SNOWSHOE HARE RESPONSE TO PRE-COMMERCIAL THINNING IN NORTHWEST MONTANA[TWS]

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We assessed snowshoe hare (*Lepus americanus*) response to 2 distinct pre-commercial thinning treatments on a state forest in northwest Montana. One treatment retained five 0.2-ha patches of unthinned saplings totaling 8 percent of the sapling stand area, and the second retained five 0.8-ha patches totaling 35 percent of the sapling stand area. Hare use was also estimated within nearby mature conifer stands and a control sapling stand. We used snow tracking and fecal pellet density to estimate hare use before and after thinning treatments were applied. Hare use of sapling stands generally declined after thinning. However, results suggest that dense sapling patches retained at the 35 percent retention level may have provided habitat conditions similar enough to the unthinned control stand to not appreciably influence their use under the conditions we observed. Hares used retention patches regardless of size, even though large retention patches were four times larger than small retention patches. Because hares demonstrated a significant affinity for dense patches of residual forest any retention of untreated sapling patches may be beneficial for hares when applying pre-commercial thinning treatments. Use within a mature forest stand declined after thinning treatments were applied to 2 adjacent sapling stands suggesting that pre-commercial thinning may have broader effects than those directly associated with treated sapling stands. Results from the control stand and an adjacent mature stand suggest that during winter hares may benefit from maintaining a mosaic of suitable habitat patches within close proximity or connected to one another when applying pre-commercial thinning treatments.

Recovery And Delisting of the Gray Wolf in Montana, Idaho, And Wyoming[TWS]

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Gray wolf (*Canis lupus*) populations were eliminated from the western United States by 1930. Naturally dispersing wolves from Canada recolonized northwestern Montana in the 1980s. In 1995 and 1996 wolves from western Canada were reintroduced to central Idaho and Yellowstone National Park, Wyoming. By late 2003, about 750 wolves were being managed in those three states under the federal Endangered Species Act. Wolf recovery proceeded

more quickly, with more benefits (public viewing and restoration of ecological processes) and fewer problems (livestock and pets depredations) than predicted. However, between 1987 and December 2002, a minimum of 237 cattle, 593 sheep, 57 dogs, a horse, and 9 llamas were killed by wolves and nearly $275,000 was paid from a private damage compensation fund. The USDI Fish and Wildlife Service relocated 117 wolves and killed over 150 to reduce future conflicts. Management also included non-lethal tools such harassment, barriers, guard animals, altering wolf activity patterns, livestock management, and practical research. Confirmed livestock loss from wolves is regionally uncommon, i.e., wolves caused 0.04 percent and 0.03 percent of all sheep and cattle deaths in Montana, Idaho, and Wyoming in 2000, but is inordinately controversial and significantly affected a few producers. Many hunters perceived that wolf predation dramatically reduced elk populations and hunter harvest and this issue became extremely controversial. Because over 85 percent of adult wolf mortality is human-caused, the interagency recovery program emphasizes resolving the concerns of local people to increase their tolerance of wolves. Wolves were reclassified from endangered to threatened status in April 2003 to recognize their recovery and to increase options for problem wolf management. Litigation by some environmental groups over reclassification is ongoing. The wolf population achieved its numerical, distribution and temporal recovery goal in December 2002. Montana, Idaho, and Wyoming finalized their state wolf management plans by September 2003. They will regulate human-caused mortality through defense of property regulations and public harvest programs so that wolves will not again be jeopardized with extinction. A proposal to delist wolves could occur by early 2004, and by late 2004 wolves could be managed solely by the states.

Small Aspen Stand Dynamics in the Elkhorn Mountains[TWS]

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In an effort to better understand the dynamics of small aspen (*Populus tremuloides*) stands in dry habitats, the Slim Sam aspen project, located in the southeast portion of the Elkhorn Mountains, was initiated in 1999. Eighteen aspen stands were inventoried. Before treatment, on average, there were about four live sprouts/100 ft2 and aspen stands were generally in a state of decline. Factors contributing to the decline in the Slim Sam project area included shading from conifers, old age, and browsing and mechanical damage from livestock, moose, and elk. Eight stands were burned in the spring 2002. Six of the burned stands were fenced with 7-ft high wildlife fencing during summer 2002. In 8 of 18 stands, conifers were removed and placed around the outside of the stand to provide some protection from browsing animals. Two of the stands were not treated. Following the initial treatments, ground cover and sprout densities were assessed for two field seasons. This presentation summarizes the dynamics of different treatments in isolated aspen stands and compares cost and effectiveness of treatment types.

Recovery Of The Bald Eagle In Montana—an Update[TWS]

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Bald eagle (*Helicoetus leucocephalus*) populations have been increasing in Montana and throughout most of the U.S. since 1980 and now exceed recovery goals in most areas. The current Montana population is over 300 nesting pairs. Delisting of the species will likely occur within the next few years. The Montana Bald Eagle Working Group is developing a post-delisting monitoring plan. I summarize a brief history of bald eagle management and population trends in Montana and provide an update on the delisting process.

Using Land Use Planning to Protect Montana's Wetlands and Riparian Areas[TWS]

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As more and more people choose to build homes next to Montana's streams, rivers, lakes, and ponds, and as property values increase, pressures to develop our state's wetlands and riparian areas are increasing—often to the detriment of the very qualities that attracted buyers in the first place. As explained in A Planning Guide for Protecting Montana's Wetlands and Riparian Areas, many of the impacts to these areas can be avoided by land use planning decisions made at the local level. An overview of the handbook will be presented, along with information on how to determine an effective buffer size, and examples of how numerous communities—from Powell County to the city of Missoula, and from Chouteau County to the city of Bozeman—have used the principals outlined in the book to protect important resources. An update will be given on protection measures adopted by local governments since the guide was published. This publication was a cooperative venture between Montana Audubon, Montana Watercourse, and the Montana Department of Environmental Quality.

Climate Change In Montana[TWS]

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Records from climatological stations having approximately 100 years of record and snow courses with approximately 75 years of record were analyzed to determine how temperatures, precipitation, and snowpack have changed over the last century. Only stations that were not moved and those that had substantially complete data were analyzed. Comparisons have been made for annual and seasonal temperature and precipitation for stations in Montana and northwestern Wyoming. Many Montana snow courses have been measured since the mid-

1930s. Three snow courses that were established in Glacier National Park (GNP) in 1922 are still being measured on May 1. Only the 1 April (1 May for GNP) snow water equivalent (SWE) for snow courses that have been measured manually since the 1930's and have not been relocated were analyzed. Reduction in manual measurements due to implementation of the SNOTEL network has eliminated most of the early-season manual surveys and most of the snow courses that were co-located with SNOTEL sites. Annual or seasonal values were used to obtain 5-yr moving averages to help visualize trends. Annual and seasonal variability is probably more significant than small changes over long time periods. Wet and dry years and warm and cold years will still be part of our climate even though trends over longer periods may change. For example, it is not uncommon for annual precipitation to vary between 40 and 160 percent of average and annual temperatures to vary 3 °C above or below average.

Economic And Social Truths Underlying Modern Agriculture In Western Montana And Their Effect On Wildlife Habitats[TWS]

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Farming and ranching in harsh physical and economic environments have brought significant changes to the landscape of Western Montana over the last century. Those changes continue at an exponential rate. Farms and ranches that do not survive the challenges are destined for alternative uses. The opportunity for land managers, wildlife professionals, and conservationists is to find solutions to maintain open space and sustainable agricultural practices that are ultimately much more wildlife friendly than 20-ac tracts. A discussion of the history of land use from a 5th generation rancher and professional land manager will lend insight into the cause and effect of real life decisions and the results of those decisions on the social and natural resources of a community.

Common Loon Management: Implications From Sensitivity Analyses[TWS]

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The Montana Natural Heritage program gives the common loon (*Gavia immer*) a global rank of G5 (demonstrably secure), but a state rank of only S1 (critically imperiled). The USDA Forest Service status is sensitive. I investigated whether current management applications were adequate to address the state and federal rankings. Most management

agencies take the approach of protecting nesting birds and their chicks. Managers hope to maintain or increase population sizes in many portions of the common loon's range by using this approach. I used sensitivity analyses to determine which vital rate had the most influence on the population growth rate (l) of common loons. I altered the range of variation in vital rates to mimic applied management applications to determine how management efforts should be directed to accomplish the goals of common loon conservation. I found that chick survival and fecundity had the most influence on l. I make suggestions on how to apply management strategies that increase these vital rates so that management objectives may be met.

Winter Feeding Ecology of Mule Deer, Elk, And Cattle Along Montana's East Front[TWS]

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Mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*) populations have increased near the Theodore Roosevelt Memorial Ranch (TRMR) along Montana's East Front. The appearance of browse on the ranch suggested that some species have experienced intense browsing pressure. The purpose of this study was to examine the condition of chokecherry (*Prunus virginiana*), aspen (*Populus tremuloides*), and creeping juniper (*Juniperus horizontalis*) on the TRMR and assess the future impacts of current browsing pressure on these plant species. Other goals of the study were to reconstruct a browsing history for chokecherry and aspen relative to recent increases in ungulate numbers, and examine winter forage utilization through fecal analysis. The effect of browsing on species condition was determined by comparing growth rates and live dead indices of plants exposed to browsing to those of plants protected by exclosures. Results indicate that most aspen were not intensely browsed, but the condition of chokecherry and horizontal juniper had been affected by browsing. Aspen appeared to be growing out of the browse zone and attaining their potential height, but current browsing pressure prevented chokecherry stems from reaching their normal stature. Browsing history indicated that increased browsing pressure on chokecherry and aspen in the mid-to-late 1980s, corresponded to a large increase in mule deer and elk numbers. However, fecal analysis suggested that chokecherry and aspen were not a significant component of mule deer and elk winter diets. In winter, mule deer fed primarily on Juniperus spp., and elk fed mostly on graminoids.

Ecology And Management Of Sylvatic Plague in Phillips County, Montana[TWS]

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Sylvatic plague is a disease that was introduced into North America ~1900 and has since become well-established in native rodent populations in the western United States. The etiologic agent of plague is the bacterium *Yersinia pestis*, and most transmission between hosts occurs indirectly through the bite of an infected flea. Susceptibility to the disease varies widely among taxa. Aside from human cases, concern over plague in the U.S. has centered around effects on prairie dogs, which are uniformly susceptible to the disease. Efforts to restore populations of black-tailed prairie dogs in Montana have centered in Phillips County where ongoing efforts to reintroduce black-footed ferrets are ongoing. Currently, wildlife managers have few tools with which to manage or mitigate the effects of plague. One commonly used tool is the application of insecticides to prairie dog burrows to reduce flea abundance. We present an overview of plague ecology and the results of a dusting trial. We used a before-after control-impact design to test the effects of DeltaDust (0.05% Deltamethrin) on flea abundance in prairie dog burrows, on prairie dogs, and on associated small mammals. This and previous studies demonstrate that dusting prairie dog burrows is an effective way to reduce flea abundance in burrows and on prairie dogs. In addition, this study shows that flea abundance is also reduced on sympatric small mammal species that may act as reservoir hosts for *Y. pestis*.

Challenges, Opportunities And Techniques For Wetland Wildlife Habitat Restoration And Management On Montana's Private Lands[TWS]

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Seventy percent of Montana's wildlife habitat occurs on private land. As a result, private landowners have a key role in restoration and management of our wildlife habitat. This presentation overviews the challenges and opportunities associated with wetland wildlife habitat restoration and management on private land and summarizes the Natural Resources Conservation Service's work to assist private landowners with that effort including wetland

and riparian habitat restoration, a brief overview of Farm Bill Program funding support, and techniques for wetland habitat management on working lands.

Wolverine Ecology And Management In The Greater Yellowstone Ecosystem, A Program Overview And Update[TWS]

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The status of wolverine (*Gulo gulo*) populations in the lower 48 remains uncertain and the ecological requirements of the species are not well described. Federal and state resource managers need information in order to make well-informed policy decisions that affect land-use practices and populations of wolverines. This project is designed to provide baseline ecological data and answer specific questions relevant to wolverine management and related land-use policies. Our study objectives are to document wolverine demographic parameters, determine if and how wolverine populations may be affected by human recreational activities, identify wolverine dispersal corridors and/or linkage areas between mountain ranges in the GYA, and collaboratively design and implement management strategies and actions aimed towards the long-term persistence of wolverines in the GYA. Two areas, the Madison Range Complex of southwestern Montana and southeastern Idaho (MFA) and the Teton Range of northwestern Wyoming (TFA), have been selected for intensive study. These areas are representative of the land management jurisdictions and human-use impacts that are common to the Greater Yellowstone Area (GYA). Seventeen different wolverines (9♀, 8 ♂) have been captured since 2001 and 11 (7♀, 4 ♂) are currently radio-instrumented. Four wolverines were fit with store-on-board GPS collars, and one was fit with a satellite collar. Success and failure of collars and preliminary results regarding mortality and reproductive rates, habitat use, home range size, and winter recreational use will be discussed. This research program is designed as a comprehensive, long-term effort to address specific wolverine management questions and collect information that can be integrated into a landscape species approach to conservation planning in the Greater Yellowstone Ecosystem.

Beyond Bait:
Opportunities for Passive Bear Hair Collection[TWS]

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We surveyed trails, forest roads, power lines, and fences on 32,300 km^2 in northwestern Montana to identify trees and other objects that bears rub against. Genetic analysis of passively deposited hair (as opposed to that obtained by attracting bears with bait) is used to identify individual bears to document bear presence, obtain minimum counts, and as capture events for mark-recapture population estimates. Hair will be collected from barbed wire and other hair snags attached to the rub surface. Hair samples from barbed wire are larger, have more follicles, require less time to collect than hair on bark, and define discrete samples that help prevent getting samples from more than one individual. Of the over 5000 rub objects we identified, the majority were trees along 7500 km of hiking trails. We summarize characteristics of rub trees and other objects including species and diameter of tree, amount and type of bear use, distance from trails, and maximum and minimum height of rubbing. The density of rub trees along forested trails varied widely but it was rare to find any area devoid of rubbing activity. When large diameter trees were not available, such as in clear cut logging units, recently burned areas, and tree line communities, bears used sign posts or small diameter trees to rub against. In areas with high levels of pack animal use, ~ 60 percent of the bear rub trees were also bumped by stock packs. We report on the effectiveness of pack stock-friendly, alternate hair grabbing devices tested in the field.

Efforts to Re-establish Northern Leopard Frogs on the Flathead Indian Reservation[TWS]

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The northern leopard frog (*Rana pipiens*) was once common throughout Montana but is now extirpated from most of western Montana including the Flathead Indian Reservation. The Confederated Salish and Kootenai Tribe's Wildlife Management Program is working to return leopard frogs to the Flathead Indian Reservation. Potential source populations were identified through DNA testing in 2001. Reintroduction methodology was tested using Columbia spotted frogs (*Rana luteiventris*) in 2002. In 2003, eight egg masses were collected from five leopard frog source populations. Each mass was placed within a float that in turn was placed inside an enclosure to protect the eggs from predators and keep track of individuals. An estimated 16,500 tadpoles hatched from these egg masses. Five hundred tadpoles were released into each enclosure and the remaining tadpoles were released into the surrounding water. Tadpoles outside the enclosures grew and developed more quickly than the tadpoles inside enclosures, however, survival within the enclosures was high, 68 percent. During July 2003, we released 1342 tadpoles and 21 metamorphs from within the enclosures into the surrounding water. Time constrained surveys were conducted after the release to monitor leopard frog metamorphs until the end of September 2003. Intensive surveys will be conducted in spring 2004 to estimate winter survival and to determine dispersal distances from the release sites. We plan to continue similar reintroduction and long-term monitoring efforts at current and additional release sites.

Detection Of (*Batrachochytrium Dendrobatidis*), The Chytrid Fungus Associated With Global Amphibian Declines, In Montana Amphibians[TWS]

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In order to identify potential causes of declines in the northern leopard frog (Rana pipiens) and western toad (*Bufo boreas*), which have been noted since the 1980s, and assess the risk posed to other amphibian species whose status is uncertain, we submitted 98 tissue samples gathered from eight amphibian species across Montana for PCR based identification of the chytrid fungus (*Batrachochytrium dendrobatidis*). This chytrid fungus has been associated with declines, extirpations, and losses of numerous amphibian populations and entire species around the globe over the last two decades. Tissue samples from 30 museum voucher specimens of three species collected in the Flathead Valley in the 1970s, prior to amphibian declines in the area, were all negative for *B. dendrobatidis*. However, four species and 26 of 68 tissue samples gathered during inventory work across the state since 1998 tested positive for *B. dendrobatidis*. In light of its association with other amphibian declines, *B. dendrobatidis*, acting alone or synergistically with other stressors, is a potential cause of the declines observed and should be regarded as an ongoing threat to Montana amphibians. In order to prevent additional spread of this fungal pathogen personnel working in either lentic or lotic systems should thoroughly rinse and decontaminate all equipment with 10-percent bleach between (1) any sites where dead, dying, or ill amphibians are encountered, (2) sites located in different local watersheds or definitive clusters of sites, and (3) all breeding sites of sensitive species separated by > 1 km.

Landscape-scale Nesting Behavior of Greater Sage-grouse in North-central Montana[TWS]

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The long-term decline of greater sage grouse (*Centrocercus urophasianus*) over much of their historic range is a concern of managers of sagebrush (*Artemisia* spp.) habitats. Because sage grouse range widely across expanses of sagebrush habitats, and due to the extent of public land holdings in north-central Montana, conservation or recovery efforts for sage grouse are likely to be applied at the landscape scale (rather than the scale of the nest-site, for example). Much of current management focus center on the area around leks because leks appear to be the center of year-round activity. Therefore, it is important to understand where sage grouse nest and rear their broods in relation to leks. As part of a larger doctoral research project, 247 female sage grouse were radio-marked during springs 2001-2003 to estimate reproductive parameters. With the resultant wealth of GPS locations on sage grouse nests, the spatial relationship between nests and leks can be quantified. In general, sage grouse in this study nested further away from leks than expected, though distances varied among four study sites. Renesting attempts within a year were generally close to the first nest location (within several hundred meters). Finally, individuals tracked in successive years typically nested within several hundred meters of the previous year's nest location. Though habitat conservation and enhancement efforts must target more land than first expected, individual birds exhibit some degree of nest-area fidelity. Focusing on particular geographic areas centered on leks may be an effective strategy.

Cause-specific Mortality of Calf Elk in the Garnet Mountain Range, Montana[TWS]

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Recruitment rates of Rocky Mountain elk (*Cervus elaphus*) have been chronically low in recent years and may have progressively declined over the past 2 decades across western Montana. Calf:cow ratios generated from spring classification flights on our study site, Montana Hunting District 292-00, have declined from 41 calves:100 cows in 1988 to 19 calves:100 cows in 2003. In spring of 2002 and 2003, a total of 69 neonatal calf elk ≤ 8 days old were captured and instrumented with mortality-sensing radio transmitters that

were attached with ear tags or expandable, break-away collars. In 2002, 17 of 27 radio-marked calves died. In 2003 we have documented just three mortalities among 42 calves radio-marked this year. Sources of mortality include: black bear (n = 8), cougar (n = 3), undetermined predator (n = 2), malnutrition (n = 2), abandonment (n = 2), coyote (n = 1), human hunter (n = 1), and disease/drowning (n = 1). Estimated mean calf birth date was 29-30 May in both years. The sex ratio of calves captured was 11 male:15 female in 2002 and 23 male:17 female in 2003. Birth weights for calves were estimated by plotting a linear regression of estimated calf elk age at capture versus calf elk capture weight for each sex. Estimated mean male calf birth weight in 2003 was 1.6 kg greater than that of 2002, and estimated mean female calf birth weight in 2003 was 0.7 kg greater than that of 2002; however 95-percent confidence intervals about these estimates overlapped. This study is planned to continue through 2006.

Cougar Ecology and Cougar-Wolf Interactions in Yellowstone National Park: A Guild Approach to Large Carnivore Conservation[TWS]

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Cougars (*Puma concolor*) and wolves (*Canis lupus*) coexist on the Northern Range of Yellowstone National Park. Understanding of how these two species partition resources may influence the management of these predators and their prey populations. Our study is designed to examine cougar population characteristics including: density, sex and age structure, reproductive and survival rates, dispersal and recruitment events, prey selection, predation rate, and spatial movements. These parameters will be compared with estimates made prior to wolf restoration (Phase I data, Murphy 1998), and current parameters for the wolf population, to assess competition and resource partitioning between the two species. The cougar population was increasing during Phase I and stable in Phase II. Litter sizes have not changed, but a peak in births during summer months in Phase I has been replaced by a more even distribution of births occurring through the year. Mortality from harvest and other cougars has remained the same, but wolves have directly and indirectly killed cougars in two family groups. Prey selection and predation rates are similar between Phase I and II. Elk are the primary prey, the predation rate is nearly the same, and biomass killed per day is slightly greater in Phase II. Cougars kill proportionally more elk calves, and fewer cow and bull elk than wolves during winter. Wolves were known to have displaced cougars from kills in 23 percent of visits; bears in 19 percent of visits. We have begun using GPS collars to look at interactions and habitat use among cougars, wolves, and bears.

Fire Effects on Populations and Habitats of Sensitive Species of Wildlife in Ponderosa Pine Forests of the Interior West[TWS]

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The USDA Forest Service, Rocky Mountain Research Station, is leading the effort to examine fire effects on populations and habitats of wildlife in ponderosa pine forests on 12 sites in eight states across the western United States, including locations on National Forests, National Parks, and state and private lands. We have one site in Montana, in the Elkhorn Mountains on the Helena National Forest. Our goal is to understand the ecological consequences of fire management for wildlife in ponderosa pine forests. The target wildlife species are cavity-nesting birds and songbirds (also small mammals at selected locations). Cavity-nesting birds are a focus of this research because many of them depend on fire-maintained habitats for their dispersal and movements, they are designated as Management Indicator Species (MIS) and Sensitive Species by state and federal agencies, and they are responsive to timber and fire management activities. This presentation summarizes study objectives, methods, and some preliminary results for the Montana and western study sites.

Quantification of Noninvasive Population Sampling: A Comparison of Genetic and Independent Estimates for Cougars in Yellowstone National Park[TWS]

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Many carnivores, including cougars (*Puma concolor*), are difficult to study due to their low densities and secretive nature. Estimating population size is important to the conservation and management of most carnivore species. Currently, no reliable method of

estimating cougar population size exists other than radio collaring, which is intrusive and expensive. Non-intrusive genetic sampling (NGS) has great potential as a tool for population enumeration and monitoring, but has not been adequately developed to date for cougars. The Yellowstone Cougar Project has radio-marked approximately 87 percent of the resident adult cougar population in the Northern Range of Yellowstone National Park (YNP) and has collected blood from all captured individuals ($n = 68$ as of winter 2002-2003). Therefore, the YNP Cougar Project provides a unique situation in which to test and develop NGS methods. In January 2003, we initiated a study to test and develop NGS methods. Backtracking was used to find hair at bed sites and scat at kill sites. Hair was also collected through the use of hair-snagging stations. Our study objectives include 1) evaluating the effect of varying sampling intensity for both backtracking and hair-snagging stations on population estimates, 2) quantifying genotyping error rates by comparing non-intrusively collected samples to blood and tissue samples taken during capture, 3) analyze hair and scat (DNA) samples to identify species and individual-specific information on cougars such as gender and relatedness. Currently, we are conducting the second field season in this 3-yr study. No genetic analysis has yet been performed, but we present some preliminary results.

Bat Conservation Strategy and Plan for the State of Montana[TWS]

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Bats are among the least studied animals, yet make up the second most diverse order of mammals in the world. Fifteen species of bat occur in Montana and this diversity reflects the variety of resource requirements between species. The economic and ecological benefit of bats, mainly consumption of nocturnal insects including agricultural and forest pests, has only recently been acknowledged. This realized importance increases the need for the protection of the essential resources utilized by bats; primarily day and hibernation roosts, foraging habitat, and open water. Montana continues to observe the significance of its wildlife as one of only a few states that have initiated and drafted conservation plans for bats. This conservation plan outlines the necessary steps toward successful bat conservation through four mechanisms: Research, Management, Inventory and Monitoring, and Education.

Grizzly Bear Recovery: A Progress Report After 23 Years[TWS]

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The grizzly bear (*Ursus arctos horribilis*) was listed as a threatened species under the Endangered Species Act in 1975. Six areas were identified in the 1975 listing as grizzly bear populations. Organized recovery efforts have been underway since 1981. The Interagency Grizzly Bear Committee representing state, federal, tribal, and county interests, implements the recovery program. The recovery program is a cooperative multi-agency effort with full state, federal, tribal and public participation. Significant progress has been made in the recovery of the Yellowstone and Northern Continental Divide populations. The Yellowstone population is increasing at approximately 4 percent/year, and recent work has demonstrated exponential expansion of range in the southern part of the ecosystem. All demographic targets in the Recovery Plan have now been met for the last 7 years in the Yellowstone ecosystem. The situation in the Northern Continental Divide Ecosystem (NCDE) also appears to be improving with bears expanding their range on all sides of the ecosystem. A detailed project to produce the first accurate population estimate for this ecosystem will start in 2004 to make a total population estimate in this ecosystem using DNA. The situation in the four other ecosystems is much less positive. Grizzly bear populations spanning the U.S.-Canadian border in the Cabinet/Yaak and Selkirk ecosystems are small and vulnerable, and occur in the southernmost extensions of Rocky Mountain habitat extending down from Canada. The North Cascades grizzly population is isolated on both the U.S. and Canadian sides and is considered the most endangered grizzly population in Canada. Certain political interests blocked an attempt to begin to reintroduce grizzlies into the Bitterroot ecosystem in 2000. Recent genetics work demonstrates that the south Selkirk grizzlies are an isolated population (no male or female connectivity) under 100 individuals with a 15-20 percent reduction in genetic diversity. The Purcell/Yaak population between Highway 3 in Canada and U.S. Highway 2 is demographically isolated (no female connectivity) with < 50 individuals. The Cabinet Mountains population is likely isolated from both the south Selkirk Mountain and the Purcell/Yaak populations. Aggressive conservation measures are necessary to recover these populations including augmentation with additional bears, mortality reduction programs, public outreach, and reestablishment of population linkage so these areas are no longer isolated. We are working on enhanced cooperative U.S. and Canadian efforts to address the issues facing these small grizzly populations and to build connectivity to existing larger populations and areas of vacant habitat. Limitations to grizzly recovery are funding and political resistance and interference. If funding, agency and political commitment, and public support are present, we believe recovery of grizzly bears is possible in all six areas where they were thought to exist in 1975. Success of the Yellowstone recovery effort is proof that a cooperative effort can recover a grizzly population. We know what to do to help the remaining populations, and we can do it if we are given the opportunity.

Wildlife, Fire And The Urban Interface[TWS]

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When a wildfire starts, it is often too late to implement needed protection measures or too save unique or critical habitats. Using a proactive and interdisciplinary approach, we can often use fire and fuel reduction techniques to improve the habitats for threatened and endangered species This talk will show how these techniques can and have been used in bald eagle and sage grouse management.

Wolf-Prey Interactions in Yellowstone National Park[TWS]

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Wolf-prey interactions were studied in Yellowstone National Park from 1995-2000. We intensively tracked wolves for 30 days in early (Nov-Dec) and late (Mar) winter from the ground and fixed-wing aircraft. Our objectives were to determine wolf killing rate (kills/wolf/30 days) and prey selection. The primary prey of wolves was elk (91%) but bison (3%), moose (2%), and deer (2%) were also killed (2% unknown). The proportion of elk calves, cows, and bulls killed was 43, 36, and 21 percent, respectively. Wolves selected for calves, against cows, and proportional to availability for bulls. Average age of cow elk killed by wolves was 14 years compared to 6 years for hunter-killed cows. Seasonally, calves were selected in early winter and bulls in late. Two distinct wolf-prey systems exist in Yellowstone: 1) the northern area with a large elk population, and 2) interior park with low elk but more bison and moose. Wolves killed a greater variety of prey (elk, bison, moose) in the interior area compared to the northern area (elk). Wolf killing rate increased from early (1.6 elk/wolf/30 days) to late (2.2 elk/wolf/30 days) winter. Averaging early and late winter data and correcting for scavenger removal, consumable biomass was 3.3 kg/wolf/day.

An Evaluation of Fisher Introductions in Montana[TWS]

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Translocations play a crucial role in the conservation and restoration of wildlife populations. We investigated the impact of translocations on the distribution and genetic structure of fisher (*Martes pennanti*) populations in Montana. We documented the presence of fisher in the Cabinet Mountains, 10 years after the release of 110 fishers from the upper Midwest. Verifiable detections were made in four of 17 systematically surveyed sampling units. Surveys indicated that fishers are rare, but present and reproducing in an area where they were believed absent prior to the introduction. To approximate the occupied range of fisher throughout Montana, we mapped fisher distribution using contemporary occurrence data (harvest, sighting, and tracking records). The spatial and temporal extent of these records demonstrated that translocations have been successful in establishing, and/or augmenting, fisher populations in the state. To investigate the origin of extant populations in Montana tissue samples from Montana, British Columbia, Minnesota, and Wisconsin fishers were collected and two regions of the mitochondrial DNA genome were examined. Haplotype frequencies differed significantly by region with four haplotypes unique to British Columbia, two to the Midwest, and one to west-central Montana. The distribution of these haplotypes in Montana suggests that fisher populations in the state have multiple origins reflecting the history of translocations and the influence of native populations. Analysis of mitochondrial DNA sequence data indicated that fisher may not have been extirpated from Montana prior to the translocations. Fisher populations in west-central Montana appear be descended from both native and introduced animals.

Sage Grouse, Coal-bed Methane Development, And West Nile Virus In The Powder River Basin: Is There A Link?[TWS]

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Sagebrush habitats in North America continue to be significantly altered by anthropogenic change. Simultaneously, populations of sagebrush-obligate species, including greater sage grouse (*Centrocercus urophasianus*), have experienced pronounced long-term declines. Conservation of Montana's sage grouse populations poses a significant challenge for biologists, land managers, landowners, hunters, and industry. Extensive coal-

bed methane (CBM) development is planned for the Powder River Basin in southeastern Montana, an area that supports robust populations of sage grouse. However, it's influence on grouse populations remains unknown. In 2003, we initiated a pilot study of demographic responses of sage grouse to CBM development on three sites in southeastern Montana and northeastern Wyoming. Preliminary analysis indicates that hens at the CBM site nested, on average, 7-8 days later and renested at significantly lower rates than hens on two non-CBM sites. Hen survival on the CBM site was dramatically lower than that on non-CBM sites due to an outbreak of West Nile Virus (WNV). Future research is geared toward identifying physiological, behavioral, and ecological mechanisms underlying demographic effects of CBM on populations and determining whether excess surface water produced by CBM increases risk of exposure to WNV for sage grouse.

$18 Billion For Conservation—how The 2002 Farm Bill Can Assist Provate Lands Wildlife Conservation Efforts[TWS]

Dave White
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Dave White was named state conservationist of the USDA Natural Resources Conservation Service (NRCS) in Montana effective May 19, 2002. White is responsible for NRCS operations within the state, including administration of conservation planning assistance to private landowners, conservation cost-share programs, Resource Conservation and Development, the Natural Resources Inventory, soil survey mapping, and water supply forecasting. Before coming to Montana, White worked as a professional staff member of the Senate Agriculture Committee. In this position, he helped develop the conservation and forestry titles of the 2002 Farm Bill. White said the farm bill will bring many new opportunities for landowners to protect Montana's natural resources. White has also worked for NRCS in Missouri, South Carolina, and Washington, D.C. He is an honors graduate from the University of Missouri with a BS degree in Agriculture. White is married and has two children.