFC-managed property rights were monitored. Approximately 2,000 acres of noxious weed treatments were performed by WGFD personnel and contract applicators.

Sunlight Creek Stream Restoration (Goal 2) – Laura Burckhardt

Figure 47. *Sunlight Creek eroding bank prior to constuction.*

Figure 48. *Sunlight Creek eroding bank after constuction.*

Sunlight Creek has experienced unnatural stream channel movement and severe bank erosion for the last 40 years (Figure 47). Since purchasing the Sunlight WHMA in 1960, WGFD has lost 7.3 acres of uplands and 1.9 acres of riparian habitats. In 2017, one of the stream banks eroded up to 150 feet, dumping over 31,000 tons or 1,855 dump truck loads of sediment into Sunlight Creek. In 2018, the channel moved an additional 100 ft and resulted in the closure of public access roads.

In 2018, WGFD used natural channel design methodologies to repair channel degradation across 0.77 mile of stream (Figure 48). In addition, the Sunlight WHMA headgate was removed and 0.8 mile of stream was restored. Construction will be completed in May 2019. The project is anticipated to increase trout biomass, create 3.5 acres of wetlands, protect WGFD cabins, and provide secure access to WGFD and USFS administered lands. Sediment inputs into Sunlight Creek will be reduced by up to 31,063 tons per year or 1,855 dump truck loads.

Major funding was provided by WWNRT as well as funding and support from WGFD, USFS, East Yellowstone Chapter of TU, and TU's Embrace a Stream Grant. Shamrock Environmental performed construction based on designs by WaterVation.

Yellowtail WHMA (Goal 1) – Brad Sorensen, Eric Shorma and Craig Swanson

The Yellowtail WHMA has approximately 100 acres of farm fields irrigated for permanent cover. Millet, milo, barley and oats were planted for food plots. These food plots benefit waterfowl, pheasants, and wild turkeys by providing cover and a food source (Figure 49). These fields also provide hunting opportunities for the large number of recreationists that utilize the WHMA.

Figure 49. *Farming on the Yellowtail WHMA.*

Habitat Restoration Using Beaver Relocation (Goal 2) – Jerry Altermatt, Laura Burckhardt and Eric Shorma

Figure 50. *A young beaver in a temporary holding facility awaiting a move to a new home.*

Figure 51. *A temporary "lodge" was constructed to provide beavers with some security in their new location on Big Sand Coulee.*

Cody habitat personnel relocated eight beavers as part of a region-wide effort to use beaver dams for stream and riparian restoration (Figure 50). Nuisance beavers were trapped from the Yellowtail Wildlife Habitat Management Area and from three different landowners where they were causing problems with irrigation structures and, in one case, a fish screen. All beavers were released on private lands in the Big Sand Coulee drainage where a landowner had expressed interest in using beaver to improve the riparian habitat (Figure 51).

Yellowtail WHMA Russian Olive Removal and Drain Cleaning (Goal 2) – Eric Shorma, Brad Sorensen and Craig Swanson

Figure 52. *Habitat and access personnel remove Russian olives from the drain on Yellowtail WHMA.*

Figure 53. *Habitat and access personnel chipping the cut Russian olive trees on Yellowtail WHMA.*

Russian olives were removed from approximately 0.8 miles along a drain on Yellowtail WHMA (Figure 52) Cleaning the drain will assist with drainage issues that have resulted in severe road damage. Removing the Russian olives will allow native vegetation to reestablish (Figure 53).

Cabin Creek Conifer (Goal 2) – Jerry Altermatt

Figure 54. *A Shoshone National Forest crew memeber makes quick work of a juniper tree.*

Figure 55. *Private contractors piling conifers after lopping with chainsaws.*

WGFD and Shoshone National Forest completed a conifer removal project on the upper Southfork drainage. A private contractor and Shoshone National Forest crews removed juniper and other conifers using chain saws from 540 acres of crucial winter range for bighorn sheep, elk and mule deer (Figure 54). Conifers were lopped and scattered on most of the project area, but some areas of high conifer density necessitated hand piling (Figure 55). The piles will be burned in the winter after needles turn red. The objective of the project was to eliminate conifers encroaching into sagebrush/grassland habitats. As conifers increase they out-compete sagebrush and grasses, critical forage components for wintering big game. Additionally, bighorn sheep generally avoid areas of conifer encroachment because of reduced visibility.

Funding was provided by WWNRT, RMEF, Wyoming Wild Sheep Foundation, Shoshone National Forest and WGFD.

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

A spring/summer/fall grazing treatment was conducted on the Sunshine WHMA during the spring, summer, and fall of 2018. One thousand two hundred, ninety-six AUMs were utilized to graze the WHMA using a high intensity short duration approach on a rotational schedule. This treatment was initiated to reduce litter and stimulate growth on the WHMA (Figure 56).

Figure 56. *Cattle grazing on the Sunshine WHMA.*

Sunlight WHMA Road Repairs/Upgrades (Goal 2) – Brad Sorensen and Craig Swanson

Figure 57. *Road washout on Sunlight WHMA.*

Figure 58. *Habitat and Access personnel use a motor grader to repair Sunlight WHMA roads.*

High runoff caused the roads on the Sunlight WHMA to become impassable and resulted in a one month closure (Figure 57). Habitat and access personnel were able to haul material and blade the road once high water receded on the Sunlight WHMA. Proper road maintenance is necessary to facilitate proper WHMA management (Figure 58).

Yellowtail Area Coordinated Resource Management (Goal 2) – Jerry Altermatt

The Yellowtail Area CRM team continued to manage invasive plants on agency and private lands in the Lower Shoshone and Bighorn River bottom lands near Lovell, Wyoming. The CRM consists of the four landowners on the Yellowtail WHMA (National Park Service, WGFD, BLM, and Bureau of Reclamation), neighboring private landowners, the Bighorn County Weed and Pest, NRCS, Shoshone Conservation District and other interested parties. With over 2,000 acres of riparian area mechanically and chemically treated to remove Russian olive and salt cedar, the project is now in a maintenance phase. This phase consists of herbicide treatments to eliminate re-sprouts or new seedlings of Russian olive and salt cedar in previously treated areas on the Shoshone River.

Figure 59. *National Park Service crewman chainsaws a Russian olive tree while a "swamper" looks on, waiting to pile limbs at Yellowtail CRM.*

In 2018, 230 acres of salt cedar and Russian olive resprouts and seedlings were treated with herbicide using backpack sprayers. A National Park Service Exotic Plant Team spent several days in the spring and fall treating mature Russian olive trees that could not be accessed by masticating machines because of soft soil conditions. Trees were felled using chainsaws and immediately stump treated with herbicide (Figure 59).

Eaglenest Creek Riparian Restoration (Goal 2) – Jerry Altermatt and Laura Burckhardt

Figure 60. *A BDA two years after installation on Eaglenest Creek. The green tubes are browse protection for shrub plantings.*

Figure 61. *A planting crew plants trees and shrubs along Eaglenest Creek.*

A riparian and stream restoration project on Eaglenest Creek on TNC's Heart Mountain Ranch north of Cody continued into its fourth year. The stream has experienced accelerated erosion due to operational spills from the Heart Mountain Canal, and shrubs and trees are largely absent in the riparian area due to historic livestock use. Four beaver dam analogs (BDAs) were constructed in the creek in 2016 with the objective of raising the water table to support woody vegetation establishment and slowing water flows through stream meanders to reduce erosion of banks. In 2018, the terrestrial and aquatic habitat biologists conducted intensive monitoring of the project, including longitudinal profile, cross sections, greenline transects and photopoints, to determine the effectiveness of the structures. The BDAs appear to be functioning as anticipated (Figure 60). A contracted planting crew planted over 200 cottonwood, dogwood and chokecherry seedlings along the creek to add to a previous planting of several hundred buffaloberry plants (Figure 61). Partners include WGFD, TNC, Wyoming Disabled Hunters, WWNRT, Wyoming Outdoorsmen and BLM.

Renner WHMA Reservoir Upgrades (Goal 2) – Brad Sorensen, Eric Shorma and Craig Swanson

Figure 62. *WGFD personnel breach Renner Reservoir dam.*

The Renner Reservoir dike was breached in summer 2016 to drain the reservoir for repairs (Figure 62). After two years of drying out, 1,200 cubic yards of silt was removed (Figure 63), islands were built, ditches were dug, a control structure was installed and a concrete boat ramp was constructed. In spring 2019, the reservoir will be stocked with catchable bass. These improvements to the reservoir should reduce the possibility of winter kill and allow personnel to control the water level in the reservoir (Figure 64).

Figure 63. *WGFD personnel dredge a portion of Renner Reservoir.*

Figure 64. *New outlet works installed in the Renner Reservoir dike.*

Owl Creek/Meeteetse Mule Deer Initiative (Goal 2) – Jerry Altermatt

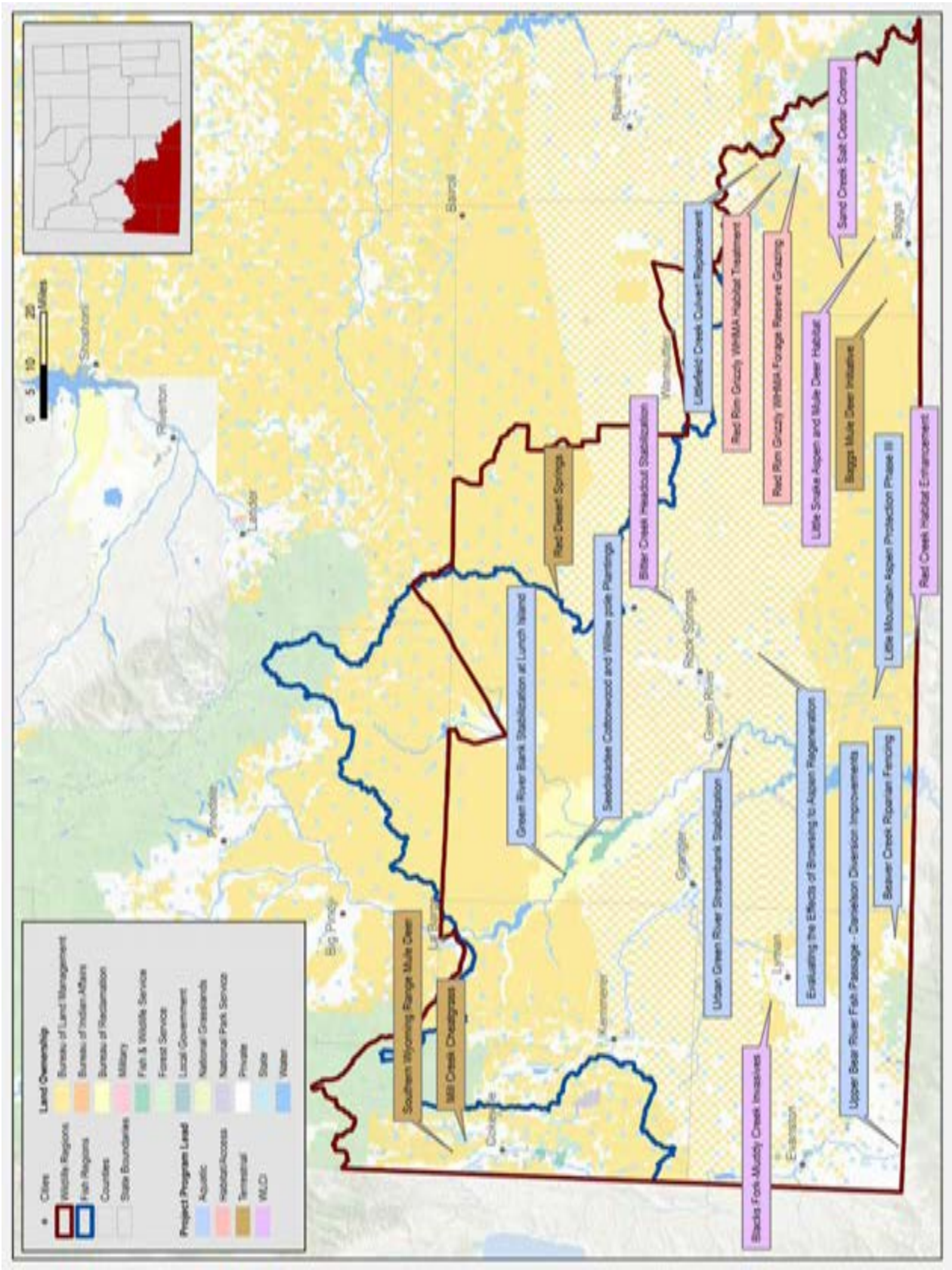
The Cody Region identified the Owl Creek Meeteetse mule deer herd unit to focus efforts as part of the state-wide MDI. One of the habitat issues identified through the public process involving landowners, hunters and land management agencies, was the loss of aspen communities on summer and transitional ranges. A treatment to remove conifers from 140 acres of aspen on private and state lands in the Grass Creek drainage was completed in 2018. Conifers were cut with chainsaws and either left as they fell or lopped and scattered (Figure 65). Funding was secured to treat over 200 acres of treatments on private lands in the Gooseberry drainage in 2019.

During summer and fall 2018, a total of 34 RHAs were conducted on aspen, riparian and rangeland habitats. RHAs afforded the opportunity to identify aspen stands that are at risk of being replaced by conifers. A total of 300 acres of aspen in the Upper Gooseberry drainage within the Shoshone National Forest were identified as needing treatment (Figure 66). A coordinated effort between WGFD and the Forest Service is underway to treat these communities over the next eight years.

Figure 65. *An example of a lop-only treatment of aspen communities in the Grass Creek drainage.*

Figure 66. *A typical aspen community heavily encroached by conifer in the Upper Gooseberry drainage.*

Green River Region



Green River Region

The strategic habitat efforts and accomplishments achieved during the 2018 field season in the Green River Region continued to be guided by a commitment to projects on a landscape-level, in multi-year phases, and projects completed via much collaboration with state, county and federal partners, as well as private landowners and non-governmental agencies. Habitat improvement continued to focus on: enhancing habitat for big game, beaver and sage grouse; improving fish passage and spawning; improving maintenance for PAAs; control of invasive species; developing upland springs and ditch diversions in our more-xeric habitats to benefit multiple bird and ungulate wildlife and improve fencing for livestock grazing management and stream restoration.

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

Monitoring activities were, again, increased in 2018, especially those 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 using the Live-Dead (LD) index. Sagebrush, aquatic and terrestrial habitat health assessments were also the norm, including some major tree planting and large-scale streambank stabilizations.

Habitat and access employees continued to treat noxious weeds, enhance public facilities and access points in the region, including new culverts and many miles of roads graveled to prevent further damage, on Blue Rim, Viva Naughton, Woodruff Narrows, Bear River and Hank's Hill Road Public Access Areas.

Personnel in the Green River Region continue to focus a significant amount of time on reaching out to the public about the importance of habitat to our vast wildlife resources via one-on one contacts, contacts at various WGFD formal meetings, open houses, regional newsletters, web postings and WGFD social media events.

Beaver Creek Riparian Fencing (Goal 2) – Kevin Spence and WLCI, Jim Wasseen

The Lonetree Ranch is located on Beaver Creek, a tributary to the Henrys Fork River near the Utah state line on the North Slope of the Uinta Mountains. TU collaborated with the ranch owners to use a combination high tensile electric (Figure 67) and wildlife friendly barbed wire to install riparian corridor fencing with livestock water gaps along 3.5 miles of Beaver Creek. WGFD and WLCI partnered with the effort by contributing Habitat Trust Fund and WLCI cost share funding. The corridor fencing defers livestock grazing from 103 riparian acres, which is expected to improve degraded stream habitat to benefit trout, and enhance cottonwood/willow riparian habitat conditions to benefit moose, mule deer, elk, and numerous other wildlife species. The landowner has committed to routine fence maintenance and repair over the 20 year life expectancy of the fence.

Figure 67. *High tensile electric fence used at Beaver Creek to improve stream and riparian habitat conditions. Photo courtesy of Hillary Walrath, Trout Unlimited.*

Evaluating the Effects of Browsing to Aspen and Cottonwood Regeneration (Goal 2) – Kevin Spence and Jim Wasseen

The LD index was used again during 2018 to evaluate the effects of big game and livestock browsing to the vertical growth of aspen regeneration in the Little Mountain landscape and cottonwood regeneration along the Green River at Seedskadee NWR (Figure 68). The LD index measures and compares the height of initial growth point for the current year's terminal leader to the height of the tallest previous terminal leader branch that was killed as a result of browsing. A positive LD value indicates uninterrupted young tree growth and/or recovery from browsing, and suggests regeneration maintains the potential to grow to maturity and replace older trees when they die. An LD value near zero indicates that browsing is suppressing growth of regeneration, and a negative LD value is an indicator of significant decline and possible death of young trees. Annual LD Index trend data is made available to wildlife managers as a habitat condition consideration for evaluating elk/moose harvest strategies and population management goals.

Figure 68. *LD index survey at Seedskadee NWR cottonwood regenearation site. Photo courtesy of Tom Koerner, USFWS.*

Littlefield Creek Culvert Replacement (Goal 2) – Mac Foos, Brandon Werner and Kevin Spence

Figure 69. *Statewide Habitat and Access crew replaces Littlefield Creek culvert at Grizzly WHMA.*

Littlefield Creek is a tributary in the upper Muddy Creek watershed where restoration of CRC populations have occurred over the past two decades. The upper segment of Littlefield Creek is located on the Grizzly WHMA, and is considered one of the stronghold stream reaches supporting the CRC population. Statewide habitat and access replaced a deteriorated upper Littlefield Creek culvert at the Grizzly WHMA access road crossing (Figure 69). Precipitation runoff had funneled down the road concentrating on the causeway over the culvert, which eroded the fill material and compromised culvert function. Drain pipes were also installed to reduce erosion on the road over the new culvert. The larger 72 inch culvert was bedded with cobble and gravel to provide 2.8 miles of upstream passage for CRC and other native fish, while improving stream stability and function (Figure 70).

Figure 70. *New Littlefield Creek culvert bedded with cobble and gravel to improve fish passage and stream stability.*

Green River Bank Stabilization at Lunch Island (Goal 3) – Kevin Spence

Technical assistance was provided to Seedskadee National Wildlife Refuge (NWR) personnel with a Green River bank stabilization project at Lunch Island on the refuge. A livestock water gap rock crib had been installed years ago, and was causing the river left channel to aggrade with sediment and force flow and erosion against the opposite side island bank. During February, Seedskadee equipment operators reshaped 400 ft of vertically incised bank and covered it with sod plugs, then removed the rock crib and used the rock to build a series of barbs to deflect the flow off the newly re-constructed bank (Figure 71). Later in April, Department biologists and volunteers assisted Seedskadee NWR personnel with planting willow poles along the new bank to promote further stabilization. The river left channel flowing around Lunch Island supports previously constructed trout holding habitat features, and is a favorite destination for anglers.

Figure 71. *Freshly completed bank stabilization features on the Green River at Lunch Island.*

Bitter Creek Restoration (Goal 2) – WLCI, Jim Wasseen

Figure 72. *Before and after photos of the Bitter Creek drop structure. Photo courtesy of Sweetwater County Conservation District.*

The Sweetwater County Conservation District (SWCCD) along with agencies and funding partners installed an engineered diversion structure and replaced the failing Pierotto Ditch Diversion Structure. The existing structure prevented a 20-ft high head cut from moving up the channel. In 2017, Phase I was completed. In 2018 the final stage was completed which consisted of excavating a new creek channel upstream of the drop structure, placing turf reinforcement mats along the banks, site grading, and seeding (Figure 72). Silver buffaloberry was planted and an engineered seed mix was used for reclamation. The effort will improve bank stabilization and habitat for sensitive native Flannelmouth Sucker, migratory bird species, and other wetland dependent wildlife.

Mill Creek Cheatgrass (Goal 2) – Troy Fieseler and Jill Randall

Approximately 1,543 acres of cheatgrass infestations were treated in 2018. This project, a collaboration between the Mill Creek Grazing Association, NRCS, WGFD, and the Lincoln County Conservation District, began in 2017 with range evaluations to determine the best approach. Pre-treatment monitoring was put into place to judge the success of the project and to help inform timing of future re-treatments. In addition to cheatgrass management, Spike herbicide treatments were carried out in the same area to reduce sagebrush canopy cover with the objective of encouraging herbaceous production and improving conditions for preferred shrub species.

Green River Public Access Areas (Goal 3) – Miles Anderson, Derek Lemon, Kyle Berg and Brandon Werner

Figure 73. *Access road repairs on Hank's Hill at Bear River PAA.*

Habitat and access personnel performed annual required maintenance and monitoring of PAAs in the Green River Region. The Viva Naughton Reservoir PAA campgrounds and facilities were maintained, roads and campsite facilities were graveled to prevent further resource damage. Woodruff Narrows PAA facilities were maintained and access areas cleaned along the reservoir. The Bear River PAA had six culverts installed to improve access and reduce resource damage on Hank's Hill Road (Figure 73). At Green River Blue Rim PAA one half mile of access road was graveled. In Lincoln County, habitat and access contracted 3.58 acres of noxious weeds to be identified and sprayed on PAAs this year.

Red Creek Habitat Enhancement (Goal 2) – Kevin Spence and WLCI, Jim Wasseen

The goal of the Red Creek Habitat Enhancement project is to protect, maintain, and enhance the ecosystem within the Little Mountain and Pine Mountain areas. The exclusion of fire within the ecosystem has allowed conifer to expand into the landscape. Conifer expansion alters the vegetative characteristics and composition across the landscape, which changes critical terrestrial and aquatic habitat that many species depend on. As conifers mature, their canopies encroach into surrounding areas and understory herbaceous species and sagebrush communities decline. This shift of vegetative composition can result in erosion, reduced seasonal stream flows, forage reduction, habitat loss, introduction of invasive species, and increased risk of uncharacteristic fire behavior. Conifer removal is one approach being used to meet the Red Creek ecosystem enhancement goals.

Figure 74. *A member of the BLM fire crew cutting subalpine fir in the Red Creek drainage. Photo courtesy BLM.*

In 2018, the BLM Fire Staff treated 81 acres of fir and juniper. Most of the subalpine fir, lop and scatter, was done on BLM land (Figure 74) while horizontal juniper thinning was done on state land. Minimal work was accomplished due to severity of the fire season and timing restrictions within the Little Mountain and Red Creek area. The other projects within the area are still in the NEPA planning phase.

Southern Wyoming Range Mule Deer Habitat (Goal 2) – Troy Fieseler, Jill Randall and WLCI, Jim Wasseen

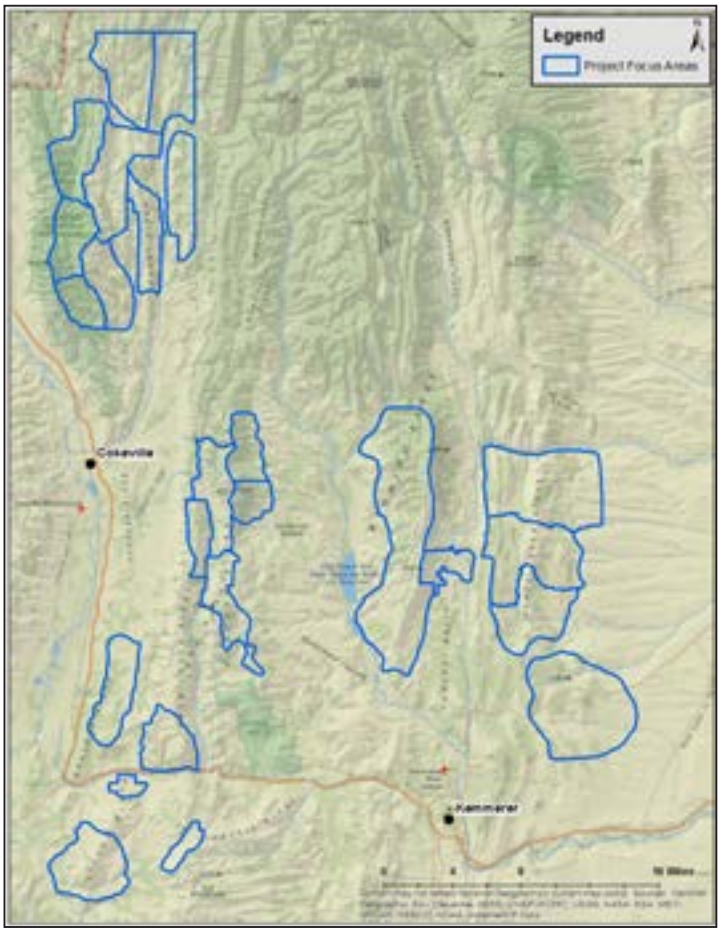


Figure 75. *Project focus areas for Wyoming Range mule deer near Kemmerer and Cokeville in southwest Wyoming.*

Work continued advancing towards the implementation phase, starting with the project approval through the Kemmerer BLM Field Office and the successful hiring of a contractor to begin the NEPA process. During the 2018 field season, all mechanical soil disturbing treatments were delineated in addition to treatments scheduled to be implemented in the first two years of the project. These proposed treatments include mowings in sagebrush (~2,400 acres), Spike herbicide treatments in sagebrush/mixed-mountain shrub communities (~1,350 acres), cheatgrass spraying (~5,300 acres), juniper removal from sagebrush and mixed-mountain shrubs (~620 acres), and prescribed burns in mixed-aspen forest and mountain shrub communities (~3,000 acres). In addition, the BLM mechanically treated 100 acres of juniper encroached sagebrush within mule deer crucial winter range (Figure 75).

This project, which is a collaborative effort between the BLM and WGFD, focuses on improving mule deer transitional ranges using a combination of treatment types with the goal to set back succession in plant communities that have deviated from an optimal state. By doing this, we aim to improve fawn survival by providing the best available resources for does during critical times. With NEPA completion anticipated in winter 2019/2020, we plan to begin implementation in 2020.

Sand Creek Salt Cedar Control (Goal 2) – WLCI, Jim Wasseen

The Sand Creek Saltcedar control project includes approximately 65 miles of stream bottom, and all infested reservoirs/sites within the BLM checkerboard portion of the Colorado River watershed. Activities include inventorying new infestations, treating existing infestations, and evaluating treatment effectiveness. Inventory consists of checking reservoirs and creek bottoms for saltcedar. Treatment consists of cutting and applying herbicide to the stump, as well as foliar herbicide treatment to reduce and eliminate saltcedar plants. Monitoring consists of returning the same year to confirm herbicide effectiveness, and returning at a later date (3-5 years) to ensure there are not any seedlings or resprouts. Contractors were hired through the Carbon County Weed & Pest District via a BLM Cooperative Agreement. Inventory and treatments from last year continued through mid-October 2017. In fall 2017 and spring 2018, 47 reservoirs were inventoried, treated, and monitored. Of the 47 reservoirs, 17 had never been inventoried for weeds before; 30 reservoirs were last inventoried in 2010, 2011, and 2012. None of the 47 reservoirs

had saltcedar; however, two reservoirs had other noxious weeds, consisting of black henbane, houndstongue, and perennial pepperweed and were chemically treated. The saltcedar infestations inventoried in November 2016, April 2017, and May 2017 were treated chemically in 2018. This year focused on monitoring past treatments and identifying new saltcedar or other weed infestations. Overall, saltcedar chemical treatment has been successful. Other weed infestations are slower to respond, but population sizes are reduced. The 47 known weed locations ranging from 0.1 to 10 acres were monitored with the option for retreatment. Eleven of the 47 locations were treated chemically, and the 36 previously treated sites were free of saltcedar resprouts. One area that had been treated chemically seven times since 2002 was found to be clean, with many dead stumps visible but no new growth.

Little Snake Aspen, Mule Deer Habitat (Goal 2) – WLCI, Jim Wasseen

Figure 76. *Ripping aspen roots to encourage "suckering", new saplings stemming from the roots. Photo courtesy of the Little Snake River Conservation District.*

Figure 77. *Masticating junipers to increase grass, forb and shrub production for mule deer and sage grouse. Photo courtesy of Little Snake River Conservation District.*

The Little Snake River Conservation District (LSRCD) is working to improve and enhance habitat condition and resiliency in critical aspen, sagebrush, mountain shrub, and wet meadow habitats for sage grouse, mule deer, and other wildlife species. The LSRCD met with Baggs Mule Deer Working Group and the BLM Juniper Treatment ID team to coordinate habitat treatments and priorities consistent with the Baggs Mule Deer Habitat Plan; and a field tour to review proposed juniper treatment locations and a scope of work on BLM lands. Working with partners, accomplishments include: ripping 628 acres of aspen (Figure 76), masticating and cutting 526 acres of juniper on mule deer winter range (Figure 77), brush beating decadent mixed mountain shrub/sagebrush communities (366 acres), and chemically treating 2,795 acres of cheatgrass on mule deer winter range.

Urban Green River Streambank Stabilization (Goal 3) – Kevin Spence and WLCI, Jim Wasseen

Figure 78. *Photo point along the Green River at Scott's Bottom comparing bank erosion between 2017 (left) and 2018 (right).*

Preliminary engineering survey and designs were completed to address 2,000 ft of vertically incised riverbank associated with the Scott's Bottom area of the City of Green River's riparian greenbelt. The unstable riverbank is eroding and migrating laterally into the riparian zone (Figure 78) threatening to remove a portion of one of the younger and healthier cottonwood galleries along the river which are important to neo-tropical migrant birds, mule deer, and other terrestrial wildlife. The laterally cutting river bank is also jeopardizing a segment of the Scott's Bottom Nature Trail where the Department has previously invested funds towards the establishment of this interpretive wildlife viewing and educational trail. Using a Bank Erosion Hazard Index survey, habitat biologists estimated 1,654 tons, or 165 dump truck loads, of sediment annually erode into the river from this reach. Collaborative plans for stabilizing the river bank include narrowing and deepening the river channel and constructing a vegetated bankfull floodplain bench the entire length using toe-wood and sod mats. This strategy will not only maintain riparian habitat integrity, but will enhance instream trout holding habitat to provide a quality public angling opportunity in an urban setting. Fundraising for the improvement has begun, and implementation is expected in 2019.

Mule Deer Initiative, Wyoming Range Mule Deer Herd (Goal 5) – Troy Fieseler

In 2017, efforts began to increase the number of Rapid Habitat Assessments (RHA) completed in the southern stretches of the Wyoming Range Deer Herd with a total of 1,155 acres assessed. During the 2018 field season, with the help of regional personnel, we were able to increase this acreage to nearly 8,400 with 18 Rangeland RHAs totaling 7,630 acres and 11 Aspen RHAs totaling 756 acres. These assessments will be used to inform Herd Objective Reviews and to provide insight into future habitat improvement projects (Figure 79).

Figure 79. *An aspen stand with a forb understory located in the Wyoming Range MDI herd.*

In addition to performing habitat assessments, two public meetings were held in the Green River region updating the public on the status of the Wyoming Range deer herd. Presentations were given about ongoing habitat treatments as well as planned future projects.

Blacks Fork/Muddy Creek Invasives (Goal 2) – WLCI, Jim Wasseen

The Uinta County Weed and Pest District (UCWPD) has been working on this long term project, since 2012, to minimize tamarisk from encroaching on stream banks, preserve existing riparian habitat, and improve native vegetation. This project also involves controlling and decreasing other invasive species along the drainage. The area includes multiple drainages with several small tributaries that feed into the Blacks Fork River. Headwater Weed Control received the 2018 contract through the UCWPD and focused treatments on tamarisk, Perennial pepperweed, thistle complexes and other invasive species occurring on the Blacks Fork River. The contractor began work on the Smiths Fork River and Cottonwood Creek, where they found new starts of Salt cedar and mature parent trees up dry drainages. Many mature trees were as far as 1 mile from the drainage and providing a seed source for the reestablishment of Salt cedar on the drainage. Noxious weed treatments were targeted to maintain desirable vegetation along the riverbank and limit seed propagation down the drainage (Figure 80).

Figure 80. *Photo depicts effectiveness of previous treatments - the reddish stems in the background are dead tamarisk plants. Photo courtesy of Uinta County Weed and Pest District.*

Upper Bear River Fish Passage – Danielson Diversion Improvements (Goal 2) - Kevin Spence

Figure 81. *Permanent rock cross-vane diversion structures installed in the upper Bear River to promote fish passage and river stability.*

Figure 82. *Farmer's Conservation Alliance flat plate fish screen installed at in irrigation diversion in the upper Bear River.*

The Danielson Canal diversion is located on the Bear River near the Wyoming-Utah border south of Evanston. The diversion headgate had been in disrepair, and an annually constructed push-up cobble dam promoted streambed instability and made upstream fish passage difficult. TU took the lead to improve the diversion infrastructure with the financial support of multiple partners. The cobble push up dam was replaced with two permanent rock step up cross vane structures that would stabilize the river bed at the site, encourage sediment transport, and created 1.3 miles of upstream fish passage (Figure 81). A new headgate and sediment sluice was installed, and a water measuring flume was also added to the new infrastructure. The Department contributed funding to install a Farmer's Conservation Alliance flat plate fish screen (Figure 82) with the purpose of returning fish entrained in the canal safely back to the river. The project will improve the ability of Bonneville Cutthroat Trout to move through this reach of river during spawning migration, and eliminate the loss of fish to the Danielson Canal. The project serves as a showcase to encourage other water users to improve their diversions, thereby promoting a cumulative positive effect for fisheries over a larger reach of the upper Bear River.

Red Desert Springs (Goal 2) – Troy Fieseler

In a partnership with the Rock Springs BLM Field Office, this project, located in the northern portion of the Red Desert, was developed to preserve and enhance key habitats for wildlife living in and those migrating through a desert landscape. A total of nine spring sites and 11 aspen stands have been identified to receive steel-jack fencing due to the intense use of these limited habitat communities by animals including feral horses, livestock and wildlife. Given the rarity of these sites across this landscape and the high preference for them by animals, many sites have seen pressure beyond which is sustainable leading to the risk of these sites disappearing altogether. The loss of these habitats will result in negative long-term impacts to big game, small game and upland game species, as well as a host of neo-tropical migratory birds (Figure 83).

Figure 83. *A degraded spring site with heavily browsed riparian vegetation on Steamboat Mountain.*

To mitigate excessive use and ensure that these water sources and plant communities remain intact for future generations, we plan to first exclude them from pressure with the use of steel-jack fencing. In addition, plans to enhance springs with offsite water to provide for a more reliable water source are being developed. Currently, ~ 6,000 feet of steel-jack fencing is being welded and will be erected around three spring sites and one aspen stand in 2019 with the generous assistance from our funding partners including WGFC MDI, BOW, WFWF, JIO and MFF.

Seedskadee Cottonwood and Willow Pole Plantings (Goal 2) – Kevin Spence and WLCI, Jim Wasseen

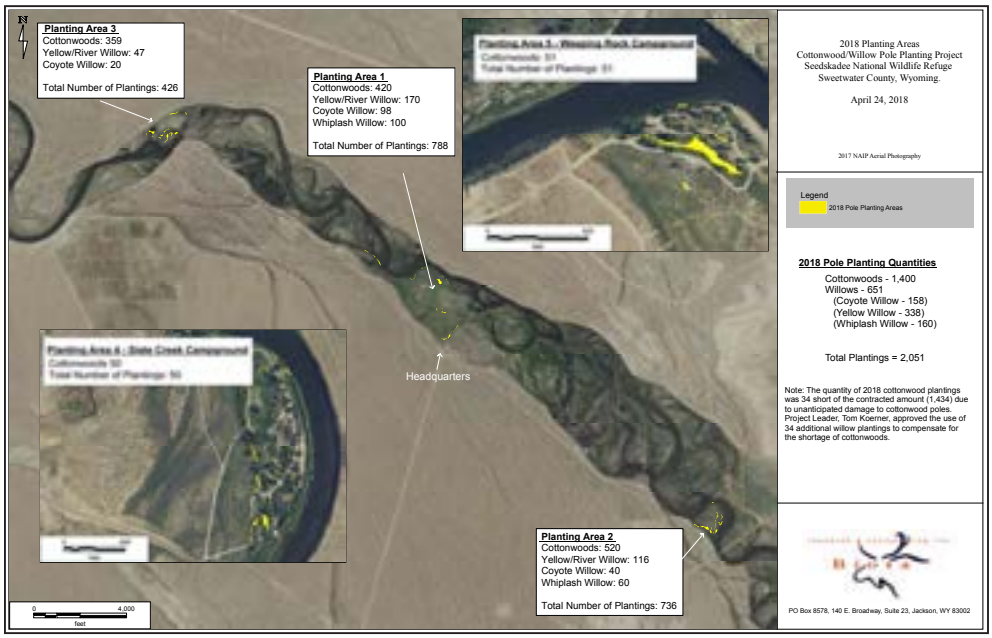


Figure 84. *Cottonwood and willow pole plantings on Seedskadee National Wildlife Refuge in 2018. Figure courtesy of Biota Research and Consulting.*

Riparian habitat along the Green River that flows through Seedskadee NWR has been influenced by Fontenelle Dam located upstream. Changed hydrology has limited opportunities for natural regeneration and replacement of the stands of narrow leaf cottonwood, native willows, and other riparian vegetation. WGFD and WLCI provided cost share funding to the USFWS to hire a contractor to plant 1,400 narrow leaf cottonwood poles and 651 willow poles at select sites on and near Seedskadee NWR during spring 2018 (Figure 84). Ventilated poly tube tree protectors were placed over each pole to protect new growth from browsing and wind damage. Additionally, Department biologists and volunteers assisted the Seedskadee NWR staff with planting an additional 1,750 willow poles later in the spring. By July, visual inspections showed that 90% of the planted poles rooted and exhibited healthy new growth. The 2018 plantings were a component of an ongoing multiple phased effort to restore healthy cottonwood and willow communities on Seedskadee NWR. Numerous species of migratory birds, big game including moose and mule deer, and many other terrestrial and aquatic species will benefit from the improved woody riparian vegetation and the habitat conditions it provides.

Little Mountain Aspen Protection Phase III (Goal 2) – Kevin Spence and WLCI, Jim Wasseen

Figure 85. *Partners erect phase III steel jack fencing on Little Mountain to protect aspen regeneration from overbrowsing.*

A collaborative effort between WGFD, BLM, MFF, Seedskadee Chapter of TU, R&M Welding, BOW, and inmates from Sweetwater County Corrections on a community work release program installed 3,800 ft of temporary steel jack fencing to protect ten acres of severely browsed aspen regeneration on Little Mountain during August (Figure 85). This is the final phase of an initial three phased effort that began in 2015 to protect aspen regeneration and promote healthy aspen stands in the upper Currant Creek watershed.

Summer concentrations of ungulates in Little Mountain aspen stands encourage excessive browsing of young aspen regeneration. Browsing impacts to aspen suckers at many locations continue to impede vertical growth, and some sites exhibit browsing severe enough to cause retrogression and death of aspen suckers. Ungulate browsing not only limits vertical growth, but also weakens vigor and subjects aspen regeneration to losses from disease and insects. The cumulative effects of ungulate browsing likely are preventing enough young aspen trees from growing to maturity and to be able to replace older trees in a stand when they die, ultimately reducing the amount of aspen habitat present on the Little Mountain landscape. The purpose of excluding most ungulate use (elk, cattle, and moose) is to encourage unimpeded vertical growth of aspen regeneration for stand replacement and promote healthy aspen habitat conditions. Once monitoring shows young aspen trees have grown to an average height where they are no longer susceptible to browsing and are capable of maintaining a healthy stand, the fencing will be dismantled and moved to another identified aspen stand nearby in need of protection.

Red Rim Grizzly WHMA Habitat Enhancements (Goal 2) – Mark Cufaude, Mac Foos, Brandon Werner and Katie Cheesbrough

In cooperation with the Little Snake River Conservation District (LSRCD) and the BLM, work continued on serviceberry thinning and juniper mastication. In 2018, WGFD began habitat enhancements on state sections of the Grizzly WHMA where shrub communities have become overly dense (average of 45% shrub cover) and monotypic in age class (trending from mature to decadent (Figure 86); and where aspen regen-

Figure 86. *Pretreatment monitoring was conducted in 2018 with shrub cover transects on the Grizzley WHMA.*

eration has become stagnant (Figure 87). Sagebrush and mixed mountain shrub mowing were conducted on 315 acres of the Grizzly WHMA to increase shrub age class diversity, improve understory production, and enhance water flow to stock ponds and wet meadows. Grizzly WHMA aspen enhancements included 560 acres of mechanical aspen ripping by the statewide habitat and access crew to stimulate aspen regeneration and stand expansion.

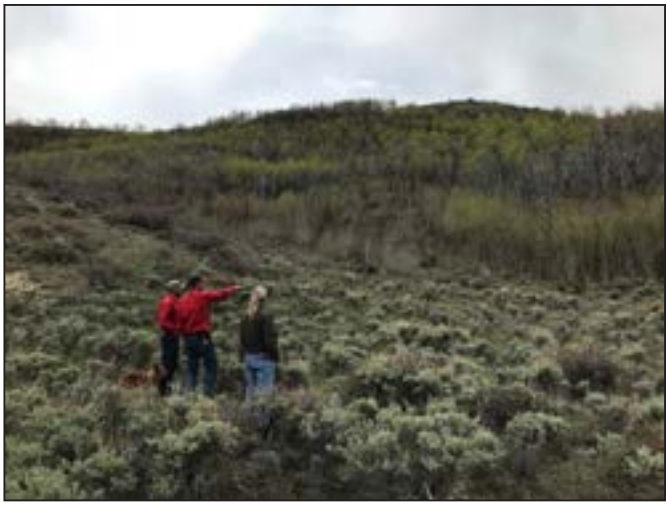


Figure 87. *WGFD personnel accessing aspen in the Baggs mule deer herd unit.*

The Baggs MDI working group met in 2018 to discuss WGFD personnel changes, the Baggs mule deer migration corridor designation process, updates on collar research within the Baggs mule deer herd, and the future direction of the working group. RHA monitoring continued with seven rangeland assessments (1,883 acres) and three aspen assessments (172 acres) across mule deer seasonal ranges within the mule deer herd unit.

Figure 88. *Mosaic mechanical brush thinning.*

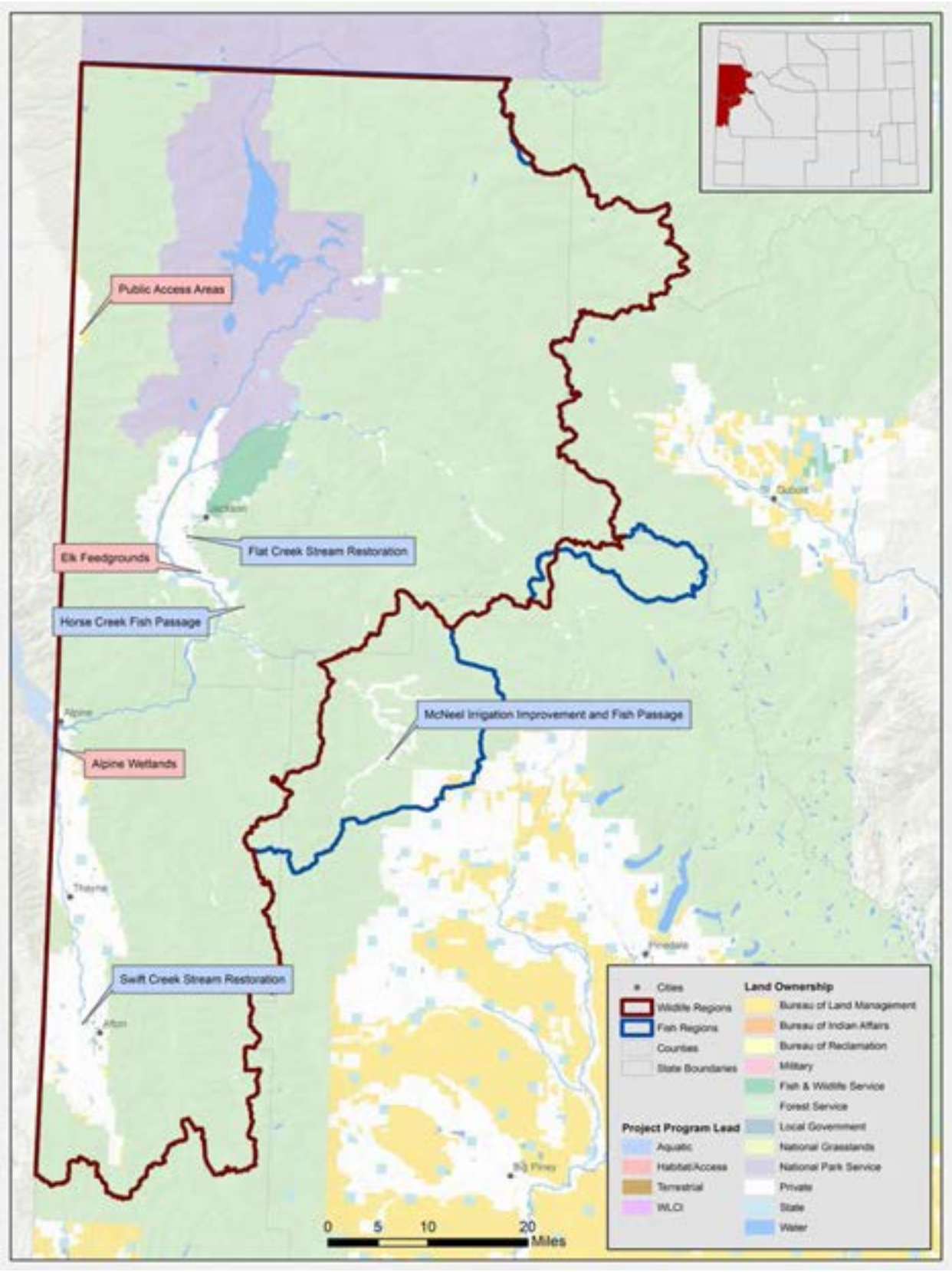
Figure 89. *Aspen understory ripping.*

Red Rim Grizzly WHMA Forage Reserve Grazing (Goal 2) – Mark Cufaude

Figure 90. *Cattle grazing on the Red Rim Grizzly.*

Red Rim Grizzly WHMA is comprised of 38,000 acres; this includes 9,451 acres of OSLI land, which is leased by the Commission, 26,920 acres of BLM which is under an Memorandum Of Understanding (MOU) with the Commission, and 1,664 acres of WGFC fee title lands. Three cattle operators utilized an annual rest rotational grazing plan (Figure 90) 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. The operators also provide labor on the Red Rim Grizzly infrastructure such as construction of water tanks, replacing stock fence to wildlife friendly specifications, and habitat improvements.

Jackson Region



Jackson Region

The Jackson Region encompasses the area along the western border of the state, south of Yellowstone National Park, south to Star Valley and LaBarge. Many regional aquatic habitat projects involve restoring stream functions while also facilitating fish passage. One such projected completed involved bank stabilization on a section of the upper Hoback River near Bondurant in partnership with Trout Unlimited. The project was designed to provide a fish-friendly alternative to two gravel push-up dams while satisfying irrigation needs for livestock and elk at the Department's McNeel elk feedground. In fall 2018, two push-up dams were consolidated and replaced with a permanent rock diversion. In addition to installing a new headgate, eroded areas were repaired and several in-stream structures were constructed to improve both irrigation efficiency and fish habitat quality.

A second project in the works involves restoration of a 1.4 mile section of Flat Creek on private property south of Jackson. This effort is entering the final design phase, slated to begin in the winter/spring of 2019/2020. This project will improve stream connectivity and increase Snake River cutthroat trout spawning habitat throughout lower Flat Creek.

Approximately two miles upstream from the Snake River confluence is the Game & Fish Horse Creek WHMA, which serves as a winter elk feedground with irrigated hay pasture. In June 2017, high water eroded the current irrigation diversion. Stop-gap repairs were made in October 2017, but a new design has been completed to withstand future flooding and allow both up and downstream movement of all age-classes of fish. This effort illustrates how WGFD lands can showcase best management practices and stewardship values.

A fourth riparian improvement project involves four landowners along Swift Creek, a tributary of the Salt River near Afton. The stream has experienced several impacts but instream improvements are planned in lower Swift Creek, which will also maintain the creek's connection to a perennial spring creek with known cutthroat trout spawning value.

Other projects include water management for waterfowl production at the Alpine Wetlands and construction of haysheds, stackyards, horse corrals and some 2,500 feet of new wildlife-friendly pole-top fence at regional elk feedgrounds. Haying was again conducted on approximately 120 acres of the Horse Creek and South Park WHMAs in 2018, producing 227 tons of hay that was fed to elk this past winter. The primary goal of haying on the WHMAs is to produce more nutritional standing forage on the ground as well as reduce the amount of hay needing to be purchased for elk in the winter.

Wildlife Habitat Management Areas (Goal 2) – Miles Anderson, Derek Lemon, Kyle Berg and Brandon Werner

Figure 91. *WGFD personnel irrigating on Horse Creek WHMA.*

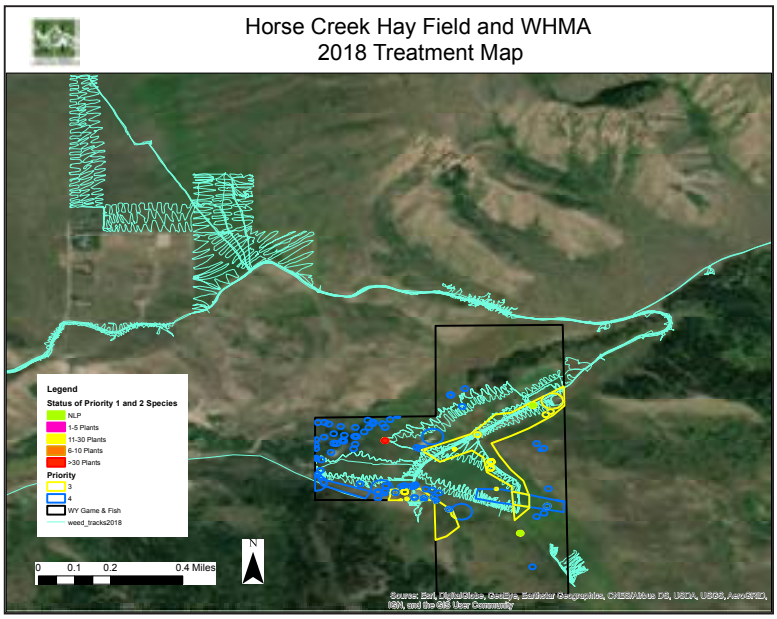


Figure 92. *Noxious weed report for Horse Creek WHMA.*

Annual maintenance and improvements continued on the three WHMAs in the Jackson Region in 2018. The Greys River WHMA received annual fence maintenance on 13 miles of crucial winter range elk fence. Annual fence maintenance continued on the South Park WHMA, seven miles of boundary fence was maintained along with one mile of crucial winter range elk fence. The South Park and Horse Creek elk feeding areas were harrowed in spring 2018 to break up elk scat and promote growth of new grasses. The Horse Creek WHMA received annual maintenance on one mile of crucial winter range elk fence. Five hundred feet of wildlife friendly pole top fence was installed, replacing dilapidated fencing. The 60 acres of grass meadows on Horse Creek WHMA were irrigated before and after haying from May through August (Figure 91). The irrigation after haying helps provide nutritious natural forage for the elk when they arrive on the Horse Creek feedground prior to feeding in the fall. The Jackson Region WHMAs and PAAs also received noxious weed treatment from the Teton County and Lincoln County Weed and Pest Districts (Figure 92). In 2018, 98 acres of noxious weeds were treated on WGFC owned and managed lands.

McNeel Irrigation Improvement and Fish Passage (Goal 2) – Anna Senecal and WLCI, Jim Wasseen

The Hoback River provides habitat for one of Wyoming's native cutthroat trout species, the Snake River Cutthroat Trout. The Hoback River is an important, wild fishery; meaning the fishery is self-sustained through wild recruitment (no stocking). Maintenance of the fishery for future generations therefore requires that functioning instream and riparian habitats be conserved and degraded habitats restored or improved. The aquatic and riparian habitats along the Riverbend Ranch have been heavily degraded by historical and ongoing land management practices associated with cattle ranching and winter elk feeding.

Diverting irrigation water from the Hoback River is necessary for operating the cattle ranch and elk feedground. In the past, water was diverted through the annual construction and regular maintenance of gravel push-up dams formed by using heavy equipment to mine riverbed material to build temporary

Figure 93. *Hoback McNeel diversion before (left) and after (right) construction.*

dams or wing walls to push water down a ditch (Figure 93). The constant manipulation of river bed and banks exacerbates erosion and channel instability and can cause seasonal fish barriers.

The objective of the McNeel Fish Passage and Irrigation Improvement was to provide a fish and stream friendly alternative to the two gravel push up dams while satisfying irrigation needs. In fall 2018, the two push up dams were consolidated and replaced with a permanent rock diversion structure keyed into a bedrock feature. In addition to installing a new headgate and rock cross-vane diversion, eroded areas were repaired, bankfull benches were constructed and toewood and j-hook structures were installed. As part of the ditch consolidation work, the irrigation canal delivering water from the new structure was moved slightly, enlarged, and repaired (Figure 93). These actions will improve irrigation efficiency and aquatic and riparian habitat quality.

Horse Creek and South Park WHMA Haying (Goal 2) – Miles Anderson, Derek Lemon, Kyle Berg and Brandon Werner

The Horse Creek and South Park WHMAs were hayed in 2018 (Figures 94-95). In all, approximately 120 acres were hayed and the WGFD produced 227 tons of hay which will be fed on the Horse Creek and South Park feedgrounds. The main goal of haying the WHMAs is to produce more nutritious forage for wintering big game during the late fall and early spring as they are migrating to and from the elk feedgrounds. Haying will continue on the WHMAs to continue providing forage for big game, helping reduce chances for commingling between elk and cattle on private land adjacent to elk feedgrounds, and reducing the amount of hay that the WGFD purchases by feeding hay that is produced on our own lands.

Figures 94-95. *Cutting hay (left) on South Park WHMA and baling hay (right) on the Horse Creek WHMA.*

Swift Creek Stream Restoration (Goal 2) – Anna Senecal

Figure 96. *Swift Creek design illustrating extensive channel realignment, bank treatments and establishment of appropriate pool and riffle spacing.*

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

In 2017, WGFD partnered with TU, USFWS, NRCS, and four landowners to begin improving instream and riparian habitats in lower Swift Creek and maintain the creek's connection to a perennial spring creek. Survey and stream restoration designs were produced in 2018 (Figure 96). Final design, permitting acquisition and fundraising will continue through winter 2019 with the first phase of construction to take place during winter/spring 2019/2020.

Public Access Areas (Goal 3) – Miles Anderson, Derek Lemon, Kyle Berg and Brandon Werner

Personnel from habitat and access performed annual maintenance and monitoring of regional PAAs. All public access boundary fences were maintained to protect riparian habitat. PAAs on the Salt River had entry doors replaced on restroom facilities and leaking skylights were fixed. Vandalized and weathered signs were replaced. Coco Belle vanMeerendonk PAA had a new wildlife friendly boundary fence, an access road and parking area installed (Figure 97).

Figure 97. *Coco Belle new wildlife friendly pole top fence.*

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

Horse Creek is an east-side tributary to the Snake River south of the Town Jackson that supports Snake River Cutthroat Trout spawning and holding habitats. Approximately two miles upstream from the Snake River confluence sits the Horse Creek WHMA. The WHMA operates as a winter elk feedground and is irrigated and hayed for this purpose. The irrigation diversion, which doubles as a road crossing, consists of two 36 inch culverts and a headgate. The culverts are undersized for the stream and have caused up and downstream habitat loss in addition to serving as seasonal barriers to upstream fish migrations. High flows in June 2017 eroded a section of culvert and roadway at this crossing (Figures 98-99). Repairs were made in October 2017 to replace the culvert and stabilize the roadway. Optimizing long-term irrigation and fish habitat and movement requires a new irrigation structure.

Figure 98. *Horse Creek irrigation diversion failure and road loss, June 2017.*

Figure 99. *An upstream view of the Horse Creek irrigation diversion in 2017 shows significant backwater ponding upstream of the undersized culvert.*

Conceptual designs are in-hand to construct an irrigation structure and road crossing. The new structure will be capable of withstanding floods, will not contribute to downstream erosion, and will regularly allow up and downstream movement of all age classes of fish. This effort illustrates how Department WHMAs can be showcases for best management practices that optimize land management and stewardship values.

Elk Feedrounds (Goal 2) – Miles Anderson, Derek Lemon, Kyle Berg, Brandon Werner and Daniel Pinneo

Figure 100. *New horse corral at Patrol Cabin feedground.*

Figure 101. *Harrowing on Dog Creek feedground.*

Annual maintenance and improvements continued on 11 WGFD managed elk feedgrounds in the Jackson Region. Annual repairs and maintenance were done to feedground structures, corrals, stackyards, elk migration fences and grounds. A new hayshed and stackyard was constructed at South Park Feedground. A new horse corral was built at Patrol Cabin Feedground up the Gros Ventre (Figure 100). Approximately 2,500 feet of new wildlife friendly pole top fence was constructed on the Dog Creek Feedground. The Dog Creek elk feeding area was also harrowed in spring 2018 to break up elk scat and promote growth of new grasses (Figure 101).

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

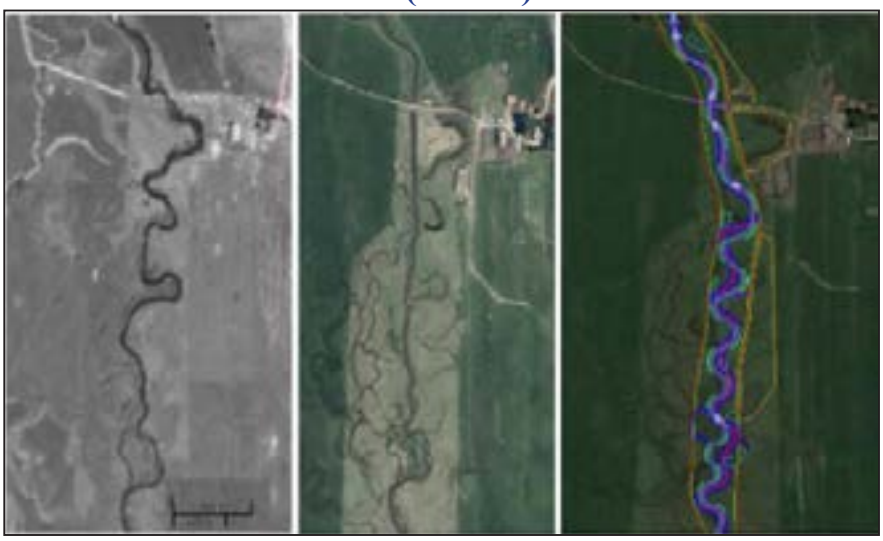


Figure 102. *A comparison of Flat Creek pattern over time: 1945 (left), 2015 (center) and proposed (right) channel alignments.*

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 6 road miles south of town. Flat Creek is integral to the town of Jackson, the Snake River Cutthroat Trout fishery and the aquatic ecosystem. The creek provides multiple beneficial uses including fish habitat, 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 (WYDEQ) 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 spawning riffles and deep pools (Figure 102). These channel conditions reduce spawning activity and may restrict seasonal movement through shallow depths, high summer temperatures, and the formation of unstable winter ice.

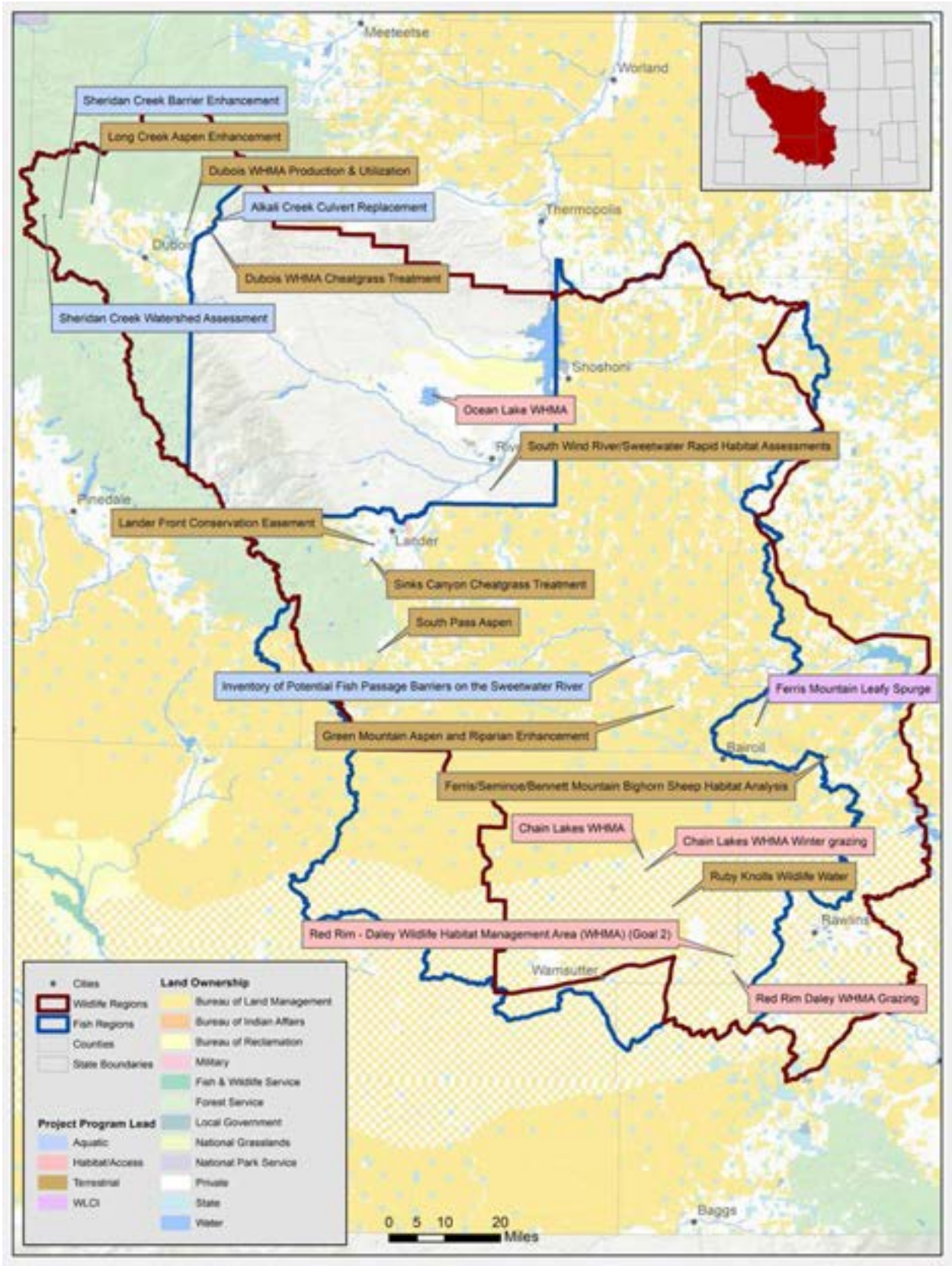
WGFD is partnering with a private landowner south of the town of Jackson to restore stream function and cutthroat trout habitat to 1.4 miles of Flat Creek. This project is entering the final design phase. A team is under contract for final design and construction oversight. Fundraising and permit acquisition is ongoing for project construction, slated to begin in the winter/spring of 2019/2020. This project will improve stream connectivity and increase Snake River cutthroat trout spawning habitat availability throughout lower Flat Creek. Both will ultimately benefit the fishery drainage-wide.

Alpine Wetlands (Goal 1) – Miles Anderson, Derek Lemon, Kyle Berg and Brandon Werner

Personnel from Habitat and Access performed annual maintenance and monitoring of the Alpine Wetland complex. Approximately 1,875 feet of the main transport ditch was cleaned to maintain adequate water flows to the ponds (Figure 103). Water levels were adjusted to maintain sufficient habitat for waterfowl. The Alpine Wetlands received noxious weed treatments from Lincoln County Weed and Pest.

Figure 103. *Water flowing after ditch was cleaned at Alpine Wetlands.*

Lander Region



Lander Region

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

One focus of aquatic habitat personnel was identifying fish passage barriers on the Sweetwater River where diversions provide water to 24,000 acres and fish populations can be impacted during low flows. Twenty locations along the river were found to provide barriers to fish. Planning will begin on projects to improve fish passage in these areas.

The South Pass Aspen project saw its fourth year of work and a total of 325 acres were treated this year bringing the four year total to 1,531 acres. This year, a Good Neighbor Authority Agreement was made between the Shoshone National Forest and WGFD to help streamline cooperation between the agencies. This agreement allowed for an additional 90 acres of treatment in 2018 and planning for an additional 3000 acres in the next three years. Follow-up monitoring has already shown good response of aspen seedlings from the first years of treatment.

Another large area of effort was managing the 210,000 plus acres of Commission administered lands in the region including lands around Dubois on the Spence and Moriarity Wildlife Management Area (WMA), 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.

Farming and haying operations on these lands were expanded in 2018. Two 1,000 foot pivot sprinklers were constructed and began being used this season. These new pivots will increase water efficiency. In total, Dubois Habitat and Access staff hayed 819 acres on these lands, producing 708 tons of hay, which was shipped to Pinedale and Jackson area elk feedgrounds, while simultaneously leaving enough winter forage for elk in the Dubois area.

Long Creek Aspen (Goal 2) – Amy Anderson

Figure 104. *Saw crews working on Long Creek near Dubois, WY to remove encroaching conifer from aspen stands to benefit mule deer, elk, moose and ruffed grouse.*

Figure 105. *After selective thinning of conifer from aspen habitat using lop and scatter method.*

Through a partnership approach to managing important habitats for mule deer and other iconic wildlife, the Shoshone National Forest is using active vegetation management to enhance mule deer populations, habitat and hunting opportunity in the Long Creek Watershed. The project has used thinning and prescribed fire to restore early seral habitats. Use of commercial timber harvest to thin overstocked stands, remove beetle kill and reduce the threat of landscape scale wildfire has complimented the aspen project activities (Figures 104-105). This project is in its fourth year of active treatment, and has used emerging migration information from big game research being conducted on the Shoshone National Forest.

Project goals include improving mule deer habitat across the landscape to affect long term positive change in herd level health, reproductive success, and survival to enhance populations. The partners hope to improve the health and vigor of aspen communities and increase the extent of aspen, an ecologically important cover type for mule deer, elk, moose, ruffed grouse, and other non-game species.

In 2018, 260 acres of selective thinning of conifer from aspen occurred using a variety of treatment prescriptions. Partners on this project include RMEF, Shoshone National Forest, WWNRT, and WGFD.

CM Horse Grazing, Whiskey Basin WHMA (Goal 2) – 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 2018. 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.

Inventory of Potential Fish Passage Barriers on the Sweetwater River (Goal 2) – Joanna Harter

Figure 106. *A diversion dam that is a barrier to fish passage.*

Figure 107. *A diversion dam that is a barrier to most fish, but may be passable by trout.*

Diversions from the Sweetwater River drainage provide water for approximately 24,000 irrigated acres. Low flows and elevated water temperatures in portions of the Sweetwater River can impact fish populations. Additionally, numerous diversion dams in the river may be barriers to fish migration, especially during low flows. In 2017, aerial imagery and water rights data were used to identify 79 possible fish passage barriers (Figures 106-107) throughout the entire mainstem Sweetwater River, including irrigation diversions and natural structures. Between 2017 and 2018, 58 of these sites were visited and evaluated as barriers to trout and other fish species.

Of the 58 sites visited, 20 diversions pose a barrier to fish passage, at least seasonally. Of these 20 diversions, three are complete barriers to all fish passage and nine are complete barriers to many species other than trout. The remaining eight diversions are only seasonal barriers to fish passage. Upon evaluation of remaining sites in 2019, barriers will be prioritized and considered for projects to improve passage of native fish species and trout in the Sweetwater River.

Chain Lakes WHMA Winter Grazing (Goal 5) – Matt Pollock

Domestic sheep graze on Chain Lakes WHMA from December through April each year. In 2018, in collaboaration with the BLM, we accepted applications for a new five-year grazing lease. During 2018, the grazing lessee utilized approximately 900 AUMs. In exchange for the 2018 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 an oasis in the dry desert with concentrations of lush vegetation and abundant wildlife frequenting these areas.

South Wind River/Sweetwater Mule Deer Initiative (Goal 2) – Amy Anderson, Stan Harter, Brady Frude and Teal Cufaude

Figure 108. *Conducting Rapid Habitat Assessments on Red Canyon near Lander, WY.*

The South Wind River/Sweetwater Mule Deer Initiative is moving forward with habitat improvement work across the herd units. Some of these projects include: South Pass aspen, Green Mountain Aspen and Riparian Enhancement, Sinks Canyon Cheatgrass Treatment, and Lander Front Conservation Easements. These projects address concerns outlined in the MDI Working Group's recommendations. These projects address concerns with habitat loss associated with invasive species, fragmentation from development, encroaching conifers into aspen stands, and degraded riparian areas. In addition to the habitat improvement projects, 16 RHAs were conducted (Figure 108) in areas identified through mule deer collar data, or within planned habitat treatment areas. RHAs were conducted across shrub/rangeland habitats (1,167 acres), aspen habitats (310 acres), and riparian habitats (208 acres). These assessments will ultimately help inform the South Wind River and Sweetwater Mule Deer Herd Unit Objective Reviews occurring in 2020.

Ocean Lake WHMA NW Corner Irrigation Cells (Goal 2) – Justin Rhine

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

The northwest corner of Ocean Lake WHMA had several pieces of infrastructure already in place that were conducive to creating seasonal wetlands. Several earthen berms with relic water control structures were in place from preliminary work completed in the 1960s and 70s by WGFD personnel. The goal of this project was to upgrade, reconfigure, and rehabilitate the existing infrastructure to create six individual irrigated cells ranging from 2.5 to nine acres in size. Goals are to 1) enhance vegetation and increase plant diversity, 2) provide habitat needed for migrating waterfowl, 3) provide additional hunting and wildlife watching opportunities for the public, and 4) reduce sediment input to Ocean Lake.

Follow up work was completed in October 2018. DU retained and managed the contractor for project completion. WGFD personnel assisted DU by regulatory navigation and water right procurement. The project consisted of installing a pump that charges a buried pipeline that is capable of delivering water to each of the six cells. Each cell can be controlled independently of each other to allow the greatest flexibility for managing water levels to produce desirable food plants for waterfowl, control salinity and maintain open water.

Dubois WHMA Cheatgrass Treatment (Goal 2) – Amy Anderson and Brian Parker

In 2016, the Fremont County Weed and Pest (FCWP) District conducted an inventory of cheatgrass on the Dubois WHMAs which include: Whiskey Basin WHMA, Inberg-Roy WHMA and Spence-Moriarity WMA. Cheatgrass was found prominently along many of the main roads within these areas. Wildlife migrations are a key component of all of the WHMAs, and the crucial winter range aspect of all of the grasslands on these units, this is particularly troubling. As wildlife move along roads, or disturbed sites, there is potential to spread cheatgrass into high priority habitats, which would be detrimental for wintering wildlife dependent on healthy habitats.

Figure 109. *Helicopter application of herbicide to treat cheatgrass on Duncan Bench within the Spence-Moriarity WMA near Dubois, WY.*

In September 2018, cheatgrass was aerially treated on approximately 800 acres on Duncan Bench within the Spence-Moriarity WMA (Figure 109) using Plateau herbicide at a rate of 8 oz per acre. Roads were treated using a similar rate of herbicide, but utilizing a Fremont County Weed and Pest ground spray rig with a boom and hand guns. All of the main roads within the three habitat areas were treated amounting to ~ 30 miles of roads. Funding was provided from RMEF, Wyoming Wild Sheep Foundation, Fremont County Weed and Pest and WGFD.

Sinks Canyon Cheatgrass (Goal 2) – Amy Anderson

Figure 110. *Aerial application of herbicide to control cheatgrass in Sinks Canyon State Park.*

Sinks Canyon State Park is located on WGFD Commission owned land. It is a very popular recreation area both locally and nationally. In 2012, the Fairfield fire burned along most of the south facing wall of the canyon, which resulted in an infestation of cheatgrass throughout the burn scar and along all roads and trails. The burn includes lands within the State Park, but also BLM and USFS lands, as well. The area is classified as crucial mule deer winter range.

In 2014, the FCWP District in partnership with BLM, WGFD, and State Parks sprayed Plateau on both the State Park and on adjacent BLM lands. A portion of the State Park was also treated with *Pseudomonas fluorescens* bacteria. While there may have been limited success from these treatments, follow-up herbicide treatment was necessary in 2018.

The same partners, along with Popo Agie Conservation District and WWNRT teamed up to treat 406 acres of BLM and State Park lands with a combination of herbicides in 2018. On BLM land, Plateau was aerially applied with a surfactant on 242 acres. On Sinks Canyon State Park land, Esplanade and the surfactant Inlet were aerially applied on 164 acres (Figure 110). This is the first larger scale application of Esplanade, outside of small trial plots, in Fremont County. Weed and Pest will continue to monitor the results.

Red Rim - Daley WHMA (Goal 2) – Matt Pollock and WLCI, Jim Wasseen

Figure 111. *New fence on the Red Rim - Daley WHMA constructed to reduce erosion caused by the old fence line.*

Figure 112. *New fence on the Red Rim - Daley constructed to make the Shipping Pasture more user-friendly.*

This project has several objectives to improve habitat on the Red Rim - Daley WHMA; reduce erosion and sedimentation created by cattle walking along an existing fence line (Figure 111), thereby creating ruts which become an artificial waterway. Second, reduce total internal fencing thus removing impediments to wildlife mobility. Third, create a smaller shipping pasture that allows for more efficient livestock handling (Figure 112). Finally, improve forage utilization and livestock handling capabilities by getting a water source in the Shipping Pasture. Work continues with the BLM and the grazing lessee on finding solutions to provide stock water into the Shipping Pasture. Initially, a pipeline was considered, but the artesian well from which the water would come, may not have the necessary capacity. The removal of 2.65 miles of unnecessary fencing in the western part of the shipping pasture was completed via contract. This project also entailed the construction of approximately ½ mile of new fence. The new fence was constructed to make the Shipping Pasture smaller and more "user-friendly" as well as to alleviate some erosion issues created by the old fence line that was four and five-wire fence. The new, re-routed fence is a more wildlife-friendly, three-wire design. WGFD contributed contract oversight and provided all the materials for the new fence. Also in 2018, WGFD habitat and access personnel repaired wildlife/livestock watering projects completed via contract with WLCI funding in 2016. Three leaking water tanks were repaired and two above-ground water storage tanks were re-plumbed.

Ruby Knolls Fence (Goal 2) – Amy Anderson

The Ruby Knolls fence was originally installed in September 2016. It occurs on a small private land parcel within the checkerboard in the Red Desert northwest of Rawlins. The project included the installation of a pumping station, solar panel, and tire tank on an existing well. The water fills the tank and then overflows via a short pipe into a shallow depression. A 100 x 100 ft fence was put up surrounding the project to create a watering location specific to wildlife, excluding livestock. The fence consisted of a smooth bottom wire, two barbed wires and a 4"x 4" wood top rail.

Prior to the installation of the project, cattle from the adjacent BLM allotment had been habituated to

Figure 113. *Continuous panel fencing around the Ruby Knolls water development in the Red Desert.*

Figure 114. *Mule deer using Ruby Knolls watering facility and jumping the continuous panel fence.*

using the water source, and with the next available water more than two miles away, they were very persistent in attempting to gain access to the water source after it was fenced. The cattle repeatedly broke the fence down, and at least one cow got mired in the mud and died.

The permittee attempted to string an electric wire around the fence to keep cattle away, but calves still managed to access the exclosure and get trapped inside. The BLM has pledged to develop an additional water source on adjacent BLM lands, however, this is unlikely to occur until 2019-2020. The private landowner, Water for Wildlife Foundation personnel, and WGFD met and decided to enlarge the fenced area to 400 ft x 400 ft, and to use

Figure 115. *Ferruginous hawk using Ruby Knolls watering facility.*

continuous fencing panels (Figure 113) instead of traditional fencing. Installation of the new fencing occurred over Memorial Day weekend using equipment rented by the landowner, a Wyoming Conservation Corps Crew, WGFD and other volunteers. Since the continuous fencing was constructed, there have been no other instances of cattle trespass. Pronghorn, mule deer, and elk all traverse the fence to utilize the water source without any trouble (Figures 114-115).

The area surrounding the watering facility was heavily trampled and very little vegetation remained. A native seed mix was procured from Granite Seed, and in early April the seed was planted using the Department's Dew Drop Seed Drill. This small drill can be pulled behind an ATV, and worked very well on this small acreage project. Establishment of the seed was high thanks to several early spring snow storms.

Partners include Water for Wildlife Foundation, US Fish and Wildlife Service- Partners Program, Wyoming Conservation Corps, BP, and the private landowner.

Ferris Mountain Leafy Spurge (Goal 2) – WLCI, Jim Wasseen

Figure 116. *Photo shows herbicide applied to leafy spurge (center of photo) in 2015. Photo courtesy of BLM.*

Figure 117. *Monitoring in 2018 shows the herbicide applications to the leafy spurge, in 2015, were successful. Photo courtesy of the BLM.*

The Ferris Mountain Wilderness Study Area (WSA) Leafy Spurge project involves an informal partnership between the BLM, the State of Wyoming, WLCI, Carbon County Weed & Pest District, and the owners of the 47 Ranch and Ferris Mountain Ranch. This project entails inventory, monitoring, and treating the WSA and adjacent hogback ridges for invasive weeds; mainly leafy spurge, whitetop, and Russian knapweed. Treatment consists of herbicide application to control weeds in this extremely rugged area. The main goal is to restrict weed infestations to the currently affected landscape. A secondary goal is to remove or contain new noxious weed infestations where possible to prevent further degradation and improve the quality of wildlife habitat and livestock forage. The ranch owners were contacted for access and to discuss priority areas for treatments. Contractors were hired through the Carbon County Weed & Pest District via a BLM Cooperative Agreement. Chemical treatments, inventory, and monitoring were carried out on state, federal, and private lands in June 2018. Regularly treating this area in the past has thinned infestations to the point that aerial treatments are no longer needed. In order to continue to reduce infestation density on the ground infestation maintenance must carry on. Treatments were also implemented by the ranch owners.

Two new infestation locations were found during the 2018 treatment season, and were subsequently treated. Previously treated sites are monitored and photographed by treatment crews and noted on their application records (Figures 116-117). This is an ocular method, but works well for tracking density and extent of patches from year to year. Many sites are also visually inventoried and monitored by BLM staff prior to treatment to avoid sending crews into an area that does not need treatment. Some monitoring was also conducted by ranch owners.

Ocean Lake Winter Grazing (Goal 2) – 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.

Dubois Production and Utilization Monitoring (Goal 2) – Amy Anderson and Greg Anderson

Figure 118. *Forage production clipping on Inberg-Roy WHMA.*

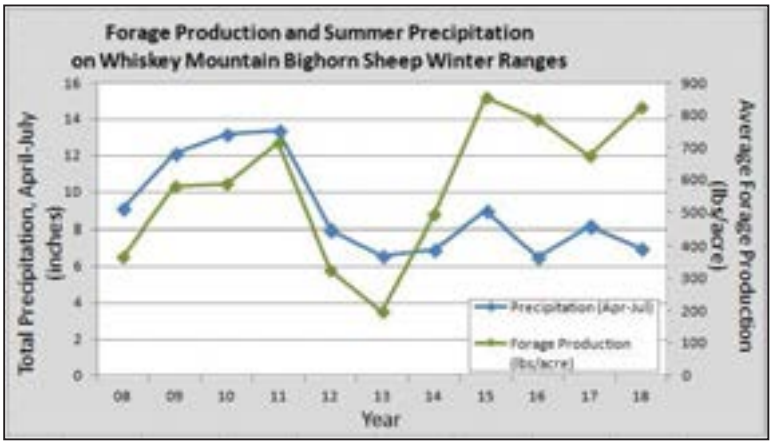


Figure 119. *Average herbaceous production and precipitation on Whiskey Basin WHMA.*

Annual production and utilization transects were again clipped on the Whiskey Basin WHMA, Spence-Moriarty WMA, and Inberg-Roy WHMA (Figure 118) with assistance from BLM and USFS Biologists. Two sites within the Whiskey Basin WHMA (Red Creek and Little Red Creek) were not clipped in 2018 due to restricted access across the Wind River Indian Reservation. All other sites were clipped as usual.

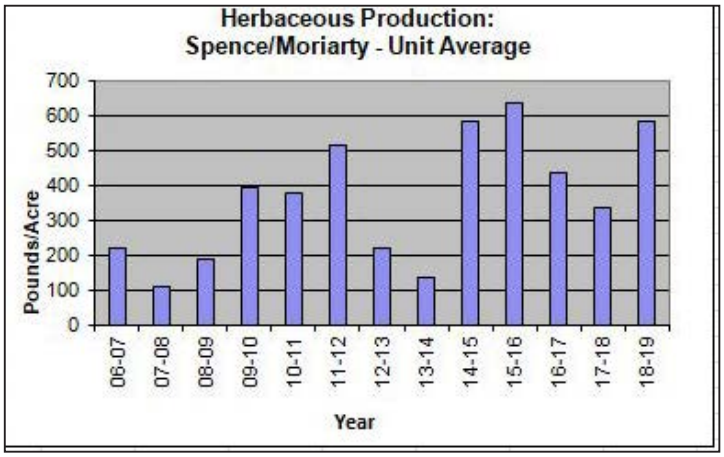


Figure 120. *Average herbaceous production on Spence-Moriarity WMA.*

Spring precipitation (April-July) varied across the area depending on the location of the weather stations, however it was near to slightly below average in most areas. The overall average production across all Dubois Habitat Units improved slightly over previous years, and remained above the ten year averages (Figures 119-121).

Utilization on the Whiskey Basin WHMA has been much lower than average for the last two years. The bighorn sheep have not been present on their traditional winter range sites during these two winters, which is highly unusual.

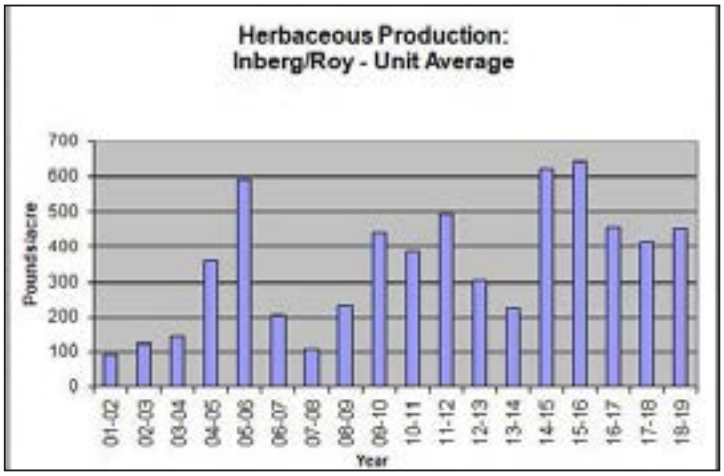


Figure 121. *Average herbaceous production on Inberg-Roy WHMA.*

Sheridan Creek Watershed Assessment (Goal 1) – Joanna Harter

Figure 122. *Riparian vegetation regenerating where the Lava Mountain Fire bured in 2016 (left) and upstream where the fire did not burn (right).*

A watershed assessment was conducted for the Sheridan Creek watershed in 2018, using the Wyoming Habitat Assessment Methodology (WHAM). Sheridan Creek supports an important population of pure YSC. The watershed has experienced several disturbances that affect aquatic habitat including the historical effects of tie hacking on physical stream habitat, a large wildfire in 2016, overgrazing in the riparian areas of the upper reaches, extensive beaver dam complexes, and the introduction of Rainbow Trout and Brook Trout. In 2018, habitat was evaluated in 10.8 miles of Sheridan Creek and 2.3 miles of perennial tributaries (Figure 122).

In 2016, the Lava Mountain fire burned up to the stream in most of the lower third, killing all vegetation including mature willow stands. A benefit of the fire is that it removed conifers that were encroaching on the riparian area and opened space to enable willows and other riparian vegetation to regenerate. Some of the smaller, steep tributaries have eroded due to loss of vegetation, but the banks and channel of Sheridan Creek itself appear stable and riparian vegetation is re-establishing well along the banks. Four active beaver colonies were observed on Sheridan Creek, which provide deep pools as overwintering habitat for cutthroat trout. Severe historical overgrazing in the upper reaches has resulted in over-widening of the stream and lowering of the stream bed. There is some evidence of the stream restoring itself, and this section will continue to be monitored.

To protect YSC in the upper reaches of Sheridan Creek from hybridization and competition with Rainbow Trout and Brook Trout, the USFS, in coordination with WGFD, blasted a natural partial barrier to prevent upstream fish migration. The barrier will be evaluated in 2019 after high runoff to determine if the criteria for the barrier have been met and sustained. Additional blasting may occur if necessary.

Figure 122. *Upper Sheridan Creek has over-widened due to a combination of overgrazing and historical effects of tie hack splash dams.*

Green Mountain Riparian Enhancement (Goal 2) – Amy Anderson, Brian Parker and Joanna Harter

The Green Mountain Riparian Enhancement is in its third year of active habitat manipulations. Some of the work completed to date includes: 100 acres of encroached conifer removed from aspen stands, 10 acres of conifer removed from the West Cottonwood Creek riparian area, a four acre wetland fenced to remove livestock and feral horse impacts, and eight BDAs constructed to improve riparian vegetation and floodplain connectivity. This project has 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.

In 2018, another spring was protected from overuse by livestock, feral horses and wildlife using drill stem pipe fencing. This type of fence is very sturdy and low maintenance, but moving the materials to the site proved to be extremely difficult. RMEF helped hire a helicopter to move the materials to the site. On a perfect May morning, with the help of WGFD employees and Sky Aviation, all materials were delivered safely to the site in preparation for construction later in the summer (Figure 123).

Figure 123. *Drill stem pipe fencing materials being aerially delivered to a spring location on Green Mountain. The fence will protect a spring from overuse by livestock, feral horses and wildlife.*

Maintenance occurred on eight BDAs in West Cottonwood Creek (Figure 124). After the first year, water wasn't pooling up behind the structures as well as was hoped. Some of the rocks used at the base of these structures were removed and replaced with sod clumps to improve water holding capacity. The purpose of these BDAs is to connect the stream to the riparian area and hopefully improve conditions for riparian vegetation.

Figure 124. *Maintaining BDA structures on West Cottonwood Creek on Green Mountain.*

Red Rim-Daley WHMA Grazing (Goal 5) – Matt 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 deferring grazing on their private ground in exchange for grazing on the WHMA.

Ferris Mountain Habitat Analysis (Goal 2) – Amy Anderson

Figures 125-126. *Water for Wildlife interns collecting forage production data on Ferris Mountain to inform bighorn sheep population objective decisions.*

WGFD in partnership with the Wyoming Wild Sheep Foundation, University of Wyoming Co-op Unit, and BLM-Rawlins Field Office collected data during late summer 2018 (Figures 125-126) to determine whether a change in the herd objective for bighorn sheep is warranted in the Ferris/Seminoe/Bennett bighorn sheep herd unit located north of Rawlins, Wyoming. In August, habitat biologists, BLM range conservationists and Water for Wildlife interns collected vegetation production data across the Ferris and Seminoe Mountains in bighorn sheep use areas identified using collar data. Through funding provided by WyWSF, UW will analyze resource availability for bighorn sheep along with the vegetation production data to help inform WGFD's objective review.

Bighorn sheep from the Devil Canyon herd have been relocated to the Ferris and Seminoe Mountains in recent years. Since the Devil Canyon herd continues to thrive, additional sheep may need to be relocated in order to maintain herd health and habitat productivity. The Ferris/Seminoe Herd has nearly reached the objective set by WGFD in 2014. It is important to ensure habitat is available for these sheep. The BLM Rawlins Field Office is planning prescribed burns on the Ferris and Seminoe Mountains to enhance bighorn sheep habitat, which should have additional positive effects for carrying capacity. The habitat analysis will occur through the upcoming winter, and results will be available by May 2019.

Dubois Hay Production (Goal 2) – Miles Proctor and Kevin Howard

Figure 127. *Hay meadow on Spence and Moriarty WMA.*

Figure 128. *Stack of hay that will be fed on the elk feedgrounds.*

Lander Habitat and Access continued expanding farming and haying operations (Figure 127) across Dubois area WHMAs, with specific focus on Spence and Moriarty WMA. During the 2018 field season, two-1,000 foot pivot sprinklers were constructed. One located on the basin meadow (90 acres) Whiskey Basin WHMA and the second on Pease Meadow (75 acres) located on Spence & Moriarity WMA. These new pivots will increase water efficiency and effectively irrigate these fields for hay production used for feeding elk on feedgrounds.

Dubois staff hayed 819 acres on Spence and Moriarity WMA and Whiskey Basin WHMA, producing 708 tons of hay, which was shipped to Pinedale and Jackson area elk feedgrounds. The hay operation allows WGFD to generate hay for use at elk feedgrounds, while simultaneously providing supplemental winter forage for elk in the Dubois area (Figure 128).

Noxious Weed Control (Goal 2) – 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 thru fall 2018. Habitat and Access personnel also dedicated substantial AWEC time to noxious weed control.

South Pass Aspen (Goal 2) – Amy Anderson

Figure 129. *BLM Aspen unit near Miners' Delight before removal of encroaching conifers.*

Figure 130. *BLM Aspen unit near Miners' Delight after removal of encroaching conifers.*

In 2018, the South Pass Aspen Project continued with its fourth year of treatment, and expanded into new areas. A total of 325 acres were treated on BLM, State, and USFS land. One hundred eighty acres of BLM lands were treated (Figures 129-130) which will be the final phase on BLM until further analysis on the grazing/browsing effects within the treated areas occurs to determine project effectiveness.

A Good Neighbor Agreement was created between the Shoshone National Forest and WGFD to help make cooperation between the two agencies more streamlined. The first treatments under this agreement were on Iron Mountain, which was a new area within the South Pass Project. Ninety acres of treatment occurred in 2018, with an additional 400 acres planned for 2019.

Planning was initiated to expand the project even further under the Good Neighbor Agreement into the Pine Creek, Gold Creek, and Willow Creek areas in 2019. More than 200 acres have been identified for treatment in 2019, with nearly 3,000 acres planned over the next three years.

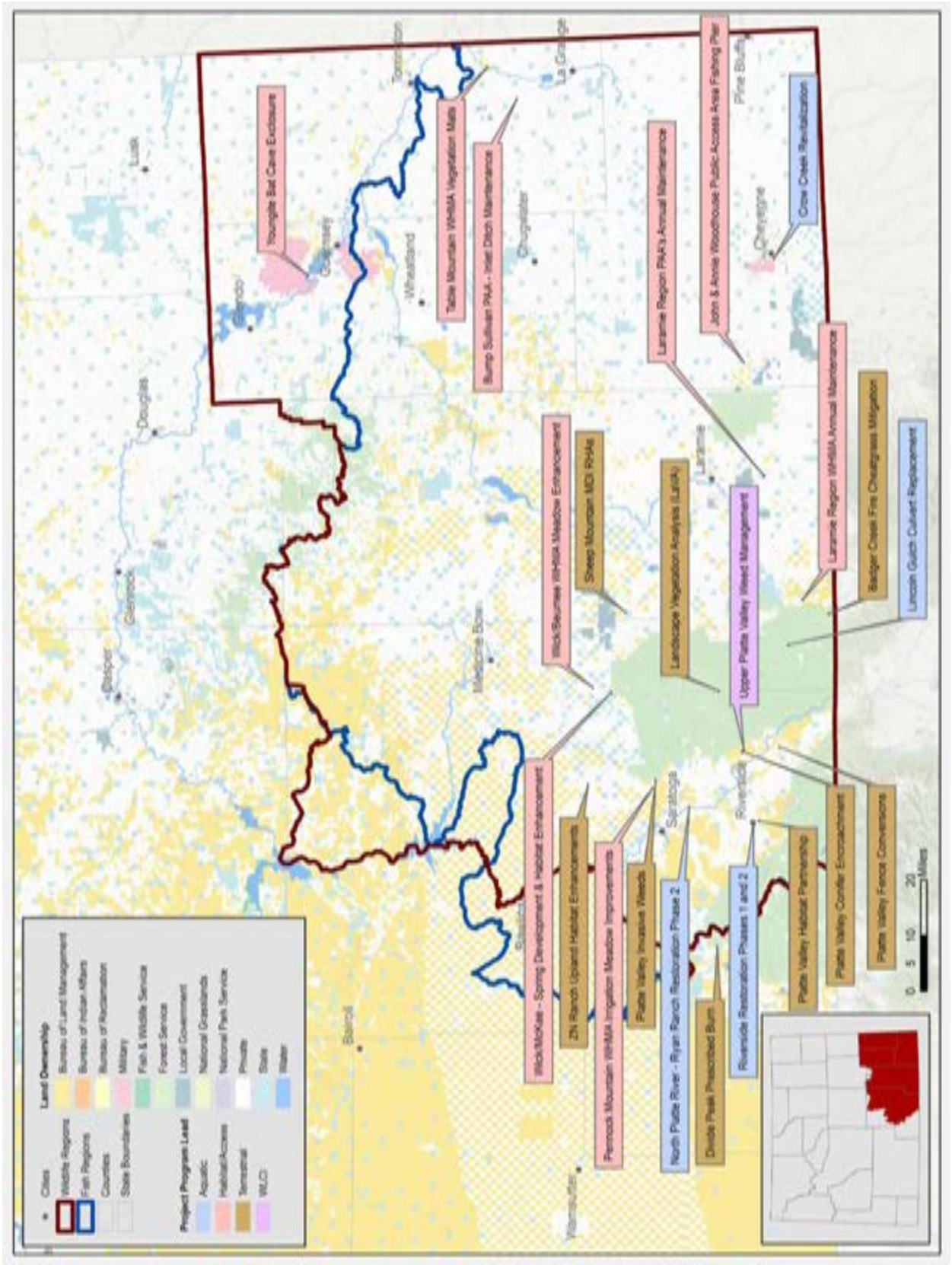
Meadow Restoration (Goal 2) – Miles Proctor and Kevin Howard

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 elk feedgrounds. Hay meadow farming is typically accomplished over a two-year period.

The 2018 farming program included:

- North Long Meadow- farming began on approximately 20 acres; fall 2016
- 21 Meadow- farming began on approximately 25 acres; fall 2016
- Pease Meadow - farming began on approximately 75 acres; fall 2017
- Thunderhead Meadow - farming began on approximately 75 acres; fall 2018

Laramie Region



Laramie Region

In 2018, 824 acres were irrigated on WHMAs throughout the Laramie Region to grow hay, food plots and dense nesting habitat for wildlife. Twelve water control structures were built on various WHMA units. More than 300 acres were planted for cover, food plots and crop fields for wildlife benefit. Noxious weeds were sprayed on 373 acres, and stem boring weevils were released in riparian areas to reduce weed spread. The installation of vegetation mats on Pond One at Table Mountain WHMA created approximately 1,600 linear feet of new vegetation along the shoreline.

Wildlife depend on the water resources in the Laramie Region, and three separate restoration and habitat enhancement projects were completed on the Encampment River in 2018. The projects improve bank stability, reduce sediment, enhance trout habitat and provide continuity of channel restoration. The Ryan Ranch Restoration project re-established stable channel pattern on more than 2,150 feet of the North Platte River near Saratoga, and a culvert replacement on Lincoln Gulch improved upstream fish access to two miles of habitat in the Douglas Creek Watershed. In Cheyenne, planning efforts continued for the restoration of Crow Creek and its tributaries. Assessment, design, and permitting will take place in 2019, with construction anticipated in 2020.

WGFD partnered with several partners to complete a spring development and habitat protection project on state land that borders the Wick/Beumee WHMA. Also on the Wick/Beumee WHMA, vegetative seeding was completed to benefit migrating and wintering wildlife. And a project to inventory, monitor and treat noxious weeds, such as leafy spurge, musk thistle and spotted knapweed, will improve wildlife habitat quality and livestock forage in the Upper Platte Valley area.

Information and education projects across the region include two-day camps in Cheyenne and Laramie to teach 47 children about wildlife management and habitat needs. Participation in Ag Expos in Laramie and Goshen counties reached approximately 1,200 fourth-graders.

Badger Creek Fire Cheatgrass Mitigation (Goal 2) – Katie Cheesbrough

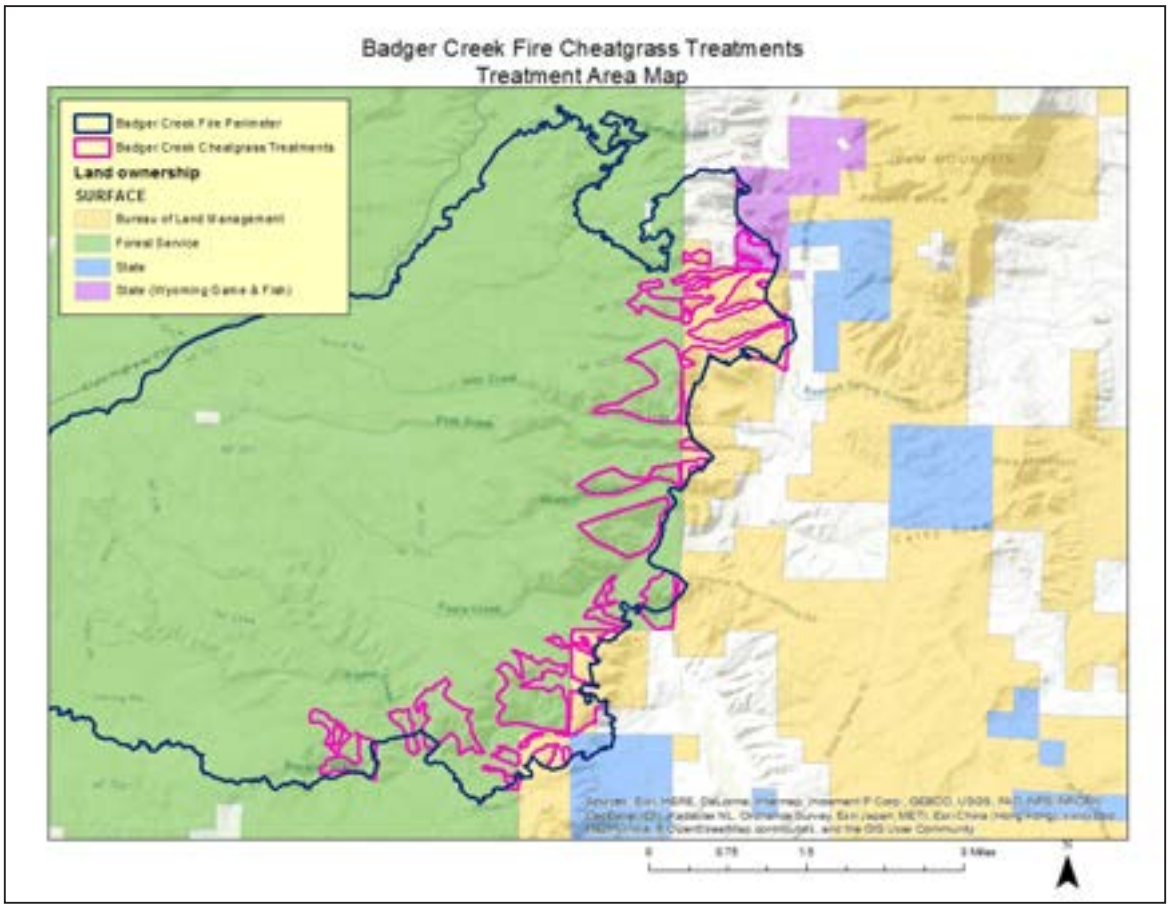


Figure 131. *The Badger Creek Fire burn perimiter with identified cheatgrass treatment areas on USFS, BLM and WGFC lands.*

On June 10, 2018 the Badger Creek Fire started on the Medicine Bow National Forest, approximately two miles northwest of Mountain Home, WY. This fire grew rapidly to over 21,000 acres in a ten day period. Although a majority of the fire burned on USFS lands, it also burned onto state, BLM and WGFC owned lands on the east flank of the fire. Within lower elevations on the furthest east and southeast areas of the burn perimeter where the fire crossed land ownerships, there is high risk of cheatgrass spread and infestation due to a combination of previous cheatgrass presence, burn intensity, elevation, and aspect. As such, the WGFD, CCWP, BLM, and USFS worked together to acquire emergency funds and implement aerial herbicide cheatgrass treatments on approximately 1,810 acres in September 2018 (Figure 131).

North Platte River-Ryan Ranch Restoration Phase 2 (Goal 2) – Christina Barrineau

Figure 132. *Constructing rock barb in "the dry" while flows are bypassed around construction area at North Platte River - Ryan Ranch Restoration Phase 2.*

Figure 133. *Completed North Platte River - Ryan Ranch Restoration Phase 2 with new channel alignment and channel dimensions.*

The Ryan Ranch Restoration re-established stable channel pattern and dimensions on over 2,150 feet of the North Platte River seven miles southeast of Saratoga. Prior to the restoration, the river was moving towards creating a new channel through a productive hay meadow. If the river had made this adjustment, a large side-channel/wetland complex would have been cut-off from the river. The restoration entailed moving approximately 22,000 cubic yards of material to address the stable pattern and dimensions. Four rock barbs were constructed (Figure 132) to reduce bank stress and maintain pool depth. Approximately 515 linear ft of toewood was installed to enhance trout habitat and improve bank stability. Willow clumps and native seeding were placed on bankfull benches and disturbed areas (Figure 133).

Partners included two private landowners, NRCS-RCPP, WWNRT, NAWCA, USFWS-Partners Program, TNC, SERCD, TU and WGFD. The project was designed by Green Watershed Restoration LLC and constructed by North State Environmental.

ZN Ranch Upland Habitat Enhancements (Goal 2) – Ryan Amundson

In conjunction with WGFD, the ZN Ranch located north of Saratoga leased and operated a 4-wheel drive tractor and used a Lawson aerator during summer 2018. The equipment was used on over 200 acres of dense sagebrush stands to aerate in a mosaic pattern to promote seedling establishment and provide increased age class diversity in important mule deer transitional ranges. Following aeration, native forbs and grasses were broadcast seeded to assist with revegetation following soil surface disturbance. The seed mix is designed to provide early green-up species in the spring and will also serve as brood rearing habitat for sage grouse. Funding for this portion was provided by WWNRT.

Upper Platte Valley Weed Management (Goal 2) – WLCI, Jim Wasseen

The Upper Platte Valley Weed Management Area entails inventorying, monitoring, and treating noxious weeds; mainly leafy spurge, musk thistle, Canada thistle, and spotted knapweed. Treatment consists of herbicide application and manual treatments to control weeds (Figure 134). One of the main goals is to prevent weed encroachment off BLM onto the adjacent USFS and private lands and restrict weed infestation to the currently affected landscape. A secondary goal is to remove or contain other noxious weeds where possible to prevent further degradation and to improve wildlife habitat quality and livestock forage. This project is an informal partnership between the BLM, WLCI, Carbon County Weed & Pest District (CCWP), and multiple landowners. Each landowner conducts treatments on their private lands. Inventory for weeds, chemical treatments of known and new infestations, and monitoring of past treatments were carried out on state, federal, and private lands in June, July, September, and October of 2018. Regularly treating this area in the past has thinned infestations to the point that the majority of locations do not need aerial treatments. In order to continue to reduce infestation density on the ground, infestation maintenance must continue. In 2018, three quarters of the known infestations (500 acres) on BLM land were treated and/or monitored. Only one new musk thistle location was identified within the Bennett Peak area. Most of the treatments conducted were in the Bennett Peak area, which continues to have the greatest concentration of known weed infestation sites. Treatments conducted in the Encampment River Campground and Miner Creek area were completed by BLM staff and CCWP contractors.

Figure 134. *A crew from the Platte Valley Habitat Working Group prepares to apply herbicide. Photo courtesy of BLM.*

Crow Creek Revitalization (Goal 2) – Christina Barrineau

Figure 135. *Segment of Crow Creek that is set to be revitalized.*

Planning for the restoration of Crow Creek and its tributaries in Cheyenne continued throughout 2018 (Figure 135). Crow Creek Revival (CCR), the planning/management committee, met monthly throughout the year. Fundraising continued for design and implementation and enough funds were raised to initiate design in the Phase 1 reach (Happy Jack Road to Lincolnway Avenue). Through a competitive bid process, a stream restoration design firm was selected to begin the assessment and design process on Phase 1. Assessment, design, and permitting will take place in 2019 with construction anticipated in 2020. CCR also continued working on master planning and promotion of Crow Creek.

Wick/Beumee WHMA Meadow Enhancement (Goal 2) – Micah Morris and Jerry Cowles

Figure 136. *Meadow re-seeding using Trudax drill.*

As part of the Wick/Beumee WHMA five-year plan, irrigated fields/meadows have been hayed and re-seeded (Figure 136) with a wildlife mixture to enhance forage palatability for wintering wildlife, and reduce co-mingling between elk and cattle on private lands in the area. The seed mixture included crested wheatgrass, western wheatgrass, pubescent wheatgrass, sainfoin, small burnet, falcata alfalfa, and strawberry clover. During the 2018 field season, WGFD worked with a local contractor to harvest 260 acres of decadent vegetation weighing 153 tons. This hay operation allows lands managers to increase plant diversity and provide nutrient rich forage for permanent, migrating and wintering wildlife. Producing more nutritious forage for wintering wildlife helps the neighboring landowners by reducing commingling between elk and cattle. The haying operation provides the contractor with one cutting per year on 300 acres in exchange for upgrades on the irrigation system and noxious weed control. Upgrades to the irrigation system ensure the WGFC owned water rights are used across the adjudicated lands and resulted in increased flows into the fishery at Wagonhound creek.

Platte Valley Conifer Encroachment (Goal 2) – Katie Cheesbrough

As part of the collaborative PVHP effort, the BLM is continuing their large-scale conifer encroachment efforts in the Platte Valley. The South Corral Creek project focuses mostly on the removal of encroaching juniper in mixed mountain shrub communities through lop and scatter methods with some additional understory conifer slash and broadcast burning in limited aspen habitats. In 2018, approximately 236 acres of juniper lop and scatter were completed in the South Corral Creek Unit, 12 acres of thin and pile treatments done in the School Creek South units, and 541 acres of mastication were completed in both the north and south Corral Creek units (Figure 137). Following cut and pile treatments an equivalent of approximately 15 acres of piles were burned and seven acres of noxious weed treatments were completed.

Figure 137. *Mastication of juniper results in small mulch piles in the Corral Creek area.*

Youngite Bat Cave Exclosure (Goal 2) – Micah Morris, Jacob Sorensen, Mac Foos and Stephen Siddons

Youngite Cave is a subterranean structure at the base of a band of rock, above a steep scree slope near the outpouring of the Platte River into Guernsey Reservoir. The cave has been mined in the past, but there are no current mineral leases in effect. The cave entrance had been fenced (chain-link) and signed to prevent human entry, but had a large breech in it. WGFD, along with Wyoming Military Department (grazing lessee) personnel have documented limited use by bats in the cave, as well as obvious signs of recent human entry, including destruction of cave structures. DNA from guano indicates that more species of bats roost in the cave than those that have been observed. The exclusion of human disturbance by means of a bat friendly gate (Figure 138) have dramatically increased the value of the cave as bat habitat, as evidenced by large increases in use after a gate was installed. A second benefit of a robust gate on this cave could be the reduction in liability to the state by the untrained public entering the cave, as the fence is in poor repair and easily circumvented. The bat gate will have a lockable entry portal, to allow biological monitoring by trained personnel from WGFD and the Wyoming Military Department.

Figure 138. *Youngite Bat Cave entrance exclosure gate.*

Platte Valley Fence Conversions (Goal 2) – Katie Cheesbrough

Figure 139. *Before (left) and after (right) photos of the Stateline fence that was converted from dilapidated hazardous fence, to a wildlife-friendly design in 2018.*

Approximately 26 miles of fence throughout the Platte Valley mule deer herd unit have been collaboratively identified for conversion to wildlife-friendly design with the WGFD, BLM, USFS and Saratoga-Encampment-Rawlins Conservation District (SERCD). The proposed fence conversions cross mule deer migration paths and high-use areas as identified by GPS collar data. These fence conversions are intended to increase overall habitat connectivity, decrease big game mortalities, and maintain proper grazing systems. In 2018, 9.71 miles of hazardous fence were converted to wildlife friendly designs (Figure 139). Total fence conversions completed over the past two years is just over 18 miles.

USFS Landscape Vegetation Analysis Project (LaVA; Goal 5) – Katie Cheesbrough and Mark Conrad

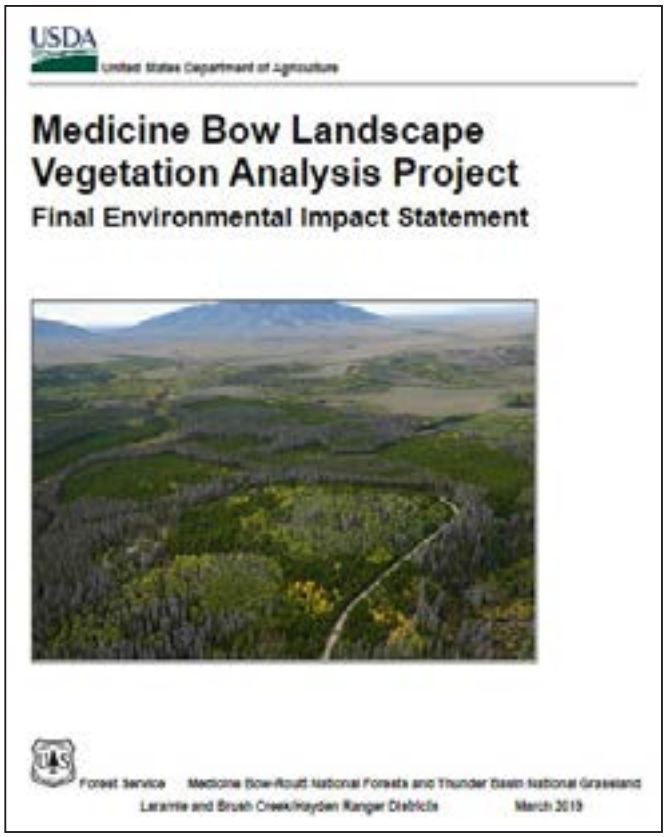


Figure 140. *The USFS Landscape Vegetation Analysis Project EIS.*

For the past two years, WGFD has been working with the USFS and other federal, state, and local cooperators on planning the Landscape Vegetative Analysis (LaVA) project for the Medicine Bow National Forest. LaVA institutes conditional NEPA, thereby increasing efficiencies for planning vegetation treatments intended to work toward a more natural and healthy forest landscape.This project proposes the opportunity to treat up to 360,000 acres over the next 15 years using a variety of treatment methods to diversify age class and types of forest communities. Implementation of the LaVA project will have many benefits for wildlife as it will extend habitat work being done within the Mule Deer Initiatives (MDIs) in the project area. The Platte Valley, Sheep Mountain, and Baggs MDI efforts will be able to more efficiently move forward with implementing large-scale, cross-boundary treatments in big game summer and transition ranges. Over the past year the USFS and cooperating agencies have held public information meetings, produced a draft EIS, and plan to have final EIS (Figure 140) and draft Record of Decision completed in March 2019. The collaborative group will be working to prioritize treatments and look forward to beginning implementation in 2019.

Bump Sullivan PAA – Inlet Ditch Maintenance (Goal 3) – Jacob Sorensen and Mac Foos

Bump Sullivan PAA is a 1,590 acre-foot warm water reservoir that supports black crappie, channel catfish, walleye, yellow perch, and over 50,000 waterfowl each spring. Sustaining the 1,590 acre-ft reservoir filled with enough water to sustain a fishery requires maintaining the 12 miles of ditch that has a 60% loss (Figure 141). During the early winter, reservoirs like Bump Sullivan start receiving water for irrigation and WGFD interest water to sustain the fishery. WGFD has made a commitment to maintain the 12 miles of inlet ditch from the diversion on Horse Creek to the reservoir with assistance from a local irrigation company and local volunteer fire departments. WGFD continues to lease water shares from neighboring landowners to ensure this reservoir is a viable warm water fishery for the public enjoyment.

Figure 141. *Bump Sullivan ditch after maintenance.*

Encampment River Restoration and Habitat Enhancement (Goal 2) – Christina Barrineau

Three separate restoration and habitat enhancements were completed on the Encampment River in 2018. The projects continued restoration efforts to improve bank stability, reduce increased sediment from channel degradation, enhance trout habitat and provide continuity of channel restoration in the lower Encampment River Watershed.

Riverside Phases 1 and 2

Completed in November 2018, the Riverside Restoration Phases 1 and 2 restored channel form and function to 2,020 feet of the Encampment River near Riverside. Goals were to 1) decrease streambank erosion, 2) decrease riffle bankfull widths, 3) increase bankfull riffle depths, and 4) redirect the river to flow under the middle of the Highway 230 bridge.

Activities included re-aligning the channel and adjusting channel dimensions (Figures 142-143). The following grade control structures were installed: one constructed riffle, four J-hook vanes, one cross-vane, and one mini/straight vane. Approximately 670 ft of toe wood bank stabilization was also constructed. Willow stakes were incorporated into toe wood features and disturbed areas were re-seeded.

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Figure 142. *Looking downstream from Highway 230 bridge at the Encampment River before Riverside Phase 2 Restoration.*

Figure 143. *Looking downstream from Highway 230 bridge at the Encampment River after Riverside Phase 2 Restoration.*

Partners included eight private landowners, WYDOT, WWNRT, NRCS, USFWS-Partners Program, WLCI, SERCD, TU, and WGFD. The project was designed by WWC Engineering and constructed by Olson Excavating.

Pickett Restoration

Located just south of Encampment, the Pickett Restoration focused efforts on 1,450 ft of the Encampment River and was completed in October 2018. Project goals were to 1) enhance river flow into the active channel and away from a headcut channel, 2) decrease sediment from an active channel headcut, 3) improve water delivery into an irrigation ditch, and 4) enhance trout habitat by adding woody debris and rock clusters.

Restoration activities included adjusting channel width, depth and alignment (Figures 144-145). Grade control structures installed included one constructed riffle and two J-hook vanes. Several boulder clusters were also installed for trout habitat. Approximately 450 feet of toe wood bank stabilization was also constructed. Willow clumps were incorporated into toe wood features and disturbed areas were seeded.

Figure 144. *Constructed riffle on Encampment River-Pickett Restoration.*

Figure 145. *Fine channel grading for new channel dimensions on the Encampment River Pickett Restoration.*

Partners included five private landowners, NRCS-RCPP, WWNRT, USFWS-Partners Program, SERCD, TU, and WGFD. The project was designed by Green Watershed Restoration LLC and constructed by North State Environmental.

Oddfellows Phase 2

Figure 146. *Constructing boulder clusters in narrowed, deepened channel at the Encampment River - Oddfellows Phase 2 site.*

Habitat enhancements to improve adult trout habitat in the reach downstream of the BLM Encampment River Campground were completed in fall 2018. The enhancements continue efforts started adjacent to the campground in 2016. The Oddfellows reach is located within a transitional area where the river flows out of a canyon and onto a wide valley. The reach lacked deep pool habitat and cover for adult trout.

To improve stream channel diversity and adult brown trout and rainbow trout habitat in the Phase II reach, the low flow channel was narrowed and deepened throughout a 2,000 ft reach. Numerous boulder clusters and woody debris enhancements were placed to create trout cover and holding habitat (Figure 146).

Partners included BLM Rawlins Field Office, SERCD, TU and WGFD. The project was designed by Green Watershed Restoration LLC and constructed by North State Environmental.

Platte Valley Invasives (Goal 2) – Katie Cheesbrough

In 2017, WGFD and Carbon County Weed and Pest (CCWP) were awarded funds for monitoring and treatment of cheatgrass and leafy spurge from the USFS, State and Private Forestry grant, awarded through the Wyoming Department of Agriculture. Pre-treatment inventories (Figure 147) began in spring 2018, which consisted of line point intercept transects by type (annual/perennial grasses, annual/perennial forbs, and shrubs) in each of the treatment areas. These transects will also be re-evaluated post-treatment. In conjunction with continued BLM cheatgrass mitigation, a total of 1,290 acres of aerial cheatgrass herbicide treatments were done across land ownerships in the Platte Valley in September 2018. Additionally, 22 miles of the North Platte were systematically treated for leafy spurge via raft.

Figure 147. *Cooperators from CCWP, USFS and WGFD conduct pre-treatment monitoring in spring 2018 for aerial herbicide cheatgrass treatments.*

Public Access Areas (Goal 3) – Jerry Cowles, Mark Cufaude, Micah Morris and Jacob Sorensen

The Laramie Region crew continued monitoring, completing annual maintenance and providing improvements on 40 PAAs.

The crew maintained 63 miles of boundary fence and cleaned two miles of ditches for water control to wetlands and nearby lakes. The crew worked with several private contractors to spray 81 acres of noxious weeds and also released stem boring weevils to reduce weeds. The road maintenance entailed cleaning out three cattle guards, replacing one culvert (Figure 148), and road blading contract oversight of 24 miles of gravel roads. To keep the public informed and provide legal compliance the crew installed 27 new signs. The crew completed new roof upgrades to seven comfort stations and completed adjustments and repairs to nine region boat docks.

Figure 148. *Outlet structure feeding water to supply Diamond Lake.*

Wick/McKee - Spring Development & Habitat Enhancement (Goal 2) – Micah Morris, Matt Pollock, Jerry Cowles and Volunteers

Figure 149. *Spring intake box.*

Figure 150. *Storage tank making water available to wildlife.*

WGFD partnered with the USFWS Partners for Fish & Wildlife Program, OSLI, Water for Wildlife Foundation and Iron Bar Holdings, LLC and worked together to accomplish a spring development and habitat protection project on a state land section which borders the Wick/McKee WHMA. Historically, the two springs involved in the project have been a reliable source of clean, high-quality groundwater that flow at a relatively constant rate and as a result has become an attraction to wildlife and livestock. In order to protect these sites, vegetation from trampling, overgrazing, increased erosion and siltation, the partnership collectively constructed an intake box (Figure 149) at the spring emergence point which transports the water through a small pipeline to a storage tank. The storage tank (Figure 150) holds water which is available for wildlife and livestock to drink from, and the overflow travels to another collection pool also available to wildlife. Installation of buck and rail fence in high snow load areas and wildlife friendly four strand fence promotes better pasture management. It also protects the critical buffer zone along the riparian area of the springs making this the best way to ensure good water quality, maintain range health and vigor and benefit fish and wildlife.

Platte Valley Habitat Partnership (Goal 5) – Katie Cheesbrough

The Platte Valley Habitat Partnership (PVHP) continued in its fifth year of collaborative project implementation. In 2018, partners coordinated and developed a new large-scale, multi-year project (Platte Valley Mule Deer Habitat Project-Phase I) and submitted funding applications for the first three year phase. The USFS continued efforts to improve mixed mountain shrub habitat with the Divide Peak prescribed burn. The BLM continues to implement their large-scale conifer encroachment project with mechanical removal of junipers and follow-up prescribed burning. Efforts to minimize the impacts of cheatgrass and noxious weeds throughout the Valley continue in cooperation with the Carbon County Weed and Pest, BLM and USFS with an additional 1,290 acres of aerial cheatgrass treatments and 22 miles of leafy spurge treatments along the North Platte River. The WGFD expanded irrigated meadow enhancements on the Pennock WHMA as well as continued work with landowners on aspen enhancement projects and mechanical shrub enhancements. PVHP partners continue to participate in the annual Platte Valley Volunteer day with work focused on mechanical and herbicide treatment of musk thistle and houndstongue in the Miner Creek area for 2018.

Wildlife Habitat Management Areas (Goal 2) – Jerry Cowles, Mark Cufaude, Micah Morris and Jacob Sorensen

Figure 151. *Red Rim Grizzly WHMA wildlife friendly fence conversion.*

The Laramie Region habitat and access crew continued monitoring, annual maintenance, and improvements on 11 WHMAs. The crew maintained 216 miles of boundary fence and reconstructed five miles to meet wildlife friendly specifications (Figure 151). In 2018, 824 acres were irrigated several times throughout the irrigation season across the Laramie Region which included hay meadows, food plots, and dense nesting cover fields for wildlife. Along with irrigating, 12 water control structures were constructed and installed on various units. With assistance from a contract farmer in Goshen County; 341 acres were planted for wildlife nesting cover, food plots, and crop fields that were harvested with 20% remaining for wildlife benefits. The crops included beans, sunflower, corn, barley and grain sorghum. The crew added wildlife food plots on 90 acres which consisted of sorghum, sudan grass, alfalfa, buckwheat, annual ryegrass, bluegrass, timothy, millet and sweet clover, which was donated by Pheasants Forever. Seven acres of sunflowers were planted, irrigated and harvested through the Exchange of Use Agreement with an adjacent landowner at Rawhide WHMA.

The crew worked with several private contractors to spray 373 acres of noxious weeds. Stem boring weevils were utilized instead of herbicide along streams and riparian area to protect fish, streams and amphibians. Road maintenance included the installation of one cattle guard, cleaning out seven cattle guards and installing four culverts. A total of 47 miles of road were bladed in which 29 miles were contracted privately. To keep the public informed and provide legal compliance, the crew installed 46 new signs. The crew completed facility upgrades on the Red Rim Grizzly house, Saratoga shop, Springer residence, Wick bunkhouse, and assisted with the Laramie regional office move.

Lincoln Gulch Culvert Replacement (Goal 2) – Christina Barrineau

WGFD partnered with the USFS to replace a culvert on Lincoln Gulch, a tributary to Lake Creek in the Douglas Creek Watershed on the Medicine Bow National Forest. The culvert prevented upstream fish passage because the outlet was perched and the bottom was rusted out so that water flowed under the culvert for a portion of the pipe. The Lincoln Gulch culvert replacement improved upstream fish access to two miles of habitat in the Douglas Creek Watershed.

Over the past seven years, seven culverts have been replaced to improve fish passage in tributaries to Douglas Creek including Lincoln Gulch, Lake Creek and Pelton Creek.

Table Mountain WHMA Vegetation Mats (Goal 2) – Jacob Sorensen, Micah Morris, Jerry Cowles and Volunteers

Figure 152. *Table Mountain WHMA vegetation mats along shoreline.*

Figure 153. *Vegetation mats being unrolled prior to staking at Table Mountain WHMA.*

Volunteers heaved 98 of the 120 pound rolled wetland vegetation mats (Figure 152) from trailers to Pond One at Table Mountain WHMA to assist with the vegetation mat installation. From there, the mats were unrolled and dragged into place at the edge of the pond (Figure 153), creating approximately 1,600 linear feet of new vegetation along the shoreline of the spreader dikes. The vegetation mats will help prevent erosion at the dikes, ensuring habitat remains lush for waterfowl and other wetland animals. Forty-nine vegetation mats contained a mixture of Nebraska sedge, beaked sedge and Arctic rush, while the other 49 were grown with hardstem bulrush. The sedge mixture was placed end to end along the shore with the bulrush adjacent in slightly deeper water. To prevent the mats from floating, volunteers secured them with wooden stakes.

Rapid Habitat Assessments (Goal 5) – Katie Cheesbrough

RHAs occurred in Mule Deer Initiative (MDI) herds across the state to better assess habitat conditions in mule deer seasonal ranges (Figure 154). For the Platte Valley mule deer herd, 16 rangeland assessments (3,654 acres) and two aspen assessments (131 acres) were conducted this year. Within the Sheep Mountain mule deer herd unit, three rangeland assessments (1,974 acres) and one aspen assessment (125 acres) was 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 (conducted annually). This data will provide population managers and the public with tangible information on the current state of mule deer habitat conditions.

Figure 154. *WGFD personnel conducting RHAs in mule deer habitat.*

Pennock Mountain WHMA Irrigated Meadow Improvements (Goal 2) – Mark Cufaude

Figure 155. *Pennock meadows being re-seeded with Trudax drill.*

Pennock Mountain WHMA is critical habitat for elk, mule deer, pronghorn, sage grouse and many other wildlife species. The Pennock Mountain irrigation system is supplied by the South Fork of Lake Creek. Two water rights off the South Fork of Lake Creek date back to 1906-07 allowing for 2.37 cfs and 1.33 cfs to respectively be used across the lands. They have been actively used by WGFD since the property was acquired in 1962. These water rights allow WGFD to irrigate 260 acres but with the current system we are only successfully irrigating 55 acres. With the improvements to the irrigation system we will effectively irrigate 110 acres and set ourselves up to potentially irrigate another 200 acres in the future. By installing 8,800 ft of transport pipe along with 14,500 ft of gated pipe we can more efficiently and effectively produce forage for the wildlife that utilizes the WHMA. The improvements and expansion will increase the amount of quality forage produced for the 400-600 wintering elk, fawn rearing mule deer, antelope and the brood rearing sage grouse during the spring, summer and fall. The crew continues meadow interseeding with a mix of grass and legumes in the fall months (Figure 155).

Forage production and utilization monitoring began in 2014 on the Pennock WHMA to determine forage availability on the unit. Sites were selected based on elevational ranges and vegetative types and production/utilization were extrapolated for those parameters. Total production on the WHMA in fall 2017 was measured at 471.66 lbs/acre. Residual forage was measured in early spring (131.67 lbs/acre) and utilization across the unit came to a total of 339.99 lbs/acre. Production on Pennock WHMA continues to decline with lower levels of annual and growing season precipitation. Production samples were collected again at the end of the growing season in July 2018 and shrub cover transects were conducted as well to determine a more accurate measure of forage available on the unit. Shrub cover averaged 28% at low elevation, 25% at mid elevation,and 48% at high elevations. When shrub cover values were applied to acreages and production/utilization values, it did not have much effect on the overall lbs/acre, however, it did reduce the available acreages of forage by approximately 33.26%.

Divide Peak Prescribed Burn (Goal 2) – Katie Cheesbrough

Figure 156. *USFS personnel use drip torches to achieve a mosaic burn in a mixed mountain shrub community in the Divide Peak prescribed burn on the Medicine Bow National Forest.*

The US Forest Service continued work on the Divide Peak prescribed burn in the northern Sierra Madre Range on the Medicine Bow National Forest. In spring 2018, fire crews attempted a mosaic burn (Figure 156) in the remaining mixed mountain shrub units to diversify age class, increase shrub nutritive quality, and increase forage for wildlife. However, due to difficulties in finding an appropriate burn window at higher elevations, fuel moisture variability and a lack of fine fuels due to herbivory, prescribed fire was only put in place on one 43 acre shrub unit. To help alleviate these burn window issues, the NEPA for this project was updated to allow for fall prescribed burning and the burn plan will be similarly updated so that burning can proceed in 2019. Funding for 2018 burns came from the RMEF and the USFS.

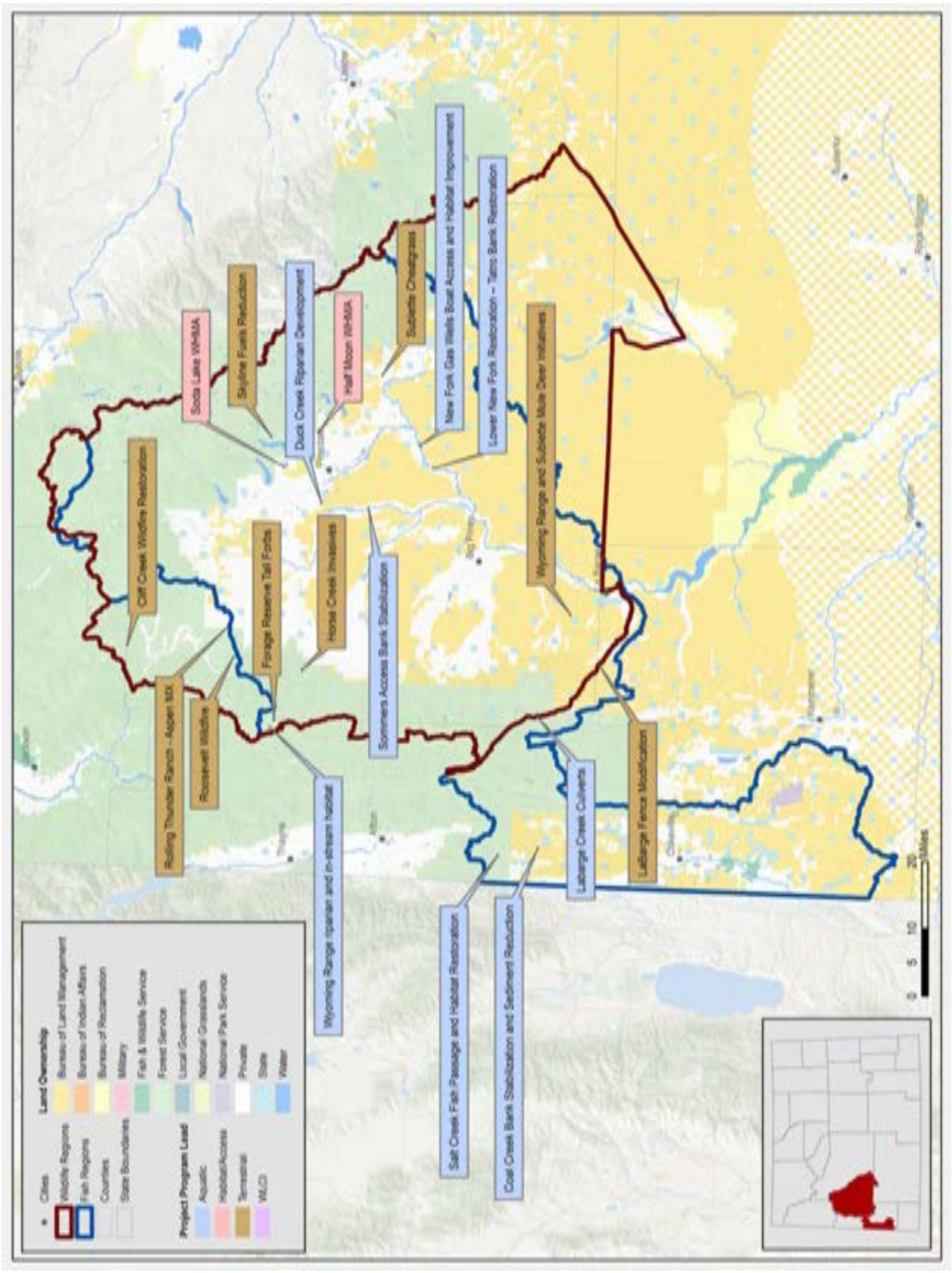
John & Annie Woodhouse Public Access Area Fishing Pier (Goal 2) – Micah Morris and Jacob Sorensen

Figure 157. *John & Annie Woodhouse fishing Pier.*

Figure 158. *Lower North Crow Reservoir sediment removal.*

WGFD installed a new fishing pier in Lower North Crow Reservoir at the John and Annie Woodhouse Public Access Area (Figure 157) west of Cheyenne. Recently, the City of Cheyenne Board of Public Utilities removed 14,000-cubic yards of sediment from the reservoir (Figure 158). Over the years, silt and sediment has migrated downstream and become trapped in Lower North Crow Reservoir, decreasing the water storage diversion capacity. The silt removal project will restore water storage diversion capacity for the city and assist the WGFD by improving the aquatic habitat, reducing the sucker population and allowing for the installation of a fishing pier for people with disabilities. WGFD took advantage of the low water level to build the wheelchair-accessible fishing pier. Fish stocking will resume later this summer upon completion of the project.

Pinedale Region



Pinedale Region

The Pinedale Region essentially encompasses the area between the Wyoming, Gros Ventre and Wind River mountain ranges in western Wyoming. The Wyoming Mule Deer Initiative is a statewide framework designed to address declining mule deer populations, particularly over the last decade. Both the Wyoming Range and Sublette Mule Deer Initiatives have since been developed under the statewide initiative. Habitat improvement is a major component of both plans and it continues to be the focus for a large portion of the terrestrial habitat work being done in the Pinedale Region. There have been several projects completed to improve grasses, forbs, shrubs and aspen on both public and private lands. Cheatgrass control has become a major emphasis in the Pinedale Region as well, with over 34,000 acres treated in 2018.

Much of the aquatic habitat related activities focus on riparian habitat improvements to allow fish passage, sediment reduction and livestock grazing management. One riparian habitat project on private land west of Pinedale involved transplanting willow cuttings to serve as a research project while also improving bank stabilization. In all, 1200 willow stakes were planted and the success of these plantings will be monitored annually for 5 years to assess the relative efficacy of each approach. This experiment will help identify the optimum procedure for willow cutting and plantings in the Pinedale Region, and hopefully lead to many more riparian willows in the Upper Green and Bear Rivers.

A second project involves addressing significant bank erosion that was jeopardizing a fence at the parking lot and boat ramp at the Sommers PAA on the Green River west of Pinedale. Several site visits resulted in design plans to reduce the pressure from high flows on the eroding bank with root wads to stabilize the bank downstream of the boat ramp and provide trout holding cover. An existing chain link fence will be replaced with a wildlife-friendly wooden pole-top fence. Construction is planned for spring 2019 with the improved access being available to public users as waters clear.

There two additional projects on the New Fork River south of Pinedale are designed to address significant bank erosion while improving fish habitat and a boat launch. Construction on these projects is planned for 2019.

A considerable amount of time has been dedicated to construction of new wildlife-friendly boundary fences on several Department-owned WHMAs with drill pipe donated by local energy companies. Six additional campsites were graveled, fire rings with concrete bases constructed and picnic tables added to address increased use at the Soda Lake WHMA. Finally, finishing work on parking areas and fences was completed at the new Luke Lynch WHMA that was acquired by the WGFC through a partnership with the Conservation Fund. The property is a key parcel within the Hoback to Red Desert mule deer migration corridor, determined to be the longest big game migration in the contiguous 48 states.

LaBarge Fence Modifications (Goal 2) – Jill Randall

Figure 159. *A fence that has been reconstructed to wildlife friendly specifications along LaBarge Creek. A pole top was included because this is in a riparian area and experiences significant use from moose.*

The Rocking Chair Ranch, Johnson Place, Fish Creek Ranch and Spring Creek Ranch are working to rebuild over 14.6 miles of fence to wildlife friendly pole-top design to improve wildlife movement through their properties (Figure 159). Rocking Chair Ranch modified 1.25 miles of fence in 2016 within the LaBarge Creek riparian corridor and is expanding the effort on the Ranch as well as their other properties on Fish Creek and the Green River. Due to the success and visibility of the 2016 work, a neighbor, Spring Creek Ranch, has joined the project effort and increased the footprint of improvement by modifying their fences upstream along LaBarge Creek. The project area serves as crucial winter year long habitat for moose and mule deer, spring through fall range for antelope, mule deer migration, and includes sage grouse core area. A significant number of moose and mule deer mortalities have occurred annually on the ranches for the last several years due to current fence conditions that include fences over 50" tall and old woven wire sheep fence. In 2018, 2.4 miles was constructed with the remaining portions expected to be completed by 2020. Funding was provided by WWNRT, MFF, MDF, WGFD and WGBGLC.

Public Access Areas (Goal 2) – Miles Anderson, Derek Lemon, Kyle Berg and Brandon Werner

Habitat and access personnel performed annual required maintenance and monitoring of regional PAA's. All public access boundary fences were maintained to protect riparian habitat. On Airport PAA, additional culverts were placed and access road graveled to repair damage for access on the New Fork River (Figure 160). More Public access improvements were made at Green River Lakes in cooperation with Bridger Teton National Forest and Pinedale Fish Division personnel. Preliminary work for river restoration and fence repairs at Sommers Boat launch PAA were completed for the 2019 season.

Figure 160. *Access road repairs at New Fork River's Airport PAA, Pinedale.*

Sommers Access Bank Stabilization (Goal 2) – Luke Schultz

Figure 161. *Site assessments at the Sommers Access on the Green River were conducted to reduce streambank erosion and protect fencing at the boat ramp.*

The Sommers PAA on the Green River is located within the Sommers-Grindstone conservation and fishing easement. In recent years, bank erosion at the access area has accelerated and jeopardized a fence around the parking lot and boat ramp. Damage to this fence has necessitated increased maintenance from the Pinedale habitat and access crew. Pinedale habitat and access approached both Pinedale fisheries management and aquatic habitat to come up with a solution that would improve river health and alleviate bank erosion at this site. The restoration would also have to protect downstream irrigation infrastructure on an adjacent landowner's ranch.

Several site visits (Figure 161) were conducted in the fall and early winter to discuss options and conceptualize potential design solutions, and follow-up river assessments were conducted to solidify designs. Design plans include a rock j-hook structure to reduce the pressure from high flows on the eroding bank, and a bankfull bench with root wads to stabilize the bank downstream of the boat ramp and provide trout holding cover. Finally, an existing chain link fence will be replaced with a wildlife friendly wooden pole top fence. Construction will likely occur in spring 2019, and the upgraded access area will be available to public users.

Elk Feedgrounds (Goal 2) – Miles Anderson, Derek Lemon, Kyle Berg and Brandon Werner

Annual maintenance and improvements occured to 11 WGFD managed elk feedgrounds in the Pinedale Region. Annual repairs and maintenance to feedground structures, corrals, stackyards, elk migration fences, and grounds. A new steel hayshed and a stackyard was constructed at the Upper Green River Feedground (Figure 162). Horse corrals were enlarged at Soda Lake Feedground.

Figure 162. *Hayshed construction at Green River Lakes elk feedground.*

Rolling Thunder Ranch Aspen Mechanical Treatment (Goal 2) – Troy Fieseler, Phil Damm and Jill Randall

In 2018, two-year post treatment monitoring data was collected on Rolling Thunder Ranch in the Upper Hoback drainage. The treatment targeted conifer encroached aspen communities by removing all conifers up to a 10" dbh on approximately 624 acres. The goals were 1) to reduce competition and increase the available resources, previously taken up by conifers, and 2) increase production on understory grasses, forbs and shrubs while encouraging aspen growth (Figure 163).

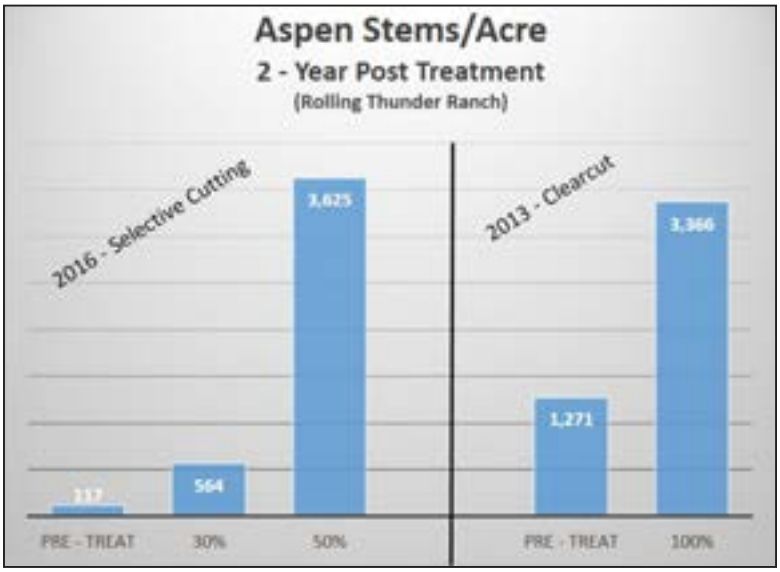


Figure 163. *Results of selective cutting percentages compared to a clearcut aspen project performed on the same property. Stems/acre represents all aspen trees less than or equal to 6" dbh.*

Given that one of the main goals of the landowner is to establish a new age class of aspen across the property and increase stems/acre, we evaluated mechanical treatment options for aspen through selective cutting as well. Partial removal of aspen canopy cover has been a management tool used to simulate the natural process of suckering or regeneration from root sprouting resulting from the mortality of mature trees. We investigated what percentage of trees can be removed to maximize results, while also maintaining the aesthetic properties of the stand without eliminating the majority of the canopy. To help answer this, four treatment blocks were delineated to compare 50% removal of canopy aspen trees versus 30% removal. Although both treatment options resulted in a greater number of stems/acre than pre-treatment conditions (117 stems/acre), there was a staggering difference between the two prescriptions. Two years post-treatment, the 50% selective cutting aspen treatment resulted in approximately 3,625 stems/acre, while the 30% canopy aspen removal treatment only resulted in 564 stems/acre. Comparing this to a clear-cut of aspen performed on the same property which had 3,366 stems/acre two-years post treatment, removing only half of the canopy resulted in a similar out-

Figure 164. *Before and after treatment photos showing slashing of conifer.*

come while still maintaining the overstory structure of the stand. Monitoring will continue on these sites to obtain a better understanding of treatment prescriptions. For now, the data from this site supports the prescription of 50% canopy thinning to get a desirable aspen suckering response (Figure 164). Additionally, in fall 2018, the Roosevelt wildfire burned a significant part of this ranch including conifer, aspen, riparian, and sagebrush communities. Monitoring efforts in future years will evaluate wildfire as an additional treatment effect on this property.

Woody Vegetation Regeneration Soda Lake WHMA (Goal 2) – Miles Anderson, Derek Lemon, Kyle Berg, Brandon Werner and Pete Cavalli

Two thousand feet of steel jack fencing were built and placed around Soda Lake to restore woody vegetation, increase age diversity, and increase maturity of these species within the WHMA. Restored woody vegetation will provide soil stability and shade Soda Lake. These improvements will reduce soil erosion and reduce water temperature benefiting aquatic resources and increase habitat for moose, elk, deer, sage grouse and riparian-obligate birds. Additional fencing for exclosures is being constructed for placement in 2019 (Figure 165).

Figure 165. *Volunteers and employees placing woody vegetation exclosure fencing at Soda Lake WHMA.*

Wyoming Range Riparian and In-stream Habitat (Goal 2) – Luke Schultz

Figure 166. *Aquatic habitat technician conducts a riparian assessment on North Horse Creek in the Wyoming Range.*

Livestock allotments in the Wyoming Range were historically overgrazed in many places since the early 20th century by domestic cattle and sheep. In recent years, two forage reserves have been established in the Wyoming Range to restore vegetative communities to these sensitive alpine habitats. In these allotments, WGFD has observed expanded distribution of fishes following the initiation of these forage reserves, including Colorado River Cutthroat Trout, a species of greatest conservation need.

There has been considerable interest in understanding whether or not habitat changes in streams and riparian areas are driving these expanded distributions of fishes, as tall forb (upland vegetation) monitoring has suggested some recovery of these communities. In 2018, two sites were measured using the Multiple Indicator Monitoring (MIM) framework in conjunction with tall forb (upland) monitoring that has been conducted by the terrestrial counterparts (Figure 166). The MIM framework allows a suite of riparian and in-stream variables to be tracked relative to management changes and will allow us to assess the recovery of each of these components of the alpine system.

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

Figure 167. *Beaver ponds impound Salt Creek and provide stability to habitat structures built in the 1980s.*

A collaboration between the USFS, TU and WGFD will address habitat and passage on Salt Creek. This tributary to the Bear River provides valuable Bonneville Cutthroat Trout habitat and is an easily accessible and highly-visible fishery along US Highway 89. However, numerous past and on-going practices impact fish habitat and water quality in the project area, and the creek is crossed by a Forest Service road with an undersized and perched culvert. The site also has an active salt mine within the floodplain, and has instream structures spanning approximately two miles upstream of the salt mine/culvert that were constructed beginning in 1982. While these structures helped resolve many of the habitat issues they were intended to address when they were constructed, some have outlived their life expectancy and are currently impairing stream function (Figure 167).

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

Final project designs were completed in 2018, and the NEPA process has been initiated by project partners with an anticipated completion in spring 2019. Construction will occur in summer and fall 2019. Funding from WGFD fueled the design and implementation will be funded by WWNRT, WNTI, and a Wyoming DEQ 319 grant.

Roosevelt Wildfire (Goal 2) – Jill Randall and Phil Damm

In fall 2018, the Roosevelt Wildfire burned 62,000 acres in the Upper Hoback and Beaver Creeks drainages, south of Bondurant. This wildfire had significant impacts to the community of Hoback Ranches with dozens of residential structures lost. To provide technical assistance to landowners, and ensure proper resource management in the future, several agencies collaboratively assembled information specific to landowner concerns and their unique conditions by providing maps of their property including fire severity, slope and risk for erosion, as well as best management practices for site stability, weed control and vegetation restoration in the short and long term. The agency group also held public meetings to reach out to landowners and members of the public. These contacts resulted in several Farm Bill and Farm Credit Service applications to assist landowners.

Similar to several recent landscape-scale fires in Sublette County, this experienced and collaborative group of agencies quickly assembled to plan grazing management, weed control, fence reconstruction to wildlife friendly standards, and recreation management for the next several years. Extensive effort will go into on the ground work on BTNF, BLM, and private land in 2019 including monitoring vegetation response, specific erosion control measures and grazing management to rest five federal allotments and private land.

Duck Creek Riparian Development (Goal 2) – Luke Schultz

Restoration of stream habitat and riparian health often hinges on the re-establishment of woody shrubs. Luckily, species such as willows will actually regrow from planted cuttings of their stems. Many different approaches are dogmatically advocated as being the "right way" to do these cuttings and plantings. However, the relative success of these different approaches is often not objectively assessed, and might vary in different areas.

Working with a landowner on Duck Creek, we are examining different cutting and planting techniques in the Pinedale area. The landowner has also expressed interest in improving fish habitat on the property, which is immediately upstream of approximately four miles of publically accessible river. Ultimately, the landowner agreed to allow us to test several different approaches for willow restoration in fall 2017 and spring 2018 on the property.

In October 2017, we collected Booth's Willows and Geyer's Willows from mature stands and trimmed the cuttings for planting. We planted 400 stems to evaluate spring vs. fall planting and clipping the cutting at the ground surface vs. clipping the cutting surface 4-7" above ground level. In addition, we tested the two different species by planting 100 cuttings in each treatment group. We repeated these two techniques in spring 2018, but also added an additional experimental group of willow stakes that were cut and then stored in a cooler for 7-10 days prior to planting. Cutting and storing willow stakes is very commonly used for spring planting because the stakes can be collected well before the planting window and planted when soil conditions are ideal for sprouting and growth.

In all, 1,200 willow stakes were planted as part of this evaluation (Figure 168), and the success of these plantings will be monitored annually for 5 years to assess the relative efficacy of each approach. This experiment will help identify the optimum procedure for willow cutting and plantings in the Pinedale Region, and hopefully lead to many more riparian willows in the Upper Green and Bear Rivers.

In-kind contributions from WGFD and the landowner have been instrumental in this effort.

Figure 168. *WGFD employees use a stinger jet pump to plant willow cuttings along Duck Creek near Pinedale.*

Half Moon Fence Conversion (Goal 2) – Miles Anderson, Derek Lemon, Kyle Berg and Brandon Werner

This is a multi-year project converting WHMA boundary stock fences to steel drill stem pipe top rail and wire fence. Fence construction is being accomplished in partnership with a neighboring landowner, Fayette Ranch. Fence conversion to wildlife friendly fencing improves the Hoback to Red Desert Migration Corridor and protects winter forage for wildlife on Half Moon WHMA. Eighty-two thousand feet of drill pipe was donated by Ultra Resources for fence construction.

Wyoming Range Mule Deer Habitat (Goal 2) – Jill Randall

The Wyoming Range Mule Deer Habitat Project is a cooperative endeavor between WGFD, Pinedale BLM and other partners targeting improvements to mule deer habitat in the Big Piney and LaBarge areas. It supports the Pinedale BLM RMP objective of maintaining and enhancing big game habitats. In particular, this project addresses declining mule deer habitat conditions and supports big game populations at WGFD objective levels. This habitat effort is intentionally landscape-scale and will be conducted over a ten year period, which started in 2014. Over 30,000 acres of vegetation treatments on winter and transitional ranges are being targeted and an additional 40,000 acres are slated for cheatgrass control (Figure 169). The treatments target many vegetation types including Wyoming and mountain big sagebrush, bitterbrush, true mountain mahogany, and aspen communities. Implementation techniques include brush mowing, Lawson aerator, Dixie harrow, seeding, Spike, herbicide application, fencing, conifer thinning, and prescribed burning.

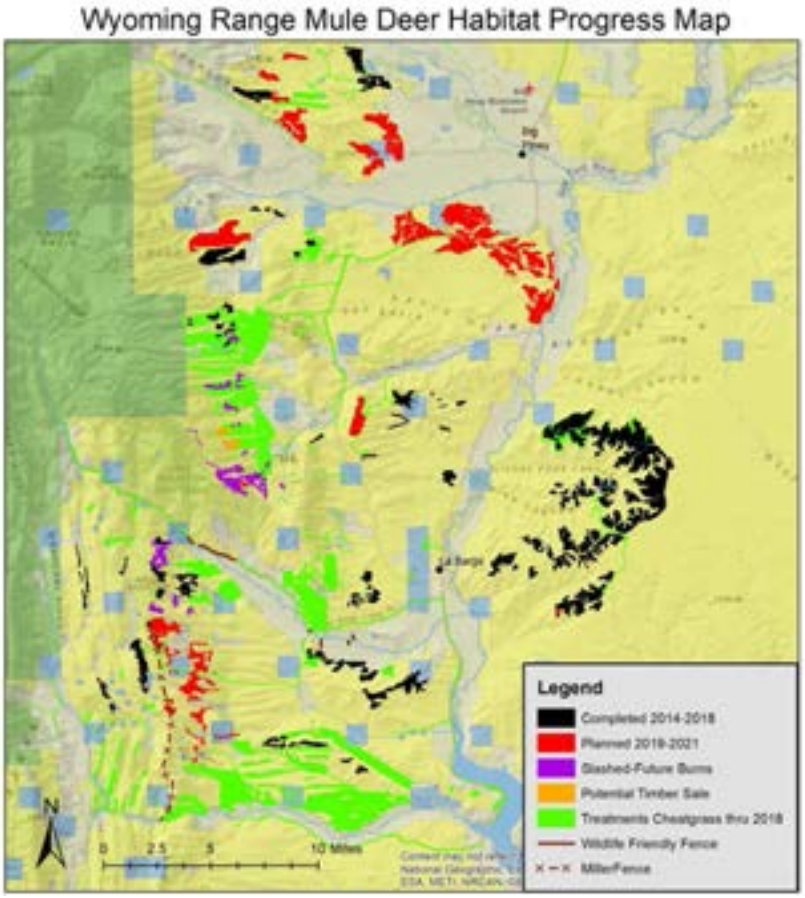


Figure 169. *Completed treatments and areas to be completed from 2019-2021 within the Wyoming Range Mule Deer Habitat area.*

In 2018 project accomplishments included: 1,369 acres of sagebrush mowing and Lawson aerator treatments (Figure 170), 263 acres of aspen mechanical preparation (slashing and cut-pile), 806 acres of prescribed burning in aspen communities (Figure 171), 17,083 acres of cheatgrass herbicide application, and hiring three livestock riders to manage livestock distribution post-treatment. Cumulative project accomplishments (2014-2018) include: 12,827 acres of sagebrush thinning, 3,149 acres of aspen mechanical preparation, 1,401 acres of aspen prescribed burns, 35,675 acres of cheatgrass herbicide application, 2,032 acres of cheatgrass hand grubbing, 11 livestock riders, 11 miles of fence construction, and one reservoir renovated to influence livestock distribution.

Figure 170. *Mowing sagebrush completed by WGFD Habitat and Access personnel southwest of Big Piney.*

Figure 171. *Aspen prescribed burns completed in the Burdick Creek vicinity in June 2018. Notice additional photo of the immediate positive aspen response below.*

Figure 172. *Aspen response is excellent three months after the prescribed burn was completed in Burdick Creek..*

Extensive vegetation monitoring has been conducted throughout the project area. Data and reports have been compiled by WGFD, and in general, vegetation has responded very well to disturbance with increased aspen density within prescribed burn areas (Figure 172), improved leader lengths on sagebrush plants, increased herbaceous species production, reduction of cheatgrass (Figure 173), and establishment of newly seeded species in treatments. A summary report will be generated in 2019 summarizing monitoring results from 2014-2018. Overall objectives include improving forage for mule deer in order to improve doe nutritional condition, thereby increasing fawn survival and ultimately increasing overall population numbers.

Nearly $4.2 million of funding has been secured for the project to date. Additionally, over $200,000 of in-kind support has been contributed by BLM and WGFD from 2014-2018. Partner funding includes contributions from WWNRT, WLCI, Denbury Energy, Exxon, MFF, RMEF, WGBGLC, BLM and WGFD MDI.

Figure 173. *Significant reduction in cheatgrass with herbicide application on Saddle Ridge demonstrated by pre-treatment (left) and four years post-treatment (right) monitoring photos.*

Cliff Creek Wildfire Restoration (Goal 2) – Jill Randall and Phil Damm

In 2016, the 34,000 acre Cliff Creek Wildfire occurred north of Bondurant, primarily on BTNF. The fire was managed for resource benefits and resulted in mixed severity conditions that were ideal for wildlife habitat restoration. The burned area consists of important spring, summer, and fall habitat for elk, moose, mule deer and pronghorn as well as a portion of the Sublette mule deer migration corridor. Because the burned area affected four federal grazing allotments, a collaborative group of agencies worked with permittees to rest the burned areas from livestock in order to allow for succulent new vegetation to reach a more mature and established stage. This was accomplished through relocating livestock, using electric fencing and hiring a livestock rider to exclude use from areas requiring recovery time. The weed control work was lead by SCWP and included treatment on 22 acres through backpack and horseback sprayers within the larger project area (Figure 174). Project funding was provided by WWNRT, RMEF, WGFD Trust, and WGBGLC.

Figure 174. *Weed control was a big part of management activities in 2018 and primarily include horseback and backpack work.*

Wyoming Temperature Metrics and Database (Goal 1) – Luke Schultz

Water temperature data are routinely collected in Wyoming, and each aquatic habitat biologist has been collecting annual stream temperature records from at least two sites in each region. These records are collected to provide an informational baseline and allow periodic analysis for water temperature changes. However, a relational database to house these records has not been developed, nor has a set of metrics to report from these records been standardized across regions.

Starting in 2017, an effort was made to develop a relational database to house these data, and formulate a series of reportable metrics that are standardized across Wyoming. Efforts in 2018 expounded on these efforts by further developing the Microsoft Access database to streamline importation of data and developing computational spreadsheets for calculating each of the proposed metrics. Work with other aquatic habitat and fisheries biologists refined these applications, and data from multiple regions has been uploaded. Additional data from across the state will be inputted into the database. Data retrieval and processing for exportation from the database will be added following importation of data statewide.

Soda Lake Fence Conversion (Goal 2) – Miles Anderson, Derek Lemon, Kyle Berg and Brandon Werner

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

Soda Lake Designated Campsite Construction (Goal 3) – Miles Anderson, Derek Lemon, Kyle Berg and Brandon Werner

Improvements continue on Soda Lake WHMA to address increased use. Six additional campsites were graveled, fire rings with concrete bases constructed and picnic tables added. These improvements will help contain campfires and protect resources on the habitat area while promoting public use (Figure 175).

Figure 175. *One of six new fire ring placements for Soda Lake campsite improvements.*

Lower New Fork Restoration – Tatro Bank Restoration (Goal 2) – Luke Schultz

A landowner on the Lower New Fork has been working with WGFD for several years to address bank instability on an outside bend approximately one mile downstream of the Remmick Access Area. A ~5-7' vertical eroding right bank (Figure 176) annually loses 1-2' laterally to instability and channel erosion. In July 2017, the Pinedale aquatic habitat biologist estimated annual sediment contributions from the bank using the BANCS model (Rosgen 2006). The 1,600 ft bank was estimated to contribute 290 tons of sediment annually. The landowners have been, and remain, very interested in addressing this bank and have offered substantial in-kind contributions to a potential project here.

In 2018, a Rosgen Level II assessment was conducted to develop restoration designs for this bank. Designs were drafted in the fall, and further project planning will occur throughout the winter to work out project logistics, mobilize materials to the site, and complete permitting prior to construction in 2019. In-kind contributions from WGFD and the landowner have been instrumental in the planning of this project, and funding from WGFD will help finalize implementation.

Figure 176. *Eroding fenceline on the New Fork River on the property of a private landowner. Working with this landowner, this restoration will address sedimentation from a bank that is approximately six feet high and 1600 feet long and laterally migrated up two feet annually.*

Sublette Mule Deer Habitat (Goal 2) – Phil Damm

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 near Pinedale, WY (a segment of the Sublette Herd). Cooperators and funders include: PAPO, JIO, WWNRT, NRCS, WGBGLC, BLM, many grazing permittees and private landowners.

Projects include roughly 6,000 acres of habitat treatments, primarily in decadent sagebrush, mountain shrub, and aspen communities, with primary goals of improving habitat forage quality and quantity for mule deer. Additionally, over 55 miles of livestock fences within the designated migration corridor are to be converted to wildlife friendly specification, which is in addition to over 20 miles already completed on the Rolling Thunder Ranches. All treatments and fences occur in either mule deer winter or summer ranges, in addition to migration corridors. Projects under the umbrella NEPA planning effort for BLM lands commenced in 2016 and will continue through 2020. Projects on private lands are ongoing and additional projects are likely to occur as relationships with new landowners develop.

Figure 177. *Designing mosaics into mechanical sagebrush treatments provides structural diversity and increases in productivity for ungulates and sage grouse.*

From 2016 to date, big sagebrush has been mechanically treated in a mosaic fashion on nearly 3,900 acres of key mule deer ranges, with nearly 700 acres completed in 2018 (Figure 177). Also in 2018, 370 acres of big sagebrush-bitterbrush communities were treated with Spike herbicide. Livestock grazing on treatments completed in 2016 and 2017 (3,800 acres) was managed by three riders, electric fencing, and deferment in 2018. Treatments completed in 2016 have shown excellent herbaceous and shrub leader growth response (Figure 178), so livestock grazing will resume for those treatments in 2019. Livestock grazing on treatments completed in 2017 and 2018 will continue to be managed in 2019 with similar strategies. In 2017, 50 acres of prescribed burns were completed in spring where over 4,000 serviceberry and chokecherry seedlings were planted in fall. Anecdotal monitoring and maintenance in 2018 showed excellent single season success on those plantings, with only minimal mortality observed. Anecdotal observations within the prescribed burn areas also indicated a fair amount of mountain big sagebrush seedling recruitment, which is impressive after only one growing season (Figure 179).

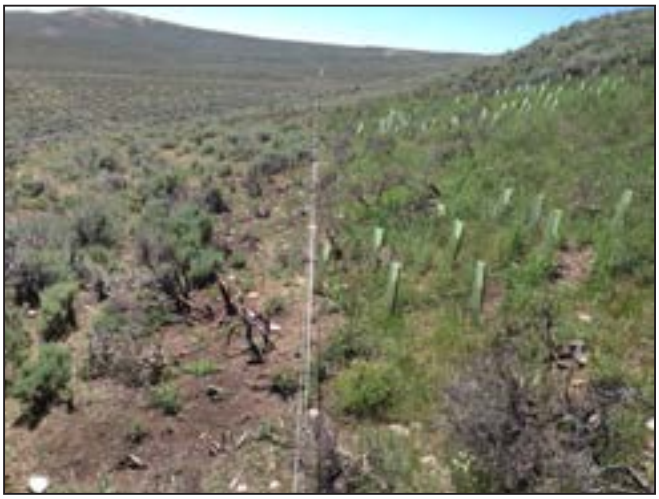


Figure 178. *Prescribed fire was used in spring 2017 to prepare sites for serviceberry and chokecherry plantings and regenerate mountain big sagebrush. By late June 2018, excellent herbaceous productivity was evident among shrub planting tubes.*

Pre-treatment monitoring was established and read for 2018 treatment areas, in addition to monitoring 2016 treatments for the scheduled two-year visit. Increasing bitterbrush productivity is a common ob-

Figure 179. *Prescribed fire was used in spring 2017 to prepare sites for serviceberry and chokecherry plantings and regenerate mountain big sagebrush.*

Average Annual Bitterbrush Leader Growth (mm)			
	Pre-Treat (2016)	2 Years Post (2018)	Percent change
Control	48	38	-21%
Treatment	76	79	5%
Net	-	-	**26%**

Figure 180. *A mowing treatment implemented in 2016 to improve bitterbrush productivity had resulted in an increase of 26% relative to the control site after only two growing seasons.*

jective in mountain big sagebrush-bitterbrush communities. One such site was treated in 2016 with a brush mower set at high deck height to reduce sagebrush and maintain bitterbrush. Monitoring in this site revealed a bitterbrush productivity increase of 26% relative to the control site (Figure 180), which is particularly interesting given below average growing season precipitation in 2018. Finally, across five private lands projects, about 23 miles of wildlife friendly fence was constructed in 2018; those projects all continue in 2019.

Figure 181. *Example of a negative outcome resulting from a mule deer-bison fence interaction at the fence modification site, spring 2018. Photo courtesy of Walter Wehtje.*

WGFD allocated considerable resources in 2018 to developing new additions to Sublette Mule Deer work, in terms of assessing site-wide habitat conditions, fence inventories, and coordinating and collaborating with partners, including NRCS, BTNF, SCWP, BLM, SCCD, TNC, private landowners, and grazing permittees. This groundwork resulted in adding several projects that will positively impact Sublette mule deer, including an additional 400 acres of big sagebrush/bitterbrush Spike herbicide treatment, several hundred acres of big sagebrush aerator treatment, modifications to a woven-wire bison fence in a high priority mule deer migration area (Figure 181), and helping coordinate Roosevelt fire recovery work and fundraising. Continued relationship building efforts with additional landowners and land managers throughout the Pinedale-area range of the Sublette Herd will likely yield complementary projects in the near future.

Sublette Cheatgrass (Goal 2) – Jill Randall

Figure 182. *Pre- and post-treatment photos in the Boulder Lake area demonstrating excellent control of cheatgrass with herbicide application.*

In 2018, cheatgrass management along the west slope of the Wind River range was the most aggressive attempt to date in Sublette County. This project generally aims to slow the invasion of cheatgrass into native rangelands across multiple land ownerships. Cooperative efforts between SCWP, private landowners, BLM, Wyoming OSLI, NRCS and WGFD resulted in 17,616 acres treated with herbicide in 2018. Monitoring efforts (Figure 182) were completed on 11 trend sites. Also, four separate trials were evaluated with UW partners on Fall Creek WHMA, Half Moon WHMA and BTNF. Additionally, USFS has been completing a NEPA analysis to update the herbicide application authority across the entire Forest. This could potentially permit aerial application of herbicide to manage cheatgrass, which is currently not an approved application tool on BTNF land. Funding has been provided by WWNRT, WLCI, Sage Grouse Local Working Group, and NRCS.

Forage Reserve Tall Forbs (Goal 5) – Jill Randall

The Wyoming Range Allotment Complex and Triple Peak Forage Reserve were created in 2004 and 2006 when donors facilitated buyouts of 12 domestic sheep allotments in the Wyoming Range. Traditionally, vegetation monitoring has been completed by BTNF and WGFD to understand the effects of the management change over the last twelve plus years. Seven of the benchmark sites were monitored in 2018, and due to the increased workload, BTNF and WGFD collaborated with Sublette County Conservation District to assist with completing these monitoring requirements (Figure 183). The dominant vegetation type monitored through this effort was tall forb which is a very important summer forage for many wildlife species including mule deer, elk and moose. Funding was provided by WGBGLC and WWSF.

Figure 183. *Agency personnel cooperatively complete monitoring of a tall forb community in the Horse Creek drainage of the Wyoming Range.*

Coal Creek Bank Stabilization and Sediment Reduction (Goal 2) – Luke Schultz and WLCI, Jim Wasseen

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

Figure 184. *Excavators build a bankfull bench on Coal Creek to reduce erosion from the raw, vertical bank.*

To address these habitat and road access issues, this project was initiated in the early 2000s and was completed in two phases. The first phase replaced two undersized culverts on Coal and Little Muddy creeks in 2015, and Phase II was completed in 2018. Phase II addressed habitat and road access maladies by restoring riparian and upland vegetation, constructing bankfull benches and/or toe wood along stream banks (Figure 184), completing necessary borrow ditch and road drainage upgrades, and reducing bank angles at ten sites along a two-mile section of Coal Creek Road. Additional revegetation and post-runoff site visits will occur in spring 2019 to ensure project completion and document any changes.

Considerable funding contributions were provided by WWNRT, WGFD, and WLCI from the Western Native Trout Initiative. In-kind contributions from WGFD and BLM have also been critical for project success.

Wildlife Habitat Management Areas (Goal 2) – Miles Anderson, Derek Lemon, Kyle Berg and Brandon Werner

Annual maintenance and improvements continue on Pinedale regional WHMAs. The Soda Lake WHMA had 36 miles of crucial winter range habitat boundary and elk fence maintained and repaired. Six additional campsites were improved and established to prevent resource damage on Soda Lake WHMA. One mile of crucial winter habitat boundary fence was replaced with steel drill pipe wildlife friendly fencing (Figure 185). On Muddy Creek Feedground 1 1/4 miles of crucial winter range elk fence was maintained. On Fall Creek WHMA four miles of crucial winter habitat boundary fence was maintained. On Half Moon WHMA 11.6 miles of crucial winter habitat boundary fence was maintained, 1/2 mile of boundary fence was replaced with steel drill pipe wildlife

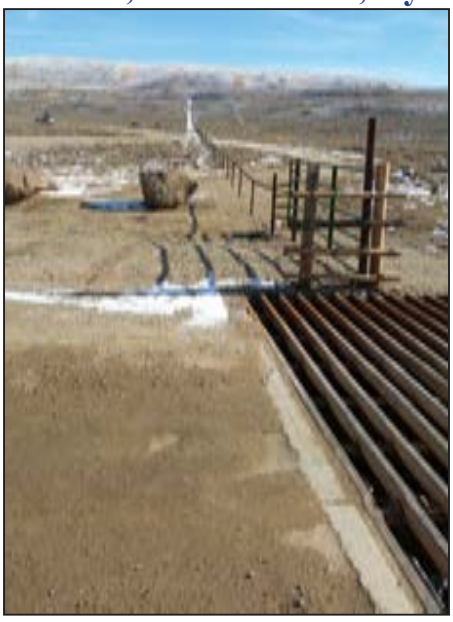


Figure 185. *Wildlife friendly steel drill pipe boundry fence on Soda Lake WHMA.*

friendly top rail fencing. Sections of WHMA roads were re-graveled, three culverts installed, and annual road maintenance performed. On Black Butte WHMA, livestock grazing of 335 AUMs (525 acres) were used to improve nutritional quality of rangeland health and forage. One half mile of pole top fencing was replaced and four miles of crucial winter habitat boundary fence was maintained. On the recently acquired Luke Lynch WHMA, 1 1/4 miles of wildlife friendly pole top fence was maintained. In Sublette County, 17.6 acres of noxious weeds were sprayed on PAAs, WHMAs and feedgrounds, and an additional 160 acres of aerial cheatgrass spraying was completed.

Skyline Fuels Reduction (Goal 2) – Jill Randall

The Skyline Fuels Reduction Project includes 2,247 acres and is located near Pinedale on the BTNF. Implementation began on this five year project in 2016. The majority of the existing vegetation in the project area consists of conifer encroached old-aged aspen communities, lodgepole pine communities and Douglas Fir/mix conifer stands. From 2003-2006 a mountain pine beetle epidemic occurred causing widespread mortality of lodgepole pine. Along with high mortality in the lodgepole pine, a decrease in aspen across the landscape is also evident. Due to wildfire exclusion aspen is now in danger of losing viable root systems and over-story stems necessary to maintain the clones. Completion of this project is expected to provide benefits to aspen and associated understory shrubs.

In 2018, 362 acres were mechanically prepped and treated through slashing and piling prescriptions, 283 acres were prescribed burned (Figure 186), and 25 acres were commercially logged by a local company with primarily post and pole product removed. Monitoring different prescriptions of forest management is an ongoing component of this project. Funding partners include USFS Joint Chiefs, WWNRT, WGFD MDI and RMEF.

Figure 186. *Prescribed burning occurs after mechanical preparation of targeted stands.*

New Fork Gas Wells Boat Access and Habitat Improvement (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 cutthroat, Brown and Rainbow Trout is degraded in the Lower New Fork relative to other portions of the basin. Hence, there is considerable interest in expanding the productive portions of the river, while also increasing angler access points to spread fishing pressure across more of the river and throughout the entire Pinedale region. TU, BLM and WGFD have partnered to address some of these deficiencies in the Lower New Fork.

Figure 187. *The "Gas Wells" site on the New Fork River historically supported a boat ramp, but has been lost in recent years due to lateral migration of the river channel.*

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 (Figure 187) since the site was established. Currently, the eroding bank approaches six ft high in many areas along this site, and low quality habitat is the norm in the general vicinity. 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, creating a non-point pollution area of concern.

In 2018, additional fund raising and project planning were completed for the Gas Wells site. Wetland delineations were completed by Intermountain Aquatics, Inc. (who also did the restoration designs for the site), and the permitting process has been initiated for implementation in 2019. This phase will reconstruct the boat ramp and associated access facilities and restore stream habitat in approximately 0.6 miles of river. Additional funding was sought for this restoration from several new partners. Currently, funds from WGFD, the Wallop-Breaux boat access fund, two DEQ 319 grants, and in-kind contributions from BLM, WGFD, and industry partners will be used to complete Phase I implementation in 2019.

Wyoming Range and Sublette Mule Deer Initiative (Goal 5) – Jill Randall and Phil Damm

Efforts continued within the Wyoming Range and Sublette Mule Deer Herds to assess important habitats using the RHA methodologies. In the Wyoming Range Herd Unit, 401 acres of rangeland RHAs were completed in the Big Piney-LaBarge portions of the herd unit. In the Sublette Herd Unit, 2,362 acres of rangeland and 651 acres of aspen RHAs (Figure 188) were completed in 2018. This effort is part of a goal to increase the number of RHAs completed in MDI herds encompassing the Pinedale, Jackson and a significant portion of the Green River Regions. Additionally, three public MDI meetings were held to further engage stakeholders regarding population and habitat management, as well as ongoing research conducted in collaboration with UW Haub School of the Environment and Natural Resources.

Winter range shrub transects were monitored in the Big Piney area of the Wyoming Range Mule Deer

Figure 188. *Aspen community in Hoback Basin within the Sublette Mule Deer Herd where a RHA was conducted in 2018.*

Herd. Generally the amount of new growth on shrubs, or annual production, is a result of the amount of precipitation received during the growing season. The more precipitation, typically falling in the months of April through June, will produce an increased amount of annual production on winter range shrubs. In 2018, production on true mountain mahogany shrubs was significantly less than the last three years (Figure 189). This reduction is due not only to less precipitation, but also higher than average temperatures during the growing season, which decreased available soil moisture for plants to put into growth.

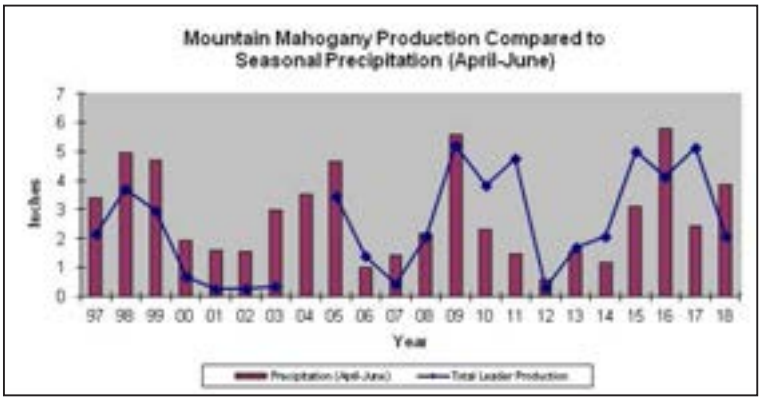


Figure 189. *Production on true mountain mahogany compared with total precipitation for the months of April through June annually, collected on the Big Piney-LaBarge winter range.*

Leader production in 2018 for true mountain mahogany decreased from an average of 5.13 inches in 2017 to 2.07 inches in 2018 across the four transects that were monitored. WGFD also continued to monitor other shrub species within habitat treatments, documenting in some cases a four-fold increase of production in treated areas versus untreated areas (Three Buttes Dixie Harrow, 2014), with many at least doubling in production two years post treatment. When applying treatments in shrub communities, WGFD is looking to not only increase the production of plants, but also increase the age-class diversity by creating conditions favorable to the establishment of younger shrubs for recruitment into the future. This ensures the long-term viability of these communities, which in turn will help support deer populations into the future and help them during the winter months when tough foraging conditions are present.

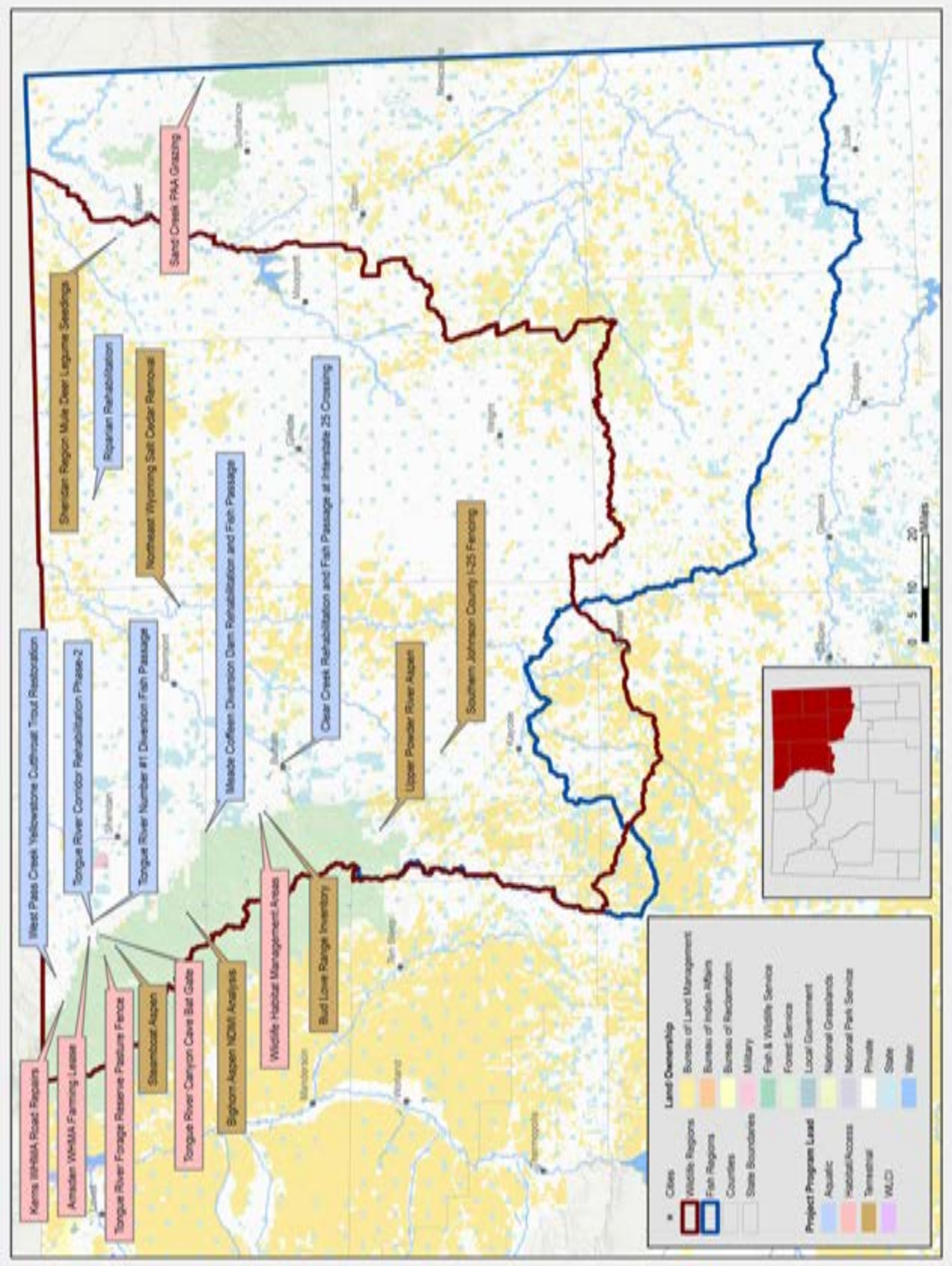
Horse Creek Invasives (Goal 2) – Jill Randall

The Horse Creek and Cottonwood Creek area in the Wyoming Range have had several prescribed and wildfires in recent years including the 2007 Horse Creek wildfire which burned nearly 10,000 acres on Bridger Teton National Forest (BTNF). Although there are many positive changes in terms of wildlife habitat after these disturbances, weed control is required to fully realize the potential forage benefits. In 2014, with an increase in moisture the weed infestation exploded, and musk and Canada thistle have become a significant portion of the understory vegetation. Musk thistle has actually added another canopy layer and is out-competing native trees, forbs and grasses for space and resources. The weeds are effectively reducing the carrying capacity and health of the land that includes Sublette mule deer migration corridor as well as crucial winter range for elk and important moose habitat.

Since 2015, over 200 acres have been treated within a several thousand acre project area by Sublette County Weed and Pest (SCWP). Specifically in 2018, 77 acres were treated with backpack and ATV sprayers (Figure 190). In previous years, biocontrol insects have also been released in more remote areas. Additionally, an intensive weed treatment monitoring study was initiated through a partnership with the Teton Interagency Fire Effects crew. This should help inform managers if intensive herbicide application is necessary and effective after landscape scale wildfires. Funding was provided by WWNRT, Pinedale Anticline Project Office (PAPO) and USFS.

Figure 190. *Sublette County Weed and Pest backpack crew working in a remote location of the Horse Creek Wildfire.*

Sheridan Region



Sheridan Region

The Sheridan Region covers northeast Wyoming, from the summit of the Bighorn Mountains, east to the Black Hills and from the Montana/Wyoming state line, south to the northern portions of Natrona and Converse counties. It encompasses the Powder, Tongue, Little Bighorn, Belle Fourche, Little Missouri and Cheyenne River drainages.

Our region enjoys good working relationships with a variety of governmental agencies, nongovernmental organizations and private landowners that allow significant habitat projects to be planned and completed.

The rehabilitation of stream and riparian corridors is a priority as evidenced by two ongoing, multi-year projects. Two phases of a rehabilitation project along the Tongue River were completed this year in cooperation with TNC, WWNRT, a local irrigator, the Sheridan County Conservation District and the IXL Ranch. The third phase will begin in 2019 and when completed, hundreds of feet of streambank will have been protected from erosion and fish habitat in those areas will be much improved.

Terrestrial habitat projects this year focused on aspen forest communities retention and improvements as well as projects designed to positively impact mule deer. In Crook County, 183 acres of alfalfa were planted on two ranches to provide high-quality forage for mule deer while in Johnson County, the early stages of a research project on big game movements began. With cooperation from the BLM, WYDOT and the Western Transportation Institute, we began researching movements of big game through existing structures along Interstate 25, which has been identified as a high-priority area for reducing wildlife-vehicle collisions. The next phase of the project will include construction of game fencing to direct animal movements and follow-up monitoring to determine the effectiveness of that fencing.

Habitat and Access personnel, in partnership with the local Weed and Pest boards and private contractors, completed mechanical and chemical treatment of noxious weeds on several WGFD WHMAs and PAAs. Two particularly damaging weeds, ventenata and medusahead, have been found in recent years and identifying and controlling these plants remains a challenge, with more than 275 acres mechanically or chemically treated to limit their spread.

In addition, Habitat and Access personnel completed annual repairs and maintenance of roads, fences, facilities and signs on regional WHMAs and PAAs to improve public access and safety. Habitat and Access personnel provided regional assistance to both terrestrial and aquatic projects throughout the region including assisting in the installation of a fish barrier on the North Fork of West Pass Creek and a habitat inventory on the Bud Love WHMA.

At the request of the Bighorn National Forest, a custom-welded, lockable gate was installed at the entrance to Tongue River Cave to protect hibernating bats from human disturbance during the winter months.

Tongue River Canyon Cave Bat Gate (Goal 1) – Seth Roseberry

Through a cooperative project between USFS and WGFD efforts were made to protect hibernating bat populations in the Tongue River Canyon Cave. A new bat friendly gate was installed in the cave opening to prevent un-permitted access. Informational signage was installed at the cave and on the trail to the cave to inform visitors about the importance of protecting bat habitat and bat health. An access bridge to the cave and portions of Tongue River Canyon was repaired to comply with safety standards (Figure 191).

Figure 191. *New gate installed at the opening of the Tongue River Canyon Cave to protect bat habitat.*

Bud Love Range Inventory (Goal 1) – Todd Caltrider and Seth Roseberry

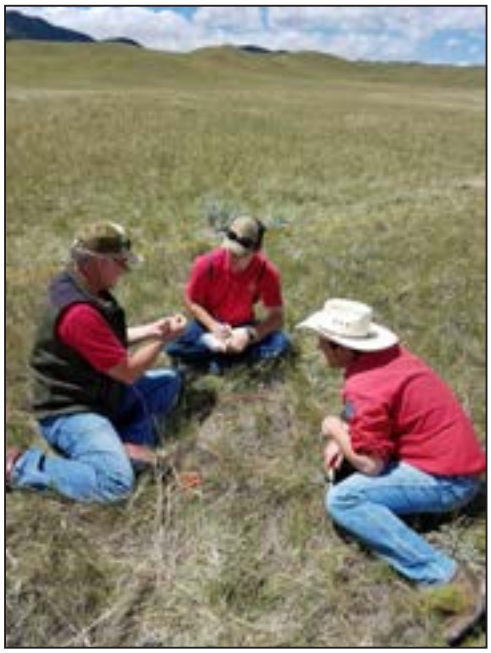


Figure 193. *WGFD personnel conducting rangeland inventories on Bud Love WHMA.*

Figure 192. *Rangeland site on Bud Love WHMA.*

In 1971, WGFD completed a baseline rangeland inventory on Bud Love WHMA. Since this initial inventory, no other in-depth rangeland inventory has been conducted on Bud Love WHMA. In order to evaluate current management and identify potential habitat improvement projects, WGFD has begun re-surveying the original inventory sites evaluated 1971 (Figure 192). Since 1971, some significant changes have the potential to affect rangeland conditions on the WHMA, including increased elk populations and a decreased mule deer population. During the summer of 2018, 50% of the original 1971 inventory sites were sampled (Figure 193). We are planning to complete the remaining inventory sites during summer 2019.

Riparian Rehabilitation (Goal 2) – Travis Cundy and Todd Caltrider

Aquatic Habitat, Terrestrial Habitat, and Habitat and Access section personnel worked with a landowner to plant about 400 streambank willow cuttings along a tributary to Bitter Creek in the Powder River watershed. The cuttings were collected at available sources and planted using a water jet stinger (Figure 194). The plantings are to provide a willow source for expansion over future years within a continuous CRP fenced riparian buffer.

Figure 194. *Regional personnel planting willow cuttings within a fenced riparian buffer.*

Public Access Areas (Goal 3) – Seth Roseberry and Brad Sorensen

Personnel from Habitat and Access performed annual maintenance and monitoring of Sheridan Region PAAs. All public access boundary fences were maintained and signed to protect Commission property rights and protect habitat. Vandalized and weathered signs were replaced. Noxious weed spraying occurred where weeds were present, and access roads and parking lots were maintained as needed. Public facilities at these sites were maintained as needed and maintenance contracts were fulfilled at Tongue River Canyon PAA and Sand Creek PAA (Figure 195).

Figure 195. *A boat ramp at Healy PAA was installed to improve watercraft user access.*

Tongue River #1 Diversion Fish Passage (Goal 2) – Travis Cundy

Canyon rehabilitation was completed at the Tongue River Number #1 Diversion on the Tongue River to improve the function of the diversion structure and enhance fish passage. Rehabilitation included replacing a push-up dam with a ramped vane diversion structure and improvements to the ditch head gate (Figure 196). Cost share was provided from WGFD and fish passage grants program, TNC, WWNRT and the irrigator.

Figure 196. *New ramped vane structure completed at the Tongue River #1 Diversion (also known as the Green Ditch) on the Tongue River.*

Upper Powder River Aspen (Goal 2) – Todd Caltrider

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

Figure 197. *Conifer removal in an aspen stand in the Upper Powder River mule deer herd. A slash barrier was created to keep elk from accessing anticipated new aspen saplings following conifer removal.*

Figure 198. *Conifers removed from this aspen stand were lopped and scattered and left in the stand to protect saplings from browsing.*

The majority of the aspen stands in the Upper Powder River Mule Deer Herd Unit are located just off the Hazelton road in the north portion of the herd unit. Land ownership is a mixture of state, BLM and private land and some of the largest aspen stands in the southern Bighorn Mountains can be found here. This project is a cooperative effort between Wyoming State Forestry and private landowners to enhance and perpetuate aspen stands into the future. Conifer encroachment will be removed from aspen stands and slash will be managed to reduce ungulate herbivory (i. e. jackstrawing, coarse slash treatment, slash barriers). A total of 163 acres of conifer removal are planned for this project. During fall 2018, a total of 22 acres of conifer removal was completed (Figures 197-198). The remaining acres are planned to be completed over the next two years. Funding was provided by the WGFD Mule Deer Initiative, RMEF, WGBGLC and WWNRT.

Sheridan Region Noxious Weed Control (Goal 2) – Seth Roseberry

Approximately 200 acres of invasive plants were treated by Sheridan Region Habitat and Access personnel and private contractors during 2018. The invasives were treated using chemical and mechanical methods to stress the plants during the growing season. Controlling these noxious weeds will enhance habitat for wildlife while allowing for native plants to thrive.

West Pass Creek Yellowstone Cutthroat Trout Restoration (Goal 2) – Travis Cundy and Seth Roseberry

Figure 199. *A timber crib barrier constructed on the North Fork of West Pass Creek secured 1.7 stream miles of habitat for native YSC.*

Expanding a native YSC population in the West Pass Creek watershed is an ongoing project in northwest Sheridan County. Aquatic habitat and Habitat and Access section personnel constructed a temporary fish barrier on the North Fork of West Pass Creek (Figure 199) to prevent other trout species from moving upstream and mixing with YSC. This log crib barrier secured 1.7 miles of stream habitat in the North Fork of West Pass Creek for YSC. In the future, following the removal of non-native Brook Trout above the barrier, South Fork YSC will be moved to the North Fork. Plans are also underway to construct a permanent fish barrier on the main stem of West Pass Creek that will secure a total of six miles of suitable stream habitat for YSC.

Tongue River Forage Reserve Pasture Fence (Goal 1) – Seth Roseberry

Figure 200. *Tongue River forage reserve.*

Through a Cooperative Agreement with the Tongue River Ranger District of the USFS a forage reserve for wildlife and livestock has been maintained in the Tongue River Canyon since 1978. The pasture fences are maintained cooperatively on a rotating schedule by the USFS, lessee, and WGFD. In 2018 WGFD performed the maintenance and rebuilt portions of this pasture fence (Figure 200). The area fenced provides forage for wildlife along with acting as a grass bank for livestock lessees in the event an alternate livestock pasture is needed to rest more permanent pastures due to habitat improvement projects or wildfire restoration efforts (Figure 201).

Figure 201. *Tongue River forage pasture fence repairs near Horse Creek.*

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

Salt cedar (Tamarix spp.) is a highly invasive plant that is gaining a foothold in the Powder River drainage. Salt cedar removal started in the upper Powder River Basin in Johnson County. Since 2007 Johnson County Weed & Pest District has removed a total of 3,350 acres of Salt cedar between Kaycee, WY and the Sheridan county line through a mixture of mechanical mowing and chemical herbicide treatments. In conjunction with Johnson County, Sheridan County Weed and Pest District began 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 W&P has been limited in how many acres of Salt cedar can be treated each year. In 2018, WGFD partnered with the Sheridan County Weed & Pest to seek grant funding to treat more acres/year. With increased funding, it is anticipated that Salt cedar removal can be completed on the Powder River in five years. During winter 2018 the Sheridan County W&P removed 94 acres of Salt cedar on the Powder River (Figure 202). Funding for this project was provided by the NWTF, WGFD and WWNRT.

Figure 202. *Before and after Salt cedar removal in Sheridan County.*

Kerns WHMA Road Repairs (Goal 3) – Seth Roseberry

Major road repairs and maintenance were performed on the Kerns WHMA road between TR Bench and Broderick Flat. The road work helped improve water drainage and minimize erosion along with re-establishing a safer overall road width to allow safer access for ATVs/UTVs and smaller 4x4 vehicles. This road system is the sole access through the Kerns WHMA and onto the USFS Dry Fork Ridge and West Pass area (Figure 203).

Figure 203. *A bulldozer was required to re-shape and grade Kerns WHMA access road to reduce erosion and improve public access.*

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

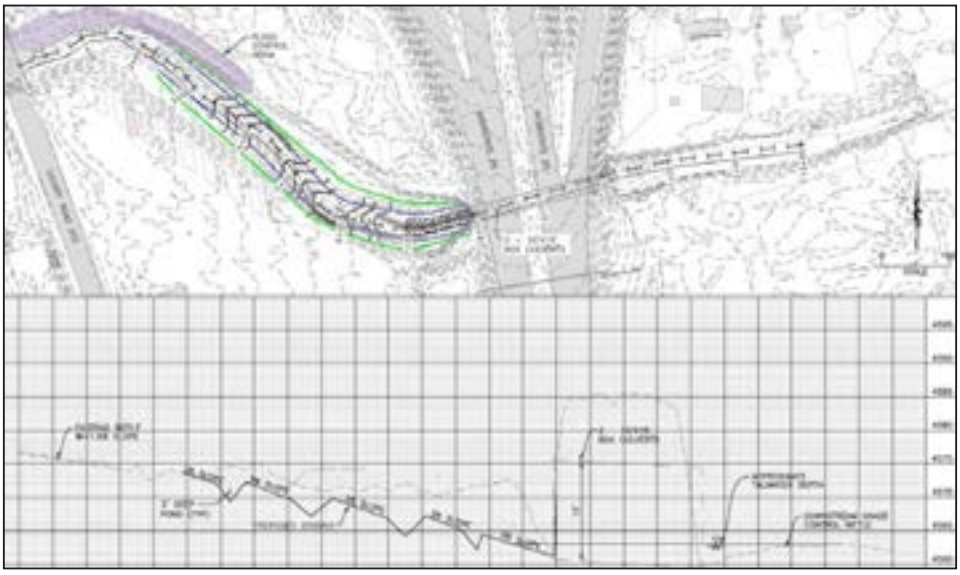


Figure 204. *Design concept being considered to restore fish passage in Clear Creek at the Interstate 25 culvert crossing. Photo courtesy of WWC Engineering.*

A memorandum of agreement was completed with WYDOT allowing the Department to lead a fish passage and stream rehabilitation project at the Interstate 25 drop structure on Clear Creek. It included funding from WYDOT to implement the fish passage and stream rehabilitation. Additional design funding was secured from WGFD and the Clear Creek Conservation District. The team of WWC Engineering, Wild Fish Engineering and Five Smooth Stones Restoration was selected to design the rehabilitation. A preliminary design concept for the project is presented in Figure 204. Passage at this location is expected to primarily benefit Rainbow and Brown trout.

Sand Creek PAA Grazing (Goal 3) – Seth Roseberry

Cattle from the Ox Yoke Ranch graze on the Sand Creek PAA annually from mid May to mid June. During 2018, 286 pairs and 9 bulls grazed the area from May 28th through June 10th totaling 98 AUMs utilized. The grazing on Sand Creek PAA is part of an Exchange-of-Use agreement that results in an additional two miles of public fishing access adjacent to Sand Creek PAA and works in conjunction as a multi aspect weed management plan for the area. Sand Creek PAA is treated annually for noxious weeds by a licensed applicator.

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

The Meade Coffeen Crossover Diversion Dam on South Piney Creek is the primary water supply for the Story Hatchery. The grouted riprap dam is at risk of breaching due to toe degradation. Aquatic Habitat, hatchery and engineering personnel worked with WWC Engineering and Wild Fish Engineering to finalize designs to rehabilitate the dam and improve passage by adult trout over the structure. Permitting and contracting was completed and implementation began in October. By mid-November, winter conditions forced the suspension of the rehabilitation. The contractor, North State Environmental will finish the rehabilitation in 2019.

Steamboat Aspen (Goal 2) – Todd Caltrider

Figure 205. *Contract crew removing conifers from an aspen stand in the head of the Tongue River Canyon.*

Figure 206. *Aspen stand with conifer removed and coarse slash treatment.*

Conifer encroachment and overbrowsing appear to be growing issues in many aspen communities in the Bighorn Mountains. This project is located in the northern Bighorn Mountains on State of Wyoming Trust and Bighorn National Forest lands. The project occurred on Pasture Creek, which eventually drains into Tongue River Canyon just below Steamboat Point. Aspen stands in this area appear to be stable, but are threatened by increasing conifer encroachment due to lack of disturbance and recruitment is limited by over-browsing by wildlife and possibly livestock. Increased conifer densities in Pasture Creek are also having negative effects on riparian willow communities.

In order to increase aspen forest vigor and recruitment, conifer removal was completed by a contracted hand saw crew utilizing chainsaws (Figure 205). In the treatment units, conifers were felled within 1 chain (66 feet) of existing aspen trees. Slash was treated in a manner to reduce herbivory (jackstrawing/hinging) (Figure 206). Work began on August 8, 2018 and was completed August 17, 2018. A total of 222 acres of conifer removal in aspen stands was completed. The main purpose for this prescription was to open up aspen stands and willow communities to increase sunlight exposure and decrease resource competition from conifer trees. The coarse slash treatment will provide an obstacle for wildlife and livestock browsing, improving recruitment success of aspen saplings. Funding was provided from WWNRT, WGBGLC, WGFD, RMEF, and WSG.

Amsden WHMA Farming Lease (Goal 1) – Seth Roseberry

The Amsden WHMA has approximately 38 acres of hay meadows irrigated and harvested by a contract farmer. The first cutting of hay is harvested by the contract farmer in exchange for area improvements as part of an Area Improvement Plan Agreement. The second growth of hay is left as standing forage for wintering wildlife. These fields also provide hunting opportunities for recreationists that utilize the WHMA and help to minimize wintering wildlife damage on neighboring private lands (Figure 207).

Figure 207. *Amsden WHMA hay meadow harvested through AIPA farming lease with neighboring ranch.*

Tongue River Corridor Rehabilitation Phase 2 (Goal 2) – Travis Cundy

Tongue River Phase 2 rehabilitation involving stream bank stabilization on the IXL Ranch above Dayton was completed during October. The work included securing channel grade, restoring dimensions, and stabilizing eroding banks along about 750 ft of river through the placement of two j-hook vanes and the development of a bankfull bench along the lower third of an eroding meander bend (Figure 208). Although this rehabilitation alternative was riskier, it was favored by the Sheridan County Conservation District Board because it cost less than half as much as the bio-revetment alternative and less than a quarter as much as the rock toe alternative.

Figure 208. *Vane and bankfull bench treatments on the Tongue River above Dayton, WY.*

Southern Johnson County I-25 Wildlife Fencing and Connectivity (Goal 1) – Todd Caltrider

WGFD and WYDOT have been collaborating on a research 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 patterns, a Before-After-Control-Impact (BACI) study design was developed by the Western Transportation Institute. This study will look at big game movements along I-25 for the next five years. Trail cameras will be installed at existing below grade structures currently used by big game to monitor movements. The study will monitor big game movements before game proof fencing is installed and then after to see if there is any change in big game movements as result of the fencing. This spring, 23 trail cameras were installed along I-25 to collect preliminary data (Figures 209-210). The actual study will begin January 1, 2019. Funding for this project was provided by the BLM.

Figure 209. *Mule deer buck utilizing a bridge to go under I-25.*

Figure 210. *A group of Mule deer using a machinery underpass to cross I-25.*

Wildlife Habitat Management Areas (Goal 1) – Seth Roseberry and Brad Sorensen

Annual maintenance and improvements continued on the four WHMAs in the Sheridan Region in 2018. The Kerns, Amsden and Bud Love WHMAs received annual fence maintenance on a total of 26 miles of crucial winter range elk fence. The Kerns, Amsden, Bud Love and Ed O. Taylor WHMA received annual fence maintenance on a total of 35 miles of stock fence. A total of 142 acres of irrigation water rights were spread on the Amsden and Bud Love WHMAs (Figure 211). Annual parking lot and access road maintenance was performed. Over 20,000 acres of deeded Commission lands property rights were monitored. Approximately 75 acres of noxious weed spot treatment was performed by WGFD personnel and contract applicators.

Figure 211. *Irrigation on the Bud Love WHMA, historic hay meadows are irrigated to promote forage production for wildlife utilization year round.*

Bighorn Aspen NDMI Analysis (Goal 1) – Todd Caltrider

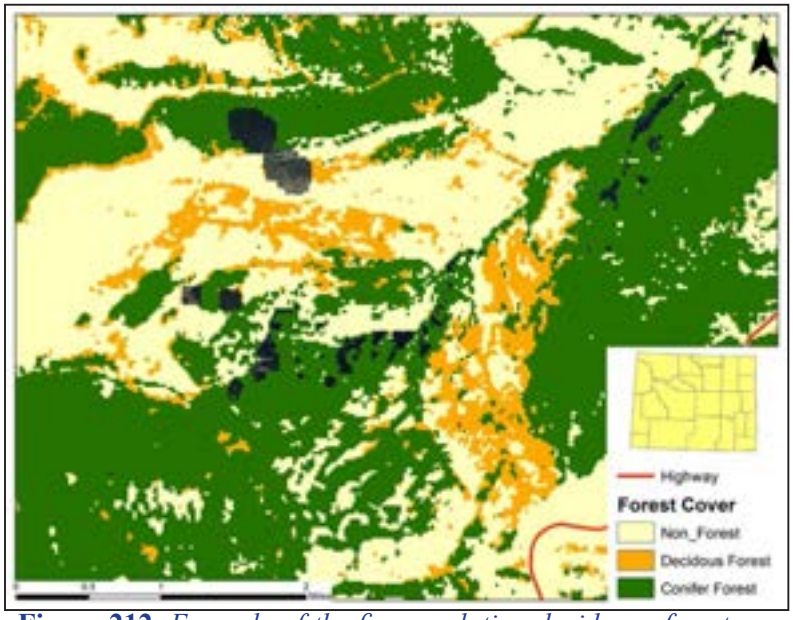


Figure 212. *Example of the fine resolution deciduous forest map that was developed. The area shown is the Tongue River Canyon area, west of Dayton, WY.*

The original goal was to conduct an analysis of deciduous forest trends in the Bighorn Mountains using the remotely sensed vegetation indices, including Naturalized Differential Moisture Index (NDMI). At the time when this project was initiated, it was believed an adequate base map existed of current deciduous forest distribution throughout the Bighorn Mountains. Upon review of this data, it was determined that the available spatial data resolution for deciduous forest distribution was too coarse for this analysis. As a result, a fine resolution base map of current deciduous forest distribution was needed to complete the deciduous forest trend analysis. Grant funding was used to develop a fine resolution deciduous forest distribution map for the Bighorn Mountains (Figure 212). Now that the base map has been developed, the next phase is to develop the model to conduct the trend analysis. Additional funding from WGFD was secured to fund the development of the model for the trend analysis. The model will be tested at a smaller spatial scale first to work out any issues with the model before it is applied to the entire Bighorn Mountain range. Currently, the model is being assessed on the Clear Creek drainage. Once the model has accurately provided an adequate analysis of deciduous forest trend at this scale, the next step will be to apply the model to the entire Bighorn Mountain range. Funding for this project was provided by the WGBGLC.

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

A total of 183 acres of alfalfa were planted in spring 2018 in Crook County on the McDonald and Jolley Ranches. The plantings will provide high quality forage for mule deer (Figures 213-214). This project was funded in part through the statewide WGFD Shrub, Grass, and Legume Seeding Program.

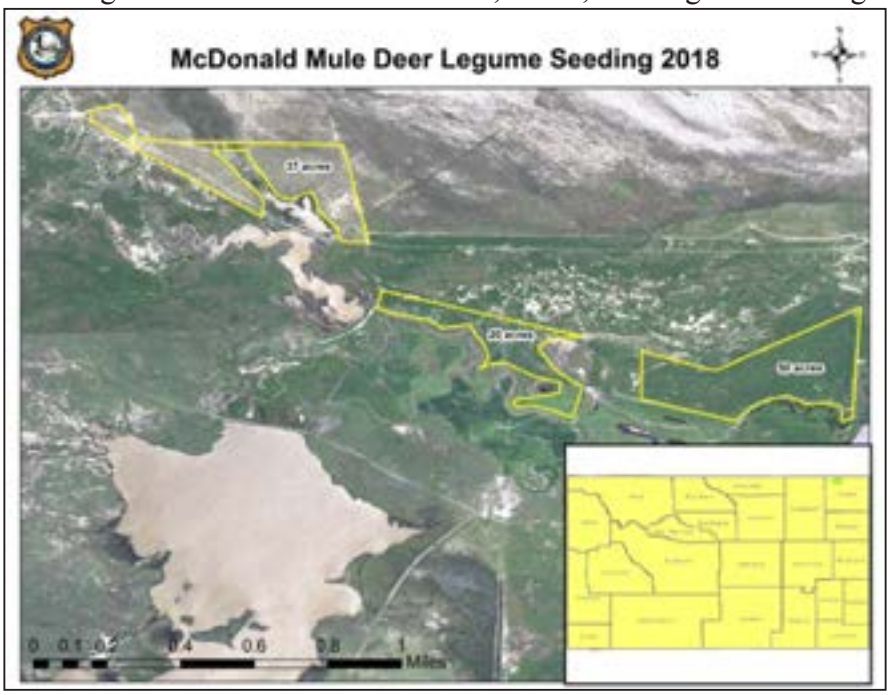


Figure 213. *McDonald Ranch mule deer legume seeding locations.*

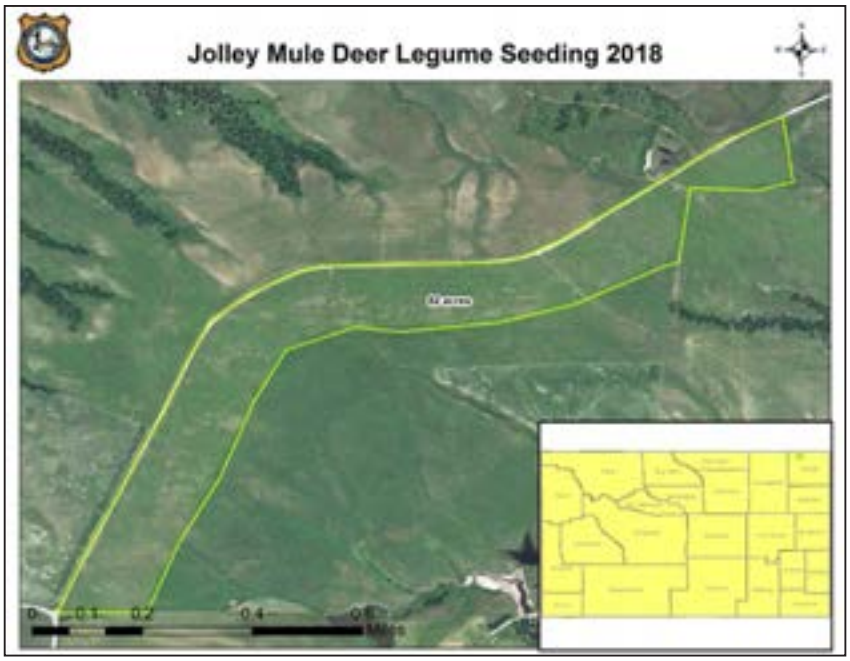


Figure 214. *Jolley Ranch mule deer legume seeding locations.*

WGFD would like to recognize Jessie Reece for her diligence in compiling the 2018 SHP.

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List of Acronyms

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