PROCEEDINGS

of the 30th annual Meeting

The Montana Chapter
The Wildlife Society

WHITEFISH, MONTANA ▴ February 5-7, 1992

FORWARD

The 1992 annual meeting of the Montana Chapter of the Wildlife Society was held 5-7 February at the Grouse Mountain Lodge in Whitefish. The meeting included a one-day symposium on 'Habitat Fragmentation and Biodiversity'.

The meeting opened Wednesday afternoon and included several presentations relative to wildlife policy. Keynote addresses were given by Tom Franklin, Wildlife Policy Director for The Wildlife Society, Bethesda, MD and John Mumma, recently retired Region One Forester, USFS, Missoula. The Chapter honored Jack Jones, an employee of the Bureau of Land Management in Butte and a charter member the Chapter, with its Distinguished Service Award. Mike Thompson, a Department of Fish, Wildlife & Parks biologist, was recognized as Biologist of the Year. Jim Williams and John Hughs each received the Wynn Freeman Scholarship Award.

These proceedings were compiled and edited by Gary Dusek, program chairman. The real credit is due all those who presented papers and submitted them for inclusion in these proceedings. A special thanks is extended to Gail Williams, who provided assistance with word processing, and to Marilyn Wood and Tom Wittinger for organizing the Symposium on Habitat Fragmentation and Biodiversity.

MONTANA CHAPTER, TWS, OFFICERS

YEAR	PRESIDENT	VICE PRESIDENT	SECRETARY-TREASURER
1963-64	Jack Lyon	Tom Mussehl	Les Pengelly
1965-66	Louis Moos	Phillip South	Curtis Halvorson
1966-67	John Harris	Robert Howe/ Jack Schmautz	Tom Mussehl
1967-68	Harold Picton	Gerry Atwell	Bob Hensler
1968-69	Reuel Janson	Duane Pyrah	Duane Whitmer
1969-70	Arnold Foss	Curtis Halvorson	K. Johnson
1970-71	Buck Compton	Roger Bumstead	William Radtkey
1971-72	Bart O'Gara	Charles Eustace	John Firebaugh
1972-73	Roger Bumstead	John Weigand	Robert Ream
1973-74	Dick Mackie	Jim Cole	Gene Allen

	PRESIDENT	PRESIDENT-ELECT	SECRETARY-TREASURER
1974-75	Jim Cole	Duane Pyrah	Frank Gjersing
1975-76	Duane Pyrah	Bob Martinka	Rick Wallestad
1976-77	Bob Martinka	Dick Knight	Glen Erickson
1977-78	Dick Knight	Ken Coop/ Terry Lonner	Jack Jones
1978-79	Terry Lonner	John Weigand	Jim Cross
1979-80	John Weigand	Bob Hensler	John Cada
1980-81	Bob Hensler	John Ormiston	John Mundinger
1981-82	John Ormiston	Charles Eustace	Jon Swenson
1982-83	Charles Eustace	Jon Malcolm	Mike Hedrick/ Gary Olson
1983-84	Jon Malcolm	Arnold Dood	Gary Olson
1984-85	Arnold Dood	Rich DeSimone	Dave Pac
1985-86	Rich DeSimone	Heidi Youmans	Steve Knapp
1986-87	Heidi Youmans	Alan Christensen	Harvey Nyberg
1987-88	Alan Christensen	Joe Ball	Harvey Nyberg
1988-89	Joe Ball	Mike Aderhold	Ray Mule'
1989-90	Mike Aderhold	Fritz Prellwitz	Ray Mule'
1990-91	Fritz Prellwitz	Keith Aune	Bill Haglan
1991-92	Keith Aune	Gary Dusek	Bill Haglan
1992-93	Gary Dusek	Wayne Kasworm	Gary Hammond

MONTANA CHAPTER, TWS
AWARD RECIPIENTS

Established 1976

YEAR

1976 The first chapter award was made for professional achievement and presented to Wynn Freeman prior to establishment of current chapter awards.

YEAR	DISTINGUISHED SERVICE	BIOLOGIST OF THE YEAR
1976-77		
1977-78	Bob Greene	
1978-79	Reuel Janson	
1979-80	Merle Rognrud	
1980-81	Faye Couey	
1981-82	Bob Eng	Tom Mussehl
1982-83	Jim Posewitz	Mike Rath
1983-84	Ken Walcheck	
1984-85		Dale Harmes
1985-86		
1986-87	Richard Mackie	
1987-88	Jim Mitchell/ Larry Thompson	Duane Pyrah
1988-89		
1989-90	Jim Phelps/ Joe Egan	Gary Hammond/ Neil Martin
1990-91	Jerry Gallagher	Scott Denson
1991-92	Jack Jones	Mike Thompson

YEAR	COMMUNICATIONS**
1989-90	Gary Dusek

** The award was established in 1990 by the "Bohemian Corners Foundation" and renamed the "Bob Watts Communication Award" by a bylaw change in April 1991 in memory of C.R. "Bob" Watts, a member of the Foundation.

MONTANA CHAPTER, TWS

WYNN FREEMAN SCHOLARSHIP AWARD
Established 1979

YEAR	RECIPIENTS	
1980-81	Karl Grover (MSU)	
1981-82	Tim Andryk (MSU)	
	MSU	UM
1982-83	Jody Canfield	Robin Rae Brown
1983-84	Scott Greer	Rob Bennets
1984-85	John Vore	Sandra Noble
1985-86	Scott Jackson	Susan Reel
1986-87	Katie Albrecht	Mark Hurley
1987-88	Timothy Ferguson	**
1988-89	**	Chris Loggers
1989-90	Shawn Bayless	Nathan Hall
1990-91	Thomas Baumeister	Mike Gibeau
1991-92	Jim Williams	John Hughs

** Name of recipient was unavailable at time of printing.

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WILDLIFERS AS GLADIATORS IN THE ARENA OF PUBLIC POLICY

Thomas M. Franklin, The Wildlife Society, Bethesda, Maryland.

Wildlife professionals working on controversial issues may feel like gladiators, combating adversaries that would sacrifice wildlife values for economic gain, development and greed. The old-growth/spotted owl controversy is an example of the gladiator-style hand to hand combat that is occurring in the public policy arena between wildlife and timber interests. Old-growth conservation policies and programs must be developed and implemented if the values of old-growth forests are to be retained.

Americans support laws that address the maintenance of viable populations of native vertebrates, management of habitats for threatened and endangered wildlife and perpetuation of biological diversity. Considering these laws and their regulations, the mandate of science, a commitment to the stewardship of wildlife and habitats, and professional ethics, The Wildlife Society concludes that the preservation and maintenance of old-growth in adequate amounts and appropriate distributions to ensure persistence of associated plants and animals is required in managed forests. Agency efforts to consider old-growth forests in land use planning have been fragmentary and limited in scope. There has been little coordination between and within state and federal agencies. In short, many governmental leaders have not aggressively protected old-growth forest values.

The Wildlife Society and its members are engaged actively in the old-growth/spotted owl debate. The Society advocates science as the cornerstone of any resolution to the issue. TWS analyzes proposals, challenges schemes that ignore the best available biological information, and strongly supports teams of biologists that use wildlife science to meet conservation goals. Although conflicts arise between biologists holding opposing viewpoints (each convinced that they are correct) combatants should seek the responsible answer, based on the best available data, and attempt to view the issue from a larger conservation perspective. Wildlife professionals should be aware of their value judgements and biases, but should strive to separate these from the use of science to analyze and recommend policy actions. Wildlife biologists should apply the best scientific information available to complex biopolitical issues to achieve the best possible conditions under prevailing circumstances. The application of biological science, while considering socio-political factors, will be critical to the long-term resolution of the old-growth and other natural resource challenges.

SLEEPING WITH ELEPHANTS - CAN BE A CRUSHING EXPERIENCE!

John W. Mumma, USDA Forest Service, Region One, Retired.

When we as professionals in the field of Wildlife and Fisheries Management move into the 21st century we will be judged by our actions in the 1990's. How well we have met the challenges will be in large part due to our ability to work together during this "decade of change".

Change will occur at a faster rate than any of us have experienced. With that in mind, it behooves the people in this room and our peers in the profession to make every effort to increase the inter and intra agency communication and cooperation. The challenges will be far too great for any single entity or person to overcome.

We all face a variety of challenges day in and day out but the "biggies or elephants", as I will refer to them, will have the size and weight to crush us. Some of those elephants will relate to the threatened and endangered species management. Wolves and grizzly bears are just two of the species that will test our abilities to work together. With all of the attention on spotted owls in the Northwest and with the reauthorization of the Endangered Species Act, ramifications will reach far beyond the Northwest. The growing anti-hunting sentiment will continue to gain momentum, not only here, but internationally as well--another elephant that will test our abilities and prerogative to continue to manage wildlife programs. By rounding out our overall programs, we will gain support from a broader segment of society.

Forest management with all of its attendant programs will be severely tested and much of that will focus on wildlife and fisheries implications. As Forest Plans are revised and amended, legislation will be encouraged to politically fix certain aspects of the plans with emphasis on special interests, particularly commodity-oriented but also including biodiversity and fragmentation.

These are just a few of the big challenges facing our profession as we near the turn of the century. We can be successful in meeting those challenges if we work together for the common good. After all, as members of the scientific community, we have a responsibility legally and morally to leave the land and its resources in better shape.

In closing, I want to take this opportunity to say "thank you" to all the members of the Montana Association of Fish and Wildlife Biologists for their support of me and the principles I practiced as Regional Forester.

THE UNION'S ROLE: DISRUPTIVE OR CONSTRUCTIVE?

Mike Thompson, Chairman, Montana Association of Fish and Wildlife Biologists, Missoula 59801.

My title--"Chairman of the Board of Directors"--does not imply any particular insight into the collective thinking of the Montana Association of Fish and Wildlife Biologists. In fact, the Chairman is, in my experience, someone without the nerve to say "No" when drafted by others who also don't want the job.

Therefore, the perception of reality that follows is my own. To the extent that it represents fact, or a consensus of opinion, so much the better. Conversely, I'm confident that if I misrepresent any historical perspective or philosophy of the Association, enough members are in the audience to perform damage control at the end of my presentation.

The Montana Association of Fish and Wildlife Biologists is the collective bargaining unit for about 103 fish and wildlife biologists employed by the Montana Department of Fish, Wildlife and Parks (DFWP). The Association is a labor union. It has been affiliated with the Montana Federation of State Employees, AFL-CIO, for the past couple years.

Members of the Association are the practicing wildlife scientists of the DFWP. The primary duty of these scientists is the collection, analysis, interpretation and communication of information pertaining to the wildlife resource. I quibble with the notion that wildlife management is an art. I think wildlife management is an evolving science, but it is convenient to think of it as art when we find ourselves unable to keep up with the literature or think beyond the details of current social issues due to a lack of time and support afforded by our employers and constituents.

Maintaining the support of governors, legislators, directors, county commissioners and others to fund a wildlife management agency for the purpose of carrying out the public's wishes is, in the short run, relatively easy (that is, until the accumulated mistakes and tradeoffs come home to roost). However, maintaining support for objective scientific management that may produce results and identify issues that are politically unpalatable is a much more difficult proposition for a state agency, particularly in a state as poor as Montana.

State politicians frequently demonstrate their disregard for the science of wildlife management--and, unwittingly, for the public trust--by jumping on tempting special interest bandwagons regarding the direction of the Fish, Wildlife and Parks Department. For example, according to the Montana Standard last August, Lt. Governor Dennis Rehberg told a group in Dillon that a "good board" is in place to control the department. He said, "We've seen substantial changes. . . We've got them in a hold pattern now, and we're in a position to start making changes."

In response, the Association wrote a letter to Lt. Governor Rehberg, asking for clarification on his comments. We noted the need for continued scientific management of Montana's nationally recognized fish and wildlife resources, and expressed interest in what changes he might be promoting. Our letter to the Lt. Governor was dated September 23, 1991, and we have not received his reply more than four months later.

Another example of how some politicians fail to appreciate the science of wildlife management is the tendency of gubernatorial candidates to advocate replacement of state department staffs from director down to, and including, the bureau chief level. Democratic hopeful Frank Morrison, although publicly critical of Lt. Governor Rehberg's comments which I just quoted, indicated his preference to replace bureau chiefs during a candidates' forum sponsored by the Montana Federation of State Employees last November. He is likely unaware of what he is proposing as it relates to the successful administration of scientific wildlife management in Montana. In that regard, he represents a large proportion of the public.

It is understandable that the public in general does not appreciate the science of wildlife management. The public entrusts its wildlife resources and management to the state of Montana. Ultimately, the public retains decision-making authority through the election of legislators and a governor--who appoints the director and Fish, Wildlife and Parks Commission. However, they have wisely turned over the technical aspects of wildlife management to qualified professionals because the public in general does not have the time to devote to the education and experience they need to do the work themselves. This is a logical arrangement.

Unfortunately, by divorcing themselves from the details of conducting wildlife science, they may become unaware and unappreciative of its value and requirements. People relate to tangible products. They do not appreciate the processes, labor, equipment, and effort that resulted in our knowledge that elk avoid traffic during hunting season, for example, but they may call for more wardens to enforce the road closures that result. They experience the road closure violations and see (or don't see) the wardens, but the information leading to the establishment of road closures is taken for granted.

This lack of appreciation for wildlife science is most alarming when it occurs at the highest levels of the DFWP itself. If I had to attribute the organization of the Biologists' Association in 1983 to a single issue, I would attribute it to then-Director Jim Flynn's rumored desire to blend wardens and biologists into conservation officers. While this action may have improved some of the direct public service functions which the department has taken on, it demonstrated a lack of appreciation for the activities that provide the credible information that good government and resource stewardship depends on. Public service provided by the conservation officer might have been measured by public contacts, questions answered or assistance provided. Public service provided by wildlife biologists, however, is measured by the credibility and completeness of information contributed to the landmark public debates we face regarding resource management policy in Montana.

The wildlife biologist's job is a full time one. Increasingly it seems that maintaining support for the job, and ensuring full public consideration of the information provided by biologists, is also a full time job. Perhaps the latter is one role of the Montana Association of Fish and Wildlife Biologists.

I believe the organization of the biologist's association is a constructive reaction on the part of the State's wildlife biologists to gain an intra-agency policy voice for wildlife science. The Association owes its legal standing to its recognition by the State of Montana as a collective bargaining unit; hence, the Association's effectiveness to date has been greatest within the DFWP--we are labor and DFWP administration is management. Our relations with management have not been adversarial for the most part. After all, we find ourselves dealing with friends and colleagues, many of whom have the same education and experience, and are in support of the Association's objectives.

For eight years, the Association has worked rather quietly to build its organization and develop key affiliations, drawing upon the professionalism and volunteerism of many DFWP biologists. As a result of this effort, the Association is a more organized and potentially powerful force today than it was only a few years ago. Concurrently, the Association has worked to increase intra-agency communications, through regularly scheduled meetings with administrators, through the collective bargaining process, and recently through the formal grievance of specific Department policies. Even the grievance is a constructive step to bring about necessary communication. The fact that those of you outside the DFWP are unaware of the Association or its actions is not evidence that the Association has been inactive or timid. On the contrary, I believe it is evidence that the Association has been at least partially effective behind the scenes, and has very carefully considered the tradeoffs before taking any cause to the public.

In fact, the Association's reluctance to take public stands on resource issues has disappointed many members, as well as biologists and advocates outside the DFWP. Earlier I cited the conservation officer issue as the primary cause that brought the Association together. In my opinion, a close second would be a desire on the part of DFWP biologists to take a strong public stand when they perceived their Department was increasingly unwilling to do so. Many of us have traditionally countered that our professional society, The Wildlife Society, should carry the professionals' message into the public arena. However, many lack confidence that The Wildlife Society can be effective in that role.

For what I consider to be practical reasons, I would rather see The Wildlife Society actively promote our professional stands on issues such as wilderness, livestock grazing on public lands, timber harvest on National Forests, reintroduction of wolves in Yellowstone Park, and other important resource issues of the day. I concede that it may be more difficult to reach a Society-wide consensus on such issues than it might be to reach a consensus of the Association. I think this is healthy, and is evidence that indeed the Society is the proper arena.

A parallel observation is the frustration that many biologists experience with the peer review process for scientific publication. Many are unwilling to subject themselves to the tug and pull of critical reviews and subsequent letters of explanation and rewrites, even though the product is almost always enhanced as a result. Instead, some authors react by reducing the size of their audience--and the intensity of peer review--by publishing internally, or not at all. Similarly, I think many biologists have been frustrated over the years with difficulties they have had in influencing The Wildlife Society with their views. Tired of re-evaluating their positions and pursuing the professional debate, they react by forming a smaller club--the Association. However, the issues we face today are too important and increasingly complex to divide ourselves and our opinions. Today more than ever, we need to seek critical review of our ideas from professionals with different viewpoints, and then keep working to a better position statement--and course of action. The result will be the greatest possible power and support--and the Association, almost by definition, will be in agreement and ready to support the Society through its most effective intra-agency channels.

To further illustrate my point, note that Keith Aune served as a member of the Association Board of Directors while serving as President of the Montana Chapter of The Wildlife Society. This is not, by any means, an unusual situation. True to the tendencies of society as a whole, relatively few DFWP biologists are active participants in The Wildlife Society or the Association. Those that are active in one organization tend to be the ones who are active in the other as well. Therefore, the considerable time and effort that the Association might spend on influencing public policy could further reduce active participation in the affairs of The Wildlife Society. The result would likely be an even more sluggish and ineffective Society.

The Association has selected its public statements carefully. We did feel compelled to respond to the transfer of USFS Region 1 Forester John Mumma amidst allegations that he was forced out of his position because he did not meet timber harvest targets. The Association responded with a letter to the Montana Congressional Delegation, and the Missoulian and Independent Record newspapers reported this action. Among other things, the Association stated:

"In the case of the transfer of John Mumma, the [Association] is concerned that the U.S. Forest Service might be suppressing--for political gain--credible scientific information from the public debate over natural resource policy. If true, [the Association] would view this as a serious violation of the public trust."

In this case, the Association felt it was important and appropriate to support a sister association--the Association of Forest Service Employees for Environmental Ethics--in their campaign to prevent retribution to resource professionals who are doing the jobs the public expects of them. By making this statement, we publicly reaffirmed this commitment for the benefit of our state's administrators as well. It appears that the congressional investigation of John Mumma's transfer has brought to light some Forest Service practices that the public should be aware of, and disgusted by. The Association is pleased with whatever small effect it may have had at the outset of these hearings.

I foresee some issues of the 1990's that the Association is particularly well-prepared to deal with. The Association, through its affiliation with the Montana Federation of State Employees, has access to gubernatorial candidates in situations where the Association is able to question the candidates on their perceptions of wildlife issues in Montana. As a result, Association representatives are in a unique position to evaluate the wildlife management philosophies of the candidates, and, after careful consideration, may choose to participate in future campaigns.

Issues such as the "right to hunt" initiative beg for public comment from the DFWP, yet state employees may not lobby for or against such initiatives on work time. There may be a role for the Association to carefully develop a credible position on this issue when the Department as a whole cannot.

The Association's role in influencing the recruitment of biologists with the best possible scientific qualifications must continue. Now the Association must increasingly turn its attention toward retaining those professionals in state government, in the face of comparatively low wages and the donation of thousands of uncompensated hours to the job.

To this point, I have largely ignored the title of this presentation--"The Union's Role: Disruptive or Constructive?" Let me conclude by emphasizing that the Association strives to be constructive, as exhibited by its evolved role as an organization that works to improve wildlife management in Montana from within the DFWP. I believe we have been effective where we could be, and where we are ineffective, we choose to keep the dialogue going rather than attempt riskier measures at this time. However, the Association continues to tend its organization so that it will be ready for temporary disruption if necessary in the future. No one can be sure what tomorrow brings. That's why a quiet Biologists' Association remains organized--and vigilant.

TRIBAL WILDLIFE MANAGEMENT ACTIVITIES
FLATHEAD INDIAN RESERVATION

Dale M. Becker, Wildlife Program Manager, Confederated Salish and Kootenai Tribes, Pablo, Montana 59855.

The relationship between Native Americans and wildlife in North America represents a longstanding coexistence. Wildlife was one of the most important natural resources for the provision of food, clothing, tools and the raw materials used to fill a variety of basic needs and a dominant component in many traditional beliefs of the various tribes. During the pre-settlement period, the impacts of man upon the wildlife resources in North America were quite limited.

The arrival of Europeans resulted in significant changes in the culture and lifestyles of the North American tribes. The acquisition of horses by the Great Plains tribes allowed them to range over larger areas, hunting and gathering as they moved.For some of the plateau tribes, such as the Salish, Kootenai and Pend Oreille, the horse allowed them to range more easily throughout Montana to hunt bison and other wildlife.

With the adoption of the Hellgate Treaty in 1855, the Flathead Indian Reservation was established as a homeland for the Kootenai, Pend Oreille and Salish Tribes. Article 3 of the Treaty provided the Tribes the exclusive right to hunt and fish on the Reservation, as well as the right to hunt, fish and gather food items on open and unclaimed lands outside the Reservation boundaries.

During the early 1900's, Indian lands were taken by the U.S.Government for creation of the National Bison Range, irrigation projects, townsites, power sites, Agency administration purposes, and land allotments to individual Indians. In 1910, the Reservation was opened to homesteading. Creation of Ninepipe and Pablo National Wildlife Refuges occurred in 1921 for the provision and management of wildlife habitat, and those areas were placed under the management of the U.S. Fish and Wildlife Service. Additional land acquisitions in the vicinities of Ninepipe and Pablo National Wildlife Refuges by the Montana Fish and Game Commission were made in the 1950's to provide upland gamebird and waterfowl habitat and public hunting opportunities.

Contemporary Tribal wildlife management activities, in the form of several Tribal Council Resolutions, commenced during the 1930's. The Tribal Council established and sold the first Tribal hunting and fishing permits and established fish and game regulations in 1936. In 1940, the first Tribal Fish and Game Commission was established by Council Action. The first Tribal Elk Range was established in 1943, and Tribal Game Wardens were hired during that year.

Lowell Adams, a Wildlife Biologist with the U.S. Fish and Wildlife Service, was stationed on the Reservation to assist the Tribal Council with wildlife population surveys and wildlife management issues during the 1940's.

During the period of 1962-1977, the Tribes received technical assistance on wildlife matters from the U.S. Fish and Wildlife Service. During this period, the first systematic study of big game populations, their habitat and utilization by Tribal members on the Reservation was conducted by James Richard, a University of Montana Wildlife Management graduate student.

As demands for technical expertise on wildlife issues grew on the Reservation, the Tribes hired a Wildlife Biologist in 1977. Assignments included assessment of the condition and trend of wildlife populations and their habitats, determination of habitat use patterns of big game, preparation of wildlife management recommendations, and interdisciplinary activities.

In 1978 the functions of the Wildlife Biologist were transferred to the Bureau of Indian Affairs. The Bureau hired a Supervisory Wildlife Biologist and retained the Wildlife Biologist. During the late 1970's and early 1980's the Tribes and the Bureau initiated the first comprehensive survey and research on the ecology of grizzly bears in the Mission Mountains. Other projects conducted during the 1980's included research projects on hydroelectric impacts, Canada geese, bald eagles, ospreys, aquatic furbearers, short-eared owls, mule deer, elk, peregrine falcons and leopard frogs.

Wildlife management accomplishments included big game hunting closures on transplanted bighorn sheep and elk populations, interdisciplinary timber management activities, incorporation of a wildlife management section in the Reservation Forest Management Plan, establishment of a licensing system for on and off-Reservation moose hunting by Tribal members, and a ban on the use of lead shot for waterfowl and upland gamebirds on the Reservation. Protective closures on taking of grizzly bears, gray wolves, river otters, wolverines, fishers, mountain lions, lynx and bobcats were also instituted.

In March of 1988, the Tribes assumed wildlife management responsibilities under a PL 638 Contract, as provided for under the Indian Self-Determination and Education Assistance Act. Since that time, the program has expanded and now employs a Wildlife Program Manager, two Wildlife Biologist II's, two Wildlife Biologist I's, a professional consultant, and three part-time Wildlife Technicians.

The goal of the Tribal Wildlife Management Program is "the protection, enhancement and management of wildlife resources and habitats to provide for viable populations of all wildlife species present on the Reservation. To achieve this goal, the program consists of nine primary components. Details of these program components are discussed below.

HYDROELECTRIC MITIGATION

In cooperation with the Bureau of Indian Affairs, the Montana Department of Fish, Wildlife and Parks and the U. S. Fish and Wildlife Service, the Tribes have been involved in the documentation of wildlife and wildlife habitat losses due to the operations of Kerr Dam. Currently, a management and mitigation plan for the facility is under consideration by the Federal Energy Regulatory Commission. When approved, this plan will provide for funding for a number of wetland and riparian habitat acquisition and enhancement projects.

The Tribes are represented on the Montana Wildlife Mitigation Advisory Committee, which provides interdisciplinary review to the Department of Fish, Wildlife and Parks regarding proposed mitigation projects for the adverse impacts attributable to the operations of Libby and Hungry Horse Dams. Tribal Wildlife Management Program personnel also participate on technical review committees for proposed projects.

MONITORING OF TERRESTRIAL WILDLIFE

To provide sound management for wildlife resources on the Reservation, the Wildlife Management Program designs and implements population inventory and monitoring projects. Winter and spring aerial surveys of big game, seasonal aerial surveys for waterfowl, spring and summer surveys for upland gamebirds, aerial and ground surveys for federally-listed endangered and threatened species, breeding bird surveys for nongame bird species, raptor inventories, and furbearer winter surveys are among ongoing wildlife population inventory and monitoring projects being conducted. These efforts will be the basis for the development of wildlife management guidelines.

WILDLIFE REGULATIONS AND ENFORCEMENT

The Tribal Fish and Wildlife Conservation Program is staffed by eleven Conservation Officers, who are federally-certified in law enforcement. The Wildlife Management Program is involved with technical training for the officers in topics such as drugging and handling animals, wildlife identification, wildlife ecology and management. The two programs are responsible for the development of regulations on hunting, trapping and other recreational activities.

RESOURCE MANAGEMENT

The Tribal Wildlife Management Program serves as the representative for wildlife and wildlife habitat issues in the Tribal and Bureau of Indian Affairs Forest Management Program. In this capacity, Tribal wildlife biologists evaluate proposed timber sales and develop mitigation plans for the activities. Staff members are also currently involved in revision of a ten-year forest management plan, forest road management planning and analysis of wildlife habitat data collected as part of a Continuous Forest Inventory.

The Tribal Division of Lands is responsible for leasing of Tribal lands for livestock grazing. The Wildlife Management Program reviews proposed grazing leases, provides recommendations to alleviate wildlife habitat impacts, and proposes mitigation for anticipated impacts.

Several planning efforts are presently underway on the Reservation. The Tribal Planning Office is in the process of developing a draft Comprehensive Resources Plan, aimed at providing better integration of resource concerns in planning future direction for resource management. The Wildlife Management Program is presently involved in developing a Strategic Wildlife Management Plan for Reservation wildlife resources and will soon begin revising the Flathead Indian Reservation Grizzly Bear Management Plan.

Wildlife Management Program staff provide oversight and wildlife input for a variety of project proposals which might impact wildlife or wildlife habitat on the Reservation and on aboriginal lands. Current projects include impact assessment and development of mitigation recommendations for reconstruction of portions of U. S. Highway 93, forest management activities and irrigation project construction activities.

In order to provide sound management of wildlife and wildlife habitats, managers must have access to sound habitat inventory data. The Tribal Wildlife Management Program is currently completing work on the National Wetland Inventory through a cooperative effort with the U. S. Fish and Wildlife Service. When completed, wetland information will be installed in the Tribes' Geographical Information System for use in wetland management activities. The Tribes are also pursuing plans for inventory of riparian zones to better manage these areas. Due to concern for wildlife species dependant upon old-growth timber habitat, the potential of initiating an old-growth inventory is also being investigated.

Under the provisions of the Treaty of the Hellgate of 1855, Tribal members were guaranteed the continued exercise of hunting, fishing and gathering on open and unclaimed lands outside the exterior boundaries of the Reservation. As a result the Tribal Wildlife Management Program staff review and comment on a variety of wildlife habitat issues that could affect wildlife populations on aboriginal lands.

RESEARCH AND SPECIAL PROJECTS

The Wildlife Management Program has been involved as a cooperator in studies of waterfowl population recruitment being conducted by University of Montana researchers since 1988. Since 1990, the Tribes have provided partial funding and logistical support for two research projects on the assessment of predation impacts on waterfowl and ground-nesting bird populations.

Grizzly bears are an important species to the Tribes from both ecological and cultural perspectives. During the past decade, the Tribes have been involved in several projects related to the management of grizzly bears and their habitat on the Reservation. Most recently, the Tribes provided logistical support for a study on habitat fragmentation impacts being conducted by the U. S. Fish and Wildlife Service. Wildlife Management Program personnel are also active in the interagency efforts to develop a grizzly bear cumulative effects model. Fieldwork to ground-truth habitat components on Reservation lands will be completed during the coming summer.

Beginning in the summer of 1992, the Tribes will commence a five-year cooperative project with the Peregrine Fund to reintroduce the peregrine falcon to the Reservation. The objectives of this project, funded by the Tribes, are the restoration of the species as a breeding bird on the Reservation and its eventual recovery.

The Tribes recently entered into an agreement with the Montana Department of Transportation to participate in preparing an environmental impact statement on the reconstruction of a portion of U. S. Highway 93 that crosses the Reservation. Under this agreement, Tribal Wildlife Management Program staff will assess impacts upon wildlife and wildlife habitat, specifically wetlands and riparian zones and participate with the Department of Highways to develop mitigation measures. As a component of this project, Tribal biologists are conducting a study to document wildlife use of the Evaro area and the significance of the area as a habitat linkage between the Mission-Rattlesnake Range and the Bitterroot Range. The study results will be utilized to develop mitigation measures to insure the integrity of travel corridors in the area.

INTERAGENCY ACTIVITIES

Staff members of the Wildlife Management Program participate in several interagency management and technical advisory groups that deal with issues such as endangered, threatened and sensitive species management, local and regional hydroelectric mitigation, habitat management and Treaty rights.

DEVELOPMENT OF FINANCIAL SUPPORT

Due to the fact that Tribal wildlife management programs are not currently eligible for funding under many of the federal programs established for state management programs, Tribes are collectively attempting to secure such funding though legislative action. The Confederated Salish and Kootenai Tribes are actively involved in this effort, providing information and support to the Native American Fish and Wildlife Society to further Tribal efforts at funding procurement.

In order to fund special projects in wildlife management, Wildlife Management Program staff have prepared several funding proposals for submission to several federal agencies and grant-funding institutions. To date, these efforts have been successful in obtaining funding for wetland inventories and highway impact assessment.

PUBLIC RELATIONS/INFORMATION

To facilitate communication of Tribal wildlife regulations and policies, the Wildlife Management Program utilizes the media to the extent possible to communicate with the public. The Program is also involved in the production of informative brochures on wildlife topics. To date, information brochures on wildlife watching, recreational opportunities, and mountain lions have been produced and distributed. A brochure on bears is being planned for production in the near future.

COOPERATION WITH ACADEMIC INSTITUTIONS

The Wildlife Management Program has initiated strong working relationships with Salish-Kootenai College, the University of Montana and the University of Idaho in an effort to develop research projects on specific wildlife topics on the Reservation. These efforts have complicated Tribal initiatives to develop wildlife data bases.

Through a program sponsored by Salish-Kootenai College, funding is available to local elementary and secondary school science programs for field-oriented science projects. The Wildlife Management Program staff coordinates these projects through the college and directs them in ways that facilitate baseline data collection by program personnel.

CONCLUSION

In conclusion, the Confederated Salish and Kootenai Tribes place wildlife and wildlife habitat management at a high priority level. The existence of the Wildlife Management Program and the direction and support that it receives from the Tribal Council is a strong indication of that priority. The Tribes will continue to carefully manage the wildlife and wildlife habitat resources of the Flathead Reservation for the benefit of the present generation, as well as generations to come.

LEOPOLD'S LAND ETHIC AND LAND AESTHETIC

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ABSTRACT

Aldo Leopold, widely regarded as the father of wildlife management, called for a very basic extension of our ethical framework in his classic book, A Sand County Almanac. While previous ethics dealt with human-human and human-community relationships, the land ethic extended the definition of community to include the land community. The maintenance of biological diversity is an integral part of the land ethic. This Leopoldian call has been discussed by wildlife professionals, but has much less frequently been acted upon.

The A-B cleavage discussed by Leopold almost 50 years ago still exists. The field of wildlife management arose when most population problems were due to over-exploitation; currently, at least in North America, the major problem is habitat change, and the number of species potentially affected are much greater. While wildlifers have focused on the effects of habitat change, we probably have not focussed sufficiently on the "integrity, stability, and beauty" issue discussed by Leopold. The land ethic and land aesthetic of Leopold are starting points for addressing biodiversity and other issues.

BIOLOGICAL DIVERSITY: ISSUE AND OPPORTUNITY

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ABSTRACT

Interest in the conservation of biological diversity among conservation groups, resource management agencies, some professional societies and legislators is among foremost current challenges in resource management (Wilson, E. O., ed. 1988. Biodiversity. National Academy Press, Washington, D.C.). This interest is particularly focused on public lands (Keystone. 1991. Final consensus of the Keystone Dialogue on Biological Diversity on Federal Lands. The Keystone Center, Keystone, CO.). One among several major contributing factors in the loss of biological diversity is habitat fragmentation (Wilcove et al. 1991. Habitat Fragmentation in the Temperate Zone. pp 237-256 in M. E. Soule, ed. The Science of Scarcity and Diversity. Sinauer Press, Sunderland, MA.). Major, current approaches to the conservation of biological diversity include three, GAP analysis (Scott et al. 1991. Gap Analysis of Species Richness and Vegetation Cover: An Integrated Biodiversity Conservation Strategy. Pages 282-297 in K. A. Kohn, ed. 1991. Balancing on the Brink of Extinction. Island Press, Covelo, CA.), Coarse filter (Hunter, M. L., Jr. 1991. Coping with Ignorance: The Coarse Filter Strategy for Maintaining Biodiversity. pp 266-281 in K. A. Kohn, ed. Balancing on the Brink of Extinction. Island Press, Covelo CA.) and sustaining ecological systems (Lubchenco et al. 1991. The Sustainable Biosphere Initiative: An Ecological Research Agenda. Ecology 72:371-412; Samson, F. B. 1992. Sustaining Ecological Systems and Conservation of Biodiversity. Transaction North American Wildlife and Natural Resource Conference. 57 (in press). This presentation reviews issues relative to the conservation of biological diversity, specifically those related to fragment, and considers opportunities in terms of approaches to conservation of biodiversity, specifically where habitat fragmentation is linked to natural processes such as fire or the activities of man.

BIODIVERSITY AND SONGBIRDS: THE NEW NEOTROPICAL MIGRATORY BIRD CONSERVATION PROGRAM

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ABSTRACT

Populations of migratory songbirds are declining in many regions of North America. The nation-wide "Neotropical Migratory Bird Conservation Program" was formed in 1990 to tackle the problem through partnerships among federal and state wildlife and land management agencies, and conservation organizations. The program will help address biodiversity issues through research, monitoring, and management of songbird communities.

THE UNIQUENESS OF EARLY POST-FIRE BIRD COMMUNITIES IN ROCKY MOUNTAIN CONIFEROUS FORESTS

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ABSTRACT

I conducted point-count breeding bird surveys in 1989 and 1990 within 38 different sites that had burned in 1988. These sites were distributed from Glacier National Park in the north, to Grand Teton National Park in the south, and they varied in size from about 100 ha to about 100,000 ha. All sites harbored more than a dozen species, and many of those species appear to be nearly restricted to early post-fire conditions (e.g., Black-backed Woodpecker) or they occur more frequently in early post-fire habitats than in any other forested habitat type (e.g., Olive-sided Flycatcher). Thus, the maintenance of viable populations of these bird species demands that canopy fires (and standing dead trees) be maintained in Rocky Mountain forests.

SOME CONSEQUENCES OF THE COLLAPSE OF THE PRAIRIE DOG ECOSYSTEM

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ABSTRACT

Black-tailed prairie dogs (Cynomys ludovicianus) once occupied about 20% of the short and mixed-grass prairies. Prairie dogs, in conjunction with bison (Bison bison), created patches of distinctive habitat within the prairie biome. A variety of species utilized prairie dogs and their habitat to varying degrees. Today, prairie dogs occupy less than 0.5% of this original area. The collapse of the prairie dog ecosystem has resulted from government sponsored eradication programs, the conversion of shortgrass prairie to agricultural purposes, and epizootics of sylvatic plague. As a direct result, the black-footed ferret (Mustela nigripes), an obligatory predator of prairie dogs, is endangered with extinction despite over 25 years of conservation effort by the Federal government. Other predators such as the swift fox (Vulpes velox) and ferruginous hawk (Buteo regalis) have suffered drastic population declines and local extinctions. Likewise, two habitat dependent species, the mountain plover (Charadrius montanus) and burrowing owl (Athene cuncularia), are greatly reduced in numbers. Less obvious changes of ecological importance probably have occurred. Prairie dogs played an important role in establishing habitat patches with distinctive vegetative composition, rapid nutrient cycling, and altered soil formation. Preferential ungulate response to patch structure and dynamics created by prairie dogs suggest that destruction of the prairie dog ecosystem has been cost ineffective livestock management to the detriment of several native species.

INTRODUCTION

The prairie biome has probably been disturbed more by man than any other biome. All that remains of native prairie are isolated tracts embedded in a sea of grain crops. Frequently, these remaining areas of prairie have been radically altered for livestock production. One prairie ecosystem singled out, and systematically destroyed, was that of the black-tailed prairie dog. The black-tailed prairie was originally a wide spread and dominant life form on the short and mixed-grass prairies. Its elimination from large areas of the Great Plains has had significant repercussions on wildlife abundance and diversity in the short and mixed grass prairies. This paper examines some of the consequences of the collapse of the prairie dog ecosystem.

SPECIES ACCOUNT

The black-tailed prairie dog is a ground dwelling squirrel weighing about 2 pounds. They are densely colonial; forming colonies ranging in size from a few acres to thousands of acres. Their foraging activity and burrowing habits alter plant species composition and abundance. Generally, prairie dogs selectively reduce grasses and this combined with soil disturbance results in increased forb and subshrub abundance (Knowles et al. 1982, Archer et al. 1986). Vegetative height profile is lower within a prairie dog colony when compared with surrounding areas. Bare ground is also increased within a colony. Even within a colony vegetation is not uniform and will vary in relation to time since colonization, and prairie dog density (Whicker and Detling 1988).

The black-tailed prairie dog breeds in early spring, and bears one litter per year of usually 4-5 young (Knowles 1987). Females are capable of breeding as yearlings but frequently do not breed until two years old. Life expectancy for males is under three years and for females it is around 4 years (King 1955). Prairie dog densities during summer range from 5-10 animals per acre (King 1955, Koford 1958, Tileston and Lechleitner 1966).

Prairie dogs generally occupy sites with slopes of less than 10% (Knowles 1986a). Their preference for nearly level land frequently results in prairie dog colonies being found either in bottomlands of broad, low gradient drainages (Flath and Clark 1986) or broad, open upland areas (Knowles 1986a). In addition to these topographic preferences, prairie dogs usually colonize areas with low growing vegetation. It is believed that low vegetative height profile facilitates their predator avoidance behavior (Koford 1958).

Prairie dog colonies tend to be clumped in distribution and form a complex of colonies of various sizes (Forest et al. 1985, Flath and Clark 1986). Typically, one or a few large colonies (>1,000 acres) are in close association with several smaller colonies (<1,000 acres). This distribution is probably a result of prairie dog dispersal, physiography, vegetation and ungulate use patterns. Thus, prairie dog colonies create patches of distinct habitat which share similar distributional characteristics as the colonies themselves. This distributional pattern is of importance to maintaining local populations of associated species.

NUMBERS AND DISTRIBUTION

Prairie dogs were once widespread on the shortgrass and mixed grass prairies. They originally occurred east of the Rocky Mountains to about 87 degrees longitude and from Texas to southern Canada. It is estimated that they inhabited about 20% of this original habitat or about 100,000,000 acres (Nelson 1919, Whicker and Delting 1988). There is anecdotal evidence that prairie dog numbers decreased following the extermination of the bison (Bison bison) (Mead 1898) and increased substantially with the advent of homesteading (Merriam 1901). Prairie dogs have been extensively poisoned during most of the Twentieth Century and by the mid-1960's prairie dogs had been reduced to under 1,500,000 acres. Today they occupy about 2,000,000 acres of their original range; this represents a 98% reduction in prairie dog acreage.

It is not known how much of Montana was originally occupied by prairie dogs. Approximately 54,000,000 acres of Montana lies within the range of the prairie dog (58% of the State) (Flath and Clark 1986). Flath and Clark (1986), using Great Northern Railroad survey records from 1908-1914, were able to reconstruct prairie dog distribution and density along a belt 120 miles wide and about 300 miles long following the Yellowstone River from Wibaux to Livingston. Based on their analysis, approximately 2.8% of the survey area was occupied by prairie dogs. The longest colony documented by Flath and Clark was 10 miles long. This compares to Lewis and Clark records of prairie dog colonies along the Missouri River ranging in maximum length of 3-7 miles while in the glaciated prairies of northern Montana, some prairie dog colonies were reported to be 30-50 miles long (Messiter 1890). As a result of eradication efforts, only about 8% of the original prairie dog acreage remains in the survey area of Flath and Clark.

Flath and Clark (1986) used this survey information to extrapolate prairie dog acreage for all of Montana and estimated that about 1,471,011 acres of prairie dogs occurred in Montana. This estimate may be conservative since much of the survey area covered by Flath and Clark was in an area where prairie dogs primarily were restricted to drainage bottomlands. There is anecdoted evidence that prairie dogs might have been more abundant in the glaciated prairies of northern Montana. Presently, it is believed that 120,000-130,000 acres of prairie dogs occur in Montana (D. Flath pers. comm.).

HISTORY OF PRAIRIE DOG CONTROL

Fragmentation of the prairie dog ecosystem began early this century. Initially, the major cause of this fragmentation was poisoning. The coloniality of prairie dogs, the conspicuous nature of their colonies, and the open habitat in which the colonies were found made the goal of eradication feasible. Shortly after Montana was opened to homesteading, the U.S. Biological Survey began an organized program of prairie dog extermination in 1915 (Clark and Flath 1986). Specific details of this program from its inception to its termination in 1972 are unknown due to a lack of Federal documentation. It is known that strychnine was the principal poison used during the first half of the program and Compound 1080 was used almost exclusively in the latter half. Recent field tests show that strychnine as a control agent is about 80-90% effective at reducing prairie dog populations, whereas Compound 1080 approaches 100% effectiveness (Swick 1976). Both poisons pose secondary toxicity hazards.

In Montana, the initial poisoning of prairie dogs occurred during the 1920's and 1930's, and was under the direction of U.S. Biological Survey. During the 1930's, funds and labor of the WPA, CCC, and ECW became available to assist in the program. As an example of what this eradication program consisted of, records for Phillips County show that 172,525 acres of prairie dog colonies were treated with 75,941 lbs of strychnine grain bait (BLM 1982). The poisoning was discontinued in 1939 when it was determined that most of the prairie dogs were eliminated. The acreage figures for Phillips County did not specify what was initial treatment and what was follow up treatment. In addition to poisoning prairie dogs in Phillips County, 3,806,520 acres of Richardson ground squirrels (Spermophilus richardsoni) were also poisoned during this period. Presently there are over 26,000 acres of prairie dogs in Phillips County.

Based on our present knowledge of strychnine, we can assume that prairie dog control during the 1920's and 1930's achieved a range-wide 90% + reduction in prairie dog numbers but probably did not eliminate prairie dogs from any widespread area. We now know that prairie dogs are capable of rapid population recovery (about 5 years) following a 90% reduction in numbers (Knowles 1986b). It is generally believed that during, and shortly after, World War II when the nation was preoccupied with war and economic recovery, prairie dog numbers increased substantially from the 1930's low (Koford 1958). The real bottleneck in prairie dog numbers came during the 1950's and 1960's when Compound 1080 provided land managers the means to eliminate prairie dogs from widespread areas (Koford 1958).

As an example, the Charles M. Russell National Wildlife (CMR) which had a policy of minimal (not zero) tolerance for prairie dogs, had 2,350 acres of prairie dogs in 1946 (Haglan, pers, comm.). In 1964 when the CMR discontinued their control program over concern for the black-footed ferret, they had only 700 acres of prairie dogs. Although there is no information as to the original acreage of prairie dogs on the CMR, present day acreage following 25 years of no control may be an indication of former abundance of prairie dogs. By 1974 there were 4,464 acres of prairie dogs, and by 1979 this had increased to 5,241 acres. Prairie dog colonies on some portions of the Refuge continued to grow during the 1980's, and in 1984 there were 6,934 acres occupied by prairie dogs. When last surveyed in 1989 there were 9,473 acres. Based on this information it can be assumed that by the early 1960's 93% of the Refuge's prairie dogs had been eliminated. Murie (1935), in his survey of what was to become the CMR, indicated that most of the prairie dog colonies north of the Missouri River in this area had already been poisoned while some remained on the south side. It is quite probable that there was a 30 year period of highly suppressed prairie dog populations on the Refuge.

Generally, prairie dog control in other areas of Montana followed a similar sequence as Phillips County. However, intense prairie dog control began during the 1920's in some southerly sites. One notable deviation from this pattern is the Fort Belknap Indian Reservation where it appears that prairie dogs were systematically poisoned only during the 1930's but not with Compound 1080 during the 1950's and 1960's.

Both strychnine and Compound 1080 pose secondary poisoning hazards to predators scavenging prairie dogs killed with these poisons. Executive order 11643 in 1972 prohibited the use of Compound 1080 of Federal lands. Today, zinc phosphide is the only EPA registered toxicant for prairie dog control. This latter poison lacks secondary poisoning hazards and is about 90% efficacious in controlling prairie dogs.

Conversion of short and mixed-grass prairies to agricultural crops has also reduced habitat available for prairie dogs. Prairie dogs appear to be unable to withstand repeated summer fallow and slowly die out in areas under dry land cultivation. Even if prairie dogs could survive under these agricultural conditions, they would be rapidly eliminated by farmers to prevent crop damage.

The introduction of sylvatic (rodent) plague (Yersinaia pestis) into North American in 1899 has resulted in another controlling factor on prairie dogs (Cully 1989). Prairie dogs have minimal immunity to plague, and when introduced into a colony, is nearly 100% fatal (Cully 1989). Plague is believed to be brought into prairie colonies by carnivores carrying infected fleas. It is thought that other rodents species may be enzootic and serve as a reservoir for the disease. Plague typically destroyed all colonies within a complex within a few years of its introduction. Plague infected fleas remain alive in prairie dogs burrows for up to one year following the death of prairie dogs (Lechleitner et al. 1968). Thus, prairie dog recolonization following the epizootic is slow. Plague is now believed to be a controlling factor on three of Montana's larger prairie dog complexes and will likely spread to other complexes.

ASSOCIATED SPECIES

Originally, prairie dogs were a dominant and widespread species in the prairie biome. Their colonies formed a mosaic of patches of altered prairie habitat; the prairie dogs themselves served as a food source to a variety of predators and their burrows were used as shelter by many species of animals. Prairie dogs most likely have played a significant role in the ecology of the plants and animals of this region.

A variety of plant and animal species are associates with prairie dogs to varying degrees. The very first written account of priaire dogs (Lewis and Clark Expedition) comments about two frogs (Great Plains toad, Bufo cognatus) being found in an excavated burrow and one prairie rattle snake (Crotalus viridis) nearby (Burrows 1961). One South Dakota study reported that 134 vertebrate species in that state have been reported on priaire dog colonies. This represents 40% of the States terrestrial fauna found west of the Missouri River. Another study summarizing associated species found in prairie dog colonies listed 163 vertebrate species (Reading et al. 1989).

In general, associated species can be categorized as prey dependent or habitat dependent, and obligatory or facultative. Although the vast majority of associated species are not dependent upon prairie dogs for their survival (facultative), many species of birds and small mammals have been documented to occur with higher densities on colonies than on adjacent areas. For prey dependent species, prairie dog colonies represent patches of dense prey availability. Colonies are easily located and hunting prairie dog requires little energy expenditure for locating and pursuing prey. In addition, prairie dog numbers generally are fairly stable from one year to the next and do not exhibit cycles as seen in lagamorghs or microtine rodents. For habitat dependent species, colonies represent patches of low growing vegetation that are high in nitrogen and low in stem content. Colonies also have increased areas of bare ground and numerous burrows for shelter. The majority of associated species are responding to the altered habitat.

The black-footed ferret is probably the only truly obligatory predator of prairie dogs. It has been conclusively demonstrated that the ferret is totally dependent upon prairie dogs for survival. In addition to feeding of prairie dogs, the ferret is dependent upon prairie dog burrows for shelter. Although only 44 ferret specimens have been reported from Montana, it is assumed that the ferret was abundant in pre-settlement times (Anderson et al. 1986). There is ample evidence that at least some ferrets in Montana survived the early prairie dog eradication effort with strychnine. Loss of ferrets during this period was probably a result of secondary poisoning and to a lesser extent, a declining prey base. Murie (1935) in his survey of the future CMR warned of the impending loss of the ferret should prairie dogs be eradicated from the area and recommended that prairie dogs be managed on the Refuge for the preservation of the species. Regrettably, his recommendations were not heeded until it was too late.

The advent of Compound 1080 into the prairie dog eradication arena so completely changed prairie dog control that the question of secondary toxicity was irrelevant when compared to the complete loss of prairie dogs from large areas. Since 1953 there has been only one documented sighting of ferrets in Montana and unfortunately these ferrets did not survive. As it now stands, the major and most specialized predator of prairie dogs no longer plays a role in the prairie dog ecosystem despite over 25 years of conservation effort on the part of the Federal Government (Carr 1986).

Two generalized predators which feed on prairie dogs and have declined substantially during this century are the ferruginous hawk and swift fox. The ferruginous hawk apparently was once abundant in eastern Montana and is still abundant in areas with prairie dogs. Although it is capable of capturing other prey, prairie dogs and ground squirrels are preferred prey items. However, the decline of the ferruginous hawk in Montana is associated with the decline of prairie dogs.

The swift fox was once abundant in Montana east of the Rocky Mountains. Sometime during the past 50 years this species probably disappeared from the State (FaunaWest 1991a). Although wolf and coyote extermination programs may be the major cause of its demise, the elimination of prairie dogs may also have been a factor. So little is known of swift fox ecology in Montana it is impossible to draw any conclusions concerning this. However, recent research in South Dakota suggests that a substantial reduction of prairie dogs on the Buffalo Gap National Grasslands during the 1980's was followed by a precipitous decline in what had been a growing swift fox population (Sharps 1989). Swift foxes in this area were known to prey upon prairie dogs and den in and near their colonies (Hillman and Sharps 1978, Uresk and Sharps 1986).

The burrowing owl (Athene cunicularia) in Montana is a species closely associated with prairie dogs. Its presence in prairie dog colonies is associated primarily with the availability of nest burrows and secondarily with increased insect, small mammal, and bird abundance. Although the burrowing owl has an extremely wide distributional range in the Americas and is not endangered with extinction, that portion of the species associated with prairie dogs has declined remarkably since settlement of the prairies.

The burrowing owl does not normally feed on prairie dogs and is not at great risk from secondary poisoning following prairie dog poisoning programs. Furthermore, burrowing owls are capable of using abandoned prairie dogs burrows for a couple of years following prairie dog poisoning. With some poisoning operations (strychnine and zinc phosphide), prairie dog recolonization is sufficiently rapid to assure a supply of nest burrows. However, the long-term loss of prairie dog habitat has correspondingly reduced burrowing owl numbers.

For the above reasons, the burrowing owl has survived in Montana despite the collapse of the prairie dog ecosystem. A recent Montana mountain plover (Charadrius montanus) survey (FaunaWest 1991b) noted burrowing owls to be adaptive and capable of finding and colonizing small isolated (5 acres) prairie dog colonies. Twenty-four of the 60 prairie dog colonies visited during the survey contained one or more burrowing owls.

The mountain plover is another Montana species closely associated with prairie dogs; it verges on being an obligatory habitat dependent species in this area. At least three authors commented about mountain plovers using prairie dog colonies during the late 1800's and early 1900's (Cooper 1869a,b, Coues 1878, Cameron 1907). Originally, in many areas of Montana this bird was considered common and range-wide probably numbered in the millions. Today its numbers in Montana probably do not exceed 2,000 breeding birds.
Most of these birds are associated with prairie dog colonies in Phillips and Blaine Counties. The following paper will detail the biology and conservation problems associated with this species.

Ungulates, including bison, elk (Cervus canadensis), pronghorn (Antilocapra americana) and cattle, have been documented to preferentially use prairie dog colonies (Coppock et al. 1983, Wydeven and Dahlgren 1985, Knowles 1986a, Krueger 1986). Moreover, one study found cattle forced to graze on prairie dog colony showed similar weight gains as those grazing off of a colony during the growing season (O'Meilia et al. 1982). Research over the past 15 years has begun to offer an explanation for this association. Prairie dogs do not change the aboveground net primary production of a site even though their foraging activity changes species composition and plant stature (Whicker and Detling 1988). However, nitrogen concentration in plant leaves on prairie dog colonies have been found to be significantly higher than adjacent areas not grazed by prairie dogs (Coppock et al. 1983, Whicker and Detling 1988). More rapid nutrient cycling is believed to be the basis for this phenomena. Even though there may be quantitively less forage available for ungulates on prairie dog colonies, it is offset by qualitatively better forage. Current research suggests that control of prairie dogs to increase forage for livestock is not economically feasible except at low maintenance levels (<5%) based on 50 pounds per acre increase in livestock forage (O'Meilia 1982, Collins et al. 1984, Uresk 1985).

The long-term absence of prairie dogs from short grass prairies may have biotic and abiotic ramifications which are not yet fully understood. It is generally believed that the influence of prairie dogs on the soil and vegetation has been to increase plant species diversity. There has been much speculation on what the long term (thousand of years) influence of prairie dogs has been on soil formation but here are few quantitative studies on the subject. One study found increased soil pH and phosphorous around prairie dog mounds (Carlson and White 1988), and others have suggested that nitrogen concentration is higher in prairie dog colonies (Sharps and Uresk 1991). Another study in Wyoming concluded that prairie dogs greatly accelerated the rate of soil mixing, and permanently affected soil chemistry (Munn 1989). Munn (1989) concluded that 20,000 years are needed for complete ground coverage of subsoils and 100,000 years for complete soil mixing to 1.5 m. This time period is relatively short in terms of normal soil genesis which may take up to a million years.

CONCLUSION

The systematic extermination of prairie dogs for over a 50-year period earlier this century was considered by many as a wildlife management success story. The extreme coloniality of black-tailed prairie dogs focused the attention of land managers on the environmental affects of prairie dogs. It also presented opportunities for eradication not found in any other North American rodent species. Total extermination effort was conducted by, or directed by, our Nation's primary wildlife conservation agency.

This massive disruption of the prairie dog ecosystem preceded any attempt to understand its intricacies and functions. Although research during the past 20 years has offered some insight as to the impacts of the earlier eradication programs, the prairie biome has been so radically altered that it is highly unlikely that we will fully understand all the consequences of this disruption. It is apparent that no other rodent has or will fill the niche vacated by the prairie dog. The eventual spread of sylvatic plague throughout the prairie dog range will mean that remaining prairie dog populations will behave erratically and pose a continual threat to the survival of several associated species.

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STATUS AND BREEDING DISTRIBUTION OF THE MOUNTAIN PLOVER IN MONTANA

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ABSTRACT

Surveys of areas within Montana with a record of historic and recent mountain plover sightings were made during July and August 1991. Phillips County was not surveyed because mountain plover distribution had been previously documented. The survey consisted of slowly driving roads and trails, and stopping to examine intensively grazed sites. A total of 789 miles of roads was surveyed resulting in a total of 10 observations of 24 mountain plovers. Most of these plovers were observed in heavily grazed, shortgrass habitat on the south side of the Little Belt and Big Snowy Mountains. One mountain plover was observed on a prairie dog colony 8 miles northwest of Harlem. Mountain plovers were primarily found on broad, flat, and nearly level sites. Native vegetation at these sites was composed of varying amounts of Stipa comata, Bouteloua gracilis, Agropyron smithii, Koeleria cristata, Carex spp., Artemisia frigida, Opuntia polycantha, and Gutierrezia sarothrae. Most areas formerly inhabited by mountain plovers were found to have been extensively converted to agriculture. This survey, and a review of recent records, show that Montana has at least three geographic areas inhabited by mountain plovers. The largest population is located in Phillips/Blaine County and is associated with prairie dog colonies (estimated number 1,251-1,951). Smaller populations exist along the south side of the Little Belt and Big Snowy Mountains (estimated number 38-142) and in the vicinity of Little Beaver Creek southwest of Glasgow in Valley County (estimated number 198-721). Although mountain plovers have been reported in other areas over the past two decades, it is believed that the majority of Montana's mountain plovers occur in these three areas and the State has an estimated minimum population of 1,487-2,820 birds.

A PRELIMINARY ASSESSMENT ON THE IMPORTANCE OF LANDSCAPE PATTERNS OF BIRD DIVERSITY IN WESTERN MONTANA

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ABSTRACT

Bird densities in old-growth and second-growth stands of ponderosa pine/Douglas-fir were compared to the landscape setting of these stands in western Montana. While second-growth stands were much larger than old-growth stands, all stands were mostly surrounded by forested areas. Most of the second-growth forests were near stands of similar age, with little old-growth nearby. Both types of stands interdigitate with many landscape elements: young, mature, and old-growth forests, recently logged areas, grasslands, agricultural fields, riparian areas, and houses. Recent clearcuts and heavily logged partial cuts account for a small proportion of these landscape settings. Some birds were associated with old growth at both the stand and landscape level. In contrast, birds that were in higher numbers in the second-growth stands had landscape associations with these landscape patterns are spatially and temporally complex. Forest management implications include the consideration of landscape populations of birds. The maintenance of natural landscape patterns and processes will probably help maintain any species that evolved in association with such a setting.

EVIDENCE OF FRAGMENTATION EFFECTS ON HABITAT SELECTION BY ROCKY MOUNTAIN ELK DURING THE HUNTING SEASON

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ABSTRACT

Environmental security for elk has become a major concern in recent years. Habitat models considered adequate to provide quality elk habitat in a forest managed for timber production do not necessarily provide adequate security during the hunting season. We compared habitat selections by legally huntable elk immediately before the hunting season with selections by the same elk during the first two weeks of hunting. Radio locations were examined in a GIS system to provide comparisons of vegetation structure within stands, stands within communities, and communities across the landscape. At each level of examination we used a discriminant function analysis to evaluate differences between pre- and post-opening day locations. At every level of analysis we detected elk response to some function of road density or distance to roads. In addition, we discovered that elk consistently select a conformation of habitats that provides access to the larger, continuous forest communities in the environment. The size of the smallest accessible community doubled when the hunting season began.

INTRODUCTION

During the past 10 years, elk habitat management in the Northern Rockies, particularly on National Forests, has been structured around a model that recognized cover, forage, and road management as the determining parameters of habitat quality.

Two shortcomings in the various "habitat effectiveness models" include the lack of recognition of the distinct reduction in environmental security associated with the big game hunting season (even though some Forest Plans used the models to represent hunting season requirements), and the inability to account for the arrangement and juxtaposition of habitat components on a given "elk landscape".

Timber harvest in the Northern Rockies had its boon in the 1960's and 70's both in terms of the volume cut and the characteristics large and blocky clearcuts. When Congress passed the National Forest Management Act (NFMA) in 1976, timber harvest openings in the Northern Rockies were limited to 40 acres. Biologists supported smaller units since elk, a species of the "edge" were more likely to utilize forage provided in openings where cover was nearby as compared to large clearings.

As progressively more roads were built and more cover was removed by logging, the background matrix of habitat in some areas tended toward a fragmented network of cover and openings, replacing a background matrix of continuous forested cover. At the same time, state managers noticed a progressive decline in the number and age of bulls surviving the hunting season. Thus, the concept of elk vulnerability was recognized as a priority concern in elk management, and has prompted biologists to begin identifying the habitat and social factors that contribute to vulnerability.

A discussion of the effects of fragmented habitats on elk habitat selection must be prefaced by acknowledging that elk have evolved and thrived through periods of natural habitat fragmentation prior to European man's arrival on the scene. Our understanding of fire ecology in the Northern Rockies paints a picture of dynamic ebb and flow of forested cover due to natural and Native American set fire events. It is the social values placed on both elk, to provide hunting recreation, and timber harvest, to provide wood products, that make fragmentation and elk habitat security a relevant topic.

The study reported here is the result of a cooperative attempt to identify the habitat components that contribute to hunting season elk habitat security. Study contributions were made by the Intermountain Research Station, the Montana Department of Fish, Wildlife and Parks and the Lolo National Forest.

STUDY OBJECTIVE

The study objective was to develop a description of habitat characteristics in areas that satisfy the requirements of elk for security during the hunting season. We looked for discriminating characteristics at the structural level within stands, at the community level across stands, and at the landscape level across communities. We focus on the community scale for this presentation.

STUDY AREA

The study area is roughly outlined by a triangle with Lookout Pass, St. Regis, and Thompson Falls, Montana at the corners. It encompasses about 1249 km^2 (482 mi^2) along the divide between the St. Regis and Clark Fork Rivers. This is typical western Montana mountain terrain with stands of Douglas-fir (Psuedotsuga menziesii) and western larch (Larix occidentalis) at lower elevations and lodgepole pine (Pinus contorta), subalpine fir (Abies lasiocarpa) and Engelmann spruce (Picea engelmannii) at higher elevations. Most of the area is administered by the Lolo National Forest, and although various sections have been heavily roaded and logged, there is still a background matrix of continuous cover in other sections. The area includes most of Montana hunting districts 123 and 200. During the period 1985-88, 1,500 to 2,000 licensed hunters took an annual harvest of about 350 elk from two hunting districts. Bulls comprise about 15-20% of the post-hunting elk populations in this area. Relative to other hunting districts in Montana, this area provides for good bull survival and recruitment (Montana Dept. Fish, Wildlife and Parks, Annual Reports).

METHODS

We examined the areas occupied by individual elk immediately before hunting started and compared with habitats occupied during the hunting season and within the same general weather pattern.

Locations of Elk: Between 12 and 20 radio-equipped elk were selected for study in each year between 1985 and 1988. Mature bulls were used when possible, but mature cows were also considered suitable because the female herd segment was legally hunted by permit. About one-fourth of observed animals were bulls. During the two weeks preceding and the two weeks following the opening of the general big game season as many radio locations were obtained as permitted by weather and flight scheduling. Although some observations were sight-confirmed, the majority were not because of dense vegetation. Locations were recorded to the nearest 100 m as judged from radio signal strength. All animals surviving at the end of the study period were included in analysis.

A representative sample of the stands surrounding elk relocations were field-sampled and described according to such variables as tree density, basal area, slash, etc.

Description of Vegetation Communities: The continuity of overstory canopy and the presence or absence of roads were used to classify stands as forest communities within a landscape.

Roads were digitized and classified by quality of the road (4-lane, primary, secondary, primitive, abandoned) and traffic level (closed yearlong, closed hunting season, open yearlong). Analysis used both road densities and distances from elk observations to the nearest road.

Elk habitat descriptions: Data summarization for analysis was facilitated by GIS and the program MAYA (Glassy and Lyon 1989). For each proposed analysis, a foreground map of elk locations was overlaid on a background map of vegetation. Output was a frequency distribution table for each location, giving the proportion of the sample occupied by various communities (canopy classes), and distances to or road densities within a circular sample frame of 100 acres.

Information regarding landscape fragmentation was provided by the number of communities in the sample and the smallest community "patch" intersected by the sample (minimum accessible).

Analysis of Habitat Selections: Our hypothesis was that changes in habitats selected as a result of hunting pressure would reveal increases in those parameters that contribute to security and decreases in parameters that impair security. At the community level, we used a stepwise discriminant function analysis with habitat characteristics as independent predicators classifying observations made before and after the opening of the hunting season.

RESULTS

In all the analyses, road consistently influenced elk selection of habitats more than any of the vegetation variables. Hunting season habitats were characterized by a decline of at least 30 percent in the density of open roads.

At the stand level, none of the stand structural characteristics (e.g. basal area, tree density, slash) provided consistent discrimination between pre-hunting and hunting season observations.

Discrimination between selection of communities provided information that elk under hunting season stress selected larger more connected communities in the landscape. The number of communities in the sampling unit decreased and concurrently, the average size of the smallest community "patch" intersected by the sample (minimum accessible) increased from 933 acres to 1,554 acres.

However, average may not be meaningful because the community sizes in the study area are extremely skewed. There are a lot of very small "patches" and a few very large "patches" and no real mean exists on the landscape.

Therefore, elk selection of community size and connectivity were examined by displaying the percentile distribution of the "minimum accessible" communities in random 100 acres sample units and comparing that with the distribution of selections by elk. Before the hunting season, the percentile distribution of habitat selections by the majority of elk was nearly identical to random availability. After the commencement of hunting, large, connected communities became extremely important. In general, the minimum accessible community selected was about twice as large as the acceptable community before hunting. In addition, while openings were present in prehunt habitats, they virtually disappeared in hunting season habitats.

The median elk (elk at the 50th percentile) selected for communities of at least 100 acres; elk at the 60th percentile selected for communities of at least 230 acres and 30 percent of the elk selected communities exceeding 580 acres once hunting commenced.

DISCUSSION AND CONCLUSIONS

Interpretation of the results is complicated by the many extraneous factors contributing to variance in elk behavior. A key variable not examined in this study was the influence of hunting pressure. We suspect that there may exist hunter density thresholds keyed to habitat variables, and that at very high hunter densities, no amount of cover or limit to access will provide elk much security (indeed, research in Idaho confirms this).

In spite of the complicating factors, the results do demonstrate that under the stress of hunting season, the distribution and density of roads, and the size and continuity of forested communities influence elk habitat selection.

Fragmentation in this area is most notably a function of roads, timber harvest, and human settlement. However, at present hunter densities, a large enough background matrix of cover and administrative road closures provide adequate elk security during the hunting season to effectively limit elk vulnerability to "acceptable" levels.

MANAGEMENT IMPLICATIONS

In areas where elk management objectives include maximizing hunting season length, minimizing restrictions, and maintaining a reasonable branch-antlered bull component, retention and creation of large, connected blocks of homogenous canopy structure should accompany a progressive road closure program.

More specifically, guidelines that address habitat fragmentation by roads and timber harvest should be incorporated into Forest Plans as they are revised and updated (the Hillis paradigm [Hillis et al. 1991] is a start at this). In addition, biologists need to provide recommendations to land managers about timber harvest strategies and their effects on long term elk security concerns.

[1] Presented paper.

EFFORTS TO MAINTAIN A REMNANT POPULATION OF COLUMBIAN SHARP-TAILED GROUSE AND THEIR NATIVE GRASSLAND HABITAT

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ABSTRACT

Columbian sharp-tailed grouse (Tympanuchus phasianellus columbianus) are 1 of 6 sharp-tailed grouse subspecies found in North America and are the only subspecies native to the Pacific Northwest. Historic range included both the fescue-wheatgrass and sagebrush-grass semidesert scrub associations. Columbian sharp-tailed grouse populations and occupied range have declined throughout much of the Intermountain West; these grouse populations currently inhabit <10% of their former range. Destruction of native grasslands by agricultural expansion and overgrazing of livestock, loss of deciduous trees and shrubs, and rural development were identified as the primary factors in the decline.

Both the abundance and distribution of this subspecies in Montana has drastically declined. Loss of suitable habitat from changes in land use and degradation of native prairie has played a major role in the decline of Montana's population. Currently, active dancing grounds and documented nesting success are found only on the Tobacco Plains of northwestern Montana. In 1987, only 3 male grouse were observed on the last remaining dancing ground on the Tobacco Plains.

This paper discusses the results of nearly 5 years of cooperative efforts to maintain and enhance the grouse population on the Tobacco Plains. Augmentation efforts initiated by The Nature Conservancy and the Montana Natural Heritage Program were continued and expanded by the Montana Department of Fish, Wildlife and Parks through its Northwest Montana Wildlife Mitigation program. Although translocation efforts with most upland game birds are usually not successful, our initial results indicate that grouse transplanted from British Columbia remained in the area and successfully reproduced. Preliminary results of a two-year graduate student project identified critical needs for nesting and brood rearing habitat. Recent unsuccessful translocations from Idaho identified the need to examine survival of grouse transplanted from dissimilar habitats. Efforts to protect and enhance Columbian sharp-tailed grouse habitat are ongoing.

HABITAT FRAGMENTATION AFTER THE FACT: FEMALE SAGE GROUSE USE OF A CRESTED WHEATGRASS PLANTING

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ABSTRACT

Radio telemetry was employed to study female sage grouse (Centrocercus urophasianus) use of a crested wheatgrass (Agropyron cristatum) planting and the surrounding vegetation during spring and summer, 1989. The planting resembled Conservation Reserve Program (CRP) tracts in the monotypic nature of the vegetation stand. One of 6 monitored grouse successfully escorted a brood from the nest. Relocations were classified by vegetation type. Bonferroni confidence intervals were calculated to their home ranges. In addition, a ratio of total linear distance of intermittent stream channel (km) to home range area (km^2) was calculated and compared to the immediately adjacent terrain and to randomly selected sites.

Hens not escorting broods appeared indifferent to the vegetation types within their home ranges. They neither selected or avoided the planting. These hens established home ranges which included a significantly higher ratio of linear stream km to km^2 area than occurred on random sites. The brood hen strongly avoided crested wheatgrass, instead selecting sagebrush. Additionally, this hen included significantly fewer km of intermittent stream channel in her home range than occurred at random sites.

Results suggest that in the development of habitat use strategies, there may be subtle tradeoffs between overall vegetation quality and the availability of microhabitats. If vegetation is suboptimal, grouse may continue using an area as long as microhabitat features (e.g. intermittent stream channels) compensate. If such features are not available, grouse may make extensive daily or seasonal movements to satisfy their requirements for food and security. Such movements would be energetically demanding, particularly for young grouse because of their dietary requirements and limited mobility. Thus seasonal distribution and/or abundance may be affected. Results also emphasize the importance of microhabitat features in fragmented habitats. Furthermore, microhabitats may be easily overlooked during habitat evaluations.

Managers of the public wildlife resource have often lamented that they had little influence over private land use. With CRP, we have the opportunity to replace cultivated cropland with idled stands of vegetation which could benefit sage grouse during seasons when they do not rely on sagebrush. For this purpose, rather than crested wheatgrass, a native grass/forb mix is recommended.

AMOUNT AND DISTRIBUTION OF OLD-GROWTH HABITAT ON THE FLATHEAD NATIONAL FOREST

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ABSTRACT

An analysis of the amount and distribution of old-growth habitats has recently been completed on the Flathead National Forest. Western Montana Zone draft definitions for old-growth were used as criteria to derive a map using Landsat imagery and vegetation plot data. The amount of old-growth on the Flathead National Forest was estimated and compared for two sample time periods, 1898-1899 and 1991. The amount of old-growth at the lower elevations appears to be less today than at the turn of the century, while the amount of old-growth at high elevations appears to be much greater. For the Forest as a whole, the estimated percent of land in old-growth has increased from approximately 7 percent to 19 percent. A map of nesting/denning/feeding habitats for pileated woodpecker, barred owl, and marten, which were designated as Management Indicator Species in the Forest Plan, was derived by combining forest structure, canopy cover, and forest cover type layers, and applying minimum acreage criteria. Current habitat capability is estimated to be 577 pairs of pileated woodpeckers and barred owls, and 279 marten "reproductive units" (1 male and 1 or 2 females). Timber harvest and prescribed natural fire are expected to reduce the scale of vegetation disturbance by creating smaller patches, more evenly distributed across the landscape. The old-growth MIS were purposefully selected because they have large home range sizes. Retention of MIS habitat will result in more variation and larger average patch size than would otherwise occur across the managed forest landscape.

PLIGHT OF THE HOMELESS: UPDATE ON THE BLACK-FOOTED FERRET RECOVERY PROGRAM

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The black-footed ferret (Mustela nigripes) (BFF) reintroduction to the wild program is on track and moving forward. This paper will present some insights into the politics of the processes rather than discussing the biological issues.

In 1988, after the last known wild BFF had been placed in captivity, the US Fish and Wildlife Service (USFWS) rewrote the BFF Recovery Plan. This Plan had two main objectives:

1) increase the captive breeding population to 200 breeders by 1991.

2) establish populations which before breeding, number 1500 BFFs in 10 or more populations in the wild.

The first objective was achieved and surplus young-of-the year ferrets were available for release in the fall of 1991. It was hoped the first reintroduction attempt would take place on the prairie dog towns from which the breeding population originated. However, sylvatic plague had reduced the Meeteetse prairie dog population to below critical levels. Therefore, they were released in the Shirley Basin region of South Central Wyoming. In the fall of 1991, 49 young-of-the-year ferrets were released onto a white-tailed prairie dog (Cynomys leucurus) town.

These releases, the fruits of an amazingly successful cooperative recovery effort, should have been the cause of much interagency jubilation and joint celebration. Instead, the program was marred by what can be summarized, and sanitized, as interagency disagreements.

The following is an opinion, based on second-hand information and observations filtered through an ample set of biases, of the Wyoming program, players and philosophies.

Probably the dominant underlying cause of most conflicts was a turf battle between State and Federal wildlife agencies. Historically, the State managed the wildlife within its borders while the Federal Agencies managed the habitat. Over the years various laws and acts, such as the Migratory Bird Treaty Act, gave the federal agencies a foot in the door to get involved in wildlife management. The Endangered Species Act, in some ways, kicked the door wide open. Both sides are now standing in the doorway warily eyeing each other. The Endangered Species Act not only spells out federal management responsibilities but it also deals with controversial species. In many cases the State is only too willing to avoid the controversy and abdicate its management authority to the Federal agencies. As the management roles become less distinct and philosophical differences emerge, turf battles and personality clashes are inevitable. Unfortunately, there does not appear to be a resolution to this problem in the foreseeable future.

In Wyoming there were four major player groups. First on the State side were the wildlife managers. These were primarily Wyoming Game and Fish Department (WGF) non-game biologists and their supervisors. One of their main tasks was to put together a reintroduction plan and to sell it to the various interest groups. The other State group was involved with the captive breeding program and was composed of WGF veterinarians and their staffs. Their role was to provide ferrets for the reintroduction attempt.

The USFWS was represented by program managers scattered along the bureaucratic chain of command in Region 6. They were charged with implementing the provisions of the Endangered Species Act and with guiding the program through the federal regulatory maze. In addition, the USFWS fielded the research team from Region 8 to handle the radio telemetry program.

These four sets of egos converged on the wind swept prairie dog towns of South Central Wyoming - with some interesting results. While it would be easy to dwell on the problems and conflicts, an awful lot was accomplished.

First, we can't say enough about the captive breeding program. They overcame all the obstacles and hurdles that biology and politics could throw out and exceeded the recovery goal. Thanks to them the recovery program was able to move forward.

The second step involved putting together the reintroduction plan and selling this to the local people and the special interest groups. They also had to guide this plan through all the bureaucratic hoops. Although there were rough spots and the inevitable turf battles, the end result was all the paperwork was in place in time for a 1991 release. This could not have been accomplished without a cooperative effort between the Federal and State managers.

One major area of disagreement involved the research program. Basically, this was to due a philosophical difference concerning reintroduction goals. The State's aim was to successfully reintroduce BFF to the wild. They stressed survival. The research teams goals, on the other hand, were to use the tool of radio telemetry to collect information that would assist future reintroductions. They felt this information would help the state reach its goal. These two positions clashed on the amount of handling and human disturbance that would be tolerated.

The first disagreement involved release techniques. Research wanted to compare release methods while the State opted to concentrate its efforts on one technique on one site. The State's position prevailed. While this may have increased the chances for BFF survival it removed a major component of the research program.

The State was probably never comfortable with the excessive handling necessary for the research program. Therefore, when problems surfaced, the issue came to a head and all radios were removed in mid November 1991.

In spite of the bruised egos and hard feelings, even this cloud had a silver lining. By focusing attention on these issues now, they will be adequately addressed prior to any future releases.

While the Montana situation was quite different from Wyoming's, considerable can be learned from their experience. They led the way through the bureaucratic paper maze and, where possible, we are borrowing and following their lead.

A major difference was the makeup of the major players. The Federal land management agencies, such as the Bureau of Land Management (BLM) and the Charles M. Russell Wildlife Refuge (CMR), are much more involved in the Montana process. The wildlife management agencies (USFWS and MDFWP) are on a more equal footing. Montana does not share Wyoming's ownership of the ferrets. The lack of definite roles and responsibilities between these agencies may present problems in the future.

Another difference was the involvement of the affected private landowners. For a variety of reasons, the Montana landowners were much more interested in, involved with, and opposed to, the plan than their Wyoming counterparts.

The first task facing the MT BFF Working Group was to identify a site that would be suitable for a reintroduction attempt. This was accomplished when the black-tailed prairie dog (Cynomys ludovicianus) complex in South Phillips County was chosen.

The second task was to design a reintroduction plan that would address the wide variety of concerns from the diverse public interest groups. A draft of this plan was released in the fall of 1991 with the comment period ending December 31, 1991. The deadline was extended to February 14, 1992 at the request of the landowner.

The comments received can generally be separated into two camps with highly divergent opinions. On the one side are the conservative, rural, Eastern Montana residents. They were characterized by a distrust of government and government programs. In addition, they distrusted, feared and opposed the Endangered Species Act. Finally, they had little or no use for prairie dogs and wanted them controlled or eliminated.

On the other side are what can be broadly categorized as natural resource defender groups and individuals. They generally supported the program and wanted to provide maximum advantage to the ferret by protecting its habitat - the black-tailed prairie dogs. Many were concerned about the government's commitment to protect endangered species and their habitats in general.

What it boils down to is that one group wants to control and possibly reduce the ferret habitat while the other group wants to protect and, if possible, increase the ferret habitat. The ferret itself is almost a side issue!

The plan that was produced was aimed at ensuring a successful BFF reintroduction and making it as acceptable as possible to the local residents. A successful program hinges on receiving, albeit grudgingly, support from the local landowners.

Two major areas of conflict have emerged from a preliminary analysis of the comments. The first involves the nonessential experimental classification. This basically reduces the status of the ferret from an endangered species down to a listed one which provides for more management flexibility. The plan recommended the ferret be reintroduced as a nonessential experimental population. While the local landowners are insisting on this classification, the natural resource defenders consider it ludicrous. If this recommendation were changed there would probably be a total rejection of the plan by the local residents. If the classification is not changed there is a risk of a lawsuit from groups such as the Sierra Legal Defence Fund. There is no plan to change the classification.

The second area of conflict concerns prairie dog control. Since there is no control on the CMR and the private landowner is under no restrictions, the issue focuses on the BLM towns. In a complicated agreement that is imbedded in the BLM's Judith Valley, Phillips/Resource Management Plan it was agreed to maintain the prairie dog acreage at the 1988 levels (last time they were measured). This puts a ceiling on the prairie dog acreage at 26,000 acres to appease the landowners and a floor at the same acreage to appease the other side. Both sides are asking for guarantees that we will be able to accomplish the asking for guarantees that we will be able to accomplish the impossible. Hopefully, an appointed local steering committee will assist with the handling of this extremely complex issue.

A major change in direction that is being considered was a result of the conflicts in Wyoming. Recently the MT BFF Working Group voted to stress the experimental (or monitoring) approach to this release. Therefore, an objective of this reintroduction plan will be to test different release techniques. This will entail considerable handling of ferrets since the primary tool to be used will be radio telemetry.

In summary, in spite of all the politics, personalities, and bureaucracies a successful ferret propagation program is in place and ferrets have been returned to the wild. The Montana program is moving forward targeting a 1992 release.

WILDLIFE AND BIG SKY: THE IMPACTS OF RESORT DEVELOPMENT

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ABSTRACT

In 1990 data was collected to replicate portions of a study which began 20 years ago when the Big Sky Resort development first began. In 1990, more elk were seen on aerial surveys in the study area surrounding Big Sky than in the early 1970's. However, elk use appears to be depressed by 51 percent from the levels to be expected from the numbers of elk present in this area of summer range. The elk were concentrated upon fewer sections than in the 1970's. Much of this impact is produced by increased levels of logging in the area. The Big Sky development also appears to have reduced the number of summering elk using the development areas. Pellet group transects indicated that there was some increase in elk use in some human occupied areas where there was evidence of unauthorized winter feeding and a low level refuge effect. Restriction in public access to land increased from 15 to 50 percent of the study area over the 20-year period. Satellite developments surrounding Big Sky also increased over the study period with detrimental effects upon wildlife. The cumulative effects projections originally made in 1976 are discussed and evaluated. Unanticipated changes included land trades, elk management changes by the Montana Department of Fish, Wildlife and Parks and by private landowners.

INTRODUCTION

This study actually began about 20 years ago when Chet Huntley then of NBC NEWS proposed the development of a major year around resort in the West Fork of the West Gallatin River Drainage. A multi-disciplinary team at Montana State University supported by the NSF engaged in a major study of the impact of this development upon this semi-primitive environment. Initial baseline and early development data were collected during this study. The Montana Agricultural Experiment Station provided additional monitoring funds allowing the study to be extended from 1976 to 1980. In 1990, a grant furnished by the Center for High Elevation Studies at MSU, combined with "in kind" contributions from the Montana Department of Fish, Wildlife and Parks allowed collection of replicate data in the summer of 1990.

THE STUDY AREA

The study area is located in the Madison Mountain Range about 45 miles southwest of Bozeman. It includes about 218 square miles of the West Fork of the West Gallatin River drainage and the adjacent Jack Creek and Cedar Creek drainages of the Madison River. The Big Sky resort is centrally located in the study area. The Spanish Peaks portion of the Lee Metcalf Wilderness Area forms the northern boundary of the area with Yellow Mule Ridge and Cedar Mountain forming the southern boundary. Highway 191 forms the eastern boundary and the mountain front of the Madison River valley forms the west. A sagebrush-grassland covers the West Fork basin surrounding the Meadow Village of Big Sky. Most of the remainder of the area is covered by Lodgepole - Douglas fir forests interspersed with mountain meadows. Active logging is occurring in Jack Creek and along the S.F. of the West Fork and Yellow Mule ridge areas. A 40+ year old clearcut covers a substantial portion of the area north of the Middle Fork of the West Fork. Historically, at the beginning of this study, the West Fork basin area was occupied by cattle ranchland with some clearcut logging at the intermediate altitudes. Now the West Fork drainage is occupied by the Meadow and Mountain Village portions of Big Sky. These are typical subdivided developments with paved streets, individual homes, condominiums, hotels, businesses and a golf course. The resort receives in excess of 200,000 skier days during the winter season.

Elk, mule deer, bighorn sheep, moose, mountain goats, mountain lions and black bears are commonly seen species in the study area. Elk were the prime focus of this study because of their abundance. The study area contains mainly summer range.

METHODS

The methods utilized are described in Picton 1976 and 1980. The 1990 studies utilized the same methods used in the earlier portions of the study in an effort to replicate the earlier work. These methods included multiple aerial surveys during the July to September period and 100 m belt pellet group transects placed randomly within each square mile section of land surveyed.

RESULTS

A total of 43 aerial survey flights were conducted from 1971 to 1978. Three additional flights at the optimum July to September times were flown in 1990. Data from 140 pellet group transects on 91 sections were collected in each of 1972 and 1974. A total of 50 sections were sampled by pellet group transects in 1990. Access permission was provided too late in the season to permit pellet group transects to be run on private lands in logging areas during 1990.

Table 1. Annual aerial survey data for elk seen in the West Fork of the West Gallatin (Big Sky) summering area and from the winter ranges of neighboring hunting districts.

Years	Wintering Areas		Total	Study Area
	Bear Creek (HD 360)	Flying D (HD 311)	(HD 311+360)	
1974	546	96	642	177
1980 & 1981	836	696	1532	286
% Increase	53%	625%	139%	62%
1988 & 1990	1394	1331	2725	385
% Increase Since 1974				
	155%	1286%	324%	118%

The data from the peak counts of elk seen on the aerial survey flights is presented in Table 1 with winter census data furnished by the Montana Department of Fish, Wildlife and Parks for the two hunting districts that influence the West Fork summering area.

More elk were seen in the study area during 1990 than in the earlier years. However, the total elk seen in the study area in 1990 was 51 percent lower than the level to be expected from the population growth shown by the adjacent wintering areas.

The distribution of elk appeared to have changed in 1990 when compared to the earlier years. In the early 1970's elk were typically seen on 49 sections of land per flight, by the late 1970's this declined to 29 sections further declining to 12 sections in 1990. This, with the population data, indicates more intense use of fewer sections in 1990 than occurred at the beginning of the study.

Land trades between the U.S. Forest Service and what is now the Plum Creek Lumber Co. resulted in an increase in private land in the study area from 40 percent in 1971 to 59 percent in 1990. The lands held by Plum Creek Lumber in the Jack Creek and Yellow Mule drainages are actively being clearcut logged at the current time. Elk were seen on 10 percent of these 39

Plum Creek Lumber sections in 1990. The comparable figure for these same sections in the late

Table 2. Some indices showing the changes in land owner restrictions to free public access to land and changes in development adjacent to the Big Sky development.

	1971	1974	1978	1990
Percent of land with land owner restrictions on access	15%	25%	43%	50%
Number of buildings in satellite developments along Highway 191 in the Porcupine basin area.		68		141

1970's was 26 percent and 41 percent in the early 1970's. The largest number of elk tended to be seen in the more isolated and remote portions of the study area during all 3 portions of the study period. Nine transects were run on unlogged public land in these areas with 7 showing a decrease in use.

The north side of the West Fork basin includes the Big Sky development. The Meadow Village portion is connected to the Mountain Village (ski area) by about 6 miles of highway. No elk were seen in this area in 1990. However, 76 percent of 17 transects located in "people areas" showed an increase in use. This suggests that there is some refuge effect and evidence of unauthorized winter feeding of elk by private individuals was found.

Twelve transects were run in 1990 in natural areas relatively remote from logging and the development areas with 75 percent of them showing no change or an increase in elk use. Back country use by hikers and riders from the resort has undoubtedly increased since the early 1970's and probably influenced elk use of some of these areas.

Table 2 presents data concerning other attributes associated with the Big Sky development and the other land ownership changes within the study area. The satellite developments are those along Highway 191 which are not part of the Big Sky development. These reflect entrepenurial development drawings upon the Big Sky traffic and providing affordable housing for lower income employees. This satellite development has impacted elk by usurping winter range used by elk in the early 1970's and has restricted the ability of elk to cross the highway to only those with high levels of cover.

DISCUSSION

The data is internally consistent and indicates that the elk use of the study area is probably only about one-half of what it would be if the Big Sky and associated developments and land exchanges had not occurred.

The active logging that has been occurring for over ten years has had an expected major impact upon the intensity and distribution of elk use. The lodgepole timber in the area was heavily infested by a mountain pine bark beetle outbreak between 1975 and 1978 which killed upwards of 50 percent of the timber in some areas. Based upon observations in some portions of the study area, it is likely to take 35 to 40 years after logging for succession to produce adequate timber cover allowing elk to resume prelogging use patterns.

The original study was one of the first to attempt a cumulative effects assessment of development. A computer model (ELKMOD IV) was developed to project the effects of development into the future. This dynamic simulation model (Picton 1976) contains a number of features that have not yet been incorporated into most of the cumulative effects models used today. The 1990 project is also a rare attempt to validate and test an ecological simulation model by comparison with actual events. The predictions made in 1976 for 1990 referring to the "maximum use" scenario which is most similar to the current land use pattern predicts that elk use of the study area should now be about 80 percent of the 1975 level, which has proved to be incorrect. If we use the scenarios which gave better recognition to the increasing elk population as compared to the maximum development, a difference of about 45 percent is seen. This is comparable to today's situation in percentage but not numerical terms. It should be noted that the earlier studies (Picton 1980, 1981) which used up to 8 years of data found that the projections for elk distribution and numbers seemed to be holding and that little overall change had been seen. It should be noted that on the basis of the data up to 1980 "resort development had little or no impact on elk over and above the impacts of previous land use." (Picton 1980). The addition of the 1990 data leads to the reverse conclusion. This emphasizes the necessity of long term data bases and monitoring in measuring effects of development and other land use changes.

The impacts of development could not be detected conclusively in 1980 because of the time lags inherent in the systems, previous impacts upon them, the limitations of methodology and because some of the major impacts did not occur until after 1980.

The cumulative effect predictions were not accurate because significant changes happened which had not been incorporated in any of the projection scenarios. The most important of these were the land trades which radically extended logging and private ownership in the study area, the massive increase in the elk population produced by Montana Department of Fish, Wildlife and Parks management actions, and the massive build-up of the Flying D elk population after it was purchased by Ted Turner. While these latter two events occurred primarily outside of the study area, they strongly influence the numbers of elk summering in the area. The computer model did have the ability to deal with these sorts of changes but a scenario picturing a three-fold increase in the elk population would have appeared fanciful and unrealistic at the time of the original study.

If the proposed all weather road through the Jack Creek drainage from Big Sky to Ennis is built, private lands probably will be subdivided and developed. This would make permanent the present logging induced depression in elk use currently evident in the area. If the road is not built and the logged areas are allowed to regenerate, elk use could slowly increase over the next 50 years. Big Sky and the satellite areas can be expected to become more urbanized thus decreasing elk habitat. However, spontaneous private winter feeding programs for elk and bighorn sheep could produce problems with local concentrations.

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ONE HUNDRED YEARS OF COUGAR MANAGEMENT IN MONTANA -- IT'S CAUSE TO PAWS!

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The late Edward Abby put it this way... "The mountain lion eats sheep. Any animal that eats sheep can't be all bad." This sentiment obviously was not, and is not, shared by all parties interested in the cougar. For some people, the cougar is a threat to their livestock and their livelihood. More recently, the cougar has become a direct threat to humans, moving into towns and feeding on people's pets, and raising concerns for the safety of children playing in their own back yards. For hunters and houndsmen, the cougar is an unique opportunity to match skills of the woods and countless hours of training trailing hounds with the country's largest cat on a frozen playing field. For others, the cougar materializes the vision of a magnificent predator, indeed, a symbol of wild places, and an animal only to be preserved.

All of the perceptions described above have been reality in Montana during the past 100 or so years; and as such, the cougar has been a controversial focal point in wildlife conservation in Montana and throughout much of the western hemisphere.

In this paper, I would like to present a glimpse of cougar management in Montana over the past century. This might provide food for thought relative to large predator-prey management; and perhaps some lessons can be learned from the cougar that could assist wildlife managers trying to keep pace with other charismatic-megafaunal-predators such as the gray wolf.

The mountain lion was once the most widely distributed land mammal in the western hemisphere. They were distributed from the southern Yukon to Tierra del Feugo and from Connecticut to California. The current distribution has become more patchy, with losses of populations in eastern North America and throughout most of central America. As late as 150 years ago, the cougar was common in the eastern deciduous forests, but with the exception of the Florida panther, has recently been restricted to west of the great plains. Conversely, there are parts of the western United States that have abundant populations of cougars where they were historically, or naturally, absent. In most cases, cougars have expanded their geographical range coincidental to deer populations responding to man-made changes in the landscape.

I will make a case that the cougar has reclaimed most, if not all, of its native habitats in Montana (42 of 56 counties). The cougar exists in Montana not in a threatened status but as an enhanced population. It is important to note that much of this recolonization of habitats occurred during the past 30 years.

The first 100 or so years of cougar management in Montana, and almost everywhere else for that matter, was relatively simple -- kill them for the benefit of other species, primarily livestock and game.

The 1883 legislature (known as the "cowboy legislature") produced a vetoed rustlers law. Shortly after the legislative session, Granville Stuart and some other independent types hanged 17 rustlers near Lewistown. (That gives you the mood of the taxpayers in those days!). But, that "cowboy legislature" was able to pass the first workable bounty law; and it proved to be rather effective at first.

In 1884, the first full year after the bounty law was enacted, 146 mountain lion skins were presented for bounty payment (bounty records, Montana Historical Society, Helena). As a comparison, there were 1,774 coyote pelts, 565 bear skins, and 5,450 wolf pelts also presented for payment.

The number of bounties paid for all predators were variable but remained high for the next five years or so. The 1887 legislature added ground squirrels and prairie dogs to the bounty list, but this ultimately caused a repeal in the bounty laws as the 61,721 1887-dollars paid for these "varmints" in the first few months threatened to bankrupt the Territorial treasury. The governor called a special session of the legislature in September 1887 to repeal the entire bounty law. However, because of stockmen hatred for the wolf, bounties were in place again from the 1890's through 1962.

The number of bounty payments for cougars varied from the 146 taken the first year of the bounty system to 0 in 1931. Sixty-two cougars were taken in 1962, the last year that the bounty system was in place. Incomplete record keeping precluded determination of the exact number of lions taken under the bounty system, but I estimate that the average annual kill was 30-40 cougars per year.

The cougar was an unclassified predator from 1963 to 1966, and a legislatively classified predator from 1966 to 1970. The 1971 legislature reclassified the cougar as a big game animal for the first time in Montana, and empowered the State Fish and Game Commission with setting hunting seasons. Status changes of the cougar in Montana were mirrored throughout the western United States during the late 1960s and early 1970s. In recognition of their ecological importance, and the futility of government predator control programs, most states and provinces declared the cougar a game animal. By 1972, every state in the west had made similar changes in the legal status of the cougar, except Texas.

There are a number of ways to hunt cougar, but hunting with trailing hounds is the only effective means. Cougar hunting therefore is hunting with hounds. Nearly 90% of the 1990 cougar hunters in Montana described themselves as either hunting with their hounds, a friend's hounds, or with an outfitter (Figure 1). Outfitters made up 4.5% of Montana's cougar hunters, while outfitted hunters made up an estimated 13.4%.

Montana's cougar license sales (Figure 2) have increased 322% (9.3% annually) since the first licenses were issued in 1971. Resident license sales have increased at an even greater rate, while the number of nonresident licenses sold has remained relatively constant throughout. Resident and nonresidents purchased 1687 and 146 cougar licenses, respectively, in 1991. The first licenses issued in 1971 were free, while in 1991 license fees were $10.00 for residents and $320.00 for nonresidents.

More than one-third of the cougar hunters were first time license buyers. Thirty-eight percent of the 1990 license holders said that it was their first Montana cougar license, compared with 37% and 31% in 1988 and 1989. These rates were more than twice as great as the overall rate of increase in license sales, and suggested an annual turnover of hunters. Causes for this phenomenon may include difficulties encountered in hunting cougars without owning hounds and the fact that few hunters desire to harvest a cougar annually.

Montana's hunting regulations for cougar have evolved over the past 20 years from a six month kill season to an area quota system with both female and total harvest quotas. The winter timing of the hunting season, typical of most western states and provinces, was established because it was a time that hunters could effectively hunt over snow, and simultaneously not be in direct conflict with other hunting seasons.

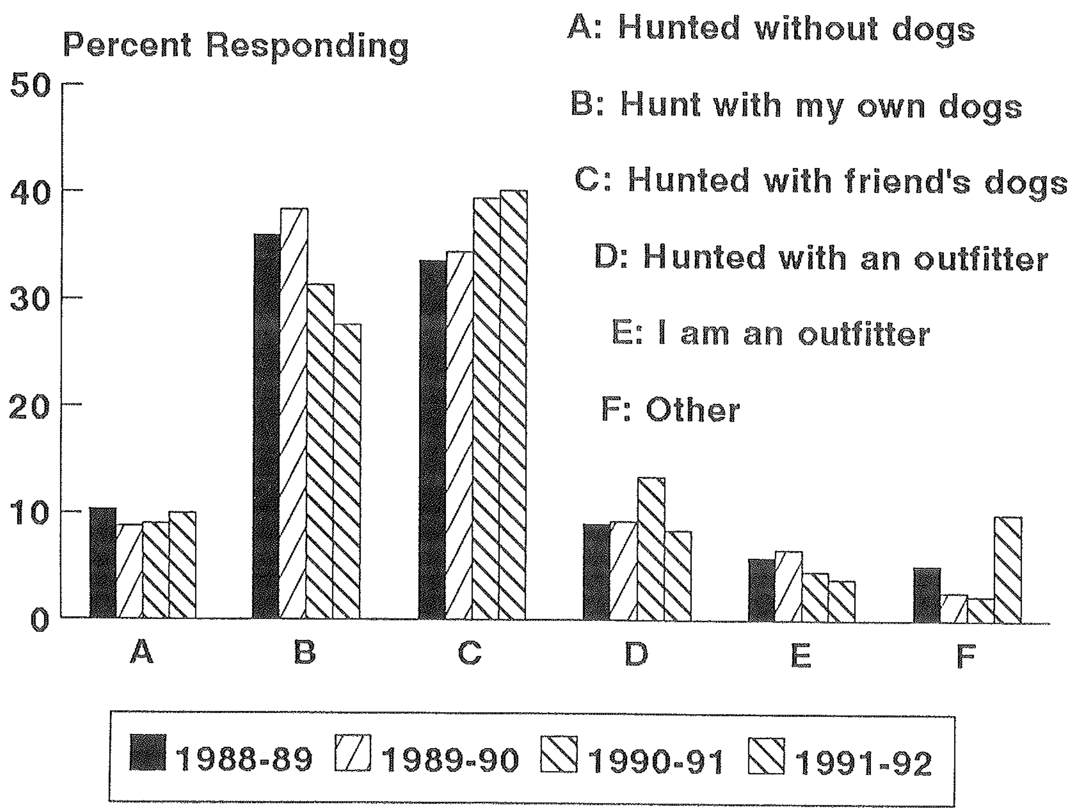

Figure 1. Characteristics of Montana cougar hunters, 1988-1992.

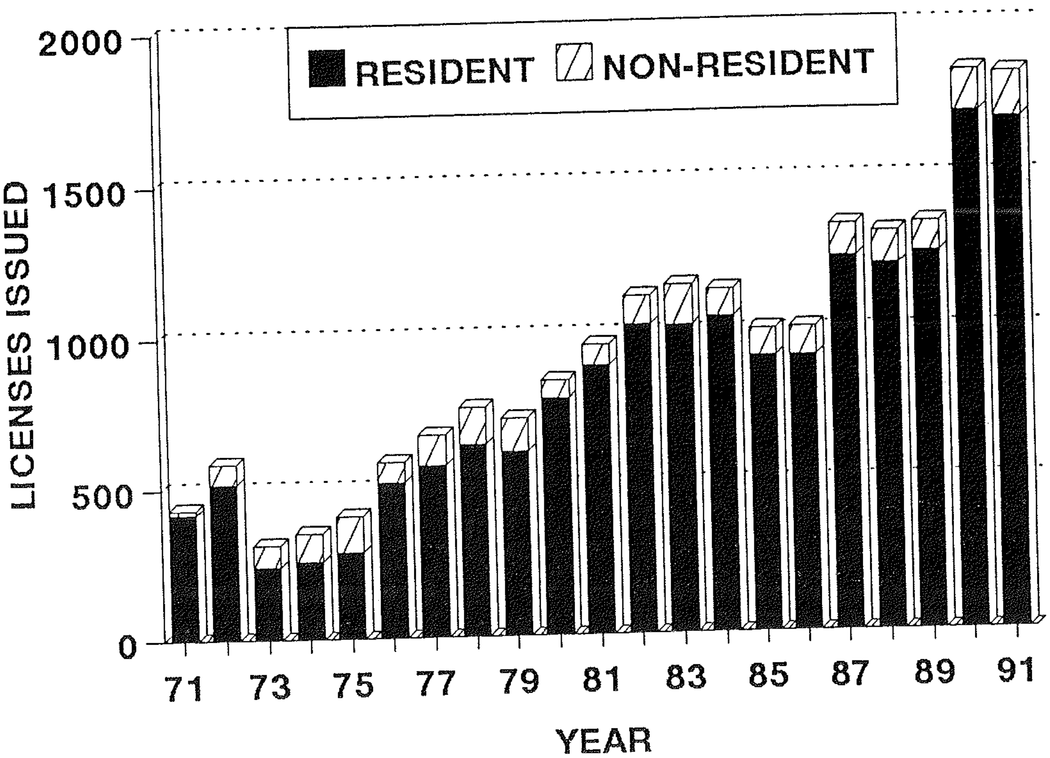

Figure 2. Number of resident and nonresident cougar hunting licenses issued in Montana, 1971-1991.

The initial 1971 cougar hunting season began the third weekend in October with the opening of the general big game season. The opening date was moved to a standard date of December 1 in 1976. The five month kill season, running from December 1 to April 30, was subsequently shortened further to two-and-one-half months in 1978. A dog training, pursuit-only season was initiated in 1978 coincidental with the reduced kill season. The purpose of the pursuit-only season was to allow non-consumptive recreation, provide an opportunity for training hounds, and collect information on cougar abundance and distribution from houndsmen. The pursuit-only season ran from February 15 until April 30. Harvest quotas went into effect in Montana Department of Fish, Wildlife and Parks (MDFWP) Regions One and Three during 1986 for the purpose of controlling harvest under steadily increasing demand. The original quota system was established so that when the female sub-quota was met the kill season ended in that particular hunting unit. The remainder of the state came under a similar quota system during 1988. In 1989, the quota system was altered to be one where if the female quota was reached first, the balance of either the kill season or quota was under a toms-only regulation. A pursuit-only season automatically went into effect within a hunting unit once the harvest quotas were reached.

Montana had the shortest general 1990 cougar hunting season when compared to the rest of the western states and provinces (Green 1992). The timing of the 1990-91 kill season was December 1 to February 15, followed by a pursuit-only season from February 16 to April 30.

A number of areas in Montana are either closed to the hunting of cougar or receive very light hunting pressure. These types of areas may function as important "reservoirs" for repopulating vacated home ranges elsewhere (Lindzey 1987:659). These reservoirs include most wildlife management areas managed by the MDFWP, Indian Reservations, legislated wilderness areas, roadless areas, road closure areas, and national parks. In addition, many other areas are effectively closed due to private land ownership patterns that do not allow access to hunters. Ruggedness and remoteness of terrain often preclude houndsmen from hunting many localized areas throughout the Montana. In all areas of state, the amount and timing of snowfall dictates the hunting success, and in years of light snowfall many of these areas do not have a cougar harvest (Greer 1984).

Reported, non-hunting cougar mortality has increased (Figure 3). The median recorded mortality has been 10 cougars (range 4-29) since 1971.

The legal take of cougars in Montana has increased from 51 during the 1971-72 hunting season, to 227 during 1990-91 (Figure 4). The 1990 harvest was 32% female, compared to the twenty year average of 36%. The proportion of females in the harvest since the initiation of the quota system has been 30% compared with 39% in the years prior to quotas.

Cougar hunters have not tended to take a cougar annually or even take more than one. The number of hunters who had taken at least one cougar between 1971 and 1991 was 1704. Of these, 1419 (83.3%) had taken only one, and 168 (9.9%) had taken two cougars. One person had taken 16.

Timing of snow cover and inclement weather, hunter access, and abundance of cougar all play significant roles in determining the level and composition of cougar harvest. However, the increase in demand for cougar hunting has also contributed to changes in the timing of harvest (Figure 5). Whereas the harvest was initially spread out from October until April, the majority of the take currently occurs in December.

The majority of the state-wide cougar harvest has always occurred west of the continental divide in MDFWP regions one and two. Sixty-five percent of the 1990 state-wide take came from regions one and two, which was similar to the 20 year average of 68%.

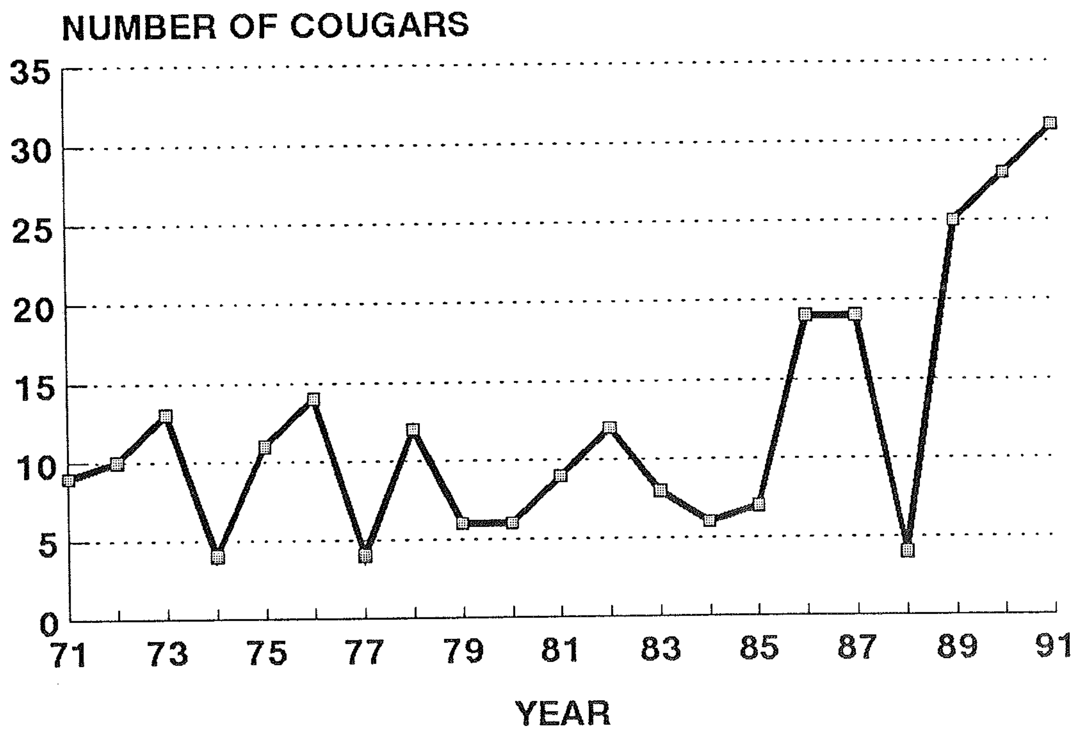

Figure 3. Number of non-hunting cougar mortalities reported in Montana, 1970-1991.

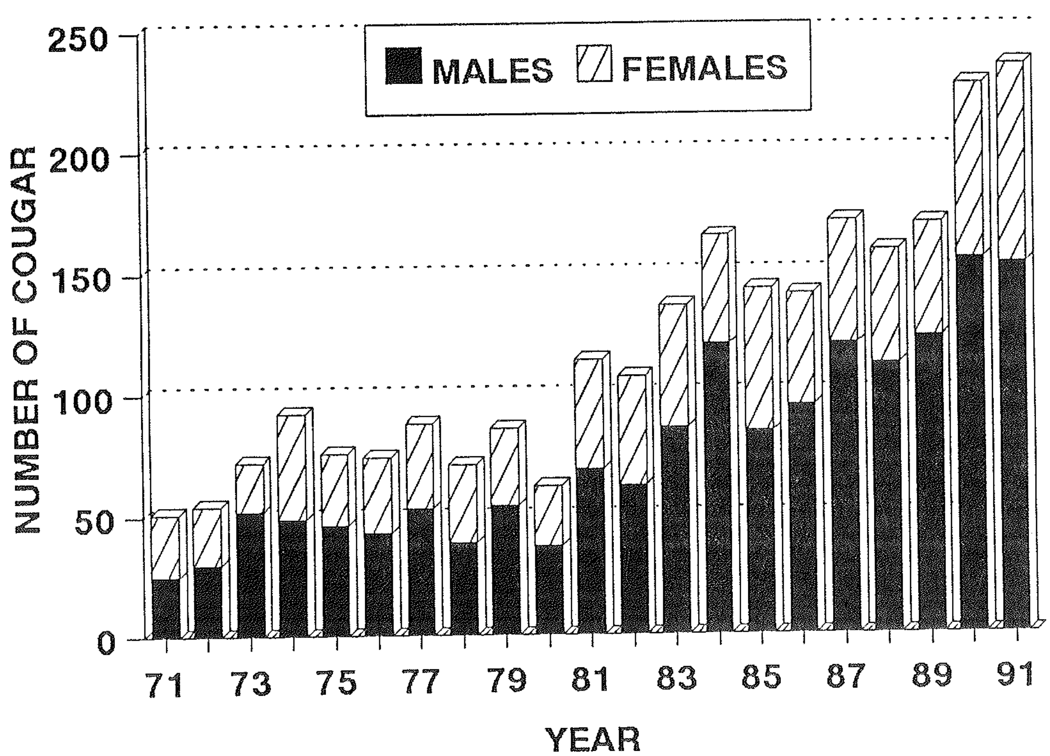

Figure 4. Number of male and female cougars legally killed during hunting seasons in Montana, 1971-1991.

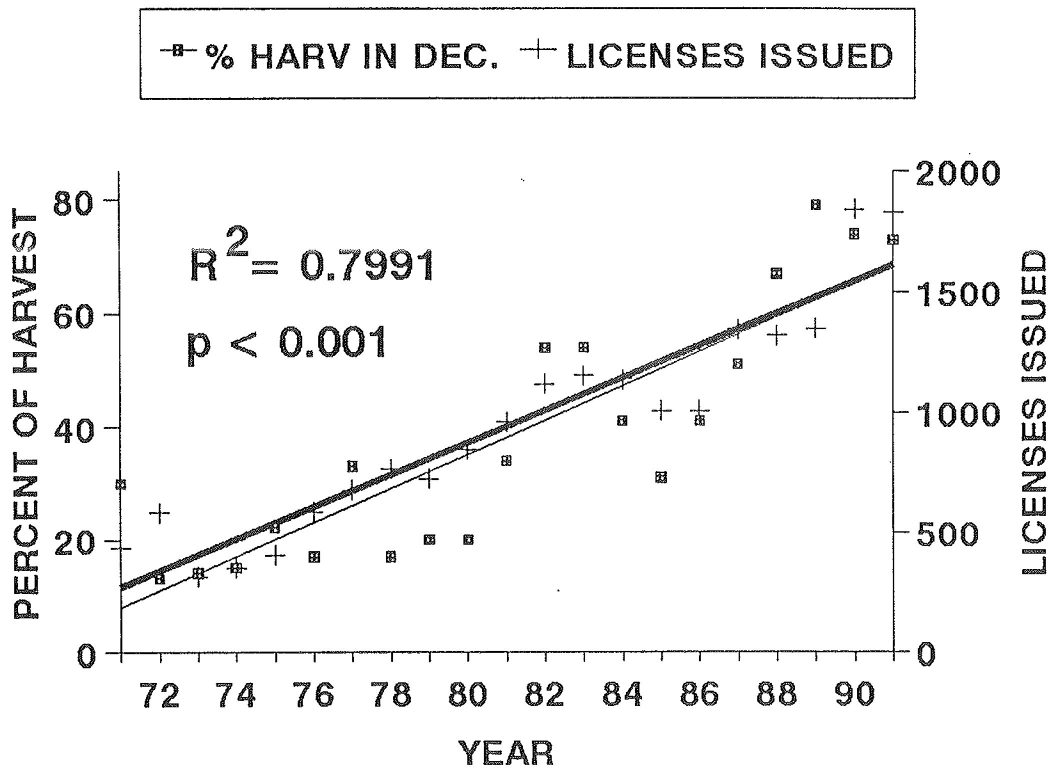

Figure 5. Percent of Montana cougar harvest that occurred in December and number of cougar hunting licenses issued, 1971-1991.

In the face of increased hunting pressure and increase non-hunting mortality, the cougar has expanded its geographical range in Montana (Figures 6-9). The distribution of confirmed 1991 cougar sightings (Figure 10) displays a range that covers most of the habitats that cougars probably occupied historically. Agriculture impacts to the landscape from planting of high protein crops adjacent to cover, efforts to increase riparian vegetation, and conservative game management have allowed increased distribution and abundance of the major prey species for cougars. In turn, cougars have been able to fill what was historically a fragmented habitat for cougars (numerous island mountain ranges and river breaks).

In an environment of human-induced habitat changes, and associated increases of non-native ungulate species, an unchecked abundance of cougars potentially could narrow the niche of some prey species such as mule deer . This phenomenon may limit the abundance of some local, "native" deer populations. Proponents of natural management should ask themselves, is this a natural phenomena?

Berger and Wehausen (1991) suggested that a predator-prey disequilibrium in the Great Basin desert has resulted from livestock grazing that favored mule deer, and hence cougars. An increase in abundance of historically non-native cougars is now impacting the community dynamics, including the abundance of rare desert bighorn sheep.

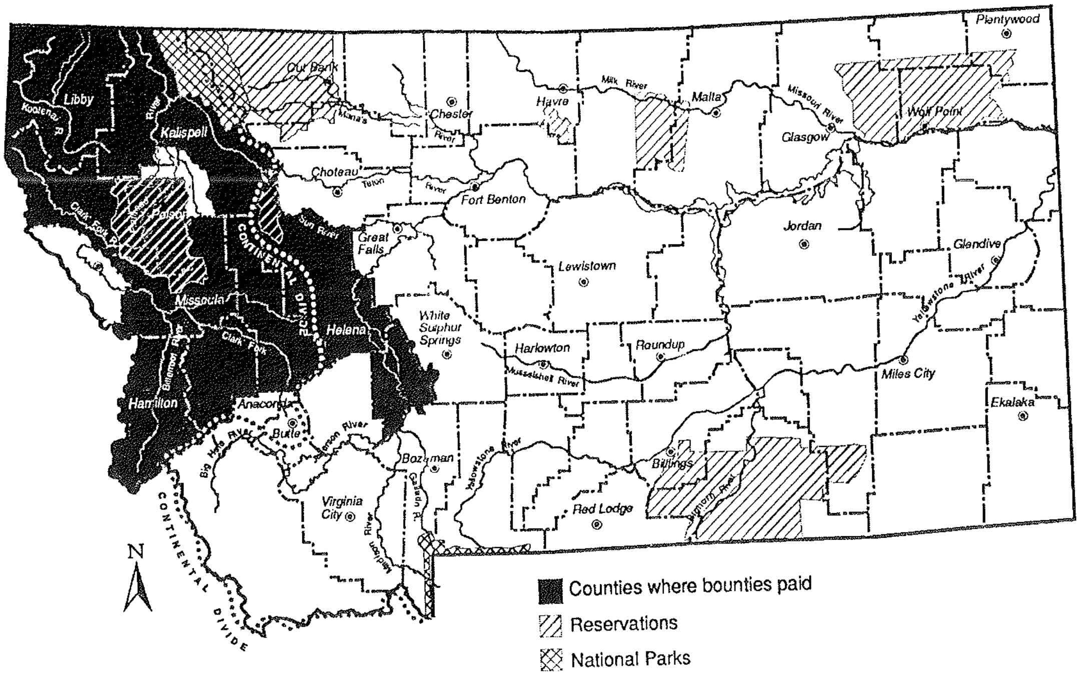

Figure 6. Distribution of Montana counties that paid bounties for cougars, 1921-1922.

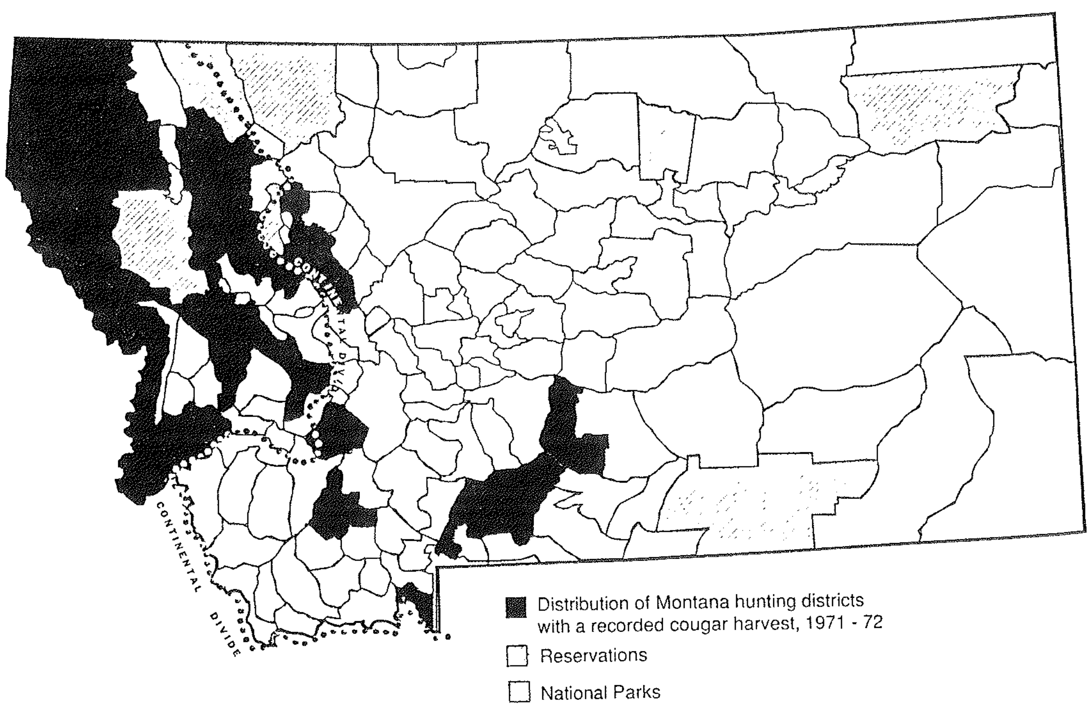

Figure 7. Distribution of Montana hunting districts with a recorded cougar harvest, 1971-1972.

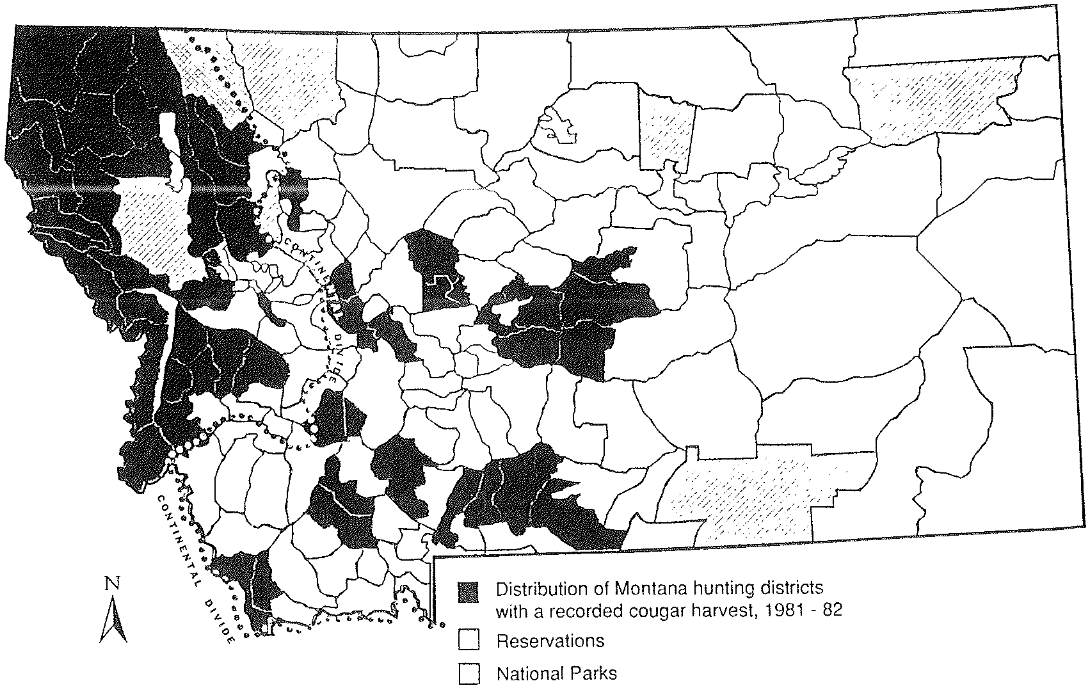

Figure 8. Distribution of Montana hunting districts with a recorded cougar harvest, 1981-1982.

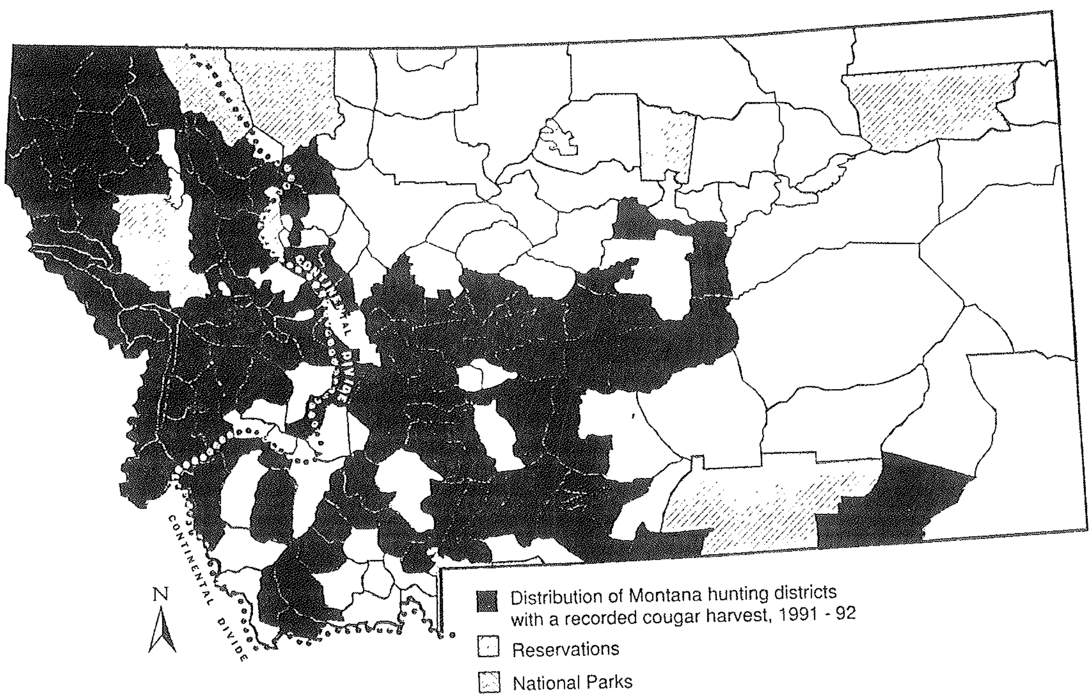

Figure 9. Distribution of Montana hunting districts with a recorded cougar harvest, 1991-1992.

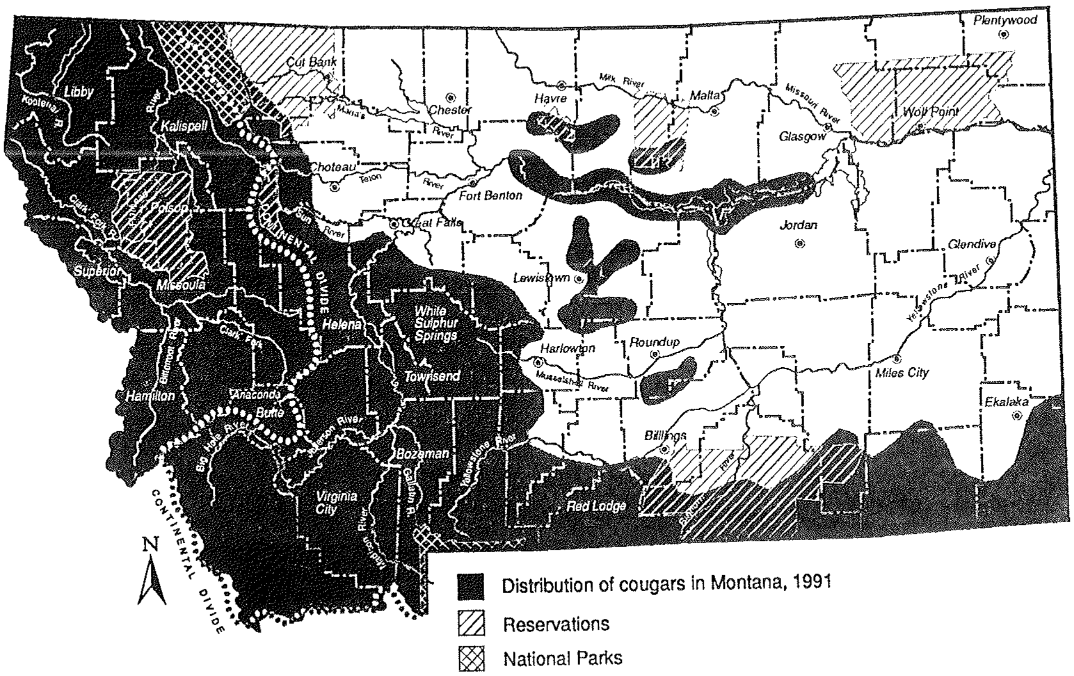

Figure 10. Distribution of confirmed cougar sightings in Montana, 1991.

Nero and Wrigley (1977) suggested that a decrease in mule deer and elk distributions (primarily through habitat alteration and exploitation, accounted for the temporary eradication of cougar in Manitoba during the early part of this century. However, a recent expansion of white-tailed deer distribution has lead to a net doubling of the historic cougar range in that province.

Predator-prey relationships are extremely complex and most people have attempted to over-simplify the relationship, primarily focusing in the quantitative aspects or numerical impacts of predators on prey populations. It is popular to believe that the mere presence of large carnivores gives a naturalness the environment. Indeed, Errington (1967) in his classic text on predator-prey relationships stated "... native predators belong in our natural outdoor scenes not so much because they have a postulated or demonstrated monetary value or utility in the so called Balance of Nature as because they are, it seems to me, a manifestation of Life's wholeness." However, research, management, and society must take into account the entire breadth of the environment and the community-level changes that have occurred (mostly the handy work of humans) when planning for the return of top-level carnivores. Just allowing it to happen, anywhere it might occur, without defining the terms and the consequences, may not be any more natural than the administrative boundaries of a wilderness area or national park.

I do not advocate cougar or predator eradication policy, but I beseech people to think about the difficulty in describing naturalness. The mere presence or particularly the density of a large carnivore, does not represent naturalness.

In my experience with the cougar, it has been apparent there were few gray areas. Most everyone has a formed opinion that is usually founded in fact. However, Botkin (1990:p. 89) concluded, after a review of the Kaibab deer-cougar-livestock situation (Rasmussen 1941), that **"What we learn from the mountain lion and the mule deer is about what we believed, not about what we know".**

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AN UPDATE ON THE MONTANA ROCKY MOUNTAIN FRONT MOUNTAIN LION PROJECT

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ABSTRACT

Population characteristics, habitat use, and food habits of mountain lions (Felis concolor) were studied along the Rocky Mountain Front west of Augusta, Montana. A total of 25 radio-collared mountain lions were monitored during the 1991 and 1992 field seasons. Two of the radio-collared mountain lions were management reintroductions. Habitat use will be analyzed with the aid of LANDSAT imagery and the geographic information system (GIS) EPPL7. The final report will be completed by fall 1992.

INTRODUCTION

Mountain lions (Felis concolor) have been studied in Montana near Fish Creek by Murphy (1983) and near Yellowstone National Park by Murphy (1991). However, little information is available concerning mountain lions inhabiting the northern continental divide ecosystem which includes the Scapegoat, Bob Marshall, and Great Bear Wilderness areas as well as the eastern front of the Rocky Mountains and Glacier National Park. This area contains large numbers of both resident and migratory populations of ungulates (Picton 1959, Knight 1970, Frisina 1974, and Kasworm 1981). Information collected on mountain lion ecology will contribute to the sound management of the species as well as explore impacts of predation on local ungulate populations. Given the recent publicity and interest in mountain lion-human interactions in Montana, information collected on the distribution of mountain lions in relation to recreational and agricultural uses will assist in management planning and strategy.

STUDY PLAN

This study was initiated in winter 1991 to investigate seasonal population characteristics, habitat use, and food habits of mountain lions inhabiting the Montana Rocky Mountain Front.

Specific objectives include:

1. Determine population characteristics of mountain lions in the study area including: number, density, home area, dispersal, and fecundity.

2. Describe and quantify habitat used by mountain lions and determine their individual importance and abundance.

3. Determine food habits of mountain lions and explore impacts of predation on local ungulate populations.

This paper describes the study area, approaches to meet the project objectives, and provides some initial results and observations. Support and funding for the project has been provided by the Montana Department of Fish, Wildlife, and Parks, the Rocky Mountain District of the Lewis and Clark National Forest, the Montana State University Fish and Wildlife Management Program, the Allen Foundation, the Teller Foundation, and the Montana Houndsmen Association. Dr. Harold Picton (MSU), John McCarthy (MDFWP), and Seth Diamond (USFS) were instrumental in project development and logistics and continue to be of assistance in project implementation. The skill and dedication of both Rocky Heckman and Kelly Hirsch in the use of trailing hounds and mountain lion capture techniques is greatly appreciated. The hard work and dedication of volunteers Jay Kolbe and Mike Kulesza is also acknowledged.

STUDY AREA

The study area is located on the east slopes of the Rocky Mountains 15 miles West of Augusta, Lewis and Clark County, Montana. It is bounded on the north by Deep Creek, on the west by the continental divide, on the south by the Dearborn River and on the east by state highway 287. Most of the study area is under designated recreation and wilderness management. Private land occurs primarily on the prairie along the Rocky Mountain Front and throughout canyons having automobile access. The western one third of the study area is within the Sun River Game Preserve. The area drains primarily to the East via the Sun, Teton, and Dearborn rivers and their tributaries. Elevations range from 1443 m in foothill areas to 2953 m in the mountains (Knight 1970). The East Front portion of the study area consists of generally parallel North-South moderate to steep, mountainous ridges and narrow valleys. The Lewis range along the continental divide consists of abrupt cliffs on the East and moderate to steep slopes on the West. The geologic formation and character of the area has been described by Deiss (1943) and Mudge (1972).

Major species present in the overstory include Douglas fir (Pseudotsuga menziesii), lodgepole pine (Pinus contorta), sub-alpine fir (Abies lasiocarpa), spruce (Picea engelmannii), limber pine (Pinus flexilis), whitebark pine (Pinus albicaulis), black cottonwood (Populus trichocarpa), and aspen (Populus tremuloides). Pinegrass (Calamagrostis rubescens) is the major understory species associated with Douglas fir, bluebunch wheatgrass (Agropyron spicatum) and Idaho fescue (Festuca idahoensis) comprise the major understory component of the limber pine savannah and wind forest, and heartleaf arnica (Arinica cordifolia), gooseberry (Ribes inerne), and smooth menziesia (Mensziesia glabella) comprise the major understory component of the closed canopy-subalpine forest (Kinight 1970). Major habitat components have been described previously by Picton (1959), Knight (1970), and Kasworm (1981).

METHODS

Methods utilized for capture are described by Hornocker and Wiles (1972) and Murphy and Tischendorf (1988). Briefly, mountain lion were captured by pursuing with trained hounds until treed. Once treed, they were tranquilized with an intramuscular injection of Ketamine hydrochloride (Vetalar). Immobilized mountain lions were lowered from the tree with the use of a rope to prevent injury to the animals. Local houndsmen were contracted for the chase-capture season due to skill in mountain lion pursuit with trained hounds, familiarity with the study area, and to encourage public support. The age of captured animals was estimated by using dental characteristics, and overall health and appearance noted (Shaw 1979, Ross and Jalkotzy 1989). Mountain lions were placed in one of three age categories as follows: kitten:0-6 months, juvenile:6 months-2.5 years or independence, and adult:2.5 years or independence and greater. Each mountain lion was tattooed in an ear with an identification number, numbered ear tags were attached and the animal was instrumented with a mortality sensing radiocollar (AVM Inc., Telonics Inc.). Juveniles (< 18 months) were fitted with a special expandable mortality sensing radiocollar (AVM Inc.).

Mountain lion relocations were obtained primarily via fixed-winged aircraft survey. Due to the extreme topographic relief of the study area, relocations obtained from ground radiotracking with a hand-held H antenna (Telonics Inc.) were only used if the animal was actually seen or fresh sign such as a track or kill site was encountered. One mortality, and three shed radiocollars offered a field test of the relocation accuracy from a fixed wing aircraft. Date, time, topography, ocular estimate of canopy coverage, and UTM coordinates were recorded for each relocation and plotted on USGS 7.5 minute topographic maps.

Kill sites, scats, and other mountain lion sign were investigated while hiking into selected aerial relocation sites. A kill was determined to be that of a mountain lion if two of the following criteria were met: 1. mountain lion track present 2. close proximity to an aerial relocation 3. mountain lion scrape or scat present 4. carcass condition is characteristic of a mountain lion kill (Shaw 1979). If a carcass was located and did not meet the above criteria it was assumed to be carrion rather than a mountain lion kill. Feeding sites were assumed to be located in the habitat that the kill was made as drag distances were difficult to detect.
Habitat use will be analyzed with the aid of LANDSAT imagery. At present a vegetation cover map utilizing a geographic information system program (EPPL7) compatible with the LANDSAT data of the study area has been developed in cooperation with the Lewis and Clark National

Forest and Washington State University in Pullman, Washington (Don Godtel, pers. comm. January 1992). Components of the vegetation-topography complex used by mountain lions in the study area (cover type, topographic type, dominant tree species, canopy closure, slope, aspect, and elevation) are recorded at mountain lion relocation sites. In order to factor in prey availability to mountain lion habitat, maps of major ungulate summer and winter ranges as well as migratory pathways will be utilized. The percent of relocations occurring in one of four slope categories was recorded. (level:0-24, gentle:25-59, moderate:50-74, and steep:75-100%). This was calculated with the use of USGS 7.5 minute topographic maps.

RESULTS

Twenty five mountain lions were instrumented with radio-collars between January 30, 1991 and April 15, 1992. Two of the mountains lions instrumented with radio-collars were management reintroductions. Radio-collared females with radio-collared offspring were collectively grouped for data analysis and treated as one adult female with offspring. A total of 268 mountain lion relocations will yield information on distribution, movements, habitat use, and food habits.

Winter-spring (Nov-Apr) and Summer (May-Oct) distribution of mountain lions showed no movements of marked animals west of the Sun River. Rather, mountain lions radio-collared on the eastern Rocky Mountain Front appeared to remain there throughout the winter and summer seasons. While mountain lions were distributed throughout much of the study area there appeared to be areas of concentration. These areas of concentration coincide with major ungulate winter ranges.

There appears to be a progressive upward shift in elevation use by radio-collared mountain lions from January to September. Use of slope during the winter-spring season appeared more random than that of the summer season in which there was an increase in the moderate to steep category. Mountain lions utilized North and South facing aspects during the winter-spring season as compared to a more random use of exposure during the summer season. Most aerial relocations of mountain lions were closely associated with heavier cover types, an open or closed Douglas fir dominated canopy being the most common. Mountain lion kill sites were associated primarily with a closed canopy forest complex. Many of the kill sites however, were near forest-grassland "edge" habitat complexes

Food habits were based on prey items identified at mountain lion kill sites. A total of 44 mountain lion kill sites have been located. Listed in order of their abundance: mule deer, white-tailed deer, elk, bighorn sheep, snowshoe hare, porcupine, marmot, and raccoon. A total of 25 mountain lion scats have been collected but have not been analyzed.

Relocations of mountain lions in the study area indicate a random distribution in relation to low, medium, and high use recreation trails, however no statistical tests have been performed yet. In contrast, kill sites were often near a recreational trail. This may be in part due to use of recreational trails by the investigator for access to and from mountain lion relocation sites to search for mountain lion kills. Recreational trails in the study area often are located in creek bottoms which are more mesic and thus subject to more vegetation which serves as stalking cover for mountain lions. Most mountain lion relocations were more than 200 m from a road, which is due in part to the lack of roads in the study area.

A reintroduced juvenile female mountain lion was removed from the area due to conflict with humans. This particular mountain lion utilized a prairie-riparian habitat immediately West of Augusta, Montana. Two out-of-state bowhunters were stalked by this female in a willow-cottonwood complex just north of Augusta on the Sun River. A second reintroduced male mountain lion established a territory on the southern boundary of the study area. This adult male was harvested during the 1992 mountain lion season.

Several USFS cattle grazing allotments occur in the study area. At the time of this report, one instance of cattle depredation has been attributed to a mountain lion attack. One domestic sheep was killed by a mountain lion as well. In this instance, the mountain lion jumped or crawled beneath a fenced enclosure and killed a ewe which was then drug outside the enclosure into nearby cover. The incident took place less than 100 m from the landowner residence.

FUTURE WORK

The first phase of the research project has been completed with a final report expected to be compiled by fall 1992. Data analysis and thesis writing will comprise the majority of project activity throughout the summer and fall. Study animals will continue to be relocated via fixed-winged aircraft survey this summer and fall. The next phase of the research project will involve exploring refined population characteristics including fecundity and dispersal, genetic analysis of sampled mountain lions, investigation of optimal foraging strategies displayed by mountain lions, and the creation of a population-habitat model for mountain lions that reside on the Montana Rocky Mountain Front.

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HABITAT SELECTION OF RADIO-COLLARED PINE MARTEN IN SOUTHWEST MONTANA

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ABSTRACT

Radio-collared pine marten (**Martes americana**) were followed throughout winter 1990-91 near Wisdom and West Yellowsone, Montana. Habitat variables were measured at those sites that marten chose to rest and/or forage. This information was compared to data similarly obtained from marten rest/forage sites during the previous winter. Little difference was found between the 2 years with respect to the number of trees and tons of deadfall per hectare. Rest trees were not large, as some literature tends to suggest, always large snags. Dead trees accounted for 19-49% of rest trees among study areas. Rest trees often were smaller live trees. While resting under snow cover during winter is thought necessary for thermal protection, a considerable number of winter rest locations (25-50%) were in trees and snags. Use of trees/snags as rest sites definitely increased as snow cover receded. Different geographical areas having different habitat types and ages of timber were used by marten. Habitat structure and prey similarities are being considered.

THE DISTRIBUTION OF PINE MARTEN PREY SPECIES IN SOUTHWEST MONTANA

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ABSTRACT

Fager (1991) found that pine marten (Martes americana) occupied some forested habitats in proportions greater than their relative occurrence. He hypothesized that an apparent selection for vegetation characteristics may involve selection for: 1) habitat type; 2) physical characteristics associated with certain growth forms of vegetation; or, 3) types that favor specific prey. A study of small mammals was conducted during August and September 1991, in conjunction with the Southwest Montana pine marten project, to determine if pine marten select habitats that favor a specific prey item. Mark-recapture methods were used in 2 areas of southwest Montana near West Yellowstone and in the Upper Big Hole, west of Wisdom. Four sites were trapped (90X90 m grids, 100 traps/grid) in each area for 3 nights, every other week for 6 weeks. Stomach contents of pine marten carcasses, collected statewide during the 1989-90 trapping season, revealed that small mammals (Microtus, Clethrionomys, and Peromyscus) made up 38.9% if items found in marten stomachs (Aune, pers. comm.). Small mammals made up the largest percentage of food items. We found that as numbers of small mammals increased, so did numbers of pine marten locations. However, this relationship was not apparent at West Yellowstone where mouse distribution by habitat showed that a Douglas fir habitat supported the highest density of mice. Biomass in 2 mesic subalpine fir and lodgepole/bitterbrush habitats was about the same. At Wisdom, the clear-cut grid was almost void of small mammals, whereas a spruce site had the highest biomass followed by xeric subalpine fir and lodgepole sites, respectively. When biomass decreased between trapping sessions (2 weeks), the rate of decrease among red-backed voles (Clethrionomys gapperi) was twice that observed among deer mice (Peromyscus maniculatus). However, the average "standing crop" of both species was similar. These data were not complete enough to conclude that pine marten were selecting vegetation types that favored a specific prey item. However, these data raise some interesting questions about the role small mammals play in the life history of pine marten.