STATEWIDE HABITAT PLAN 2020

Wyoming Game & Fish Department

CONTENTS

ACKNOWLEDGMENT

Bighorn National Forest. *(Photo by Paul Dey/WGFD)*

It has been said that many hands make light work, and this was truly the case with the revision of the Statewide Habitat Plan (SHP). Those who had a hand in the document share a deep passion for fish and wildlife habitat, which was the critical factor to accomplish the revision. Many throughout the Department participated in the effort and completed vital tasks. The Habitat and Technical Advisory Group (HTAG) was chaired by Paul Dey (Aquatic Habitat Manager). The other habitat program leaders on the HTAG, Ian Tator (Terrestrial Habitat Manager), and Ray Bredehoft (Habitat and Access Branch Chief) provided vital leadership. Many thanks go to Jim Wasseen, Wyoming Landscape Conservation Initiative Coordinator, for his diligence in completing much of the revisions, setting agendas, and general good cheer. Also Anika Mahoney (Habitat Protection Biologist) and Noelle Smith (Migratory Game Bird and Wetland Biologist) were instrumental in their contributions and reviews. Erica Cirigliano (GIS Analyst) masterfully worked with aquatic, terrestrial, and habitat and access biologists updating priority areas. Erica was instrumental in completing the virtual story map. The HTAG enlisted the help of Dr. Molly Cross with the Wildlife Conservation Society to conduct an excellent and informational virtual workshop on climate change and the potential effects it will have on Wyoming's habitats. Dr. Cross also provided instruction and tools to help when considering climate change and its effects when considering protections or restoration measures. Finally, and most importantly, this plan is a result of all the biologists and staff members who contributed ideas, opinions, and questions.

LIST OF ABBREVIATIONS

Aquatic Habitat Biologist	AHAB
Beaver Restoration Assessment Tool	BRAT
Bureau of Land Management	BLM
Crucial Habitat Assessment Tool	CHAT
Geographic Information Systems	GIS
Habitat and Access	H&A
Habitat Policy Group	HPG
Habitat Protection Program	HPP
Habitat Technical Advisory Group	HTAG
Integrated Resource Management Application	IRMA
Memorandum of Agreement	MOA
National Hydrography Dataset	NHD
National Park Service	NPS
Natural Resources Conservation Service	NRCS
Pinedale Anticline Project Office	PAPO
Resource Management Plan	RMP
Species of Greatest Conservation Need	SGCN
Statewide Habitat Plan	SHP
Terrestrial Habitat Biologist	THAB
U.S. Forest Service	USFS
U.S. Fish and Wildlife Service	USFWS
University of Wyoming	UW
Wildlife Environmental Review	WER
Wildlife Habitat Management Areas	WHMAs
Wildlife Management Area	WMA
Wyoming Game and Fish Commission	WGFC
Wyoming Game and Fish Department	WGFD
Wyoming Geographic Information Science Center	WyGISC
Wyoming Interagency Spatial Database & Online Management	WISDOM
Wyoming Landscape Conservation Initiative	WLCI

This 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. Within the WGFD, the SHP provides a single, unified roadmap defining how several Director's Office, Fish, Services, and Wildlife programs, with complementary and sometimes overlapping responsibilities, will work together to accomplish habitat protection and enhancement goals.

The WGFD's first Strategic Habitat Plan was completed and approved by the Wyoming Game and Fish Commission (WGFC) in 2001, revised and updated in 2009, and again in 2015. This current update of the Strategic Habitat Plan reflects additional information on wildlife and fish populations, distributions, and habitat. In particular, updates reflect activities under the Department's current Strategic Plan. One such change is the name of the habitat plan - it is now the Statewide Habitat Plan. This was done to reduce the confusion between the two similarly named plans (Strategic Plan and Strategic Habitat Plan). Updates also display actions from the State Wildlife Action Plan (SWAP), to incorporate changes in WGFD programmatic structure, and to address new conditions of habitat and wildlife populations since 2015, including proactively addressing the impacts of a changing climate.

Title 23, the legislation that established the Wyoming Game and Fish Commission, states the Commission was created to "provide an adequate and flexible system for control, propagation, management, protection, and regulation of all Wyoming wildlife" (23-1-103). The management of wildlife is inseparable from the habitat that sustains it. The WGFD's ability to sustain quality wildlife habitat, and therefore wildlife, is contingent upon working in partnership with private landowners and public land managers; conservation organizations; local, state, and federal governmental agencies; and the public. These partnerships are key to implementing the SHP and maintaining abundant wildlife now and into the future. Maintaining habitat values and addressing key habitat issues will require careful consideration, collaboration, and planning followed by bold action under this plan.

The purpose of this Statewide Habitat Plan update is to:

1. Provide current guidance on prioritizing the Department's habitat actions and areas,
2. Identify habitat goals, objectives, strategies, and actions for 2020 - 2025,
3. Identify how proposed habitat projects will be reviewed and ranked for funding from the Game and Fish Wildlife Trust fund and other funding sources,
4. Clarify how the SHP relates to other planning efforts, and
5. Identify how various Department sections and personnel work together to accomplish habitat goals.

Sage Creek Basin. *(Photo by Anika Mahoney/WGFD)*

HABITAT MISSION

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

HABITAT VISION

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

STATEWIDE HABITAT PLAN GOALS

Goal 1. Conserve and protect crucial aquatic and terrestrial wildlife habitats.

Goal 2. Restore aquatic and terrestrial wildlife habitats.

Goal 3. Conserve, enhance, and protect fish and wildlife migrations.

The responsibility for implementing habitat work across the Department is distributed among several programs across all Department Divisions (Figure 1). The Aquatic Habitat, Bioservices, Regional Terrestrial Habitat, and Habitat and Access Sections have primary and direct responsibility. The Director's Office provides policy-level support by implementing the policies and decisions of the WGFC regarding wildlife and wildlife habitat management, including scientific data collection, research, and habitat conservation and enhancement. The Communications and Outreach Section oversees the communication of habitat information and publications related to all department activities including habitat work.

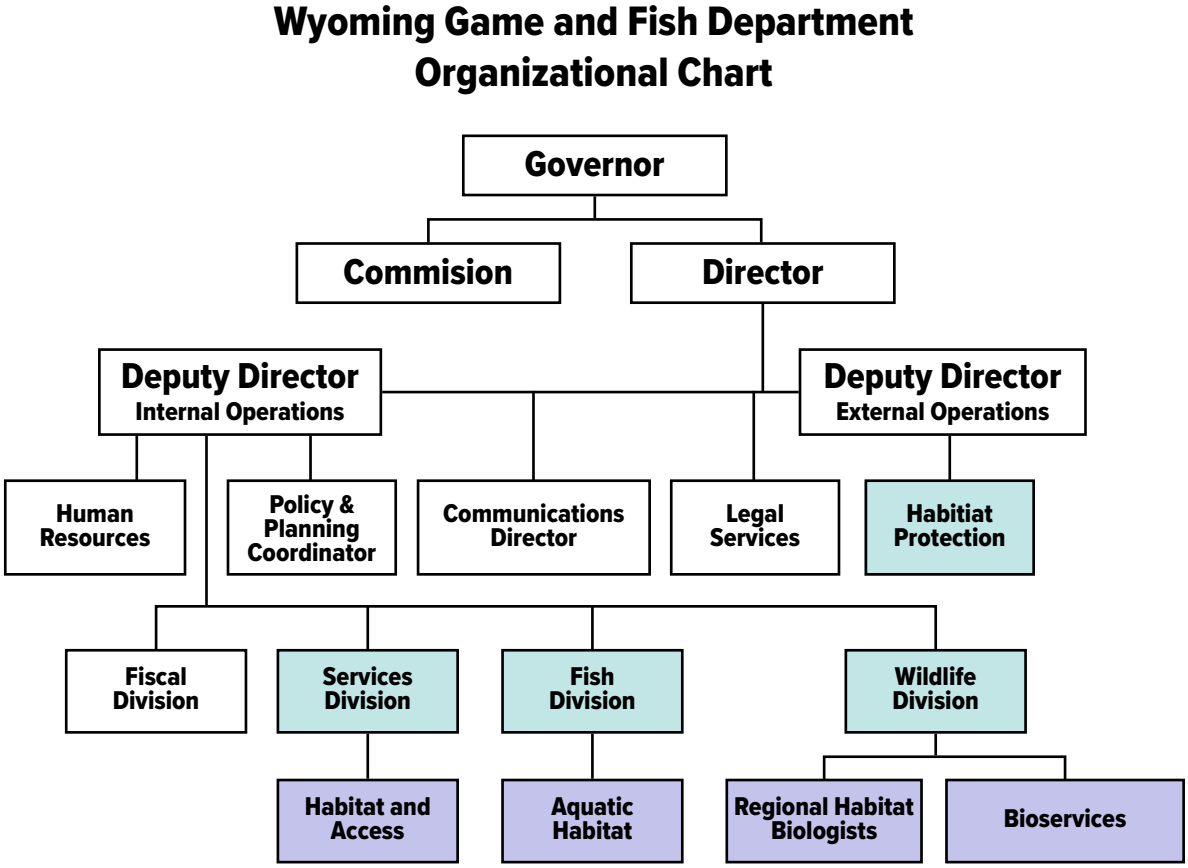

Figure 1. *Department work units with primarily habitat responsibilities.*

The Habitat Protection Program, under the Director's Office (Figure 1), coordinates WGFD review and evaluation of land use plans, projects, policies, and activities that affect fish, wildlife, and their habitats, and makes recommendations consistent with Department and Commission policies, position statements, and strategies. This section coordinates WGFD input for planning and implementation of human development activities, natural resource extraction, federal land use plans (Forest Plans, BLM Resource Management Plans, and others), and individual local habitat and land management projects throughout the state. These plans and projects, in total, influence the amount, type, and

intensity of land use changes that occur in Wyoming. The SHP serves as one of several reference documents used as a basis for WGFD recommendations and negotiations to maximize benefits and minimize harms to crucial habitats.

The Fiscal Division oversees all financial operations of the WGFD, including budget development, financial reporting, accounts payable, purchasing, asset management, federal funds (grant) management, contract management, revenue collection, and licensing.

The Services Division includes the Lands Administration Section which monitors property rights for WGFC-owned and administered lands and identifies lands to acquire property rights in order to restore and conserve habitat to enhance and sustain wildlife populations. Engineering and surveying staff assist on fish passage projects, habitat developments, and many efforts on commission held properties.

Habitat is fundamental to management efforts at all levels within the WGFD (Figure 1). Fish Division fishery managers, water management biologists, and aquatic habitat biologists all have a stake in conserving and enhancing all aquatic wildlife, reptiles, amphibians, and their habitats for current and future generations. Likewise, Wildlife Division programs at the state, regional, or section levels are responsible for conserving and enhancing terrestrial wildlife and their habitats and include: Bioservices, law enforcement, Wildlife Management Coordinators, Terrestrial Habitat, Wildlife Biologists, Access Yes Program staff, Large Carnivore Section, and the Pinedale Habitat Mitigation Biologist among others. Information and Education staff publicize a broad range of news and information including habitat-related stories.

Two WGFD committees were formed in 2006 to help address the complexity and far-reaching scope of habitat issues facing the WGFD. The Habitat Policy Group (HPG) consists of the WGFD Deputy Director and Assistant Division Chiefs and provides oversight of the Habitat and Technical Advisory Group (HTAG), consisting of program managers. The HPG and HTAG, with input and assistance from regional WGFD personnel, are tasked with revising and updating the SHP to provide oversight and direction for all habitat issues within the WGFD.

National Elk Refuge, Jackson region. *(Photo by Anika Mahoney)*

This revision aligns the Statewide Habitat Plan with the Department's Strategic Plan (Figure 2, https://wgfd.wyo.gov/about-us/strategic-plan), which was finalized in 2019 and provides direction to ensure a sustainable future for fish and wildlife. The HTAG renamed the Strategic Habitat Plan to "Statewide Habitat Plan", retaining the abbreviation "SHP". This was done to avoid confusion with the Department Strategic Plan. Another change was to reduce the number of goals within the SHP from 5 to 3. Strategies and actions from previous goals 3 through 5 are now incorporated throughout goals 1 and 2 and the new goal 3. A new Goal 3 was developed in direct alignment with the Strategic Plan, stating the department will conserve, enhance, and protect fish and wildlife migrations. To consider the latest available science on recent and future climate changes, and discuss the consequences of those changes for aquatic and terrestrial habitat management in the State, the HTAG hosted a climate change workshop in conjunction with the Wildlife Conservation Society. Many of the topics and ideas that stemmed from this workshop are incorporated into the 2020 SHP, including information and research needs for climate-informed management planning. This revision also incorporates recent information on species distributions and seasonal habitat delineations, improves links between the written SHP and priority areas, clarifies how proposed habitat projects will be ranked relative to priority areas and opportunities, and incorporates species of greatest conservation need (SGCN) as identified in the 2017 State Wildlife Action Plan.

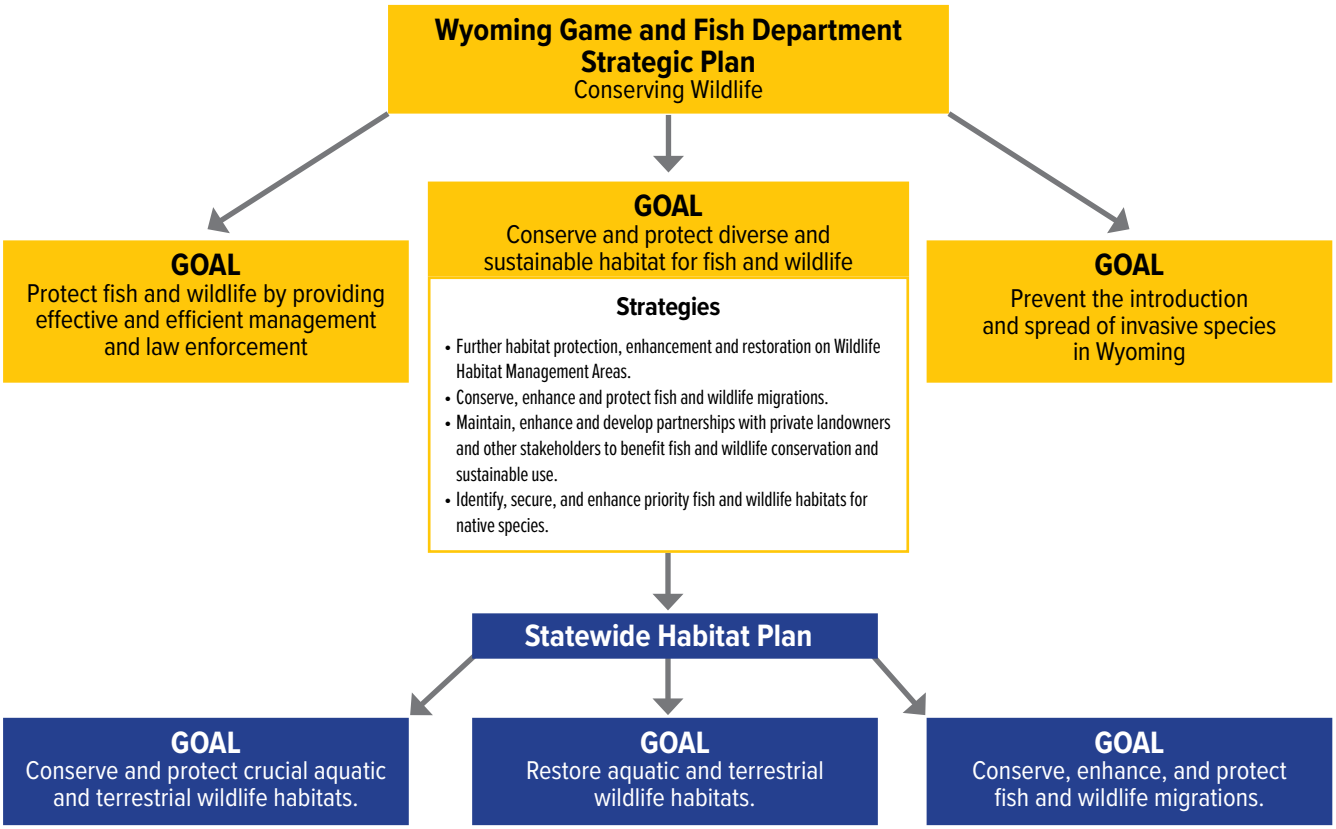

Figure 2. *Aligning the 2020 Statewide Habitat Plan with the Department's Strategic Plan*

CRUCIAL, RESTORATION, AND CONNECTIVITY PRIORITY AREAS

Department habitat plans have consistently featured geographic priority areas since the first plan was written in 2001. Identifying priority areas serves at least eight functions (Table 1).

Table 1. — How Priority Areas Are Used

Priority Area Use	Crucial Areas	Restoration Areas	Connectivity Areas
Indicate Department Support of efforts by other agencies, groups, and individuals.	X	X	X
Inform the public and specific partners about areas that are especially important to the Department's efforts to deal with connectivity limitations. GIS layers will be provided for IRMA, CHAT, WISDOM, NREX, etc. to indicate areas of high wildlife value, so others can properly evaluate and assess these sites.	X	X	X
Rank and Prioritize habitat proposals by Department personnel for funding decisions.	X	X	X
Develop Comments and or recommendations on other agencies' plans.	X	X	X
Evaluate Properties for Commission actions including land acquisitions and conservation easements.	X		X
Identify Potential Impacts of human activity and development proposals to important crucial and connectivity resources.	X		X
Develop annual work plans.		X	X
Illustrate to the public and our partners those areas the Department will focus habitat restoration and connectivity efforts for the next 5 years.		X	X

Revision of priority areas under this SHP took place in an online digital environment using ArcGIS with final areas displayed in an ESRI Storymap. Using existing, vetted Geographic Information System (GIS) data layers to develop priority areas created a uniform approach across the state that allows updating in a nimble fashion while still retaining local knowledge and flexibility to drive priorities.

The development of the 2020 SHP priority areas involved regional biologists reviewing various data layers such as big game ranges, migration corridors, Greater sage-grouse core areas, aquatic conservation areas, etc. (Appendix 2). They were asked to compare the new priority layers to the previous to decide if additional GIS layers need to be added, or edits made, to capture previous priority areas (if the biologist believed the previous priority area layer was still valid). This revision removed "Combined" areas previously used to represent both Aquatic and Terrestrial priority areas. This was done because the new riparian corridor layer includes areas previously captured as "combined" priority areas. Habitat values and issues associated with each priority area and previously written in a 2-page narrative as a pdf file, are now captured as text fields with each GIS layer.

Priority areas were not identified in Yellowstone National Park or the Wind River Reservation where the WGFD does not have wildlife management authority. The two exceptions are the inclusion of Greater sage-grouse core areas within the Wind River Reservation and WGFC-owned properties part of the Spence and Moriarity Wildlife Management Area (WMA).

Under the SHP, there is a fundamental distinction made between wildlife habitats that are "Crucial" for wildlife and those habitats that have been degraded and have potential for "Restoration". This distinction between crucial and restoration areas is captured in Goals 1 and 2. Key wildlife habitat areas are delineated as crucial under Goal 1 to communicate their value to WGFD partners and public constituents. Likewise, by identifying restoration areas under Goal 2, the WGFD is signaling its intent to focus resources on issues that indicate the highest likelihood of success and most meaningful effect on habitat. Understanding the distinctions between Goal 1 and Goal 2 are vital for understanding the SHP and are discussed in more detail below.

Priority habitats delineated under **Goal 1, Crucial Habitat Areas,** are designated as crucial to conserving and maintaining populations of terrestrial and aquatic wildlife for the present and future. Successful holistic habitat management will require a strong conservation component and partnership with private landowners, land management agencies, land users, and conservation organizations. Crucial Habitat Areas are based on significant biological and ecological values including habitats that support important life stages needed for maintaining game species, SGCN, and important species, or vegetation communities. These include well-functioning habitats that need to be maintained as well as habitats that have deteriorated and should be restored or enhanced. The key consideration in selecting these areas was the identification and use of "Habitat Values". There are a variety of values used to identify crucial habitats including: big game seasonal ranges, Greater sage-grouse core, SGCN presence and diversity, ecological condition of riparian and upland vegetation communities, movement and migration corridors (bottlenecks, routes, stopovers, high use areas) of aquatic and terrestrial species, presence of cutthroat trout populations,

watershed hydrologic function, stream flow, connectivity, and physical access by aquatic and terrestrial wildlife populations to all habitats necessary to persist. Goal 1 includes places where natural disturbance regimes continue to sustain the long-term health and diversity of vegetation.

Goal 2, Restoration Habitat Areas, are important aquatic and/or terrestrial wildlife habitats that can and should be actively restored to achieve greater wildlife value. These areas are primarily focused on aspen communities and other vegetative communities in advanced stages of succession, coniferous forests at risk due to beetle kill, fragmented and disconnected aquatic and terrestrial habitats, incompatible grazing management practices, aquatic habitats exhibiting decreased water quality and quantity, stream diversions that entrain fish, unstable stream channels (degradation, aggradation, lateral migration), shrub communities, and all habitats with invasive plant species. Other important considerations when identifying habitats for restoration include: the probability of treatment success, the current status of the wildlife species present, managing the impacts that caused the habitat loss or degradation, providing or improving recreational access to high quality habitats, and the opportunity to partner with others to increase likelihood of successful restoration and long-term management. Habitat restoration areas may overlap crucial habitat areas identified in Goal 1. Prioritization of these delineated areas will be important to properly allocate resources (e.g. manpower and money) and to properly communicate with management partners for project implementation including post-treatment management (Figure 3).

Goal 3, the connectivity goal, reflects the high importance that issues related to connectivity among fish and wildlife populations have gained in recent years. For example, the Department recently created and hired a Statewide Migration Coordinator to deal with issues around ungulate migration and road crossings. Similarly, the Department created a Fish Passage Coordinator position in 2009. Goal 3 encapsulates the value of both protecting connectivity where it currently occurs and the issue of enhancing fish passage and wildlife migrations to improve connectivity.

Figure 3. *Relationships among Goals 1 through 3. The areas may commonly overlap as shown or may be distinct.*

Officially designated wildlife migration corridors as well as informally identified migration routes are included under this goal. Likewise, fish passage areas are included. A sampling of issues addressed under this goal include road crossings that impede fish or wildlife, diversion dams that block fish, the location and accessibility of ungulate stop-over areas, diversions that entrain high numbers of fish, and fences that block or impede migrations.

FUTURE PRIORITY AREA REVISIONS

With the development of GIS based priority areas in this revision, updates will be made annually. This will reflect the most current information and simplify 5-year updates. Annually in the fall, the HTAG chair will call for proposed changes to priority areas. Biologists will have the option of working with the GIS section to revise and update priority areas. Proposed changes to priority areas will be reviewed by the HTAG and final updated areas will be published by January 31 each year. Updated GIS layers will be distributed to the WGFD staff and programs that use them in decision-making.

The occurrence of larger scale disturbances, such as wildfire, could affect any of the priority area designations. For example, focusing efforts on weed treatments and restorative actions in the seasons immediately following a wildfire are likely scenarios and would be sensible to re-evaluate restoration priority areas in such a case before the normal 5-year plan update in 2025.

WILDLIFE HABITAT MANAGEMENT AREAS

The Department manages 44 Wildlife Habitat Management Areas (WHMAs) that comprise approximately 450,000 acres of deeded, leased and/or cooperative agreement land. These areas were purchased by the WGFC as an investment to protect crucial habitat for a variety of wildlife including fish, big game, waterfowl, upland birds, herpetofauna, and non-game birds, mammals, and fish. The WHMAs include access to nearly 370 miles of streams, 2,000 acres of wetlands, and over 47,000 lake surface acres. During development of the Department Strategic Plan, WHMAs were identified as extremely important to Wyoming's citizens because of the opportunities they provide to hunt, fish, watch wildlife, and recreate. The Strategic Plan's "Further habitat protection, enhancement and restoration on Wildlife Habitat Management Areas." strategy reflects the high priority of the WHMAs for the Department's efforts and funding.

Many of the WHMAs demonstrate conservation and protection of crucial aquatic or terrestrial wildlife habitats, consistent with Goal 1 of this habitat plan. For example, Greater sage-grouse core areas and designated migration corridors can be found within a number of WHMAs. Many of the WHMAs were purchased to provide winter range for migrating big game. Some WHMAs provide crucial habitat for fisheries and are headwaters for many streams.

Habitat restoration on WHMAs demonstrates the efforts to improve and maintain the function of these highly-prized lands and water or to address unanticipated impacts. Restoration efforts on WHMAs qualify for Statewide Habitat Plan funding under Goal 2, Restore Aquatic and Terrestrial Habitats.

WHMAs serve as connectivity areas for many populations of fish and wildlife, with many overlapping or in close prox-

imity to ungulate migration corridors. The commission-owned lands provide winter range for elk, deer, pronghorn, bighorn sheep and moose; host important fisheries and provide stopover habitat for migrating birds and bats. These functions fall under Goal 3. Habitat Project Development and Funding.

HABITAT PROJECT DEVELOPMENT AND FUNDING

In 1986, the Commission recognized that habitat is the single most important factor contributing to the abundance and diversity of wildlife in Wyoming and established the Wildlife Trust Account. From interest generated by this trust, the Department has appropriated approximately $500,000 to $1.2 million dollars annually for habitat and information and education projects in addition to habitat funding available from a variety of external sources.

WGFD is consulted regularly to partner on habitat projects and on prioritizing habitat work. A project ranking system helps to allocate these funds to projects that will result in significant and long-term habitat conservation and management. A systematic project ranking approach ensures that project proponents are aware of how proposals will be evaluated and contributes to providing consistency and objectivity in the selection process. The approach below (Tables 2-4) will be used to assign ranks to proposed habitat projects.

Project development, submittal and evaluation will occur twice annually to accommodate the July 1 fiscal year beginning and corresponding to the commission meeting cycle and to align with the September 1 Wyoming Wildlife and Natural Resource Trust (WWNRT) application deadline.

The bulk of habitat projects will be:

1. Developed and submitted for review by late fall/early winter, reviewed and ranked by regional teams by early January,
2. Reviewed and ranked by the HTAG and HPG in January-February,
3. Presented in draft form to the Commission in March, and
4. Finalized by July.

For proposals applying for $200,000 or more of WWNRT funding or proposals that require funding before July 1 of the following fiscal year, applications will be reviewed and ranked in July and August. These timelines and review processes will occur for all habitat project proposals to ensure that, to the extent possible, projects are evaluated together and relative to one another and so that funding sources can be effectively leveraged. The HTAG chair will annually work with the budget team to set and publish due dates.

REGIONAL REVIEW

Each WGFD region, through their Regional Leadership Team, is responsible for voting to establish the regional ranking of the Habitat Trust fund proposals. This subgroup of the RLT should include each project proponent and the regional fisheries, wildlife, and habitat and access branch supervisors. Input should be sought from all interested regional employees. The RLT will provide ranked or prioritized project proposals along with explanations of significant discussion points pertaining to proposed projects (Table 2).

Table 2. — Regional Leadership Team project ranking

Project is a number one priority for a Region.	5 Points
Project is a number two priority for a Region.	4 Points
Project is a number three priority for a Region.	3 Points
Project is a number four priority for a Region.	2 Points
All additional projects.	1 Points

The regional review process can be tailored to the unique needs, conditions and staffing that occur in the region. However, following several best practices will ensure development of worthy proposals that receive fair and full consideration:

- At RLT, All Region Meeting or other regional gatherings, share ideas for future projects. Early notice and vetting of ideas results in improved projects.
- Allow at least 2 weeks for review of applications or project proposal materials before they are due in Cheyenne.
- Distribute project proposal materials broadly to all interested or potentially interested regional employees and provide sufficient time for review before any meetings to discuss or rank.
- Conduct an in-person or video meeting where the project proponent can describe the project and address questions and concerns.
- Have a designated person in charge of running the meeting, setting the agenda, distributing notes and products, etc.
- Understand and communicate to others that strong projects evolve through time as good ideas and constraints are accommodated.
- Share concerns and ideas in a matter of fact manner while avoiding personal attacks or prejudices.
- Ask the obvious or stupid question(s). Sometimes the simplest question needs to be asked (Why are we doing this?).
- Share regional discussion points, concerns, pros/cons, etc. with managers and HTAG members
- Consider the needs and priorities of the region as a whole, try to be objective concerning where “your” project fits into the big picture and how high it should rank.

A regional review that incorporates the above principles will yield well-vetted projects. It is important reviewers consider several components of a project:

- Does the project proposal explain why the work is important to do (What is the problem? Is it compelling?)?
- Is the proposed approach technically sound?
- What is the cost:benefit ratio (Is the investment worth the likely outcome?)?
- What is the consequence of doing nothing?
- What is the long-term commitment (for all potentially involved)?
- Will ongoing maintenance be required and who will do it?
- Is the project an additional phase or step in an ongoing effort? If so, it may rate higher
- Will the project garner "buy-in" with key landowners or partners?
- Are there, or will there be, appropriate funding and technical partners involved?
- Can the project be postponed or further developed while other "ready" projects take precedence?
- Does the project align with Department, SWAP and SHP priorities?
- Is the project seeking funding for activities that are otherwise difficult to fundraise for (project design, for example)?
- How time sensitive is the work? Would there be consequences for deferring implementation one year?

HABITAT TECHNICAL ADVISORY GROUP REVIEW

The HTAG will use a cumulative ten-point scale to assign relative importance to habitat project proposals with the highest priority projects assigned higher numbered values (Table 3). The HTAG will assign values of 1 or 0 to those projects within a WHMA and address Goals 1 through 3. An additional point will be awarded if the project proposal explicitly identifies how it addresses one of the SHP climate change strategies or goals, or identifies how conditions will be more resilient to climate change and provide climate adaptation benefits to numerous species. An additional score of up to 5 points will be awarded by the HTAG based on various considerations including technical merit, cost effectiveness, project readiness, Department or programmatic priorities, demonstration value, and amount of partner contributions and engagement. Unique or special habitat types (e.g. bat hibernacula), novel approaches, or comprehensive ecosystem benefits can be considered when awarding these additional points. This score will be combined with the regional priority score (Table 4).

Table 3. — Project ranking system to be used by HTAG

In a WHMA **and** protects or improves habitat.	1 Point
In a Crucial Area **and** addresses values (Goal 1).	1 Point
In a Restoration Area **and** addresses issues (Goal 2).	1 Point
In a Connectivity Area **and** protects or improves connectivity (Goal 3).	1 Point
Addresses a climate change Strategy or Action **or** explicitly identifies how climate change resilience will be increased	1 Point
HTAG technical review	5 Points

Table 4. — Examples of project ranking scores.

	In a WHMA	In a Crucial Area (Goal 1)	In a Restoration Area (Goal 2)	Addresses Connectivity Issues (Goal 3)	Addresses Climate Change	HTAG Review	Region Priority	Total Score
Project X	1	1	1	1	1	5	5	15
Project Y	0	1	1	0	0	3	2	7
Project Z	1	0	0	1	1	2	4	9
Project AA	0	0	1	1	0	4	2	8

Aquatic and Terrestrial Habitat Statewide Managers and the Habitat and Access Chief will lead the HTAG in reviewing all regional and statewide project proposals and supplement regional rankings with rankings developed following Table 3 to provide a statewide prioritization. Additional means of evaluating proposals may be used to apportion limited funding. The HTAG chair will present HTAG funding recommendations to the budget team.

In 2012, a coalition including the Association of Fish and Wildlife Agencies to which WGFD belongs, published the National Fish, Wildlife, and Plants Climate Adaptation Strategy (Strategy). The Strategy was designed to "inspire and enable natural resource managers, legislators, and other decision makers to take effective steps towards climate change adaptation over the next five to ten years." In that spirit, climate adaptation actions were outlined in Wyoming's 2017 State Wildlife Action Plan, and this revision of the Statewide Habitat Plan includes explicit consideration of climate adaptation actions.

In 2020, the HTAG sponsored a 3-day virtual workshop with Dr. Molly Cross of the Wildlife Conservation Society. This workshop provided an opportunity for Department staff to learn about current climate change research and climate projections for Wyoming and to discuss the impacts of those changes for habitat management. Focused on river, riparian, and wetland ecosystems, the workshop began with presentations about the best available science on observed and projected changes in climate variables, as well as approaches for climate-informed planning. These presentations were followed by discussions among Department staff and climate scientists identifying management actions, prioritization strategies, and information needs for making climate-informed habitat management decisions.

The workshop generated an extensive amount of material. This material was reviewed by the HTAG to identify specific strategies and actions for inclusion in the SHP. The climate-related actions include both novel approaches (either completely new actions or existing actions with a different emphasis than in the past) as well as continuing actions that have been a focus of habitat work for many years. Actions and strategies believed to be especially important to address climate change vulnerabilities and build resilience in fisheries and wildlife habitat are flagged in the SHP's Goals, Actions, and Strategies section with a fire symbol ( ). We highlight a few of the workshop findings here, excerpted from the complete report provided in Cross et al. (2020).

There are many approaches to modeling future climate conditions. This workshop considered climate variables with direct impacts for habitat where there was relative certainty, represented by general agreement across multiple models. The following values are predicted for Wyoming for 2040-2069 relative to a baseline period of 1971-2000:

- Significantly hotter temperatures, with annual increases ranging from 3-8^{0}F.
- More days with heat index >90^{0}F.
- A longer growing season.
- More growing degree days.
- Increases in annual, winter, and spring precipitation.
- Changes to April 1 snow water equivalent, that vary by region.

Given these and additional predicted changes in climate, workshop participants identified many impacts that can be grouped into the following general categories:

- Surface and groundwater availability (including quantity, quality, temperature, and timing)
- Physical stream conditions (including sedimentation and erosion)
- Aquatic habitat and species (including invasive aquatic species)

- Upland habitat and species (including invasive terrestrial species)
- Wetlands
- Human water use (including irrigation)

The scale of these potential impacts to watersheds or specific WHMAs will depend on the vulnerability of a given area to those changes. Vulnerability can be assessed by considering a geographic area's exposure to changes in climate conditions, the sensitivity to those changes, and the ability to cope with or respond to those changes. Workshop participants identified over 75 habitat management actions to address potential climate change impacts for river, riparian, and wetland habitats in Wyoming. Examples include:

- Ensure Department irrigation systems will be able to capture water given predicted changes in streamflow regimes.
- Maintain Department water rights while balancing in-channel and out-of-channel uses to benefit both fisheries and terrestrial wildlife.
- Develop wet meadows and beaver complexes to increase water holding capacity on the landscape and increase water delivery.
- Construct staged stream channels to better accommodate higher high flows and lower low flows.
- Emphasize floodplain reconnection with stream restoration to reduce impacts of more frequent and severe flood events.
- Consider diversion designs and management that would limit sediment from entering the systems due to changing flood regime.
- Plant woody species for stream shading to combat water temperature increases.
- Use predicted future instream habitat conditions to prioritize fish passage projects.

Participants also identified information needed to make climate-informed management decisions. These research needs vary, but generally contribute to effectively assessing the vulnerability of a given area, species, or ecosystem to predicted changes in climate and to identifying and prioritizing suitable management actions. Suggested needs include:

- Efforts to identify important places for habitat management actions, such as streams that may become more (or less) suitable for particular fish species under a changing climate and areas of "climate refugia" for imperiled species.
- Research designed to support understanding of the effects of particular climate-informed management actions, such as the influence of process-based restoration approaches on water availability for downstream users, or what are the tradeoffs and benefits of different water management approaches (e.g., flood vs. pivot irrigation, or managing water for instream vs. out-of-stream habitats) in a changing climate.
- More information related to invasive plant and fish species, such as which invasive species might be expected to increase or arrive in Wyoming as the climate changes and the best management strategies.
- A standardized, systematic protocol that considers both aquatic and terrestrial needs for evaluating and prioritizing watersheds for protection and restoration as related to climate change.

- An inventory of water temperatures by watershed and prioritized management based on species-specific tolerances.
- An inventory of climate vulnerability by species, ecosystems, or geographies.

Although the specific actions developed through the workshop are extremely valuable, the greatest priority that emerged from the workshop is the need to incorporate climate science into habitat management. A decision-making framework can be extremely valuable for such needs, for example the RAD framework, which aids managers in deciding when and where to Resist, Accept, or Direct (RAD) change:

- Resist involves undertaking actions designed to forestall changes. For instance riparian restoration - planting native vegetation to moderate stream temperatures during periods of extreme heat or cold.
- Accept refers to passively adapting to changes. For instance, an area of invasive annual grasses too large to treat, and infeasible to manage, may be accepted.
- Direct refers to undertaking interventions that will guide changes along pathways deemed most desirable by society. For example, streams that hold cold water fish species (i.e. trout and salmon) become too warm and management shifts toward warm water species (e.g., bass, bluegill, catfish, etc.).

To begin to more explicitly consider the effects of climate change and climate vulnerability, this statewide habitat plan encourages biologists and managers to weave climate change considerations into habitat project proposals. The climate workshop report can serve as an invaluable introduction and guide to aid the Department in considering habitat management through the lens of climate science. Proposals that clearly identify how work will contribute to greater resilience and fishery or wildlife protection or improvement in the face of changing climate, will be ranked higher (Table 3).

Wood River. *(Photo by Paul Dey/WGFD)*

Seedskadee National Wildlife Refuge. *(Photo by Tom Koerner/USFWS)*

The following outline highlights the goals, objectives, and strategies to address the habitat values and issues facing Wyoming's wildlife. This is a comprehensive and hierarchical list of activities that includes generic as well as specific actions. Actions and strategies believed to be especially important to address climate change vulnerabilities and build resilience in fisheries and wildlife habitat are preceded with a fire symbol ( ).

Goal 1. Conserve and protect crucial aquatic and terrestrial wildlife habitats.

Strategy I) Pursue conservation easements and other land stewardship agreements to conserve migration corridors, functioning diverse ecosystems, open spaces, and other crucial habitats.

Lands staff will coordinate agency efforts to collaborate with land trusts, conservation groups, landowners, and other partners to pursue and create opportunities. Lands staff will actively monitor and manage existing easements and agreements.

Strategy II) Provide professional habitat input into land management permitting, planning, and review processes (e.g., Resource Management Plans, Forest Plans, Environmental Impact Statements, Allotment Management Plans, Wildlife Environmental Reviews).

Habitat Protection Program (HPP) staff will continue to lead and coordinate Department habitat commenting and input on land management planning and permitting. HPP will maintain the Wyoming Interagency Spatial Database & Online Management (WISDOM) web application to provide current wildlife and wildlife habitat data to the Governor's Office, State and Federal land management agencies, the U.S. Fish and Wildlife Service, and other partners.

The following new or specific actions will be pursued or emphasized:

Action a) HPP will work with Wyoming Geographic Information Science Center (WyGISC) to re-write the WISDOM application to enhance functionality for wildlife environmental reviews.

Strategy III) Minimize impacts of natural resource extraction and other human actions on wildlife habitat.

HPP staff will continue to provide input and actively participate in land management and project planning, process review, environmental commenting efforts, and decision records as directed by the WGFC Mitigation Policy. Staff will work with the Governor's Office and as a cooperating agency to actively integrate sustainable aquatic and wildlife habitat components into land management planning documents. Staff will use the WGFD's WISDOM web application to facilitate project review and commenting. HPP staff will maintain up-to-date standardized comments and recommendations (e.g., fencing specifications, impact minimization recommendations for renewable and non-renewable energy development, pipeline stream crossing recommendations); provide them to land management agencies, other decision makers, and project proponents; and use them in WGFD reviews of projects, where applicable.

The following new or specific actions will be pursued or emphasized:

Action a) Craft renewable energy recommendations to address wildlife habitat considerations given the increasing demand for solar and wind energy.

Action b) Work with permitting entities and project proponents to understand when and how Department recommendations are implemented, and to maximize their effectiveness.

Action c) Update existing recommendations documents in coordination with Department staff based on new science and policies pertaining to fish, wildlife, and habitat.

Action d) Integrate the "Ecological Integrity" map layer into Wisdom and NREX and use it when commenting in the Wildlife Environmental Review process.

Strategy IV) Protect important fishery resources with instream flow water rights.

The Department's Instream Flow Biologist will continue to pursue instream flow filings to protect important fisheries.

The following new or specific actions will be pursued or emphasized:

Action a) Revise and update the 2011 water management plan to identify instream flow water right priorities.

Action b) Use flow and temperature resiliencies and importance to multiple species to help prioritize stream segments for instream flow water rights studies.

Action c) Identify instream flow segments for assessment to determine if water rights have been infringed upon by junior appropriators.

Strategy V) Develop water management capacity to proactively prepare for changes in water availability and minimize impacts to fishery and wildlife resources.

The Department Water Rights Team presently functions to identify solutions to water right issues involving Commission held properties and associated with Department projects. This team can address some actions under this strategy.

The following new or specific actions will be pursued or emphasized:

Action a) Create or re-assign a position devoted to water management issues and actions identified below and in Strategy VI.

- **Action b)** Given predictions related to water shortages/drought, use monitoring data to identify needs for and prioritize water management actions.

Action c) Work with partners and legislators to find and implement water management solutions like short or long-term leases or voluntary conversions of water rights to instream flow or other conservation water rights.

- **Action d)** Evaluate tradeoffs of using Bump Sullivan water shares for alternative fishery or wildlife benefits (wetland maintenance, fishery, pheasant habitat production, etc.).

- **Action e)** Pursue acquisition of water rights as water law and public acceptance allow for fishery and wildlife conservation.

Strategy VII) Protect fisheries and associated habitat from water development and management proposals that impact aquatic habitats.

Representatives from the Department Water Rights team and members of fish staff, including the instream flow biologist and the water management position proposed under Strategy V. Action a, would be primarily responsible for implementing the specific actions under this strategy. In addition, regional fisheries supervisors provide critical review of water development proposals and are the primary line of communication with project sponsors. This role is supported by regional aquatic habitat biologists (AHABs).

The following new or specific actions will be pursued or emphasized:

Action a) Coordinate regularly with and attend meetings of the Water Development Commission to maintain awareness of potential water projects and provide effective Department technical commenting to avoid or offset aquatic impacts.

Action b) Coordinate regularly and attend meetings with the State Engineer's Office and Board of Control to understand water issues and communicate on behalf of the Department.

Action c) Engage regularly with water users and managers through membership and activity in the Wyoming Water Association.

Action d) Serve on the Water Research Program Committee of the Office of Water Programs at the University of Wyoming.

Action e) Participate in the Instream Flow Council to track national issues and how they relate to Wyoming, respond effectively to water related legislative proposals, and remain scientifically and technologically up-to-date and relevant.

Bud Love Wildlife Habitat Management Area. *(Photo by Patrick Wine/WGFD)*

Whiskey Basin Wildlife Habitat Management Area. *(Photo by Parker Loew/WGFD)*

Goal 2. Restore aquatic and terrestrial wildlife habitats

Strategy I) Inventory and evaluate wildlife habitat using standardized inventory techniques (e.g., Wyoming Habitat Assessment Methodology (WHAM), Ecological Site Inventory (ESI), Cooperative Sage-Grouse Habitat Assessments, WGFD Moose and Mule Deer Habitat Assessment Techniques, Rapid Habitat Assessments (RHAs), Wyoming Stream Quantification Tool (WSQT), etc.).

Terrestrial, aquatic habitat, and habitat and access biologists are the primary agents for this strategy, though other biologists may occasionally engage. Terrestrial habitat biologists (THABs) will continue to inventory areas selected for mule deer initiatives and prepare management recommendations. The THABs will collect, analyze, and report vegetation data in a format that informs population management decisions and annually engage multiple Wildlife Division work units in systematically collecting vegetation data.

The AHABs will continue to collect WHAM data on watersheds with limited information or possible habitat limitations and temperature information on at least two streams per region.

The following new or specific actions will be pursued or emphasized:

- **Action a)** Develop an approach to identify vulnerabilities of landscapes, riverscapes, and species, then prioritize the areas for protection and restoration.
- **Action b)** Conduct a statewide riparian habitat assessment to determine resiliency and climate vulnerability.

  Action 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.
- **Action d)** Inventory water temperatures by watershed and prioritize management based on species-specific tolerances.

  Action e) Use the WSQT to determine the relative amount of improvement from stream restoration projects.

  Action f) Promote and support the development and refinement of stream, riparian, and wetland GIS data products like the National Hydrography Database.

  Action g) The THABs will continue to prioritize vegetation data collection in Mule Deer Initiative Herds as well as pre- and post-treatment project areas. This data should be analyzed and shared to improve future management.

  Action h) Conduct RHAs in all mule deer initiative herds which will be summarized every five years and considered for herd unit objective reviews.

  Action i) Implement pre- and post-treatment monitoring for projects that introduce disturbance or other management change into a landscape. This can include photo points, density circles, line point intercept, ocular estimates, and other established techniques.

Strategy II) Develop scientifically and technically sound habitat projects that wisely use sportsman and partner funding to address important issues to benefit fishery and wildlife resources.

This strategy will be implemented at multiple levels from a broad variety of staff throughout the department working together using various processes such as outlined in this plan. For example, habitat and other biologists will develop project applications annually or more frequently depending on funding sources. Regional staff will review and rank project proposals. The Habitat Technical Advisory Group (HTAG) will review and prioritize proposals using SHP priority area maps and other information.

The following new or specific actions will be pursued or emphasized:

- **Action a)** Prioritize projects that are more likely to build resilience to climate change and provide climate adaptation benefits to numerous species.
- **Action b)** Identify areas that are expected to remain or become suitable as the climate changes even outside of historic ranges (i.e., for imperiled species) that may serve as key source populations and allow for other limitations to be addressed.

Strategy III) Develop new and nurture existing coalitions, partnerships, and other relationships to accomplish habitat projects.

Staff at all levels will continue liaisons to and coordination with conservation organizations, private stakeholders, and other land management agencies as well as to foster new relationships with groups that promote wildlife habitat enhancements and sustainable natural resource management. The Department will strive to have at least one employee attend each Wyoming Wildlife Natural Resource Trust (WWNRT) meeting. Program managers and Fiscal administrators will continue to train employees and maintain staff needed to ensure accurate and timely contractual and financial operations occur with funding entities. The terrestrial habitat program manager will maintain the WGFD – Natural Resources Conservation Service (NRCS) Memorandum of Agreement (MOA) through annual meetings and coordination. All personnel need to prioritize activities that foster improved working relationships with other government agencies, private individuals, and NGOs.

Strategy IV) Emphasize implementation of watershed/landscape scale habitat projects.

Staff at all levels will emphasize landscape-scale habitat restoration when developing work schedules and prioritizing projects. Watershed level habitat inventories will continue to be collected to support larger-scale enhancements.

Strategy V) Promote sound riparian habitat with functioning riparian communities.

This strategy will be primarily executed by habitat biologists, though other biologists and staff are integral. Biologists will continue to work with land managers and landowners to transplant and restore beaver to historical and suitable unoccupied or under occupied habitat. Habitat biologists will work to facilitate grazing management that mutually benefits livestock and wildlife and provides for vegetation resiliency. Finally, habitat biologists will promote wise human development of riparian areas including roads, structures, agriculture, and other activities.

The following new or specific actions will be pursued or emphasized:

- **Action a)** Apply Beaver Restoration Assessment Tool (BRAT) statewide if reliable Landfire and National Hydrography Dataset data are available.
- **Action b)** Improve riparian habitat for wildlife connectivity via livestock grazing management, fence conversions to wildlife friendly standards, or fence riparian areas to reduce herbivory by livestock, and riparian restoration to support greater opportunities for animal movement in the face of changing climate conditions.

Strategy VI) Promote functioning stream channels that maintain natural processes and aquatic habitat.

This strategy will be primarily executed by AHABs, though other biologists and staff are integral. Biologists will work with land managers, private landowners, and conservation organizations to enhance or restore stream channels. Restoration will follow natural channel design principles and include a thorough assessment of existing geomorphology and cause-effect relationships. Channel restoration will consider watershed constraints. At a minimum, all stream restorations will include objectives to address: floodplain connectivity, lateral stability, channel bed diversity, and riparian vegetation.

The following new or specific actions will be pursued or emphasized:

- **Action a)** Use staged channels to accommodate higher high flows and lower low flows than historically common.
- **Action b)** Enhance and maintain floodplain connectivity on Shoshone and Big Horn Rivers. Emphasize enhancing floodplain connectivity for all river restoration projects.
- **Action c)** Enhance spring creeks and cold water areas as potential cool water refugia and reconnect these systems.
- **Action d)** Develop new projects or build into existing projects an appropriate emphasis on managing irrigation return water to reduce stream temperature increases.
- **Action e)** Plant woody species within the riparian corridors to reduce stream temperature fluctuations and reduce erosion.

  Action f) Work with city government, conservation groups, and others to enhance or restore stream channels and habitat within and around Wyoming communities.

- **Strategy VII)** Promote capturing and storing water in floodplains and shallow aquifers by emulating natural methods to enhance wildlife habitat and function and to buffer hydrological stresses related to drought and climate change.

  The following new or specific actions will be pursued or emphasized:

  - **Action a)** Expand water retention and recharge shallow aquifers by translocating beaver or constructing beaver dam analogs, retention ponds, Zeedyk structures, and other process-based restoration structures.
  - **Action b)** Implement measures to store water at a larger scale and in new locations within watersheds, including upland meadows and within water irrigation systems to catch and save runoff.
  - **Action c)** Develop wetlands and flood irrigation in recharge areas to increase aquifer recharge as appropriate for the local area and resource.
  - **Action d)** Increase irrigation-related water savings via more efficient techniques.

Strategy VIII) Mimic natural disturbance regimes using fire, mechanical, biological, and chemical methods.

This strategy will be primarily executed by THABs, though other biologists and staff are integral. Biologists will coordinate and plan with federal and state agencies to promote managing fires for resource benefits ("let burn") to allow fire to resume its natural role in the ecosystem. Biologists will also use prescribed fire, mechanical, biological, or chemical treatments as tools to mimic natural processes to enhance wildlife habitat across all land ownerships.

This strategy is complicated by the confounding influence of climate change with its role in altering what is considered a natural disturbance. Wildfire intensity, frequency, and magnitude are expected to increase beyond levels experi-

enced in the last approximately 100 years. The potential for these wildfires to serve as models of natural disturbance will need to be evaluated on a case-by-case basis.

Strategy IX) Work with landowners, land managers, and conservation organizations on grazing management that enhance sustainability of rangelands and wildlife habitat.

This strategy will be primarily executed by THABs, though other biologists and staff are integral. Biologists will pursue and cooperatively develop habitat treatments and grazing management plans that promote healthy rangelands and high quality wildlife habitat while also providing economic sustainability for livestock producers. They will develop and use partnership funding sources and long-term agreements that provide infrastructure and incentives to facilitate grazing management for resiliency of vegetation. Biologists will pursue and develop forage reserves and grass banks that provide rest and rotation for livestock grazing strategies.

The following new or specific actions will be pursued or emphasized:

- **Action a)** When developing or assisting in the development of grazing plans, build in adaptation measures that account for a changing climate.

Strategy X) Manage aspen, cottonwood, willow, woody draw, and mixed mountain shrub communities for sustainability.

This strategy will be primarily executed by THABs though other biologists and staff are integral to achieving this strategy. Biologists will pursue and cooperatively develop habitat treatments that mutually benefit wildlife and livestock.

The following new or specific actions will be pursued or emphasized:

- **Action a)** Conduct conifer removal projects (conifer encroached aspen, juniper treatments, etc.) to recharge the aquifer and benefit riparian systems further down the drainage.

  Action b) Develop projects that enhance and protect communities of: 1) aspen, 2) cottonwood and willow, 3) woody draws containing species such as chokecherry, plum, serviceberry, hawthorn, and mahogany; and 4) mixed mountain shrub.

Strategy XI) Reduce prevalence of non-native vegetation and emphasize native perennial plants and plant community diversity and sustainability.

This strategy will be primarily executed by THABs, though other biologists and staff are integral. Biologists will pursue partnerships and relationships to maintain WGFD awareness of the incidence and status of invasive species and options for their control. They will use proven habitat manipulation techniques to manage invasive salt cedar and Russian olive and to restore native cottonwood and willow complexes. Biologists will use proven habitat manipulation techniques to manage cheatgrass and other annual invasive plant species. They will manage wildlife and promote

livestock numbers to maintain vigorous, healthy and sustainable landscapes.

The following new or specific actions will be pursued or emphasized:

Action a) Prioritize Invasive Annual Grass infestations statewide for treatment using the newly developed online platform.

Action b) Explore new approaches for treating and mapping invasive annual grass infestations.

Action c) Utilize an Early Detection Rapid Response (EDRR) framework for newly detected invasive plant species.

Action d) The HPP staff will emphasize the importance of controlling non-native vegetation and the use of native perennial plants and plant community diversity and sustainability during reclamation in WER commenting

Action d) Work with the University of Wyoming to further develop an integrated statewide approach to assessment, treatment, and monitoring of invasive species.

Strategy XII) Mitigate impacts of energy development and other human activities on habitat.

Staff at all levels will mitigate impacts of energy development and other human activities on habitat. Staff will continue to research, develop, and implement successful active/post development reclamation techniques. They will stress the need and requirement for mitigation (e.g. avoidance, minimizations, compensation) as specified under the appropriate state and federal laws, State of Wyoming executive orders, as well as the Commission's Mitigation Policy in environmental commenting. Staff will advocate and incorporate resource maintenance (i.e., avoidance, then minimization), then resource compensation (i.e., financial compensation) of impacts during participation in land management and project planning, process review and environmental commenting. Finally, staff will continue to evaluate required mitigation monitoring data to improve mitigation standards and stipulations.

The following new or specific actions will be pursued or emphasized:

Action a) Partner with and support groups that encourage smart growth/retention of agriculture open lands to control urban/suburban sprawl.

Action b) Identify and communicate mitigation actions suitable for offsetting impacts to wildlife resulting from renewable energy development.

Action c) Participate in the U.S. Army Corps of Engineers interagency review team for stream and wetland mitigation banking to ensure that impacts to stream and wetland habitats are adequately mitigated.

Action d) Work with prospective sage-grouse mitigation bank proponents and the Compensatory Mitigation Oversight Group to review and provide input on the biological merits of new bank proposals.

Strategy XIII) Provide occasional smaller scale habitat enhancements to target specific species or assemblages of wildlife or to target life stages or seasonal needs of wildlife.

This strategy will be primarily executed by AHABs, THABs and Habitat and Access Biologists, though other biologists and staff are integral. Biologists will implement habitat enhancements that increase wildlife-based recreation as appropriate and that are complementary to other goals and objectives. For example, as interest and opportunity allow, fisheries biologists will continue to increase habitat complexity and provide local fish cover by adding used Christmas trees to Boysen and Ocean Lakes. Likewise, fisheries biologists will develop community fishing ponds to address identified needs. Legume seeding projects or other projects intended to develop a working relationship that will expand in the future are also important to implement.

Strategy XIV) Monitor effectiveness of habitat projects in reducing habitat issues and enhancing wildlife habitat.

Biologists will collaborate with land managers, landowners, and other partners to monitor the effectiveness of habitat enhancements. They will continue to use repeatable before and after photos to record and evaluate effectiveness of habitat enhancements over time. They will use WGFD and other agency permanent reference sites and monitoring stations located within or near habitat enhancements for comparison and monitoring. Biologists will communicate monitoring results among WGFD regions and with federal and county partners for future improvement of management practices. Finally, biologists will work with University of Wyoming and other scientists to research the effectiveness of habitat restoration efforts.

Wick Wildlife Habitat Management Area. *(Photo by Justin Joiner/WGFD)*

Chain Lakes Wildlife Habitat Management Area. *(Photo by Craig Okraska)*

Goal 3. Conserve, enhance, and protect fish and wildlife migrations

- **Strategy I)** Inventory and evaluate big game migration corridors as well as fish passage barriers.

These actions are led by the big game migration coordinator and the fish passage coordinator with additional actions by wildlife and fisheries biologists and habitat biologists. These staff members, along with contractors and universities will continue to inventory, assess and prepare management recommendations. The fish passage coordinator and fish passage biologist will opportunistically collect fish passage data at man-made obstructions throughout the state. They will populate and share the fish passage database with external partners and use the database to identify priority barriers. GPS collar studies will continue in order to evaluate seasonal use patterns of big game animals. Big game migration corridors will be identified and designated through the public process outlined in the Governor's Migration Corridor Executive Order 2020-1.

The following new or specific actions will be pursued or emphasized:

Action a) Continue to partner with the Wyoming Migration Initiative to collect seasonal wildlife movement data and conduct analyses to help prioritize management actions to appropriate areas.

Strategy II) Implement projects to address and preserve migration corridors, reduce connectivity issues, and enhance fish and wildlife migrations.

These actions are led by the terrestrial migration coordinator and the fish passage coordinator with additional actions by wildlife and fisheries biologists and habitat biologists. Staff members will continue to maintain and develop coalitions, partnerships, and other relationships to acquire funding and support for fish and wildlife connectivity issues. Big game corridors will continue to receive attention as we work to remove and reduce barriers. Projects will be pursued and implemented to increase movement opportunities for fish and wildlife. Fish screens will be selectively employed in situations with high fish loss to ditches and where reasonable maintenance plans can be implemented.

The following new or specific actions will be pursued or emphasized:

Action a) Ensure adequate agency funding for fish passage and wildlife migrations through the Department's Wildlife Trust Fund and Mule Deer Initiatives.

Action b) Leverage outside funding tied to the Department of Interior's Secretarial Order 3362 and other funding resources to expand the impact of big game migration projects.

Action c) Implement projects such as wildlife highway crossings, fence modification or removal, conservation easements, invasive species management, and other vegetation management strategies to ensure function of big game migration corridors into the future.

- **Strategy III)** Protect and maintain river systems and watersheds with existing high levels of connectivity for aquatic wildlife.

These actions are led by the fish passage coordinator and biologist with additional actions by fisheries biologists and habitat biologists. Staff members will identify watersheds with existing high levels of connectivity that allow aquatic wildlife upstream and downstream passage. They will continue to provide comments through the Wildlife Environmental Review and Integrated Resource Management Application systems on human development proposals to minimize threats to aquatic connectivity. Biologists, supervisors, and managers will coordinate management activities with the Wyoming Water Development Commission.

The following new or specific actions will be pursued or emphasized:

Action a) Construct barriers to prevent upstream movement of non-native species and interactions with SGCNs

- **Action b)** Select sites that may be appropriate for construction of barriers now, that will prevent upstream movement of non-native species that are undesirable. The barrier(s) can prevent future interactions with SGCNs that may be able to persist further upstream following climate change.
- **Action c)** Use predicted future instream habitat conditions to prioritize fish passage projects.

- **Strategy IV)** Protect and maintain wildlife migration corridors including high use and stopover areas as well as other important areas of seasonal wildlife movement.

  These actions are led by Habitat Protection Program (HPP), THABs, and the Big Game Migration Coordinator with additional actions by wildlife biologists and habitat biologists. Through the HPP, staff will maintain migration corridors by identifying avoidance and mitigation measures, and provide policy reviews for assessment of compliance with the State of Wyoming Mule Deer and Antelope Migration Corridor Protection Executive Order 2020-1 for project proponents and permitting entities on State and Federal lands. Staff will collaborate with the Wyoming Department of Transportation, Office of State Lands and Investments, and non-governmental organizations to assist with maintaining the function of migration corridors. Through HPP, staff will provide guidance to project proponents, permitting entities, and land managers to maintain bird and bat migration routes and minimize impacts to these routes and other important areas of seasonal wildlife movement.

  Action a) Staff will continue to protect corridors through the use of conservation easements or stipulations in land management planning documents.

  Action b) Staff will support the Wyoming Migration Initiative by providing technical, funding, and personnel assistance.

Half Moon Wildlife Habitat Management Area. *(Photo by Parker Loew/WGFD)*

Fall Creek Wildlife Habitat Management Area. *(Photo by Parker Loew/WGFD)*

Strategy I) Work with private landowners, other agencies, and conservation groups to understand issues and communicate habitat goals.

This strategy will be pursued by all those engaged in habitat protection and restoration. This includes meeting at least once annually with BLM, Forest Service, NRCS, and other federal partners to coordinate habitat management.

Strategy II) Communicate habitat efforts and project results consistently with partners and internally within the Department and Commission.

This strategy will be implemented at a general level by all those engaged in habitat efforts. At a more specific level, this strategy will be implemented by sharing this habitat plan with the Governor's Office, State and Federal agencies, private landowners, conservation districts, and groups and the public.

The following new or specific actions will be pursued or emphasized:

Action a) Habitat program managers will produce an annual report highlighting habitat projects.

Strategy III) Manage the WHMAs to meet fisheries and wildlife objectives, allow for compatible wildlife oriented

recreation, and meet the purposes under which the property was originally acquired.

This strategy will be primarily achieved by staff in the Habitat and Access program with assistance from regional biologists and managers. Staff will continue to use regional and administrative teams to assist with the administration and management of the WHMAs.

The following new or specific actions will be pursued or emphasized:

Action a) Monitor habitat on WHMAs with vegetation transects, riparian greenlines, photo points, stream temperature, etc. as needed to understand resource condition and balance management approaches.

Action b) Survey and control invasive species on WHMAs with a proactive and coordinated approach.

Action c) Advance WHMAs as forage reserves when livestock grazing will benefit or improve wildlife habitat on the WHMA providing it is consistent with the Managed Land and Access Summaries (MLAS), regulations, policies, and guidelines and does not impact wildlife-oriented recreation.

Action d) Continue to improve or develop traditional (hunting & fishing) and nontraditional (wildlife watching, nature trails, etc.) wildlife-oriented recreational opportunities on the WHMAs, while balancing such recreation with habitat conservation.

Action e) Refine and update the MLAS for all WHMAs with input and approval from WHMA teams by December 2025.

- **Action f)** Assess management objectives of WHMAs to determine any needed changes based on climate projections.
- **Action g)** Monitor changes in vegetation species composition on winter ranges to ensure forage availability for wintering wildlife.

Action h) Review the results of the implementation of the Spence Moriarty 10-year management plan and adjust management as appropriate by December 2025.

Action i) Ensure irrigation infrastructure is capable of capturing and utilizing allotted water rights on WHMAs. Balance use of water rights with aquatic habitat needs and develop minimum flow objectives where needed.

- **Action j)** Assess irrigation technologies (flood, pivot, sprinkler) for the best use, given climate ramifications, management objectives, and priorities.

Strategy IV) Foster and support funding for continuous training among habitat biologists.

This strategy will be pursued throughout the habitat sections with cross over to wildlife and fisheries biologists. Staff will continue to use available resources within the work units to cross train and educate one another using internal and external experts. Staff will continue holding biennial meetings among all work units to share innovative approaches and foster training and comradery. Additional annual work unit meetings will continue to provide training opportunities.

Strategy V) Pursue new research and synthesis of available research to address key climate change vulnerability and adaptation information needs. This strategy will be pursued throughout the habitat sections and the HTAG with cross over to wildlife and fisheries biologists.

The following new or specific actions will be pursued or emphasized:

- **Action a)** At least once annually, the HTAG chair will call for committee review and discussion of the information needs listed in Cross, et. al. (2020).
- **Action b)** The HTAG will encourage development of proposals or other actions to address key information needs.

Strategy VI) Review and update this statewide habitat plan and associated priority areas.

This will be implemented under the direction of the HTAG and include a review of habitat priority areas; goals, strategies and actions; and other elements of the SHP.

Action a) The HTAG chair will lead habitat plan revision to be completed by December 30, 2025.

Action b) The HTAG chair will annually call for proposed priority areas updates and revisions. Updated priority areas and associated narratives will be published once annually by January 31.

John and Annie Woodhouse Wildlife Habitat Management Area. *(Photo by Justin Joiner/WGFD)*

STATEWIDE HABITAT PLAN VERSUS THE STATE WILDLIFE ACTION PLAN

The SHP and the State Wildlife Action Plan (SWAP) are easily confused with one another; however, the SHP pertains mainly to habitat issues across WY and the SWAP deals with the state's effort to conserve Species of Greatest Conservation Need (SGCN).

The WGFD developed the current version of the SWAP (2017), in cooperation with a number of conservation partners and other interested parties, including agencies, academia, conservation organizations, and the general public. It is a plan intended to direct the state's effort to conserve SGCN and to allow the state to maintain eligibility for the U.S. Fish and Wildlife Service-administered State Wildlife Grant funding.

While the two plans overlap in several regards, the SHP is distinctly a document to guide internal WGFD actions and priorities. Both plans provide direction for WGFD actions: the SWAP emphasizes individual species and the habitat actions needed to ensure their future; the SHP emphasizes habitat communities and identifies how actions that perpetuate vital habitats benefit communities of wildlife. The SHP further includes a strong perspective toward habitat actions to benefit game species but through its emphasis on functioning landscapes and watersheds it strives to maintain a broad perspective that pursues protecting and improving entire wildlife communities.

The SWAP identifies five major challenges facing SGCN and for maintaining fish and wildlife diversity across the State: 1) rural subdivisions and development; 2) energy development; 3) invasive species; 4) climate change; and 5) disruption of historic disturbance regimes. In addition to identifying SGCN, the SWAP also identifies important habitats for those species; with portions of many of these habitats included as crucial and enhancement priority habitat areas in the SHP. The priority areas identified in this revision to the SHP were based on the needs of all wildlife.

Sunlight Wildlife Habitat Management Area. *(Photo by Chris Martin/WGFD)*

PRIORITY AREA DEVELOPMENT AND GIS REFERENCE DATA DESCRIPTIONS

With guidelines, habitat biologists (Aquatic, Terrestrial, and Habitat and Access) developed draft priority areas. The overall approach involved using existing GIS data layers to depict and derive priority areas to the greatest degree possible, rather than developing new areas. A driving consideration for using existing GIS data layers was to make future SHP priority area revisions and updates seamless and linked to routine updates of pre-existing data layers. During the development process, biologists had several GIS data layers available to use as a reference. These included previous priority areas. Biologists were instructed that their goal was NOT to recreate the previous priority areas; however, reviewing the previous areas might serve to prompt consideration of additional GIS data layers to incorporate or develop to capture significant values or issues. Habitat biologists consulted with other regional staff to varying degrees during initial area development. Instructional videos were prepared to guide the biologists in using an online interactive map to review and develop priority areas. Following the initial creation of priority areas by biologists, one-on-one video work sessions were conducted with individual biologists, the GIS specialist and Cheyenne habitat managers to revise the draft priority areas. This was followed by a regional review of the priority areas. During this regional review round, nongame biologists and the Department Herpetologist were asked to also review the priority areas.

Priority areas are organized into maps which reflect the three goals under the SHP: Crucial, Restoration, and Connectivity areas. To improve the visibility of priority areas, they are also separated into Aquatic and Terrestrial maps, then symbolized as points, lines, or polygons. The types of priority areas developed and shown in the maps is described below.

Goal 1 - Crucial Priority Areas

Aquatic Lines

- Blue Ribbon Streams - Blue ribbon streams represent highly productive trout fisheries and nearly all are recognized crucial areas. The few excluded represent areas sustained by stocking. Some blue ribbon priority streams meet the 600+ lbs/mile criteria but have not yet been formally recognized on the Department's official listing of blue ribbon streams.
- Instream Flow - All instream flow reaches are represented as crucial areas.

Aquatic Polygons

- Riparian - The identified corridors represent the most intact and functional riparian communities. Habitat biologists identified major riparian stream segments using professional judgment. Identified segments often represent the largest riparian systems in each region and are considered to be ecologically functioning though they may contain relatively small impacted areas. Some biologists used the riparian habitat data from the 2017 SWAP to inform their identification of major riparian strongholds. Riparian stream lines chosen by the biologists were buffered by 0.5 mile on either side, creating corridor polygons. These can overlap line segment types (e.g. Blue Ribbon Streams or Instream Flow) or other polygons. These riparian communities support numerous fish and wildlife species including species of greatest conservation need.

- SWAP Aquatic Crucial Areas - These watersheds are from the 2017 State Wildlife Action Plan (SWAP) and are areas containing higher numbers of, or more sensitive, Species of Greatest Conservation Need (SGCN). Some range depictions (polygons) are different from the SWAP because HUC 12 basins were used in this effort compared to HUC 10 or larger watersheds used in the SWAP. In addition, the SWAP delineated some conservation areas as corridors along major streams. In the SHP, these were converted to HUC 12 basins for consistency and standardization purposes.
- SGCN - These HUC 12 watersheds are additional areas, beyond those already identified as SWAP Aquatic Crucial Areas that contain significant native aquatic species or species assemblages. This category was created because new species distribution or population abundance information since SWAP publication warrants recognition of these areas as important. SGCN areas should be distinct from, and not overlap, SWAP Aquatic Crucial Areas.
- Wetlands - The outer boundaries of wetland priority areas, both crucial and aquatic, were delineated by a 2010 wetlands analysis that used wetland density to identify complexes across the state. The Wyoming Bird Habitat Conservation Partnership chose nine complexes across the state as high priorities for conservation work due to ecological values and project potential. The nine areas were further refined into SHP priority areas. Crucial area boundaries are based on HUC12 units within the overall wetland priority boundaries described above. These areas were chosen based on a combination of features, including high amounts of stable and increasing surface water in spring and fall, known wetland obligate avian nesting sites (Trumpeter Swan, colonial nesting birds, Great Blue Heron), and regionally important Sandhill Crane pre-migration staging grounds. The surface water resiliency analysis was provided to the Department by Patrick Donnelly of USFWS Intermountain West Joint Venture and University of Montana.
- Key Functioning Watersheds - This rare category was used for HUC 12 watersheds that were not flagged as SWAP or SGCN watersheds and that are considered fairly fully functioning. Their continued functioning is considered vital for downstream important resources.

Terrestrial Polygons

- Big Game Crucial Range - Crucial range can describe any particular seasonal range or habitat component (often winter or winter/yearlong range in Wyoming) but describes that component which has been documented as the determining factor in a population's ability to maintain itself over the long term. Crucial ranges for the following species were made into crucial priority areas (as they were in the 2015 SHP): Deer, Elk, Pronghorn, Moose, Bighorn Sheep, and Rocky Mountain Goat.
- Sage Grouse Core and Connectivity - Version 4 of Core management areas, along with connectivity areas in the Sheridan region, were added as crucial priority areas (as they were in the 2015 SHP).
- SGCN - The GIS reference layer for terrestrial SGCN is Species Richness - Bird/Mammal/Herp, which is a distribution model of all SGCN from the 2017 SWAP overlaid with a 1-square-mile hexagon grid.
- SWAP Habitat - Six habitat types (Aspen/Deciduous Forests; Foothills Shrublands [Mixed Mountain Shrub]; Prairie Grasslands; Riparian Areas; Sagebrush Shrublands; Xeric and Lower Montane Forests [Ponderosa]) from the 2017 SWAP were provided to the biologists to use as reference data. These layers are comprised of raster data, which biologists could use to visualize concentrated areas of habitat and draw priority area polygons around those areas.
- Foothills Transition - This designation is given to areas where significant habitat values exist, not otherwise covered by

other polygons. These values justify conservation easements and other conservation actions and often connect designated crucial habitat priority areas into one cohesive area. These priority areas were created from HUC 12 polygons.

Goal 2 - Restoration Priority Areas

Aquatic Points

- Community Fishing Ponds - Locations where development of community fishing ponds is desired. Biologists were encouraged to limit this category to top prospects for pursuit in the immediate future. Points are located in the general vicinity of the community, not at the exact location of a proposed pond.

Aquatic Lines

- Blue and Red Ribbon Streams - Blue and Red Ribbon streams represent highly productive trout fisheries. Those which have issues that will be addressed by restoration efforts over the next five years are identified by these line segments. Lines representing Blue and Red Ribbon restoration priority streams can overlap polygons, including Riparian corridors.

Aquatic Polygons

- Riparian - The identified corridors represent riparian habitats that need or continue to need restoration efforts. These efforts are undertaken to support numerous fish and wildlife species including species of greatest conservation need. Habitat biologists identified these riparian stream segments using professional judgment. Riparian stream lines chosen by the biologists were buffered by .5 mile on either side, creating corridor polygons. These can overlap line segment types (e.g. Blue or Red Ribbon Streams) or other polygons. Biologists identified these separately, and in addition to, other layers like the Stream Restoration layer (so they will often overlap other layers).
- SWAP Aquatic Conservation Areas - These watersheds are derived from the 2017 SWAP and are areas containing higher numbers of, or more sensitive, SGCN. The identified sub-watersheds for habitat restoration work are small portions of the larger SWAP Aquatic Conservation Areas and represent areas where work will be targeted in the next 5 years. Some range depictions (polygons) are different from the SWAP because HUC 12 basins were used in this effort compared to HUC 10 or larger watersheds used in the SWAP. In addition, the SWAP delineated some conservation areas as corridors along major streams. In the SHP, these were converted to HUC 12 basins for consistency and standardization purposes. These areas do not overlap SGCN or Stream Restoration areas.
- SGCN - These HUC 12 watersheds are additional areas, beyond those already identified as SWAP Aquatic Crucial Areas, where native species provided the main motivation for targeting habitat restoration work. These areas do not overlap SWAP Aquatic Crucial Areas or Stream Restoration areas.
- Wetlands - The outer boundaries of wetland restoration priority areas were delineated by a 2010 wetlands analysis that used wetland density to identify complexes across the state. The Wyoming Bird Habitat Conservation Partnership chose nine complexes across the state as high priorities for conservation work due to ecological values and project potential. The nine areas were further refined into SHP priority areas based on surface water resiliency analysis provided to the Department by Patrick Donnelly of USFWS Intermountain West Joint Venture and University of Montana.

Restoration area boundaries are based on HUC 12 units. These areas fall within the priority area boundaries described above, but are experiencing higher amounts of decreasing surface water extent or duration in spring and fall than crucial areas. These areas may also support fewer known nesting sites of wetland obligate avian species, including Trumpeter Swans, colonial nesting birds, and Great Blue Herons. These areas still offer large coverage of wetland area and associated values to wildlife, but would benefit from restoration and enhancement efforts to maintain or improve these values.

- Stream Restoration - These HUC 12 watersheds are areas with significant habitat issues where we intend to restore stream function and/or improve fish habitats for a variety of species. They are in addition to the SWAP, SGCN, riparian, and wetland polygons and blue and red ribbon streams (all of which also may see stream restoration activities). The Stream Restoration polygon layer was defined after first considering the previously described layers and then identifying areas left over and requiring attention. They should not be considered less important but rather are often some of the areas where the greatest benefit from restoration can occur. These areas do not overlap SWAP Conservation Areas or SGCN areas.

Terrestrial Lines

- WYDOT Roadway Initiative - These are lines based on big game migrations impeded by highway fences. Biologists proposed to work with WYDOT to improve big game migrations across highways.
- Terrestrial Polygons
- MDI Herd Unit/MDI Focus Area - All herd units designated under the Department's Mule Deer Initiative were added as restoration priority areas. In some cases, biologists drew smaller polygons within a herd unit to show where restoration efforts would be focused during the upcoming Plan period.
- Mule Deer Transitional Range - All mule deer seasonal ranges with a range designation of "SSF" were added as a reference layer for biologists to use when evaluating restoration priority areas. Few, if any, restoration priority areas were developed solely from these areas, but they were used to inform issues addressed within a polygon's boundaries.
- SGCN -The GIS reference layer for terrestrial SGCN is Species Richness - Bird/Mammal/Herp, which is a distribution model of all SGCN from the 2017 SWAP overlaid with a 1-square-mile hexagon grid. Few, if any, restoration priority areas were developed solely from these areas, but they were used to inform issues addressed within a polygon's boundaries.
- SWAP Habitat - Four habitat types (Aspen/Deciduous Forests; Foothills Shrublands [Mixed Mountain Shrub]; Prairie Grasslands; Sagebrush Shrublands) from the 2017 SWAP were provided to the biologists to use as reference data. These layers are comprised of raster data, which biologists could use to visualize concentrated areas of habitat and draw priority area polygons around those areas.
- Partner Project - These areas outline existing and proposed habitat projects with outside partner agencies and organizations. The issues addressed by such projects likely coincide with the other departmental issues listed here, but these areas are important to flag because of the cooperative efforts they demonstrate. The NEPA processes may also be in progress or completed in these areas. These priority areas were drawn according to existing project shapefiles or the

field biologist's knowledge of the project extent.

- Annual Invasive Grasses - In accordance with the priority the Department's Strategic Plan has given to combating annual invasive grasses, biologists have identified these areas where the predominant habitat need is to treat invasive plant species. These priority areas were drawn according to existing project shapefiles or the field biologist's knowledge of the project extent.
- Watershed Restoration - Efforts in these areas are focused on restoring habitat functionality across the watershed as a whole. These priority areas were created from HUC 12 polygons.
- Habitat & Access - These are HUC 12 watersheds surrounding select WHMAs that Habitat & Access biologists have determined will be sites of restoration work designed to supplement the work done on the WHMA during the upcoming plan period.
- Biologists propose to improve aspen, mountain shrub, sagebrush, riparian, and wetland habitat using mechanical and chemical controls.

Goal 3 - Connectivity Priority Areas

Aquatic Lines - Fish Passage

- The Statewide Fish Passage Coordinator identified places containing high connectivity for aquatic organisms to be maintained, places where passage can be enhanced by addressing obstructions, and drainages that have work underway or planned for the next 3-5 years. The SWAP Aquatic Conservation Areas and Governors Water Strategy focal watersheds provided a starting point, but this watershed based depiction was replaced with stream line segments to emphasize the connectivity across the watershed. Intermittent and ephemeral waters were excluded.

Terrestrial Polygons - Migration Corridors

- The official Migration Corridors, as designated by the Governor, were made into terrestrial Connectivity priority areas.

Renner Wildlife Habitat Management Area. *(Photo by Chris Martin/WGFD)*

STATEWIDE HABITAT PLAN 2020

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