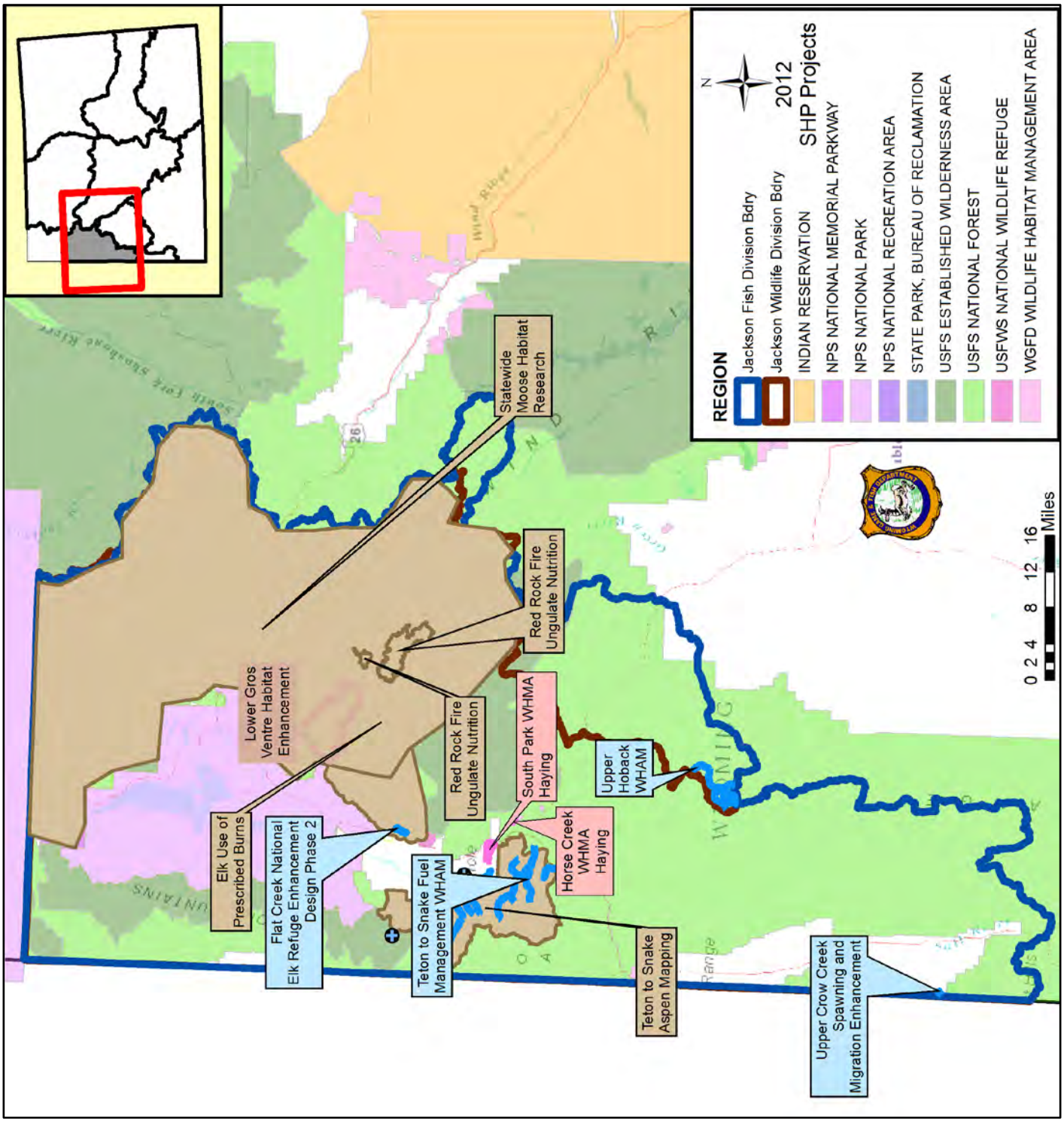
JACKSON REGION



JACKSON REGION HIGHLIGHTS

- 523 acres of prescribed burns were completed by USFS in the lower Gros Ventre area.
- 130 wetland sod mats and 5,000 bare root wetland plants were planted along one of the wetland ponds on the South Park WHMA.
- 2 irrigation diversion structures on Spring Creek were reconstructed to allow fish passage throughout 13 miles of Spring Creek.
- Coordinated Habitat Day activities at the annual WGFD Youth Conservation Camp at the Whiskey Basin WHMA near Dubois.
- 46.6 acres of noxious weeds were controlled on WHMAs, PAAs and feedgrounds.
- 3,975 acres of aspen communities were evaluated for health and risk for loss with USFS within the Teton to Snake urban wildfire interface area.

Upper Spring Creek Fish Passage (Goal 2) – Lara Gertsch

The WGFD, local landowners and cooperative partners continue to enhance Snake River tributary streams. These spring creeks are crucial spawning and rearing habitats for native trout in the Snake River system a fishery of national importance. Upper Spring Creek Fish Passage, the latest completed phase of these endeavors, removed two fish migration barriers. The JA Williams Irrigation Diversion and the TSS Irrigation Diversion were dilapidated structures causing bank erosion, over-wide channels and restricting fish passage (Figure 1).

The JA Williams Irrigation Diversion structure was replaced by a “rock-ramp” fish ladder to provide a low-velocity, low-gradient, and stable structure (Figure 2). The second barrier, the TSS Diversion was replaced with a headgate that will allow for better control of irrigation flows. This type of structure manages water levels in intervals that allow the system to flush out sediment with less manual labor and gives fish the flow cues to return to the main channel. Native trout and non game fish of all age classes can now access the entire 13 miles of Spring Creek at all times of the year.

Figure 1. The JA Williams Diversion prior to being replaced. The headgate was a migration barrier to native fish in Spring Creek.

Figure 2. The JA Williams fish ladder following completion and 2012 high flows. Upstream landowners observed a significant increase in adult trout within upstream reaches of Spring Creek.

Lower Gros Ventre Habitat Enhancement (Goal 2) - Alyson Courtemanch

The Lower Gros Ventre Habitat Enhancement Project was completed in 2012 after conducting prescribed burning over six years (2007-2012) (Figure 3). In total, 4,888 acres received prescribed fire (28% of the project area) (Figure 4). The overall goals were to reduce conifers and mature shrubs (sagebrush) within and peripheral to aspen stands, promote diverse habitat mosaics that include mid-age aspen, and improve forage quantity, quality, and palatability for big game. Prescribed fire was used to enhance habitat for elk, bighorn sheep, mule deer, and moose by increasing the quantity and quality of forage and vegetation diversity on transitional, winter, and parturition ranges and along migration routes. We achieved a mosaic of burn intensities within the project area of low, medium, and high intensities, and unburned patches.

Figure 3. Prescribed burning in spring 2012, targeting conifer encroachment into bighorn sheep habitat.

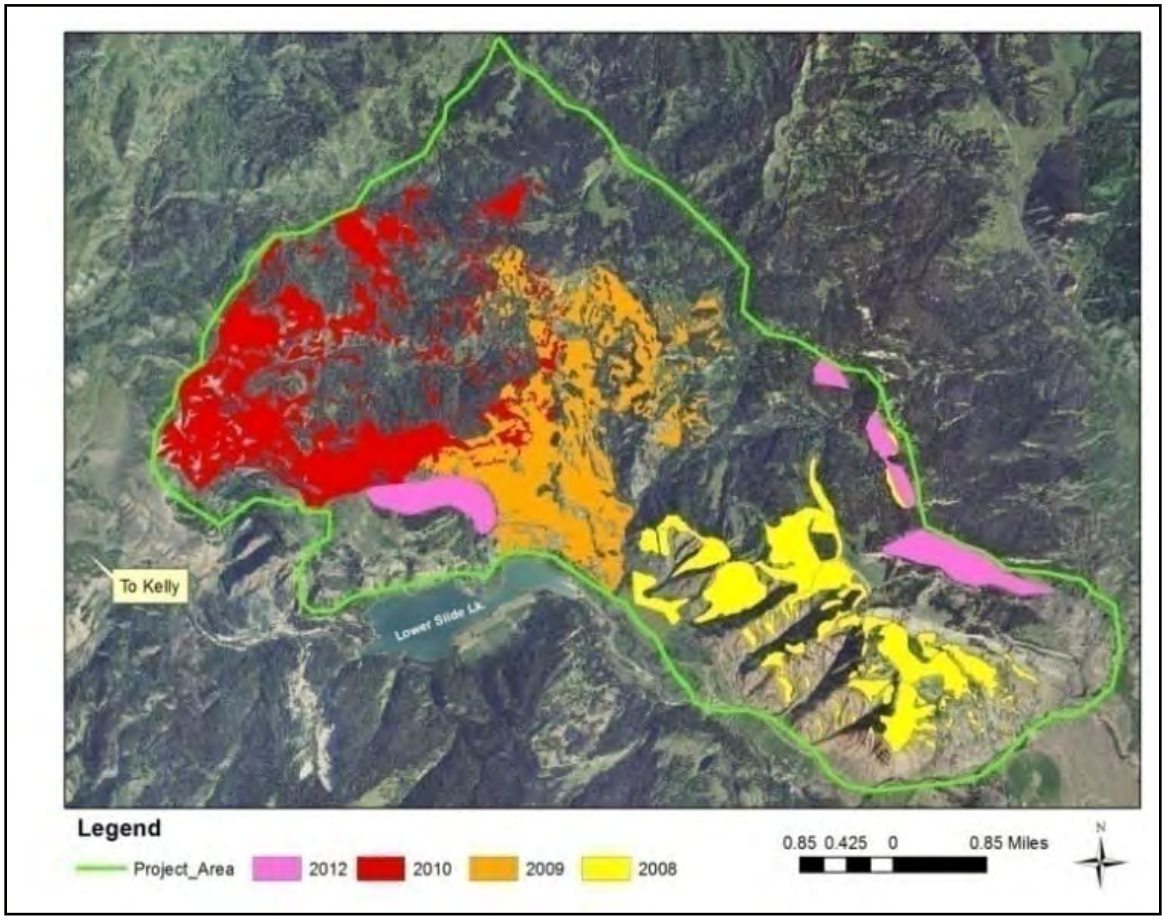


Figure 4. Prescribed burn areas by year in the Lower Gros Ventre Habitat Enhancement Project (2007-2012).

Several aspen monitoring sites were established pre-treatment and we have found that aspen suckers at these sites have exceeded 1,000 stems per acre and have experienced light ungulate browsing. Aspen sucker density increased dramatically (over 2-fold), and conifer density

decreased (over 2-fold) at the monitoring sites one-year post-burn. Ungulate use of aspen leaders at two-years post-burn (2010 treatment) was low, averaging only 4.2%. These parameters will continue to be measured up to 15 years post-burn to assess the burn success. This was a highly successful, multi-year project that involved many partners, including Bridger-Teton National Forest (BTNF), Grand Teton National Park, WWNRT, RMEF, Wyoming Wild Sheep Foundation (WWSF), and WGBGLC.

Teton to Snake Watershed Habitat Assessments (Goal 2) – Lara Gertsch

Watershed Habitat Assessment Methodology (WHAM) Level 1 surveys were conducted on tributary streams to the Snake River during summer 2012. These assessments provide a systematic means for documenting watershed, riparian and stream channel conditions and identifying issues that can be addressed to improve habitat. Surveys were conducted on 10 streams within the Fall Creek sixth level HUC (*170401030107)* and Snake River-Spring Creek sixth level HUC (*170401030101).* Approximately 36 stream miles were surveyed in total. The intent was to inventory stream reaches prior to the Teton to Snake Fuels Management Project. This BTNF proposal will reduce fuel loads near communities in Teton County, such as the town of Wilson and the Red Top Meadows housing development. Treatment goals include reducing extreme fire behavior potential, increasing aspen habitats, improving fire protection, and enhancing firefighter and public safety.

The inventory identified housing developments, roads and cattle loafing as negative influences on soil and drainage within the riparian areas (Figure 5). Other widespread watershed impacts observed included bark beetle infestations to upland conifer vegetation. Aspen "fairy rings" with conifer and sagebrush encroachment were numerous. Aspen clones, conifer stands, and sagebrush communities have become monotypic and decadent (Figure 6).

Figure 5. Fall Creek Road, cattle grazing and housing development within the Fall Creek drainage are having cumulative impacts.

Figure 6. Uplands with aspen "fairy rings" and conifer beetle kill. The Teton to Snake Fuels Management Project anticipates improving aspen habitats to reduce fuels and fire danger to housing developments.

The most important and well-timed tool within the Teton to Snake Fuel Management Project is the proposed burns. When properly managed, both prescribed burns and naturally occurring wildfires can benefit vegetation in the basin and replace expensive human suppression of wildfires. Prescribed burning can lower conifer densities and "release" growth of aspens and other species that depend on fire for regeneration. Future projects should address the abandoned housing development at the confluence of the South and North Forks of Fall Creek and the effects of the

Fall Creek Road on watershed sediment yield. Additional information can be found in the WGFD Annual Fisheries Progress Report, and the WHAM and photo databases.

Jackson Wildlife Habitat Management Areas (Goal 2) – Ray Bredehoft, Matt Miller, Kade Clark, and Breanne Thiel

- **Greys River WHMA**: 13 miles of crucial winter range elk fence was maintained on and around the WHMA. A contractor worked on the elk fence and replaced approximately 1,000 posts; all wildlife gates were replaced, one new elk jump was constructed, and over one mile of fencing was rebuilt.
- **South Park WHMA**: 2.5 miles of crucial winter range elk fence were maintained.
- **Horse Creek WHMA:** 1 mile of crucial winter range elk fence was maintained and 60 acres of meadow was irrigated.
- **Teton County WHMAs, feedgrounds and PAAs:** 26.1 acres of noxious weeds were treated.
- **Lincoln County on Greys River WHMA, Salt River PAAs, and Alpine Wetlands Complex**: 20.5 acres of noxious weeds were treated.

Red Rock Fire Ungulate Nutrition (Goal 2) – Alyson Courtemanch

Fire is generally considered to be beneficial for big game habitat because it sets back forest succession and improves forage quantity and quality. Forage quality (i.e. percent crude protein, digestibility) can increase in some plant species for up to seven years post-fire and is directly related to body condition, reproduction, and lactation for ungulate species. However, a recent study from the Wyoming Cooperative Research Unit on the Jackson moose herd in northwest Wyoming found that summer forage quality was significantly *lower* in areas burned in the 1988 Yellowstone fires than in unburned sites. These findings suggest that large-scale wildfires may, in some situations, have persistent negative effects on forage quality, and raise questions about whether all types of fire are beneficial for ungulates. In 2011, the Red Rock Wildfire burned over 9,000 acres in the Gros Ventre drainage on BTNF. The wildfire burned in a mosaic pattern of burn severities, ranging from unburned areas to high severity, stand-replacing fire. This event presented a unique opportunity to monitor changes in the nutritional quality of ungulate forage in response to fire of varying severities (Figure 7).

Figure 7. Examples of two sampling sites: a mixed conifer-aspen stand that burned at high severity (left) compared to one that burned at low severity (right) in the Red Rock Fire. Vegetation sampling and lab analysis will reveal how different wildfire severities affect nutritional content of ungulate forage species.

In summer 2012, we initiated a collaborative project to monitor these changes in ungulate forage quality with BTNF, and with funding support from WGBGLC, RMEF, and WWSF. The overall goal of this project is to understand how fires of varying severity affect the nutritional and mineral content of typical forage species used by ungulates (bighorn sheep, elk, moose, and mule deer). We are interested in tracking nutritional and mineral content over both the short-term (1-5 years) and the long-term (6-10+ years).

Figure 8. Vegetation samples collected for the Red Rock Fire Ungulate Nutrition Project, ready to be sent to the lab.

During summer 2012, we established 57 permanent sampling sites in aspen, conifer, meadow, and willow communities within the Red Rock Fire perimeter. These sites were selected to represent a range of burn intensities in each community, from unburned (control) to high severity. Key ungulate forage species were sampled at each site. In total, we collected 236 vegetation samples representing 14 different species that will be sent to the Colorado State University Plant and Soil Lab this winter for nutritional and mineral analyses (Figure 8). These sites will be re-visited each summer to collect samples from the same plant species to track changes in nutritional content over time. Results from the study will reveal how fire severity affects nutritional quality for ungulates, and improve our understanding of the benefits of prescribed fire and wildfire for big game populations.

Star Valley Front Habitat Enhancement Planning (Goal 2) – Alyson Courtemanch

The Star Valley Front Habitat Enhancement Project is located to the east of Afton on the Greys River Ranger District, BTNF. This project is currently in the planning stages and the WGFD is working closely with BTNF to develop objectives. BTNF is currently working on completing NEPA for this project that proposes using prescribed fire to improve mule deer crucial winter range, and moose and elk winter and transitional range. The area includes an important crucial winter range area for the Wyoming Range mule deer herd. A recent habitat assessment completed by the Conservation Research Center of the TSS (Star Valley Front Habitat Assessment, 2012), funded with 2010 Director's Office Funds, showed that only 0.3% of the vegetation in the project area is classified as early succession. In addition, 77% of the aspen stands (over 3,000 acres) in the project area were classified as "highest" treatment priority (Campbell and Bartos, 2001). The habitat assessment also showed that fire has been a natural occurrence in the project area from 1745 and 1941, based on aged fire scars from 23 trees. However, there has been no evidence of

fire in the past 70 years (since 1941), likely due to active fire suppression, which has undoubtedly contributed to the dominance of late succession classes. The habitat enhancement project proposes targeting various community types, including aspen, mixed mountain shrub, sagebrush, and mixed conifer to set back vegetation succession and increase habitat diversity. Project implementation will occur over five to seven years, with close coordination between BTNF and WGFD to spread treatments out spatially and temporally.

Upper Crow Creek Spawning and Migration Enhancement (Goal 2) – Lara Gertsch

Crow Creek is a tributary to the Salt River. The WGFD is continuing to work with landowners, NRCS and the Star Valley Conservation District to promote watershed function and ecosystem integrity by enhancing riparian and in-channel habitats. This enhancement began during the spring of 2010 with Boy Scouts of America planting willows. Only 10% of those willows plantings survived into the fall of 2012. The landowner noted muskrat damage to the planting and used an innovative tree wrap to discourage muskrats (Figure 9). In contrast, the naturally occurring willows are expanding within the riparian zone without any artificial protection. The landowner will continue to monitor willow recovery within the riparian pasture.

Figure 9. Surviving planted willows have been wrapped to thwart winter rodents.

Figure 10. The rested riparian pasture, stream enhancement and upland livestock trough improve Crow Creek riparian and stream habitats.

Riparian fences assist three different landowners in managing their horse pastures with a rest/rotation system. In 2012, a pipeline, trough and well system was in full operation and water gaps were removed to dissuade livestock from loafing in the riparian area. The livestock were successfully managed in the upland pastures this first year (Figure 10). The new system will exclude livestock from the riparian pasture until shrub plantings have established or after five years of grazing rest. The next phase involves similar work on private land downstream and will be pursued in 2013.

Salt River Public Access Area Development (Goal 3) - Ray Bredehoft, Matt Miller, Kade Clark, and Breanne Thiel

The Jackson Region of the Habitat and Access Branch developed a new PAA along the Salt River near Alpine. The new area will be open for public use in the spring of 2013 and will have a boat ramp along with fishing and waterfowl hunting opportunities. The WGFD worked with the USFS to update a current access road and also worked with private landowners to develop a new parking area and boat ramp. The new public access will be the last major take-out for boaters along the Salt River before hitting Palisades Reservoir.

Western Wyoming Aspen Days Event (Goal 4) – Alyson Courtemanch

Aspen Days, organized by the WGFD, took place September 25-26, 2012 in Jackson. Twenty-six participants from the WGFD, BTNF, Caribou-Targhee National Forest, Grand Teton National Park, UW, University of Utah, U.S. Geological Survey, Wyoming Wildlife Federation, and TSS attended this two-day event (Figure 11). The event included field trips to the Gros Ventre drainage to discuss historical aspen treatments and re-read aspen transects (Figure 12) and the Greys River drainage to discuss current aspen issues, and an evening of public presentations on aspen ecology, aspen/wildlife relationships, and aspen management in Jackson Hole. The event promoted collaboration and built relationships between various agencies, academic institutions, and the public, and has led to several new partnerships on aspen projects.

Figure 11. Biologists from six different agencies, universities, and organizations collect data on a historically treated aspen stand as part of Aspen Days.

Figure 12. Collecting data along a transect to record aspen regeneration on Aspen Days.

Upper Hoback Watershed Habitat Assessments (Goal 2) – Lara Gertsch

WHAM Level 1 inventories were completed within the South Fork Hoback River sixth level HUC *(170401030301)* in the upper Hoback River drainage on the BTNF during summer 2012. Surveys were conducted on 6 streams. Approximately 4.5 stream miles were inventoried. The purpose was to identify conditions of upland, stream, and riparian habitats and identify reference reaches. Reference reaches provide vital stream channel design criteria for restoring degraded stream reaches. The drainage contained streams assessed as stable, although some areas of instability were observed. The majority of channel types of these streams are classified as a B4 or A3 which are common in the Jackson Region. The upper Hoback River is classified as a C3 channel, indicating a moderately sinuous channel in a well developed floodplain with riffles, pools and point bars and a cobble substrate which is ideal for a reference reach (Figure 13).

Figure 13. The upper Hoback River stream flow was low during summer 2012. Beaver ponds and streams with northern aspects serve as refugia for Snake River cutthroat trout during drought years.

There were several distinguishing landscape issues within the drainage. Aspen communities were notably absent from the uplands. Conifer stands lacked diversity in age classes and had minor bark beetle infestations. Beaver ponds were relic and two of the larger ponds were abandoned on the terrace above the active stream channel. These dams produce a stable wetland vegetative community and amphibian habitat. The most remarkable element of the inventory was Bare Creek (Figure 14). This stream doubled the flow of the upper Hoback River at its confluence. The water temperature was considerably colder than the Hoback River or other surveyed tributaries. This stream was previously designated as unsuitable, but during 2012 sampling adult Snake River cutthroat were found. Bare Creek's headwaters are within a "bowl" shaped glacial formation. Bare Creek and its tributaries have limited exposure to sunlight and the snowmelt is delayed into the summer months. This geomorphology may make it ideal adult habitat during drought years but stream temperatures may be too cold during "normal" years and/or the other three seasons.

Figure 14. Bare Creek provided adult Snake River cutthroat trout summer refugia from low flows and high water temperatures but may be unsuitable at other times.

Information and Education (Goal 4) - Mark Gocke

Wildlife and habitat ecology was taught at several events including Jackson Hole Elk Fest, the Jackson Interagency Wildlife Expo, WGFD Hunting and Fishing Expo, and the WGFD Teachers and Youth Conservation Camps. Probably the most noteworthy was coordinating the Terrestrial Habitat Day activities at the annual WGFD Youth Conservation Camp near Dubois. Groups of students are paired up with habitat biologists to inventory and evaluate a habitat type, learn techniques for possible improvement, and provide a PowerPoint presentation on their findings to the rest of the students at the end of the day.

Text and photos were developed for a flyer on Wyoming Range mule deer and habitat projects. The flyer was handed out at hunter check stations and emailed directly to a list of stakeholders. In

addition, PowerPoint presentations were developed for public meetings on the Wyoming Range Mule Deer Initiative.

Additional habitat efforts by the Jackson I&E Specialist included providing interviews and photos to several media outlets including the *Casper Star Tribune* and *Bugle* magazine on two separate CEs involving the Chrisman and Budd Ranches near Big Piney.

Teton to Snake Aspen Mapping (Goal 2) – Alyson Courtemanch

The Teton to Snake Project is a proposed fuel treatment by the BTNF that would occur within wildland-urban interface areas around the town of Jackson. The project proposes to conduct prescribed burning and non-commercial thinning on approximately 22,511 acres (within a larger 79,000-acre project area) to modify potential wildfire behavior, set back vegetation succession, enhance aspen communities and protect private property. The project area includes important big game habitats along the west side of the Snake River from Teton Village to south of Hoback Junction.

In 2010, the WGFD granted funding to the Forest Service to help support information collection required by NEPA. In part, the funding has been used to map aspen stands within the project area and collect information on historical fire events using fire-scarred trees. Past fire suppression has moved the landscape toward an advanced successional state with decreased vegetation age-class diversity. During summers 2011 and 2012, personnel from the WGFD and BTNF completed aspen surveys on 3,957 acres within the project area. 29 aspen stands were mapped and data collected on habitat type, aspen community type, overstory and understory species composition, and each stand was assigned to a fuel model and aspen risk ranking (Campbell and Bartos, 2001). We discovered many aspen and mixed aspen-conifer stands on the ground had been misclassified on the *BTNF 2007 Vegetation Map* as conifer forest types. Oftentimes, these stands were at the highest risk of disappearing due to conifer encroachment, and would benefit most from prescribed fire, making them important to identify and map. These maps and aspen risk rankings will help BTNF to prioritize aspen stands for treatment.

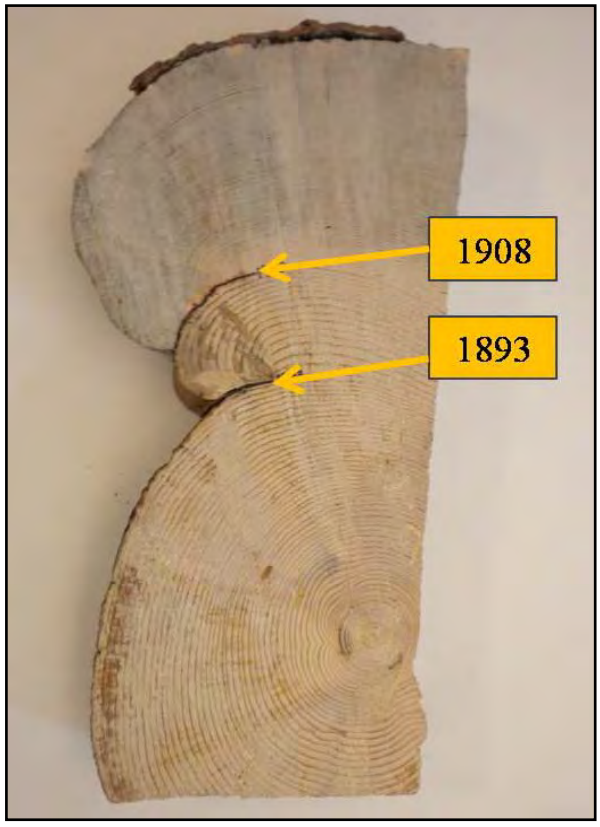


Figure 15. – An example of a fire scar sample from the Teton to Snake project area. Fires scars were present on the 1893 and 1908 rings. This tree was 176 years old.

With permission from BTNF, we collected samples from ten fire-scarred trees within the project area (Figure 15, previous page). The fire scar data indicated that several large-scale fire events have occurred in the project area within the last 200 years (fires that affected multiple sampled trees), as well as many smaller scale events (Figure 16). The earliest fire we were able to record was in 1830 and the most recent occurred in 1974. A large-scale fire event occurred in 1934,

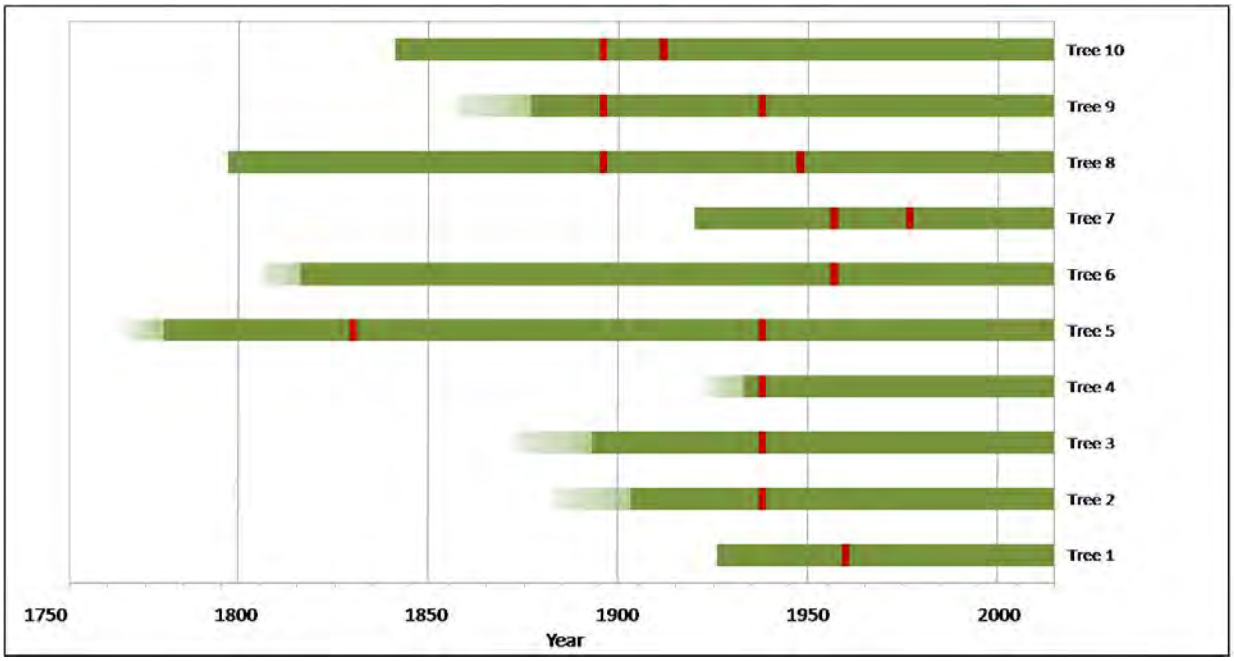


Figure 16. Chronology of fire events in the Teton to Snake project area (n = 10 trees). Green bars represent the life of sampled fire-scarred trees and red bars represent fire scar events. Faded green bars indicate uncertainties (some samples did not include tree cores, so the year of germination is unknown).

affecting five of the sampled trees in multiple drainages. These data illustrate that fire has been a natural and relatively common event for at least 200 years, but there has been little fire activity since the 1950s, probably mostly due to fire suppression efforts. We shared this historical fire information with the public during a field tour in fall 2012. We will continue efforts in summer 2013 to map the remainder of the project area.

Flat Creek National Elk Refuge Enhancement Design Phase 2 (Goal 2) – Lara Gertsch

The preliminary design of the Flat Creek National Elk Refuge Enhancement Phase II Project has been proposed by the WGFD and local stakeholders to restore fluvial processes and to improve aquatic conditions for Snake River cutthroat trout and other native trout (Figure 17). The Flat Creek project reach has experienced direct and indirect alteration as the result of changes in hydrologic and sediment inputs, past installation of various in-stream structures and treatments, and proximate land management activities. Specific channel stabilization and restoration treatments have been designed to restore fluvial process and function within the bonds of existing land use practices, irrigation management influences, site specific hydrologic regime, local sediment conditions, and site attributes. The proposed plan will have considerable beneficial effects including reduced sediment inputs to the watershed and increased habitat for all age classes of Snake River cutthroat trout.

Figure 17. Partners discuss designs plans for the Flat Creek National Elk Refuge Enhancement. The USFWS, WGFD, Jackson Hole Trout Unlimited and Biota Research and Consulting, Inc. are working together to improve this iconic fixture in Wyoming's Jackson Hole for tourists, anglers and the native cutthroat trout.

Elk Use of Prescribed Burns (Goal 2) – Alyson Courtemanch and John Henningsen

A common objective of habitat enhancement projects in northwest Wyoming has been to improve native winter and transitional range for elk, in part to reduce dependence on supplemental feeding and reduce brucellosis seroprevalence. However, little work has been done to determine if and when elk are utilizing these past habitat treatments. The WGFD and U.S. Geological Survey - Montana State University have been collaborating on elk brucellosis research projects in western Wyoming using GPS collars for the past several years. As part of that research, the WGFD deployed GPS collars and vaginal implant transmitters (VITs) on elk in the Gros Ventre drainage over the past five years. Numerous habitat enhancement projects have occurred in the Gros Ventre drainage, spanning from 1974 to 2012, making this an ideal area to study elk response to a variety of habitat treatments (Figure 18).

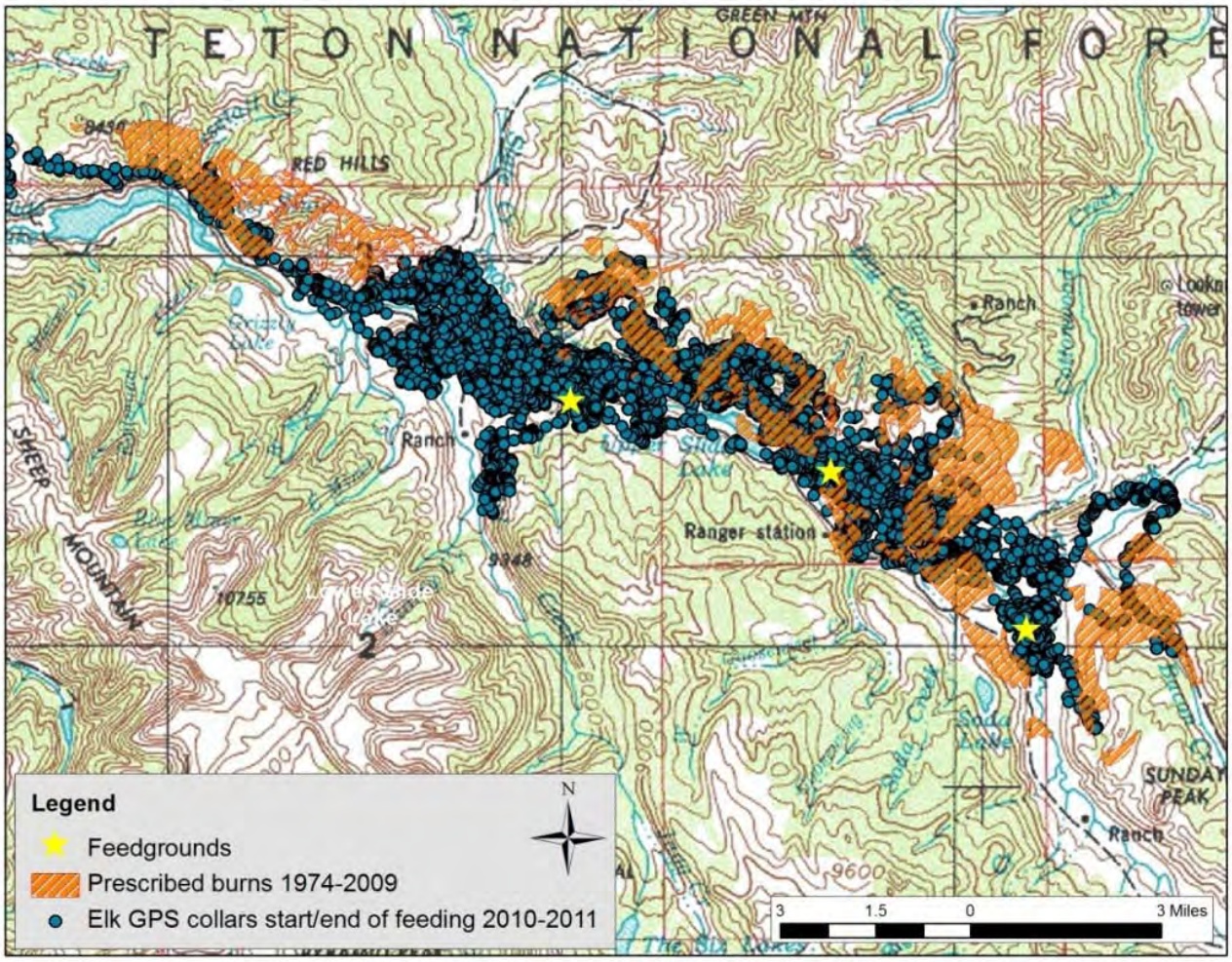


Figure 18. Habitat treatments in the Gros Ventre drainage (1974-2009), GPS-collared elk locations during start and end of feeding (2010-2011), and the locations of three WGFD-operated feedgrounds.

We used movement data from 11 GPS-collared elk in winters 2010 and 2011 to determine whether elk are selecting for past habitat treatment areas during the one month surrounding the initiation of feeding and the one month surrounding the end of feeding on three WGFD-operated feedgrounds in the Gros Ventre drainage (two weeks before and after feeding initiation date and two weeks before and after feeding end date). We predicted that elk would select the habitat treatment areas in native winter and transitional ranges around the initiation of feeding and at the end of feeding, thus, reducing their dependence on the feedgrounds. Results showed that elk selected for past habitat treatment areas during some years, especially during mild or average winters. These results suggest that these habitat projects contribute to keeping elk dispersed on transitional ranges in the early winter and early spring, potentially reducing brucellosis transmission. However, results also suggest that during particularly prolonged or severe winters, elk avoid habitat treatments and instead, remain in close proximity to feedgrounds (Figure 19). During average or mild winters, improved habitat for wintering elk could lead to less dependence on supplemental feeding, shorter feeding seasons, and lower prevalence of brucellosis. We intend to build on this study in the future with additional elk GPS collars and by analyzing elk response to different types of habitat treatments (including wildfires) and length of time since treatment.

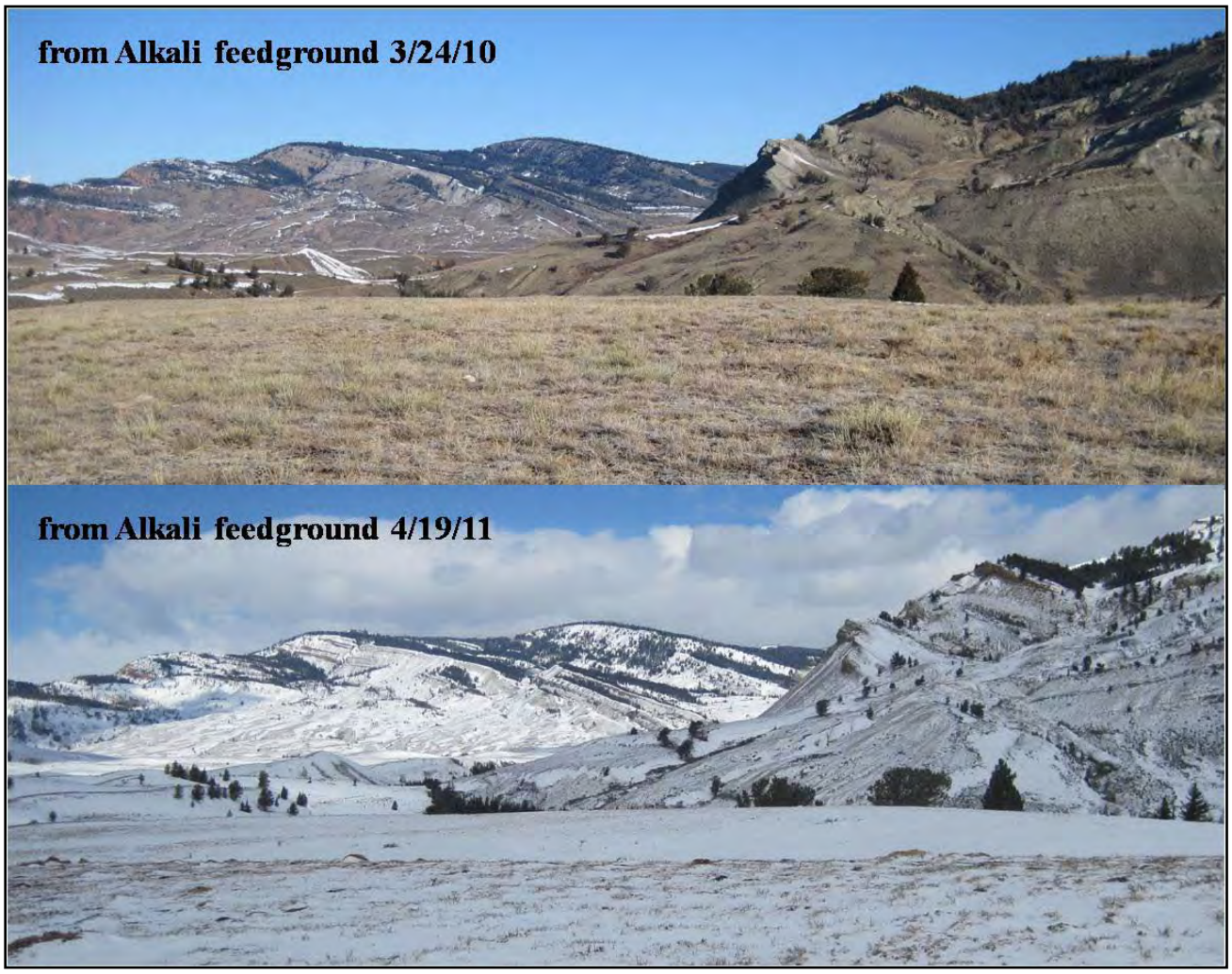


Figure 19. Differences in snow conditions in early spring can vary from year to year (2010 vs. 2011), which restricts elk dispersal from feedgrounds to habitat treatments on transitional ranges.

South Park WHMA Wetlands Restoration Phase II (Goal 2) – Ray Bredehoft, Matt Miller, and Kade Clark

The western developed wetland on South Park WHMA was restored in 2012. The islands and shoreline were excavated in 2011 and in 2012 bare root sedges and rushes along with wetland sod was planted in the newly excavated areas. In all, 130 wetland sod mats were placed along the shoreline and on the islands to help create more biodiversity and prevent erosion (Figure 20). The project also included the planting of over 5,000 bare root wetland plants (Figure 21). All new plants and wetland sod was comprised of native species of sedges and rushes. The new plant materials will give trumpeter swans and other waterfowl species nest building materials while also increasing the nutritional value of the vegetation.

Figure 20. Installed wetland sod at South Park WHMA

Figure 21. Installation of bare root wetland plants.

Horse Creek and South Park WHMA Haying (Goal 2) – Ray Bredehoft, Matt Miller, Kade Clark, Alyson Courtemanch, and John Henningsen

The Horse Creek WHMA and South Park WHMA were hayed in 2012. In all, approximately 90 acres were hayed and the WGFD produced 112 tons of hay to be fed out on the Horse Creek Feedground (Figure 22). The main goal of haying on the WHMAs is to produce more nutritional forage for wintering big game during the late fall and early spring as they are migrating to and from the elk feedgrounds. This year the Jackson Region proved this by developing ten grass monitoring points (five hayed sites and five control sites) on the Horse Creek WHMA and having a forage analysis completed at the Colorado State University Soil-Water-Plant Testing laboratory. Grass samples were clipped once in September and once in October from hayed sites and control sites (un-hayed). The grass samples were analyzed for digestible energy, crude protein, and acid detergent fiber, which are used to assess forage nutritional quality for big game. The results showed that haying had a very positive impact on the quality of forage at the Horse Creek WHMA (Figure 23). The digestible energy and crude protein at hayed sites both saw significant increases while the acid detergent fiber declined, making the grasses on the hayed sites much more nutritious for big game. The difference in nutritional values between the hayed areas and the control areas became even more evident as time went on as shown in the difference between the September and October results. As expected, the nutritional value of the grass declined from September to October (crude protein and digestible energy decreased and acid detergent fiber increased) on all sites, but the hayed sites remained within the nutritional requirements for adult female elk, while the control sites did not. These results suggest that haying increases the amount

Figure 22. Horse Creek WHMA hay meadows after cutting.

of time in the spring and fall that big game can meet their nutritional needs on the WHMAs without supplemental feeding. Haying will continue on the Horse Creek and South Park WHMAs to continue providing more nutritional forage for big game, reduce comingling between elk and cattle on private land adjacent to elk feedgrounds, and reduce the amount of hay that the WGFD needs to purchase each year.

	% Crude Protein	Requirements
Hayed Area (Sept)	17.91	14-18%
Control (Sept)	14.96	
Hayed (Oct)	15.70	
Control (Oct)	12.51	

	Digestible Energy (Mcal/kg)	Requirements
Hayed Area (Sept)	2.71	2.3-2.8
Control (Sept)	2.33	
Hayed Area (Oct)	2.51	
Control (Oct)	2.11	

	% Acid Detergent Fiber	Requirements
Hayed Area (Sept)	35.09	20-45%
Control (Sept)	45.64	
Hayed Area (Oct)	40.59	
Control (Oct)	51.96	

% Crude Protein: Total amount of protein in forage. Higher values are better.

% Acid Detergent Fiber (ADF): The fibrous, indigestible part of the forage (cellulose and lignin).

Lower values are better. ADF is inversely related to digestible energy.

Digestible Energy (DE) (Mcal/kg): The actual amount of energy (calories) the animal has available
for use. Simply the gross intake energy the animal consumes (GE) – fecal energy expelled as
waste (FE) = DE. Higher values are better.

Figure 23. Horse Creek WHMA forage results after and before haying.

Statewide Moose Habitat Research (Goal 5) – Alyson Courtemanch

The WGFD and Wyoming Cooperative Research Unit at the UW initiated the Statewide Moose Habitat Research Project in 2011. This project explores the role of habitat and nutrition in moose population performance statewide, including herds that are declining, stable, and increasing (Figure 24). The project also aims to provide WGFD biologists and managers with meaningful habitat and body condition metrics that could serve as "early warning" tools to indicate impending declines in herd productivity. The graduate student on the project, Brett Jesmer, has completed one winter and one summer field season, as well as two hunting seasons of kidney collections from harvested moose.

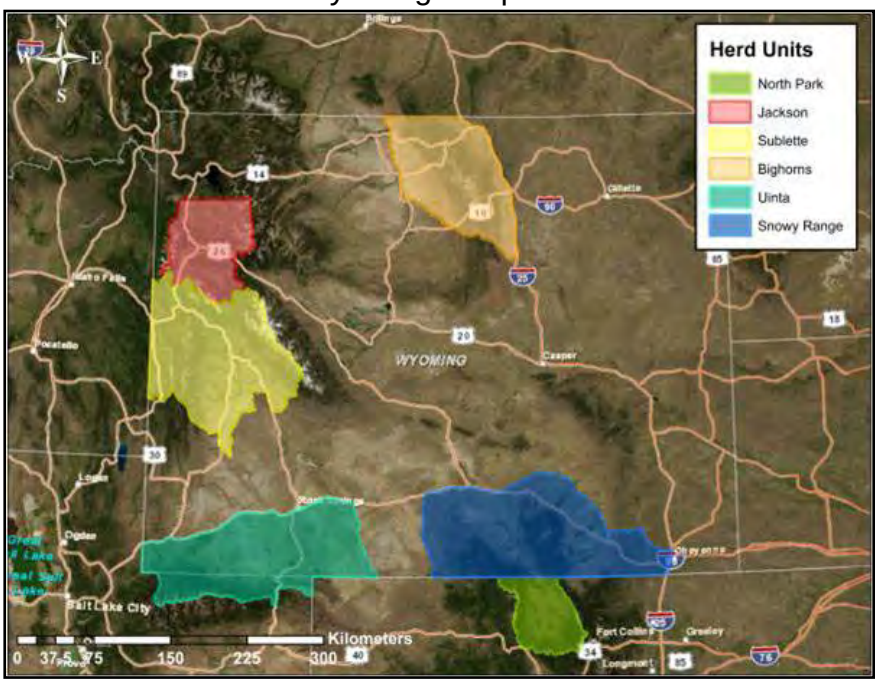


Figure 24. Locations of six moose herds being evaluated for the Statewide Moose Habitat Research Project.

Winter habitat condition is being quantified by measuring live-dead (L-D) indices, leader length, and percent browse for preferred willow species along 30 transects within each herd unit (Figure 25). In addition, winter scat samples are collected along each transect to assess diet and pregnancy rates. Scat samples are also being collected during summer to assess summer diets. Twenty summer transects were established within each herd unit, and scat detection dogs were used to locate moose scats. Summer nutritional condition of moose is being quantified using kidney fat from hunter-collected kidneys (241 kidneys have been analyzed thus far).

Preliminary results indicate that winter habitat condition (willow L-D index) and browse intensity are significantly different amongst herds, as well as male autumn nutritional condition (kidney fat). Additional field work will be conducted in 2013 and kidney samples from the 2012 hunting season will be analyzed this winter. Preliminary results from the study are highly encouraging and we suspect that we will be able to make strong linkages between habitat and moose population performance in most herd units once the analyses are complete. The project has benefited from collaboration with the USFS, Colorado Division of Parks and Wildlife, USFWS, Working Dogs for Conservation Fund, and funding support from the WGFD and WGBGLC.

Figure 25. A field technician collects live-dead index data in a willow community.