Annual Report 2023
Statewide Habitat Plan

Wyoming Game and Fish Department
July 2024

Conserving Wildlife
Serving People

Aquatic Habitat
Terrestrial Habitat
Habitat and Access Branch
Lands Administration
Communications Divison
Habitat Protection Program

MESSAGE FROM THE DIRECTOR

Quality habitat is essential for effective wildlife management. The Wyoming Game and Fish Department is deeply committed to sustaining healthy populations of aquatic and terrestrial wildlife. By investing in our habitat, we create resilient landscapes that enable wildlife to endure fluctuations in water availability and severe winters. Our approach to habitat conservation is strategic and forward-thinking, ensuring long-term benefits rather than short-term fixes.

Game and Fish allocated more than $4.6 million in funds for habitat projects and leveraged that for more than $8.6 million more from the Wyoming Wildlife Natural Resource Trust fund, federal government funds, state funds, private landowners and our local conservation partners. Together, we allocated more than $13 million towards habitat projects. That's about $2.86 from external partners for every Game and Fish dollar allocated. With 800 species under the department's charge, we use each dollar in the most impactful and effective way. That's how we executed 237 projects in 2023.

The allocation of these funds is guided by the Statewide Habitat Plan, a five-year plan guiding our work until 2025. After that, the plan will be updated. Since 2001, the SHP has remained the cornerstone of habitat management in the state. As a result, projects in this report were subject to intense evaluation and planning. The plan directs our efforts to focus on projects that invest in the future of Wyoming's wildlife.

Game and Fish and our partners united to work for a sustained future for aquatic and terrestrial wildlife. Last year, nearly 255 stream miles required habitat improvement. Stream miles improved by Game and Fish personnel and partners exceeded the 5-year average of 175 miles.

Combating invasives is a priority of Game and Fish. I'm incredibly proud of the work to control and prevent the spread of invasive plants, like cheatgrass, treating 80,704 acres. This work is ongoing. Improving wildlife habitat is a long-term commitment, and these efforts require years to yield measurable results.

In this year's annual report, we profiled a crucial partner — the Muley Fanatic Foundation.

For more than a decade, it has been a vital partner, advocating for science-based decisions, supporting research initiatives and fostering collaboration among diverse stakeholders to achieve solutions for public land management. The Muley Fanatic Foundation believes in the critical role that a thriving habitat plays in safeguarding the well-being of our mule deer population. It directs funding primarily towards habitat enhancement and restoration initiatives. At its inaugural Mule Deer Days in March 2023, it brought together more than 2,000 people and raised more than $472,000 for conservation in the span of two days. The Muley Fanatic Foundation also takes the Inspire-A-Kid initiative to heart and takes the time to connect not only our youth but also children facing life-threatening illnesses to the outdoors.

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

Brian Nesvik, Director, Wyoming Game and Fish Department

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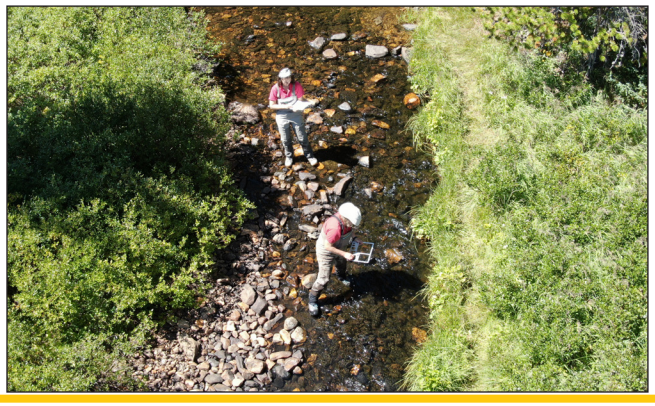
STATEWIDE HABITAT PLAN ANNUAL REPORT MISSION

The Statewide Habitat Plan (SHP) defines how the Wyoming Game and Fish Department (WGFD) will meet its mission of Conserving Wildlife, Serving People by working with external partners to conserve and improve habitat statewide and manage Wyoming Game and Fish Commission (WGFC)-owned lands. Within the WGFD, the SHP provides a road map defining how the Director's Office and all divisions will work together to accomplish habitat protection and enhancement goals. Progress to achieve these goals is tracked by the WGFD Habitat Technical Advisory Group (HTAG). A synopsis of goal progress can be found in Appendix A, SHP Implementation.

Strategy II of the SHP directs the WGFD to communicate habitat efforts and project results by developing an annual report highlighting habitat projects. This strategy will be implemented by sharing this habitat plan with the Governor's Office, state and federal agencies, private landowners, conservation districts, conservation groups and the public. The SHP Annual Report documents habitat projects executed by WGFD programs to meet SHP goals:

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

For additional information, please contact any of the personnel listed at the end of this document. This report can be viewed on the WGFD website.



HABITAT PROGRAM EXPENDITURES

The WGFD and partners have funded projects focused on SHP goals. The figures below (rounded to the nearest $1,000) represent the estimated totals expended on these goals during 2023. Additional information can be found in Appendix B, Habitat Program Expenditures.

WGFD funds expended on SHP goals: **$ 4,610,000**

Non-WGFD funds expended on SHP goals: **$ 8,618,000**

Total for SHP goals: **$ 13,228,000**

THANK YOU, PARTNERS!

The following lists major funding partners and approximate amounts (rounded to the nearest dollar) the WGFD spent in 2023. 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	2023 AMOUNT	2023 IN-KIND DONATION
Albany County Weed and Pest	$2,400	
Bowhunters of Wyoming	$2,500	
Bureau of Indian Affairs		$2,800
Bureau of Land Management	$1,008,273	$501,575
Bureau of Reclamation	$11,678	
Clear Creek Conservation District	$6,000	
Cody Conservation District	$4,000	$720
Ducks Unlimited	$100,000	
East Yellowstone Chapter Trout Unlimited	$5,000	$3,675
Federal USDA Farm Bill Program	$190,407	
Fremont County Fire Protection	$5,523	
Fremont County Weed and Pest	$16,115	$12,000
Goshen County Weed and Pest	$2,300	
Jackson Hole One Fly	$160,000	$1,200
Jackson Hole Trout Unlimited	$14,500	$1,885
Jonah Interagency Office	$146,677	
Knobloch Family Foundation	$63,320	
Laura Jane Musser Fund	$20,000	
Lincoln County	$30,000	

FUNDING PARTNER	2023 AMOUNT	2023 IN-KIND DONATION
Little Snake River Conservation District		$4,800
Meeteetse Conservation District		$5,200
Mule Deer Foundation	$55,202	
Muley Fanatic Foundation	$24,000	
National Fish and Wildlife Foundation	$270,792	
National Wild Turkey Federation	$27,500	
Natural Resource Conservation Service	$872,421	$17,334
North American Waterfowl Conservation Act	$150,000	
Northern Great Plains Joint Venture	$24,985	
Open Rivers Fund	$27,000	
Peabody Powder River Mining	$11,000	
Pinedale Anticline Project Office	$52,499	
Popo Agie Conservation District	$1,300	
Powder River Flycasters	$1,000	
Private Donors	$207,232	
Private Landowners	$148,576	$54,750
Resource Legacy Fund	$125,000	
Rocky Mountain Elk Foundation	$157,900	
Rocky Mountain Power Mitigation	$342,646	
Russell Construction Mitigation Fund	$19,800	
Saratoga-Encampment-Rawlins Conservation District	$2,666	$15,400
Society of American Foresters	$5,000	
Sublette County Conservation District	$8,981	$9,800
Teton County Conservation District	$39,000	
The Nature Conservancy	$50,117	
The Wyldlife Fund	$3,630	
Thunder Basin Coal Company	$40,000	
Thunder Basin Grazing Association	$35,200	
Trout Unlimited	$66,500	$15,500
Ultra Resources		$16,755
US Department of Agriculture APHIS	$22,000	
US Fish and Wildlife Service - Boating Access	$25,000	
US Fish and Wildlife Service - Fish Passage	$171,912	
US Fish and Wildlife Service - Great Plains FHP	$25,000	
US Fish and Wildlife Service - Private Lands Program	$183,770	
US Fish and Wildlife Service - State Wildlife Grants	$66,000	
US Fish and Wildlife Service WNTI	$8,156	
US Forest Service	$234,723	$18,500
US Geological Survey	$11,542	

FUNDING PARTNER	2023 AMOUNT	2023 IN-KIND DONATION
Volunteer In-Kind		$9,000
Water for Wildlife Foundation	$10,000	
Wind River Fire Prevention Council	$7,060	
WY Department of Agriculture Water Quality	$20,000	
Wyoming Community Foundation	$30,000	
Wyoming Department of Transportation	$63,590	
Wyoming DEQ 319	$94,221	
Wyoming Governor's Big Game License Coalition	$415,722	
Wyoming Landscape Conservation Initiative	$540,449	
Wyoming Water Development Commission	$172,211	
Wyoming Wild Sheep Foundation	$118,505	
Wyoming Wildlife and Natural Resources Trust Board	$1,839,605	
TOTAL	**$8,618,106**	**$690,894**
GRAND TOTAL	**$9,309,000**	

2023 PARTNER OF THE YEAR

MULEY FANATIC FOUNDATION

WGFD is pleased to recognize Muley Fanatic Foundation (MFF) as the 2023 Partner of the Year. MFF has been an integral partner since its founding in 2012, advocating for science based decisions, supporting research efforts, and building consensus with diverse interests to reach solutions for public land management decisions. MFF championed the establishment of the Wyoming Conservation License Plate, which funds wildlife highway crossing projects to reduce wildlife/vehicle collisions and facilitate big game migrations. MFF promotes opportunities for future generations of hunters and wildlife enthusiasts and leads an effort to help enable children facing life threatening illnesses to get outdoors. MFF believes habitat is the key to healthy mule deer populations and prioritizes funding towards habitat enhancement and restoration efforts. Lastly, MFF hosted the inaugural Mule Deer Days in March 2023 where more than 2,000 people were in attendance and approximately $472,410 was raised for conservation in the span of 2 days.

MFF helps with everything from awareness and education to fundraising and project implementation, says Kevin Spence, Green River terrestrial habitat biologist. WGFD is grateful to have MFF's help in looking out for Wyoming's wildlife and people.

DIRECTOR'S OFFICE

HABITAT PROTECTION PROGRAM

The Habitat Protection Program (HPP) coordinates project proposal and land/resource management plan reviews and recommends appropriate wildlife stipulations and mitigation strategies to protect important fish and wildlife habitats. It also is used to facilitate the implementation of Wyoming's Greater Sage-Grouse Executive Order 2019-3 (SGEO) and Wyoming's Mule Deer and Antelope Migration Corridor Executive Order 2020-1 (MCEO). HPP has six permanent, full-time employees consisting of the HPP Supervisor, four staff biologists and an office support specialist. These employees are located in Cheyenne, Lander, and Pinedale. In 2023, HPP completed 467 Wildlife Environmental Reviews (WERs) for federal, state, local government and private sector proponents. The majority of these reviews were completed for private sector and state proponents (47% and 30%, respectively). HPP completed 138 WERs for SGEO compliance and 12 WERs for MCEO compliance. The project types most frequently reviewed by HPP were related to roadwork/fences, mining, oil and gas and linear/utilities, and renewable energy projects.

TOTAL WERS		
SENDER	NUMBER OF WERS	PERCENTAGE OF TOTAL
Federal WERs	67	14%
State WERs	140	30%
Local Government WERs	42	9%
Private Sector WERs	218	47%

FISH DIVISION

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: Seven regional aquatic habitat biologists, a statewide fish passage coordinator, a statewide fish passage biologist, a Wyoming Landscape Conservation Initiative coordinator, an aquatic habitat program manager and assistant manager and a water management instream flow biologist. In late 2023 and early 2024, a highlight occurred when an annual contract aquatic habitat position located in Lander was converted to permanent. An additional full time permanent aquatic habitat biologist in the Lander Region bodes well for the future and means that big picture aquatic habitat projects can be pursued to have lasting fisheries benefits.

In 2023 there were 39 on-going aquatic habitat projects involving significant funding. Tracked annually, this metric has ranged from 34 to 42 the last five years. Work (assessment, design, restoration, or monitoring) occurred on approximately 156 stream miles. That is close to the 5- year average (see Appendix F for information about how miles are summarized). Recent years have been marked by a high number of assessments (36) and designs (56) as newer biologists are collecting information to understand and address impairments in regional streams. The amount of newly constructed stream channel or bank enhancement is usually 1-5 miles and 2023 was on the high end of that range at 5.1 miles. Water temperature monitoring has increased to the point where biologists are keeping a close eye on stream temperatures at 49 sites across

the state. Beaver dam analog work remains popular with WGFD workers joining partners to install 52 BDAs. The level of watershed assessments (WHAM) conducted was similar to 2022 with 66.4 stream miles done in 2023 compared to 72.4 miles the previous year. Finally, 2023 marked a return to a more normal amount of upstream passage creation with 27 miles compared to the whopping 128 miles recorded in 2022. The difference in passage miles was the chief difference between the last two years.

STREAM AND RIPARIAN ACTIVITY	2023 STREAM MILES	5-YEAR AVERAGE
BDAs installed	5.5	3.1
Beaver transplanted	7	4.81
Fish passage stream miles connected	27	64.15
Instream flow segments filed	0	5.39
Post-stream project reach channel	25.4	18
Riparian protection and management	3	4.95
Stream reach assessment	11.1	6.9
Stream restoration or fish passage design	5.1	3.8
Stream restoration projects maintained	0.3	1.4
Stream restorations or bank enhancements	5.1	3.7
Watershed stream assessments	66.4	74
TOTAL	**155.9**	**190.2**

Instream Flow Study Reach Reconnaissance (Goal 1) - Del Lobb

Instream flow water rights are used to help maintain fish Species of Greatest Conservation Need, like native cutthroat trout, in Wyoming. The WGFD conducts studies and files for water rights for flows needed to maintain or improve existing fisheries. In 2023, reconnaissance was conducted on reaches in 10 potential instream flow segments. Reconnaissance methods included various combinations of visual assessment and GPS referencing of habitat features, photographs from ground-level and an unmanned aerial vehicle, and discharge measurements. Five Snake River Cutthroat Trout streams in Jackson Region's Greys River Basin were assessed. Marten Creek received a cursory visual assessment. Deadman Creek, North Fork Deadman Creek, North Three Forks Creek, and South Three Forks Creek received a thorough reconnaissance and are candidate streams for instream flow studies in 2024. Potential study reaches were identified on all four of those streams. Possible locations for measurement transects were identified on North Fork Deadman Creek and North Three Forks Creek. In the Lander Region, reconnaissance was done on Little Warm Spring Creek, which supports a core conservation population of Yellowstone Cutthroat Trout, and on Sawmill Creek and Burnt

Figure 1. Reconnaissance of North Three Forks Creek.

Gulch Creek, which are both being considered for introduction of Yellowstone Cutthroat Trout. Little Warm Spring Creek needs further assessment to select a study reach. Potential study reaches were identified on Sawmill and Burnt Gulch creeks. In the Pinedale Region, thorough reconnaissance was done on North Fork Beaver Creek and South Fork Beaver Creek in the Upper Green River Basin. Both streams contain core conservation populations of Colorado River Cutthroat Trout. Further reconnaissance of North Fork Beaver Creek is needed to identify a potential study reach. For South Fork Beaver Creek, a potential study reach and likely transect locations were identified.

WYOMING LANDSCAPE CONSERVATION INITIATIVE

The Wyoming Landscape Conservation Initiative (WLCI) continues working with partners to improve habitat across Southwest Wyoming. The WGFD coordinator to WLCI is managing funds from the BLM and USFWS ($2,414,000 and $230,000) granted to 33 projects representing partnerships with local Weed & Pest Districts, Conservation Districts, NGOs, and Department personnel. Accomplishments include over 2.5 acres of Tamarisk treated along the Black's Fork and its tributaries, over 81 acres of noxious weeds treated, 2 fish passage projects completed, 7,650 feet of rivers restored (Green, North Platte, Encampment, and Smith's Fork rivers), 1,214 acres of juniper masticated to improve habitats for sage-grouse and mule deer, 1,525 acres of sagebrush treated mechanically or with herbicide to promote early successional vegetative response, 1,189 acres of mixed mountain shrub communities and 65 acres of aspen treated to promote age class diversity, three water wells converted to solar power, four tire stock water tanks installed to distribute livestock throughout a common allotment, and three miles of fence converted to wildlife friendly standards and an additional 0.75 mile of fence removed.

The WLCI Executive Committee met three times to approve projects and receive updates from the Coordination Team and the Local Project Development Teams. The Local Project Development Teams met on a few occasions to prioritize projects and provide updates on current and upcoming projects. The Coordination Team, in conjunction with the Little Snake River Conservation District and USGS, provided a couple tours of conservation actions and research in the Baggs area. These included an Executive Committee tour showcasing the Little Snake River Conservation District's Muddy Creek Wetlands and Valley and Headwaters projects. The USGS presented their initial research of the Muddy and Littlefield creeks to wildlife and habitat biologists, hydrologists, and program managers representing the BLM, USFWS, UW, and WGFD. The tour was informative and provided insights to Muddy Creek channel stability, stream gauges, sources of sedimentation in Littlefield Creek, and the development of a new Probability of Streamflow Permanence (PROSPER) model.

FISH PASSAGE

The WGFD fish passage program consists of two full-time personnel and one seasonal technician. It works with several internal and external teams to address fish passage needs across the state. A diverse workload includes passage inventories, entrainment sampling, fish movement evaluations, design review, grant writing, permitting, construction oversight and coordination with various engineering consultants. On average, four to six projects are started each year to remove barriers and reconnect streams.

Highlights for 2023 included installation of a fish bypass channel on a diversion near Torrington and rehabilitation of an additional diversion 3.5 miles downstream on Horse Creek effectively reconnecting over 23 miles of stream. Horse Creek is one of the most diverse fish communities within WY. The fish screen at the Spread Creek diversion near Jackson operated without any issue for its first year ensuring fish will no longer become entrained between Spread Creek and the Snake River. A second year of monitoring documented upstream move-

ment through the Wood River ladder by some of the 476 PIT tagged fish that also used it in 2022. A large design effort for Pitchfork Ranch in the Greybull River drainage progressed that will begin construction in 2025 to prevent entrainment of 25,000 to 60,000 fish each year and restore upstream passage to 46 miles across 18 different sites on 5 streams. Lastly, more than 235 inventories of road crossings and irrigation diversions were conducted further developing the state's fish passage prioritization tool.

Fish Passage Prioritization Tool (Goals 1 and 3) - Nick Scribner, Jim Wasseen, and Erin Sobel

Since 2020, fish passage personnel have been working with the Southeast Aquatic Resources Partnership (SARP) to develop a fish passage prioritization tool that came to fruition through funding from the USFWS national fish passage program. Primary goals of the tool include storing and maintaining passage inventory data, prioritizing passage projects, and communicating with our partners and public. In 2023, 246 passage inventories were completed across the state largely focused on road crossings though several irrigation diversions were surveyed too. Biologists used protocols developed by SARP through a Survey 123 application to collect various measurements in the field. The application calculates a "Passability Score". Data were collected on public land, within the public road right-of-way, and where permission was granted by private landowners. A subset of measurements collected at each crossing or diversion structure included height and width of structure; slope of the structure; length and depth of pools, stream width, outlet drop to water surface, physical barriers, substrate, water velocity, and photos. Information collected via the application is uploaded to a database where the information is reviewed by SARP personnel. Reviewed data is loaded into the fish passage prioritization tool where a user can perform analyses based on various attributes to identify problem structures and assist with fish passage prioritization of future projects. To date, 1,548 road crossings have been inventoried and 548 are likely to impact fish passage. There are 9,457 dams in the passage prioritization tool, but only a portion of those have been inventoried. Additions to the tool by SARP personnel over the past year include a restoration tab that can track number of projects that have been completed and miles of passage gained. Another attribute addition allows prioritization of structures based on needs of small bodied or large bodied fish. Lastly, an update coming in early 2024 will assist with survey planning efforts that will highlight areas where survey efforts have been completed and where they have not. This work will improve the utility of the tool and standardize data between agencies and states.

Figure 2. A surveyed crossing with undersized culverts.

SERVICES DIVISION

HABITAT AND ACCESS

The Habitat and Access Branch manages WGFC-owned lands. The mission is to manage WGFC lands to be the benchmark for wildlife habitat while providing public access. The Habitat and Access branch in 2023 consisted of 1 branch chief in Cheyenne, 4 regional supervisors in Lander, Cody, Pinedale and Laramie, 1 statewide crew supervisor in Cheyenne, 4 coordinators in Sheridan, Casper, Jackson, 12 biologists in Pinedale, Dubois, Lander, Yoder, Cody, Lovell, Laramie and Saratoga, and numerous seasonal employees stationed across the state.

The Habitat and Access branch manages 45 WHMAs, 202 PAAs and 22 elk feedgrounds consisting of approximately 500,000 acres. In addition, a statewide crew completes habitat development projects throughout Wyoming. 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.

Along with WHMAs, PAAs and feedgrounds, the branch manages and maintains 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 anglers, another 1,100 miles of road, 395 parking areas, 67 boat ramps, 28 docks, 200 outhouses and more than 10,000 signs are maintained.

The Ellis WHMA was acquired in 2023. This new 3,413 acre WHMA is located on the southern end of the bighorns and provides crucial habitat for elk, fishing access to Sullivan creek and the Middle Fork of the Powder River and public access to thousands of additional BLM acres. The branch also worked on other habitat development projects, including MDI, aeration, harrowing, mowing, meadow improvements, wetland developments, stream restoration, food plots, wildlife friendly fence conversions, noxious weed spraying and riparian projects. Grants provided an additional

$820,000 in on-the-ground expenditures.

LANDS ADMINISTRATION

The mission of the Lands Administration Branch is to administer WGFC property rights and work with federal and state agencies, NGOs and the public to acquire and manage property rights for the benefit of wildlife conservation and public access. The Lands Branch administers approximately 500,000 acres of property rights including WHMAs, PAAs, conservation easements, and administrative facilities. The Lands Branch consists of one Lands Branch Chief located in Cheyenne and two Lands Coordinators located in Cheyenne and Lander. The State is divided into two Lands Administration Regions with each Lands Coordinator handling four regions.

Lands Branch personnel worked on numerous projects involving habitat conservation and conservation easements in 2023. A significant portion of the Lands Coordinators' time is spent monitoring conservation easements held by the WGFD to ensure the terms of the easements are not violated, and processing lease payments for the use of both public and private properties. Branch personnel also spent a significant amount of time communicating with WGFD personnel, state and federal agencies, and various NGOs, including RMEF and The Conservation Fund, among others.

The Lands Branch has been working closely with regional staff to determine potential access or conservation projects to pursue across the state. The WGFC approved several of these projects in 2023, and the increase of the conservation stamp fees in 2021 has created much needed revenue to pursue additional access projects.

WILDLIFE DIVISION

STATEWIDE TERRESTRIAL HABITAT PROGRAM

The Statewide Terrestrial Habitat Program works to actively enhance Wyoming's vast array of terrestrial habitats. This Wildlife Division work unit consists of a Terrestrial Habitat Program Manager and Office Manager in Cheyenne, a Big Game Migration Coordinator in Pinedale and a Migratory Game Bird and Wetland Biologist in Lander. In addition, the Terrestrial Habitat Program works closely with regional personnel to administer grants, contracts, agreements and expenditures for all terrestrial habitat projects statewide.

During calendar year 2023, Terrestrial Habitat Program personnel were heavily involved with on-the-ground implementation, oversight or verification of expenditures on 90 projects concerning WGFD trust funds and funds granted to or from the WGFD from sources such as: WWNRT, various conservation organizations, local, county, state and federal agencies, conservation districts, weed and pest districts, private landowners and others.

RIPARIAN AND UPLAND ACTIVITY	2023 ACRES	5-YEAR AVERAGE
Aspen Rapid Habitat Assessment	4,084	4,064.2
Aspen, cottonwood, willow browse monitoring	0	1,011.2
Conservation Easements acquired	4,256.5	851.3
Conservation Easements in process, coordinated with partners	0	29.8
Fee title land acquisition	3,119.7	623.9
Herbicide weed treatments	80,704	83,086.4
Livestock grazing management plans or wildlife habitat stewardship plan	10,905	119,114.8
Mechanical shrub treatment	3,506	1,921.4
Mechanical tree removal	3,925	4,861
Mowing, chopping, and Lawson aerator treatments	1,866	2,429.2
Noxious weed control	6,026	53,788.4
Post-management prescription monitoring	249,958	75,307.4
Pre-treatment monitoring	51,759	33,022.7
Prescribed burns	653	854.4
Rangeland Rapid Habitat Assessment	9,494	27,075.5
Riparian habitat protection, enhancement, management	50	10.2
Riparian Rapid Habitat Assessment	1,944	1,082.3
Special Rapid Habitat Assessment	418	3,073.1
Trees or shrubs planted	1,245	3,822.5
Upland excloure developed	56	12.8
Upland grass, forb and food plot seeding	68	283.2
Upland habitat inventories	312,500	80,420.8
Wetland delineations	2.7	14.9

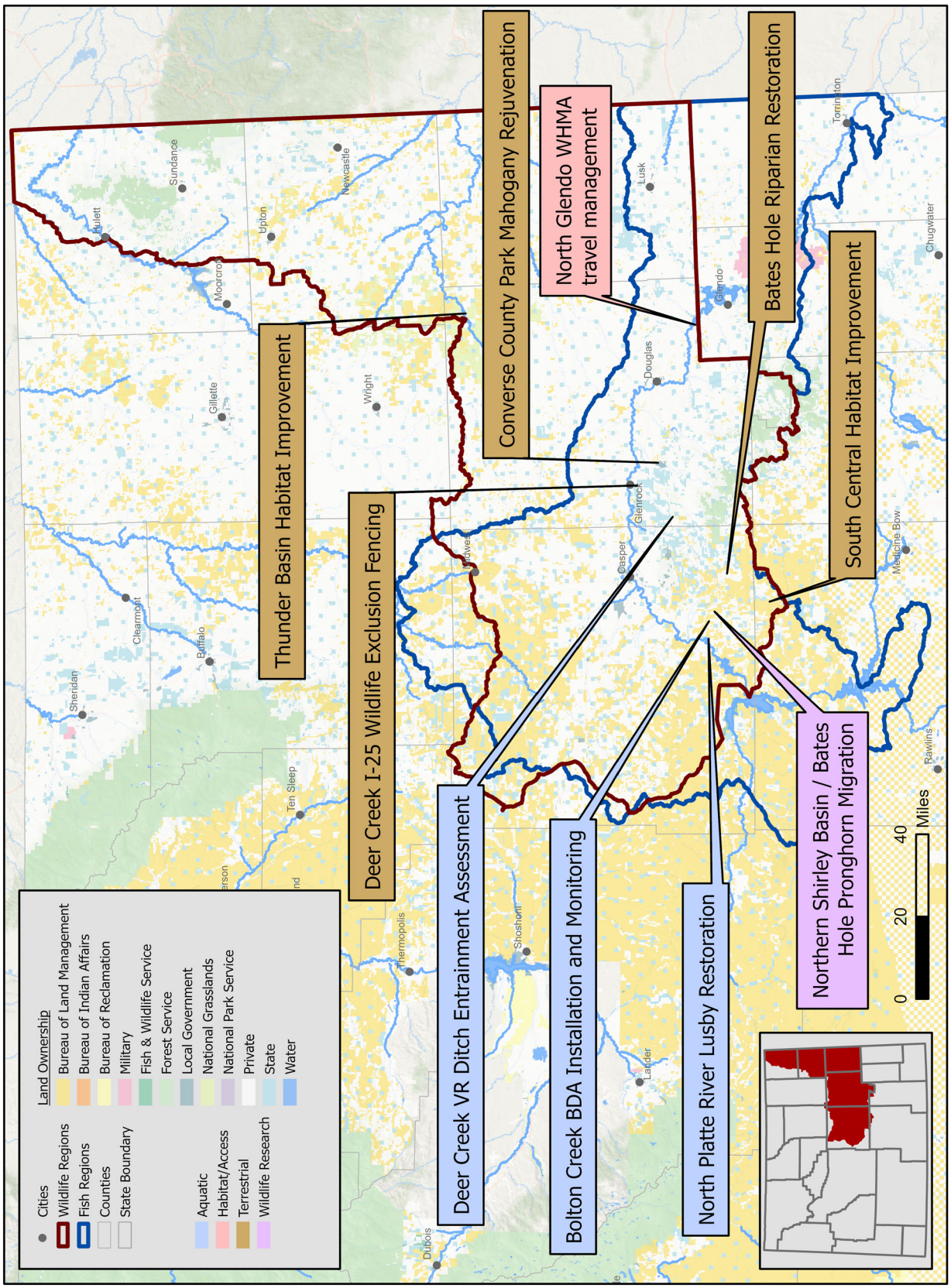
RIPARIAN AND UPLAND ACTIVITY	2023 ACRES	5-YEAR AVERAGE
Wetland development or major renovation	67	189.6
WGFC-managed lands farming contract	950	1,230.2
WGFC-managed lands food plot	220	211.4
WGFC-managed lands forage reserve	0	8,559.2
WGFC-managed lands grazed	29,237	46,788.8
WGFC-managed lands irrigated	1,100	1,779
WGFC-managed lands livestock, forage reserve, meadow rejuvenation grazing administered	38,000	47,788.8
WGFC-managed lands meadow enhancement	230	116.50
WGFC-managed lands meadow mowed/farmed	1,205	1,164
WGFC-managed lands noxious weed control	6,101.4	4,811.1
WGFC-managed lands prescribed burn	100	86.20
WGFC property right monitoring	112,000	76,166.6
TOTAL	**935,750.3**	**685,652.8**

WILDLIFE MIGRATION

In January 2022, the Movement Matters Team (Team) was assembled to better address wildlife and fish migration. The goal of this team is to strengthen the Department's position as a national leader in wildlife movement and work together to benefit fish and wildlife migrations that align with the group's Operational Plan, completed in 2023. The Team includes representatives from all Divisions and works on priorities outlined in their Operational Plan as well as other tasks assigned through WGFD leadership. In 2023, the Team had many noteworthy accomplishments. Members and other regional employees improved our relationship with partners including WYDOT, Wyoming Water Development Office, NRCS, UFSF and counties through focused training events and various collaborations. Research continues to be a priority through support of GPS collar projects, development of several new web-based applications to help prioritize conservation work at the most effective locations and help inform future land use decisions as well as partnering with UW and other researchers to advance the science of migration. Communicating our vision for a combined emphasis on fish passage and wildlife migration was fostered through developing a unifying marketing logo, improving the layout of the new website for all topics related to movement and connectivity as well as increased public education around various topics such as wildlife crossings, fence modifications and other conservation work through our magazine, news releases, videos and social media outlets. Finally, implementation of conservation work was prioritized throughout WGFD and included wildlife crossings, fence modifications, fish passage structures, habitat enhancements and other strategies throughout the state and on all land ownerships. Work has continued on many wildlife crossing projects throughout the state with the completion of the Dry Piney wildlife crossing project, significant progress on the I-25 project near Kaycee and the $24.3 million award WYDOT received for the future work on the project on US-189 south of Kemmerer serving as highlights for large statewide scale projects.

MIGRATION ACTIVITY	NUMBER	5-YEAR AVERAGE
Fish ditch entrainment	8	5.8
Fish movement monitoring	1	4.2
Fish passage barriers inventoried	246	182.6
Fish passage structures installed	4	8.2
Fish passage structures maintained	21	10
Fish passage structures monitored	20	19
Fish passage upstream miles connected	27	64.15
Wildlife crossing assessment	2	3
Wildlife crossing monitoring	25	10.75
Wildlife crossing structure installed and enhanced	17	10.75
Wildlife crossing structure installed or enhanced, over or underpass	9 on 16.7 miles	Not previously tracked
Wildlife crossing structure installed or enhanced, fence only	1 on 2.7 miles	Not previously tracked

CASPER REGION



The Casper Region extends from the plains of the North Platte River along the Laramie Range to the Black Hills, encompassing diverse habitat types. Throughout the region, efforts in terrestrial and aquatic habitat management persistently address various challenges. These include understanding seasonal use and migrations to guide future habitat treatments, tackling landscape permeability issues to minimize wildlife road collisions by adjusting fences to wildlife-friendly specifications, and enhancing wildlife visibility to motorists. Additionally, initiatives involve removing invasive and encroaching species, promoting habitat regeneration, and mitigating erosion. Prior project maintenance remains a priority, alongside the ongoing cultivation of partner relationships to sustain collaborative conservation efforts.

Several projects focused on improving riparian vegetation and reducing sediment inputs to the North Platte River. Continued assessment of "insta-dams" on Bolton Creek installed in 2014 encouraged additional beaver dam analogs (BDAs). In 2021, Game and Fish installed BDAs along Chalk Creek to improve floodplain connectivity and reduce sediment. By 2023, surveys showed a decrease in channel bottom height and an increase in riparian vegetation, supporting the effectiveness of BDAs.

Converse County Park saw a significant rejuvenation effort, specifically targeting True Mountain Mahogany stands to enhance the habitat crucial for mule deer during winter. In a parallel initiative, the Deer Creek I-25 Wildlife Fencing project near Glenrock was completed, aiming to mitigate deer-vehicle collisions by erecting high-fence deer exclusion barriers along a two-mile stretch of the interstate. This endeavor, funded alongside more extensive fence replacements by WYDOT, guides deer toward underpasses, thus enhancing safety for both wildlife and motorists. In the northern Shirley Basin/Bates Hole region, collaring efforts are employed to understand pronghorn migration patterns, crucial for future land-use planning. Notably, fences along Highway 487 were adapted to facilitate pronghorn migrations, focusing on delineating and comprehending their consistent migration routes.

South Central Habitat Improvement projects aim to bolster habitat conditions for various species, including sage-grouse, mule deer, pronghorn, and elk. These efforts encompass a range of strategies from cheatgrass management to riparian restoration, all yielding positive habitat responses.

In 2023, Game and Fish, in the cooperation with Bureau of Reclamation, began managing North Glendo WHMA. They made changes to travel routes for resource protection and public safety. Additionally, WGFC renewed the Dave Johnston Power Plant Public Access Area agreement, ensuring continued public access at no cost.

Overall actions such as juniper removal, riparian and sagebrush planting, fence modifications, and wet meadow restoration are being undertaken with the involvement of multiple funding partners, marking a holistic approach towards habitat enhancement and conservation in the region.

Chalk Creek BDA Monitoring (Goal 2) - John McCoy

Chalk Creek is an incised perennial tributary to Bates Creek with limited riparian vegetation communities and has been identified as a contributor of sediment to the North Platte River. In 2021, WGFD installed ten BDAs along an incised reach on private lands to improve floodplain connectivity, sediment, and increase riparian vegetation. Untreated fenceposts were driven perpendicular to the channel with willows woven throughout. Longitudinal profile, cross section, and green line monitoring surveys were completed post project completion. In 2023, the project reach was resurveyed assessing BDA performance. The distance from channel bottom to the abandoned floodplain terrace (low bank height) decreased by nearly a foot indicating improved floodplain connectivity and sediment attenuation. Greenline riparian transects showed increases in facultative wetland, facultative, and facultative upland species and a decrease in bare ground signaling expansion of riparian and upland communities. These findings support the use of BDAs in Wyoming basin stream habitat to improve aquatic health and function.

Figure 3. Chalk Creek BDA in 2021.

Figure 4. Chalk Creek BDA in 2023.

Bolton Creek BDAs (Goal 2) - John McCoy

In 2014 WGFD, with funding and support from numerous partners, installed 12 "insta-dam" structures in Bolton Creek at the Easter Site along 3,500 feet of severely incised, riparian vegetation limited, and highly erosive channel. The structures consisted of compacted and shredded tree materials placed perpendicular to the stream channel mimicking beaver dams. Goals include improving floodplain connectivity, increasing riparian vegetation, reducing sediment inputs from erosion, and increasing perennial flow. Following a 2016 post-construction inspection, the United States Army Corps of Engineers and WDEQ determined the structures were not built according to permitted BDA specifications (untreated fenceposts driven perpendicularly into the channel with willow materials woven throughout). Due to the newness of this restoration technique and the unique conditions present in Bolton Creek, the structures were permitted to remain in place and to be monitored as experimental. The structures have since been maintained as BDAs. Bolton Creek Easter Site monitoring has been inconsistent due to missing waypoints, benchmarks, and cross-section pins and personnel turnover. Therefore the Casper AHAB conducted a Wyoming Stream Quantification Tool assessment within the Bolton Creek Easter Site and the downstream Bolton Creek Control Site. The assessment generates a category designation of functioning, functioning at risk, and not functioning and a score

in the form of functional feet that indicates habitat quality changes. Measured characteristics included reach runoff, floodplain connectivity, large woody debris, lateral migration, bed form diversity, plan form, and riparian vegetation. Results revealed an overall shift from functioning at risk to functioning with a 79% increase in Easter Site functional feet compared to Control Site functional feet. Habitat characteristics scores that showed improvement between sites include large woody debris (100% improvement), floodplain connectivity (73% improvement), lateral migration (37% improvement), riparian vegetation (34% improvement), and bed form diversity (8% improvement). Reach runoff and plan form scores remained the same. These findings indicate that insta-dam structures can be an effective treatment for severely incised, riparian vegetation limited, and highly erosive streams.

Figure 5. Bolton Creek Easter site.

Converse County Park Mahogany Rejuvenation (Goal 2) - Willow Bish

Converse Mahogany III is a WGFD initiated and led project that has been implemented across private, state and BLM lands in Converse County since 2018. Approximately 1,400 acres have been treated to date. The goal is to rejuvenate decadent True Mountain Mahogany stands. Most of the True Mountain Mahogany habitat in Converse County is classified as Mule Deer Crucial Winter Range and is located in the WGFD Laramie Restoration Area. The South Converse Mule Deer herd uses this area extensively. This herd has experienced a significant decline and shows a high prevalence of chronic wasting disease. While the population has shown slight recovery in recent years, fawn production has been inadequate to increase the population towards objective in this herd. Therefore, high quality habitat which assists with fawn production and recruitment, may help mitigate impacts of this disease on the herd. Elk utilize mahogany stands throughout the year, but use is highest during the winter when shrubs are a higher proportion of elk diets. Bulls are also prevalent in these areas throughout the winter and hunters can often be successful by targeting mahogany stands, especially on late season licenses in Area 7. True mountain mahogany is a re-sprouting shrub. When it experiences a disturbance, such

Figure 6. True Mountain Mahogany treatment.

Figure 7. Re-growth one year post-treatment.

as fire, the root crown remains alive and new shoot growth is initiated. Due to the loss of historic disturbance regimes, such as fire, many of these stands are very decadent. With the inherent costs, risks, and liabilities of conducting a prescribed fire, alternative treatment methodologies are warranted. The use of chemical treatment options, which are much less expensive, were trialed but did not meet the objectives of the project. Mechanical mowing will be used to rejuvenate mahogany stands by stimulating new, palatable and nutritious leader growth. Brush saws operated by hand crews are used due to topography and conditions which limit the use of heavy equipment. This treatment method has been highly successful, with highly predictable results. In 2023, the final 55 acres were cut on County Park. In total, approximately 75% of the mahogany was cut across the 466 acre site. Funding was provided by the Russell Construction Mitigation Fund.

Deer Creek I-25 Wildlife Fencing (Goal 3) - Justin Binfet, Jill Randall, and Willow Bish

WYDOT District 2 engineers contacted WGFD about the potential for mitigation of a high number of deer-vehicle collisions where Deer Creek crosses under I-25 near Glenrock. Both agencies met with adjacent landowners in 2022 to develop plans for a high-fence deer exclusion from Mormon Canyon Road to the Exit 165 west of Deer Creek. This high-fence will help keep deer off of the Interstate and instead funnel them underneath through an existing underpass and bridges over Deer Creek itself, which should significantly reduce deer-vehicle collisions. The 2-mile high-fence construction project was completed and funded concurrent with a larger fence replacement effort from WYDOT along I-25 in 2023.

Figure 8. Wildlife-proof fence constructed along I-25 to reduce wildlife-vehicle collisions.

North Platte River Lusby Restoration (Goal 2) - John McCoy

The North Platte River from Grey Reef Reservoir to Robertson Road Bridge is a world renowned blue ribbon trout fishery. Despite its recognition, the reach sees large swings in trout recruitment due to inconsistent spawning flows and high sediment loads. While the Bureau of Reclamation provides gravel cleaning spring flushing flows, for the most part downstream water rights dictate discharge. Therefore spawning habitat improvement must be realized through fine sediment reduction. To identify areas of restoration need a North Platte River Restoration Area Priority Hierarchy was created generating a score from BANCS assessment data, eroding bank length, eroding bank height, proximity to spawning areas, and landownership. The North Platte River Lusby Restoration site is located within the Lusby PAA and was identified as paramount for restoration need in the hierarchy (1st and 3rd highest ranking areas). WGFD previously stabilized 630' of eroding bank on the downstream end of the PAA. Site challenges include a 1,200' long 40' high eroding bank, a 600' long 100' high eroding bank, and a dynamic sediment laden tributary delta. The site also hosts side channel spawning and rearing habitat exhibiting potential for enhancement. In 2023, the Casper AHAB collected riffle and glide cross sections, bed form feature length, max pool depth, and pebble count data to inform restoration designs. Results were typical of a regulated river with clear-water discharge indicating an over-widened, sediment starved F channel type. Restoration designs will be developed to sta-

bilize eroding banks, decrease channel widths, reroute the tributary mouth, and enhance side channel spawning and rearing habitats while promoting channel stability.

Figure 9. North Platte River Lusby eroding bank.

Mountain Lion Predation and CWD in Mule Deer (Goal 3) - Justin Binfet

The overarching objective of this project is to examine mountain lion predation and CWD dynamics within the Bates Hole / Hat Six Mule Deer Herd Unit (Casper Region's Mule Deer Initiative herd unit). CWD prevalence has been steadily increasing in this mule deer herd, hovering around 29% in adult bucks over the past five years. Potential management strategies to combat CWD such as deer density reductions and increased male harvest can be controversial, so managers wanted to better understand the influence of natural predation on CWD. Selective removal of CWD-positive animals may be one of the most promising strategies to reduce density dependent CWD transmission and environmental contamination. While past research projects suggest mountain lions may selectively prey on CWD-positive animals due to increased vulnerability, this has never been empirically measured in a formal research project. In addition, managers need to better understand the dynamics of mountain lion predation in a mule deer population with high CWD prevalence. In such a system, is lion predation an additive or compensatory source of mortality for mule deer, or is it potentially mitigating in terms of CWD transmission via the removal of CWD-positive animals? This research aims to answer this question while collecting valuable information with respect to mountain lion diet selection, mountain lion and mule deer movements,

Figure 10. Collared mountain lion.

mule deer survival and cause-specific mortality, and CWD dynamics. To date, we have collared 68 adult mule deer, located 110 newborn fawns from collared mothers (and collared the vast majority of those), and collared 26 individual lions. The mountain lion portion of field work is now concluded, with data analysis and publications pending. Mule deer collars will remain online until March of 2025. Following collar drop off, additional data analysis will be forthcoming. Better understanding of mule deer movements and seasonal habitat selection will also inform future habitat treatment priorities for this herd.

Northern Shirley Basin / Bates Hole Pronghorn Migration (Goal 3) - Justin Binfet

Within the northern Shirley Basin / Bates Hole portion of the Medicine Bow Pronghorn Herd Unit, WGFD partnered with UW and Dr. Matt Kauffman to study pronghorn movements in central Wyoming. As part of a larger six-year study to evaluate potential effects of wind energy on pronghorn, 40 does were collared in northern Shirley Basin / Bates Hole in March of 2020, with additional collars being deployed in 2021 and 2022 to augment mortalities, bringing the total to 58 adult females collared in this portion of the herd. Collaring these individuals specifically works towards the objective of understanding seasonal movements between summer range in Shirley Basin and winter range in Bates Hole, and will help inform future land-use planning and conservation efforts (i.e., fence modification, migration corridor risk assessment, and habitat projects). Bates Hole has long been known to receive a very large influx of wintering pronghorn that migrate out of Shirley Basin, with some of the highest winter densities of pronghorn known in this part of the state. WGFD therefore wanted to better understand whether any consistent migration routes exist, especially given the potential for wind and solar energy expansion in this area. Of note, WGFD recently partnered with WYDOT and local landowners to convert most of the fence along Highway 487 from woven wire to barbed wire to facilitate these movements.

Figure 11. Antelope on the move.

South Central Habitat Improvement (Goal 2) - Willow Bish

This effort is a WGFD-led plan to improve habitat at a landscape scale. These projects build upon decades of work by the WGFD and partners and compliment on-going efforts within and adjacent to this landscape. We will improve habitat for sage-grouse, mule deer, pronghorn, and elk in southern Natrona County and northern Carbon County through the implementation of sagebrush habitat treatments, conifer removal, invasive annual grass treatments, restoration, protection, and maintenance of riparian, mesic, and green area habitats, fence modification to improve landscape permeability and marking fence to reduce sage-grouse mortalities. In 2023, 315,000 acres were aerially surveyed and mapped for cheatgrass. We also treated 5,600 acres of cheatgrass and mowed 305 acres of mountain big sagebrush. The potential for cheatgrass expansion in the central portion of the Natrona Core Area will be reduced by treating cheatgrass sources. The majority of the cheatgrass management area is largely intact, native habitat. Removing sources from roadways, disturbances, and other areas will assist in safeguarding the integrity of the existing diversity and quality of habitat. The sagebrush communities which were treated have

Figure 12. Helicopter cheatgrass treatment.

canopy cover exceeding 40%, which limits understory productivity of other beneficial plant species such as forbs. These sites were historically linked to smaller, more frequent fire regimes which no longer occur due to fire suppression efforts. Mowing is a low risk, relatively low disturbance method of mimicking historical natural disturbances in these communities. Approximately 1,200 acres of sagebrush habitat with very dense cover have been identified. Mowing is occurring selectively within these areas to achieve a 500 acre mosiac. This will leave ample sagebrush for wildlife cover, forage, and to catch and hold snow. Other sagebrush treatments within this area have responded positively. Herbaceous diversity and productivity is high in previously treated sites and new sagebrush plants are healthy with good leader growth and form. Many past treatments have recently been proposed to be removed from the disturbance database as they have recovered to a minimum of 5% sagebrush cover. Lastly, in 2023, a consultant was hired to develop designs for Lone Tree Creek riparian restoration, which is a component of the project that is jointly led with Aquatic Habitat Biologist John McCoy and the Natrona County Conservation District. Funding partners included the Sage Grouse Local Working Group, WGFD MDI, and Rocky Mountain Power Mitigation.

Thunder Basin Ecoregion Habitat Enhancement (Goal 2) - Willow Bish

This is a collaborative project involving the Thunder Basin Grasslands Prairie Ecosystem Association, WGFD, and the Thunder Basin Grazing Association among others. Habitat needs for greater sage-grouse, mule deer, pronghorn and other associated species will be addressed by removing encroaching juniper, modifying fences to wildlife friendly specifications, enhancing green areas in ephemeral and upland habitats, and developing and implementing livestock grazing management plans. Thus far in this phase, approximately 500 acres of juniper have been removed, 800 riparian trees and shrubs were planted, 35,000 sagebrush plants were planted, 2 water wells have been completed, 2 windmills have been converted to solar, 1 cattle herd is being managed with virtual fencing, 1.5 miles of fence were removed, 12.5 miles of fence were modified to wildlife-friendly specifications, and 3.5 miles were marked for sage-grouse. Plans were also finalized for wet meadow restoration which will be completed in 2024. Funding partners include NFWF, SGLWG, WWNRT, WGFD, Thunder Basin Grazing Association, Peabody Powder River Mining, and Thunder Basin Coal Company.

Figure 13. Project partners and consultant evaluating potential Zeedyk sites.

Deer Creek VR Ditch Entrainment Assessment (Goal 2) - John McCoy

The VR Ditch diversion is located at the end of a long deep pool within the Deer Creek PAA. This diversion has long been thought a source of trout entrainment. In 2022, Deer Creek Section 2 (approximately 500 feet downstream) qualified as a blue ribbon fishery with 627 pounds of trout per mile. That same year, 350 feet of ditch was surveyed for entrainment using backpack electrofishing equipment. The survey turned a total of 62 brown trout and 7 rainbow trout, prompting further investigation. In 2023, the Casper AHAB conducted a follow up survey by setting an entrainment net across the ditch 100 yards downstream of the diversion for approximately 34 hours per week for the duration of the irrigation season (May 23rd through July 18th). A total of 10 brown trout were captured during 328 sample hours, which equates to roughly 41 brown trout throughout the irriga-

tion season. While trout entrainment was relatively low, the 2023 runoff season was an anomaly. Deer Creek with an average daily stream flow of 55 cfs saw discharge exceeding 3,000 cfs at the beginning of irrigation season, damaging diversion infrastructure, and postponing water use about 20 days. Further investigations will be completed to better understand entrainment.

Figure 14. VR Ditch entrainment study site.

North Glendo WHMA Travel Management (Goal 1) - Brian Parker and Matthew Pollock

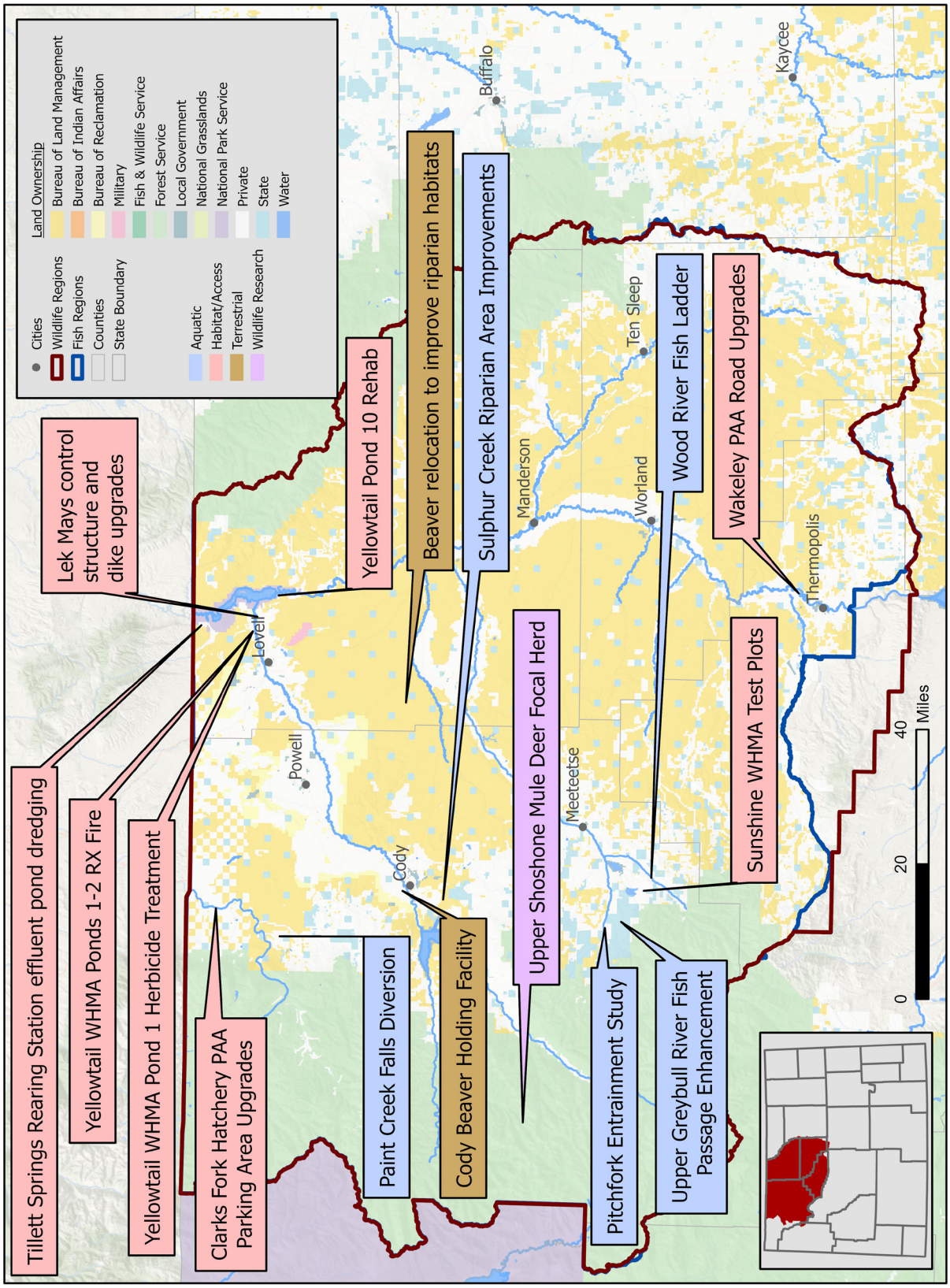
The WGFD, in cooperation with BOR, assumed management authority of North Glendo WHMA in 2023. We instituted changes to the travel management through the closure of several roads, installation of gates, and maintenance of the existing post and cable auto barriers to reduce and prevent resource damage, and to increase public safety.

Figure 15. Installation of cattle guard base.

Dave Johnston Power Plant Public Access Area Renewal (Goal 1) - Lands Administration Branch

The Dave Johnston Power Plant PAA is located on the North Platte River just east of Glenrock, on property owned by PacifiCorp. The easement includes an access road from US Highway 20/26 to a parking area and comfort station along the North Platte River. The area was originally acquired through an easement in 2003, which expired in 2023. The WGFC approved the renewal of the agreement for an additional 10 year period with another 10 year renewal option, at the July 2023 commission meeting. This public access area has been available to the public at no cost to the WGFC since 2003.

CODY REGION


Land Ownership
Bureau of Land Management
Bureau of Indian Affairs
Bureau of Reclamation
Military
Fish & Wildlife Service
Forest Service
Local Government
National Grasslands
National Park Service
Private
State
Water
Cities
Wildlife Regions
Fish Regions
Counties
State Boundary
Aquatic Habitat/Access
Terrestrial Wildlife Research
Tillett Springs Rearing Station effluent pond dredging
Lek Mays control structure and dike upgrades
Yellowtail WHMA Ponds 1-2 RX Fire
Yellowtail WHMA Pond 1 Herbicide Treatment
Clarks Fork Hatchery PAA Parking Area Upgrades
Paint Creek Falls Diversion
Cody Beaver Holding Facility
Yellowtail Pond 10 Rehab
Beaver relocation to improve riparian habitats
Sulphur Creek Riparian Area Improvements
Upper Shoshone Mule Deer Focal Herd
Pitchfork Entrainment Study
Upper Greybull River Fish Passage Enhancement
Wood River Fish Ladder
Sunshine WHMA Test Plots
Wakeley PAA Road Upgrades
Lovell
Powell
Cody
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Manderson
Worland
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Buffalo
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Kaycee
0
20
40
Miles

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

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

In 2023, habitat enhancement efforts within the region focused on fish passage and enhancing riparian areas in the Big Horn Basin through translocation of beavers. Most notably, construction of a beaver holding facility at the Cody Regional office was completed, dramatically increasing the region's capacity for trapping and holding beavers and aiding in a long-term effort to improve riparian and stream habitat using beavers. The beaver holding facility was constructed using donated funds.

Efforts related to fish passage focused on gathering data to assess need, planning and designing structures, or evaluating the effectiveness of projects that prevent entrainment of fish or facilitate fish passage. In 2023, fish passage work occurred primarily in the Greybull River Drainage to enhance connectivity for Yellowstone cutthroat trout. Game and Fish is working collaboratively with the Pitchfork Ranch and multiple partners and is in the design and fundraising phase to remove passage barriers and screen diversions to prevent the loss of fish into irrigation diversions in this drainage.

Game and Fish manages five wildlife habitat management areas (WHMAs) within the Big Horn Basin that provide crucial habitat for wildlife and 49 public access areas. Improvements and maintenance to infrastructure and habitats on these areas and other Commission owned lands continues to be a strong focus. Overall, 2,000 acres of noxious weeds were treated on WHMAs in the Bighorn Basin, 70 miles of fence were maintained to reduce trespass livestock and 45 miles of fence were maintained on WHMAs by the lessee.

One of the most notable projects is the rehabilitation of Pond 10 on Yellowtail WHMA near Lovell. This work was completed through the donation of labor and use of equipment by David Rael of Cowley, owner of S and L Industrial. The pond was cleared of sediment and breaches in the dike were repaired to benefit habitat for waterfowl and increase hunting opportunity.

Wood River Fish Ladder (Goal 3) - Nick Scribner and Erin Leonetti

The Wood River Supply Diversion to Lower Sunshine Reservoir is located on the Wood River west of Meeteetse in Park County. The diversion is approximately 14 miles upstream of the Greybull River confluence and diverts irrigation water for storage in Lower Sunshine Reservoir. A fish ladder on the dam was completed in December 2021. Fish Passage personnel monitored upstream passage during 2022 and 2023 to evaluate fish movement through the Wood River fish ladder. Biologists captured fish in 2022 from May through July using backpack electrofishing. Fish were measured, weighed and had a PIT tag inserted into their body cavity with a unique identification number. A total of 476 fish were tagged; 431 Yellowstone cutthroat trout, 39 Mountain whitefish and six Mountain sucker. Two antenna stations were established at the entrance (Antenna 1) and exit (Antenna 2) to record fish movement and direction through the ladder. During 2022, fish ranging from 6 to 21 inches long moved through the ladder and there was a 74% success rate of upstream passage. Not only were Yellowstone cutthroat trout moving through the fish ladder, but one Mountain sucker also successfully moved upstream. The following 2023 season there were less fish detected on the antennas, since we did not tag new fish and were dependent on tagged fish from 2022. However, there were 21 tags total detected on the antennas. Antenna 1 had

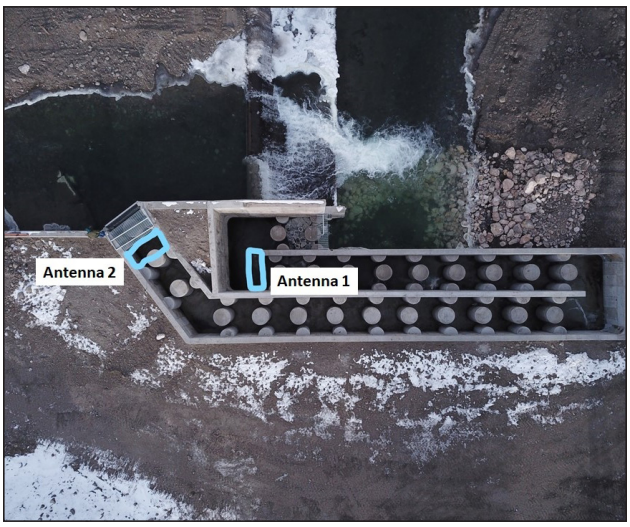


Figure 16. The wood river fish ladder showing antenna locations at the entrance and exit.

16 detections and Antenna 2 had 15 detections and of the 21 tags, 12 of the tags were new fish swimming through the ladder. Overall, there was a 93% success rate of detected fish moving upstream through the ladder. In 2023, most fish movement occurred during May and June which is similar to 2022 and represents spawning movements. Providing upstream passage past the Wood River Supply Diversion gives fish more than 50 miles of habitat to occupy.

Beaver Translocation for Stream and Riparian Restoration (Goal 2) - Jerry Altermatt and Sam Stephens

Between August 23 and October 25, 2023, a total of 14 beavers were trapped and relocated within the Cody Region. Beavers were trapped using Hancock and Comstock traps by WGFD personnel from seven different locations where they were causing problems on private or WGFD-managed lands. Beavers were relocated to Muddy Creek, Buck (Clarks Fork), Porcupine Creek, Buffalo Creek (Nowood River) and Enos Creek for the purpose of stream/riparian restoration. Beavers were held in trailer-mounted holding facilities until the time of release or were transported and released the same day as capture. The last beaver family captured was held in the newly completed beaver holding facility. Most beavers were weighed to determine an approximate age.

Muddy Creek: On September 14, two adults were released into Muddy Creek, tributary of the Clarks Fork of the Yellowstone. The Shoshone National Forest mule pack string packed the beavers into the release site. A couple of new dams were observed near the release site in late October. This was the second translocation in Muddy Creek. Three beavers released in 2021 built a dam and successfully wintered, but moved from the area after record flooding washed out the dam.

Porcupine Creek: On September 14 and September

25, 2 adults and one yearling were released at two locations in Porcupine Creek on Bighorn National Forest. One new dam was discovered in September that is assumed to have been built by one of two families released in 2022.

Buffalo Creek: On October 9, a family of 2 adults and two kits were released in Buffalo Creek on the Renner Wildlife Habitat Management Area. Two dams were discovered in November.

Enos Creek: On October 10 and October 13, a family of 1 adult and 2 kits and another unrelated adult were released in Enos Creek on private lands. This release site was within an area where 48 beaver dam analogs were constructed one week earlier. No dams were found as of November 15, 2023.

Figure 17. Beaver released into Muddy Creek.

Cody Beaver Holding Facility (Goal 2) - Jerry Altermatt, Brad Sorensen, and Craig Swanson

A permanent beaver holding facility was constructed at the new Cody Region Office property by Terrestrial Habitat and Habitat and Access personnel. The 800 square foot multi-family holding facility will provide for the short-term needs of beavers awaiting translocation. The facility was designed with four primary considerations: a) efficiency of handling the beavers with a minimum amount of stress to the animals, b) well-being of the beavers while they are being held, c) ease of maintenance and cleaning and d) ability to pair potential mates. The facility contains four individually fenced units consisting of a concrete raceway, feeding area and den. Water is delivered from an irrigation ditch on the property and levels in each raceway are maintained using stop logs. The facility's location in Cody places it in a logistically ideal location, as it is centrally located in an area of consistently occurring nuisance beaver problems. The facility will not only serve the beaver translocation needs for the WGFD Cody Region but will also provide a source of beavers for adjacent regions as well. This is a pilot project to demonstrate the efficacy of this approach with the long-term goal of establishing other facilities in strategic locations in the state. Previous to the construction of the facility, WGFD personnel used a trailer-mounted mobile facility which only allowed for one family to be trapped and held at a time. The facility will greatly expand the beaver translocation program by allowing four sites to be trapped at once. An added benefit is that there is room in the facility to "match-make" individual beavers of opposite sex and release them as pairs, which have a much higher success rate at release sites. The facility was completed in time to be used to house the last family of beavers translocated in the fall. Construction of the facility was made possible by a generous private donor.

Figure 18. First occupant of the beaver holding facility.

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

Approximately 2,000 acres of invasive plants are treated annually by Cody Region Habitat and Access Personnel and local Weed and Pest Districts on the five WHMAs within the Cody Region. These invasive are treated using chemical, mechanical, and biological methods to stress the plants. Controlling these noxious plants will enhance habitat while allowing native plants to thrive.

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

The Cody region has 49 PAAs. These PAAs serve as critical recreational areas for the general public and sportsmen alike. These areas are used for hunting and fishing access. Yearly maintenance and upgrades are necessary to preserve these habitats and access. Yearly upgrades in 2023 included treating noxious weeds, adding gravel and blading roads, installing new cattle guards, replacing dilapidated fences, and replacing signs.

Upper Greybull River Fish Passage Enhancement (Goal 3) - Laura Burckhardt

The Greybull River drainage supports the second largest genetically pure Yellowstone Cutthroat Trout population in Wyoming and is home to the largest population in the Bighorn/Wind River Basin. Enhancing connectivity in the Greybull River drainage is a priority for the WGFD, Meeteetse Conservation District, Greybull Valley Irrigation District, TU, USFS, WWNRT, and private landowners. The Pitchfork Ranch has partnered with the WGFD to restore upstream passage and prevent the loss of fish into irrigation ditches across the Ranch. The Pitchfork Ranch contains four tributaries to the Greybull River that together contain over 46 miles of high quality spawning, rearing, and overwintering habitat for native fish. However, for many decades, five active diversions, four abandoned diversions, and thirteen road crossings in the drainage have impeded upstream passage and entrained thousands of fish each year. WGFD and partners are in the design and fundraising phase to remove passage barriers and to screen diversions to prevent the loss of fish into irrigation diversions. When implemented, this project will restore upstream passage to over 46 miles of critical habitats within a large and key watershed for native fish.

Figure 19. Timber Creek.

Screening of the diversions will restore downstream passage to over 21 miles of habitat and prevent the loss of up to 60,000 Yellowstone Cutthroat Trout per year. These conservation efforts will yield a great deal of resilience to Yellowstone Cutthroat Trout populations in the face of natural and manmade disturbances such as drought, climate change, floods and wildfire.

Cody Region WHMA Grazing Treatments (Goal 1) - Brad Sorensen

The Cody region has grazing agreements on three WHMAs: Renner, Sunlight, and Sunshine WHMAs were grazed with cattle in the spring and summer months. Cattle were grazed in a rotational pattern to reduce litter and stimulate new growth. Stocking rates on Renner were 383 AUMs, Sunlight 600 AUMs, and Sunshine 1,035 AUMs. In exchange for grazing the permittees complete area improvement projects that include fencing, water developments and noxious weed control.

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

Annual maintenance and improvements continued on the five WHMAs in the Cody Region in 2023. The Sunlight, Yellowtail, and Medicine Lodge WHMAs received annual fence maintenance on a total of 70 miles to reduce trespass livestock. The Sunshine and Renner WHMAs received annual fence maintenance on a total of 45 miles of stock fence by lessee. 1,486 acres of irrigation water rights were spread on the Yellowtail, Renner, Medicine Lodge, and Sunlight WHMAs. Annual parking lot and road maintenance was performed. Over 57,000 acres of WGFC managed property rights were monitored.

Clarks Fork Hatchery PAA Parking Area Upgrades (Goal 1) - Brad Sorensen, Craig Swanson, and Eric Shorma

Approximately 350 linear feet of steel pole top fence was installed to delineate the parking area and deter off-roading issues at Clarks Fork Hatchery PAA. Over the years the public has created new roads and caused resource damage to private lands. This new fence will prevent that from continuing.

Figure 20. Clarks Fork Hatchery PAA parking area.

Lek Mays Control Structure and Dike Upgrades (Goals 1 and 2) - Brad Sorensen, Eric Shorma, Kade Clark, and Mac Foos

A new control structure was installed to regulate the water levels within the 65 acre Lek Yellowtail Mays wetland complex. This will allow managers better control of water levels to improve habitat for migrating waterfowl, upland birds, other wildlife, and general maintenance. A dilapidated structure was also removed and several dike maintenance issues were addressed to facilitate access for maintenance.

Paint Creek Falls Diversion (Goal 3) - Erin Leonetti

Paint Creek Falls Diversion is located on Paint Creek, a tributary to the lower Clarks Fork of the Yellowstone River north of Cody. The lower Clarks Fork and Paint Creek support a wild Brown trout fishery along with Rainbow Trout, Yellowstone Cutthroat Trout, Mountain Sucker, and Longnose Sucker. This irrigation diversion is located between two undersized road culverts that will be replaced by the Park County Road and Bridge Department in fall 2024 to allow upstream fish passage. Paint Creek Falls Diversion was identified in 2017 as a partial salmonid passage barrier and now that the culverts are being replaced to allow passage it's important that there is also passage between the culverts. The diversion spans the full channel as a concrete structure that is 15 ft wide, 17 ft long with a 12 ft long 18% ramp with concrete baffles. There are 9 baffles in five rows with 2-4" water depths between the baffles. To evaluate fish passage over the diversion, we used PIT tags and two stationary antennas along with weekly flow measurements. Antennas were placed on the structure at the downstream and upstream ends. Fish were captured via electrofishing and then measured, weighed and a PIT tag inserted into the body cavity with a unique identification number. A total of 131 fish were tagged: 127 Brown trout, one Mountain Sucker and three Longnose Sucker. Flows of 3-12

cfs were measured weekly from August to October near the top of the ramp at the first row of baffles. Fish ranging from 6 to 12 inches successfully moved upstream and past the diversion and a small amount (11%) did not pass the diversion. Overall, 55% of fish successfully passed between August and October. Modifications to the diversion are not needed at this time.

Figure 21. Paint Creek Falls diversion on Paint Creek.

Pitchfork Entrainment Studies (Goal 3) - Erin Leonetti and Laura Burckhardt

The Pitchfork Ranch is located west of Meeteetse in the Greybull River drainage, a stronghold for Yellowstone Cutthroat Trout. The Ranch has many irrigation diversions that are known to entrain fish during the irrigation season (April-October). Previous entrainment sampling efforts within the drainage and on the Ranch occurred in 2010, 2020 and 2022. Additional studies were completed in 2023 on four ditches including Ashworth No. 1(Rose Creek), Rock Creek Ditch (Pickett Creek), Jevon's Ditch (Greybull River) and the Dumpling Diversion Ditch (Timber Creek). Trap nets with 3/16 in. netting were used at all sites and were set in May. All nets were set once a week for 24 hours from May until October. The nets are checked frequently to keep clean for irrigation water and minimize the loss of fish trapped in the net. Overall in 2023, a combined total of 2,000 sampling hours occurred with an estimated total fish loss of 1,450 into the ditches. The primary species and size captured were Yellowstone Cutthroat Trout fry and they were captured in all ditches. The Dumpling Diversion and Rock Creek had the highest estimated entrainment of 600 and 520 fish, respectfully. In 2022, Rock Creek entrainment was estimated at 2,000 fish lost to the irrigation ditch. The Ranch is cooperatively working with the Department to conserve Yellowstone Cutthroat Trout populations within the Greybull River drainage by installing fish screens on five irrigation diversions. We are working towards final designs with plans to construct in 2025 and 2026.

Figure 22. Entrainment net set in a Pitchfork Ranch irrigation ditch.

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

Yellowtail WHMA is an important stop-over point for waterfowl during spring and fall migration. Cattails have inhibited open water habitats on the Yellowtail ponds. Increasing open water will provide important loafing areas for migrating waterfowl. Prescribed fire burned cattails to increase open water for the benefit of migrating waterfowl. Prescribed fire was used on approximately 50 acres

to increase site wetland plant species diversity and open water areas by reducing existing cattails and allowing opportunities for more desirable marsh and grass species to become established.

Sulphur Creek Riparian Area Improvements (Goal 2) - Laura Burckhardt

To restore this reach of Sulphur Creek to its floodplain and enhance riparian vegetation, a phased approach has been taken that includes installation of BDAs, gated exclosure fencing, and woody riparian plantings. In 2022, BDAs and exclosure fencing were installed to wet the riparian area and foster regrowth of woody vegetation. In conjunction with the BDA construction, a riparian protective exclosure was installed with 5,500 linear feet of fencing around 0.5-miles of Sulphur Creek to exclude cattle from grazing within the riparian area. In 2023, woody vegetation was planted within the 0.5 acres of reconnected riparian and around the BDAs. A total of 575 containerized plants, 2,700 willow stakes, and 25 cottonwood stakes were planted. These plantings were made possible through funding from WWNRT, WGFD, and BLM along with a community volunteer day hosted by the East Yellowstone Chapter of TU. This restoration is key for providing important habitat for mule deer, antelope, sage-grouse, and various avian species. The restoration will also help to eliminate bank erosion, resulting in a sediment load reduction to the Lower Shoshone River, an important blue ribbon trout fishery that is currently limited by sedimentation of spawning gravels. Funding partners include the BLM and WWNRT.

Figure 23. Planted cottonwoods with browse protection.

Sunshine WHMA Test Plots (Goal 1) - Brad Sorensen and Craig Swanson

Approximately 30 acres were planted as test plots on Sunshine WHMA. Fifteen of these acres were chemically treated and the other 15 acres were interseeded. Six, 5-acre test plots were seeded in areas where crested wheatgrass and multiple brome species were present. Plots were seeded with Ladak Alfalfa, Survivor Plus Alfalfa, falcata yellow blossom, cicer milkvetch, small burnet, meadow fescue, orchardgrass, and timothy. The purpose of these plots is to entice elk off the neighboring private lands and to test the grazing response and drought resistance with a future plan of planting all the irrigated meadows with the proper and most productive seed mix.

Figure 24. Elk bulls on the Sunshine WHMA test plot.

Tillett Springs Rearing Station Effluent Pond Dredging (Goal 2) - Kade Clark, Mac Foos, Todd Grosskopf, Darby Schock, and Daniel McGillivray

In 2023, the Habitat and Access Statewide crew, in cooperation with the Tillett Springs Rearing Station personnel, and local landowners, removed roughly 36,000 tons of sediment from the Tillett Springs Rearing Station Effluent pond. The dredging of the pond reduced the sediment flowing downstream into Bighorn reservoir, as well as improved aquatic, and wetland habitats in and around the impoundment. The effluent pond had not been cleaned since the hatchery was first operational.

Figure 25. Tillett Springs rearing station post-completion.

Upper Shoshone Mule Deer Focal Herd (Goal 3) - Corey Class, Tony Mong

A total of 210 deer were collared in December 2022, and will be maintained for 5 years as part of the focal deer research program. Collared animals include 100 fawns, 80 adult does, and 30 adult bucks. Adult collaring will be continued to maintain sample sizes, and each year 100 new fawns will be collared. At the end of the initial year we had 18 bucks remaining (18/30=60% survival), 63 does (63/80=79% survival), and 58 fawns (58/100=58% survival). Fawn survival for this focal herd is over a longer period than other herds because collars stay on longer for retrieval purposes.

Wakeley PAA Road Upgrades (Goal 1) - Brad Sorensen, Craig Swanson, and Eric Shorma

Gravel was hauled in to improve approximately one mile of road at Wakeley PAA, located on the Big Horn River outside of Thermopolis. After the gravel was spread, the road was graded to improve access for sportsmen to the Wakeley PAA. This area receives a lot of use and the road had deteriorated beyond normal maintenance.

Yellowtail Pond 10 Rehab (Goal 2) - Brad Sorensen and Eric Shorma

A dilapidated pond was rehabbed to allow water to pass and fill two separate ponds. This pond had silted in recently. Agri-drains were installed and approximately 1,000 cubic yards of sediment was removed. The finishing touches were put on pond 10 in 2023 at the Yellowtail WHMA. Water was diverted to fill the pond as well as Pond 7, and 6.5. The sediment was hauled off and breaches in the dikes were repaired. These ponds provide habitat for waterfowl.

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

A farming lease is utilized to provide food plots and permanent cover for wildlife on 1,200 acres within the Yellowtail WHMA. Lesees are responsible for planting cereal grains and alfalfa as well as irrigation, farming, seeding, and harvesting of the crops of these fields. 10% of each field is left standing for wildlife to utilize into the fall and winter months.

Yellowtail WHMA Food Plots (Goals 1 and 2) - Brad Sorensen and Eric Shorma

The Yellowtail WHMA has approximately 137 acres of fields that are farmed and irrigated for permanent cover. In 2023, grass, oats, milo, and millet were planted. These food plots benefit waterfowl, pheasants, wild turkeys, and deer by providing cover and a food source. These fields also provide hunting and wildlife viewing opportunities for the large number of recreationalists that utilize the WHMA.

Figure 26. 2023 farm field.

Yellowtail WHMA Irrigation and Canal Maintenance (Goal 1) - Brad Sorensen, Eric Shorma, and Mac Foos

Over 14 miles of irrigation canals were cleaned of sediment deposits and debris on Yellowtail WHMA. The Big Fork Canal supplies water to over 600 irrigated acres and 8 wetland complexes. These irrigated acres provide food plots for forage and dense nesting cover for migrating waterfowl, upland game birds, and big game.

Yellowtail WHMA Pond 1 Herbicide Treatment (Goals 1 and 2) - Brad Sorensen and Eric Shorma

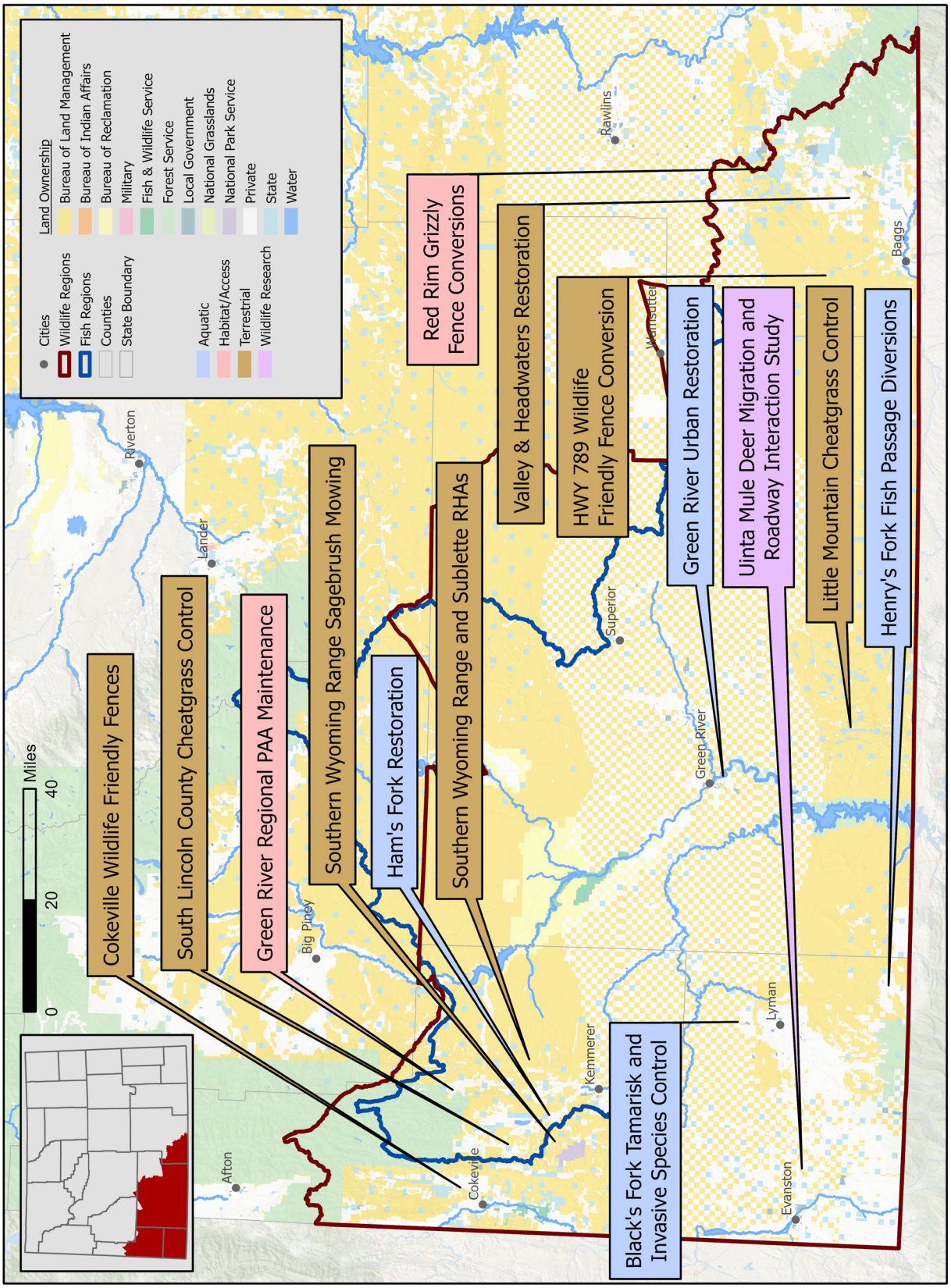
On Yellowtail WHMA, pond 1 was treated to remove cattails. Approximately 19 acres of narrowleaf cattails (Typha angustifolia) were treated with herbicide following a prescribed burn treatment. A drone was used to apply Imitator Aquatic, an aquatic listed Glyphoste, in an effort to decrease the percent cover of invasive cattail and increase open water. This will continue to be monitored to see if it is successful and if WGFD will continue treating into the future.

Figure 27. Pond 1 cattail spraying.

Yellowtail WHMA Russian Olive / Tamarisk Treatment (Goal 2) - Brad Sorensen and Eric Shorma

In 2023, approximately 430 acres of the Shoshone River riparian area were treated with element herbicide via backpack sprayers. This was done to reduce or eliminate Russian olive and tamarisk re-sprouts and seedlings. Reducing these invasive plants will allow native grasses to establish in the riparian corridor and provide better habitat for wildlife on Yellowtail WHMA. Removal also allows the cottonwood gallery along the river to thrive without competition from Russian olive.

GREEN RIVER REGION



The Green River region spans southwest Wyoming from Evanston north to Cokeville and east to Baggs. Regional habitat projects involved collaboration with local, state and federal partners, volunteers and NGO groups and included:

- Terrestrial invasive species treatment for tamarisk and cheatgrass
- Sagebrush mowing
- Fish passage diversions
- Green River urban restoration
- Habitat assessments
- Wildlife crossings work
- Fence modifications

Funds allocated from the "Valleys and Headwaters" Joint Chiefs conservation program received funding over three years to implement vegetation treatments around Baggs, WY. Phase I was completed in 2022, and Phase II in 2023 focused on improving habitat conditions for various wildlife species. Phase III, starting in 2024, will focus on removing juniper and enhancing aspen stands as well as large-scale wildlife-friendly fence conversions, which are crucial to decreasing barriers in high-use mule deer areas. Fence modification projects aimed at improving the passage of multiple big game species continue to be a priority across the region and statewide.

The Black's Fork Tamarisk and Invasive Species Control project targeted tamarisk and other invasives to preserve riparian habitat. Cheatgrass control was conducted in Sweetwater and Lincoln counties to reduce the threat to native ecosystems. Trout Unlimited worked with the department to implement erosion control on the Green River near Scott's Bottom in the city of Green River. The project resloped and stabilized the riverbank, deepened and narrowed the river channel underneath the bridge and reseeded the area with native vegetation.

The South Kemmerer US-189 Wildlife Crossing Project aims to reduce wildlife-vehicle collisions by constructing wildlife crossings. This project is fully funded and will take 2-3 construction seasons to complete. The Uinta Mule Deer Migration and Roadway Interaction Study collected data to aid in reducing wildlife-vehicle collisions along I-80. GPS collar data has been crucial in assisting wildlife managers with the prioritization of roadway crossing and fence modification projects.

Baggs Mule Deer Valleys and Headwater Restoration (Goal 2) - Kevin Spence and Britt Burdett

In 2022, the USFS and NRCS were awarded approximately $8.4 million for the Valleys and Headwaters - Joint Chiefs conservation program. The awarded funds are spread over three years, with NRCS receiving approximately $1.5 million each year for EQIP contracts for participating landowners. The NRCS and Little Snake River Conservation District applied for these funds to implement vegetation treatments around Baggs, WY. Phase I was completed in 2022. Phase II began in 2023 and aimed to improve habitat conditions for sage-grouse, mule deer, elk, and pronghorn. Approximately 647 acres were treated with a Lawson aerator to reduce mountain sagebrush canopy cover from 30-40% to 15%. Additionally, 39 acres of mesic habitat were inter-seeded with legumes. These treatments will increase age-class diversity, improve shrub health, and increase species diversity. Phase III will begin in 2024 with treatments designed to remove juniper from crucial winter ranges, enhance aspen stands, and improve mixed mountain shrub communities. Large-scale wildlife friendly fence conversion is important to decrease barriers in high-use mule deer areas throughout the Baggs Mule Deer Herd Unit. With the designation of the Baggs migration corridor and stopover areas through the use of GPS collars, we can better prioritize conversions in areas that most affect mule deer movements.

The Red Rim - Grizzly WHMA contains over 37,900 acres of mountain shrub, sagebrush, aspen, and riparian communities that are jointly managed by the WGFD and the BLM. The WHMA provides important habitat for many wildlife species, but has proven to be an especially crucial area for mule deer given recent GPS collar data. Much of the WHMA is within the Baggs mule deer migration corridor and contains several vital stopover areas. Wildlife friendly fence conversions will be consistent with BLM fence standards to allow wildlife movement through, under, or over fences while minimizing entanglement. The WGFD has previously worked with contractors, livestock operators, and volunteers to tear out and rebuild fencing on the WHMA. The focus will be directed towards the approximately 16 miles of fence located within Baggs mule deer corridor. Once completed the remaining 17 miles of non-wildlife friendly fence will be converted. Additionally, the Grizzly WHMA is managed for both livestock and wildlife and must maintain proper grazing management within the unit. Fence conversions will continue to allow permittees to manage the season, timing, and duration of livestock use on vegetation by providing reliable physical control measures during periods of domestic grazing. Continued livestock management will improve distribution and use patterns in the area, and should further enhance upland forage conditions for resident and migratory wildlife. By controlling the duration and intensity of livestock use in these areas, vegetation will be granted longer grazing recovery periods during the growing season, increasing and improving forage for migratory mule deer use. This project also aligns with goals outlined in the Baggs Mule Deer Initiative and the WGFD Statewide Habitat Plan. Funding partners included the USDA Farm Bill and USFWS – Private Lands Program.

Figure 28. Mountain big sagebrush being treated with a Lawson aerator to improve age class diversity.

Black's Fork Tamarisk and Invasive Species Control (Goal 2) - Jim Wasseen, WLCI

The Uinta County Weed and Pest District has been controlling tamarisk and other invasive species within the Black's Fork and Muddy Creek watersheds. The project area includes multiple drainages with several small tributaries that feed into the Black's Fork. This is a long-term project to preserve existing riparian habitat and improve native vegetation. This effort also involves controlling and decreasing invasive species along the drainage to benefit fish and wildlife species. Headwater Weed Control Services, the District's contractor, worked on Muddy Creek (a tributary to the Blacks Fork) and the Blacks Fork River near Carter and northeast of Lyman. Access and travel to the streams and rivers were difficult with the abundant moisture the area received over the winter. High water reduced the amount of time the contractor was able to treat weeds. The contractor noted that high water scoured the banks and less tamarisk seedlings were observed on the sand banks and bars in the river channel. The contractor spent more time up dry drainages and found new starts of tamarisk and mature parent trees. Mature trees were located up to 3 miles from the river drainage and provided a seed source for the re-establishment of tamarisk lower down in the drainage. Once again the contractor noted the presence of cheatgrass in the drainages. The District will continue to monitor and treat tamarisk along the Black's Fork in the next year. This project has been successful at controlling tamarisk and they have proposed treating tamarisk and other noxious weeds along the Ham's Fork, a tributary to the Black's Fork.

Figure 29. Tamarisk treatments along the Black's Fork.

Cokeville Wildlife Friendly Fences (Goals 2 and 3) - Kevin Spence

WGFD collaborated with Lincoln Conservation District, NRCS, WWNRT, and four private landowners in the Cokeville area to replace 5.5 miles of 5-wire and woven wire stock fence with new 4-wire fence constructed to wildlife friendly specifications. Most of these fences were a perpendicular impediment to significant numbers of mule deer migrating between summer and crucial winter range. These newly constructed fences are designed to be more permeable for mule deer passage, and will also facilitate movements of pronghorn, moose and elk between seasonal ranges. More than half of each fence project was funded with NRCS Big Game Conservation Partnership pilot program funding via EQIP contracts with private landowners. Additional cost share funding was provided by WWNRT.

Figure 30. 4-wire wildlife friendly fence replaces netwire along mule deer migration path near Cokeville.

Green River Regional PAA Maintenance (Goal 1) - Miles Anderson, Kyle Berg, and Kevin Pousson

Habitat and Access personnel performed annual maintenance on Green River Region's many PAAs: Lake Viva Naughton, Woodruff Narrows, Hams Fork, Green River Blue Rim, Blacks Fork, and V-Cross. Maintenance included signs, parking areas, access roads, boat ramps, camp grounds, and comfort stations. At the Raymond Mountain PAA in Cokeville, a comfort station was installed and gravel hauling for the parking area was completed. A new wildlife friendly pole top fence was added for the Hams Fork Bagley fishing access parking area.

Figure 31. Hams Fork Bagley parking area fence conversion.

Green River Urban Restoration (Goal 2) - Jim Wasseen, WLCI

TU led efforts to protect 2,000 feet of the Green River near Scot's Bottom in the town of Green River. The project reshaped the river bank and deepened and narrowed the river channel below the bridge across the river to Scot's Bottom Nature Area. Eight hundred feet of riverbank was stabilized with toewood and an additional 1,200 feet of bank was re-sloped. A bankfull bench with toewood was built to allow the river to access its floodplain, while reducing shear stress on the bank and sediment erosion into the river. Submerged root wads reduce river bank erosion while attracting and holding Rainbow and Brown Trout as well as river otters and ospreys. Following construction, the area was seeded with native vegetation and irrigated throughout the summer. Anglers and wildlife will benefit from this effort for years to come. Funding partners include DU, TU, USFWS – Private Lands Program, DEQ, WLCI, and WWNRT.

Figure 32. Green River urban restoration with crews installing live stakes.

Henry's Fork Fish Passage Diversions (Goal 3) - Jim Wasseen, WLCI

TU aims to improve fish passage for three native Species of Greatest Conservation Need that occupy the mainstream of the Henry's Fork: Colorado River cutthroat trout, bluehead sucker and flannelmouth sucker. The plans are to replace thirteen push-up style dams with natural channel designed diversions (eleven in Wyoming and two in Utah). The push-up diversion dams create seasonal barriers for passage during the summer when flows are low and the water temperatures are high. Fish seek out cooler refugia in deep pools for survival during that critical time of year. Improving the diversions to rock-vane structures will reconnect the native fish populations and allow access to refugia.

Work will also improve bank stability and reduce erosion. After the diversions are improved, over 50 stream miles will be reconnected for native fish. In 2023, The Donahue diversion was completed in late November in tandem with a diversion in Utah. Permitting requirements like wetland delineations and cultural resources surveys delayed work at the other locations. Trout Unlimited has received confirmation that these permitting requirements are approved and the project can move forward. TU plans to complete the remaining diversions in 2024. Funding partners include WLCI and WWNRT.

Figure 33. Natural channel design irrigation diversion on the Henry's Fork.

Highway 789 Wildlife Friendly Fence Conversion (Goals 2 and 3) - Kevin Spence, Phil Damm, Britt Burdett

The ROW fencing along Highway 789 is a combination of multiple types of fence, including woven wire and multiple strands of barbed wire fence. In many cases, the ROW fence serves as a partial or complete barrier to wildlife movement in the area. In particular, these fences impede pronghorn and mule deer seasonal movements through crucial winter range and winter-year-long range. In late November and early October, WGFD hosted two volunteer days to modify existing ROW fencing along Highway 789, north of Baggs, WY. The existing fence was once a lay-down fence that had unfortunately been permanently nailed up. With the help of WGFD personnel and local members of the public, approximately 0.8 miles of fence were modified to wildlife-friendly fence specifications. WGFD plans to complete additional modifications to HWY 789 fences to further reduce impediments to wildlife movement between seasonal ranges.

Figure 34. Converting highway ROW fence to wildlife friendly fence specifications.

Little Mountain Aspen Exclosure Repairs (Goal 2) - Kevin Spence and Jim Wasseen

During 2016 and 2018, steel jack fencing was used to protect nearly 20 acres of aspen habitat from excessive ungulate browsing on Little Mountain near the head of Dipping Springs. This project was a collaborative partnership among the WGFD, BLM, WLCI, BOW, MFF, TU, and Sweetwater County Conservation District. The effort included erecting two separate exclosures with the purpose of excluding most large ungulate use (elk, cattle, and moose) to encourage unimpeded vertical growth of young aspen regeneration for stand replacement and promote healthy aspen habitat conditions. During the 2022-2023 winter, exceptional snow accumulation buried the fence placing extreme weight on the fence's bucks holding the fence upright and intact. As a result of the snow load, several welds either completely broke or cracked causing the legs on 129 bucks to fail. MFF provide funding to hire a

contract welder to repair each of the fence bucks, and a crew of BLM, BOW, and department workers dismantled the fence and carried each damaged buck to the welder, and reassembled the exclosure fence once repairs were completed. This project was conducted during November, and due to winter weather and access, a short segment of one exclosure fence was not completed. The remaining portion of fence will be repaired during the 2024 field season.

Figure 35. Repairing aspen exclosure fence on Little Mountain.

Little Mountain Cheatgrass Control (Goal 2) - Kevin Spence

Cheatgrass threatens key aspen, sagebrush-grassland, juniper, and mountain shrub habitats within the Little Mountain Ecosystem that are important to mule deer, sage grouse, pronghorn, elk and several other species of terrestrial wildlife. Increasing cheatgrass dominance also has a negative effect on watershed function and streamflow for Colorado River cutthroat trout inhabiting these headwater drainages. A series of annual treatment phases have been implemented to strategically control cheatgrass at the leading edge of invasion to buffer and protect the most ecologically important terrestrial and aquatic wildlife habitats on the Little Mountain landscape. Sweetwater County Weed and Pest District used BLM Fire Fuels funding to treat 4,751 acres of BLM and state lands to control cheatgrass in the landscape surrounding Little Mountain during 2023. Imazapic (Plateau) was used to treat cheatgrass in the Red Creek, Spring Creek, Currant Creek, Gooseberry Creek, and Marsh Creek watersheds. Data collected by WGFD and BLM biologists were used to identify previously treated areas that were in need of re-treatment. Cheatgrass treatments in the upper Marsh Creek drainage were conducted in anticipation of upcoming juniper control efforts to reduce the likelihood of spreading invasive grass.

Figure 36. Aerial cheatgrass control treatment near Little Mountain.

Red Rim Grizzly WHMA Fence Conversions (Goal 3) - Mark Cufaude

During the field season of 2023, 6.5 miles of fence were converted to wildlife friendly specifications on the Red Rim Grizzly WHMA. This was completed through volunteers, contractors and WGFD employees. The overall goal is to convert all fences to wildlife friendly specifications within and bordering the WHMA that are deemed not to be wildlife friendly. Funding partners include RMEF, WG-BGLC, and WWNRT.

South Kemmerer US-189 Wildlife Crossing (Goal 3) - Jill Randall, Jeff Short, and Sean Yancey

The proposed South Kemmerer wildlife crossings will likely consist of five underpasses, one overpass and fencing improvements along a 30-mile stretch between Kemmerer and I-80. This will provide motorists with a safer means of travel while ensuring wildlife can continue to migrate between seasonal ranges. Along U.S. 189, an average of 80 deer-vehicle collisions are reported annually — although this number is likely underreported. Traffic is expected to increase on this stretch of road in the coming years as a nuclear power facility will be constructed near Kemmerer. Once completed, this work is anticipated to eliminate 80-90% of wildlife-vehicle collisions. The Kemmerer project will help the Wyoming Range and Uinta deer herds, as well the Carter Lease pronghorn herd. The total cost is expected to be approximately $37.4 million. WYDOT was awarded $24.3 million federal grant from the U.S. Department of Transportation. In addition to the federal grant and $4.2 million in WYDOT formula funds, the Wyoming Transportation Commission, WGFC, WWNRT and partners contributed $8.8 million to fully fund the project. The project will go out to bid in early 2024 and is expected to take two to three construction seasons to complete.

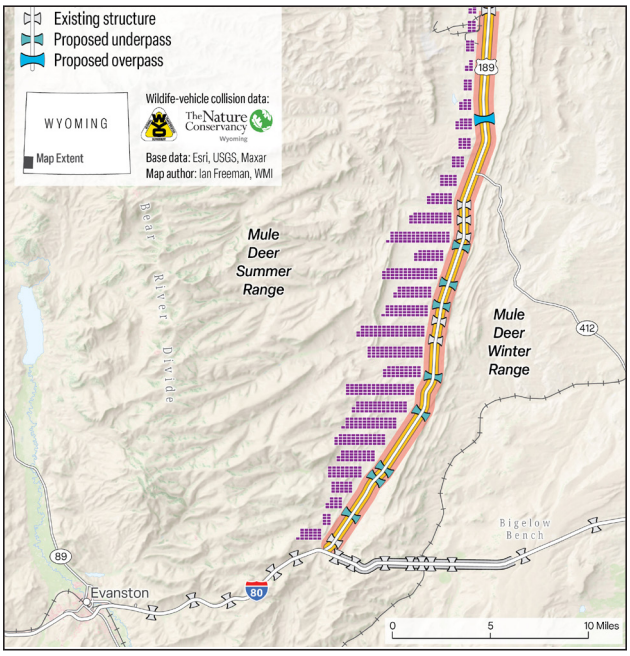


Figure 37. Wildlife-vehicle collisions documented in the South Kemmerer wildlife crossing project area.

South Lincoln County Cheatgrass Control (Goal 2) - Kevin Spence

Lincoln County Weed and Pest District utilized $600,000 of BLM Fuels funding for cheatgrass control treatments in the southern Wyoming Range, much of which occurred on key mule deer crucial winter/transitional ranges and sage-grouse core habitat. Approximately 24,534 acres of sagebrush-grassland and mixed mountain shrub habitats were treated with aerially applied Imazapic (Plateau) to control cheatgrass during late summer and early fall. A significant portion of the 2023 efforts were follow-up re-treatment of acres where department biologist's vegetative monitoring had identified areas of cheatgrass resurgence. A UW IMAGINE monitoring crew also performed surveys of the Slate Creek Ridge treatment area and marked cheatgrass with GPS points to treat in the future. These treatments were not only designed to generally control cheatgrass to enhance native vegetation, but many sites were also targeting cheatgrass control to encourage favorable sagebrush mowing results in the Rock Creek Ridge area.

Figure 38. Cheatgrass monitoring site on Boulder Ridge.

Southern Wyoming Range and Sublette RHAs (Goal 2) - Kevin Spence

RHAs are conducted annually in MDI herds across Wyoming to better evaluate conditions of mule deer seasonal habitats. Eight additional RHA assessments totaling 6,642 acres were completed for the Southern Wyoming Range within transitional, summer, and crucial winter ranges, including five rangeland habitat assessments, 2 aspen assessments, and one special feature assessment. One 132 acre rangeland assessment was completed on crucial winter yearlong range in the southern portion of the Sublette Herd. RHA survey information will be used for mule deer herd unit objective reviews, annual Job Completion Reports, and assist in determining locations of future habitat improvements.

Figure 39. Tall Forb RHA site in Ham's Fork watershed.

Southern Wyoming Range Sagebrush Mowing (Goal 2) - Kevin Spence, Kade Clark, Rick Harmelink, and Todd Grosskopf

Collaborative BLM and WGFD sagebrush treatments continued during 2023 across the southern Wyoming Range landscape. The Statewide Habitat and Access Crew completed sagebrush mowing treatments on 1,801 acres of mule deer winter and transitional ranges on Rock Creek Ridge and the South Slate Creek watershed. Dense big sagebrush stands exhibited monotypic older shrubs lacking vigor and recruitment of younger age classes. Productivity of associated grass and forb understories had also declined. A portion of treated sites supported both older age classes of sagebrush and mixed mountain shrub species of antelope bitterbrush, serviceberry, snowberry, and true mountain mahogany. A fine scale mosaic of mowed and un-mowed sagebrush was created where an average of 24% or 432 acres were manipulated within the total 1,801 acre project perimeters. Once sagebrush mowing was completed, aerial application of Imazapic herbicide was applied on the Rock Creek Ridge treatment sites to reduce cheatgrass establishment and maintain native herbaceous vegetation. Benefits of creating sagebrush age class diversity across this segment of mule deer crucial winter range will be fully realized over the next 20-40 years when sagebrush plants have re-established with enhanced vigor and nutritional browse. Immediate benefits are increased grass and forb productivity in mowed areas for meeting needed nutritional demands for mule deer when leaving winter ranges during the early spring migration. Mowed areas with mountain shrub species are expected to resprout next year with vigorous leader growth and palatable browse available for mule deer and other big game. Improving the ecological condition of these sagebrush and mixed mountain shrub sites using fine scale mosaic treatments will also enhance habitat for sage grouse and other sagebrush dependent wildlife species. Funding for this effort was provided by the BLM.

Figure 40. Sagebrush mowing mosaic on Rock Creek Ridge.

Uinta Mule Deer Migration and Roadway Interaction Study (goal 3) - Kevin Spence and Jeff Short

Reducing WVCs has been a priority for the WGFD and we have worked with WYDOT and other partners for many years to develop workable solutions. One of the roadways contributing to mule deer WVCs is I-80. I-80 crosses the range of the Uinta mule deer herd which comprises approximately 12,000 to 14,000 animals. These deer are known to cross I-80, which dissects the winter range for this herd. As deer navigate between seasonal ranges they are being hit by vehicles along the I-80 corridor and in other locations of the herd unit. The purpose of this study is to collect movement and habitat use data for mule deer to aid WYDOT and agency partners in reducing WVCs and conserving ungulate migrations along the I-80 corridor in western Wyoming. In March 2022 additional collars were placed throughout the Uinta mule deer herd. This collar data was instrumental in various crossing projects, particularly the South Kemmerer Highway 189 project. This collaring effort also provided valuable data to the impact of the 2022-2023 winter. This information helped directly inform managers of mortality within this herd. The last remaining collars will drop off in March 2024, which will conclude the Uinta Mule Deer Study.

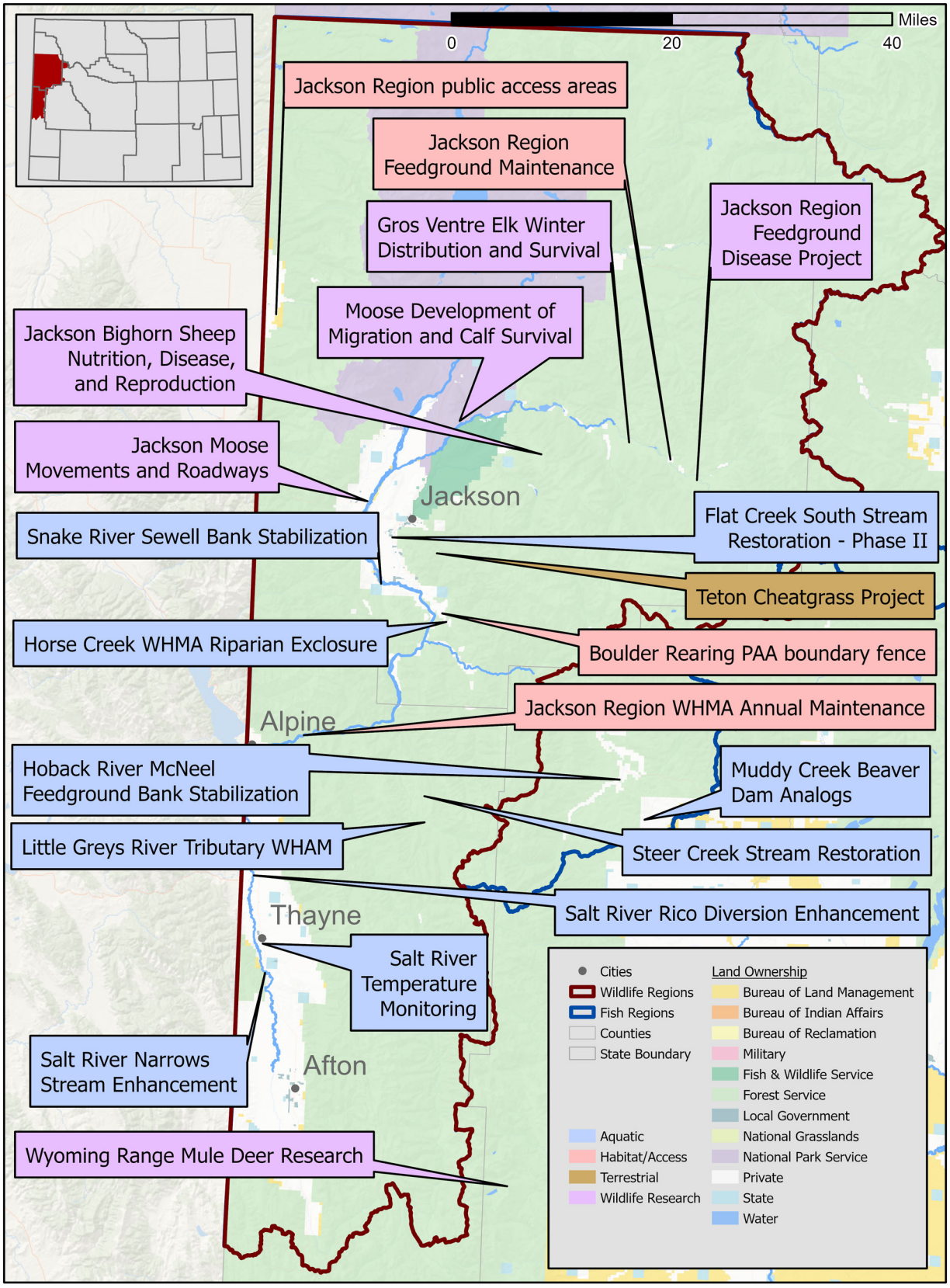
Figure 41. GPS collared mule deer in Uinta Herd.

Valley and Headwaters Restoration (Goal 2) - Jim Wasseen, WLCI

The WLCI along with many other funding partners have contributed to the Little Snake River Conservation District's Valley and Headwaters Restoration Project. This effort consists of numerous treatment types including 1,214 acres of juniper-sagebrush mastication treatments in low elevation crucial winter ranges for mule deer and pronghorn. Mixed mountain shrub treatments included 506.5 acres of mastication treatments of decadent serviceberry, mixed mountain shrubs, and mixed aspen in winter and transitional habitat for mule deer and elk. Sagebrush treatments covered 1,525 acres and consisted of Lawson aerator and spike treatments in high density (>30% canopy cover), mountain big sagebrush communities. The sagebrush treatments occurred in sage grouse core area and summer transitional range for mule deer, antelope, and elk. Participating partners include the USFWS, NRCS, BLM, WWNRT, five private landowners, OSLI, WGFD, and the Little Snake River Conservation District. This project is part of a long term ongoing collaborative partnership to address declining habitat conditions throughout the watershed. Over 31,000 acres of big game habitat have been treated in the last 15 years and has demonstrated tangible benefits to all big game species and sage grouse.

Figure 42. Mixed Mountain Shrub treatment.

JACKSON REGION



The Jackson Region lies in the far western reaches of Wyoming and is flanked by Idaho to the west and Yellowstone National Park to the north. Its eastern boundary follows the Continental Divide south to the divide of the Wyoming Range to Salt Pass.

The Snake River and its tributaries, which include the Buffalo Fork, Gros Ventre, Hoback, Grey's, and Salt rivers, pump water and offer world-class fishing throughout the region. Iconic lakes such as the Jackson, Jenny, Bradley, Taggart and Phelps in the Tetons; Slide Lake in the Gros Ventre and Palisades Reservoir on the Idaho Border call this region home.

In 2023, habitat enhancement efforts within the region focused on enhancing riparian areas and improving wildlife habitats.

Several habitat projects in the Jackson Region have focused on stabilizing stream banks and encouraging willow and cottonwood establishment. These projects have been conducted on both public and private lands and have involved a number of partner organizations.

Most notably, two projects aimed at improving Snake River cutthroat habitat were completed in the region. The Flat Creek South Stream restoration project was completed and will restore form and function to 1.2 miles of valuable Snake River cutthroat trout habitat on Flat Creek.

Additionally, twenty beaver dam analogs were installed along Steer Creek, a tributary of the Little Greys River, to improve spawning habitat. The BDAs will capture sediment, increase groundwater elevations and encourage willow recruitment.

The region continues to focus on monitoring big game animals, with several ongoing research projects. Wildlife biologists are closely monitoring moose, elk and bighorn sheep populations in the region to better understand their seasonal movements, survival rates and distribution.

Other habitat restoration projects in the region were diverse and range from installing wildlife-friendly fencing to combating invasive grasses and noxious weeds. In addition to a range of targeted projects, the Jackson Region continued to maintain its seven wildlife habitat management areas and 19 Public Access Areas.

Horse Creek WHMA Fence Conversion (Goal 3) - Derek Lemon, Miles Anderson, and Kyle Berg

1.25 miles of woven wire and stock fence was replaced on Horse Creek WHMA. The wildlife friendly pipe fence conversion preserves forage for wildlife while allowing for transitioning deer, moose, and an average of 1,500 elk that are fed at the WHMA during winter months. The drill stem top rail fence was built to wildlife friendly standards which will allow for crossing without injury and requires very little maintenance in heavy snow pack areas.

Figure 43. New wildlife friendly fence at Horse Creek WHMA.

Flat Creek South Stream Restoration Phase II (Goal 2) - Holden Reinert

Flat Creek provides multiple uses including fish habitat, water for irrigation, aquifer recharge and municipal drinking supply. The creek is 305(d) listed as threatened by the 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 a wide and shallow channel lacking spawning riffles and deep pools. These channel conditions reduce spawning activity and restrict seasonal movement and use. Stream restoration on private land south of Jackson was initiated in 2016 to restore form and function to 1.2 miles of valuable Snake River cutthroat trout habitat on Flat Creek. The first of two construction phases began October 2021 and was successfully completed in spring 2022. Phase II in-stream construction started in October. Construction was paused in mid-December due to an increase in shelf ice that would compromise infrastructure and previous work completed downstream, but was resumed late February 2023. Approximately 3,100 feet of stream was restored, including three outside bends with toewood banks, five outside bends finished with soil lifts and plantings, and two outside bends fortified with large rock. Armored riffles with cobble material were installed, and seven rock vanes were installed in two locations to provide grade control near infrastructure. A fence spanning the length of stream on the left bank was installed to protect bank work, and allow ranch operations to resume on adjacent pastures while protecting riparian vegetation. Over 2,000 willow stakes and 26, 5-gallon cottonwoods were planted in the riparian area to support revegetation efforts. Partners include: WWNRT, Western Native Trout Initiative, Teton County Conservation District, the landowner, Wyoming Water Development Commission, Jackson Hole One Fly, TU, WyDEQ, Water for Wildlife, WGBGLC, NRCS and the Community Foundation of Jackson Hole.

Figure 44. Reconstructed outside bend on Flat Creek.

Gros Ventre Elk (Goal 3) - Aly Courtemanch

The purpose of this project is to gain information about the seasonal movements and survival of the Gros Ventre herd segment of the Jackson Elk Herd. The Jackson Elk Herd contains approximately 11,000 elk, and the WGFD has a goal of wintering 3,500 of these elk in the Gros Ventre drainage. However, in recent years as few as 86 elk have spent the winter there. The objectives of this project are to monitor cow elk survival and causes of mortality, evaluate seasonal movements and winter distribution, and evaluate how wolf density and other factors such as changing weather patterns are affecting elk winter distribution. This project began in 2018 with the capture and collaring of 20 cow elk in the Gros Ventre drainage in the fall before they migrate to winter ranges.

Figure 45. Remains of a collared elk in the Gros Ventre drainage northeast of Jackson

We captured additional elk in 2019, 2021, and 2022 to maintain a rotating sample size over time as collars dropped off. In total, we have collared 75 cow elk from 2018-2023. A major finding was that approximately 30%-50% of collared Gros Ventre elk migrated out of the Gros Ventre drainage during the fall and early winter, mostly to the National Elk Refuge, hunt area 80 to the east of the NER, and in Grand Teton National Park near the town of Kelly. The number of elk moving out of the Gros Ventre drainage is variable from year to year and is likely driven by a combination of weather conditions (snow) and wolf density in the drainage. We found that individual elk can switch their movements from year to year (sometimes leaving the drainage and sometimes not). Overall, 25% of collared elk switched winter ranges at least once during the study, showing that elk are very flexible in their choices of where to winter. Nineteen percent of the collared elk wintered off of feedgrounds on native winter range and 81% wintered on feedgrounds. Despite where elk chose to spend the winter, they showed very strong fidelity to their summer ranges with 95% returning to the same summer range every year. Only one elk switched its summer range during the study.

These findings have provided us with the best information to date on understanding elk movements in this herd segment and interpreting winter trend count fluctuations in the different herd segments. Cow elk annual survival ranged from 71%-91% with a 5-year average of 82%. These survival rates are similar to what we would expect for cow elk, with the exception of 2022 when the survival rate was relatively low at 71%. Overall, the primary causes of death were harvest (mostly outside of the Jackson Herd Unit) (31%; n=8), predation (27%, n=7 (6 wolf and 1 mountain lion)), and unknown causes (31%; n=8). Other causes of death included disease (necrotic stomatitis; n=1), birth complication (n=1), and infection (n=1). Funding was provided by WGBGLC.

Hoback River McNeel Feedground Bank Stabilization (Goal 2) - Holden Reinert

The Hoback River flows for 49 miles from its headwaters to the Snake River confluence. A degraded reach occurs on and upstream of the River Bend Ranch outside of Bondurant, Wyoming, on an active cattle ranch that doubles as a WGFD-leased elk feedground (McNeel feedground). The property's riparian area experiences stunted growth and historic mechanical removal, and has an ongoing history of active channel manipulation. In combination with naturally erosive headwater geology, this reach experiences excessive erosion, deposition and braiding throughout the ranch property. The river's instability has caused continual problems for stream habitat and land managers. Nu-

merous outside bends are actively eroding, including high eroding banks adjacent to the stack yard used by WGFD to store 500 tons of hay for winter elk feeding. Eight stream banks were identified to install brush structures and rock toes with bankfull benches to reduce sediment inputs and land loss from lateral erosion over the course of 2.5 river miles. Construction began in October and was finished in November 2023. In addition, 8-foot tall riparian exclosures were set up to protect willow (Salix spp.) and cottonwood (Populus angustifolio) from browsing ungulates. Intact riparian corridors will aid in creating self-sustaining riverine habitats that benefit both aquatic and terrestrial species.

Figure 46. Hoback River bank treatments.

Horse Creek WHMA Riparian Exclosure (Goal 2) - Holden Reinert

Steel jack fencing was constructed in 2019 around Horse Creek on the WHMA adjacent to the property boundary fence line. Fencing was constructed to encourage willow and cottonwood establishment, promote stream stability and reduce property boundary fence maintenance. Baseline vegetation monitoring showed decreased vegetation cover and a lack of older age classes of woody riparian vegetation. In the four years the riparian fence has been installed the overall bank stability index increased and riparian vegetation populated the majority of the streambank. Age class distribution of woody vegetation saw large increases in sprouts and young cottonwoods (Populus angustifolia), and in sprouts, young and mature willows (Salix exigua) compared to 2019 data.

Figure 47. Willow recovery in a Horse Creek exclosure.

Jackson Bighorn Sheep Nutrition, Disease, and Reproduction (Goal 3) - Aly Courtemanch

This project is led by the Monteith Shop at UW's Haub School of Environment and Natural Resources, in collaboration with the WGFD. The goals are to: 1) understand how ecological factors, including habitat quality, pathogens, and social dynamics influence the effect of pneumonia on bighorn sheep populations, and 2) evaluate management strategies aimed at mitigating the effects of pneumonia on populations. With GPS collars, disease assessment, and intensive field studies, we study the same animals through time to track pathogen presence, nutritional condition, adult and lamb survival, causes of mortality, and forage availability. Recent results show that pneumonia negatively affects both bighorn sheep mothers and their lambs. When bighorn sheep are infected with pneumonia pathogens, they gain less fat over the summer and lose more fat over the winter. Bighorn sheep require fat to survive and raise lambs, so less fat may mean that they can't meet their energetic needs. Not only do pathogens mean mothers have less fat to help them raise lambs, the pathogens can cause disease and mortality for the lambs. The Jackson Herd has increased beyond the WGFD's

population objectives and is showing signs of surpassing the habitat's carrying capacity. Only 50% of the sheep we caught in March 2023 were pregnant; pregnancy rates are typically above 95%. The sheep were also the skinniest we have seen since we began the project in 2015. WGFD has started ewe hunting seasons in this herd in response to the herd being above population objective to avoid another pneumonia outbreak and die-off. We aim to continue this research while management actions such as ewe hunting are taking place.

Figure 48. Dr. Kevin Monteith (UW) measures a bighorn sheep's body fat during captures.

Jackson Region Feedground Maintenance (Goal 1) - Derek Lemon, Miles Anderson, Kyle Berg, and Jacob West

Annual maintenance, repair and improvements were done to the 11 WGFD-managed elk feedgrounds in the Jackson Region. Annual repairs and maintenance included work on feedground structures, corrals, stackyards, elk migration fences, and feeding grounds. Dog Creek, South Park and Horse Creek elk feeding areas were harrowed in spring 2023 to break up elk scat and promote growth of new grasses. Access roads to feedgrounds were maintained and roads resurfaced or otherwise improved at Horse Creek and South Park. Ten upright poles and eight rafters were replaced this year on various haysheds. The elk trap and horse corral were removed from Alkali feedground in preparation of Alkali closing.

Figure 49. Feedground maintenance.

Jackson Moose Movements and Roadways (Goal 3) - Aly Courtemanch

This project began in 2019 with initial funding from the WYDOT for the WGFD to collar adult moose in the vicinity of the Highway 22/390 intersection, located west of Jackson, Wyoming. The aim was to gather information about moose movements and road crossing patterns in the Snake River Bridge Replacement Project area, which would inform the quantity and locations of wildlife crossings and associated wildlife exclusionary fencing for the road project. Due to a high degree of inter-

est and support from the public, local non-profit organizations, county government, and university researchers, we obtained additional funding in 2020. As a result, additional collaring occurred in 2020 and 2022. Research partnerships were also formed with USGS and Montana State University to learn about winter tick effects on moose. In total, 30 cow moose have been captured and collared from 2019-2022. Collars will collect data through summer 2024 and then automatically drop off. Preliminary results show that approximately 50% of the collared moose that spend the winter in residential areas are migratory and 50% are resident. One of the primary objectives of this study was to learn where, when, and how frequently moose were crossing Highway 22 and Highway 390 within the Snake River Bridge Replacement project area to inform wildlife underpass locations and exclusionary fencing. From 2019-2022, collared moose crossed Highway 22 or Highway 390 within the highway project area a total of 670 times. About 50% of these crossings occurred during the daytime and 50% during nighttime. Four wildlife underpasses are currently being constructed around the Snake River Bridge and Highway 22/390 intersection, and those locations were directly informed by this study. For the larger study area outside of the highway project area, individual collared moose exhibited varying frequencies of road crossings. Some individuals cross major roads a few times a year, whereas other moose have crossed over 300 times since they have been collared. On average, individual collared moose crossed major roads 125 times while they were collared (over 2.5 years). This is an average of 50 times each year for each individual. In general, migratory moose have less exposure to roads than resident moose. From 2019-2022, collared moose crossed major roads a total of 2,055 times. Interestingly, thus far none of the collared moose in this study have been killed in vehicle collisions. Funding for this effort was provided by Teton County Conservation District.

Figure 50. Attaching a collar to a cow moose.

Jackson Region Feedground Disease Project (Goal 3) - Benjamin Wise

This is an ongoing project involving capture and collaring of elk in the Jackson Region. The goals are to: 1) inform local managers of movements, distribution and seasonal ranges of elk that utilize supplemental feedgrounds as well as native winter ranges in the Jackson Region, 2) collect biological, disease and survival data on marked elk, 3) provide data on feedground utilization attendance and implementation of feedground management, 4) provide information to local livestock producers about disease transmission risk and ways to prevent transmission events. This project was initiated in the early 2000's and currently includes 18 collared cow elk. Elk are captured via corral traps, chemical immobilization and helicopter capture. The data collected from this ongoing project have been used in more than 30 publications to date.

Figure 51. Elk trap.

Jackson Region PAAs (Goal 1) - Derek Lemon, Miles Anderson, and Kyle Berg

Jackson region personnel performed annual maintenance on 19 PAAs. These PAAs provide access for hunting and fishing. This maintenance included all the PAAs on the Salt River, Von Gontard's Landing and Coco Belle. PAA maintenance activities included replacing signs, repairing fences, spraying noxious weeds and painting comfort stations. The Department used 645 tons of gravel to fill holes and improve the roads on the north half of the Salt River PAAs. One new ADA comfort station was installed at A/G Lane along the Salt River.

Figure 52. Road maintenance on Salt River PAAs.

Jackson Region WHMA Annual Maintenance (Goals 1 and 2) - Derek Lemon, Miles Anderson, Kyle Berg, and Jacob West

Annual maintenance and improvements continued on the seven WHMAs in the Jackson Region in 2023. The Horse Creek, South Park and Grey's River WHMAs received annual fence maintenance to reduce trespass livestock and comingling of elk and livestock in the winter. 100 acres of irrigation water rights were spread on Horse Creek and 5 acres on South Park WHMAs. Horse Creek and South Park were hayed to feed elk in the winter and promote new growth for fall and spring forage; 220 tons were produced between the two WHMAs. Annual parking lot and road maintenance was performed on South Park and Horse Creek WHMAs. Noxious weeds were treated by WGFD personnel and contract applicators on all Jackson WHMAs.

Figure 53. Greys River WHMA informational kiosk.

Little Greys River Tributary WHAM (Goal 2) - Holden Reinert

Redd count declines in Steer Creek, a tributary to the Little Greys River, have been observed in recent years. Habitat assessments were conducted on upper Steer Creek and adjacent tributaries Blind Trail Creek, South Fork Little Greys, and Stewart Creek to see if the loss of habitat was restricted to Steer Creek, or more pervasive throughout the drainage. Blind Trail Creek is a spawning tributary to the Little Greys River that has extensive beaver dams along its lower reaches. Beaver dams appear passable and create a shifting mosaic of in-channel and wetland habitats throughout the drainage. Reaches above or in-between beaver dam complexes have adequate spawning gravel and overhanging riparian vegetation. The upstream reaches of Blind Trail Creek see increased use from livestock as the uplands near the riparian corridor. High levels of connectivity allows fish movement throughout the drainage. The South Fork of the Little Greys River has extensive beaver populations and dams. Livestock use the riparian areas frequently in this drainage, as hoof-shearing and erosion are evident

throughout the lower reaches. Riparian vegetation is healthy, but grazed. Spawning habitat between beaver complexes is present. Stewart Creek is a tributary to the South Fork Little Greys. A beaver complex lies within the middle reach, but there is noticeable downcutting that occurs downstream of the complex. Increased rates of erosion are present, and cattle crossings are abundant due to the close proximity of upland habitat near the channel. Spawning habitat is limited throughout these reaches, but the pools, while scarce, hold fish. Habitat assessments showed a mix of accessible, suitable habitat for Snake River cutthroat trout, with degraded habitat that has been adversely affected by land use practices. Long term habitat monitoring sites will be established in 2024.

Figure 54. Example of conditions observed along Little Greys River Tributaries

Moose Migration and Calf Survival (Goal 3) - Aly Courtemanch

This is a new project that began in 2023 and is being led by the Wyoming Cooperative Fish and Wildlife Research Unit at the University of Wyoming, in collaboration with WGFD. The goals are to: 1) learn how moose develop their migration patterns from the time they are a calf to an adult, 2) collect data on moose survival and causes of death during the first three years of life, and 3) collect data on moose seasonal habitat use and movements. To accomplish these goals, we are capturing and collaring cow moose and calf pairs during winter. Collars will remain on the calves until they are approximately three years old to learn how their migration patterns are similar or different from their mother's. Measuring survival during the first few years of life and causes of death will also provide valuable information on why this moose herd is not increasing, despite relatively high calf to cow ratios in the winter. In 2023, five moose cow/calf pairs were captured and collared in the Jackson area to assess calf collar design and fit. In 2024, additional cow/calf captures and collaring are planned in this area.

Figure 55. A collared cow and calf moose after being captured in the Buffalo Valley north of Jackson.

Upper Hoback BDAs (Goal 2) - Luke Schultz and Holden Reinert

The Roosevelt Fire burned over 50,000 acres across the headwaters of the Hoback River drainage in 2018, and contained many locations of high-intensity burns. In this steep and highly erosive landscape, denuded slopes were expected to create localized landslides and other mass wasting events and generally elevated sediment transport across the watershed. In addition, historical overuse by livestock and, in some cases, artificially elevated wildlife populations led to deteriorated upslope and riparian conditions, and localized channel incision. Muddy Creek and its tributary to Coyote Gulch near the Hoback Rim are streams that display these impairments. Historically, beaver would have had a strong mediating effect on these riparian systems by constructing dams that slowed flood flows, vertically stabilized stream beds, and inundated floodplains to support vigorous vegetation that resisted

erosion. However, with the loss of many beaver populations over the last two centuries, stream systems have suffered. The goal of this project was to emulate the positive aspects of beaver ecology by constructing BDAs on private lands of Muddy Creek, and to compare conditions in Muddy Creek to those in Coyote Gulch that were not treated with BDAs. Conditions monitored included fish assemblages/populations, riparian vegetation, channel morphology, and stream temperature. In 2020 and 2021, crews constructed 20 BDAs in Muddy Creek along approximately 0.5 miles of the Muddy Creek floodplain (~1 mile of stream channel) and collected pre construction data on both the control (Coyote Gulch) and treatment reaches (Muddy Creek) to evaluate changes in upcoming years. The study reach was revisited annually. Longitudinal profiles and cross sections were resurveyed, and 2020 BDAs were maintained. Some beaver colonization of BDAs was noted. On Coyote Gulch, beavers moved into the control reach and provided the opportunity to compare BDAs to naturally occurring beaver dams. While surveyed channel changes are minimal after the passing of three years, partners will continue to track ongoing changes in channel slope and cross section, riparian community adjustments and stream temperatures associated with BDA construction. Partners include USFWS Partners Program, Bridger-Teton National Forest, and the Rolling Thunder Ranch.

Figure 56. Cross section survey on Muddy Creek.

Salt River Rico Diversion Enhancement (Goal 2) - Holden Reinert

The Salt River is a blue ribbon trout fishery that sustains wild populations of native Snake River cutthroat trout. Snake River cutthroat trout rely on high quality, interconnected habitats to persist throughout the watershed. The Rico Diversion is located on the eastern split channel of the Salt River 2 miles south of Etna, Wyoming. The diversion structure is a concrete, rock and tarp diversion structure that is annually maintained by heavy machinery. The structure presented a boating hazard and a seasonal fish barrier. Streambank conditions up-and-downstream of the point of diversion were degraded due to a lack of woody riparian vegetation, causing increased fine sediment and land loss. TU hired a consultant to design bank stabilization and diversion infrastructure updates. Designs included enhancements to 1,800 feet of the Salt River and included toewood banks (4), bankfull benches, j-hooks, and a rock ramp (in lieu of concrete and tarp diversion structure). In early summer 2023, high runoff caused 26 feet of lateral erosion on the downstream end of the reach, threatening the water user's ability to draw water and the integrity of local residences. The point of diversion was moved 320 feet upstream to meet the necessary elevation to deliver water. A 30-inch irrigation pipe was used between the new and existing point of diversion. Construction on the stream banks and the rock ramp began in October 2023 and was completed mid-January 2024. The diversion structure will be complete spring 2024.

Figure 57. Recently installed toe wood, willow transplants and soil lifts.

Salt River Narrows Stream Enhancement (Goal 2) - Holden Reinert

The Salt River is a blue ribbon trout fishery and is an aquatic crucial and restoration priority area for WGFD. Bank hardening, flood protection, channelizing, diversions, pasture management, riparian grazing, and loss of riparian habitats and beaver compared to historic levels have resulted in a degraded and unstable stream channel. This site was brought to WGFD's attention when landowners reached out for help addressing excessive stream bank erosion and a recent avulsion. The project is in the Narrows, a natural constriction in the valley that is approximately midway through the Salt River watershed. It is one of the most productive and heavily used stretches of the river by anglers for both wade fishing and floating opportunities. The project reach has grown to include three upstream landowners, the BLM, and the USFS, and covers about 9,600 feet of stream channel from the Highway 89 bridge to the WGFD PAA. Historic imagery and surveys reveal loss of over a mile of stream length, resulting in an increase of slope by 50%. During summer 2023, WGFD assessed conditions using the Stream Quantification Tool. Results show an overly steep stream with low pool depths, little woody debris, and high rates of bank erosion. The downstream reach of the Narrows has seen extensive lateral erosion and pasture loss due to land use and removal of riparian vegetation. Habitat improvements like bank stabilization, increasing channel length and woody debris recruitment would likely produce favorable conditions and enhance the fishery even more. This spring, partners will select a consultant to produce restoration design. Project partners include: TU, USFWS, BLM, an irrigator and landowners.

Figure 58. Surveying the Salt River.

Salt River Temperature Monitoring (Goal 1) - Holden Reinert

The Salt River is a blue ribbon fishery hosting excellent habitats for all life stages of native cutthroat trout. Channel manipulation and riparian vegetation conversions due to land use practices impact the drainage in addition to ongoing temperature shifts associated with the changing climate. Long-term monitoring at this site will help identify and prioritize management actions in this basin. Two temperature loggers were deployed in the lower Salt River drainage in August 2020 and are downloaded annually to establish long-term water temperature monitoring sites. One logger was deployed at the Clark's Barn public access area near Afton Wyoming and the other at the Miller public access area near Etna, Wyoming.

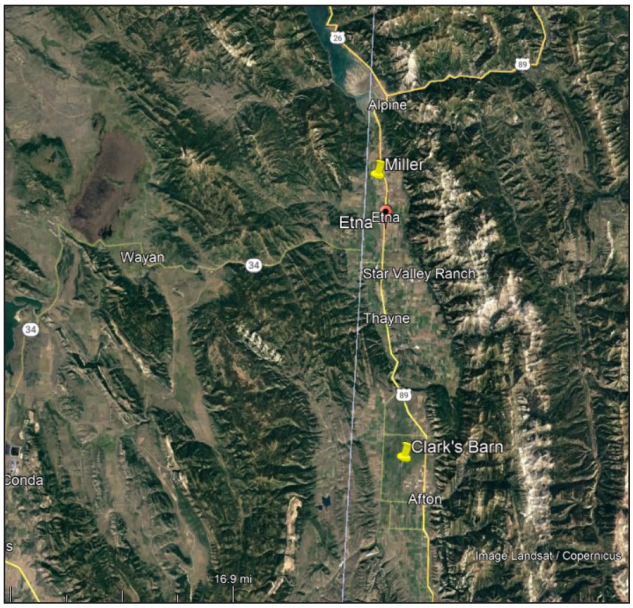


Figure 59. Salt River temperature monitoring sites.

Snake River Sewell Bank Stabilization (Goal 2) - Holden Reinert

Trout Unlimited has led efforts to restore form and function on the Snake River south of Jackson. The Sewell Ranch is a subsidiary of the Snake River Ranch, and is situated on the west side of the Snake River at the foot of Munger Mountain, near the Wyoming Game and Fish Department's South Park WHMA. The Ranch has experienced significant bank erosion and land loss at this location, downstream of the river-right terminus of the Snake River levee. This excessive erosion demonstrates the River's highly variable range of flows and geomorphic dynamism. From 2009-2017, approximately 180 feet of bank and irrigated pastureland were lost, or about 23 ft/year. Currently, this eroded bank is not along the main channel of the Snake River; however, as recently as the summer of 2017, the main channel was along this bank and accelerated rates of bank erosion were observed. There is 1,000 feet of exposed, vertical, actively eroding banks along the Snake River, and an additional 800 feet of eroding bank in a smaller side channel of the Snake River. Trout Unlimited, WGFD, and the Snake River Ranch collaborated to address bank erosion, land loss, and lack of quality fish habitat within the project area. A final design was agreed upon that ensured the selected bank treatments will withstand a wide range of flows, and a contractor was selected in spring 2023. Treatments for the main channel include brush bank structures, rock toes, toe wood, and bankfull benches. Side channel treatments are the same. The project created holding, cover, and juvenile rearing habitat for Snake River cutthroat trout as well as other native fish species, including bluehead suckers, in the Snake River. Construction began in late-September and was completed in November 2023. Project partners include: WWNRT, TU, Snake River Ranch, RMEF, Teton County Conservation District, TNC, Wyoming Water Development Commission, Jackson Hole One Fly, and NRCS.

Figure 60. Bank treatments on the Salt River.

Steer Creek BDAs (Goal 2) - Holden Reinert

Steer Creek is a tributary to the Little Greys River that is important for Snake River cutthroat trout spawning. Redd count declines in Steer Creek have been observed in recent years. From McCain Cabin on Meadow Creek to the Little Greys River confluence, a distance of approximately 3 miles was assessed. Spawning habitat in lower reaches is limited due to increased sediment loads from Meadow Creek and compacted gravel from cattle crossings. The Meadow Creek reach features incised, shallow, homogenous habitat, with excessive sedimentation and limited woody vegetation recruitment. Project partners agreed to use BDAs in the upper reaches to capture sediment, increase surface and groundwater elevations, and encourage willow recruitment. Permits were obtained September 2023. Materials were gathered by WGFD, TU and Bridg-

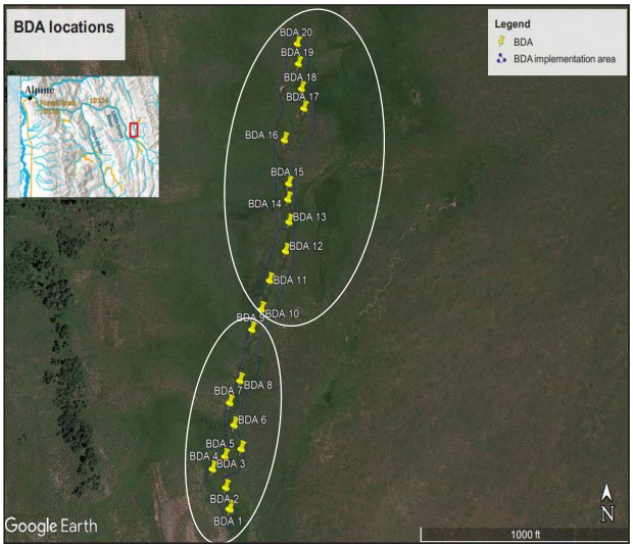


Figure 61. BDA locations on Steer Creek.

er-Teton National Forest. Posts were installed with a hydraulic post pounder, and construction of 20 BDAs occurred early October 2023. Structures will be maintained and monitored, and willow stakes will be planted in May 2024 to increase woody riparian vegetation throughout the reach.

Teton Cheatgrass Project (Goal 2) - Troy Fieseler

This project is part of the long-term management of cheatgrass in Teton County designed to: 1) identify the extent of Invasive Annual Grass occurrence across the county; 2) educate and incorporate stakeholder and partner input; 3) treat identified cheatgrass infested areas; and 4) initiate treatment efficacy monitoring in treated areas. Cheatgrass, when left untreated, can aggressively out compete native species that wildlife depend on for survival. By controlling the spread and reducing overall cover of cheatgrass, it is possible to rehabilitate areas that have been impacted. The primary focus of this phase will be the re-treatment of areas targeted during a previous application in 2020 while also including newly identified areas over the last two years on the leading edge of infestation. Treatment areas are primarily a mix of sagebrush and mixed-mountain shrubs with an understory of native bunch grasses and forbs and overlap with migratory and summer habitat for mule deer and elk, crucial winter range for bighorn sheep and moose, and important seasonal forage areas for sage grouse as well. Partners include the Teton County Weed and Pest, USFS, Jackson Hole Weed Management Association, WWNRT, WGBGLC, RMEF, SGLWG, Teton Conservation District, and NFWF.

Figure 62. Helicopter applying herbicide to treat cheatgrass in Teton County.

Teton County Wildlife Crossings (Goal 3) - Cheyenne Stewart

In 2022, Teton County allocated voter approved Wildlife Crossing Specific Purpose Excise Tax funds to develop 30% engineering design plans for three priority areas as identified in the Counties Wildlife Crossings Master Plan: U.S. Highway 26/89/191 (Camp Creek area), N U.S. Highway 89/191 (between the Fish Hatchery and Town of Jackson), and WY Highway 22 (west side of Teton Pass). WGFD personnel consulted with Teton County and their contractors to come up with conceptual mitigation plans and 30% design plans for each of the three locations. This effort included multiple in-person and virtual meetings throughout the year. In October 2023, Teton County hosted a public open house and presented to the Teton County Board of County Commissioners. Teton County and the Department also provided a letter of support for the National Elk Refuge for fence updates and improvements as a spin-off from the conversations surrounding the three main projects.

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

The Wyoming Range mule deer research project has been a collaborative research effort with UW since 2012. This project attempts to investigate the nutritional relationships between mule deer population dynamics, energy development and disturbance, habitat conditions, and climate to provide a mechanistic approach to monitoring and managing mule deer. The focal herd research was initiated in December 2022 and is collecting additional population data which will be compared to four other herds in the state. As a result of the initiation of the Focal Herd program in 2022, annual survey data collected by Department personnel, and long-term research conducted in collaboration

with the UW, WGFD was able to closely monitor the impacts from the severe 2022-2023 winter on this population. Overwinter survival for fawns and adults was the lowest since the Wyoming Range mule deer herd was conceptualized in 1982. Only 33% of radio-collared adult does associated with the UW study survived the 2023 winter, while zero (0) radio-collared fawns survived. The Focal Herd research reported on November 27, 2023 only 48 (18%) of the 262 mule deer that entered the winter in December 2022 were alive. By this same date, zero (0) of 92 fawns collared were still alive. Subsequent to the 2023 winter, the effects were noted in the recent herd unit classifications in which buck ratios were 22 bucks:100 does. During 2023, habitat biologists piloted vegetation survey protocols in association with the Wyoming Range Focal Herd study. Collared females were randomly selected and data collection took place on summer home ranges utilizing Line Point Intercept methodologies to understand variation in adult female survival and habitat use.

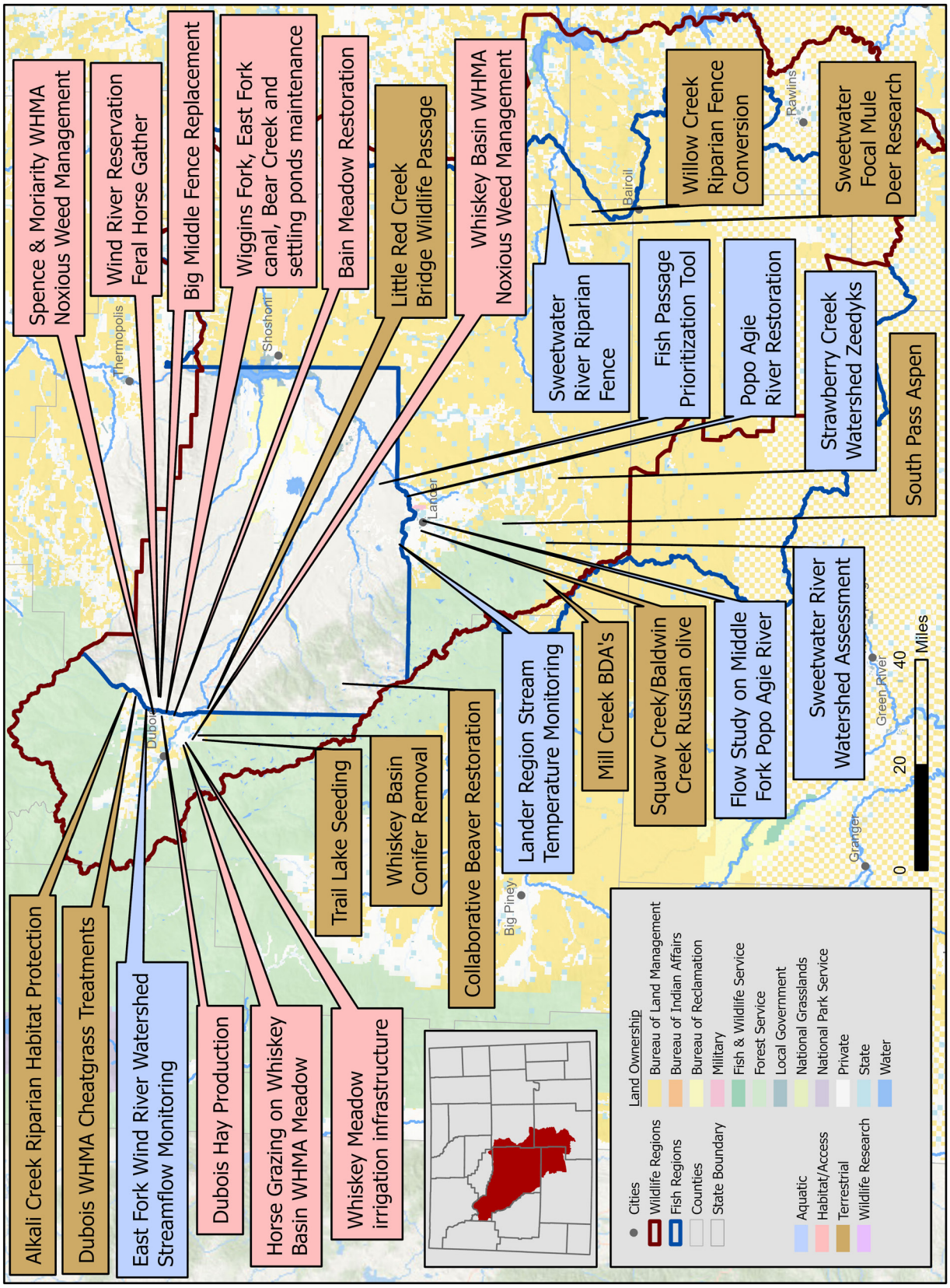
Chimney Draw Conservation Easement (Goal 1) - Lands Administration Branch

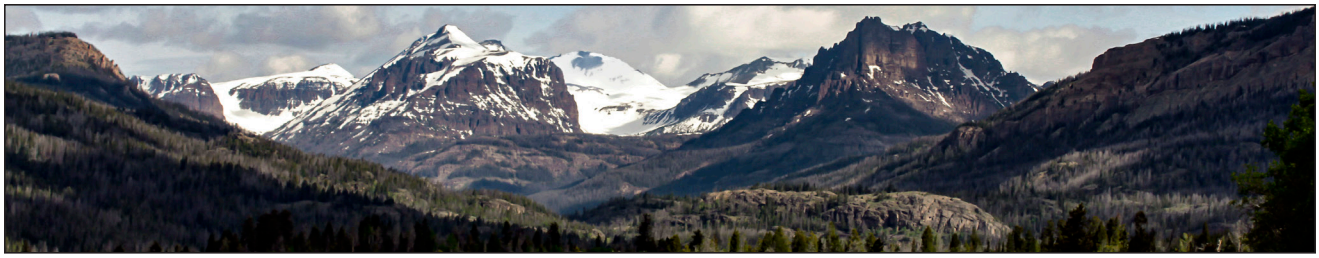
The Lands Branch worked with The Conservation Fund, Wyoming State Forestry, and many other partners to accept the donation of two conservation easements just south of Jackson, WY and west of the Snake River. The conservation easements total approximately 256.5 acres and are the third phase of the Munger Mountain Conservation Easements I & II that were donated to the Commission in 2013 and 2021 respectively. The area of these conservation easements is under intense pressure for development, and the conservation of these properties along with other easements in the area ensures the movement of wildlife from the Bridger-Teton National Forest to the WGFC South Park WHMA near the Snake River. The area is designated by the WGFD as a crucial habitat for elk and moose, and is recognized as valuable habitat for gray wolves and grizzly bears as well as 47 other species classified by Wyoming as SGCNs.

This project was administered by the Wyoming Forestry Division, landowners, The Conservation Fund, US Forest Service Forest Legacy Program, WWNRT, and the Jackson Hole Land Trust. The acceptance of the Chimney Draw Conservation Easements was approved by the WGFC at their July 2022 meeting, and the easements were finalized in fall 2023.

Figure 63. Chimney Draw Conservation Easement.

LANDER REGION





The Lander Region covers a stretch of central Wyoming from the peaks of the Wind River Mountains east to Boysen Reservoir, from Dubois to Rawlins, and points between.

In 2023 Game and Fish employees worked on 23 regional projects. Many of these projects were focused on Commission-owned lands in the Dubois area. In particular, 258 acres of conifer were removed in areas where collar data showed that bighorn sheep were not using the habitat and conifer was restricting or limiting their movements. Immediately after the cutting was completed both bighorn sheep and mule deer began using the cleared areas.

Habitat and Access personnel have been working to restore Bain Meadow on the Spence and Moriarity Wildlife Management Area to increase the forage palatability, combat noxious weeds, and produce hay to use on western Wyoming feedgrounds. In addition, these fields provide supplemental forage for wintering wildlife that use these Commission lands.

One collaborative project this year was with the U.S. Forest Service-Shoshone National Forest to relocate a family of beaver utilizing a string of pack mules. After live-capturing the beaver family, they were loaded into panniers and onto the Forest Service mules and moved a mile into the Wind River Mountains. Relocation occurred in an area identified as needing improved riparian health, fish habitat, and increased water storage capabilities - all things beavers can help create.

Other habitat projects in 2023 aimed to protect rivers and riparian areas, restore aspen, mitigate wildlife-vehicle collisions, and combat invasive species.

Alkali Creek Riparian Habitat Protection (Goal 2) - Amy Anderson

Alkali Creek is a tributary to the East Fork of the Wind River that supports Yellowstone Cutthroat Trout spawning, a healthy beaver colony, and winter habitat for mule deer, elk and moose. Historically the riparian habitat was utilized heavily year round by cattle and horse grazing, which resulted in a gradually declining condition. The landowner approached WGFD to improve the riparian area, as well as protect livestock from falling through the ice on beaver ponds in the winter. Between 2022-2023, the Bitterroot Ranch constructed 5,927 feet of wildlife friendly fencing around a half mile reach of Alkali Creek to improve riparian willow habitat by excluding livestock grazing. This fencing also assists with retaining beaver and supporting Yellowstone Cutthroat Trout habitat needs. The ranch has already seen an improvement with increased wildlife activity along the creek. Riparian systems are resilient, and beaver increase the resilience by keeping water on the landscape. The new fence is 38" tall with a top rail and two smooth wires. The complete project, with support from Water for Wildlife, WWNRT, NRCS, and Dubois Conservation District, also installed off-site water for livestock.

Figure 64. Beaver pond on Alkali Creek.

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

Chain Lakes is grazed annually in the winter with sheep to remove decadent herbaceous material without adversely impacting overall wildlife habitat. This grazing improves plant vigor and vegetative growth by removing decadent herbaceous material, and reducing plant competition. This also improves plant regrowth and reseeding through the hoof action of the sheep and fertilization through the animal's elimination processes. The lessee entered into an Area Improvement Project Agreement (AIPA) with the WGFD. The AIPA allows the lessee to complete projects in lieu of cash payments for the right to graze the WHMA. The AIPA allows us to complete many projects on the WHMA without tying up staff time and budgets. Over the years, we have completed many fence conversions to wildlife-friendly specifications, completed the north boundary fence, and rejuvenated many defunct water wells with solar pumps. Since water is the limiting factor for carrying capacity on the WHMA, developing water resources on the WHMA has been a very favorable development to allow better wildlife utilization of the existing forage resources. Completion of the boundary fence and converting parts of it to wildlife-friendly specifications allows for easy wildlife passage while keeping out feral horses and other livestock, thus saving the forage resources for wildlife use.

Horse Grazing on Whiskey Basin WHMA Meadow (Goal 1) - Brian Parker, Miles Proctor, and Kevin Howard

The WGFD entered into a long term grazing agreement with CM Ranch to allow 37.5 Horse AUMs to be grazed annually from November through December on the Whiskey Basin meadow. In exchange for the grazing the WGFD received a permanent administrative access easement to sheep ridge on Whiskey Basin WHMA. Without this easement, there would be no road access for WGFD to Sheep Ridge.

Collaborative Beaver Restoration (Goal 2) - Amy Anderson and Colter Brown

In 2023, the WGFD and USFS utilized a beaver holding trailer and packing panniers to move beaver to new habitats. A cabin owner in the Red Desert south of Atlantic City reported beavers cutting down trees, and potentially flooding their cabin and road. After visiting the site, a decision was made to attempt to trap beaver to give the cabin owners a chance to install beaver mitigation strategies (tree wrapping, beaver deceivers, and pond levelers). The goal is to protect infrastructure while maintaining a population of beavers in Willow Creek to support the habitat in this drainage. Two adult beavers, one sub-adult, and one kit were captured, and held for several days prior to being released on 9/27/2023 in Brooks Creek at the upper end of Brooks Lake. The USFS pack crew loaded the beaver into panniers and onto mules and moved them from the parking area to the release site a mile upstream. A post-release site visit occurring three weeks after release showed beaver activity including new dams, lodge maintenance, and visual confirmation of beaver still using the site. Another large male beaver was trapped from Hornecker Creek that was causing localized flooding of infrastructure, and cutting trees in the Pheasant Run Subdivision. This beaver was relocated to the West Willow release site.

Figure 65. Beaver loaded onto the Shoshone National Forest pack string on their way to a backcountry site for release.

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

The Dubois hay operation allows WGFD to generate hay for use at the WGFD 22 elk feedgrounds, while simultaneously providing supplemental winter forage for elk in the Dubois area. In 2023, WGFD personnel put up 1,301 tons (2100 bales) of hay on Spence and Moriarity WMA and Whiskey Basin WHMA for use on the feedgrounds. Hay production on WGFD managed lands significantly offsets costs associated with purchasing feedground hay on the open market. Additionally, this operation allows for a single unit of WGFD managed land to doubly benefit wildlife. The meadows are re-irrigated after they are cut for hay, providing supplemental forage for the elk and deer that winter on Spence & Moriarity and Whiskey Basin.

Figure 66. Hay production field near Dubois.

Dubois US-26 Wildlife Crossing (Goal 3) - Daryl Lutz and Jill Randall

US 26 around Dubois is one of the most dangerous highway segments in Wyoming for both motorists and wildlife in terms of WVC risk. From 2015 through 2019, collisions with wildlife accounted for 74% of all vehicle crashes reported to law enforcement. The cost of these collisions is estimated at $791,400 annually, including property damage, accident response and cleanup costs, and the value of the wildlife killed in these collisions. To address these issues, in 2020 WGFD and WYDOT initiated a wildlife mitigation assessment for US 26/287, engaging other agency, tribal, and

non-profit partners. The purpose of the mitigation assessment was to compile and evaluate wildlife habitat and movement data, WVC datasets, and other information to inform the development of cost-effective mitigation solutions for reducing WVCs, improving driver safety, and maintaining permeability for wildlife movement across US 26 from mileposts 24-73. The resulting mitigation strategy was informed by community feedback and outlines a common vision that identifies and prioritizes important wildlife movement areas and wildlife-highway conflict zones on US 26 around Dubois, with site-specific mitigation recommendations identified in each segment. Within the study area, two segments were prioritized for implementation actions: 1) east of Dubois from the Wind River oxbow to the Military Vehicles Museum, mileposts 58-64, and 2) from Stony Point to the western limits of Dubois, mileposts 48-54. The assessment and other materials are available on the Lander Region WGFD website. To date partners have focused on the Red Creek Bridge vegetation removal to keep bighorn sheep from needing to cross the highway for water. WYDOT has also conducted vegetation removal near Crowheart primarily for whitetail deer. Partners continue to deploy the variable messaging signs in two segments of the highway: one for bighorn sheep and the other for mule deer. Additional fundraising efforts are underway for federal funds that require non-federal match.

Dubois WHMA Cheatgrass Treatments (Goal 2) - Amy Anderson

In 2023, WGFD in partnership with Fremont County Weed and Pest, conducted a repeat application of Rejuvra herbicide on 800 acres of WGFC owned land known as Duncan Bench. This area is crucial mule deer and elk winter range on the Spence Moriarity WMA. This is the third treatment for cheatgrass in this location. The first treatment was using Plateau (Imazapic) herbicide, and control only lasted one year. The second treatment, in 2020, applied using a fixed wing airplane showed very good control, but there were missed patches across the treatment, especially at the ends of the treatment polygon. For the latest treatment, Hammond Helicopters aerially applied Rejuvra herbicide at 5 oz per acre. Monitoring in 2024 will show if this was a successful strategy.

Figure 67. Aerially applying herbicide on Duncan Bench.

Dubois WHMA Production & Utilization (Goals 1 and 2) - Amy Anderson

In 2023, the Dubois area received near record high precipitation amounts, most of which fell in June, which contributed to an increase in forage production compared to the last several years. With the extensive snowfall and growing season precipitation, production was expected to be higher than it was, but possibly due to a late spring melt, cooler than normal temperatures, and then the bulk of the precipitation coming later in the spring, production was good, but less than expected. Utilization of forage on Whiskey Basin remains below 60% use across all sites, likely due to the declining numbers within the Whiskey Mountain Bighorn Sheep Herd. Utilization of forage within the Inberg-Roy WHMA and Spence Moriarity WMA over the 2022-23 winter was above 70% across many of the clipping sites. This is attributed to higher numbers of elk wintering on the WHMA/WMA than a typical year.

East Fork Wind River Watershed Streamflow Monitoring (Goal 1) - Colter Brown and Holden Reinert

The East Fork Wind River watershed is the largest, contiguous, intact watershed in the Lander region that is primarily under public land management and is designated a crucial habitat area for Yellowstone Cutthroat Trout in the SHP. Instream flow water rights exist in both Bear Creek and the East Fork Wind River to protect habitat and the Commission holds water rights from these streams for irrigation use to support wildlife needs. The Lander AHAB measured stream flow periodically in August and when streamflow was measured below 20 CFS, irrigators were informed and water use was reduced to maintain habitat for Yellowstone cutthroat trout in Bear Creek.

Figure 68. Measuring discharge in Bear Creek.

Wind River Reservation Feral Horse Gather (Goal 1) - Brian Parker, Miles Proctor, and Kevin Howard

Wind River Reservation Tribal Fish and Game, in cooperation with the Bureau of Indian Affairs and USFWS, began gather operations of feral horses on the Wind River Reservation. Prior to gather operations feral horse populations expanded to extreme population numbers causing substantial negative range and habitat degradation, resulting in impacts to mule deer populations within and outside of the Wind River Reservation. WGFD personnel assisted in gather operations on and in grazing allotments adjacent to Spence & Moriarity WMA, and provided operational logistic support.

Middle Fork Popo Agie River Flow Study (Goal 1) - Del Lobb and Colter Brown

The Healthy Rivers Initiative (HRI), is a working group of stakeholders who share a mission to improve water quality, quantity, and the biological health of the Popo Agie River watershed to better support domestic, agricultural, recreation, fish and wildlife uses. The Middle Fork Popo Agie River has been a primary focus of HRI's efforts because of extremely low flows (5-10 cfs) for multiple weeks during July and August of most years. To provide a stream flow goal for HRI, WGFD conducted a flow study on the Middle Fork Popo Agie River in 2019. The primary objective was to quantify late summer flow levels needed to maintain adequate habitat for Rainbow and Brown Trout. Habitat modeling results were also used to develop flow recommendations for other seasons. A presentation/training session to share study methods, results, and recommendations was given at the March 2, 2023 HRI meeting. A late summer flow of 46 cfs is recommended to provide sufficient habitat conditions for growth of juvenile and adult trout and for the long-term productivity of trout populations. A year-round threshold flow of 24 cfs is recommended for fish passage, macroinvertebrate production, and overwinter survival. For spawning and rearing of trout, a flow of at least 90 cfs is recommended for late spring – early summer.

Figure 69. Middle Fork Popo Agie River at 41 cfs.

Fremont County Forest and Aspen Ecology Interpretive Signs (Goal 1) - Amy Anderson

Forest management is occurring across BLM, Shoshone National Forest, County and State lands to maintain and improve forest health, reduce fuels, provide wildlife habitat, and supply forest products. Society of American Foresters (SAF) partnered with Wyoming Game and Fish, Wind River Fire Prevention Council, Lander BLM, USFS, State of Wyoming Forestry Division, Fremont County Wildfire Hazardous Fuels, and Wind River BIA, the BLM, and the USFS to design, build and install 17 interpretive signs at twelve different locations on National Forest, State of Wyoming land, and BLM land in Fremont County. These signs will be adjacent to recent aspen regeneration treatments, fuels reduction projects, and forest health improvement projects. The signs are proposed to answer questions project managers are continually getting about why these projects are occurring, and what benefits they provide. To help the outdoor community understand why forest management is important to them as public land users, and to the wildlife that inhabit these areas. As an example, more than 3,200 acres of aspen enhancement has occurred in the vicinity of South Pass and the Loop Road. This area is one of the major hubs of outdoor recreation for the Lander community. By placing interpretive signs at both entrances to the Loop Road, and at trailheads along the way, there is potential to educate a multitude of users about the on-going forest enhancement projects nearby. Other areas where signs will be placed are Green Mountain near Jeffrey City, and Long Creek, Horse Creek/Double Cabin, Union Pass, and Brooks Lake near Dubois.

Lander Region Stream Temperature Monitoring (Goal 1) - Colter Brown

From 2022 through 2023, nine HOBO water temperature loggers were deployed at established monitoring sites in streams in the Little Popo Agie, Sweetwater, Upper Wind, and East Fork Wind River watersheds. Data were recorded every 30 minutes. These data will be used to calculate a suite of metrics to describe each stream's thermal regime (the magnitude, frequency, variation, and timing of temperature events). Stream temperature data have been collected at these established sites for 4-22 years to inform stream habitat and fish management decisions and to share with USGS scientists. Two new locations were added to Lander's water temperature monitoring sites in cooperation with the WyDEQ, one in the Sweetwater River and one in the Middle Fork Popo Agie River. The Sweetwater River site was chosen to monitor water temperature at the Hornyhead Chub transplant location near the Alkali Creek confluence. The Middle Fork Popo Agie River location was chosen to examine the relationship between water temperature and low summer stream flow in the city of Lander. The WGFD cooperated with WDEQ by helping create a sampling and analysis plan to that ensures high data quality and allows WDEQ to also use the data.

Figure 70. Stream temperature logging site.

Little Red Creek Bridge Wildlife Passage (Goal 3) - Amy Anderson and Kevin Howard

The Red Creek Bridge on U.S. Highway 26 is sometimes used as an underpass for bighorn sheep, mule deer and moose seeking water from the Wind River, but the dense vegetation under the bridge has precluded more use. The dense vegetation reroutes wildlife above grade and puts them at a very high risk for collision with vehicles. Over winter 2022-2023, Habitat and Access personnel utilized a skidsteer with a mastication head loaned from the Bureau of Indian Affairs to mow willows around

the Highway 26 Bridge at Little Red Creek. The intent is to open sight lines and opportunities for improved wildlife passage. Crews also cleared willow, juniper, and other vegetation around a warm spring/wetland upstream of the bridge to try to entice bighorn sheep to drink from this site rather than cross the highway to the Wind River. In late summer, Sage Vegetation Management sprayed the mowed area to maintain more open habitats and targeted species also included noxious weeds such as Russian knapweed and Canada thistle. Funding was provided by the WyWSF.

Figure 71. Moose and mule deer have benefited from the vegetation removal under the bridge.

Bain Meadow Restoration (Goal 1) - Brian Parker, Miles Proctor, and Kevin Howard

As part of the Spence & Moriarity WMA 10-Year Plan, irrigated fields/meadows have been farmed to increase forage palatability, combat noxious weeds and ultimately generate hay for use on the western Wyoming elk feedgrounds. Hay meadow farming is typically accomplished over a two-year period. In 2022, the WGFD farmed approximately 180 acres and planted a cover crop to improve soil management on the Bain Meadow. In 2023 the WGFD farmed these again to improve soils, and planted the field with grasses as the production crop and also planted a cover crop to allow the grasses to establish.

Figure 72. Clearing irrigation ditch on Bain Meadow.

Mill Creek BDAs (Goal 2) - Amy Anderson and Colter Brown

The USFS and WGFD team continued to work in the Mill Creek drainage in 2023 installing 7 new BDAs and continuing maintenance on the previous 20 BDAs. The new BDAs were installed in a section of stream where conifer removal already occurred. In a continuing integrated approach to aspen and riparian enhancement on South Pass, BDAs should contribute to water storage in the Mill Creek drainage, which will promote aspen and willow recruitment. Trespass cattle concerns in this area due to dilapidated boundary fencing between BLM/USFS. Additional fence inventory was conducted in 2023 to inform future fence discussions with the Rock Springs BLM, lessees, and the Shoshone National Forest.

Spence & Moriarity WMA Noxious Weed Management (Goals 1 and 2) - Brian Parker, Miles Proctor, and Kevin Howard

Annual herbicide application is a crucial part of the WGFD habitat management strategy. The majority of the irrigated hay meadows are certified "Weed Free". The hay produced here is then used on the WGFD elk feedgrounds in Sublette and Teton counties. Upland weed management

promotes habitat integrity and minimizes noxious weed spread with migrating wildlife. The WGFD contracted with the Rocky Mountain Agronomy Center to apply herbicide across irrigated meadows on Spence and Moriarity WMA to control noxious weeds, largely white-top and Canada thistle, in early June and July. Additionally, Fremont County Weed & Pest sprayed a variety of noxious weed species on irrigated meadows and rangeland starting in July and continuing through fall 2023. Habitat and Access personnel also dedicated substantial contract personnel time to noxious weed control.

Ocean Lake WHMA Grazing (Goals 1 and 2) - Brian Parker and Justin Rhine

Ocean Lake WHMA is grazed on a five year, five pasture rotation cycle. Each field is grazed with a short duration high intensity prescription during the month of January. Grazing reduces herbaceous matter accumulation, and promotes vigor and palatability of grasses, benefiting waterfowl and deer. Additionally, high intensity grazing serves to fertilize each pasture for the upcoming growing season. Each pasture is rested for four years following winter grazing allowing for sufficient recovery. In 2023 we grazed the Parkhill fields.

Figure 73. Cattle grazing on Ocean Lake.

Popo Agie River Restoration (Goal 2) - Colter Brown

The Popo Agie River is a Red Ribbon Trout fishery (300-600 lbs. of trout per mile) that is regionally popular for anglers. The only public land access is a state section five miles north of Lander. The lessee has allowed the USFWS and NRCS to conduct river bank stabilization projects in the past (2010 and 2014), and maintained a fence to protect the riparian area from overgrazing. These projects along with improved grazing practices have improved habitat conditions, but more work is needed to restore the river habitat for trout, riparian habitat for many wildlife species, and to protect infrastructure for the lessee. Many issues with the Popo Agie River can be attributed to past or present land use activities and dewatering. These issues caused considerable agricultural land loss, a lower water table, and a decrease in deep-rooted native riparian vegetation. Improving the river habitat would benefit Brown Trout, Rainbow Trout, and Mountain Whitefish, and improved riparian habitat would benefit many wildlife species. Additionally, a project would improve the limited fishing and hunting resource while helping a lessee that is already managing the land in a way that benefits wildlife and the public. In 2023, bank erosion was assessed, project sites were identified, and the Lander AHAB coordinated with the Popo Agie Conservation District to secure funding for a design report and engineering. Streambank erosion rates were estimated using the BANCS model and by measuring the lateral erosion rate observed in the last 10 years using aerial imagery. In 2024, we plan to have an engineering firm complete a design report and designs for all project sites.

Figure 74. Popo Agie River on the state land section near Lander.

Red Rim - Daley WHMA Grazing (Goal 1) - Brian Parker and Matthew Pollock

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

Big Middle Fence Replacement (Goals 1 and 3) - Brian Parker, Miles Proctor, and Kevin Howard

The fences bordering the Wind River Indian Reservation and Spence and Moriarity WMA receive the most pressure from trespass cattle in the region. The Habitat and Access crew along with private contractors replaced 3.81 miles of fence bordering the Wind River Indian Reservation. This fence serves to keep out trespass cattle and feral horses from the reservation while still allowing for big game movement. The old fence was wildlife friendly but many old posts were rotten and wires were rusty which allowed horses and cattle to cross. The fence was replaced with new wildlife friendly materials.

Figure 75. New corner brace on Spence and Moriarity WMA.

South Pass Aspen (Goal 2) - Amy Anderson

This was the eighth year of on the ground treatment work for the South Pass Aspen Project, and another year of excellent partnership with the Shoshone National Forest. Integrated aspen restoration continued with conifer removal from aspen stands, additional BDA maintenance and construction, boundary fence inventory and maintenance, and a variety of treatment methods. In 2023, Summitt Forests conducted 75 acres of coppice cutting in the Townsend Creek/Fossil Hill vicinity. This consisted of cutting all conifer within the aspen stand, and also cutting all aspen larger than 2" dbh. Cutting aspen parent trees should stimulate them to root sprout more quickly than just removing conifer. This is the second year of coppice cutting along the northern portion of the Loop Road. Some private land work continued in the Twin Creek area, where 153 acres of treatment was completed using a combination of lop and scatter, and cutting and hand piling conifer slash. Partnering with Wyoming State Forestry, private land pile burning will occur over the next several years. This year, 228 acres of treatment occurred on private and USFS lands. Funding partners include RMEF, USFS, WGBGLC, and WWNRT.

Figure 76. Mule deer browse on aspen leaves on South Pass.

Wiggins Fork, East Fork Canal, Bear Creek and Settling Ponds Maintenance (Goal 1) - Brian Parker, Kevin Howard, and Kade Clark

Removal of silt and debris from the irrigation canals on Spence and Moriarty WMA occurs annually to improve water efficiency on commission owned irrigated lands. These irrigated lands are critical winter range for elk, mule deer, and bighorn sheep. In 2023 silt and debris were removed from almost 25 miles of ditch on the Wiggins Fork, East Fork, and Bear Creek canals, located on the Spence and Moriarty WMA. 2.5 acres of settling ponds were also maintained. These ponds allow silt deposition to be more localized within the irrigation system and easier to remove.

Squaw Creek / Baldwin Creek Russian Olive (Goal 2) - Amy Anderson

The Popo Agie Weed Management Association (PAWMA) has been working since 2020 on the removal of invasive Russian olive trees impacting the riparian system of the Squaw Creek drainage near Lander. Russian olive trees are cut using chainsaws and piled for future burning. Larger stumps are collected by a local woodworker for furniture construction. Cut stumps are immediately treated with the herbicide triclopyr ester, mixed with methylated seed oil to prevent re-sprouting. In 2023, PAWMA shifted to the Baldwin Creek drainage. This is a parallel drainage to Squaw Creek with similar impacts from Russian olive. Like Squaw Creek, this project aims to control Russian olive higher up in the drainage downstream toward the confluence with the Popo Agie River. In addition, the effort will improving wildlife habitat by reducing competition with native trees and shrubs, improve wildlife access to important habitats, and improving native riparian vegetation. In 2023, DeFord Timber Services was hired to remove Russian olive on three properties. A total of 4.5 canopy acres were removed and 77 acres of adjacent land has been protected. The PAWMA group coordinated with Sprouts Greenhouse to provide large potted buffaloberry shrubs and cottonwood trees to landowners who removed Russian olive. These plants were provided both as an incentive to maintain their Russian olive-free status, and to promote re-establishment of native trees and shrubs in removal areas. Funding partners include Fremont County Weed and Pest, National Wild Turkey Federation, Popo Agie Conservation District, Fremont County Fire Protection, and private landowners.

Figure 77. Before and after Russian olive removal on Baldwin Creek near Lander.

Strawberry Creek Watershed Zeedyks (Goal 2) - Colter Brown

Strawberry Creek is a tributary to the Sweetwater River with degraded wet meadow habitat. Wet meadows are vitally important to wildlife providing hot spots of productivity and are heavily used by sage grouse and other wildlife, especially when uplands dry in the summer. Multiple influences, beginning in the mid 1800's with grazing and travel on the Oregon Trail, have degraded these wet mead-

ows. In the Strawberry Creek watershed many wet meadows have headcuts, hummocks, and have become channelized. The WGFD has been working closely with the BLM to help restore wet meadows in the Strawberry Creek watershed. In 2021, Zeedyk structures, which are hand placed rock structures, were placed in an ephemeral tributary of Strawberry Creek. The structures have improved habitat conditions, so the WGFD and BLM have decided to expand the project. In 2024, 50 Zeedyk structures will be installed in two other ephemeral tributaries to Strawberry Creek. The structures are designed to prevent headcut migration, slow and spread the movement of water, and build back the system over time by catching sediment. These changes will increase the watersheds water retention, productivity, and resilience to drought.

Figure 78. Wet meadow enhanced with Zeedyk structures.

Sweetwater River Riparian Fence (Goal 2) - Colter Brown

The Sweetwater River and its riparian area on the Split Rock Ranch, near Jeffery City, are crucially important for many wildlife species, and the river currently supports trout and a variety of native fish species. The area is crucial range for pronghorn antelope, moose, and mule deer, is a core area for sage grouse, and is an aquatic crucial area for riparian and SGCN fish species. Currently, the Split Rock Ranch's reach of the Sweetwater River is generally incised, overly wide and shallow, has poor riparian vegetation health, and has many actively eroding banks. In addition, wildlife are frequently caught and killed in fences near the river and irrigated land. The Split Rock Ranch would like to restore the river and riparian area health on the 16.2 miles of river they control and reduce wildlife mortality in fences by adjusting fence lines to make a separate riparian pasture and converting to wildlife friendly fences. The proposed fence would allow grazing on irrigated and range pastures while eliminating or greatly reducing grazing near the river. Reduced grazing near the river will allow riparian vegetation to recover and restore river health. To reduce wildlife mortality, the fence will use standard wildlife friendly practices that make the fence more visible and passable for a myriad of wildlife species. WGFD has been working with the ranch and NRCS to develop solutions that maximize river and riparian habitat benefits while allowing the ranch to efficiently and successfully operate. Fence removal and replacement began in fall 2023, and all fencing is expected to be completed by fall 2026.

Figure 79. Sweetwater River area to be protected with riparian fencing.

Sweetwater River Watershed Plan (Goal 2) - Colter Brown

An assessment of the Rock Creek watershed, a sub-watershed of the Sweetwater River, has been conducted from 2020 to 2023 to describe stream and riparian habitat, identify major watershed issues, describe possible restoration approaches, and outline future enhancements. The Sweetwater River has been prioritized to preserve habitat for SGCN fish and riparian reliant wildlife. The Wyoming Habitat Assessment Methodology was used to document current conditions along approxi-

mately 66 miles of the Sweetwater River and 77 stream miles of tributaries. In 2023, current conditions were documented on the four remaining undocumented miles of the Sweetwater River in the Rock Creek sub-watershed and on 7 miles of tributaries. Throughout the Sweetwater River, excessive lateral streambank erosion and low density and recruitment of willow communities is common, but some tributaries are in notably better condition. During assessments of the Sweetwater River, riparian herbaceous vegetation stubble height was often near or less than 2-3 inches in the fall. Wild ungulates and livestock contribute grazing pressure to these degraded riparian communities. High spring flows combined with reduced stream bank stability caused by degraded riparian vegetation have led to excessive bank erosion, over-widening of the channel, and channel incision. However, in tributaries, especially where they transition to USFS, conditions are often much better with stable banks and age class diversity of willow communities. The

Figure 80. Rock Creek.

improved condition is likely related to differences in grazing practices and increased productivity outside the riparian area. Habitat assessments will continue in 2024, focusing on areas where restoration actions have been proposed and where there is the greatest interest and feasibility for future restoration.

Sweetwater Focal Mule Deer Research (Goal 3) - Amy Anderson, Jill Randall, and Stan Harter

In 2022, WGFD initiated the focal mule deer research project across five herds in the state, one of which is the Sweetwater mule deer herd. This intensive research is designed to deliver robust population information, assessments of future harvest opportunities, and an enhanced ability to evaluate the results of management actions. In November, 2022 80 does, 30 bucks and 100 juveniles were collared. Survival and movement data has been collected. During summer 2023, habitat data collection methods were piloted in this herd. Data was collected including RHA, line point intercept transects and fecal samples to better understand habitat selection and quality as well as evaluate differences between herds. Habitat data collection methods will be refined and expanded in future years.

Figure 81. Habitat data collection point for a doe in the Sweetwater focal mule deer research project.

Trail Lake Seeding (Goals 1 and 2) - Amy Anderson, Brian Parker, Miles Proctor, and Kevin Howard

Trail Lake Meadows is located above the Whiskey Mountain Conservation Camp on Whiskey Basin WHMA. Trail Lake Meadow was farmed and seeded in spring 2023. Seeding was a mix of legumes and grasses identified as nutrient rich forage for the bighorn sheep and other big game found in the area. A cover crop was also planted to give immediate forage for wildlife and control erosion from moisture. An irrigation system was installed to improve grass production for grazing wildlife.

Whiskey Mountain Irrigation Infrastructure (Goal 1) - Brian Parker and Kevin Howard

Silt and brush were removed from the Torrey irrigation canal on the Whiskey Basin WHMA to improve water efficiency on commission owned irrigated lands. These irrigated lands are critical winter range for elk, mule deer, and bighorn sheep. Silt, debris and ditch bank overgrowth removal occurred on a little over a mile of irrigation ditch. Check structures along with a bubbler to convert remaining open ditch into gated pipe were also installed on the Whiskey Basin WHMA. This maintenance ensures water gets to WGFD irrigated lands. The conversion to gated pipe allows more accurate water distribution on meadows and decreases evaporation loss during transport.

Figure 82. Torrey irrigation canal maintenance.

Whiskey Basin WHMA Noxious Weed Management (Goals 1 and 2) - Brian Parker, Miles Proctor, and Kevin Howard

Habitat and Access personnel and Fremont County Weed & Pest sprayed a variety of noxious weed species including white-top, Canada thistle and cheatgrass on irrigated meadows, rangeland, and road right of ways starting in July and continuing through fall of 2023. Noxious weed management is an important component of promoting rangeland health, to benefit bighorn sheep, elk and deer. Upland range is surveyed and sprayed annually in this management effort.

Whiskey Basin Conifer Removal (Goals 2 and 3) - Amy Anderson

This project was initiated in 2023 by inventorying timber to determine prescriptions, tree densities, species, and treatment polygons. With a path forward identified, WGFD began conifer cutting using Summitt Forests Inc in an area of heavy conifer with a high percentage of Douglas fir. The prescription was very conservative due to the aspect and density of trees. In areas of less dense conifer, and higher incidence of sheep use, treatments were more aggressive, especially adjacent to rocky outcrops and cliffs which constitute bighorn sheep escape cover. Opening additional foraging and loafing habitat, movement corridors, access to mineral licks and watering locations is a high priority of the Whiskey Technical Committee. This work will likely continue over the next several years, and will expand to include treatment areas on BLM, USFS, and Wilderness as opportunities arise. In 2023, a total of 107 acres of encroached conifer removal was completed along the Torrey Rim Slope. A combination of lop and scatter, and cut and hand pile prescriptions were used. Piles will be burned at a future date. Funding partners include NFWF, WGBGLC, and WyWSF.

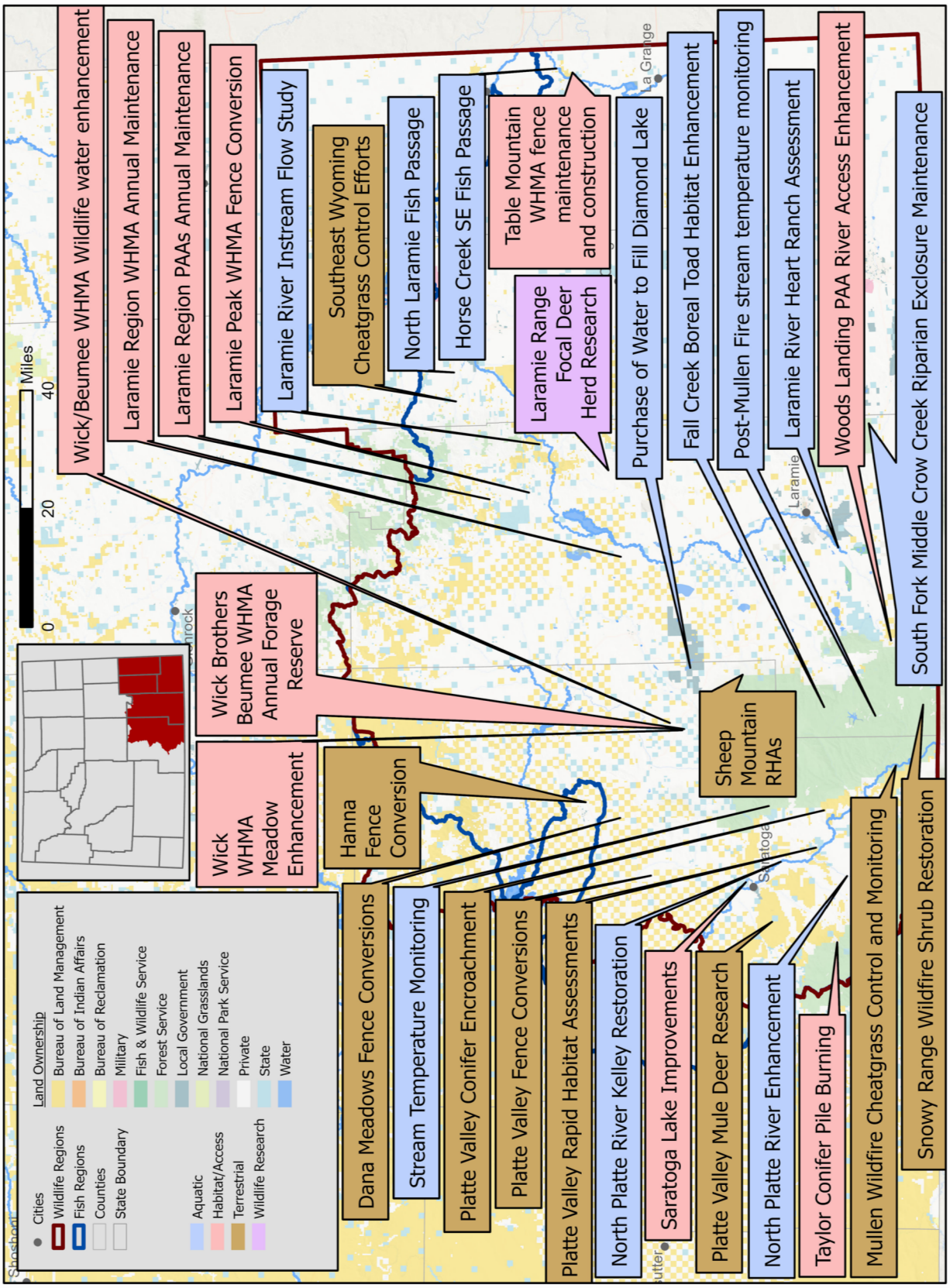
Willow Creek Riparian Fence Conversion (Goal 2) - Amy Anderson

The Willow Creek Riparian Fencing project is a cooperative effort between the Split Rock Ranch, USFWS Partners Program, Popo Agie Conservation District, and WGFD. Due to the importance of the area for sage grouse and other wildlife, the landowner initiated plans to protect as much of the riparian habitat on the Split Rock Ranch as feasible. In 2023, more than 4 miles of old fence was replaced with wildlife friendly 3 barbed/1 smooth wire fencing with the specifications of top height no more than 42", and bottom wire at a minimum height of 18". The remaining 3 miles of fencing to complete the 1,000 acre riparian exclosure will be completed in spring 2024. The overarching goal is to improve stream and riparian habitat along Willow Creek. At times during construction, project managers noted as many as 130 wild horses grazing, loafing, or drinking from Willow Creek. This

level of pressure is not sustainable, if healthy riparian habitat is to be maintained. The landowner also has a strong desire to expand beaver colonies along Willow Creek to reduce sediment flowing into the Sweetwater River, and to create fish habitat, as well as promoting healthier terrestrial wildlife habitat. Willow stands must be maintained and expanded in order to support beaver, and this would not be possible with current levels of use by feral horses. Funding partners include the USFWS – Private Lands Program and WWNRT.

Figure 83. Willow Creek Fence under construction.

LARAMIE REGION



From prairie streams along the Wyoming-Nebraska border to high alpine vegetation in the Snowy Range, the 2023 work in the Laramie Region addressed a diversity of habitat types. From routine maintenance on more than 40 Public Access Areas and 11 Wildlife Habitat Management Areas (WHMAs), to exciting new land agreements and a variety of projects to better understand and support wildlife, the region worked tirelessly to improve habitat in 2023.

Several land purchases and lease renewals were made in the Laramie Region last year. The purchase of the Hansen Property expanded the Jelm WHMA by adding 459.7 acres of critical mule deer winter range and high-use migration routes. An agreement with the City of Cheyenne renewed the John and Annie Woodhouse WHMA and extended its use for an additional 20 years. Two road easements were also signed to increase public access to state and federal lands; Sims Land and Livestock granted a free lease to an access road and parking lot, and the Pitcher-Brokaw Access Easement was renewed for an additional 20 years. These land purchases and access agreements mark significant steps towards enhancing wildlife habitat conservation and providing recreational opportunities for the public.

Aquatic habitat projects in the region focused on restoring river connectivity, stabilizing eroding banks, monitoring biological and physical characteristics of fish habitat, and maintaining and evaluating exclosure areas. For example, on Fall Creek, boreal toad habitat was improved by planting willows and constructing beaver dam analogs in 2022. The restored area was then enclosed with an electric fence in 2023 to allow the willows to establish without browsing pressure. Meanwhile on Horse Creek, two irrigation diversions underwent significant improvements and modifications, facilitating the reconnection of 23 miles of stream habitat utilized by a high density of native fish. Extensive aquatic monitoring of these and other areas is ongoing, with an added emphasis on watersheds burned in the 2020 Mullen Fire.

Terrestrial habitat projects in the region ranged from deploying and retrieving GPS collars on moose, bighorn sheep, and mule deer, to addressing conifer and cheatgrass encroachment, and converting or removing wildlife unfriendly fences. For example, 10 GPS-collared bighorn sheep in the Ferris-Seminoe herd were monitored to understand their habitat use and movement outside of the herd unit's boundaries. Impacts of recent wildfires were also a continued focus for terrestrial habitat projects last year, with teams monitoring the recovery of native perennial vegetation, GPS-collaring moose occupying burned areas, and spraying aerial herbicides to prevent cheatgrass invasion during recovery.

Importantly, the work conducted in the past year would not have been possible without the support of critical partners. Partnership with non-profit organizations, local conservation districts and governments, state and federal agencies, and volunteers made these projects possible. From our funders to the folks on the ground leading or assisting on these projects, the region is grateful for the support they have received in making the projects summarized here come to fruition.

Wick / Beumee WHMA Wildlife Water Enhancement (Goals 1 and 2) - Jerry Cowles, Micah Morris, Mac Foos, and Todd Grosskopf

The WGFD, in cooperation with a neighboring landowner, developed an alternative water source through a storage tank and tire tanks. The project aims to decrease livestock pressure on riparian areas. The solar well and storage tanks ensure a consistent water supply for migrating wildlife. This initiative plays a crucial role in supporting the diverse needs of wildlife, fostering a healthier and more resilient ecosystem. Creating separate water sources for livestock and wildlife minimizes competition for this essential resource. The project's overarching goal is to enhance habitat conservation by preserving riparian areas and ensuring sustained water availability. This contributes to the overall health and biodiversity of the Wick/Beumee WHMA.

Figure 84. Installation of storage water tank.

Dana Meadows Fence Conversion (Goal 3) - Ryan Amundson and Britt Burdett

In the fall of 2023, the WGFD, BLM, Medicine Bow Conservation District, and USFWS Partners for Fish and Wildlife removed 3.5 miles of woven wire/barbed combination fence in important elk, pronghorn, and mule deer habitat on Dana Meadows Ranch's deeded lands. A new, wildlife-friendly 4-wire fence (three barbed, one smooth) will be constructed in summer 2024. This project builds upon a previous, 10 mile fence conversion project on Dana Meadows that was completed in 2021. The new fence should increase overall habitat connectivity, decrease big game mortalities, and maintain proper grazing systems.

Figure 85. Pronghorn stuck in woven wire fence.

Diamond Lake Water Delivery Assessment (Goal 2) - Jerry Cowles and Del Lobb

The WGFD, in collaboration with Wheatland Irrigation District (WID), executed a 10-year agreement initiated in 2017, allowing Game and Fish to purchase up to 1,000 acre-feet of water annually. The water, delivered through a pipeline constructed by Game and Fish in 2018 from the Cannon canal to the lake, began its journey on June 2 and concluded on June 22. A meticulous monitoring process was implemented, utilizing trail cameras, staff gauges, and dataloggers to ensure accurate measurements and accountability. The calculated delivery amounted to 800 acre-feet, with both WID and WGFD in agreement that 800 acre-feet were delivered. Game and Fish purchased this water at a rate of $1,000 per acre-foot, resulting in a total transaction value of $80,000. The successful water delivery contributed to raising the lake level to 7,350 feet on June 22. This accomplishment underscores our commitment to effective water resource management and conservation.

Douglas Creek Bighorn Sheep Study (Goal 3) - Ryan Amundson and Lee Knox

We collared 19 adult ewes, including 6 recaptures, from the Douglas Creek Herd Unit on February 12, 2022. The median age was 4.5, with the oldest being 9.5, and the youngest 3.5. An additional 5 adult ewes were collared in March 2023 to maintain sample size. There were no post capture mortalities during either captures. Tonsil and nasal swabs were sampled on all captured sheep, and Mannheima haemolytica and M. ovipneumoniae were found in the majority of the sheep sampled. This herd was previously sampled in 2019 and M. ovipneumoniae was not detected at that time. However survival still remains high with only three mortalities in 2022 and one in 2023. The collars will remain on sheep until December 2024. The data gathered will be used in habitat selection and movement analyses to prioritize future habitat projects and bighorn sheep conservation.

Figure 86. Carrying bighorn sheep to be fitted with radio collar.

Encampment River Bighorn Sheep Research (Goal 3) - Britt Burdett and Teal Cufaude

Over the last four winters, helicopter/net-gun capture and collar efforts have occurred in the Encampment River bighorn sheep herd unit. As of February 2023, there were nine GPS collared bighorn sheep within this herd. These collared sheep will be monitored until collars release in January 2024. In 2023, data on released collars was downloaded and preparations for data analysis were started. Data analysis will continue with the collars that release in 2024. Fine-scale movement data collected from the GPS collars will help managers fully understand the movements of this herd, and to delineate the habitats these bighorn sheep select. Managers will use these data to determine high-use ranges and movement routes and to better quantify the habitat attributes that might limit the expansion of this herd. Encampment River bighorn sheep research is funded by WyWSF and WGBGLC.

Figure 87. Searching for collared bighorn sheep with students from Encampment K-12.

Fall Creek Boreal Toad Habitat Enhancement (Goal 2) - Ryan Amundson, Steve Gale, and Wendy Estes-Zumpf

The Fall Creek Boreal Toad habitat enhancement seeks to maintain beaver pond habitat used by the toads for breeding. Fall Creek is located in the Medicine Bow Mountains. Without active beaver, remnant beaver ponds fill with sediment and vegetation and render the area unsuitable for Boreal Toad breeding. Additionally, willow species in the drainage are severely browsed and lack height needed for beaver dam and lodge building materials. To bridge the gap between existing and optimal Fall Creek beaver habitat conditions, nine BDAs were constructed in 2022 within a 420-foot reach to mimic beaver pond habitat. The BDAs maintain water depths necessary for Boreal Toad breeding.

In 2022, to aid willow diversity along Fall Creek, approximately 300 cuttings of wolf and Geyer's willows (which are less palatable to wildlife) were planted along the BDA enhancement reach. The last phase of erecting an electric fence to exclude wildlife from the project area, was completed in 2023. The Laramie Region AHAB, Laramie Region THAB, Herpetological Coordinator and USFS personnel worked collaboratively to acquire fencing materials and construct the 2.8-acre, 6-foot high, 6-strand wildlife electric fence. This Boreal Toad breeding habitat exclosure is constructed of over 100 10-foot poles and over two miles of wire. The fence was in operation from August through October. The fence was monitored weekly to ensure wildlife were not being entrapped and that any damage to the fence was fixed. Prior to winter, a large portion of the perimeter was left open to facilitate wildlife movement. The fence will be reconnected in May or June and a gate installed to improve functionality in 2024. Monitoring of the fence and area will be an important part of the ongoing work at this site in 2024.

Figure 88. WGFD and USFS personnel constructing fence.

Table Mountain WHMA Fence Maintenance and Construction (Goal 1) - Jerry Cowles, Jacob Sorensen, Kade Clark, Mac Foos, and Todd Grosskopf

The Table Mountain WHMA Fence Conversion Project was undertaken collaboratively by the BLM and Habitat and Access crews, focusing on transforming existing fence lines and constructing new wildlife-friendly fences. This initiative recognizes the importance of mitigating the impact of fences on wildlife habitats, ensuring a harmonious coexistence between conservation efforts and fencing infrastructure. This collaborative effort capitalizes on the combined skills and resources of both teams to address the critical need for wildlife-friendly fencing. Modifications are made to existing fencing to minimize potential barriers to wildlife movement and migration, fostering a habitat that aligns with conservation goals.

Figure 89. Fence on Table Mountain WHMA.

Ferris-Seminoe Bighorn Sheep Research (Goal 3) - Britt Burdett and Teal Cufaude

In February 2020, ten bighorn sheep in the Miracle Mile area were collared to monitor movements. These collars were released from sheep in December 2022 and an additional ten sheep were collared in February 2022. These ten collars will be released in December 2024. Each day, wildlife managers receive four locations for each collared animal. An R code was developed to automatically notify managers if a collared bighorn sheep has left the herd unit boundaries. Data gathered from these collar efforts will be primarily used to monitor movements outside the herd unit boundaries, but could also be used to evaluate bighorn sheep habitat use in the Ferris-Seminoe herd unit. Additionally, managers will use collared animal data to evaluate annual trend flight results and estimate the population. Ferris-Seminoe bighorn sheep research is funded by WyWSF and WGBGLC.

Hanna Fence Conversion (Goal 3) - Ryan Amundson

One half mile of woven wire/barbed fence was converted to a 4 wire fence south of Hanna to help facilitate pronghorn and mule deer movements, as they migrate to and from Hanna Draw annually in spring and fall. Existing fences create substantial bottlenecks to wild ungulate movements, and this site was recognized by the cooperating private landowner as an area where pronghorn are heavily concentrated and struggle through this reach each year in their annual migrations. Funding was provided by BOW.

Figure 90. Fence conversion to assist pronghorn migration.

Horse Creek Fish Passage (Goals 2 and 3) - Nick Scribner

Work was completed at two irrigation diversions (Lawrence Ditch & Horse Creek Lateral) on Horse Creek south of Torrington, WY to improve fish passage and maintenance concerns. The Horse Creek drainage supports one of the highest densities of native fishes, and some of the highest densities of SGCN including suckermouth minnow, plains topminnow, brassy minnow, and common shiner. Addressing these two diversions reconnects year-round access to over 23 miles of habitat and reduces long-term maintenance for water users. Construction was completed in spring 2023 at Lawrence Ditch to replace a dilapidated sheet piling structure that created a two foot jump barrier to fish. This diversion also provides water to Packers Lake, which is a PAA that provides fishing and wildlife viewing opportunities on a 73 acre reservoir. Improvements included moving the point of diversion upstream, installing a new headgate with trashrack, modifying the stream channel geometry and stabilizing with 300ft of toe-wood and sod mats, planting 700+ willows, seeding, riparian fencing, and piping the first 450ft of ditch. Water users extended the pipeline another 450ft past the highway crossing due to a deteriorated culvert that was restricting irrigation flow under the roadway. In fall 2023, construction was completed at Horse Creek Lateral diversion, which is 3.5 stream miles upstream of Lawrence Ditch. A 380ft long fishway

Figure 91. New Lawrence Ditch headgate on Horse Creek.

was built at this 4ft high diversion dam that previously only allowed seasonal passage during non-irrigation months (November - March) through a bypass gate. Rehabilitation of the dam was also completed to extend the lifespan of this structure. Now with year-round passage possible, fish in Lower Horse Creek will be able to access some of the best available habitat in Horse Creek upstream of this site. The Fort Laramie irrigation canal dumps 80cfs into Horse Creek 12 miles upstream and uses Horse Creek as a conduit before diverting it at Horse Creek Lateral diversion. These higher flows provide cooler temperatures, more food and cover, and refuge areas from predators for fish. Fu-

ture monitoring efforts are planned to document fish movements through these improved irrigation diversions and throughout the lower watershed. Funding partners include the North American Waterfowl Conservation Act, USFWS – Fish Passage, WGBGLC, Wyoming Water Development Commission, WWNRT, NRCS, and USFWS – Great Plains.

Wick WHMA Meadow Enhancement (Goals 1 and 2) - Jerry Cowles and Micah Morris

On the Wick WHMA, discing of the Johnson-Oleson meadow occurred to remove the existing seedbed, preventing the dominance of aggressive weedy species. Seedbed preparation ensured optimal seed-soil contact, promoting the germination of planted seeds. A dormant forb and legume seeding covering 100 acres in select portions of the Johnson-Oleson meadow aimed to enhance the native forage base for wildlife throughout all seasons. The seeding process followed seedbed preparation to maximize germination and establishment. Fertilization of the Johnson-Oleson meadow occurred in 2023, stimulating seedbed fertility and microbial activity within the organic soils. Hydrologic restoration efforts included the construction of irrigation delivery diversion structures to aid in supplemental water transfer to a mile of gated pipe. Re-seeding riparian areas along Wagonhound Creek occurred to address erosion, sedimentation, and stabilize stream banks. This contributes to improved plant diversity, soil health, and enhanced wildlife values in sensitive areas. The integrated meadow enhancement project at Wick Brothers-Beumee WHMA reflects a holistic and sustainable approach to habitat conservation. By addressing seedbed quality, native forage availability, fertilization, and hydrologic restoration, this initiative plays a vital role in fostering a resilient and balanced ecosystem that benefits both wildlife and the surrounding environment.

Figure 92. New irrigation diversion box on Wick WHMA.

Landscape Vegetation Analysis (LaVA) (Goal 2) - Britt Burdett

The Landscape Vegetation Analysis (LaVA) Project was developed in response to changed forest vegetation conditions caused by the bark beetle epidemic and other forest health issues. LaVA allows for up to 288,000 acres to be treated over fifteen years through a conditional NEPA based process. The WGFD continues to work with the Medicine Bow National Forest and other federal, state, and local cooperators to plan and implement habitat projects that improve wildlife habitat by diversifying age class, improving stand health, and increasing species diversity.

Laramie Peak Bighorn Sheep Disease Surveillance (Goal 3) - Ryan Amundson and Keaton Weber

This collaring project is part of the statewide bighorn sheep disease surveillance effort, to garner baseline information on the various respiratory pathogens within Wyoming's wild sheep populations. For the Laramie Peak herd unit (Hunt Area 19), the primarily goal is to monitor respiratory disease outbreaks that could potentially cause large or small scale die-offs. Additionally, this collar data will assist in identifying seasonal movement patterns, crucial winter ranges, habitat selection, lambing areas, and cause specific mortality and survival estimates. In 2023, ten new collars and two old collars were deployed. Collars are scheduled for release in January 2026. As of December 2023, 21 collars remain online as a result of collaring efforts in the last couple of years. There were 6 mortalities throughout 2023. Cause of mortalities included: pneumonia (1), mountain lion predation (1), com-

plications during birth (1), and unknown (3). The primary concern with this herd unit is outbreaks of respiratory pathogens. In 2019, there was a small scale die-off due to a Pneumonia outbreak within the Sybille Canyon sub-herd and these collars will aid in monitoring future disease outbreaks and mortalities. Mortality notifications from collars will notify managers of major die-offs. Funding partners include WGBGLC and WyWSF.

Figure 93. Collecting samples to test for disease.

Laramie Peak WHMA Fence Conversion (Goal 3) - Jerry Cowles and John Henningsen

In 2023, we converted another 2.5 miles of fence on the Laramie Peak WHMA. With this project we are transforming dilapidated, overly tall woven wire fences to a wildlife-friendly specification. We have identified over 40 miles of fencing to convert over the course of this multi-year project. Field work began in 2021; we have successfully converted 10 miles thus far. Serving as a crucial winter range for bighorn sheep, elk, mule deer, and pronghorn, Laramie Peak WHMA plays a pivotal role in supporting diverse wildlife populations during critical winter months. Wildlife-friendly fencing enhances wildlife access to key seasonal habitats, promoting natural movement patterns. Wildlife-friendly fencing on our WHMAs also sets an example of proper stewardship, fostering public awareness and understanding of the benefits for both wildlife and livestock operations. Converting to wildlife-friendly fencing reduces annual maintenance, allowing crews to focus efforts towards valuable habitat enhancement projects that conserve wildlife. The Vale Ranch is a key and trusted partner in the management of the Laramie Peak WHMA. Driven by a commitment to responsible land stewardship, Vale Ranch aspires to expand wildlife-friendly fencing efforts across their lands, setting an inspiring example for neighboring ranches. The Laramie Peak WHMA Fence Conversion is a multi-stakeholder collaboration, addressing fencing challenges and promoting a collective commitment to wildlife-friendly land stewardship. Thus, this initiative not only benefits wildlife within the WHMA but also catalyzes positive change across the broader landscape. Funding partners during Phase 1 of this project included WWNRT, RMEF and MFF.

Figure 94. New 4-strand fence on Laramie Peak WHMA.

Southeast Wyoming Cheatgrass Control (Goal 2) - Ryan Amundson

Over 6,000 acres were aerially treated with herbicides to control cheatgrass in southern portions of the Laramie Range on critical wildlife habitat areas. Three of four project sites were impacted by previous wildfire events. One project was completed due to cheatgrass infestations showing up 7 years post-prescribed fire. Monitoring sites were established pre-treatment and will be visited annually to determine herbicide efficacy and will aid in making informed decisions about re-treatments in some areas if necessary. Several years of control are anticipated with Rejuvra being applied. Funding partners include the BLM, MFF, RMEF, and WyWSF.

Figure 95. Herbicide application to control cheatgrass.

Laramie Range Focal Deer Herd Research (Goal 3) - Ryan Amundson and Keaton Weber

In 2022, five mule deer herds were selected throughout the state to conduct an intensive monitoring program to aid managers in making future management decisions with struggling mule deer populations. The Laramie Mountains mule deer herd unit (Hunt Areas 59, 60, and 64) was chosen as one of these focal herds to better understand why this population is not performing the way it has historically. The project consists of fitting does, bucks and juveniles with GPS collars over 5 years. Specifically, a sample of 80 does and 30 bucks will be maintained for all 5 years and 100 juveniles will be collared each year, for the first 3 years. This focal herd project will help provide managers with robust population estimates, herd composition data, and vital cause-specific survival estimates across all portions of the population. In addition to these population metrics, collar data will also help managers make informed decisions on habitat improvements, fence modifications and assist in providing informed recommendations in the face of energy and mining developments. With this herd unit, managers are most interested in learning which portion of the population is not surviving and what the leading causes of death are (predation, CWD, malnutrition, etc.). In late November and early December 2022, 210 (80 does, 30 bucks, and 100 Juveniles) deer were captured and fitted

Figure 96. Vegetation transect conducted for habitat evaluation.

with GPS collars. Causes of mortality are pending determination from a pathologist. In early December 2023, the second year of captures and collar deployments were completed. A total of 130 deer were captured from November 27 through December 1. We captured 99 Juveniles (90 with collars and 9 with solar ear tags), 22 does, and 9 bucks to reach the target sample size of 30 bucks and 80 does. The hunt area breakdown was 40 deer captured in Hunt Area 59, 24 in Hunt Area 60, and 66 in Hunt Area 64. Average fawn weight was 79 lbs. The survival rates from 11/25/2022 – 7/3/2023) were 86% for bucks, 78% for does and 70% for

juveniles. In June and September 2023, local biologists completed 5 Rapid Habitat Assessments and 12 line point intercept transects within identified mule deer home ranges for 2 collared does, to assess current habitat conditions in areas selected by does for fawning and fawn rearing. These pilot sampling methods will be refined and implemented more widely in 2024.

Laramie Region PAAs Annual Maintenance (Goal 1) - Jerry Cowles, Micah Morris, Jacob Sorensen, Mark Cufaude, and John Henningsen

PAAs within the Laramie Region play a pivotal role in providing recreational opportunities for the public, ranging from hunting and fishing to birding and camping. The annual maintenance and enhancements of these areas ensure a balance between public recreation, ecological conservation, and responsible land management. Crews conduct annual maintenance to preserve habitat, mitigate impacts, and promote safe and responsible public recreation. Thirty-three miles of boundary or interior fences are maintained annually. Wildlife-friendly fencing designs are emphasized where possible to showcase responsible land management practices. Ongoing efforts include the installation and updating of signs to provide directional, regulatory, interpretive, and informational awareness. Maintenance or contract oversight is provided for 60 miles of currently designated "open" roadways with 66 associated parking areas. Oversight on 11 contracts ensures service for comfort stations, litter removal, and the collection of public use/recreational data. Noxious weed control involves various methods, including herbicide applications, hand removal, mechanical removal, grazing, revegetation, and biological control. Regular removal of silt and debris from boat ramps, adjustment of boat docks to match seasonal water levels, and repairs to boat docks contribute to safe and ample recreational opportunities.

Figure 97. Boat dock at Diamond Lake.

Laramie Region WHMA Annual Maintenance (Goal 1) - Jerry Cowles, Micah Morris, Jacob Sorensen, Mark Cufaude, and John Henningsen

The Laramie Region has 11 WHMAs. These WHMAs require annual monitoring, maintenance, and improvement. These actions aim to protect and enhance critical wildlife habitats, showcase land use practices, and provide high-quality recreational experiences. Approximately 257 miles of boundary and interior allotment fences were maintained in 2023. An additional 17.6 miles were converted to wildlife-friendly specifications, emphasizing responsible land management practices. Irrigation water was spread across 1,658 adjudicated acres, contributing to wildlife nesting cover and wintering habitat. Intensified efforts in 2023 targeted noxious weed control, involving collaboration with private contractors and County Weed and Pest districts. State-designated noxious weeds on 1,183 acres within regional WHMAs were eradicated or con-

Figure 98. Wildlife friendly fence install.

trolled. Maintenance on more than 316 miles of roads and 57 parking areas. New or updated signs provide directional, regulatory, interpretive, and informational awareness on managed lands. Remote building facilities at four WHMAs and the Laramie Regional Office undergo structural enhancements, roof repairs, water drainage improvements, siding repairs/replacements, kitchen remodels, electrical, plumbing, HVAC upgrades, water quality testing, and annual inspections. The annual efforts in Laramie Region WHMAs signify the WGFD's dedication to ensuring the long-term health and viability of these critical habitats, enriching the wildlife experience for all and reinforcing the balance between conservation and recreation.

Laramie River Heart Ranch Assessment (Goal 2) - Steve Gale

The Heart Ranch, also known as Bath Ranch, sprawls along the Laramie River encompassing around 8,200 acres. This ranch dates back to the early 1860s, and has the oldest recorded water rights along the Laramie River. Through a joint purchase agreement between the City of Laramie and The Conservation Fund, the ranch was acquired. The City secured 4,600 acres, with the remaining acres going to The Conservation Fund. The City's primary interest in the Heart Ranch lies in its water rights. Beyond water rights, the City of Laramie is exploring additional potential uses such as public access, hunting, and fishing. The City of Laramie is collaborating with the Wyoming Game and Fish Department to assess these opportunities. A level 1 watershed assessment was conducted for a segment (4 mile) of the Laramie River that flows through the City of Laramie Heart Ranch, using the Wyoming Habitat Assessment Methodology (WHAM). The WHAM survey was conducted to gather baseline data on stream and riparian area characteristics. Baseline data were also collected on the fish assemblage. Laramie Region Fish Management surveys found the Laramie River through the Heart Ranch supports a naturally reproducing wild Brown Trout fishery, in addition to native nongame fish such as Brassy Minnow (SGCN), Creek Chub, Common Shiner (SGCN), Fathead Minnow, Iowa Darter (SGCN), Johnny Darter, Longnose Dace, Longnose Sucker, and White Sucker. The Laramie River through the Heart Ranch has experienced riparian habitat degradation and dewatering. The assessed segment mostly displayed characteristics of a C channel. Pools and runs are common, while riffles are rare. The channel substrate and bank material

Figure 99. Typical eroding bank on the Laramie River.

are mostly gravel and sand (>80%). Bank erosion varies between 25-50% along the entire segment. In addition to the WHAM level 1, a rapid bank erosion assessment was conducted along a 3,700-foot reach of the Laramie River within the WHAM segment. To conduct the rapid assessment, Bank Erosion Hazard Index (BEHI) variables were measured on five banks to determine a BEHI rating. Three of the five evaluated banks are actively eroding, contributing approximately 105 tons of sediment to the river annually. An estimated 24-35% of the banks within the rapid assessment reach are actively eroding and are contributing between 157 tons to 370 tons of sediment to the river annually. If the City of Laramie pursues angler access within the Heart Ranch, future habitat work could help improve stream function and increase habitat complexity. Therefore, additional field measurements will be collected in 2024 to facilitate future planning.

Laramie River Water Temperature Monitoring (Goal 1) - Del Lobb, Steve Gale, and Bobby Compton

The Laramie River downstream of Wheatland Irrigation District's Tunnel Dam supports a population of Hornyhead Chub, a Species of Greatest Conservation Need. In 2021, the dam was rebuilt. Since then, flow releases and leakage during the summer can be very low, sometimes near zero, raising concerns about high water temperatures affecting Hornyhead Chub and other fish populations in the river. Summer water temperature monitoring was conducted at four locations in the 18-mile river section downstream of the dam. Monitoring locations, sites 1-4, were 0.8, 2.6, 12.4, and 18 river miles from the dam. Maximum water temperatures at Site 1 and Site 4 were 80.6° F and 79.9° F on August 21. A maximum temperature of 76.3° F occurred on July 24 at Site 2. On July 30, maximum temperature at Site 3 was 75.5° F. Stream stage monitoring and three flow measurements were done at Site 2. SEO stream flow gages located near Sites 1 and 4, show that summer flows typically were higher in 2023 than in 2021 and 2022. The relationship between stream flow and water temperatures in 2023 will be assessed. Future monitoring is being considered.

Figure 100. Laramie River water temperature monitoring.

Mullen Wildfire Cheatgrass Control Monitoring (Goal 2) - Ryan Amundson and Britt Burdett

Areas burned in the 2020 Mullen Wildfire continue to be monitored through annual visits to vegetation monitoring plots. Eighteen vegetation plots were visited throughout the burn scar, where species diversity, percent control of cheatgrass in treated sites, percent bare ground, and other variables are documented. Heavy snowpack followed by favorable spring and summer moisture in 2023 aided in further perennial, native vegetation recovery. Areas treated with herbicide continue to exhibit strong cheatgrass control. Monitoring will continue on treated and untreated areas within the burn scar to determine if, and when, a potential re-treatment may be necessary in some areas.

Figure 101. Mullen wildfire habitats assessed post-burn.

North Laramie Fish Passage Monitoring (Goals 1 and 3) - Nick Scribner

Improvements were made in fall 2022 at two irrigation diversions (North Laramie Canal and Wilson No. 1) on the North Laramie River near Wheatland, WY to improve connectivity to over 13 miles of stream. These diversions previously were barriers to fish movement, but both were replaced with roughened rock channels to simulate natural riffles. Longitudinal profile surveys were collected of the as-built conditions in March 2023 before spring runoff to verify elevations met design specifications and allow future comparisons. These surveys were repeated in late August to determine any changes

following runoff conditions. Channel adjustments occurred at both diversions, but were more pronounced at Wilson No. 1 where significant bed movement occurred. Following construction, Wilson No. 1 had a 125ft long roughened channel at a 2.8% slope using various rock sizes up to 2ft. Rock as large as 4ft was used at the crest or top of the roughened channel. When surveyed in August, we documented a 0.5-2ft drop in bed elevation of the thalweg over the first 70ft of the roughened channel downstream of the crest. This material was deposited immediately downstream over a distance of 130ft ultimately raising the thalweg 0.5 to 1ft and reducing the slope of the roughened channel to about 2.4%. The large movement of bed material suggests the roughened channel dimensions and/or material gradation were not sized properly. Having larger material at greater quantities throughout the constructed channel would have likely created more stability. However, the primary objective of improving year-round fish passage was not compromised at either site, though periodic monitoring will be done to ensure project goals are being met.

Figure 102. North Laramie River channel improved for fish passage.

Treasure Island Information Kiosk (Goal 1) - Mark Cufaude and Steve Gale

Upgrades were made to Treasure Island PAA boat ramp and parking area in 2021 and 2022. The upgrades were needed to address boater safety while landing and launching watercraft as well as parking issues and traffic flow. After the upgrades to the parking area and boat ramp, new signage was instrumental to educate and inform users of what the overall project addressed. A three panel kiosk was installed with signage informing users of rules, regulations, along with the unique resource and management challenges of the Upper North Platte River system.

Figure 103. Treasure Island information kiosk.

North Platte River Enhancement (Goal 2) - Jim Wasseen, WLCI

The Saratoga Encampment Rawlins Conservation District is leading efforts to restore the North Platte and Encampment rivers. Due to high flows on the Encampment River during spring 2023, repair work was needed on the Peryam and Riverside Phase III sites downstream from Encampment. These sites were restored in recent years through the dedication and funding from the Conservation District, landowners, TU, WWNRT, WGFD, WLCI, and other partners. WLCI funding allowed repairs to a sill and a mini-vane. Cobble was moved to reestablish a bankfull bench on Peryam. Work at the Riverside Phase III site consisted of repairing a head cut from an overtopped irrigation ditch which was threatening the river work. Two aggrading point bars were excavated to relieve bank stress and reduce erosion. The excavated material was used to grade erosive slopes and promote river access to the floodplain. Also, at the Riverside site, a large rock cross vane was extended into the chan-

nel, reducing the river's ability to bypass it during high flows. The Conservation District will continue to monitor the sites to inform future designs and track success of the projects.

North Platte River Kelley Restoration 2023 (Goal 2) - Jim Wasseen, WLCI

The Saratoga Encampment Rawlins Conservation District is leading efforts to restore the North Platte and Encampment rivers. Two phases of a three phase stream restoration effort were completed on the North Platte River at the Kelley Ranch a few miles upstream from Saratoga. A total of 2,400 feet of the 3,600 feet project was completed in fall 2023. A natural channel pattern was created with a stable bankfull bench and toewood to reduce lateral bank erosion. The restored reach transports sediment, provides trout habitat and minimizes agricultural land loss. The riffle width to depth ratio was decreased which improves sediment transport. Boulder mini-vane structures direct water velocity away from the outside of the meander bends while creating deeper pools for fish and other aquatic species. These pools provide refugia during low, warm summer flows and during periods of winter ice. The reduction of the size and slope of the opposing point bars further minimizes stream bank stress by allowing higher spring runoff flows to inundate point bars. Willow clumps, willow stakes, and native grass mix were used to encourage faster regrowth of riparian areas, further adding to stream bank stability and vegetation diversity. The remaining 1,200 feet of river restoration is scheduled to be completed in late summer-early fall 2024. The project is the result of the combined efforts and funding of the Saratoga-Encampment-Rawlins Conservation District, NRCS, WWNRT, and WLCI.

Figure 104. Restoration with toewood and bankfull benches with willow plantings on the North Platte River.

Platte Valley Conifer Encroachment (Goal 2) - Britt Burdett

As part of the collaborative PVHP effort, the BLM is continuing its large-scale conifer encroachment removal efforts in the Platte Valley. The Barrett Ridge/Corral Creek project focuses on the removal of encroaching juniper in mixed mountain shrub communities. The BLM completed approximately 214 acres of juniper mastication in the project area in 2023. This work was completed in sage-grouse core area and mule deer winter range. Funding was provided by the BLM and WWNRT.

Platte Valley Fence Conversions (Goals 2 and 3) - Britt Burdett

Through the Platte Valley Habitat Partnership, the Saratoga-Encampment-Rawlins Conservation District (SERCD), BLM, WGFD, USFS, and private landowners have worked collaboratively to identify fences within the Platte Valley mule deer herd unit that are in need of wildlife-friendly fence conversion. These fence conversions are intended to increase overall habitat connectivity, decrease big-game mortalities, and maintain proper grazing systems. In 2022, 10.2 miles of fence were planned to be converted to wildlife-friendly specifications. Only 9.2 miles were completed with plans to complete the remaining mile the following spring. In 2023, the remaining mile of hazardous fence was converted to wildlife-friendly specifications. Additionally, 0.82 miles of unnecessary fence were permanently removed. Members of the Platte Valley Habitat Partnership also participated in an agency volunteer day to tear down two exclosures that were burned in the Mullen fire. These exclosures were once used to monitor vegetation responses to domestic and wild ungulates but have not been used or maintained for years. Since 2014, the PVHP working group has converted over 71 miles

of hazardous fences. The PVHP working group will continue to prioritize large-scale fence conversions within the migration corridor and mule deer crucial range using the Platte Valley mule deer GPS collar data to guide our efforts. Funding was provided by USFWS Partners for Fish and Wildlife and WWNRT.

Figure 105. Recently converted wildlife friendly fence.

Snowy Range Wildfire Shrub Restoration (Goal 2) - Britt Burdett

Over the last 10 years, several large wildfires have occurred in the Snowy Range. Many of these fires burned through important wildlife habitats including parturition areas, crucial winter ranges, and migration corridors for mule deer, elk, and bighorn sheep. Recovery has been slow and prompted MDF to lead a large-scale shrub restoration effort in the Badger Creek (2018) and Mullen fire (2020) burn scars. To increase germination and survival rates, MDF staff and volunteers collected local seeds to be grown in a greenhouse. Approximately 69,315 big sagebrush and antelope bitterbrush seedlings were planted over 534 acres during the first week of October 2023. MDF plans to monitor seedling survival over the next five years. The goal is to accelerate shrub habitat restoration post-fire, reduce erosion, and reduce bare ground to limit invasive weeds. Funding was provided by the RMEF, MDF, WGFD, Wyoming Community Foundation, and the USFS.

Figure 106. Recently planted sagebrush seedling in the Mullen Fire burn scar.

Platte Valley Mule Deer Research (Goal 3) - Ryan Amundson, Teal Cufaude, and Britt Burdett

In February 2020, forty-seven (47) Platte Valley mule deer were fitted with GPS collars. The project area encompasses Deer Hunt Areas 78, 79, 80, and 81. The primary objective is to evaluate detailed movement data. In 2022, the collars that were still online began releasing per the initial collar programming. In 2023, data on collars was downloaded and preparations for data analysis were started. Data will be used to inform priority opportunities for habitat improvement projects including fence conversions, shrub enhancements, roadway crossings, and invasive species mitigation.

Platte Valley RHAs (Goal 2) - Britt Burdett

RHAs are conducted in MDI herds across the state to better assess habitat conditions across mule deer seasonal ranges. The summer of 2023 was the ninth year of RHA data collection in the

Platte Valley. In 2023, two aspen (82.20 acres), six rangeland (342.40 acres), and four riparian assessments (17.61 acres) were completed in the Platte Valley mule deer herd unit. The information obtained from these assessments will primarily be used for Herd Unit Objective Reviews (conducted every five years) and annual data will be summarized in Job Completion Reports. These data will provide population managers and the public with documentation of the current state of mule deer habitat conditions in the Platte Valley.

Figure 107. Mixed mountain shrub stand near Encampment.

Post-Mullen Fire Stream Temperature Monitoring (Goal 2) - Steve Gale

The Mullen Fire consumed over 175,000 acres in 2020 and had a significant impact on the Medicine Bow-Routt National Forest. A substantial portion of the forest impacted was within the Middle Douglas Creek watershed. Specifically, the fire affected 89% of the watershed, with 72% experiencing moderate to high soil burn severity. This is particularly significant because Douglas Creek is renowned for being one of the most productive trout fisheries within the forest (Brook, Brown, and Rainbow Trout) and providing substantial recreational benefits. Douglas Creek is also an important spawning tributary for migrating Brown and Rainbow Trout from the North Platte River. Five Habitat Quality Index (HQI) monitoring sites were established in 2021 to monitor the impacts of the Mullen Fire. The HQI model, developed by the WGFD, uses nine biological, chemical, and physical trout habitat attributes to estimate relative habitat suitability in a stream. This monitoring will help track the impacts of the Mullen Fire on trout populations and their habitat. Post-fire HQI monitoring will continue on a 1-3 year rotation. Part of the HQI is summer stream temperature monitoring. Therefore, three monitoring locations were established within the portion of the Douglas Creek watershed (i.e., two locations in Douglas Creek and one in Muddy Creek) impacted by the fire. A control site was established on the Middle Fork Little Laramie River, which did not burn. Water temperature data will be downloaded annually and ultimately compared to the control site to understand the magnitude of post-fire water temperature shifts.

Figure 108. Muddy Creek riparian area.

Saratoga Lake Improvements (Goal 1) - Mark Cufaude, Mac Foos, and Todd Grosskopf

In 2021, yellow perch were documented in Saratoga Lake and in fall 2022 a large scale treatment was conducted to remove the perch. Prior to water being returned to the lake a fish screen was installed on the inlet ditch. This was completed by using a precast concrete structure to mount the screen and numerous large concrete blocks set in to the ditch bank to anchor the structure. The crew also

worked on the fishing access points along the dam while the lake was drained. They added river rock and gravel to each point to increase the ease of access for sportspersons.

Sheep Mountain RHAs (Goal 2) - Ryan Amundson

Fourteen RHAs were completed in the Sheep Mountain mule deer herd unit in 2023, totaling over 309 acres. In total, 7 RHA's were completed in aspen habitats encompassing 125.3 acres. Five RHAs totaling 172 acres were completed in rangeland habitats. Finally, two riparian assessments were completed totaling 12.6 acres. Late seral aspen and mixed mountain shrub habitats dominated most areas evaluated in the northern half of the mountain range. Lack of disturbance has resulted in diminished habitat values for mule deer and other wild ungulates. Species diversity, forage quantity and quality have all decreased in these habitats as succession continues. Some areas evaluated are also negatively impacted by subdivision developments in historical transition range for mule deer.

Figure 109. RHA focused on fringe habitats on private and USFS lands.

Sheep Mountain Mule Deer Study (Goal 3) - Ryan Amundson and Lee Knox

In spring 2017, the WGFD marked 60 does with GPS collars that collected locations every two hours. Preliminary data suggest that, while we sampled broadly, much remains to be learned from animals that interact with I-80 and those that move through alpine and subalpine habitats on the north end of the Snowies. We deployed 30 collars November 2020-February 2021 in portions of the herd where additional habitat and movement data are critical to ongoing conservation. Fifteen collars were retrieved in November 2023 and fifteen remaining collars will fall off in early 2024. Analysis of collar data will occur in 2024.

Figure 110. Collared mule deer doe.

Snowy Range Moose Research (Goal 3) - Britt Burdett and Teal Cufaude

The field component of this project began in February 2022; nine female adult moose were captured via helicopter darting on winter habitats within and surrounding the Mullen Creek Fire scar. Moose were fitted with GPS store-on-board collars set to collect hourly locations, which will allow us to compare movement and habitat use of moose prior to and following this large-scale fire. These nine collars will remain deployed for a period of four years (through 2025). A second capture occurred in 2023 to collar 21 female moose in the study area. These 21 moose will be collared through 2026 to improve study sample size and garner an understanding of longer-term impacts of fire on moose and moose habitats. Snowy Range moose research is funded by Wyoming Sportsmans Group, BOW, and WGBGLC.

South Fork Middle Crow Creek Riparian Exclosure Maintenance (Goal 1) - Steve Gale

Six fenced exclosures were constructed in conjunction with the Cheyenne Stage II Water Development Diversion Project in 1985 to stabilize stream banks along the South Fork of Middle Crow Creek. The exclosures were to remain in place "until it is determined by the US Forest Service (USFS), in cooperation with the Wyoming Game and Fish Department, that the stream banks were stable enough to withstand livestock traffic." Two of the exclosures were removed in 2005 and the four remaining exclosures will remain in place at USFS discretion to benefit the riparian ecosystem. With the assistance of WGFD and USFS personnel, the Laramie AHAB coordinated efforts to evaluate and repair the four cattle exclosures on South Fork Middle Crow Creek. The Laramie AHAB will continue to work with USFS personnel on exclosure maintenance.

Stream Temperature Monitoring (Goal 1) - Steve Gale

Two water temperature monitoring locations were established in 2015 at the Encampment River and Wagonhound Creek. Water temperature loggers installed at these sites record annual fluctuations in stream temperature and data is downloaded on an annual basis. Two loggers are used at each monitoring location to provide redundancy in case one logger is lost or fails to work. Long-term water temperature monitoring at these two locations will help with understanding temporal and spatial variations in stream temperatures within the Laramie Region.

Figure 111. Wagonhound Creek site.

Taylor Conifer Pile Burning (Goal 2) - Mark Cufaude and Britt Burdett

A contractor was used to remove conifer trees from the understory of an aspen stand to increase recruitment and regeneration of aspen along with forbs. The project was completed and the contractor piled the removed conifers. WGFD employees assisted the landowner with burning the piles. The pile burning started in December 2022 and was completed in December of 2023. Crews waited until safe levels of snow were present to reduce risk. Piles were then shoveled and ignition commenced via drip torches and fuses.

Figure 112. Slash pile burning.

Wick Brothers WHMA Grazing (Goal 1) - Jerry Cowles and Micah Morris

The Wick Brothers WHMA Forage Reserve Project was initiated in 2019. The Forage Reserve employs a Lease Agreement with Double 8 to graze livestock, while providing habitat utilization of

nearly 12,257 acres in exchange for various improvements within the boundaries of the Wick WHMA. An integral component of the initiative involves resting private lands with high wildlife use. This strategic approach not only contributes to habitat conservation but also acknowledges the importance of maintaining a healthy and balanced ecosystem beyond WHMA boundaries. The targeted approach supports natural recruitment and dispersal through essential hoof action, fostering a diverse and resilient ecosystem. The deferred rest-rotational grazing plan stimulates compensatory growth of perennial communities, providing a foundation for sustainable plant development. A utilization target of 40% ensures sustainable plant development, expanding perennial communities to support a variety of wildlife species. The Wick Brothers WHMA forage reserve is an initiative that combines sustainable grazing practices, wildlife habitat management, and collaboration between stakeholders.

Figure 113. Livestock grazing on Wick WHMA.

Woods Landing PAA River Access Enhancement (Goal 1) - Jerry Cowles and Micah Morris

The Woods Landing PAA River Access Enhancement project was completed in 2023. This marks a significant step in ensuring the safety and convenience of waterway enthusiasts. The WGFD installed a strategically positioned boat ramp. The construction of a 60 X 16 foot flex-a-mat ramp, combined with the use of native materials to create J-hooks, not only prioritizes safety but also contributes to the re-establishment of physical and ecological river functions. The ramp, conveniently located near the junction of Wyoming State Highways 230 and WY Highway 10, serves as a crucial take-out point for boaters.

John and Annie Woodhouse WHMA Renewal (Goal 1) - Lands Administration Branch

The John and Annie Woodhouse WHMA, spanning 680 acres in Laramie County along the North Fork of Crow Creek, is owned by the City of Cheyenne through its Board of Public Utilities. Since 2013, it has been managed for public access, offering opportunities for hiking, fishing, wildlife viewing, and archery hunting. The area features the scenic North Fork of Crow Creek, and reservoir providing water for the City of Cheyenne, and recreational opportunities.

The Lands Branch collaborated with the Board of Public Utilities, and WGFD's Habitat and Access crew to secure a renewed agreement, extending its term to 20 years. We look forward to the continued success of the John and Annie Woodhouse WHMA in serving as a recreational and wildlife habitat educational resource for the community.

Figure 114. John and Annie Woodhouse WHMA.

Sims PAA (Goal 1) - Lands Administration Branch

Due to the abandonment of a portion of County Road 440 by Carbon County in 2022, a section of State Land was left without public access. Sims Land and Livestock generously offered to grant a lease at no cost to the Commission, facilitating the establishment of an access road and parking area on their property. This initiative was a collaborative effort between the Lands Branch and Laramie Region Staff. The public is now permitted to park on lands owned by Sims land and Livestock, providing them foot or horseback access to the adjacent state section. This mutually beneficial arrangement enhances public access while addressing the challenges posed by the road abandonment.

We believe that this five year lease, with an option to renew for an additional five years will significantly contribute to the Commission's commitment to providing public access to state lands.

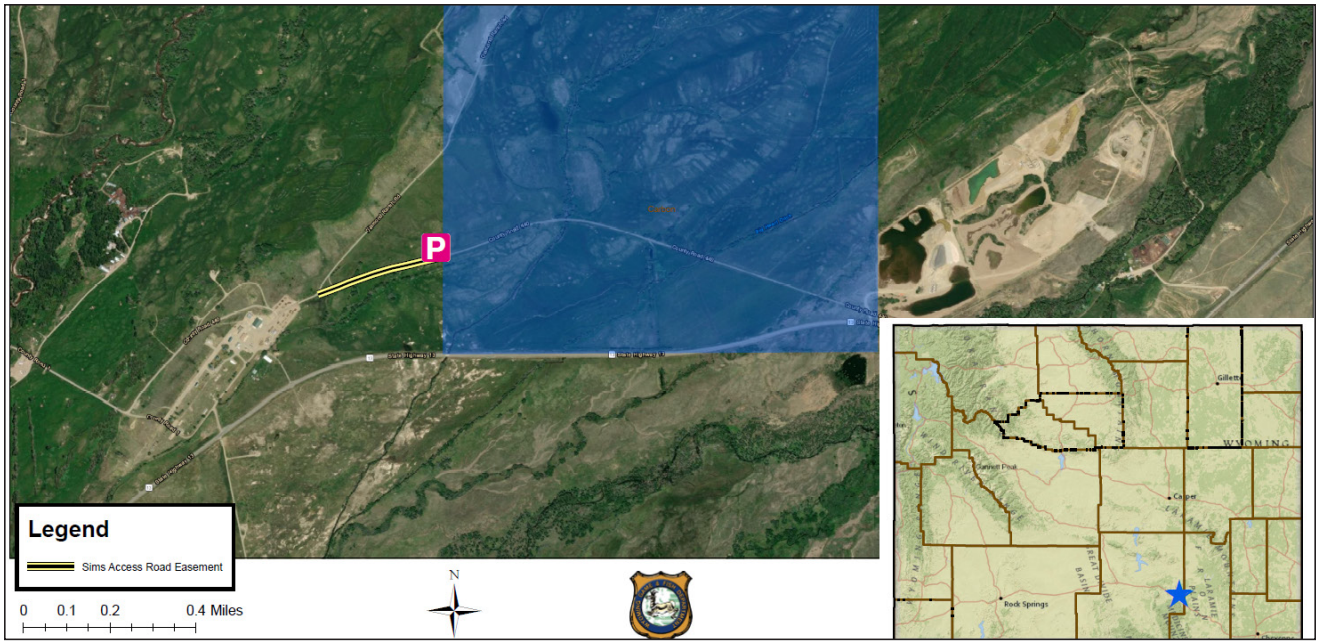


Figure 115. Sims PAA.

Pitcher-Brokaw Access Easement Renewal (Goal 1) - Lands Administration Branch

This access easement located just south of Arlington, in Carbon County, Wyoming, has been successfully renewed. The Pitcher-Brokaw easement has been providing public access through an agreement with the WGFC since August 2008. The access road consists of 3.57 miles of access road extending from County Road 13 through property owned by the Pitcher Family and the Brokaw Family, connecting to a large swath of Bureau of Land Management and United States Forest Service property south of I-80. The new easement will be open to the public from August 1st through December 31st of each year, for the next 20 years. WGFD collaborated with RMEF and WWNRT on this project. Their generous contributions of $150,000 significantly supported the access easements renewal.

This achievement underscores the partnership's commitment to providing the public with access to valuable natural resources for recreational and wildlife enjoyment. The partnerships with RMEF and WWNRT exemplifies the positive impact that collaboration can have on advancing our shared conservation goals.

Expansion of the Jelm WHMA (Goal 1) - Lands Administration Branch

The WGFC was able to complete the recent acquisition of the Fred and Patricia Hansen property, a 459.71 acre tract adjoining the Jelm WHMA. This significant acquisition was made possible through their generous offer to sell the property to the WGFC for below market value. The property is located 27 miles southwest of Laramie along Highway 10 in Albany County, and adjacent to the Medicine Bow National Forest. The parcel features varied vegetation, including mature aspen, juniper trees, mountain shrubs, sagebrush, rabbit brush and 15 acres of sub-irrigated meadows along the Laramie River. The terrain includes steep mountain hills, rock outcrops, and Porter Creek draining from the National Forest to the Laramie River.

An analysis of recent mule deer movement and location data using GPS collars indicates that the Hansen property falls within high-use migration routes and critical winter range. The Hansen family recognizes the importance of the property to wildlife conservation, particularly for mule deer, and is interested in conserving its ecological value into the future. The acquisition of this property ensures the public continues to have permanent access to three miles of Laramie River frontage in the newly expanded Jelm WHMA, and expands the size of the WHMA to 1,096 acres.

This strategic acquisition aligns with our commitment to conserving critical wildlife habitat and expanding public access to natural resources. The Laramie River frontage, diverse terrain, and adjacency to the Medicine Bow National Forest makes this property a valuable addition to the Jelm WHMA. The acquisition process was successfully finalized by the Lands Branch in December of 2023, marking a significant step towards enhancing wildlife habitat conservation and providing recreational opportunities for the public.

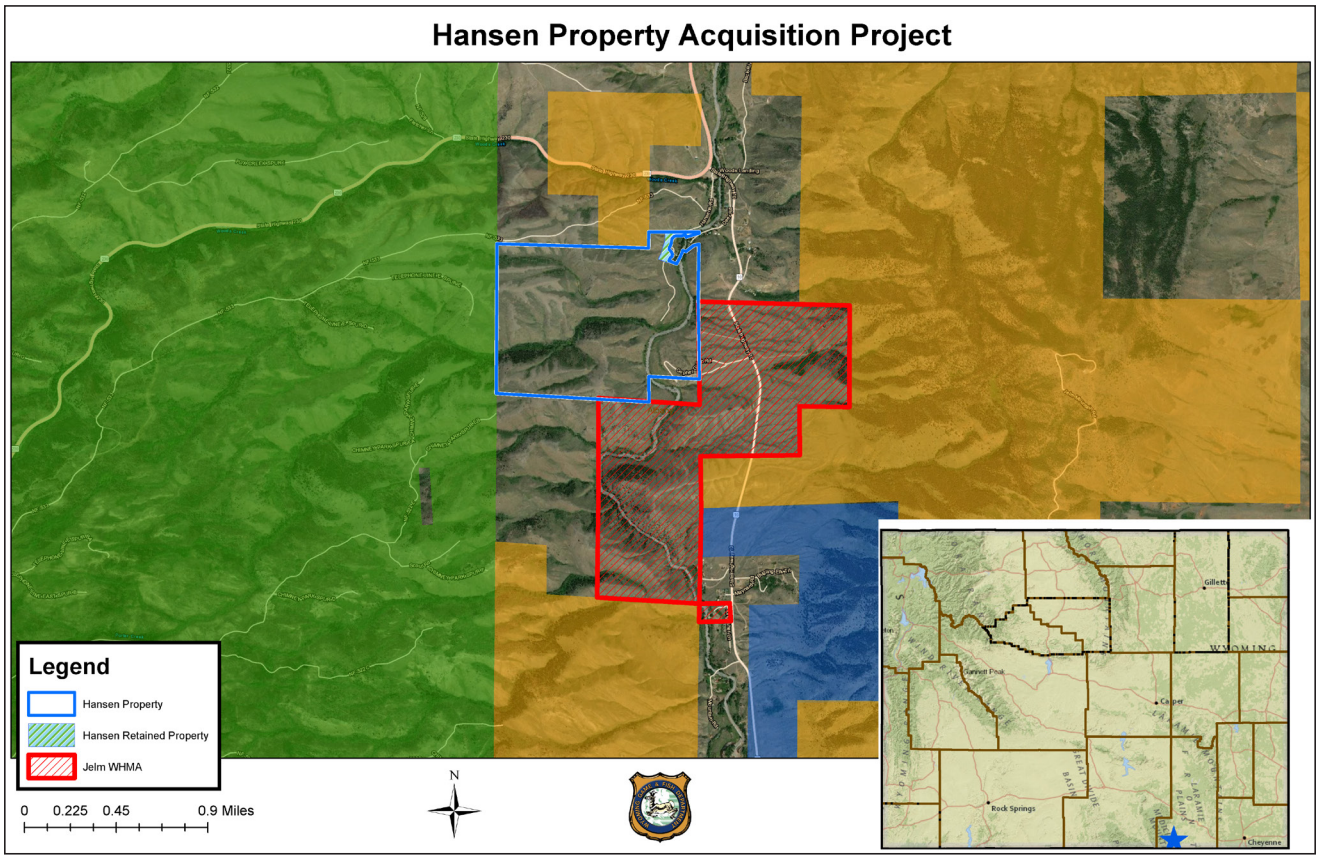
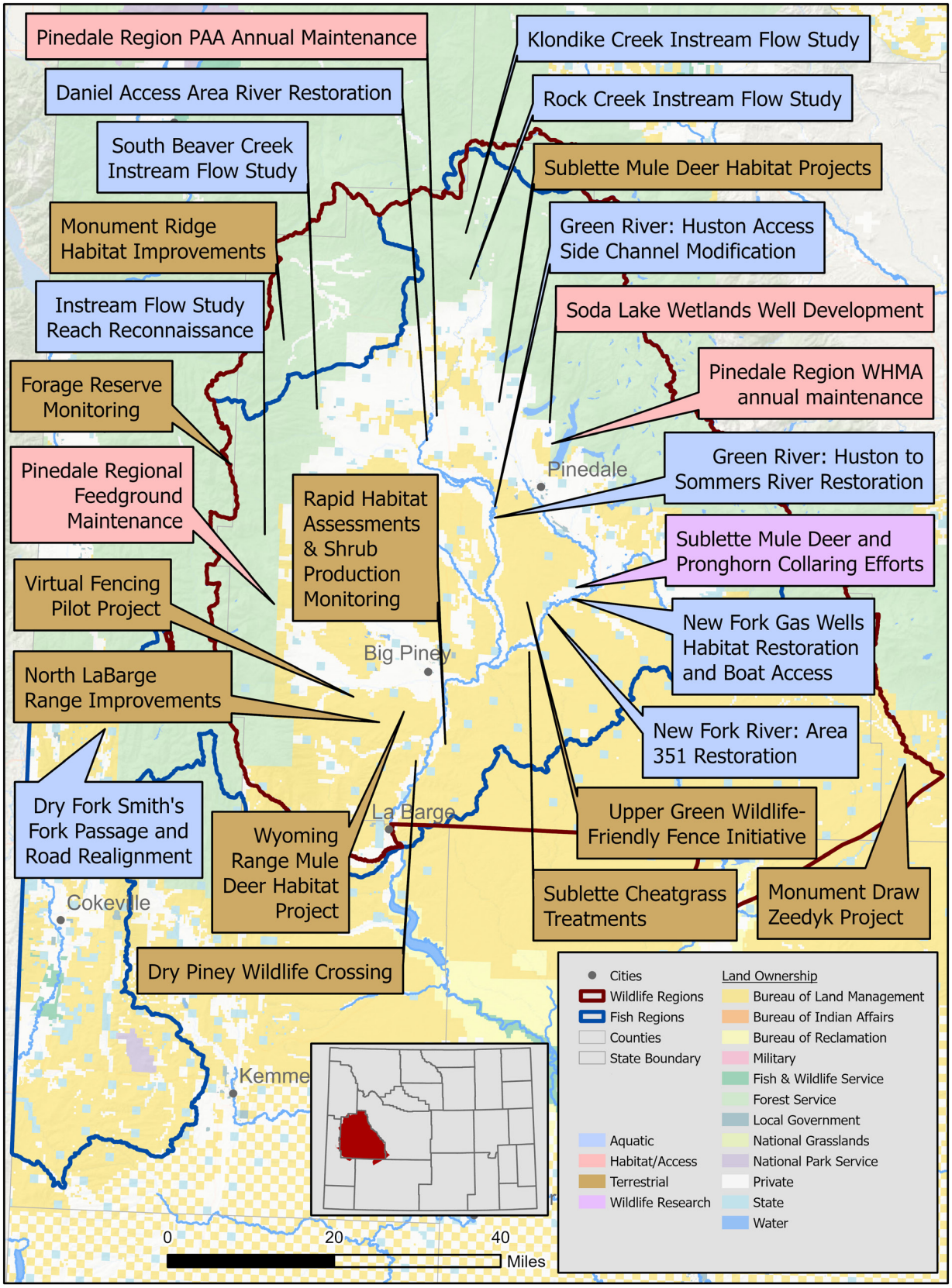
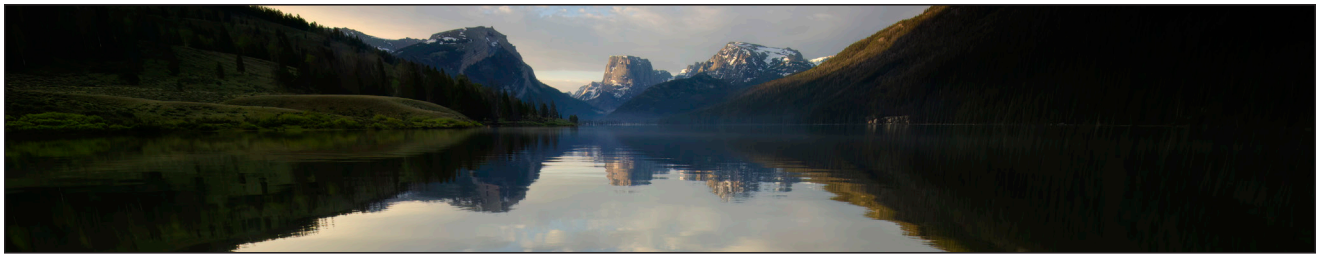


Figure 116. Jelm WHMA expansion.

PINEDALE REGION





The Pinedale Region lies in the western part of the state bound by the divide of the Wyoming Range on the west and the divide of the Wind River Range on the east. It extends north to Union Pass and south near Farson. It is home to the upper Green River and its iconic tributaries, the New Fork and East Fork rivers. Memorable lakes like Soda, Fremont, Half Moon, Burnt and Boulder lakes call this region home.

In 2023, habitat enhancement efforts within the region focused on improving riparian areas, improving wildlife habitats and facilitating wildlife and fish movement.

Most notably, after two years of construction, the Dry Piney wildlife crossing project was completed in partnership with the Wyoming Department of Transportation. The project includes nine underpasses and 17 miles of 8-foot tall fencing on both sides of U.S. Highway 189 to encourage big game, primarily mule deer and pronghorn, to use the underpasses and avoid wildlife-vehicle collisions. This section of highway has one of the highest wildlife-vehicle collision rates in Wyoming. It goes through the Wyoming Range, which serves as a crucial winter range for one of the largest mule deer herds in the West.

The most widespread issue facing Wyoming's wildlife are invasive annual grasses. Since 2011, collaborators in Sublette County have worked together to combat cheatgrass. Over the last year, over 1,600 acres were treated with both aerial and on-the-ground applications. Non wildlife-friendly fences also pose a risk to wildlife and cause entanglement and mortality. During 2023, the Pinedale Region assisted in converting approximately 19 miles of wildlife-friendly fencing and 16 fence-crossing structures.

Regional personnel also spent the year improving fish passage, restoring river access and improving riparian habitat. Fish biologists worked with partners to improve fish movement and realign the Smith's Fork road in Lincoln County. The Dry Fork Smith's Fork provides habitat for native fish assemblages, including the Northern Leatherside Chub and Bonneville Cutthroat Trout. Ongoing research work concerning Colorado River Cutthroat trout along the Klondike Creek in the Bridger Teton National Forest continues to be of research interest to the region. Collected data from the instream flow study will be used to identify appropriate flows for spawning, late summer habitats, overwintering and passage.

In addition to a range of targeted projects, the Pinedale Region continued to maintain its five wildlife habitat management areas and 25 Public Access Areas.

Daniel Public Access River Restoration (Goal 2) - Luke Schultz

In August 2021, river restoration and modifications to the boat ramp at the Daniel Access Area were completed. Stream modifications included the installation of a ~400' long constructed riffle that included three boulder steps and a 20' wide bankfull bench with a brush bank, a ~250' long deepened pool with toe wood along a ~15' wide bankfull bench, a 200' long bankfull bench with brush banks, and a ~150' long enhanced pool with toe wood. Following 2022 spring runoff, substantial erosion occurred on the toe wood section of this reach, which necessitated additional maintenance and a rebuild of the toe wood in 2022. While the river only peaked at just over 3,000 cfs, the site experienced a substantially long duration spring runoff in 2023. Despite the presence of these bankfull magnitude events, the newly constructed toe wood section performed well. We didn't observe more than one foot of lateral migration throughout the segment, and vegetation was establishing well. A wet summer in 2023 allowed additional vegetation establishment, but additional seeding and fertilization were performed to help boost nutrients and speed reestablishment efforts.

Figure 117. Two years post-construction.

Dry Fork Smith's Fork Passage and Road Realignment (Goal 3) - Jim Wasseen, WLCI

TU and the BLM coordinated efforts to improve fish passage and realign the Smith's Fork road (BLM Road 4213) in Lincoln County. A perched culvert is the last remaining stream crossing to be upgraded to a bottomless arched culvert. There are four stream crossings on this road and the other three were completed between 2017 and 2020. The Dry Fork Smith's Fork provides habitat for native fish including Northern Leatherside Chub and Bonneville Cutthroat Trout. Construction began in fall 2023 and the contractors were able to install the culvert, decommission and realign 500 feet of road, and fence the site prior to inclement weather. The instream restoration work and vegetation plantings planned for the site will commence spring 2024. Partners include the BLM, WWNRT, WLCI, Lincoln County, and Open Rivers Fund.

Figure 118. Bottomless arch installation.

Dry Piney Wildlife Crossing (Goal 3) - Jill Randall, Brandon Scurlock, and Gary Fralick

The Dry Piney wildlife crossing project was completed in partnership with WYDOT in fall 2023 after two years of construction. The entirety of the project included 33.4 miles of eight foot tall deer fence, eight box culvert underpasses and one arch-style underpass. This project was constructed in mule deer crucial winter range between Big Piney and LaBarge with a goal of significantly reducing wildlife vehicle collisions in this high priority area. Wildlife have started using the structures immediately, even before the deer fence was fully constructed. WYDOT installed trail cameras at

all underpass structures to evaluate use, and will continue this monitoring in future years to further evaluate effectiveness of the project. To date, many deer have successfully navigated all of the structures as well as documented use from moose. Pronghorn have also used the arch structure which was specifically designed to better accommodate the larger opening they prefer when using crossing structures.

Figure 119. Pronghorn use of the Dry Piney wildlife crossing.

Forage Reserve Monitoring (Goal 2) - Troy Fieseler and Ashleigh Rhea

The Wyoming Range Allotment Complex and Triple Peak Forage Reserve were created in 2004 and 2006 when donors facilitated voluntary buyouts of 12 domestic sheep allotments in the Wyoming Range. Collection of vegetation data associated with benchmark sites has been cooperatively collected to understand the effects of the management change over the last two decades. In 2023, partners visited 8 sites and collected data with the use of Nested Frequency transects, Line Point Intercept, Line Intercept as well as soil data to inform the USFS in the development of Ecological Site Descriptions. The dominant vegetation type monitored are tall forb communities which are a very important summer forage sites for many wildlife species ranging from songbirds to ungulates. Partners for 2023 include the USFS and Sublette County Conservation District.

Figure 120. Partners monitoring site within Wyoming Range Allotment Complex in 2023.

Green River: Huston to Sommers River Restoration (Goal 2) - Luke Schultz

This broadly-visioned restoration includes several landowners along an approximately 5 mile long corridor of the Green River within the vicinity of the Huston and Sommers access points. While this corridor is largely intact, several locations show high rates of lateral migration relative to reference conditions, and channel avulsions and side channel piracy are observable in a few locations. Surveys were conducted throughout the reach at individual work areas in 2022 and 2023 to infer channel stability and trajectory and inform restoration designs. Reaches surveyed in 2022 included 8 distinct work areas (i.e., Rizzo-Moore Bend, Side Channel Exit, Todd View Bend, Side Channel Re-Enters, Grindstone Bar, Lost Tree, Grindstone Double Bend, and Sommers Bend) and totaled some 13,600' of channel. A wetland delineation of these work areas was completed in June 2023. Additional work areas identified and surveyed in 2023 include the Lower Sommers Bend, the Moore Side Channel, and the Moore "Pipe" Bends; collectively these add over 5,300' of surveyed main and side chan-

nel length. One work area was constructed in 2023 by Game and Fish's Statewide Habitat & Access crew at the Upper Sommers Bend. At this site a 7-9' tall vertical bank eroded several feet annually and contributed hundreds of tons of sediment to the river each year. The landowner had previously stockpiled >100 CY of boulders to pursue a rip rap approach to stabilizing the channel, but these were instead used to construct 2 boulder vanes on the downstream portion of this work area. A shaped bankfull bench with willow transplants was constructed upstream and downstream of the vanes. Along the vertical bank, a 250' long section of toe wood was constructed and an associated pool was excavated. Following construction, willow cuttings were planted by TU volunteers during a work day in October. Additional work is planned in 2024 for the Moore-Rizzo Bend, the Side Channel Exit, The Todd View Bend, and the Grindstone Bar work areas. In preparation, materials were mobilized to the site in late 2023, and transported to the individual work areas in December after the ground had frozen to facilitate staging and minimize ground disturbance. Funding partners include PAPO, WG-BGLC, and WWNRT.

Figure 121. Bankfull bench construction on the Green River.

Huston Access Side Channel Modification (Goal 2) - Luke Schultz

Surveys in 2021 at the behest of a concerned landowner on the Green River suggested that a side channel about ½ mile upstream of the Huston Access boat ramp might be at risk of capturing the entire river. Data collected during that survey suggested that flows were partitioned roughly equally between the side channel (river right) and main river (river left), and boats were using the side channel, and potentially missing the Huston Access take out. In response, the Pinedale AHAB developed plans that would partition flows at roughly 80-85% through the left channel, and included about 500' of bank stabilization and pool enhancement in the main channel. Channel manipulations and bank stabilization was completed in August 2023 with assistance from the Statewide Habitat and Access crews. Flow partitioning in the side channel was achieved by setting grade with two rock vanes positioned near the head of the side channel, and upstream of two rock vanes that were constructed in the early 2000s. In addition to the rock grade checks, materials were used to narrow the side channel. In the main river, two rock vanes were used to hold grade and maintain channel dimensions near the mouth of the side channel and a brush bank was constructed to arrest lateral migration. In addition to this work, toe wood was installed downstream of the side channel on the main river to help prevent further lateral migration (and channel elongation) and enhance fish habitat. Crews also installed surplus woody slash and transplanted live willows to address an eroding bank in the side channel as well.

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

Data for an instream flow analysis were collected at a reach on Klondike Creek in the Bridger National Forest during summer 2023. Depth, velocity, substrate, cover, water temperature, nitrate-nitrogen, macroinvertebrate, stream stage, stream bed elevation, and water surface elevation data were collected at three stream flows. Measured flows during June, July, and August were 2.5 cfs, 1.3 cfs, and 0.42 cfs. Maximum water temperature was 61.8 F on July 29. Collected data will be used with habitat modeling and hydrologic analysis to identify appropriate flows for Colorado River Cutthroat Trout spawning, late summer habitats, overwintering, and passage.

Monument Draw Zeedyks (Goal 2) - Troy Fieseler

This project is a collaborative effort to improve degraded wet meadows within Monument Draw near the intersection of the Lander cut-off road and Wyoming Hwy 28. During 2023, partners constructed an additional 4 Zeedyk rock structures and identified an additional 8 locations on neighboring private land. Located within Sage Grouse Core habitat, these structures kick-start regeneration of ecological processes to assist in reversing historic degradation. Placed in existing head-cuts, they eliminate the expansion and loss of soil and mesic plant communities. This will improve wildlife habitat, water quality and quantity, soil health, and makes these systems drought resilient in the face of a changing climate. Project partners for 2023 include the South-west SGLWG, BOW, and numerous volunteers.

Figure 122. Zuni Bowl, one year post-construction.

Monument Ridge Habitat Improvements (Goal 2) - Troy Fieseler

This project, which primarily focuses on the enhancement of aspen communities, has been prioritized due to the significant overlap with wildlife values in the area. During 2023, additional timber units were treated via hand crews in preparation for broadcast prescribed burns. Mule deer migrating from the Pinedale Anticline utilize vegetation communities within the project area for summer, transitional, and parturition habitat. With the implementation of this project, the quality and quantity of forage will be enhanced for deer and a suite of other wildlife species. Furthermore, adjacent private land will be protected from the threat of wildfires through fuels reduction. The USFS is leading implementation, with assistance from the WGFD, grazing permittees, Sublette County Conservation District, WWNRT, and NFWF.

Figure 123. Crews implementing broadcast prescribed burn.

New Fork River Area 351 Restoration (Goal 2) - Luke Schultz

TU is leading an effort with WGFD and the USFWS Partners program to complete restoration on a long (>8 mile) corridor of the New Fork River near Highway 351. The work involves bank stabilization, fish habitat enhancement, reconnection of old side channels that were lost due to channelization of the river, and an upgraded irrigation diversion that improves fish passage and boatability. Initial designs were developed in early 2022 and included four work areas; these were revised through a series of site visits and discussions with landowners. In 2022 an additional work area was added about 4 miles upstream. In total, the project's work areas include (upstream to downstream): Thompson/Looney Bends, Butler Diversion, Olson/Jaggers Bend, Historical Island, and the Johnson Pasture. In August 2023, the Looney Bend work area was constructed by the Statewide Habitat & Access

crew. At this site, a rock and log revetment was completed in the 1990s by WGFD and the landowner. The revetment extended roughly half way around the meander, and was constructed at least a foot above the bankfull elevation. As a consequence, erosion downstream of the revetment was occurring for approximately 600'. The landowner had previously mobilized wood and rock to the site for maintenance, so these materials were incorporated into the 2023 work. The Statewide crew constructed 100' of toe wood, 300' of a bankfull bench with brush bank, and a 220' long shaped bankfull bench that had transplanted willow clumps every 20-30 feet. In addition, a 70' long boulder vane was constructed at the riffle crest on the downstream part of the bend to re-direct stream energy away from the bank. Lastly, a small depressional wetland was created approximately 300' south of the river. Collectively these efforts should reduce erosion and land loss, and improve wetland function.

In September 2023, the Johnson Pasture work area was constructed by a private contractor hired through TU. This site is located approximately 1000' downstream of the Highway 351 bridge where a mid-channel bar was causing lateral migration into a fence and pasture on the Johnson Bend. Over 600' of the bank was eroding up to several feet annually. Construction included building approximately 400' of toe wood along the river left bank, enhancing a pool in association with the toe wood, adding approximately 400' of brush bank upstream and downstream of the pool, and creating an overflow channel and shaped bench along an overflow bar to prevent erosion into a hay field. Although the contractor had little river experience, the project went smoothly and the landowner expressed great satisfaction. The PE AHAB provided significant oversight throughout the construction. The Olson/Jaggers Bend will be constructed in 2024, and additional work areas will be constructed as plans with landowners are finalized and materials and funding become available. Funding partners include a private donor and the Wyldlife Fund.

Figure 124. Rootwad installed at the Johnson Pasture.

New Fork River Gas Wells Habitat Restoration, Phase II (Goal 2) - Luke Schultz

The New Fork Gas Wells Boat Access and Habitat Enhancement was conceived in the mid-2000s to address channel instability, poor quality habitat and the loss of a boat ramp on the New Fork River at a ~2-mile long segment managed by the Pinedale Field office of BLM. This reach represents nearly half of all the publicly held river corridor on the New Fork between Boulder and its confluence with the Green River. Phase I was completed in May 2021 and involved installing approximately 500' of toe wood with double soil lifts, two boulder j-hooks, and a roughly 700' long bankfull bench with slash, transplanted willow, and toe rock. A boat ramp and associated parking lot were also constructed to provide an access area for river users. The site experienced bankfull or greater discharg-

Figure 125. Surveying the New Fork River.

es in each of the first three runoffs (2021-23) following construction, with the 2023 spring runoff being a prolonged high flow event. Minor erosion was observed following the 2023 runoff, which will be addressed during construction of Phase II. Restoration designs for Phase II were finalized in 2023 following external reviews from two external consultants. In total, 5 work areas have been identified for bank stabilization, and designs incorporate bankfull benches with a variety of woody structure to help support them. Plans also utilize depressional wetland and alcove development in the floodplain to boost wetland function and improve juvenile fish habitat. Approximately half of the needed materials for phase II were mobilized to the site in 2023 and bidding documents are currently being prepared for construction beginning in August 2024, with a target completion of phase II prior to runoff in 2025. Partners include WWNRT, DEQ, Central Utah Project Completion Act Office, BOR, WGBGLC, TU, JIO, WLCI, and the BLM.

North LaBarge Range Improvements (Goal 2) - Jim Wasseen, WLCI

The Sublette County Conservation District and its partners are leading cost-share efforts to upgrade existing water improvements to improve the distribution of water facilities, thus improving livestock distribution throughout the North LaBarge Allotment. The goal is improved vegetation utilization and overall rangeland health. These water sources are necessary to support future implementation of virtual fencing which will give livestock permittees additional opportunity to manipulate livestock movement, allowing greater control of livestock grazing timing, intensity, and duration in any one location at any point in time during the grazing season. Three water wells were upgraded to solar energy to run the pumps, and larger tire troughs were installed. The improved wells benefit three different pastures within the common allotment. Remaining projects include installing two tire troughs to increase capacity, relining and cleaning five reservoirs, and developing two springs. Funding partners include private landowners, Sublette County Conservation District, and WLCI.

Figure 126. Installation of a solar array to power wells.

Pinedale Regional Feedground Maintenance (Goal 1) - Miles Anderson, Kyle Berg, and Kevin Pousson

The Pinedale region elk feedground maintenance encompasses 11 of the 22 Department managed elk feedgrounds. Habitat and Access's 2023 activities included annual repairs and maintenance to feedground structures, corrals, stackyards, elk migration fences, stock fences, and grounds. Thirteen upright poles were replaced this year on various haysheds and one hay stackyard constructed. One new steel hayshed was built at Black Butte Feedground as well as equipment storage buildings at Finnegan and Bench corral feedgrounds. In addition, access roads to feedgrounds were maintained and roads resurfaced or otherwise improved at Finnegan and Fall Creek feedgrounds. Feeding areas were harrowed at Black Butte and Soda Lake and 22 miles of elk migration fence maintained.

Pinedale Region PAA Annual Maintenance (Goal 1) - Miles Anderson, Kyle Berg, Kevin Pousson, and Jacob West

The Pinedale Region contains 25 public access areas to provide access for hunting and fishing. In 2023, annual maintenance occurred on all of these PAAs. This included sign installations and replace-

ments, maintenance to parking areas and 2 miles of roads, as well as maintenance to comfort stations, boat ramps and docks, camping facilities, and fences. At the Green River Daniel/40-Rod PAA designated campsites were completed. Five culverts were installed and road repairs initiated at the Green River Fear fishing access sites to resolve flooding damage.

Figure 127. Green River Daniel camp sites.

Pinedale Region WHMA Annual Maintenance (Goal 1) - Miles Anderson, Kyle Berg, Kevin Pousson, and Jacob West

Annual maintenance and improvements continued on the five WHMAs in the Pinedale Region in 2023. Soda Lake, Half Moon, Black Butte, Fall Creek, and Luke Lynch WHMAs received annual fence maintenance on a total of 59 miles to reduce trespass livestock and facilitate annual wildlife migrations. Habitat and Access personnel maintenance activities included sign replacements, maintenance and repairs of 23 miles of roads, comfort stations, boat ramps, parking areas, wetlands, WHMA structures, watering systems, and campsites were maintained and improved.

Figure 128. Bear proof food storage for campsites.

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

Data for an instream flow analysis were collected at a reach on Rock Creek in the Bridger National Forest during summer 2023. Depth, velocity, substrate, cover, water temperature, nitrate-nitrogen, macroinvertebrate, stream stage, stream bed elevation, and water surface elevation data were collected at three stream flows. Measured flows during June, July, and August were 78 cfs, 25 cfs, and 10 cfs. Maximum water temperature was 61.2 F on August 17. Collected data will be used with habitat modeling and hydrologic analysis to identify appropriate flows for Colorado River Cutthroat Trout spawning, late summer habitats, overwintering, and passage.

Soda Lake Wetlands Solar Well Array Installation (Goal 1) - Miles Anderson, Kyle Berg, and Jacob West

In 2023 Habitat and Access personnel and contractors collaborated to install a solar array for remote power, a control panel and pump equipment, along with a protective elk fence enclosure to provide additional water for the Soda Lake wetlands system. A solar well was installed to develop a supplemen-

tal water source for the Soda Lake Wetlands. Due to current drought conditions an additional water source provides the ability to increase water distribution throughout the wetlands and helps maintain water levels during summer months. An 800ft well provides 70 gallons per minute from a lower aquifer feeding the Soda Lake and wetlands water table. This project enhances and protects hydrologic processes, water control, and water quality, providing diversity for the wetlands complex and ungulates transitioning through the wetlands on Soda lake WHMA. Funding partners include the Water for Wildlife Foundation.

Figure 129. Soda Lake Wetlands.

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

Data for an instream flow analysis were collected at a reach on South Beaver Creek in the Bridger National Forest during summer 2023. Depth, velocity, substrate, cover, water temperature, nitrate-nitrogen, macroinvertebrate, stream stage, stream bed elevation, and water surface elevation data were collected at three stream flows. Measured flows during June, July, and August were 17 cfs, 6.7 cfs, and 2.5 cfs. Maximum water temperature was 71.1 F on July 22. Collected data will be used with habitat modeling and hydrologic analysis to identify appropriate flows for Colorado River Cutthroat Trout spawning, late summer habitats, overwintering, and passage.

Figure 130. South Beaver Creek.

Sublette Cheatgrass Treatments (Goal 2) - Troy Fieseler

Likely the most prevalent and widespread issue facing Wyoming's wildlife, invasive annual grasses are a top priority to treat and control due to their ability to negatively alter forage quality and quantity, increase fire return intervals and decrease overall species diversity. Since 2011, collaborators throughout Sublette County have worked as part of the Sublette Invasives Taskforce to map and treat IAGs. Cheatgrass, the primary species of concern, has been treated across 103,000 acres. During 2023, treatments took place across landownerships with priority given to re-treatment blocks on USFS lands and newly identified sites on BLM and private lands. A total of 1,695 acres were treated with both aerial and on-the-ground applications. Rejuvra, the preferred herbicide, was used on all landownerships currently approved for the chemical. A major component of the Invasives Taskforce is the monitoring program that investigates treatment effectiveness and assists with informing future management decisions. Through this monitoring effort, consisting of 55 transects spread across multiple ecological sites, partners have learned that Rejuvra has been effective at controlling cheatgrass for up to 5 years and that we have a resilient native plant community that recovers well following treatment.

Sublette Mule Deer and Pronghorn Collaring (Goal 3) - Dean Clause, Brandon Scurlock, and Ashleigh Rhea

The Red Desert to Hoback Migration Assessment is ongoing research facilitated by Dr. Matthew Kauffman, in collaboration with WGFD and the BLM, to understand the migratory strategies of the Sublette Mule Deer Herd, particularly those animals that winter in the southern portion of the herd. The project maintains 90 GPS collared doe mule deer, with captures occurring each March and December. In conjunction with this study, WGFD deployed 35 GPS collars in March 2022 and an additional 10 GPS collars in March 2023 in the flank areas of the Pinedale Anticline Project Area. These WGFD maintained collars aim to better characterize annual movements and survival of the animals belonging to the northern half of the Sublette Mule Deer Herd that winter in close proximity to energy development and in areas where the biological boundaries between sub-herd units is unclear. Following the winter of 2023, where the Sublette Pronghorn Herd experienced high rates of mortality attributed to extreme weather conditions and a disease outbreak of Mycoplasma bovis, WGFD deployed 20 GPS collars on adult doe pronghorn in November 2023. Collars were deployed in the most heavily impacted northern portions of the Sublette Pronghorn Herd, to monitor survival and disease prevalence in conjunction with energy development activities on the Pinedale Anticline Project Area. Funding was provided by PAPO.

Figure 131. Pronghorn collars prepped and ready for deployment.

Sublette Mule Deer Habitat (Goal 2) - Ashleigh Rhea

Sublette Mule Deer Habitat Projects are a direct response to cumulative declines across the Sublette Mule Deer Herd (SMD) in addition to declines associated with natural gas development in the Pinedale Anticline Project Area near Pinedale. Projects consist of over 7,400 acres of habitat treatments and monitoring on federal, state, and private lands, mainly in decadent sagebrush, mixed mountain shrub, and aspen communities. Treatments are designed to enhance successional diversity on a landscape scale while improving habitat forage quality and quantity for mule deer in summer and winter ranges within the SMD Migration Corridor. Projects under the umbrella NEPA planning effort for BLM lands commenced in 2016 and will continue through 2024. Projects on private lands are ongoing and identified annually. Post-treatment monitoring was conducted for numerous treatments on both public and private lands in 2023. Previously implemented projects included in 2023 monitoring activities consisted of several erosion control structures, shrub plantings, shrub mowing, harrow, and aeration treatments. Five-year post treatment monitoring on vegetation treatments implemented

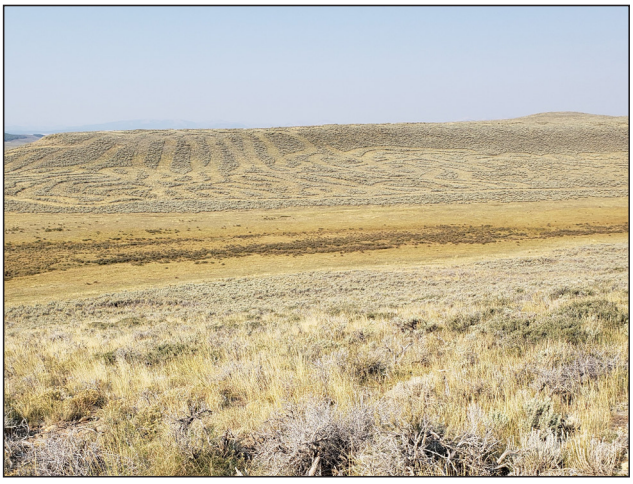


Figure 132. Sagebrush mowing treatments.

in 2018 commenced on 1,100 acres of BLM lands located in mule deer crucial winter range. These treatments consisted of shrub mowing, aeration, prescription fire, and herbicide applications. Monitoring was conducted using line-point-intercept, shrub density belt, and annual production/utilization methods, in addition to photopoint documentation. Post-treatment monitoring of all project sites is ongoing until vegetation objectives are met. Cooperators and funders include: PAPO, JIO, WWNRT, NFWF, USFWS, BLM, Sublette County Conservation District, NRCS, and numerous private landowners.

Sublette Antelope Migration Corridor Identification (Goal 3) - Daryl Lutz, Sean Yancey, Jill Randall, Brandon Scurlock, and Cheyenne Stewart

The Sublette Antelope herd has undergone extensive internal evaluation and stakeholder outreach to work through the identification process outlined in the Wyoming Mule Deer and Antelope Migration Corridor Protection Executive Order. This is the first herd WGFD has taken through this process. GPS collar data has been collected from 2002 through 2022 that was analyzed, in partnership with Dr. Jerod Merkle at the University of Wyoming, with the line buffer and Brownian Bridge Movement Model to develop high, medium and low use level polygons as well as stopovers for this migration corridor. A Threat Evaluation was then written by regional personnel and presented to the public during three public meetings as well as various other individual stakeholder contacts with landowners, agency partners, elected officials and industry representatives. Future actions in 2024 will include a presentation to the Commission which will direct WGFD's future actions.

Upper Green Fence Initiative (Goal 3) - Troy Fieseler and Ashleigh Rhea

A major threat to Wyoming's migratory ungulate and greater sage-grouse populations are fences that restrict movements and pose a risk of entanglement and mortality. The focus of this project is to work with private landowners and public land permittees to replace or modify existing fences with designs that facilitate the movement of wildlife, while maintaining effective livestock containment. During 2023, Pinedale Region WGFD personnel assisted in converting approximately 19 miles of fence and the installation of 16 fence crossing structures across 7 separate projects. In collaboration with the Upper Green Wildlife-Friendly Fence Initiative, numerous NGO and federal partners, cumulative efforts in Sublette county area have resulted in the conversion of almost 750 miles of fencing to wildlife-friendly standards since 2010. Numerous funding partners and volunteers have contributed over the years with NFWF, WWNRT, PAPO, JIO, USFWS, Knobloch Family Foundation and private landowners providing funds for the most recent accomplishments.

Figure 133. Fawn deer utilizing modified structure.

Virtual Fencing Pilot Project (Goal 2) - Troy Fieseler

Virtual fencing is a livestock management technique currently being used for cattle. The technology allows managers to control movement, dictate grazing behavior and monitor animal wellbeing through the use of virtual boundaries with advanced GPS tracking. This is done remotely with collars utilizing audio and shock cues tied to pre determined pastures developed without the need for traditional wire fencing. Cattle are fitted with collars that provide location data as well as impart

shock and audio stimulus associated with remotely drawn pasture boundaries. Virtual fencing not only provides an option for sustainable grazing for producers while minimizing costs, the technology can be used to implement land management practices that improve native habitats and the wildlife that depend on them. In 2023, 550 collars and communication towers were purchased to facilitate a virtual fence pilot grazing plan on BLM allotments and private land near Big Piney, WY. The overall objective of this project was to test the capabilities of the technology and determine if it is a viable tool for improving rangeland health long-term. Partners worked with the permittee, collaring both heifers and cows, and delineated boundaries to exclude cattle from prior habitat treatments, riparian areas, as well as open range highways with no existing fences. In one example, virtual boundaries were drawn around portions of a riparian system with a perennial stream to avoid overuse. Post-vegetation monitoring revealed that average stubble height of key forage species was over 20 inches tall in areas cattle were excluded compared to 13 inches tall in accessible portions of the same stream. While

Figure 134. Cow fitted with virtual fence collar.

we still learned that virtual fence does not remove the necessity of typical animal husbandry practices and is a technology that is still being perfected, it did prove to be an effective tool for livestock management through rest and deferred grazing, which benefits all plant communities on the landscape. Partners include the Private Landowner and Permittee, Sublette County Conservation District, BLM, WWNRT, and JIO.

Rapid Habitat Assessments & Shrub Production Monitoring (Goal 2) - Troy Fieseler

Throughout the Pinedale and Jackson regions, RHAs are conducted within the Wyoming Range and Sublette Mule Deer herd units across seasonal range habitats. During 2023, ten assessments were completed totaling 3,445 acres comprising aspen, rangeland and special survey types. The data collected will be used for Herd Objective Reviews and compiled annually in Job Completion Reports. Furthermore, the data provides managers and the public with documentation of the current state of mule deer habitat across herd units. In addition to RHA data, monitoring sites were visited on mule deer winter range complexes throughout the Pinedale region to measure annual production on key shrub species. These species included sagebrush, antelope bitterbrush, and true mountain mahogany. Sites are monitored annually to better understand the availability of forage on crucial ranges. In 2023 there was particular interest in investigating how the above average precipitation received during and following the winter of 2022/2023 influenced production. Across winter range com-

Figure 135. RHA conducted in a tall forb community.

plexes for both the Wyoming Range and Sublette Deer herds shrub growth measured two times the long-term average for all species. In certain cases the longest leader growth documented in 20 years was reported. Sites with fewer decadent or old plants had improved production compared to ar-

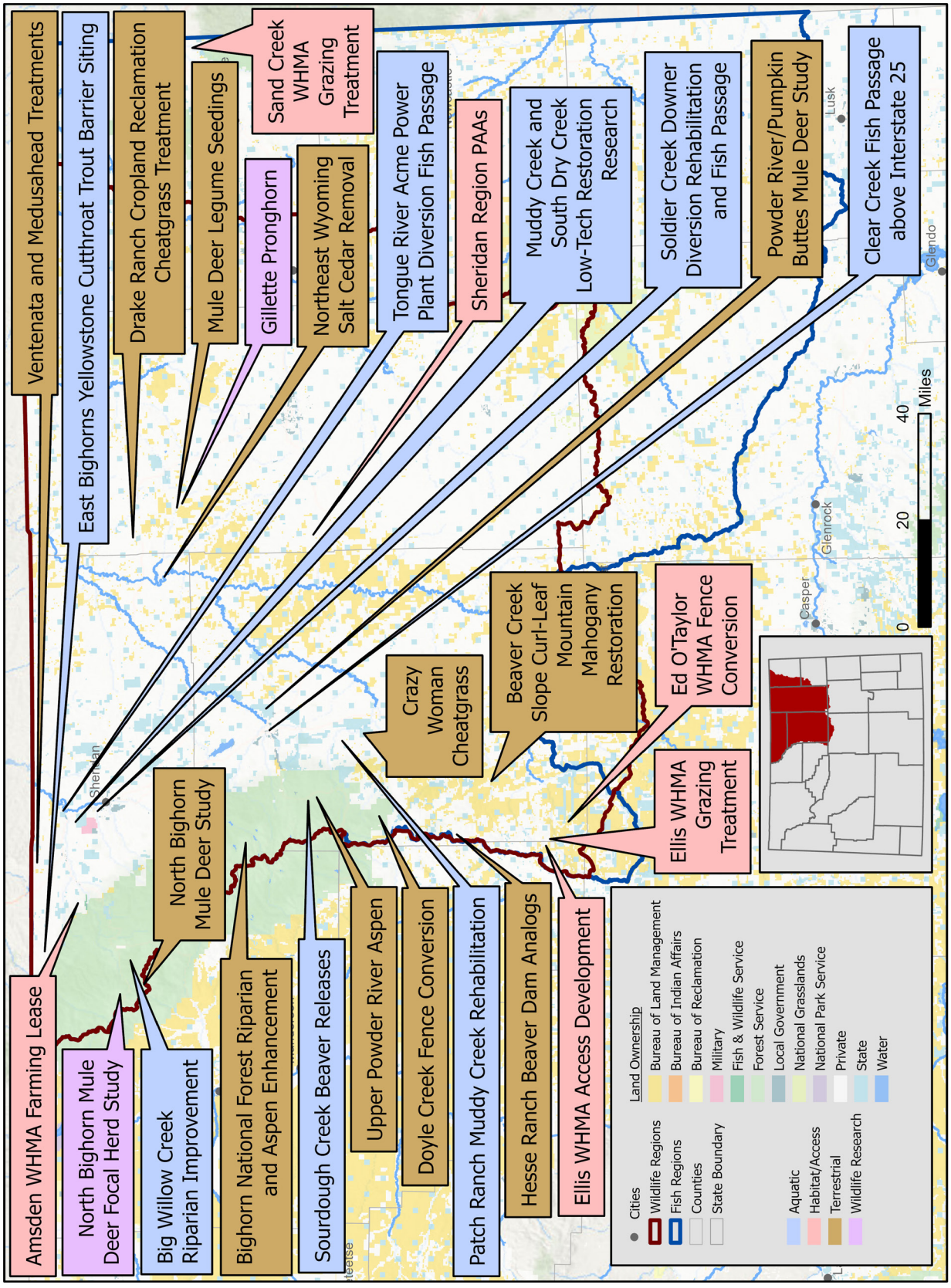
eas with a shrub community dominated by older age-classes. This data highlights the importance of maintaining or improving shrub community age-class structure to maximize production following good precipitation events in future years.

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

The Wyoming Range Mule Deer Habitat Project is a cooperative project between WGFD and Pinedale BLM targeting improvements to mule deer habitat in the Big Piney and LaBarge areas. This habitat project is intentionally landscape-scale and has been conducted over a 10 year period, which started in 2014. Winter and transitional ranges are targeted with this project that totals over 30,000 acres of vegetation treatments and over 20,000 acres of cheatgrass treatments. Projects have targeted many vegetation types including Wyoming and mountain big sagebrush, antelope bitterbrush, true mountain mahogany, salt desert shrub, and aspen. Implementation techniques have included mowing, Lawson aerator, seeding, Spike, herbicide application, fencing, conifer thinning, and prescribed burning. During 2023, a total of 252 acres of prescribed burns were conducted within aspen-conifer forests. Conifer often threatens the persistence of aspen communities in seral communities by limiting resources leading to a decrease in overal stand diversity and quality. Aspen stands can contain a rich diversity of forbs, grasses, and shrubs that provide important forage and cover used by mule deer and other species. With prescribed fire, this project sets back succession creating the opportunity for more palatable new growth along with the likelihood of the aspen community providing higher quality nutrition into the future. Cumulative project accomplishments (2014-2023) include: 18,963 acres of sagebrush thinning, 3,232 acres of aspen mechanical preparation, 1,703 acres of aspen prescribed burns, 20,000 acres of cheatgrass herbicide application, 2,032 acres of cheatgrass hand grubbing, 19 livestock riders hired for grazing rest, 11 miles of fence construction, 5 miles of temporary electric fencing installed, virtual fence (3 towers and 441 collars) deployed, and one reservoir renovated to influence livestock distribution. Partners for 2023 accomplishments include BLM, Sublette County Conservation District, North Labarge Allotment permittees, and WWNRT.

Figure 136. Prescribed fire operation.

SHERIDAN REGION



The Sheridan Region covers much of 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.

The majority of land in the Sheridan Region is privately owned. Game and Fish regional personnel work year round to develop and maintain working relationships with landowners, governmental agencies and nonprofit organizations to facilitate habitat conservation, implement habitat improvement projects and meet management goals.

Terrestrial habitat projects this year focused on native grassland improvements as well as addressing the increasing threat of invasive annual grasses such as cheatgrass, ventenata and medusahead. Efforts to remove invasive salt cedar plants from the Powder River continued, with 269 acres of salt cedar removed in 2023. Other projects focused on improving mule deer summer range habitat in the southern Bighorn Mountains with construction of 30 beaver dam analogs and 600 acres of aspen enhancement.

Aquatic habitat improvements included construction of 50 beaver dam analogs on the Bighorn National Forest. This large-scale project was completed in cooperation with the Bighorn National Forest, Backcountry Hunters and Anglers and the Wyoming Conservation Corps.

In 2023, work on a fish passage project on the Tongue River was completed at the derelict Acme power plant outside Sheridan. Aquatic habitat personnel worked with the Sheridan County Conservation District to address a sheet piling diversion in the river that was an obstacle to upstream fish movement and a hazard to watercraft. Combined with earlier efforts, completion of this project improved safety for watercraft and opened 37 miles of fish passage.

Habitat and Access personnel focused significant effort in 2023 on planning public access to the Ellis Wildlife Habitat Management Area. Ellis is the first new WHMA in the Sheridan Region in 40 years. It consists of 2,640 deeded acres and 1,264 acres of BLM lease at the southern end of the Bighorn Mountains. Plans are developed for the property that include designating road and trail routes, converting dozens of miles of existing fence to a wildlife-friendly design and creating appropriate livestock grazing rotations.

Research studies are ongoing in the Sheridan Region, collecting data on movement, survival rates and habitat preferences for mule deer in the north Bighorn Mountains, pronghorn northeast of Gillette and mule deer in Hunt Area 10.

The roadway fencing project along Interstate 25 north of Kaycee neared completion in 2023 and will finalize in 2024. Seventeen miles of game-proof fencing on either side of the interstate will funnel wildlife into existing underpasses to reduce wildlife-vehicle collisions that impact the Upper Powder River and Pumpkin Buttes mule deer herds.

Amsden WHMA Farming Lease (Goals 1 and 2) - Nathan Lindsey

The Amsden Creek Wildlife Habitat Management Area has historic hay meadows and a gravity fed irrigation system that allows for the successful growing of an alfalfa/grass crop. To fully benefit and utilize these lands and water rights WGFD has determined it most beneficial to lease the farming/hay rights to a single annual cutting. The lessee irrigates and harvests a single hay cutting annually and irrigates for a second growth of forage left for wildlife. The lessee compensates the Department through an Area Improvement Plan Agreement, whereas the lessee provides an agreed amount of goods or services in return for the Farming Lease.

Big Willow Creek Riparian Improvement (Goal 2) - Travis Cundy

During July, WGFD habitat personnel collaborated with the Bighorn Forest and Backcountry Hunters and Anglers to construct 50 beaver dam analog (BDA) structures in a segment of Big Willow Creek where willow communities were mostly absent. Previously, twenty BDA structures were completed in August 2022 upstream of the mostly willowless reach, which reactivated several remnant side channels leading into the reach. Both treatment reaches occur southwest of Burgess Junction. A Wyoming Conservation Corps crew helped complete both BDA treatment phases. Funding support came from the WGFD habitat trust fund and a Good Neighbor Authority agreement between the WGFD and the Bighorn Forest. The BDAs were constructed to promote overbank flooding and attenuate high flows along the treatment corridor, raise the riparian water table, promote riparian plant expansion, provide a foundation for future beaver dam building, and improve security habitats to entice beavers dispersing from lower in the watershed to take up residence. A third phase involving placing steel jack fence exclosures to limit herbivory, and planting willow and aspen seedlings will begin in 2024.

Figure 137. BDA construction on Big Willow Creek.

Bighorn National Forest Riparian and Aspen Enhancement (Goal 2) - Todd Caltrider

WGFD, in cooperation with the Bighorn National Forest, hired a habitat technician in summer 2023 to map and inventory potential habitat treatment units in the Pole Creek and Goose Creek drainages. Most habitat projects focused on conifer encroachment in aspen and riparian stands. A total of 667 acres of potential conifer removal units were mapped and assessed in the Pole Creek watershed and 945 acres were identified in the Goose Creek watershed. Funding for this position was provided by the USFS and these assessments will result in future habitat enhancement opportunities in this area.

Clear Creek Fish Passage Above I-25 (Goal 2) - Travis Cundy

A concrete grade control structure built circa 1964 upstream of the Interstate 25 culvert crossing on Clear Creek at Buffalo obstructed upstream fish movements for decades. Fish could swim downstream past the structure, but were blocked from swimming upstream to spawn or seek refuge from warm stream temperatures. In 2021, the grade control was removed and replaced with a series of alternating riffle structures and pool features along 700 feet of stream corridor above the culvert crossing. The slope reduction over the longer course of riffle to pool features allows adult life stages of trout

and native suckers previously isolated downstream of the grade control to access upstream habitats mostly unimpeded along 9.7 miles of creek. The work also enhanced stream habitat available to the public along 3.5 acres of the stream corridor owned by WYDOT. The spring 2022 runoff involved the occurrence of 800 cfs flows (3-year event) over the banks of the 520 cfs design channel prior to adequate vegetation establishment on the floodplain benches. Repairs completed by Barnum construction, the original contractor, in late winter 2023 included cleaning pools of substrate that mobilized from constructed inner berm features, reshaping meander bends, reinforcing constructed riffles with floodplain sills and splash aprons, regrading segments of floodplain benches and revegetating benches with native sod mats. Subsequent to the repairs, the June 2023 runoff involved peak flows exceeding 1,470 cfs (10 year event) that further setback revegetation efforts and altered some of the channel features. Maintenance using remaining cost-share partners funding will be completed in 2024. Work will include stabilizing grade control features that shifted during high flows. Establishing vegetation to maintain stable floodplain features

Figure 138. Clear Creek culvert crossing during runoff.

along the channel has been problematic due to the steep slope and narrow width of the corridor, but a reasonably durable channel that supports fish passage to upstream habitats in Clear Creek has been achieved along the regraded channel. Partners involved with the rehabilitation included the Clear Creek Conservation District, WYDOT, WWNRT, WWDC, WGBGLC, WY Sportsman's Group and Powder River Flycasters.

Crazy Woman Cheatgrass (Goal 2) - Todd Caltrider

The area surrounding the lower Crazy Woman/ Poison Creek drainages is very important for the management of mule deer in the Upper Powder River Herd Unit. This area contains a mixture of native grassland, sagebrush steppe, riparian areas, and agricultural fields. The combination of these habitat types allows for a high density of mule deer to live year around in this area. In addition to high quality habitat, this area contains large tracts of publicly accessible state land, which allow for public mule deer and other big game hunting opportunities. In 2023, WGFD treated 1,638 acres of rangeland with a cheatgrass herbicide treatment. Funding for this project was provided by WGBGLC and WWNRT.

Figure 139. Spraying cheatgrass.

Deer Area 10 Collaring Study (Goal 3) - Erika Peckham

More life history information on the mule deer inhabiting Hunt Area 10 is needed to better manage this unique area. Hunt Area 10 is of high interest to hunters and the public due to good public land access, and the historic numbers and quality of buck deer it formerly produced. Demand for the

limited number of available licenses is high and the recruitment into this herd increased with favorable weather the past few years. Information gathered will likely be applicable to other areas in the same herd unit. In addition, the WGFD has an interest in learning how deer use the unique habitat types in this area, and how that use may be impacted by increasing elk numbers. Lastly, active coal mining and associated reclamation provides an opportunity to assess mule deer behavior and habitat selection in relation to coal mining. This study was initiated in 2019. At the beginning of 2023, there were 27 live GPS-collared deer in the study. Numerous mortalities occurred throughout the year. At the end of 2023, there were 17 deer with working collars. The data collection portion of this project will cease in July 2024, with an analysis and report to follow.

Figure 140. Captured mule deer doe being processed during collar study.

Doyle Creek Fence Conversion (Goal 3) - Todd Caltrider

The Doyle Creek Allotment lies on the very southern end of the Bighorn National Forest. This allotment also lies on a main migration route for mule deer migrating back and forth from winter range to summer range on the Bighorn National Forest. The grazing permittee of the Doyle Creek allotment identified eight miles of fence that needed replacement. This fence was not wildlife permeable and was in the middle of the migratory habitat as identified by the collar data from mule deer from the Upper Powder River project. WGFD, USFS, and NRCS provided cost share to the permittee to replace 4 miles of the fence with a wildlife friendly design. The remaining four miles of fence will be replaced at a future date.

Figure 141. Retrofitted fence.

Drake Ranch Cropland Reclamation Cheatgrass Treatment (Goal 2) - Todd Caltrider

The Drake ranch is a family ranch located in the northwest portion of Campbell County, WY. Historically, the Drake Ranch's operation revolved around wheat farming and cattle grazing. Due to a mixture of grain prices, overhead costs, and production potential of the currently farmed ground, the Drake Ranch is looking to convert their operation primarily to a grazing operation. In 2020, the Drake Ranch began converting 333 acres of retired cropland back to native grassland. Cropland has limited value to wildlife, and reclaiming cropland back to native grassland has high value to wildlife. Reclamation of retired farm ground can be a costly, especially with native seed. By providing cost share to landowners reclaiming retired cropland, WGFD can incentivize planting mixes that have high value to wildlife, such as native mixes of high quality forage plants. WGFD provided cost share to the Drake Ranch for the purchase of native seed mix in 2020. Three hundred and thirty three acres were planted to a native grass/forb mixture. The spring/summer following the planting was unseasonably

dry, and the native planting struggled to get established. Currently, it appears that the planting will be successful, but due to the delay in germination of native seed and amount of open ground during the drought, cheatgrass has become established within the reclamation area. To ensure the success of this native planting, a cheatgrass herbicide treatment was needed to reduce competition from non native annual grass and forbs. In spring 2023, the Drake Ranch sprayed the 333 acres of native planting for invasive annual plants. This project was funded by the Northern Great Plains Joint Venture.

Figure 142. Drake Ranch cropland reclamation.

East Bighorns Yellowstone Cutthroat Trout Barrier Development (Goal 2) - Travis Cundy and Andrew Nikirk

During spring, field reviews were completed with WWC Engineering to identify Yellowstone Cutthroat Trout isolation barrier placement locations along Elkhorn, Red Gulch and Columbus creeks located west of Parkman, Wyoming. Funding to develop barrier concept designs was secured through a State Wildlife Grant. Constructing barriers on Elkhorn and Red Gulch creeks would secure 4.3 stream miles with endemic Yellowstone Cutthroat Trout populations from potential recolonization of nonnative trout present in the Little Bighorn River. Adding a barrier on Columbus Creek would allow expanding Yellowstone Cutthroat Trout populations to over six stream miles through translocation efforts and isolate those Yellowstone Cutthroat Trout from nonnative trout present in lower Columbus Creek and the Tongue River. WWC Engineering completed preliminary barrier design assessments and cost estimates in July. Additional funding was secured from the WGFD habitat trust fund and WGBGLC to complete final designs and initiate bidding for barrier construction on Elkhorn and Red Gulch creeks. Final designs, permitting and fundraising for barrier construction will occur in 2024.

Figure 143. Elkhorn Creek fish barrier site.

Ed O. Taylor WHMA Fence Conversions (Goal 3) - Nathan Lindsey

Unused and dilapidated fencing across Wyoming is a safety concern to wildlife, livestock, public users and managers. Efforts to remove or repair these fences help to improve these areas for a wide variety of users. Much of the work is done through physical labor and these projects have successfully for involved volunteer groups. Approximately one half mile of buck and pole fence was removed and converted to wildlife friendly, and fireproof fence, on Ed O. Taylor. Another mile to 1.5 miles of fence is expected to be converted with fireproof fencing and wildlife specs within the 24/25 fiscal

years. Fireproof fence materials will eliminate possibility of the fence being destroyed from wildfires or during prescribed burns to improve habitat and forage. These materials should last lifetimes, compared with traditional fencing materials.

Figure 144. New fence construction on Ed O. Taylor WHMA.

Ellis WHMA Access Development (Goal 1) Mac Foos and Nathan Lindsey

To better manage and control access to Ellis WHMA, two parking lots were constructed to provide users with places to park and enter the habitat unit by foot or horseback during open hunting seasons. The goal is to limit vehicle access with the intent to help hold animals in the area during open seasons to increase harvest, as well as control and reduce habitat and vegetation destruction during wet periods. Cattle guards were also installed to eliminate gates and control livestock in the pastures when they are present during the off seasons.

Figure 145. Cattleguard and gate installation on Ellis WHMA.

Ellis WHMA Grazing Treatment (Goal 1) - Nathan Lindsey

Ellis WHMA was purchased in late 2022. Historically, the property has been used for agricultural livestock grazing with sheep and cattle. In 2023 WGFD took over management and converted grazing to cattle only. A light yearly grazing regime will be conducted, grazing each of the two pastures once every other year, allowing full regrowth and a year of rest between grazing events. Grazing utilization will be light with approximately 500 AUM's from mid June to late August each year. This light grazing pattern should remove decadent old growth, while stimulating new regrowth for wildlife, and creating healthier ecosystems with abundant forage.

Gillette Pronghorn (Goal 3) - Erika Peckham

Northeast Wyoming has some of the highest densities of pronghorn in Wyoming. Because they appear to be prolific, they can often be overlooked as a conservation priority. In recent years, howev-

er, numbers have fallen due to prolonged extreme drought and disease impacts from Mycroplasma bovis, epizootic hemorrhagic disease and bluetongue virus outbreaks. WGFD is implementing a GPS collaring project with pronghorn in the North Black Hills Herd Unit that began in November 2022. The goal is to understand movement patterns and survival rates of pronghorn in this herd unit. At the start of 2023 there were 35 doe pronghorn with collars. At the end of 2023 there were 26 collared individuals remaining. This project has secured more funding and additional recapture and data collection will occur in 2024.

Kaycee I-25 Wildlife Crossing (Goal 3) - Todd Caltrider, Jill Randall, and Zach Turnbull

The I-25 Kaycee fence project is slated for completion in 2024. Wildlife fence (8 ft.) will be constructed along 16.8 miles of interstate (mm 253.67-270.46), along with 76 deer jumps and the addition of 10 cattle guards. Survey camera work, indicates that mule deer and many other species of wildlife already utilize existing underpasses, culverts, bridges and structures to cross the interstate. The WGFD worked with WYDOT, landowners and contractors to increase permeability for wildlife at existing structures through fence and gate modification. This project, and interstate, form the boundary between Upper Powder River and Pumpkin Buttes mule deer management herds. While these herds are largely non-migratory, deer-vehicle mortality has been extremely high as deer utilize the right-of-way to browse and occasionally cross.

Figure 146. Jumpout on Right of Way for ungulate use.

Muddy Creek and South Dry Creek Low-Tech Restoration Research (Goal 2) - Travis Cundy

Assistance continued through 2023 with the ongoing research on Climate Refugia and Restoration for Native Fishes being conducted by the Wyoming Cooperative Fish and Wildlife Research Unit. The research involves evaluating the effects of beaver dam analog and woody debris placement treatments in providing base flow refugia for native fish. Funding support was provided by a North Central Climate Adaptation Science Center grant. Monitoring and maintenance activities continued at the beaver dam analog and woody debris placement treatments completed on Muddy Creek south of Buffalo, Wyoming in 2022. An additional treatment and control reach was added on South Dry Creek north of Sheridan, Wyoming. Unfortunately, permitting delays into November – beyond the Coop Units field season – resulted in the abandonment of the low-tech treatment applications within the study reach. Stakeholder consultations will be pursued in 2024 to determine if support remains for pursuing the South Dry Creek treatments. Monitoring of the research objectives on the Muddy Creek reach will conclude in 2024.

Figure 147. Muddy Creek study reach.

Mule Deer Legume Seedings (Goal 2) - Todd Caltrider

A total of 68 acres of alfalfa was planted in spring 2023 in Campbell County on the Kretschman Ranch. The plantings will provide high quality forage for mule deer. This project was funded in part through the statewide WGFD Shrub, Grass, and Legume Seeding Program and will provide high quality forage for mule deer into the future.

Figure 148. Mule deer utilizing legume seeded pasture.

North Bighorn Mule Deer Focal Herd Study (Goal 3) - Tim Thomas, Sam Stephens, Eric Maichak, and Zach Turnbull

This project is part of the Department's new mule deer monitoring program that will examine variation in survival, habitat use and movement behavior in five focal herds to both improve population estimates and enhance understanding of the key factors that influence population dynamics. The five focal herds are: Laramie Mountains, North Bighorn, Upper Shoshone, Sweetwater and Wyoming Range. This report focuses on North Bighorn. The focal herd component allows the Department to monitor female, male and juvenile survival across the five herds using GPS collars. The herds are located in different parts of the state to encompass important differences in habitat, disease and predators. Studying focal herds will help managers better understand the key factors that influence how many deer we have in Wyoming. Managers may use the information they collect to measure herd performance, assess causes of mortality, evaluate harvest strategies, update maps of seasonal ranges and more. In January 2023, 210 mule deer were captured and collared in the North Bighorn Mule Deer Herd Unit. This included 30 adult males, 80 adult females and 100 young of the year.

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

This two-part project is in the final stages of part one, with data collection completed in March 2023 with the majority of collars dropping off deer. In 2023, we documented the year-round movements of a total of 202 mule deer. This included 17 migrants and 55 residents on the east side of the mountain range as well as 123 migrants and 3 residents on the west side of the mountain range. The second part of this project began in March 2023. This marked the sixth round of captures for the study, where we captured and collared an additional 39 mule deer on west side winter ranges. Thirty-two of these captures were nine-month-old juveniles. We also added an additional seven adult does to our study connected with the captured juveniles. We have documented the movement of five genetically confirmed doe-fawn pairs. The anticipated completion of data collection for the second part of this project is March 2025. Funding partners include the Knobloch Family Foundation, MDF, TNC, Sheridan Community Land Trust, BLM, WWNRT, NFWF: DOI Secretarial Order 3362, Cody Chapter of Muley Fanatics, BOW, UW Research and Extension Center and WGBGLC.

Ventenata and Medusahead Treatments (Goal 2) - Todd Caltrider

Recently, ventenata and medusahead annual grasses were discovered in northeast Wyoming. Medusahead and ventenata are a highly invasive annual grasses that are a huge concern to land managers in the west. Similar to cheatgrass, they are winter annuals that reproduce rapidly, decreases rangeland productivity and increase the risk of wildfire. What separates ventenata and medusahead from invasive brome grasses like cheatgrass is their extremely aggressive rate of invasion and limited palatability. Ventenata and medusahead have been known to outcompete monoculture stands of cheatgrass and quickly become the dominant species. Ventenata and medusahead have very limited forage value to livestock or wildlife, due to their high silica content. Since the discovery of medusahead and ventenata in northeast Wyoming, a group of local, state & federal land managers, private landowners and researchers concerned about these newly discovered invasive annual grasses formed the Northwest Wyoming Invasive Grass Working Group (NEWIGWG). The group collaborated on developing strategies to manage these new invasive annual grasses, in particular, through mapping, education, outreach, research, management & control and possible eradication through EDRR. Those efforts have been paying off with aggressive management campaigns and increased awareness across the state. As a partner in NEWIGWG, WGFD provides funding to treat known infestations in high priority locations. In 2023, this funding was used for the treatment of 770 acres of medusahead and ventenata in Sheridan County. Treatments occurred via helicopter with indaziflam (Rejuvra) herbicide applied at a rate of 5 oz/acre. Funding for this project was provided by the WGFD Invasive Grass Account.

Figure 149. Treating ventenata and medusahead via helicopter.

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

Salt cedar (Tamarix spp.) is a highly invasive plant that is gaining a foothold in the Powder River drainage. Salt cedar removal started in the upper Powder River Basin in Johnson County. Since 2007 Johnson County Weed & Pest District has removed a total of 3,350 acres of salt cedar between Kaycee, WY and the Sheridan county line through a mixture of mechanical mowing and chemical herbicide treatments. In conjunction with Johnson County, Sheridan County Weed and Pest District began salt cedar removal in 2010. Salt cedar density increases greatly downstream of Johnson County. Due to limited funding and increasing density of Salt cedar farther downstream on the Powder River, the Sheridan County Weed & Pest has been limited in the number of acres of salt cedar removal that can be completed each year. In 2018, WGFD

Figure 150. Masticating salt cedar on the Powder River.

partnered with the Sheridan County Weed & Pest to seek grant funding to treat more acres per year. Since WGFD partnered with the Sheridan County Pest, 789 acres of salt cedar have been removed from the Powder River. During winter 2022-2023, a total of 269 acres were completed. Funding was provided by WGBGLC.

Patch Ranch Muddy Creek Rehabilitation (Goal 2) - Travis Cundy

In late 2023, WWC Engineering and 5 Smooth Stone Restoration completed their contract requirements to report on rehabilitation options along a three mile long degraded segment of Muddy Creek within the foothill to prairie transition zone south of Buffalo. The Clear Creek Conservation District administered the design contract. The assessment goals were to identify alternatives to stabilize active head cutting, reduce bank erosion, particularly where potential meander cutoffs could yield increased head cutting, improve stream channel habitat features, and increase floodplain connectivity and mesic riparian communities for the benefit of native fish and mule deer. Funding for the design assessment was provided by the WGFD habitat trust fund, WGBGLC, NGPJV, and Clear Creek Conservation District. Key findings of the feasibility assessment included that annual flow withdrawals for upstream reservoir storage and irrigation purposes reduced channel-forming flows and erosion-deposition dynamics to the point that regaining a restoration trajectory from an incised channel back to a multistage channel and floodplain corridor may not be viable due to reduced stream power. Options to address the extensive Muddy Creek degradation included applying natural channel design based rehabilitation designs coupled with water management practices to regain annual bankfull flow and periodic floodplain flow events. Other recommended alternatives, considering that regaining annual bankfull flows is unlikely, included the following:

Figure 151. Muddy Creek above its confluence with Dry Muddy Creek.

1. Using BDAs and post-assisted log structures within the incised channel; 2. Excavating multiple channels between meander necks to create a multiple thread channel corridor with greater slope coupled with applying low-tech grade control and roughness treatments to increase deposition features and floodplain connectivity; 3. Applying low-tech square bale revetments to stabilize high-risk areas; and 4. Planting woody riparian vegetation coupled with removing Russian olive. The first options involve novel applications that have little or no history. Efforts during 2024 will include gaining consensus among stakeholders on next steps to pursue.

Powder River / Pumpkin Buttes Mule Deer Study (Goal 3) - Tim Thomas

As part of Department of Interior Secretarial Order 3362 issued in 2018, wildlife agencies in 11 western states were tasked with developing State Action Plans that identify their top big game research priorities. The WGFD identified the Powder River and Pumpkin Buttes mule deer herds as a top priority. Historically, the Powder River herd was among the largest in Wyoming, but has been far below the 45,000 population objective for many years. Similarly, the Pumpkin Buttes herd is >40% below objective, with ~14% chronic wasting disease prevalence and fawn:doe ratios of only 42:100. Additionally, these herd units are exposed to large-scale movement barriers and habitat loss, in the forms of Interstates 25 and 90 and widespread coalbed methane development. We worked

with state agencies, federal agencies, non-governmental organizations, and private landowners to equip 114 mule deer with GPS collars to document seasonal migration and distribution patterns of this deer herd, with specific focus on impacts of Interstate 25 and 90. A report has been developed and the findings from this 3-year movement study will provide data and tools to inform management and conservation efforts, including roadway mitigation, disease management, cause-specific mortality, and identification of seasonal ranges and migration routes.

Sheridan Region PAAs (Goal 1) - Nathan Lindsey

Habitat and Access personnel performed annual maintenance and monitoring of the Sheridan Region PAAs. These PAAs serve as critical recreational areas for the public and sportsmen. Yearly maintenance and upgrades are crucial to preserve these habitats and the PAA infrastructure. All public access boundary fences were maintained and signed to protect Commission property rights and habitats. Vandalism is an ongoing issue and many signs were replaced across the region on most of the PAAs. Muddy Guard 1 & 2 received significant road blading and contouring with help from Johnson County Road and Bridge. Red Horse received a much needed top coat of road base and was contoured to improve water management and runoff. Black Elk PAA received a safety netting on the northern third of the pond to protect sportsmen from the adjacent tee box and fairways. Healy PAA received significant road blading and the dock was updated with pipe pylons and brackets to accommodate continually changing water levels in the reservoir. TR Canyon parking was improved with volunteers from the Dayton Rotary Club. All trees were trimmed, trash and brush were picked up and removed, and bear food storage boxes were installed at TR Canyon designated campsites. In addition, noxious weed spraying occurred where weeds were present.

Figure 152. Rock slide removal at Tongue River PAA.

Sand Creek WHMA Grazing Treatment (Goal 2) - Nathan Lindsey

A spring grazing treatment was conducted on Sand Creek WHMA in 2023 to manage noxious weeds. This is the 9th year of this agreement. Spring grazing in conjunction with herbicide applications during the growing seasons, control noxious weeds and allows preferred perennial forage to establish and promote growth. The grazing strategy employed is a high intensity, short duration program with approximately 140 AUMs over a 10 day period. The added hoof action helps incorporate and reduce litter, and stimulate growth without allowing plants to be continually grazed and any new growth removed. In exchange for grazing, the neighboring ranch allows access to 2.5 miles of Sand Creek for public access. This partnership between WGFD and neighboring landowners is a great example of how private landowners can help WGFD better manage lands and wildlife while also providing the public with increased access at no charge to either party.

Sheridan Region WHMAs (Goal 1) - Nathan Lindsey

Annual maintenance and improvements continued on the five WHMAs in the Sheridan Region in 2023. The Kerns, Amsden, Bud Love, Ed O. Taylor and Sand Creek WHMAs received annual fence maintenance on a total of 40 miles to reduce trespass livestock and minimize wildlife conflicts with private landowners. 104 acres of irrigation water rights were spread on the Amsden and

Bud Love WHMAs. Annual parking lot and road maintenance was performed. Over 20,000 acres of WGFC managed property rights were monitored. Approximately 300 acres of noxious weeds were treated by WGFD personnel and contract applicators.

Soldier Creek Downer Diversion Rehabilitation and Fish Passage (Goal 2) - Travis Cundy

During spring 2023, funding was secured from the WGFD Habitat Trust Fund to help repair the Soldier Creek Downer Diversion structure and develop a roughened ramp below the structure to allow fish passage upstream. The ramp would reconnect about 2.4 stream miles downstream of the diversion to about two miles upstream of the diversion. The Sheridan County Conservation District secured additional implementation funding from the WWNRT and Wyoming Water Development Commission Small Waters Grant program. EQIP funding sought by the Downer Ditch Company was not secured, however. Therefore, implementation during 2023 was postponed until additional funding can be secured.

Figure 153. Soldier Creek Downer diversion dam.

Sourdough Creek Beaver Releases (Goal 2) - Travis Cundy

During fall between 2020 through 2022, 12 beaver were released to Sourdough Creek west of Buffalo in cooperation with the Bighorn National Forest. The goals were to establish multiple colonies in the previously unoccupied watershed and allow their dam building activities to raise the streamside water table, increase soil moisture availability and improve riparian vegetation growth. During 2023, castor lure mound baited camera traps located about one half mile apart at a dam below the historic splash dam and a dam upstream of the Highway 16 culvert crossing each observed one individual in late June and late July respectively. Additional walks through the corridor above and below the cameras traps yielded only the cutting and abandonment of one aspen tree along the dryland edge of the riparian corridor below the culvert crossing. Due to the limited evidence of colony establishment, a supplemental release with two adults and two sub-adult occurred in late September and early October to improve the likelihood of establishing multiple mated pairs in the watershed. This release occurred at the unoccupied dam complex located below the remnant splash dam structure where tall willow communities were abundant. A camera trap placed at the release site and maintained into November indicated beaver did not remain at the release pond after their release.

Figure 154. Beavers released on Sourdough Creek.

Beaver Creek Slope Curl-Leaf Mountain Mahogany Restoration (Goal 2) - Todd Caltrider

The Southern Bighorn Mountains Curl-leaf Mahogany Restoration project is a long term effort initiated by the WGFD and the BLM. This project started in 2011 as a response to the Outlaw Cave fire in 2006, where 815 acres of curl-leaf mountain mahogany stands were lost due to wildfire. Although wildfire is a natural part of the ecosystem, increased conifer encroachment in curl-leaf mountain mahogany stands increased the ability of wildfire to burn and kill large stands of curl-leaf mountain mahogany. Following the fire, curl-leaf mountain mahogany regenerated, but recruitment is slow compared to the original stands. Curl-leaf mountain mahogany is crucial winter forage for mule deer. Protecting curl-leaf mountain mahogany stands from catastrophic wildfires is critical to protecting mule deer winter forage resources in the southern Bighorn Mountains. Since 2011, a total of 3,542 acres of mountain mahogany habitat has been treated by removing conifer encroachment. Conifers have been mechanically removed by chainsaw hand crews. During summer 2018, the BLM Worland fuels crew removed 256 acres of conifer encroachment along the Slip road area. In summer of 2019, WGFD hired contractors to remove conifers from 532 acres of curl-leaf mountain mahogany on the south end of Gardner Mountain. Additional conifer removal was completed in 2020 on Gardner Mountain, with a total of 167 acres of curl-leaf mountain mahogany treated for conifer encroachment. In 2021, 857 acres of curl-leaf mountain mahogany was treated for conifer encroachment on EK Mountain. Due to the high levels of conifer density on EK Mountain, slash was piled instead of lopped and scattered to reduce ground fuels. During winter 2023, 400 acres of slash piles were burned on State and BLM land on EK Mountain, further reducing fuel loading and wildfire risk on winter range for mule deer. In addition, conifer removal took place in 349 acres of curl-leaf Mountain mahogany stands on Beaver Creek Slope during summer 2023. This project was made possible by funding contributions from WG-BGLC, and BLM.

Figure 155. Crews conducting conifer removal.

Tongue River Acme Power Plant Diversion Fish Passage (Goal 2) - Travis Cundy

A derelict cooling water diversion intake structure is located in the Tongue River alongside the decommissioned Acme Power Plant. It impedes upstream fish passage and boating along the Tongue River. It occurs at river mile 32 above Tongue River Reservoir and is the last unaddressed impediment to fish movements in the river between the mouth of Tongue Canyon at river mile 60 and the Interstate Diversion at river mile 23. Barnum Construction was contracted to lower the sheet piling structure without excavating channel bed sediments around the sheet piling, and place a two percent sloping contoured rock ramp below the structure to facilitate fish and boater passage. The DEQ prohibited bed excavation to avoid mobilizing contaminated sediments retained above the structure. Piling lowering and ramp placement occurred in spring prior to runoff and grading adjustments occurred in fall. The Sheridan County Conservation District is leading the rehabilitation. WGFD is assisting with permitting and funding from the WGFD habitat trust fund. Additional funding partners included the Wyoming Department of Agriculture, Resource Legacy Fund, TNC, Musser Fund, NWTF and WWNRT.

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 in the Upper Powder River are threatened by many factors such as changing precipitation patterns, over-browsing, and lack of disturbance. This project is focused on improving aspen habitats located in spring, summer, and fall seasonal ranges 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 to capitalize on productive vegetation. Aspen stands in the Upper Powder River appear to be older age class and recruitment is struggling to reach maturity due to excessive ungulate herbivory and increased conifer shading. To perpetuate aspen communities on the landscape, action must be taken to reduce conifer encroachment and decrease ungulate herbivory. During summer 2023, a total of 596 acres of aspen enhancement took place on the Powder River District of the Bighorn National Forest. Funding for this project was provided by the USFS, and WWNRT.

Figure 156. Aspen treatment in Crazy Woman Creek.

Hesse Ranch BDAs (Goal 2) - Todd Caltrider and Travis Cundy

The headwaters of the Powder River consist of large mesic meadows that historically supported large riparian aspen and willow communities, and concurrently, large beaver populations. Riparian aspen and willow have declined in this watershed. These riparian aspen and willow communities provide high quality habitat for a variety of wildlife species, especially mule deer. This area is valuable summer range for mule deer in the Upper Powder River mule deer herd. A portion of the population of this mule deer herd migrate to this area every summer to capitalize on the high quality forage at the upper elevations of the Bighorn Mountains. The decline in mesic areas limits the habitat value of this area to mule deer. Due to the current lack of willows and aspen in the riparian area, the creek cannot currently support beavers. Beavers can have a large impact in water distribution in mountain meadows. Beaver dams are able to slow floodwater and distribute it throughout the riparian system, thus reconnecting riparian floodplains, increasing the size of mesic areas, and providing habitat for aspen and willow trees. On the Hesse Ranch, the current possibility of restoring beavers is low due to the limited amount of deciduous woody plants found here. The goal is to restore riparian floodplain connectivity and increase desirable conditions for aspen, willows, and beaver. The WGFD contracted construction of 30 BDA treatment complexes. The purpose of these structural treatments is to emulate the action of beaver dams, and to

Figure 157. Completed BDA.

retain and redistribute water during high flows to increase the size of the mesic riparian area which should increase aspen and willow growth. Currently, there are very few willows and aspen on the property, and through installation of the BDA's, we anticipate increased growth and canopy cover of willow and aspen, thus increasing habitat suitability for beaver. If beaver can eventually be restored into this section of the stream, they will maintain the water table to provide high quality riparian areas and habitats for a wide variety of wildlife species. Future phases will supplement existing willow and aspen in the riparian area with plantings. Funding was provided by the WGBGLC and NWTF.

MANY PERSONNEL CONTRIBUTED TO THE CONTENT OF THE 2023 STATEWIDE HABITAT PLAN ANNUAL REPORT. THANK YOU TO ALL THOSE WHO CONTRIBUTED. THIS REPORT WAS COMPILED AND EDITED BY IAN TATOR, PAUL DEY, RAY BREDEHOFT AND CHELSEA RAMAGE.

APPENDIX A
STATEWIDE HABITAT PLAN IMPLEMENTATION

The SHP is implemented annually by biologists and managers from throughout the WGFD. The Habitat Technical Advisory Group, comprised of program managers, is responsible for updating the plan, annually reviewing project proposals, making funding recommendations, and ensuring that WGFD activities are directed toward achieving SHP goals, strategies, and actions. To track progress toward achieving SHP actions, in 2021 the HTAG began assessing progress on goals as a standing agenda item for each meeting. The team started by reviewing progress toward Goal 1, Strategies I-III in March and progressed through Goal 2, Strategy II at the December meeting. Meeting notes document discussions and status. The team identified progress occurring on 23 of the 30 Strategies or Actions reviewed (77%). This includes progress on seven of nine actions considered especially relevant to address climate change resiliency. Actions for which little to no progress has occurred include:

- Goal 1.IV.C. Identify IF segments for assessment to determine if they have been impacted by junior water users.
- Goal 1. V.A. Create or re-assign a position devoted to water management issues.
- Goal 1. V.C. Work with partners and legislators to find and implement water management solutions.
- Goal 1. V.E. Pursue acquisition of water rights as water law and public acceptance allow.
- Goal 2. I. B. Conduct a statewide riparian habitat assessment to determine resilience and c limate vulnerability.
- Goal 2. I. C. Conduct a widespread stream channel assessment to locate and characterize incisions and other functional aspects and identify areas with significant departure from functioning condition.
- Goal 2. I. F. Promote and support the development and refinement of stream, riparian and wetland GIS data products like the National Hydrography Database.

Lack of progress on the Goal 1 actions above is unlikely until additional staff time can be secured with a new position or with re-assignment of duties. The Goal 2 actions should be considered prospects for research projects. In 2022-25 the HTAG will continue reviewing and pushing for progress on all SHP actions.

APPENDIX B
HABITAT PROGRAM EXPENDITURES

WGFD funds (figures rounded to the nearest $1,000.00) expended for the on-the-ground projects primarily directed at implementation of Statewide Habitat Plan goals and management on WGFC lands during calendar year 2023 (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: $4,610,000

Non-WGFD funds expended for implementation of SHP goals for calendar year 2023 from or in collaboration with various sources including: 1) Wyoming Wildlife and Natural Resources Trust, 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 Governor's Big Game License Coalition, 7) private landowner contributions (including in-kind), 8) corporations and businesses, and 9) private donors.

Non-WGFD Funds Expended on SHP Goals: $8,618,000

Grand Total for SHP Goals: $13,228,000

WGFD applied funding from outside sources amounting to approximately $1.87 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 $12,650,000 of WGFC funds, State Wildlife Grants from US Fish and Wildlife Service, WGFC Trust Funds, and other Grant monies. This figure includes wages, benefits, equipment, operation expenses, supplies and on-the-ground improvement material expenses allocated as follows: Approximately 40% 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: 3% for vehicles and heavy equipment and 57% for materials and supplies.

Personnel overseeing the WGFD Education, Information and Publications Programs spent approximately 12% of their time in 2023 on SHP goal activities, totaling just over $360,000 of WGFD maintenance and operating funds.

Lastly, personnel within the Lands Administration Branch conduct WGFC property rights monitoring, property rights acquisition and disposal, payment of WGFC property taxes on each county and lease payments to the OSLI. Property taxes paid to counties by the WGFC in 2023 totaled approximately $888,000.00. These taxes include WGFC owned state offices, fish hatcheries, bird farms, houses, WHMAs and PAAs.

APPENDIX C
HPP WER TABLES

During the calendar year 2023, HPP completed 467 Wildlife Environmental Reviews (WERs) for federal, state, local government and private sector proponents. The majority of these reviews were completed for private sector and state proponents (46.68% and 29.97%, respectively). HPP completed 138 WERs for SGEO compliance and 12 WERs for MCEO compliance. The project types most frequently reviewed by HPP were related to roadwork/fences, mining, oil and gas, and linear/utilities.

FEDERAL WERS			
SENDER	# OF WERS	%	% OF TOTAL
Bureau of Land Management	34	50.75%	7.28%
Bureau of Reclamation	3	4.48%	0.64%
Environmental Protection	1	1.49%	0.21%
National Parks	1	1.49%	0.21
Office of Surface Mining Reclamation	1	1.49%	0.21%
US Army Corpos of Engineers	4	5.97%	0.86%
US Fish and Wildlife Service	11	16.42%	2.36%
US Forest Service	9	13.43%	1.93%
Army National Guard	3	4.48%	0.64%
Total	**67**		**14.35%**

STATE WERS			
SENDER	# OF WERS	%	% OF TOTAL
Department of Environmental Quality	38	27.14%	8.14%
Office of State Lands and Investments	37	26.43%	7.92%
State Engineer's Office	7	5.0%	1.5%
State Parks	1	0.71%	0.21%
Wyoming Community Development	1	0.71%	0.21%
Wyoming Department of Transportation	49	35.0%	10.49%
Wyoming Game and Fish Department	6	4.29%	1.28%
Gas & Oil Commission	1	0.71%	0.21%
Total	**140**		**29.98%**

LOCAL GOVERNMENT WERS			
SENDER	# OF WERS	%	% OF TOTAL
City/Town	13	30.95%	2.78%
County	29	69.05%	6.21%
Total	**42**		**8.99%**

PRIVATE SECTOR WERS			
SENDER	# OF WERS	%	% OF TOTAL
Company	173	79.36%	37.04%
Consultant	44	20.18%	9.42%
Landowner	1	0.46%	0.21%
Total	**218**		**46.68%**

APPENDIX D

HABITAT PROGRAM ACCOMPLISHMENTS: THE NUMBERS

Activities resulting in on-the-ground accomplishments and promotion of collaborative habitat efforts, directed toward the habitat program during the calendar year 2023 are summarized below:

ACTIVITY	2023 ACCOMPLISHMENTS	5-YEAR AVERAGE ACCOMPLISHMENTS
STREAM AND RIPARIAN ACTIVITY		
Fish barrier installed	0	0.5
Fish screens installed	0	0.4
Fish tracking or investigations	1	5.8
Instream flow segments filed	0 on 0 miles	1.4 on 5.4 miles
Instream flow studies	3	1.4
Post-stream project reach channel / riparian monitoring	25.4 miles	18 miles
Project monitoring - detailed stream channel	39 on 25.4 miles	21.6 on 13.1 miles
Public fishing access projects	2	11.2
Stream flow measurements	41	32.4

ACTIVITY	2023 ACCOMPLISHMENTS	5-YEAR AVERAGE ACCOMPLISHMENTS
Stream reach assessment	36 on 11.1 miles	30.2 on 6.9 miles
Stream restoration or fish passage design	56 on 5.1 miles	24.4 on 3.8 miles
Stream restoration projects maintained	1 on 0.3 miles	4.2 on 1.4 miles
Stream restorations or bank enhancements	15 on 5.1 miles	16.6 on 3.7 miles
Stream structures installed	5	39.6
Stream structures maintained	3	1.8
Stream temperature monitoring sites	49	33.2
Suspended sediment sampling	10	18
Water temperature measurements	49	39.6
Watershed stream assessments (WHAM)	13 on 66.4 miles	21.2 on 74 miles
HABITAT AND UPLAND ACTIVITY		
Annual vegetation production / utilization sites	11	23.2
Aspen Rapid Habitat Assessment	7 on 4,084 acres	50 on 4,064.2 acres
Aspen ripping	0	19
Aspen, cottonwood, willow browse monitoring	0 on 0 acres	0.8 on 1,011 acres
BDAs installed	52 on 5.5 miles	36.8 on 3.11 miles
BDAs maintained	104	48
Beaver transplanted (100 feet of direct impact per beaver)	14 on 7 miles	14.6 on 4.81 miles
BLM RMP or USFS Cooperator Status	8	4.4
Conservation Easements acquired	2 on 4,256.50 acres	0.4 on 851.3 acres
Conservation easements in process, coordinated with partners	2	0.6
Exclosures maintained	6	39
Feedground maintenance	22	20
Fee title acquisition	2 on 3119.7 acres	0.4 on 623.9 acres
Fence maintenance	50 on 138 miles	37,031.6 on 108.8 miles
Fences installed or converted	58 miles	60.2 miles
Field cooperative research projects	57	53.2
Funding applications prepared for other entities	28	26.4
Funding sources, contracts, grants administered	195	198
Group training and continuing education	26	16.4
Herbicide vegetation to thin sagebrush	0 acres	245.9 acres
Herbicide weed treatments	80,704 acres	83,086.4 acres
Hunting access development or improvement	1	0.67

ACTIVITY	2023 ACCOMPLISHMENTS	5-YEAR AVERAGE ACCOMPLISHMENTS
Land management plan participation (BLM, RMP, USFS Cooperator)	0	1.2
Livestock grazing management plans or wildlife habitat stewardship plans	10 on 10,905 acres	1.4 on 119,114.8 acres
Major collaborative effort	136	28
Management monitoring - detailed riparian (riparian habitat assessment <0.5 mile wide along stream)	9 on 0.4 miles	6.5 on 2.6 miles
Mechanical shrub treatment	3,506 acres	1,921.4 acres
Mechanical tree removal	3,925 acres	4,861.2 acres
Monitor livestock trailing easements / trespass livestock	125	68.8
Mowing, chopping and Lawson aerator treatments	1,866 acres	2,429.2 acres
Noxious weed control	6,026 acres	53,788.4 acres
Post-management prescription monitoring	24 on 249,958 acres	12.6 on 75,307.4 acres
Post-vegetation treatment monitoring	24 on 249,958 acres	120.6 on 147,560.6 acres
Pre-treatment monitoring	38 on 51,759 acres	102.6 on 33,022.7 acres
Prescribed burns	653 acres	854.4 acres
Private landowner contacts	334	250
Private landowner / permitee contacts yielding projects	78	86.80
Rangeland Rapid Habitat Assessment	16 on 9,494 acres	54.6 on 27,075.5 acres
Riparian habitat protection, enhancement and management	4 on 50 acres	3.2 on 10.15 acres
Riparian Rapid Habitat Assessment	4 on 1,944 acres	22.8 on 1,082.3 acres
Riparian research studies	3	2.8
Special Rapid Habitat Assessment	4 on 418 acres	10.4 on 3,073.1 acres
Spring developments	0	1.4
Technical assistance requests	96	88.6
Trees or shrubs planted	3,308 on 1,245 acres	9,800.2 on 3,822.5 acres
Upland exclosure developed	6 on 56 acres	4.4 on 12.8 acres
Upland grass, forb and food plot seeding	68 acres	283.2 acres
Upland habitat inventories (GIS)	3 on 312,500 acres	19.6 on 80,420.8 acres
Upland vegetation / habitat treatment monitoring sites	0	0
USDA Farm Bill Program contract involvement	18	13
Water guzzlers or water tanks installed	0	5.2
Water wells converted to solar pumps	4	1.2

ACTIVITY	2023 ACCOMPLISHMENTS	5-YEAR AVERAGE ACCOMPLISHMENTS
Water wells drilled	0	1.8
Wetland delineations	2 on 2.7 acres	4.8 on 14.9 acres
Wetland development or major renovation	2 on 67 acres	36.6 on 189.6 acres
Zeedyk structures	4 on 150 feet	Not previously tracked
MIGRATION ACTIVITY		
Fish ditch entrainment	8	5.8
Fish movement monitoring	1	4.2
Fish passage barriers inventoried	246	182.6
Fish passage structures installed	4	8.2
Fish passage structures maintained	21	10
Fish passage structures monitored	20	19
Fish passage upstream miles connected	27 miles	64.2 miles
Wildlife crossing assessment	2	3
Wildlife crossing monitoring	25	10.8
Wildlife crossing structure installed and enhanced	17	10.8
Wildlife crossing structure installed or enhanced, over or underpass	9 on 16.7 miles	Not previously tracked
Wildlife crossing structure installed or enhanced, fence only	1 on 2.17 miles	Not previously tracked

APPENDIX E

ACCOMPLISHMENTS ON WYOMING GAME AND FISH COMMISSION OWNED LAND

WGFD accomplished the following metrics on WGFC-owned land in 2023:

ACTIVITY	2023 ACCOMPLISHMENTS	5-YEAR AVERAGE ACCOMPLISHMENTS
Access improvements	16	11.3
Farming contract	10 on 950 acres	10.2 on 1,230.2 acres
Fence maintained	43 on 260 miles	56.2 on 949.9 miles
Fence installed or converted	5 on 13.8 miles	4.6 on 9.1 miles
Food plot	12 on 220 acres	11 on 211.4 acres
Forage reserve	0 on 0 acres	0.8 on 8,559.2 acres
Lands grazed	29,237 acres	46,788.8 acres
Lands irrigated	1,100 acres	1,779 acres
Irrigation upgrades	5 on 6,600 feet	4.8 on 41,116 feet
Lands livestock / forage reserve / meadow rejuvenation grazing administered	12 on 38,000 acres	11.2 on 47,788.8 acres
Meadow enhancement	6 on 230 acres	4.8 on 116.5 acres
Meadow mowed/ farmed	15 on 1,205 acres	15.6 on 1,164 acres
Noxious weed control	86 on 6,101.4 acres	74 on 4,811.1 acres
Prescribed burn	100 acres	86.2 acres
Spring developments	4	1.6
Water control structures	4	11.4
Weed treatment	86 on 6,101 acres	528.4 on 39,665.1 acres
Wells converted	1	1
Property right monitoring	112 on 112,000 acres	69.4 on 76,166.6 acres
Road maintenance	80 on 110 miles	69.4 on 123.5 miles
Sign installation	95	145

APPENDIX F
SHP REPORT MILES AND ACRES SUMMARY METHODOLOGY

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

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

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

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

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

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

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

CATEGORY	ACTIVITY
ASSESSMENT AND INVENTORY	Stream reach assessment (Rosgen survey, HQI, etc.)
	Stream restoration or passage design
	Watershed assessment (WHAM)
PROJECT IMPLEMENTATION	Beaver dam analogs installed (stream distance influenced)
	Beaver restoration (stream distance influenced)
	Fish passage miles connected
	Stream restoration or bank enhancement
	Riparian protection, enhancement or management (<0.5 mile wide along stream)
MONITORING	Post-stream project reach channel/riparian monitoring
HABITAT PROTECTION	Instream flow filing segments

Use the following table for acres.

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

CATEGORY	ACTIVITY
ASSESSMENT AND INVENTORY	Aspen Rapid Habitat Assessment
	Rangeland Rapid Habitat Assessments
	Riparian Rapid Habitat Assessments
	Special Rapid Habitat Assessments
PROJECT IMPLEMENTATION	Herbicide treatment to thin sagebrush
	Herbicide weed treatments
	Livestock grazing management plans or wildlife habitat stewardship plans
	Mechanical shrub treatment
	Mechanical tree removal
	Mowing, chopping, and Lawson aerator treatments
	Noxious weed control
	Prescribed burns

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

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LIST OF ACRONYMS

ADA - AMERICANS WITH DISABILITIES ACT

AHAB - AQUATIC HABITAT BIOLOGIST

AUM - ANIMAL UNIT MONTH

BANCS - BANK ASSESSMENT FOR NON-POINT SOURCE CONSEQUENCES OF SEDIMENT

BDA - BEAVER DAM ANALOG

BLM - BUREAU OF LAND MANAGEMENT

BOR - BUREAU OF RECLAMATION

BOW - BOWHUNTERS OF WYOMING

CFS - CUBIC FEET PER SECOND

CWD - CHRONIC WASTING DISEASE

DEQ - DEPARTMENT OF ENVIRONMENTAL QUALITY

DBH - DIAMETER AT BREAST HEIGHT

DU - DUCKS UNLIMITED

EQIP - ENVIRONMENTAL QUALITY INCENTIVES PROGRAM

GPS - GLOBAL POSITIONING SYSTEM

HPP - HABITAT PROTECTION PROGRAM

HTAG - HABITAT TECHNICAL ADVISORY GROUP

I-25 - INTERSTATE 25

I-80 - INTERSTATE 80

I-90 - INTERSTATE 90

IMAGINE - INSTITUTE FOR MANAGING ANNUAL GRASS INVADING NATURAL ECOSYSTEMS

JIO - JONAH INTERAGENCY OFFICE

LaVA - LANDSCAPE VEGETATION ANALYSIS

MDF - MULE DEER FOUNDATION

MDI - MULE DEER INITIATIVE

MFF - MULEY FANATICS FOUNDATION

NEPA - NATIONAL ENVIRONMENTAL POLICY ACT

NFWF - NATIONAL FISH AND WILDLIFE FOUNDATION

NGO - NON-GOVERNMENTAL ORGANIZATION

NRCS - NATURAL RESOURCES CONSERVATION SERVICE

OSLI - OFFICE OF STATE LANDS AND INVESTMENTS

PAA - PUBLIC ACCESS AREA

PAPO - PINEDALE ANTICLINE PROJECT OFFICE

PFW - PARTNERS FOR FISH AND WILDLIFE

PIT - PASSIVE INTEGRATED TRANSPONDER

PVHP - PLATTE VALLEY HABITAT PARTNERSHIP

RHA - RAPID HABITAT ASSESSMENT

RMEF - ROCKY MOUNTAIN ELK FOUNDATION

ROW - RIGHT-OF-WAY

SGCN - SPECIES OF GREATEST CONSERVATION NEED

SGLWG - SAGE-GROUSE LOCAL WORKING GROUP

SHP - STATEWIDE HABITAT PLAN

THAB - TERRESTRIAL HABITAT BIOLOGIST

TNC - THE NATURE CONSERVANCY

TU - TROUT UNLIMITED

USFS - UNITED STATES FOREST SERVICE

USFWS - UNITED STATES FISH AND WILDLIFE SERVICE

UW - UNIVERSITY OF WYOMING

WGBGLC - WYOMING GOVERNOR'S BIG GAME LICENSE COALITION

WGFC - WYOMING GAME AND FISH COMMISSION

WGFD - WYOMING GAME AND FISH DEPARTMENT

WHMA - WILDLIFE HABITAT MANAGEMENT AREA

WLCI - WYOMING LANDSCAPE CONSERVATION INITIATIVE

WMA - WILDLIFE MANAGEMENT AREA

WSF - WYOMING STATE FORESTRY

WVC - WILDLIFE-VEHICLE COLLISIONS

WWNRT - WYOMING WILDLIFE AND NATURAL RESOURCE TRUST

WYWSF - WYOMING WILD SHEEP FOUNDATION

WYDOT - WYOMING DEPARTMENT OF TRANSPORTATION