

FINDINGS AND RECOMMENDATIONS FOR MANAGING WOLVES THAT MIGRATE INTO COLORADO

FROM THE COLORADO WOLF MANAGEMENT WORKING GROUP



Members of the Colorado Wolf Management Working Group at their December 14-15, 2004 meeting in Golden, CO

December 28, 2004

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EXECUTIVE SUMMARY

Dispersing wolves could enter Colorado as a result of expanding populations from recovery programs to the north and south, as evidenced by a wolf killed on Interstate 70 in June of 2004. In April of 2004, the Colorado Division of Wildlife (CDOW) appointed a 14-member Wolf Management Working Group (Working Group) to address management of wolves in Colorado, composed of four livestock producers, four wildlife advocates, two wildlife biologists, two sportsmen, and two local government officials.

The focus of the Working Group was on State management after the federal government removes the wolf from the protections of the Endangered Species Act (ESA). The Working Group met from June through December of 2004. They agreed to use consensus for their deliberations and for recommendations in the final report.

The Working Group agreed that there would be both positive and negative impacts from wolf presence in Colorado. Positive impacts could include restoration of ecological systems and aesthetic contributions to the Colorado landscape, while negative impacts could include depredation on domestic livestock and reduction of wild ungulate populations.

The Working Group finalized their recommendations by consensus to the CDOW in the following document.

Four guiding principles for wolf management were agreed upon:

- **Impact-Based Management:** Address positive and negative impacts of wolf presence.
- **Adaptive management:** Learn by doing, monitor, and apply new knowledge.
- **Monitoring:** Use various methods to track and understand wolf populations, livestock depredation, wild ungulate populations, and human attitudes.
- **Damage Payments/Proactive Measures:** Compensate for losses and encourage methods to minimize livestock-wolf conflicts.

Specific recommendations include the following:

- Migrating wolves should be allowed to live with no boundaries where they find habitat. Wolf distribution in Colorado will ultimately be defined by the interplay between ecological needs and social tolerance.
- If wolves are causing problems, manage to resolve the problem. When negative impacts occur, they should be addressed on a case-by-case basis utilizing a combination of appropriate management tools and damage payments. Allow take of

wolves to manage depredations. Flexibility should be maintained in the array of management tools available to accommodate changing circumstances over time. These management tools include a variety of lethal and non-lethal methods authorized under the Colorado Wildlife Commission regulation 1002.B.4 (federal Endangered Species Act 4(d) rule) for wolves in the Western Distinct Population Segment (WDPS).

- Wolf monitoring is an essential component of the plan. Monitoring can be conducted with different types of technology and at varying intensity levels based on local needs and CDOW discretion.
- It is in everyone's best interest to work towards solutions that will avoid or mitigate potential wolf-livestock conflicts. Opportunities should be available to livestock producers to implement non-lethal management tools and other proactive measures to reduce the potential for wolf-livestock conflict.
- The CDOW should operate a wolf damage fund for livestock losses. Funds should not be derived from sportsmen's dollars and should not encroach upon other game damage payment programs. Payments should cover 100% of confirmed losses and 50% of probable losses.
- The CDOW should, over time, bring the wolf into existing management programs and policies for other carnivores, such as mountain lions and black bears.
- The CDOW should work cooperatively with other agencies, organizations, and the private sector to achieve wolf management goals in a proactive manner.
- The CDOW should develop and implement an information, education and public outreach program to parallel wolf management activities in Colorado.

The Working Group recommends that the CDOW implement the management policies described in this document on behalf of the people of Colorado.

RECOMMENDATIONS

The Colorado Wolf Management Working Group reached consensus on the following recommendations for wolves that migrate into Colorado. It is essential that all the recommendations be considered together as a package. They are presented here under the same headings and in the same order as in the Working Group's Findings and Recommendations that follow, which provide additional background and context. Each recommendation has been given a number – however the numbers should not be interpreted to suggest priority or importance.

INTRODUCTION

Plan Goals

- 1) Accept a wolf presence in Colorado, contingent on the following:
 - Tools, flexibility, and funding to prevent potential conflicts with humans, livestock and wild ungulates/hunter opportunity, and habitat impacts.
 - Tools, flexibility, regulatory adjustments, and funding to manage in response to conflicts with humans, livestock, and wild ungulates.
 - A program and funding to provide damage payments for confirmed and probable livestock losses as a result of having wolves present.

MANAGEMENT

- 2) Migrating wolves should be allowed to live with “no boundaries” where they find habitat, and managed according to the following four principles:
 - Impact-Based Management
 - Adaptive Management
 - Monitoring
 - Damage Payments/Proactive Measures

Impact-Based Management

- 3) This plan is predicated on managing wolves in Colorado using “impact-based” management within an adaptive management framework that will allow the State the

maximum flexibility to manage wolves. The assumptions inherent in this impact-based approach are as follows:

- a) The presence of wolves in Colorado will have both positive and negative impacts.
- b) Impacts will vary in intensity and location based on a variety of factors including wolf distribution, density, and behavior; distribution, species, and density of livestock and wild ungulates; and land ownership patterns.
- c) Negative impacts can include, but are not limited to: depredation and harassment of livestock; loss of pets, herd dogs and guard animals; dispersal of wild ungulates and possible resulting property damage; changes in hunting or viewing opportunities; and declines below management objectives in ungulate populations and/or in ungulate recruitment rates.
- d) Positive impacts, where they occur, should be recognized and utilized, and can include, but are not limited to: an additional tool for managing the overpopulation of ungulates; dispersal of wild ungulates resulting in habitat improvement due to less pressure on the landscape, especially in riparian areas; a decreased possibility of disease transmission from ungulate overpopulation and concentration; tourism opportunities; and non-monetary values such as existence values and vicarious use.
- e) Wolves will be left wherever they are if they are not causing problems.
- f) Monitoring of wolf populations, livestock, wild ungulates, and human attitudes is an essential aspect of impact-based management.
- g) If wolves show up in places where conflict is likely (e.g., in proximity to livestock) measures should be taken to avoid problems, if possible, through the use of non-lethal methods. CDOW and USDA APHIS Wildlife Services¹ (Wildlife Services) will work with livestock producers to assess the situation and take appropriate action.
- h) If wolves are causing problems, manage to resolve the problem. When negative impacts occur, they should be addressed on a case-by-case basis utilizing a combination of appropriate management tools, including take of wolves and damage payments. Maintain flexibility in the array of management tools available to accommodate changing circumstances over time.

¹ Wildlife Services is a unit with the U.S. Department of Agriculture, Animal and Plant Health Inspection Service with responsibility to address and resolve damage caused by wildlife; examples include bird concentrations at airports and depredation on livestock.

- i) The CDOW may, at its discretion, reconvene the Wolf Management Working Group. This group would assist in finding resolution to unexpected or non-routine developments that are likely to occur.
- j) A high degree of cooperation and coordination among management agencies and the private sector is necessary to ensure that management actions and damage payments are efficient and timely.
- k) Education and understanding of issues, management actions, and consequences is a key component of successful wolf management in Colorado.
- l) Sufficient funds will be made available to implement all aspects of this plan.

Adaptive Management

- 4) As with any wildlife management program, the CDOW should anticipate that the wolf program will evolve through time. The CDOW should evaluate positive and negative impacts and new information annually and incorporate them into wolf management, and should review and modify its wolf management plan at least every five years after reviewing relevant peer-reviewed literature, input from the public, wildlife professionals, other state and federal agencies, etc. to insure the plan is kept current and that the management activities originating from it are effective and appropriate.
- 5) There should be ongoing efforts to assess public attitudes towards wolves and to keep the public informed and involved.

Wolf Monitoring

Monitoring Methods

- 6) Monitoring can be conducted with different types of technology and at varying intensity levels. These choices should be made by the CDOW based on the type of information needed to manage wolves in Colorado. Monitoring methods may include but are not limited to: aerial tracking, snow tracking, scent marking, howling surveys, radio collaring, remote photography, and genetic profiling.
- 7) The CDOW should consider all methods of monitoring, including new methods as they are developed. Corroborating evidence should be gathered using multiple methods, but specific protocols should be tailored to the pack, setting, and appropriate season for collecting that type of data.

Sighting Reports, Notification and Verification

- 8) When wolves are just beginning to migrate into the state, monitoring should begin with reports of sightings made to the CDOW. The CDOW should add the gray wolf to its occurrence/distribution report and track observation report forms, and plot the location of reports.

- 9) If there are several sightings over some period of time (e.g., a few weeks) and/or suspected livestock depredation from wolves occurs (in which case ranchers should contact the District Wildlife Manager (DWM) or local CDOW office), verification by a wildlife professional should take place. If this wolf presence is verified (which assumes more than an individual animal passing through an area) then the CDOW will use local conditions and its discretion in determining when to apply collars for monitoring purposes.
- 10) The CDOW should also work with residents to activate a local network (which will probably be structured differently in different communities – it might be a phone tree in some places) to contact individual ranchers to alert them to the wolf pack presence².
- 11) Additionally, there should be outreach, on a case-by-case basis, with producers about how to avoid depredation and report any problems.
- 12) The reporting system, including a protocol for reporting sightings, needs to be functioning as soon as possible, and should be well publicized.

Staffing

- 13) Even with a few wolves migrating into the State there needs to be explicit recognition of the staffing needs associated with all aspects of wolf management.
- 14) Land and wildlife agency partnerships could also improve the cost effectiveness of fulfilling Colorado's wolf management responsibilities and are highly recommended.

Trapping

- 15) In order to utilize the research exemption provided by CRS 33-6-203, also called Amendment 14, the CDOW would need to develop specific research proposals.

Managing Wolves with Other Predators

- 16) In balancing overall wildlife conservation and management, the CDOW should, over time, bring the gray wolf into the existing management framework, programs, and policies for other carnivores, such as mountain lions and black bears.

Management Authority for Control of Depredating Animals

- 17) The Working Group recommends that the CDOW develop a Memorandum of Understanding with Wildlife Services and the Colorado Department of Agriculture (CDOA) that will outline Wildlife Service's role and specify cost-sharing between the

² Some members of the Working Group expressed concern about the potential of such a notification system to promote illegal take by individuals who oppose wolves. Whatever system is put into place needs to address this issues as well as protecting the interests of those who want to try to prevent livestock depredation.

two agencies for wolf management in Colorado (i.e., respond to reports of livestock depredation, assist the CDOW in capturing, monitoring and/or removing wolves, etc.).

Wolf Management Tools

Non-Lethal Methods

- 18) The use of such management practices (referring to non-lethal methods) should not be a requirement for damage payments if a livestock producer experiences depredation by wolves.
- 19) Government and private organizations should be encouraged to assist livestock producers and landowners in designing and implementing proactive husbandry practices. Wildlife Services and the CDOW should work cooperatively in a proactive manner, with interested livestock producers and non-governmental organizations (NGOs) to provide information and assistance regarding use of non-lethal methods. Technical assistance may take the form of guidance on carcass disposal, extra fencing, deploying scare devices, and testing of developmental non-lethal control methods.
- 20) Producers should be rewarded for their willingness to cooperate in experimental protocols testing non-lethal management tools, such as scaring devices or noise-makers, and for taking voluntary measures to reduce the potential for wolf-livestock conflict.
- 21) Funding for such voluntary measures should not be taken from damage payment programs.

Law and Enforcement

State Laws Protecting Wolves

- 22) Violations of game laws applying to wolves should be reported to the CDOW through the Operation Game Thief (OGT) program.
- 23) The CDOW should inform and educate the public about the laws related to wolf take.

Bounty Law

- 24) The Working Group agrees that the bounty law on wolves (CRS 35-40-107 and 108) is antiquated and recommends that it be repealed.

Interagency Coordination

- 25) The CDOW should work with other federal and state agency personnel to coordinate surveys to determine wolf occurrence, status, and habitat use.

- 26) At the field level, the CDOW should work closely with Wildlife Services agents (as well as the counties having contracts with Wildlife Services) in their areas to achieve a timely and appropriate management response to livestock depredation and ensure accurate record keeping.

Wolf Health and Disease

- 27) Monitoring and surveillance of wolf health should be conducted by the CDOW to provide baseline information to inform future wolf management.
- 28) If live-capture operations are conducted, overall wolf health should be assessed, including presence of external parasites.
- 29) Necropsies should be performed on wolf carcasses to determine cause of death, condition, age, reproductive status, and food habits. General protocols should be followed to collect reproductive tracts, stomach and colon contents, muscle tissue for genetic purposes, and any potentially diseased or parasitized tissues.
- 30) Other sampling or testing may be conducted, depending on the request or concerns of the submitting party and the condition of wolf remains.

Research

- 31) Research by the CDOW and its partners will be an important component in wolf management, and should include projects directed to assessing wolf population status and distribution, wolf-livestock interactions (including management practices that may result in reduced wolf depredation to livestock, livestock guard and herding animals, and dogs); and wolf-wild prey-habitat interactions (e.g., the effects of wolf predation, severe weather, and habitat health on ungulate numbers, herd composition, and distribution).
- 32) Wolf research findings from other areas should be applied as appropriate, and can provide guidance in developing management and research programs in Colorado.

Captive Wolves and Wolf-dog Hybrids

- 33) The Working Group recommends that wolf-dog hybrids should not be released into the wild.

Wolf-Human Conflicts

- 34) The CDOW should take steps to educate the public in order to reduce the potential for wolf-human conflicts and minimize the risks of human injury due to wolf presence in the State.

- 35) The CDOW's approach to wolf-human interactions should model the policies for addressing mountain lion-human or bear-human conflicts.
- 36) In an effort to prevent situations that would attract carnivores and present a threat to public safety, the CDOW should continue to discourage the public from artificially feeding wildlife or allowing wild animals access to human foods, garbage, pet food, livestock feed, or birdseed.
- 37) The CDOW should discourage habituation of wolves with humans and then respond to conflicts where and when they develop.
- 38) The CDOW should promptly remove any wolf determined to be a threat to human life or safety.
- 39) If a wolf is killed in defense of life or property, citizens should not disturb the carcass; protect the scene from disturbance; and report the incident to the CDOW as soon as possible, but within 72 hours. The entire carcass should be returned to the CDOW. The CDOW or Wildlife Services will conduct a field investigation.

INFORMATION AND EDUCATION

- 40) The CDOW should develop and implement an information, education, and public outreach program to parallel wolf management activities in Colorado, drawing upon information available from sources such as tribal, state and federal agencies, and NGOs.
- 41) The objective of the public education program should be to provide scientifically based, factual information regarding the gray wolf and its management in Colorado, in hopes that the public will become more knowledgeable, and more objective about this species and its management.
- 42) The CDOW should coordinate with other sources distributing information about wolves in Colorado to achieve its public education objective.
- 43) Informally, personnel from all CDOW divisions should disseminate information to the public on a routine basis, much as they already do for other fish and wildlife species in Colorado.
- 44) As needed, the CDOW should partner with volunteers, other agencies, and the private sector to implement the education and public outreach program.
- 45) The audience of the education program should include, but not be limited to, the general public, students, visitors to the state, sportspersons and outdoor recreationists, the agricultural community, wildlife advocates, and agency personnel.

- 46) While the specific emphasis may differ by audience, it is important to convey some basic information to everyone, such as wolf numbers and distribution in Colorado, identification and ecology of the species, and guidelines for the ethical viewing of wolves. The values and challenges of wolf management should also be conveyed.
- 47) In addition to this basic information, specific information should be targeted to specific audiences.
- 48) Given the broad spectrum of interests with a stake in wolf management, the education program should utilize a variety of methods and outlets to adequately fulfill this fundamental component of Colorado's Wolf Management Plan.

DAMAGE PAYMENTS FOR WOLF DEPREDAATION

Program Administration

- 49) The CDOW should operate a wolf damage fund within the Colorado Game Damage Program, but the funds for wolf damage payments and staff to administer the program should not be derived from sportsmen's dollars and should not encroach upon other game damage payment programs.
- 50) Under current regulations, the Colorado Game Damage Program could not be applied to wolves because they are not classified as big game. The Working Group recommends a statutory change if necessary to allow payment through the wolf damage fund.
- 51) Confirmed kills would be paid at 100% (current market value, fall market value, or original purchase price, whichever is greater), and probable kills would be paid at a rate of 50% of market value. Guard and herding animals would also be eligible for payment under the program.
- 52) Wolf management expenses and damage payments should not encroach upon or negatively impact the current game damage program for bears and lions; other CDOW activities or programs; or the existing predator management programs for coyotes, bears, and lions under Wildlife Services.
- 53) The CDOW should manage wolves so that livestock producers and sportsman do not bear the cost of having wolves present in Colorado.
- 54) The CDOW should use its discretion in paying damage claims and managing depredation control programs in a manner that does not invite abuse.
- 55) DWMs should review applications for wolf damage payments and either approve payment or recommend denial, as currently occurs under the existing program for bears and mountain lions.

- 56) A known presence of wolves (den or rendezvous site) could be one among several criteria considered in making a decision regarding compensation. Wolf presence should be documented by CDOW/Wildlife Services.
- 57) If denial of payment is recommended, the application should be referred to the Colorado Wildlife Commission for final review and decision.
- 58) Livestock producers who experience an incidence of depredation from wolves should have the option of applying for damage payments from either the wolf damage fund or the Defenders of Wildlife Bailey Compensation Trust, but not both of these programs.

Verification and Notification Process

- 59) Verification, notification, reporting, and payment processes should be as efficient and straightforward as possible.
- 60) Livestock producers should report any suspected wolf depredations (injuries or death) or the disruption of livestock or guarding animals to Wildlife Services directly (or the DWM if Wildlife Services is not available), as is the case for other wildlife species such as mountain lions. Any evidence at the scene should be protected from disturbance.
- 61) If Wildlife Services or CDOW personnel are not available to investigate, then the livestock producer should fill out a report form and record that third-party verification was requested but not fulfilled.
- 62) The CDOW should establish a database to tabulate, summarize, and assess trends in wolf-livestock conflicts.

PREY POPULATIONS: CONSERVATION AND MANAGEMENT

Predator - Prey Interactions

- 63) Management programs should recognize that predator-prey interactions are another natural factor affecting ungulates and one that will also change through time.

Wild Ungulate Management

- 64) Since elk and mule deer are expected to be the primary prey species of wolves in Colorado, the CDOW should consider wolf predation, along with the other factors.
- 65) The CDOW should continue to strive to maintain healthy, viable wildlife populations and their habitats through the application of sound wildlife management principles.

- 66) When predator populations are inhibiting the ability of the CDOW to attain management objectives for other wildlife populations and the CDOW determines that predator control actions are necessary, such control actions should be directed by a species management plan that contains information addressing predator management and strategies to implement predator control.
- 67) Wildlife managers and administrators implementing predator management and/or predator control strategies should also consider ecological relationships that will be affected.

BUDGET AND FUNDRAISING

- 68) The Working Group recommends that funding for wolf management come from sources other than hunting license sales.
- 69) The Working Group recommends that the CDOW identify specific funding sources for wolf management.
- 70) If something like the CDOW Prairie Conservation Program is implemented for wolves, then funds for such a program should not come from the game cash fund.

I. INTRODUCTION

A. Purpose

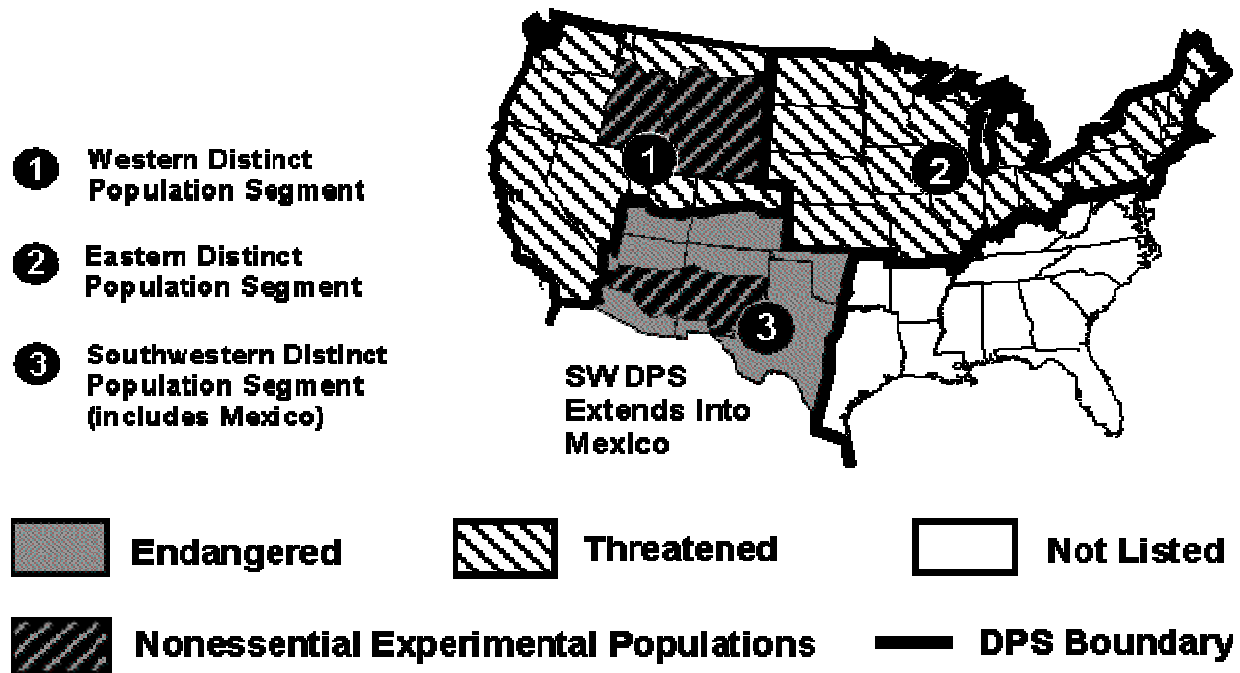
The purpose of this document is to recommend policy for managing wolves that migrate into Colorado. It also suggests programmatic direction and a spectrum of management activities for the CDOW to address potential wolf-livestock conflicts, maintain viable prey species populations, address other management issues, and gain the support of people with diverse interests. In preparation for assuming management authority for wolves in Colorado CDOW determined it was prudent to begin work on a Colorado wolf management plan. Once wolves are removed from endangered species status under the ESA, the Colorado wolf management plan will guide CDOW managers and others responsible for the planning and policy decisions that affect wolf management in Colorado and decision-making at the field level. Personnel of other State or federal agencies may also use this plan as a source of information and guidance. The plan can also serve as a source of information and provide recommendations to the Colorado Wildlife Commission. However, the plan will not preempt Colorado Wildlife Commission authority to formulate annual rules, set hunting regulations, or implement emergency actions in response to unexpected events or circumstances.

B. Status of Wolves

Historically distributed throughout nearly all of North America, the gray wolf (*Canis lupus*) was gradually extirpated from the contiguous 48 states except Minnesota. Gray wolves were classified as endangered under the ESA in 1973. Subsequently, recovery plans were developed to restore the species in three regions: the eastern U.S., the northern Rockies (Montana, Idaho, and Wyoming) and the Southwest (Arizona and New Mexico).

Gray wolves are now expanding in number and distribution in portions of the upper Midwest and the northern Rockies as a result of natural dispersal into Montana from Canada and the reintroduction of wolves into Yellowstone National Park (YNP) in Wyoming and into the wilderness areas of central Idaho. One wolf, originating in YNP, traveled on its own into Colorado in June 2004, and was killed on Interstate 70. Wolves are likely to be removed from the federal endangered species list in the near future in the Western Distinct Population Segment (WDPS), which includes Colorado north of Interstate 70. Federal regulations (68 FR 15804 – 15875) finalized in April of 2003 divided Colorado into two areas for purposes of federal management of wolves. The WDPS includes all of California, Oregon, Washington, Idaho, Montana, Wyoming, the northern portions of Colorado (north of Interstate 70), and northern Utah. The Southwestern Distinct Population Segment (SWDPS) includes Arizona, New Mexico, portions of Texas and Oklahoma, and the southern portion (south of Interstate 70) of Colorado.

Status of the Gray Wolf in the Contiguous U.S. April 2003



Source: U.S. Fish and Wildlife Service

Upon delisting from the federal ESA, management authority for wolves will return to state governments. In the North American model of wildlife conservation, the U.S. Fish and Wildlife Service (USFWS) manages species that are listed as endangered under the ESA and states have management authority over wildlife under most other circumstances. There are exceptions for migratory birds, when species are present on certain reserved lands such as national parks, when Native American treaty rights apply, and on tribally owned lands in some states including Colorado. The CDOW is the resource agency charged under Colorado State statute with the responsibility to manage resident wildlife, including wolves after they are removed from the endangered species list.

C. Colorado Wolf Management Working Group Process

The CDOW recognizes that the people of Colorado should have the opportunity to provide input and deliberate how wolves are managed. To fulfill this public trust, the CDOW held a series of public scoping meetings around the state and created the Colorado Wolf Management Working Group (Working Group) in June 2004. A brief summary of the scoping report is included in Appendix D. The full scoping report can be found at <http://www2.merid.org/graywolf/documents.php>.

The CDOW Director, Bruce McCloskey, asked the Working Group to give priority to a draft plan for managing wolves that migrate into Colorado, i.e., for when only a few wolves are present in the State. Director McCloskey left open the possibility that the Working Group could discuss wolf recovery and/or reintroduction at a later time, as long as the issue of wolves migrating into the State was addressed. Consequently, this document deals exclusively with management of a few wolves migrating into Colorado from other states. Recommendations for managing larger numbers of wolves and the possibility of recovery and/or reintroduction will be dealt with separately.

The Working Group was composed of 14 volunteers from around the State who represented a variety of interests including: livestock producers (four), environmentalists/wildlife advocates (four), sportsmen (two), local government (two), and wildlife biologists (two). Members served voluntarily, at the request of the CDOW Director. An Interagency Technical Committee (Technical Committee) advised the Working Group, providing scientifically based information about biological, technical, legal, and financial aspects of wolf management. The Technical Committee also helped the Working Group identify and assess challenges associated with implementing overall management strategies and specific management actions. Working Group, Technical Committee and facilitation team members are listed in Appendix B.

The Working Group held six meetings around Colorado between June and December 2004. With assistance from the Meridian Institute facilitation team, and using an interest-based process, the Working Group identified and deliberated issues related to wolf conservation and management, livestock depredation, damage payments for livestock losses, management of prey populations, and other pertinent issues. This document summarizes the Working Group findings and recommendations, which originated from their personal research and experiences; interests represented by members; published

research on wolves; and information and ideas provided by the Technical Committee and invited speakers from state and federal agencies, NGOs and the private sector³. The Working Group also solicited and considered input from the public. All of the Working Group meetings were open and included opportunities for public questions and comments. The Working Group agreed early on that all members would strive to develop a plan that would be acceptable to all the interests around the table. They arrived at their findings and recommendations by consensus.

The document is organized into seven chapters. The first two chapters, I. Wolf Biology, Ecology, and Behavior and II. Values and Challenges Associated with Wolves in Colorado, provide background and context. The chapters that follow contain the Working Group's recommendations. These are: III. Wolf Management, IV. Information and Education, V. Damage Payments for Wolf Depredation, VI. Conservation and Management of Prey Populations, and VII. Budget and Fundraising for Wolf Management.

D. Plan Goals

The Working Group agreed on two goal statements to guide its work:

Process Goal: Develop a plan that is acceptable to all the interests around the table, looking at both potential impacts and benefits.

Substantive Goal: Develop a plan that advises the CDOW about managing the presence of wolves in Colorado.

The following agreement was made early on by the Working Group members as a guide for their deliberations:

Accept a wolf presence in Colorado, contingent on the following:

- Tools, flexibility, and funding to prevent potential conflicts with humans, livestock and wild ungulates/hunter opportunity, and habitat impacts.
- Tools, flexibility, regulatory adjustments, and funding to manage in response to conflicts with humans, livestock, and wild ungulates.
- A program and funding to provide damage payments for confirmed and probable livestock losses as a result of having wolves present.

The goal of this plan is to manage wolves within the constraints of today's ecological, social, and political landscapes. Recognizing that wolves can have both positive and

³ The Working Group was privileged to hear presentations by Ed Bangs, USFWS Coordinator for the WDPS; Bruce Malcolm, rancher and member of the MT wolf management stakeholder group; Craig Miller, Defenders of Wildlife; Steve Nadeau, ID Department of Fish and Game; Bryce Reece, WY Wool Growers Association, and; Carolyn Sime, Gray Wolf Coordinator with MT State Fish, Wildlife and Parks.

negative impacts, the Working Group agreed that wolves in Colorado should be managed flexibly with an impact-based "live and let live" approach. Wolves that cause no problems will be left alone, but wolves that are having a negative impact on livestock or ungulate herds will have to be managed or removed on a site-specific basis. This will occur within an adaptive management paradigm and allows managers to learn from and respond to a variety of positive and negative impacts that may arise from the presence of wolves in Colorado. As circumstances change and Colorado-specific experience is gained, the tools available to managers will be refined.

II. WOLF BIOLOGY, ECOLOGY AND BEHAVIOR

A. Physical Characteristics

The gray wolf is the largest of the wild canids. It stands 65-80 centimeters at the shoulders. Total length (nose to tip of tail) is 1.3 to 1.5 meters with some individuals approaching 1.8 meters; and weight ranges from 36 to 50 kilograms. Males are heavier than females (Ginsberg and Macdonald 1990). It has a long bushy tail and erect, slightly rounded ears. Its legs are longer, feet larger, and chest narrower than a dog of similar size. The wolf has long, thick, coarse fur that is typically grizzled gray but that can vary from black through white. The most common pelt colors in the northern Rocky Mountains are grizzled gray and black (USFWS 1994). Wolves in the Southwest average 25 to 49 kilograms (McBride 1980, Leopold 1959, Young and Goldman 1944), with coat color ranging from a mix of buff, gray, red, and black (USFWS 1982, Nowak 1995).

B. Pack Size

The gray wolf is a highly social species that lives in packs. Packs are formed when male and female wolves develop a pair bond, breed and produce pups. The pack typically consists of a socially dominant breeding pair (alphas), their offspring from the previous year, and new pups. Other breeding-aged adults may be present, but they may or may not be related to the others. Cooperatively, the pack hunts, feeds, travels, and rests together. The pack also shares pup-rearing responsibilities, including hunting and tending pups at the den or at a series of rendezvous sites. Pack size is highly variable (USFWS et al. 2001). In the Greater Yellowstone Area (GYA), pack size ranges from 5 to 27 and averages 9.3. Average pack size is larger inside YNP (14.6 individuals) than outside (5.8 individuals) (Smith et al. 2000). Pack size of wolves in the Southwest averages 4.8 animals (Oakleaf et al. 2004).

C. Reproduction

Wolves normally do not breed until at least 22 months of age (Kreeger 2003). Breeding usually occurs only between the dominant male and female in a pack. The dominant pair in a pack produces most of the offspring, although 20-40% of packs consisting of two or more reproductively mature females produce more than one litter per year (Mech 1991). This phenomenon has been documented in YNP (Smith et al. 2000, USFWS 2000, USFWS et al. 2001). In 1999, one pack had two litters. In 2000, 13 wolf packs produced 16 litters. Occasionally this phenomenon leads to the formation of a new pack (Boyd et al. 1995).

In the northern Rockies, the breeding season peaks in mid to late February (Boyd et al. 1993). Wolves localize their movements around a den site and whelp in late April, following a 63-day gestation period. Reproduction occurs about two weeks earlier in wolves in the Southwest than in other areas of North America (Oakleaf et al. 2004). After the pups are about eight weeks old, they are moved to a series of rendezvous sites.

In northwest Montana, maximum litter size averaged 5.3 (range 1-9) from 1982 to the mid-1990s. By December, average litter size declined to 4.5 (Pletscher et al. 1997). In central Idaho, average litter size was 5.1 from 1996-1998 (Mack and Laudon 1998).

Pup survival is highly variable and influenced by several factors, including disease, predation, and nutrition (Mech and Goyal 1993, Johnson et al. 1994). In northwestern Montana from 1982-1995, 85% of pups survived until December, though survival varied year to year (Pletscher et al. 1997). Pup mortality in the first eight months of life was attributed to human causes (8 of 20 mortalities, 40%), unknown causes (2 of 20, 15%), and disappearance (9 of 20, 45%). In YNP, during the first four years, 133 pups were born in 29 litters and 71% were believed to still be alive in 1998 (Bangs et al. 1998). Pup survival varied between 73% and 81% from 1996-1998. However, canine parvovirus was strongly suspected as a contributing factor in the low pup survival (45%) in 1999. In 2000, pup survival rebounded to 77% (Smith et al. 2000).

D. Food Habits

The gray wolf is an opportunistic carnivore that is adapted to hunt large ungulate prey species such as elk, deer, and moose. Ungulate species compose different proportions of wolf diets, depending on the relative abundance and distribution of available prey within the territory. Ninety percent of the diet of wolves in the Southwest has been found to consist of elk (Oakleaf et al. 2004). Research in northwestern Montana also documented non-ungulate prey species, such as ruffed grouse, raven, striped skunk, beaver, coyote, porcupine, and golden eagle (Boyd et al. 1994). Wolves may also scavenge carrion or even eat vegetation. Wolf scat collected in YNP in 1998 contained voles, ground squirrels, snowshoe hare, coyote, bear, insects, and vegetation (Smith 1998). Wolves may also kill and feed upon domestic livestock such as cattle, sheep, llamas, horses, or goats. They may also kill domestic dogs but usually do not feed on the carcass. In Colorado, elk will likely make up the majority of wolves' diets.

E. Movements and Territories

A pack establishes an annual home range or territory and defends it from other wolves. From late April until September, pack activity is centered at or near the den or rendezvous sites, as adults hunt and bring food back to the pups. One or more rendezvous sites are used after pups emerge from the den. These sites are in meadows or forest openings near the den, but sometimes are several miles away. Adults will carry small pups to a rendezvous site. Pups travel and hunt with the pack by September. The pack hunts throughout its territory until the following spring.

Pack boundaries and territory sizes may vary from year to year. Similarly, a wolf pack may travel in its territory differently from one year to the next because of changes in prey availability or distribution, intra-specific conflict with nearest neighbors, or the establishment of a new neighboring pack. Because the attributes of each pack's territory are so unique (elevations, land use, land ownership patterns, prey species present, and

relative abundance, etc.), it is difficult to generalize about wolf territories and movements.

Wolves in the GYA demonstrated a greater tolerance of human presence and disturbance than previously thought characteristic of the species. It was previously believed that higher elevation public lands would comprise the primary occupied habitats (Fritts et al. 1994). While some packs have established territories in backcountry areas, most preferred lower elevations and gentle terrain where prey is more abundant, particularly in winter (Boyd-Heger 1997). In some settings, geography dictates that wolf packs use or travel through private lands and co-exist in close proximity with people and livestock.

The earliest colonizing wolves in northwestern Montana had large territories. Ream et al. (1991) reported an average of 460 square miles (mi^2). In recent years, average territory size decreased, probably as new territories filled in suitable, unoccupied habitat. In the Northwest Montana Recovery Area during 1999, the average territory size was 185 mi^2 (eight packs). Individual territories were highly variable in size, with a range of $24\text{-}614 \text{ mi}^2$ (USFWS et al. 2001).

Territories in the GYA were larger, averaging 344 mi^2 (11 packs). Individual pack territories ranged from 33 to 934 mi^2 . Central Idaho wolf packs had the largest average territory size of 360 mi^2 (13 packs), with individual pack territories ranging from $141\text{-}703 \text{ mi}^2$ (USFWS et al. 2001). Average home range of 18 packs of wolves in the Southwest is 182 mi^2 (Oakleaf et al. 2004).

F. Dispersal and Pack Formation

Wolves expand their range via dispersal, usually settling into unoccupied territories within 50-100 km of their natal pack⁴ (Gese and Mech 1991, Wydeven et al. 1995). When wolves reach sexual maturity some remain with their natal pack while others leave, looking for a mate to start a new pack of their own. These individual wolves are called dispersers and they account for 10%-30% of individuals in a wolf population (Gese and Mech 1991). This mobility of wolves provides for significant genetic exchange across regions, repopulation following wolf reductions (Stephenson et al. 1995), and source animals for recolonization. Dispersing individuals may move to nearby unoccupied habitat near their natal pack's territory or they may move several hundred miles before locating vacant habitat, a mate, or joining another pack (Mech 1970). Dispersal seems to peak in January-February, a period when intra-specific aggression is high (Ballard et al. 1987, Boyd and Pletscher 1999). Dispersers in colonizing populations have been found to move, find mates, and establish territories quickly (Boyd and Pletscher 1999, Fritts and Mech 1981). Mountainous habitat with its non-contiguously distributed packs likely encourages dispersing wolves to move quickly through the landscape (Boyd and Pletscher 1999). In a colonizing population, males and females dispersed in proportion to their numbers in the source population, and generally when they were between two and

⁴ Longer distance dispersals are not unknown. In Alaska, wolves will disperse hundreds of kilometers from their natal range, (e.g., Denali National Park to the AK National Wildlife Refuge) (Stephenson et al. 1995). Dispersers in the central Rocky Mountain Recovery Area moved up to 800 km (Boyd and Pletscher 1999).

three years old (Boyd and Pletscher 1999). New packs may be formed when two dispersing wolves from separate packs meet in unoccupied territory (Mech 1970). When settled into a new territory, dispersers produced more litters than did animals that did not disperse (Boyd and Pletscher 1999).

G. Mortality

Wolves die from a variety of causes, usually classified as either natural or human-caused. Naturally caused mortalities result from territorial conflicts between packs, injuries while hunting prey, old age, disease, starvation, or accidents. In an established Alaskan wolf population largely protected from human-caused mortality, most wolves were killed by other wolves - usually from neighboring packs (Mech et al. 1998). However, in the northern Rockies, natural mortality probably does not regulate wolf populations (USFWS 2000). Humans are the largest cause of wolf mortality and the only cause that can significantly affect populations at recovery levels (USFWS 2000). Human-caused mortality of wolves includes control actions to resolve conflicts, legal and illegal killings, as well as vehicle collisions.

H. Interactions with Other Species

Carnivores affect prey directly and indirectly, and ultimately exert an influence that cascades through the trophic levels of an ecosystem (Estes, et al. 2001, Miller, et al. 2001). Through predation, carnivores can reduce numbers of prey (Schoener and Spiller 1999) and, because prey animals change their behavior to avoid predation, carnivores also have an indirect effect (Schmitz 1998, Brown 1999). Long-term monitoring data from Isle Royale has shown that predation affects the number and behavior of moose, which consequently affects forest species composition and soil nutrient dynamics (McLaren and Peterson 1994, Post et al. 1999).

The published literature on wolves demonstrates the complexity of inter-relationships between wolves, other carnivores, prey species, and the biotic and abiotic environment. Wolves can function as a “keystone species,” which exists at relatively low abundance and whose effect on its ecosystem is relatively large and involves multiple trophic levels (Power et al. 1996, Estes 1996, Soulé et al. 2003). Further, the absence of wolves from their former range may result in simplification of ecosystems (loss of species diversity) (Soulé et al. 2003). Recent studies in YNP suggest that wolves have a direct effect upon the abundance, distribution and age class of aspen and willows because of the fact that wolf presence increases the vigilance and movement of large herbivores (Ripple and Beschta 2003). A wide variety of scavengers and other carnivores benefit from carrion being readily available year round, rather than just a pulse in the early spring because of winterkill (Stahler et al. 2001). Wolves may directly or indirectly compete for food with other carnivores (e.g. mountain lion) by selecting similar prey, or by usurping kills (Kunkel et al. 1999). Wolves sometimes kill (Boyd and Neale 1992, Mech 1970) or are killed by (Ligon and Pullianen 1944) other carnivores, such as mountain lions and black bears. In addition, there is some evidence that high densities of wolves may reduce populations of coyote, wolverine, and lynx (Mech 1970).

III. VALUES AND CHALLENGES OF WOLVES IN COLORADO

The State of Colorado has an obligation to conserve and manage native wildlife in its borders and will implement programs to make sure that wolves are included as a part of its wildlife heritage. There are a number of values and challenges associated with developing a management plan for wolves in Colorado.

A. Ecological Values and Challenges

Values

Predatory mammals such as the gray wolf are probably vital to the integrity of many ecosystems (Estes 1996). Interactions between top-level carnivores and prey species through evolutionary time have shaped and fine-tuned each one morphologically and behaviorally into what they are today. In the absence of those functional relationships, ecological systems may be incomplete.

Top-level carnivores may speed up nutrient cycling, provide carrion for other species, cull sick or weak animals, influence the way prey species use the landscape (Bescheta 2003, Ripple et. al 2001), and contribute to biological diversity as exhibited in YNP (USFWS et al. 2003). Broader habitat management and conservation purposes are also served by the presence of large carnivores such as the gray wolf (Fritts et al. 1994).

Challenges

One of the most fundamental challenges of wolves returning to Colorado is the uncertainty of the outcome, as a large carnivore that has been missing for decades resumes its functional role in the ecosystem. Biologists can only predict the effects of restored wolf populations on prey populations or other wildlife based on what is known from other places.

The uncertainty about the nature, cause, magnitude, and mechanisms of wildlife population fluctuations is further complicated by the presence of wolves. The last time wolves were present with high prey densities in the lower 48 states, bison still roamed the Great Plains. Today, wolf-prey relationships are influenced by many factors, including habitat modification and fragmentation by humans, land management activities, changes in prey species distribution and numbers, economics, and social and political factors - all of which, individually, are highly dynamic. Predator-prey relationships generally, and wolf-prey relationships have been studied extensively in North America (Mech and Peterson 2003, NRC 1997); yet the results of each study were unique to the study area, as were the conditions prevailing at the time the research was conducted (e.g. predator species present, predator density, prey species present, prey density, winter severity, drought, etc.). Consequently, obtaining Colorado-specific information will be critical to the success of this plan.

B. Social, Cultural, and Aesthetic Values and Challenges

Values

The gray wolf symbolizes the diversity of American thought, values, and opinions. From persecuted beast, to dogged survivor, to the top of the food chain in America's first national park, the gray wolf's lot and human attitudes have gone full circle. Yet, there remains a great diversity in the social, cultural, and aesthetic values that Coloradoans assign to gray wolves.

In the days of European settlement and for centuries thereafter, wolves were viewed unfavorably because they killed livestock during a period of dramatic declines in native prey populations. Wolves were also perceived as a negative, controlling influence on prey populations. However, public opinion about predators and wolves, in particular, evolved through the 1960s and 1970s. The gray wolf came to symbolize changing attitudes about wildlife, the environment, and public lands. Finally, with the passage of the ESA and similar laws in the states, changing attitudes were institutionalized. Increasingly, the national public embraced the wolf as a symbol of wilderness and the call to save imperiled species. The calls were simultaneously reinforced by the media, which promoted broad public interest in wolves and their ultimate restoration into former habitats in the northern Rockies. As evidenced in the State of Colorado Wolf Management Plan Scoping Report (Wald 2004), a Colorado State University study (Manfedo et al. 1994), and a 2001 public opinion poll (Decision Research 2001), the majority of Coloradoans are in favor of having wolves in Colorado. These results are available at <http://www2.merid.org/graywolf/documents>.

Challenges

The greatest challenges associated with wolf management today derive from social and political rather than biological issues. Fritts et al. (1994) speculated that perhaps no other wildlife species is as affected by human perceptions and attitudes than is the gray wolf.

Most livestock organizations and some hunting advocates are against wolf recovery and restoration efforts and legal protections afforded wolves by the ESA. Opposition stems from concerns about wolf depredations on livestock and the associated economic losses, loss of management flexibility by federal and state land management agencies, land-use restrictions, impacts to big game populations, and reduced hunting opportunity.

Public opinions in Colorado vary. Colorado has a dispersed rural population, an urban population concentrated mostly along the front range, agriculture and livestock interests, and expanses of land that could support wolves (Bennett et al. 1994, Carroll et al. 2003). Many urban residents want to have a sustainable wolf population in Colorado; while many livestock producers and some rural communities do not want any wolves in the State. Because the attention people pay to wolves is not balanced with the relatively minor impact wolves have on the lives of most people, wolf management will probably remain complicated, expensive, political, and controversial (Bangs et al. 1998).

The same public sentiments that promoted wolf recovery and protection often oppose management and lethal removal of wolves (Mech 1995). This irony has led many wolf experts to emphasize the need for balanced public outreach and education programs that incorporate the rationale of wolf control as a part of any wolf restoration program (Fritts et al. 1995).

C. Economic Values and Challenges

Values

Wolf tourism has had a significant economic value in many areas where wolves have been restored. Colorado is well known for its national parks, wilderness areas, vast expanses of public lands, and a high quality environment that sustains healthy populations of native fish and wildlife. Visitors and residents alike enjoy hunting, fishing, wildlife viewing, and other forms of outdoor recreation. With enhanced marketing, ecotourism associated with the gray wolf is a potential area for economic growth in Colorado. Already in Colorado, guiding and outfitting services for nature tours, wildlife observation, wildlife photography, and “outdoor adventures” have grown in popularity. The presence of wolves diversifies the opportunities associated with this type of economic activity.

Niche marketing opportunities may exist for some livestock producers who voluntarily choose to change management practices in an effort to coexist with wolves.

Challenges

The imbalance of the economic and social costs of a wolf population in Colorado to those directly affected by the presence of wolves – livestock and agriculture interests and associated businesses, some hunting interests and associated businesses, and agencies – versus those not directly economically impacted, but desiring a wolf population in Colorado, presents a major challenge for wolf management.

It has been found that some, but not all livestock producers experience significant direct and/or indirect economic impacts due to wolf presence or depredation (Bangs et al. 1998). To date, in the GYA and Central Idaho, confirmed wolf-caused livestock losses have been less than predicted (USFWS et al. 2003). However, wolf populations are currently recovering in many areas (Mech 1995, Bangs et al. 1998) and livestock depredations have concurrently increased in areas where recovery areas overlap agricultural lands (USFWS et al. 2003).

Since 1987, Defenders of Wildlife, a non-profit organization, has paid for confirmed or highly probable wolf-caused livestock losses in Montana, Wyoming, and Idaho for livestock producers who wanted to take advantage of the program (Bangs and Shivik 2001). However, it is difficult to estimate economic losses due to unconfirmed livestock losses or the indirect economic costs associated with wolf presence or depredation (Oakleaf et al. 2003, Bangs et al. 1998).

For hunting-related businesses, economic losses may be associated with decreased hunter opportunity or fewer recreational days afield, which may reduce hunter expenditures or participation rates. Ultimately hunter opportunity will probably fluctuate as predator and prey populations change through time. The economic benefits associated with the hunting and fishing industry contribute significantly to the Colorado economy and need to be protected.

IV. MANAGEMENT

Migrating wolves should be allowed to live with “no boundaries” where they find habitat and managed according to the following four principles:

- Impact- Based Management
- Adaptive Management
- Monitoring
- Damage Payments/Proactive Measures

A. Impact-Based Management

This plan is predicated on managing wolves in Colorado using “impact-based” management within an adaptive management framework that will allow the State the maximum flexibility to manage wolves. The assumptions inherent in this impact-based approach are as follows:

- The presence of wolves in Colorado will have both positive and negative impacts.
- Impacts will vary in intensity and location based on a variety of factors including wolf distribution, density, and behavior; distribution, species, and density of livestock and wild ungulates; and land ownership patterns.
- Negative impacts can include, but are not limited to: depredation and harassment of livestock; loss of pets, herd dogs and guard animals; dispersal of wild ungulates and possible resulting property damage; changes in hunting or viewing opportunities; and declines below management objectives in ungulate populations and/or in ungulate recruitment rates.
- Positive impacts, where they occur, should be recognized and utilized, and can include, but are not limited to: an additional tool for managing the overpopulation of ungulates; dispersal of wild ungulates resulting in habitat improvement due to less pressure on the landscape, especially in riparian areas; a decreased possibility of disease transmission from ungulate overpopulation and concentration; tourism opportunities; and non-monetary values such as existence values and vicarious use.
- Wolves will be left wherever they are if they are not causing problems.
- Monitoring of wolf populations, livestock, wild ungulates, and human attitudes is an essential aspect of impact-based management.

- If wolves show up in places where conflict is likely (e.g., in proximity to livestock) measures should be taken to avoid problems, if possible, through the use of non-lethal methods. The CDOW and Wildlife Services will work with livestock producers to assess the situation and take appropriate action.
- If wolves are causing problems, manage to resolve the problem. When negative impacts occur, they should be addressed on a case-by-case basis utilizing a combination of appropriate management tools, including take of wolves and damage payments. Maintain flexibility in the array of management tools available to accommodate changing circumstances over time.
- The CDOW may, at its discretion, reconvene the Wolf Management Working Group. This group would assist in finding resolution to unexpected or non-routine developments that are likely to occur.
- A high degree of cooperation and coordination among management agencies and the private sector is necessary to ensure that management actions and damage payments are efficient and timely.
- Education and understanding of issues, management actions, and consequences is a key component of successful wolf management in Colorado.
- Sufficient funds will be made available to implement all aspects of this plan.

B. Adaptive Management

Using an Adaptive Management Framework

Adaptive resource management provides a framework and a process for decision-making, even when the outcome is uncertain. Decisions are based on past, current, and future status of the resources, and future goals and objectives. Through time, experience and knowledge accumulate. Monitoring, research, and management are conducted simultaneously in a coordinated fashion that improves management (Lancia et al. 1996).

In its simplest form, adaptive management is learning by doing. When adaptive management is incorporated into any management scheme, it assumes that potential uncertainties are identified, that monitoring is sufficient to determine the success of the management alternatives chosen, and that there is a feedback mechanism from the monitoring program that allows for change from the management strategy in place to a new strategy (Holling 1978). Adaptive management is a tool, a part of a process; it is not a product.

Adaptive management is especially useful in complex ecosystems, with dynamic social conditions, lack or uncertainty of information (Gunderson 1999), and the need to take action. To be effective, adaptive management is a continuous process of planning, monitoring, evaluating, and acting upon new information (Shindler et al. 1999) that includes:

- 1) clearly identified outcomes;
- 2) management alternatives;
- 3) predicted outcomes of management activities (models);
- 4) measurable performance standards and a firm commitment to do the monitoring;
and
- 5) flexibility to make adjustments in actions based on what has been learned, to achieve those outcomes.

Plan Monitoring and Evaluation

Wolf management in Colorado will take place within a complex biological, social, economic, and political environment. As with any wildlife management program, the CDOW should anticipate that the wolf program will evolve through time. The CDOW should evaluate positive and negative impacts and new information annually and incorporate them into wolf management, and should review and modify its wolf management plan at least every five years after reviewing relevant peer-reviewed literature, input from the public, wildlife professionals, other state and federal agencies, etc. to insure the plan is kept current and that the management activities originating from it are effective and appropriate.

The challenge for the CDOW will be to discern between earnest differences of opinion in preferred management direction and substantive shortcomings of the program. Difficult decisions will have to be made and will sometimes be called into question by various interests. Understanding public tolerance for wolves and their satisfaction with how conflicts are resolved are important components of any wolf management program. There should be ongoing efforts to assess public attitudes towards wolves and keep the public informed and involved.

C. Wolf Monitoring

Monitoring Purposes

Monitoring is an essential component of any wolf management plan. The CDOW collects survey and inventory data on a variety of fish and wildlife populations. These data create the foundation upon which all wildlife populations are managed. Data about wolves will help lead to the successful integration of a wolf program with other wildlife programs so that all may be managed in an ecological context, and is necessary to discover how wolves will fit into the Colorado landscape.

The adaptive approach described above assumes there is a mechanism to adjust the plan in response to information learned from monitoring. In its most general sense, monitoring is the repeated assessment of the status of some quantity, attribute, or task within a defined area over a specific period of time (Thompson et al. 1998) with the goal

of detecting changes in the status of that quantity, attribute, or task and if determined to be necessary, taking actions in response to detected changes.

The potential purposes for wolf monitoring include (but are not limited to):

- document wolf numbers, reproduction, distribution, and causes of mortality;
- help prevent livestock depredation;
- help verify livestock deaths from wolves for damage payment purposes;
- help determine whether wolf presence and/or predation is contributing to positive and/or negative changes in ungulate populations (e.g. fawn-doe and calf-cow ratios);
- answer specific wolf related research questions;
- track illegal take of wolves;
- insure that decisions relative to wolves are made based on factual information; and
- help determine the effect of wolves on Colorado's ecosystems.

Monitoring Methods

Monitoring can be conducted with different types of technology and at varying intensity levels. These choices should be made by the CDOW based on the type of information needed to manage wolves in Colorado. Monitoring methods may include but are not limited to: aerial tracking, snow tracking, scent marking, howling surveys, radio collaring, remote photography, and genetic profiling.

Collaring is a useful tool for monitoring wolves and has been utilized throughout wolf range. Collaring of animals requires capture. Examples of capture methods would include but not be limited to: leg-hold traps, netting from aircraft, foot snares, and immobilization drugs. A higher probability of success of capture is dependent, among other things, on knowing the movement pattern of target animals and the existence of a large enough population that there is some likelihood of an animal encountering a trap or being observed by an aircraft-based capture crew. Finding and capturing dispersing animals can be challenging as they are usually traveling alone and are moving through an area rather than remaining as residents. However, the CDOW can decide based on local conditions and management goals that an effort should be made to collar wolves in a specific location.

Livestock depredation investigations by Wildlife Services can also yield important information, such as documenting wolf activity in a new area or the number of wolves involved in a depredation incident.

Each monitoring protocol has its own advantages and disadvantages. Anecdotal information can supplement formalized monitoring protocols. The CDOW should consider all monitoring methods, including new methods as they are developed. Corroborating evidence should be gathered using multiple methods, but specific protocols should be tailored to the pack, setting, and appropriate season for collecting that type of data. This will facilitate a balance between monitoring responsibilities, information needs, cost effectiveness, and scientific rigor.

Sighting Reports, Notification and Verification

When wolves are just beginning to migrate into the state, monitoring should begin with reports of sightings made to the CDOW. The CDOW should add the gray wolf to its occurrence/distribution report and track observation report forms, and plot the location of reports. Similar information could also be gathered using hunter contacts (e.g. check stations or log books), the CDOW web site, CDOW Regional Headquarters offices, and the telephone harvest survey program.

If there are several sightings over some period of time (e.g., a few weeks) and/or suspected livestock depredation from wolves occurs (in which case ranchers should contact the DWM or local CDOW office), verification by a wildlife professional should take place. If this wolf presence is verified (which assumes more than an individual animal passing through an area) then the CDOW will use local conditions and its discretion in determining when to apply collars for monitoring purposes. The CDOW should also work with residents to activate a local network (which will probably be structured differently in different communities – it might be a phone tree in some places) to contact individual ranchers to alert them to the wolf pack presence.⁵ Additionally, there should be outreach, on a case-by-case basis, with producers about how to avoid depredation and report any problems. This would probably necessitate a coordinator within the CDOW to work with local representatives responsible for notification.

The reporting system, including a protocol for reporting sightings, needs to be functioning as soon as possible, and should be well publicized. Some communication channels for informing the public about the monitoring program and how to participate might include: community forums, advertisements/posters with information about who to contact and how to complete a sighting form, and use of a toll free number for reporting sightings.

Staffing

Even with a few wolves migrating into the State there needs to be explicit recognition of the staffing needs associated with all aspects of wolf management. Although the primary wolf management and monitoring responsibilities will rest with the CDOW, monitoring efforts could benefit from any knowledge generated by the efforts and experiences of

⁵ Some members of the Working Group expressed concern about the potential of such a notification system to promote illegal take by individuals who oppose wolves. Whatever system is put into place needs to address this issue as well as protecting the interests of those who want to try to prevent livestock depredation.

cooperators (e.g., other federal and state agencies; universities; and private organizations, landowners, and volunteers⁶). Volunteer efforts/contributions would be coordinated and overseen by the CDOW. Land and wildlife agency partnerships could also improve the cost effectiveness of fulfilling Colorado's wolf management responsibilities⁷ and are highly recommended.

Trapping

Leghold or foothold traps are an effective technique for capturing wild wolves. Colorado Revised Statute (CRS) 33-6-203, also called Amendment 14, was approved by Colorado voters in 1996. Amendment 14 makes it "unlawful to take wildlife with any leghold trap, any instant kill body-gripping design trap, or by poison or snare in the state of Colorado". This statute provides an exemption to the ban on the use of leghold traps for "bona fide scientific research". The CDOW recently defined "bona fide scientific research" as follows: "systematic investigative or experimental activities which are carried out for the purpose of acquiring new and relevant knowledge pertaining to wildlife biology, ecology, or management, or the revision of accepted conclusions, theories, or laws in the light of newly discovered facts, and which are conducted in a humane fashion by qualified personnel, and the results of which would meet the accepted standards for publication in a refereed scientific journal". CDOW research involving the capture and handling of animals is performed in accordance with the federal Animal Welfare Act, and reviewed and approved by an independent Animal Care and Use Committee. In order to utilize the research exemption provided by CRS 33-6-203, the CDOW would need to develop a specific research proposal.

D. Managing Wolves with Other Predators

In balancing overall wildlife conservation and management, the CDOW should, over time, bring the gray wolf into the existing management framework, programs, and policies for other carnivores, such as mountain lions and black bears. Even though black bears are omnivorous, for the purposes of this plan, they are functionally included in the carnivore group with lions and wolves because of their predatory capabilities and known depredation of and indirect impacts on livestock production. Although each of these species is biologically unique, there are common methods of management. Elements of the gray wolf management program will also overlap other existing programs, such as ungulate management and research, habitat, public outreach, law enforcement, and private landowner relations.

⁶ CDOW has an active volunteer program in place.

⁷ Wisconsin created a volunteer carnivore survey program in which interested members of the public do snow track surveys. Participants, trained by the Wisconsin Department of Natural Resources, survey an assigned area several times a winter and forward their data in the spring. Volunteers did the surveys reliably and logged several thousand miles each winter. The method and program are still being validated with more intensive telemetry data, but it appears promising as a monitoring tool and it facilitates public involvement with wolf management issues (Wisconsin Department of Natural Resources 1999).

E. Management Authority for Control of Depredating Animals

Following delisting from the ESA, the CDOW will have authority for the management of wolves. However, the Commissioner of Agriculture has jurisdiction, as described in Colorado Revised Statutes 35-40-101, over the control of depredating animals.

“Depredating animals” are defined as any animal, animals, or group of animals that pose a threat to an agricultural product or resource. "Pose a threat" is defined as the threat of causing economic loss by killing or damaging an agricultural product or resource or consuming stored agricultural products. A threat shall be presumed to be posed when damage has historically occurred, is occurring, or when it is necessary to prevent depredating animals from inflicting death or injury to livestock or damaging agricultural products or resources. This portion of the statutes also defines “species at risk” as any depredating animal species that has been designated by the Colorado Wildlife Commission as endangered, threatened, or at risk after:

- (a) A scientific investigation by the CDOW in the Department of Natural Resources that is based on valid, sound, and objective data and analysis that substantiates such designation; and
- (b) Presentation of scientifically valid data, analysis, or commentary by the commissioner relating to depredating animals; and
- (c) Presentation of scientifically valid data, analysis, or commentary by objective professionals, mutually identified by the State Agricultural Commission and the Colorado Wildlife Commission relating to depredating animals.

There are currently no depredating animals classified as “at risk” by the Colorado Wildlife Commission, but depredating animals that are classified as endangered or threatened (including the wolf) are considered “at risk” by definition.

Wolves are designated as a depredating animal and as an endangered species in Colorado. Additionally, they are also designated a species at risk. As long as the Colorado Wildlife Commission designates wolves as endangered, threatened, or at risk, they must approve any regulations regarding the control of depredating wolves. The Colorado Wildlife Commission could place wolves in any of these categories at any time in the future, given that appropriate evidence to support that status is provided. The Working Group recommends that the CDOW develop a Memorandum of Understanding with Wildlife Services and the Colorado Department of Agriculture (CDOA) that will outline Wildlife Service’s role and specify cost-sharing between the two agencies for wolf management in Colorado (i.e., respond to reports of livestock depredation and assist the CDOW in capturing, monitoring and/or removing wolves, etc.).

F. Wolf Management Tools

As an everyday practice, livestock producers already manage their livestock to prevent depredation from bears, lions, and coyotes. However, depredation and harassment of livestock by wolves is a major concern for livestock producers. Livestock producers

need the ability to solve the immediate problem of depredation with a minimum of bureaucratic steps. The ability of livestock producers to access a variety of tools to address wolf depredation or the threat of wolf depredation is both fair and necessary.

4(d) Rule

Section 4(d) of the ESA allows for rules that relax the take provisions of the ESA for species listed as threatened. The end result is fewer restrictions on the circumstances when a listed species may be taken. The wolf is currently listed as threatened in the WDPS, and the USFWS has issued a 4(d) rule for that distinct population segment. The Colorado Wildlife Commission adopted the 4(d) rule by reference into its regulations at its November 2004 meeting (Colorado Regulation 1002.B.4). The intent of the Colorado Wildlife Commission’s action was to make State law consistent with federal law so there could be no question of competing authorities or misunderstanding of the circumstances under which wolves may be legally taken. For the full text of the 4(d) rule see 68 CFR 15803-15875, April 1, 2003 <http://policy.fws.gov/library/03-7018.html>.

Summary of the 4(d) Rule
1. Any person may take a wolf in self defense or in defense of others.
2. The USFWS, other federal land management agencies, and State or tribal conservation agencies or other agencies authorized by the USFWS, may promptly remove (that is, place in captivity or kill) any wolf determined by the USFWS or authorized agency to be a threat to human life or safety.
3. Landowners and grazing allotment holders can opportunistically harass gray wolves in a non-injurious manner without a USFWS permit.
4. The USFWS can issue a 90-day permit to private landowners or to livestock producers for use on public grazing allotments after verified persistent wolf activity on their private land or public grazing allotment; permit would allow intentional and potentially injurious, but non-lethal, harassment of wolves.
5. Livestock producers on their private land may take a gray wolf in the act of killing, wounding, or biting livestock, dogs, and livestock herding and guarding animals. Injured or dead livestock must be in evidence to verify the wolf attack.
6. Livestock producers and permittees with current valid livestock grazing allotments on public land can get a 45-day permit from the USFWS or other agencies designated by the USFWS, to take gray wolves in the act of killing, wounding, or biting livestock. The USFWS must have verified previous attacks by wolves, and must have completed agency efforts to resolve the problem.
7. Additional taking by private citizens on their PRIVATE land for chronic wolf depredation. If two separate depredation incidents on livestock or dogs on the subject private property or on an adjacent private property are confirmed, and it is confirmed that wolves are routinely present on the subject property and present a significant risk to livestock or dogs, a private landowner may receive a permit from the USFWS to take those wolves, under specified conditions.
8. Government take of PROBLEM WOLVES. “Problem wolves” is defined as: wolves that (1) attack livestock or (2) twice in a calendar year attack domestic animals other than livestock. Criteria to determine when take will be initiated are as follows: (1) evidence of the attack,

<p>(2) reason to believe that additional attacks will occur, (3) no evidence of unusual wolf attractants, and (4) any previously specified animal husbandry practices have been implemented, if on public lands.</p> <p>No numerical threshold applies, so all control measures, including lethal control, can be used regardless of the number of breeding pairs in a state.</p>
<p>9. No upper threshold of six breeding pairs (as found in nonessential experimental population regulations) limiting protection of females and their pups applies. Thus, females and their pups will be released if captured on public lands as defined above, prior to October 1, unless depredation continues. (Note: This is more restrictive than the experimental population regulations.)</p> <p>All problem wolves that attack domestic animals more than twice in a calendar year may be moved or removed from the wild, including females with pups.</p>
<p>10. States and tribes may capture and translocate wolves to other areas within the WDPS, if the gray wolf predation is negatively impacting localized wild ungulate populations at an unacceptable level, as defined by the states and tribes. State/tribal wolf management plans must be approved by the USFWS before such movement of wolves may be conducted, and the USFWS must determine that such translocations will not inhibit wolf population growth toward recovery levels. Additionally: After ten breeding pairs are established in the state, we, in cooperation with the states and tribes, may move wolves that we determine are impacting localized wild ungulate populations at unacceptable levels.</p>
<p>11. Any person may take a gray wolf if the take is incidental to an otherwise lawful activity, and is accidental, unavoidable, unintentional, and not resulting from negligent conduct lacking reasonable due care, and due care was exercised to avoid taking the wolf.</p>
<p>12. Permits for recovery actions that include take of gray wolves: Available for scientific purposes, enhancement of propagation or survival, zoological exhibition, educational purposes, or other purposes consistent with the Act (50 CFR 17.32).</p>
<p>13. Any employee or agent of the USFWS or appropriate federal, State, or tribal agency, who is designated in writing for such purposes by the USFWS, when acting in the course of official duties, may take a wolf from the wild, if such action is for: (A) scientific purposes; (B) to avoid conflict with human activities; (C) to relocate a wolf within the non-essential experimental (NEP) areas to improve its survival and recovery prospects; (D) to return wolves that have wandered outside of the NEP areas; (E) to aid or euthanize sick, injured, or orphaned wolves; (F) to salvage a dead specimen which may be used for scientific study; (G) to dispose of a dead specimen; (H) to prevent wolves with abnormal physical or behavioral characteristics, as determined by the USFWS, from passing on those traits to other wolves; or (I) to aid in law enforcement investigations involving wolves.</p>
<p>14. Land-use restrictions may be employed for wolf recovery purposes on national parks and national wildlife refuges. Between April 1 and June 30 land-use restrictions may be employed to prevent take of wolves at active den sites on federal lands.</p>

Lethal Methods

Lethal methods for taking wolves include shooting from the ground or from the air and other means deemed appropriate by the CDOW/Wildlife Services.

Non-Lethal Methods

The intent of non-lethal methods is to avert or resolve a wolf conflict without killing the wolf or wolves in question. In some instances, non-lethal management tools effectively address the public or agency concern and are the least intrusive method. If successful, non-lethal methods may also alleviate the need for more intensive management actions in the future. However, the use of such management practices should not be a requirement for damage payments if a livestock producer experiences depredation by wolves.

Proactive measures may not be practical, appropriate or effective in all circumstances, there are sometimes hurdles to their implementation (Bradley and Pletscher 2004), or they may only work for a short time. An example of a problem with a proactive measure is the difficulty ranchers may face in carcass removal when they are hours away from a landfill and burial is not feasible due to frozen ground.

Examples of non-lethal management techniques include monitoring wolf locations; voluntary changes in livestock husbandry practices such as increased human presence, herders or range riders, carcass removal/disposal, electric or predator-resistant fencing/fladry, livestock guard dogs, predator deterrent lighting, electronic alarm systems; attempts to modify wolf behavior; harassment of wolves; and wolf relocation.

Non-lethal techniques specifically intended to modify wolf behaviors can be aversive or disruptive (Bangs and Shivik 2001). Aversive stimuli cause discomfort or pain to the animal after a wolf demonstrates certain behaviors. The repeated negative experience associated with certain behaviors may condition the animal to not repeat that behavior. Examples are taste aversion, electric shock collars, cracker shells or bean bag shells. Disruptive stimuli attempt to prevent or alter behaviors by disrupting the animal when it behaves in undesirable ways. When disrupted by the stimuli, the animal is supposed to retreat. Examples are noise makers or siren devices triggered when a wolf approaches livestock too closely. At present these protocols are experimental and their efficacy is being evaluated. The National Wildlife Research Center (the research arm of Wildlife Services), in conjunction with other partners, has been actively developing and field-testing methods to discourage wolves from approaching livestock (Bangs and Shivik 2001). This work is expected to continue in the future.

It will be in everyone's best interest to work towards solutions that will avoid or mitigate potential wolf-livestock conflicts. Government and private organizations should be encouraged to assist livestock producers and landowners in designing and implementing proactive husbandry practices. Wildlife Services and the CDOW should work cooperatively in a proactive manner, with interested livestock producers and NGOs to provide information and assistance regarding use of non-lethal methods. Technical assistance may take the form of guidance on carcass disposal, extra fencing, deploying scare devices, and testing of developmental non-lethal control methods. Livestock producers should be rewarded for their willingness to cooperate in experimental protocols testing non-lethal management tools, such as scaring devices or noise-makers, and for taking voluntary measures to reduce the potential for wolf-livestock conflict. However, funding for such voluntary measures should not be taken from damage payment programs.

G. Law and Enforcement

State Laws Protecting Wolves

Under Colorado Statutes (33-6-109) it is illegal for any person to hunt, take, or have in their possession any wildlife that is the property of the State unless it is specifically permitted. For each animal listed as endangered or threatened, (the current status of the wolf under Colorado law), violations are punishable by a fine of not less than two thousand dollars and not more than one hundred thousand dollars, or by imprisonment for not more than one year in the county jail, or by both such fine and such imprisonment, and an assessment of twenty points. Upon conviction, the Colorado Wildlife Commission may suspend any or all license privileges of the person for a period of from one year to life.

Violations of game laws applying to wolves should be reported to the CDOW through the Operation Game Thief (OGT) program. OGT pays rewards to citizens who turn in poachers. Those reporting violations do not have to reveal their names or testify in court. A reward of \$250 is offered for information on cases involving big game or endangered species; a \$100 reward is offered for information on other wildlife violations. A citizens' committee administers the reward fund, which is maintained by private contributions. The committee may approve rewards of up to \$1,000 for flagrant cases. Rewards are paid for information that leads to an arrest or a citation being issued.

The CDOW should inform and educate the public about the laws related to wolf take (refer to Section V. for recommendations regarding Information and Education).

Disposition of Wolf Specimens

Possession of inedible parts of wildlife species is regulated under Wildlife Commission Regulation 012. Possession of wolf parts is currently illegal, given federal and State listing status as endangered, unless a specific scientific collection permit is issued or the animal was taken legally.

Bounty Law

The bounty statute establishing a \$2 bounty on wolves (CRS 35-40-107 and 108) is still in effect. In Colorado, until a statute is specifically repealed it remains effective (Colorado Constitution, Schedule, Sec 1). The Working Group agrees that the bounty law is antiquated and recommends that it be repealed.

H. Interagency Coordination

Within Colorado, interagency coordination at the administrative and field levels will be necessary to successfully implement a wolf management plan. The CDOW should work with other federal and state agency personnel to coordinate surveys to determine wolf occurrence, status, and habitat use.

At the field level, the CDOW should work closely with Wildlife Services agents (as well as the counties having contracts with Wildlife Services) in their areas to achieve a timely and appropriate management response to livestock depredation and ensure accurate record keeping. Moreover, collaboration at the field level can be beneficial to achieve management or research objectives with greater efficiency on a variety of topics.

I. Wolf Health and Disease

Disease in wildlife species serves as a population control and is density dependent. Wolves are afflicted by a variety of canid diseases and parasites, including canine distemper, canine parvovirus, and sarcoptic mange. Pups may be especially vulnerable to death from exposure to canine parvovirus or canine distemper (Mech and Goyal 1993, Johnson et al. 1994). Some diseases and parasites had significant impacts on wolf population recovery in Minnesota, Michigan, and Wisconsin (USFWS 2000). However, in the Northern Rockies, diseases and parasites have been less influential and have not significantly impacted wolf populations to date (USFWS 2000).

Monitoring and surveillance of wolf health should be conducted by the CDOW to provide baseline information to inform future wolf management. Wolf health could be monitored by analyzing biological samples collected from dead and live-captured animals. If live-capture operations are conducted, overall wolf health should be assessed, including presence of external parasites. Blood could also be collected. Blood tests can indicate exposure to canine parvovirus, distemper, and other potentially detrimental diseases. Necropsies should be performed on wolf carcasses to determine cause of death, condition, age, reproductive status, and food habits. General protocols should be followed to collect reproductive tracts, stomach and colon contents, muscle tissue for genetic purposes, and any potentially diseased or parasitized tissues. Other sampling or testing may be conducted, depending on the request or concerns of the submitting party and the condition of wolf remains.

J. Research

Much of the wildlife research done in Colorado is conducted by the CDOW, either directly or through cooperative partnerships with universities, non-profit organizations, tribes, and federal agencies. Research plans involving CDOW resources are subject to the CDOW's research peer review process. Permits to conduct bona fide research, particularly if live-capture is required, are issued by the CDOW to ensure that the work is scientifically justified and conducted in an ethical and responsible manner.

Research by the CDOW and its partners will be an important component in wolf management, and should include projects directed to assessing wolf population status and distribution, wolf-livestock interactions (including management practices that may result in reduced wolf depredation to livestock, livestock guard and herding animals, and dogs); and wolf-wild prey-habitat interactions (e.g., the effects of wolf predation, severe weather, and habitat health on ungulate numbers, herd composition, and distribution). Research may also help the CDOW evaluate specific management actions as to their

efficacy and projected outcomes. Wolf research findings from other areas should be applied as appropriate, and can provide guidance in developing management and research programs in Colorado. Developing Colorado-specific information will be important for sound policy formulation and decision-making.

K. Captive Wolves and Wolf-dog Hybrids

The number of captive-reared wolves and wolf-dog hybrids in the U.S. could be as high as 400,000 (Hope 1994). According to the responses to a state-wide survey of sheriffs' offices and animal control agencies conducted by the CDOA, there are an estimated 6,380 wolf hybrids in Colorado. Respondents to this study documented four incidents or damage involving wolf hybrids in Colorado (Colorado Canine and Feline Advisory Group 1998). The Working Group recommends that wolf-dog hybrids should not be released into the wild.

L. Wolf-Human Conflicts

Increasing numbers of people are living within the urban-wildland interface where a potential for conflict with a wide variety of wildlife species exists. Outdoor recreation trends also place increasing numbers of people in wildlife habitats (Youmans 1999). Living and recreating in wildlife habitats has inherent risks. Through policy development, public outreach, and technical assistance to landowners and recreationists, the CDOW is working towards mitigating those risks to the extent possible.

Wolf-Human Encounters

No wild wolf-caused human fatality has been documented in North America (McNay 2002, Fritts et al. 2003). Documented cases in which humans have been injured occurred where wolves have shared the landscape with people for a long time. Most incidents occurred in park or preserve settings where wolves were legally protected, but individual wolves had become habituated to human presence. There are no reported incidents from areas where wolves have recently recolonized or been reintroduced in the Northern Rockies or the Upper Midwest. (Montana Wolf Conservation and Recovery Planning Document 2002)

Due to behavioral traits of wolves, they are more likely to be seen by people than more solitary animals such as mountain lions. Wolves feed and rest in open areas with good visibility, whereas lions tend to hide their kills and feed or rest in dense vegetative cover. Wolves will also use linear corridors such as roads, utility lines or railroad rights-of-way for traveling and scent marking, and travel across openings in forest cover or natural meadows in ways that mountain lions or bears do not. In addition, the natural order of existence for wolves in the wild is to belong to a pack. Pack membership has attendant functions such as establishment and maintenance of social hierarchies; patrolling and marking territory boundaries; pup-tending; hunting; bringing food back to pups; resting; or interacting with other wolves or other wildlife species. Wolves affiliated with a pack are usually actively engaged in one of these "purposes" and do not spend extended periods of time loitering in any one location - activity at den or rendezvous sites

notwithstanding. Pack-affiliated wolves, when seen alone, will usually be seen sporadically because they are en route to someplace else for some particular reason. Even dispersing wolves will generally not loiter and will move through an area near people (Montana Wolf Conservation and Recovery Planning Document 2002).

Managing Wolf – Human Conflict

The CDOW should take steps to educate the public in order to reduce the potential for wolf-human conflicts and minimize the risks of human injury due to wolf presence in the State. The CDOW's approach to wolf-human interactions should model the policies for addressing mountain lion-human or bear-human conflicts. In an effort to prevent situations that would attract carnivores and present a threat to public safety, the CDOW should continue to discourage the public from artificially feeding wildlife or allowing wild animals access to human foods, garbage, pet food, livestock feed, or birdseed.

The CDOW should discourage habituation of wolves with humans and then respond to conflicts where and when they develop. The CDOW should promptly remove any wolf determined to be a threat to human life or safety. State and federal regulations also allow any person to take a wolf in self defense or in defense of others. Given wolves' usual fear of humans, non-lethal harassment should usually work to scare a wolf away. However, if a wolf is killed in defense of life or property, citizens should not disturb the carcass; protect the scene from disturbance; and report the incident to the CDOW as soon as possible, but within 72 hours. The entire carcass should be returned to the CDOW. The CDOW or Wildlife Services will conduct a field investigation.

V. INFORMATION AND EDUCATION

Education and the dissemination of factual information regarding wolves in Colorado will be essential to the successful implementation of the Colorado Wolf Management Plan. According to the USFWS, the primary determinant of the long-term status of gray wolf populations will be human attitudes towards wolves (USFWS 2000). However, attitudes, beliefs, and concerns about wolves are highly variable and this creates a challenging environment in which to manage the species. Underlying various attitudes are human safety concerns; perceptions of risk; the symbolic significance of wolves; economic impacts on livestock producers, hunters, outfitters, and rural communities; convictions that wolves should not be killed; Native American traditions; perceptions that wolves compete with human hunters for ungulates; beliefs that wolves do not have a place in the 21st century - and many others. Attitudes have changed over time and acceptance of wolves has increased among some segments of the public. Attitudes toward wolves may continue to change.

Regardless of personal beliefs and attitudes, an active, informed public is critical to the protection of all Colorado's wildlife resources. The history of wolves in Colorado has as much to do with the relationship between wolves and people as it does with the ecology of the species. The same will be true of the wolf's future.

The CDOW should develop and implement an information, education, and public outreach program to parallel wolf management activities in Colorado, drawing upon information available from sources such as tribal, state and federal agencies, and NGOs. The objective of the public education program should be to provide scientifically based, factual information regarding the gray wolf and its management in Colorado, in hopes that the public will become more knowledgeable, and more objective about this species and its management. CDOW should coordinate with other sources distributing information about wolves in Colorado to achieve its public education objective objectives. Strong outreach programs may also help decrease the level of illegal wolf killing. Informally, personnel from all CDOW divisions should disseminate information to the public on a routine basis, much as they already do for other fish and wildlife species in Colorado. As needed, the CDOW should partner with volunteers, other agencies and the private sector to implement the education and public outreach program.

The audience of the education program should include, but not be limited to, the general public, students, visitors to the state, sportspersons and outdoor recreationists, the agricultural community, wildlife advocates, and agency personnel. While the specific emphasis may differ by audience, it is important to convey some basic information to everyone, such as wolf numbers and distribution in Colorado, identification and ecology of the species, and guidelines for the ethical viewing of wolves. The values and challenges of wolf management should also be conveyed. In addition to this basic information, specific information should be targeted to specific audiences. For example, information and education on the hunting and trapping of coyotes should emphasize differences between wolves and coyotes. Finally, it will be important to identify the most

efficient ways to reach various audiences, which means gaining an improved understanding of who the audiences are and through what channels and sources they receive information. Given the broad spectrum of interests with a stake in wolf management, the education program should utilize a variety of methods and outlets to adequately fulfill this fundamental component of Colorado's Wolf Management Plan.

VI. DAMAGE PAYMENTS FOR WOLF DEPREDATION

A. Introduction

Addressing wolf-livestock conflicts entails two separate, but parallel elements. One element includes wolf management activities that minimize the potential for wolf-livestock conflicts and resolve the conflicts where and when they develop, as described above. The second element addresses the economic losses incurred when livestock are killed or injured by wolves, the focus of this chapter.

Damage payment programs are tangible evidence that the broader society which seeks to conserve wolves recognizes that there are costs to wolf conservation. This stems from an understanding of the social responsibility and fairness relative to the costs of depredation, and the widely held public belief that ranching produces valued societal benefits including wildlife habitat and open space (Montag et al. 2003). While there are ecological benefits to wolf conservation, they are accompanied by some social and individual costs. The Working Group believes that these costs should be mitigated.

B. Program Administration

The CDOW should operate a wolf damage fund within the Colorado Game Damage Program, but the funds for wolf damage payments and staff to administer the program should not be derived from sportsmen's dollars and should not encroach upon other game damage payment programs.

Colorado Wolf Damage Fund

Under current regulations, the Colorado Game Damage Program could not be applied to wolves because they are not classified as big game. The Working Group recommends a statutory change if necessary to allow payment through the wolf damage fund.

Confirmed kills would be paid at 100% (current market value, fall market value, or original purchase price, whichever is greater), and probable kills would be paid at a rate of 50% of market value. Guard and herding animals would also be eligible for payment under the program. However, wolf management expenses and damage payments should not encroach upon or negatively impact the current game damage program for bears and lions; other CDOW activities or programs; or the existing predator management programs for coyotes, bears, and lions under Wildlife Services.

The CDOW currently evaluates game damage compensation claims individually and has the discretion to reject a claim. The CDOW should: a) manage wolves so that livestock producers and sportsman do not bear the cost of having wolves present in Colorado and, b) use its discretion in paying damage claims and managing depredation control programs in a manner that does not invite abuse.

DWMs should review applications for wolf damage payments and either approve payment or recommend denial, as currently occurs under the existing program for bears

and mountain lions. A known presence of wolves (den or rendezvous site) could be one among several criteria considered in making a decision regarding compensation. Wolf presence should be documented by CDOW. If denial of payment is recommended, the application should be referred to the Colorado Wildlife Commission for final review and decision.

Defenders of Wildlife Bailey Compensation Trust

Defenders of Wildlife, a non-profit wildlife advocacy organization, recognized the disparity of the costs and benefits for wolf restoration between the ranching community and those advocating wolf recovery. Their goal was to shift the economic liability away from ranchers and towards wolf advocates through a compensation program that reimbursed ranchers for losses from wolf depredation (Fischer 1989). A Wolf Compensation Fund was established in 1987 and as of August 2004, Defenders of Wildlife has contributed more than \$400,000 in compensation for livestock losses to wolves in the Northern Rockies through The Bailey Wildlife Foundation Wolf Compensation Trust. In addition, Defenders of Wildlife has invested more than \$200,000 in preventative approaches and assistance to livestock producers since the establishment of The Bailey Wildlife Foundation Proactive Carnivore Conservation Fund in 1999 (Defenders of Wildlife 2004). Defenders of Wildlife has indicated that the compensation trust will be maintained for as long as the wolf is on the endangered species list in that wolf recovery area (stated on the Defenders of Wildlife website, 11/30/04).

The Defenders of Wildlife Compensation Fund pays 100% of the market value for confirmed losses up to \$2,000 per animal and 50% of the value for probable losses. It pays for livestock and livestock guarding or herding dogs killed or injured by wolves (Defenders of Wildlife 2004). Funds from the Wolf Compensation Fund have also been used to purchase livestock feed, lease supplemental pasture, purchase additional guarding animals or fencing materials, and to cost-share other modifications to husbandry practices to proactively minimize the potential for future depredations.

Defenders of Wildlife has verbally committed to providing compensation when wolves are present in Colorado and to continue to offer compensation when wolves transfer to State management jurisdiction.

Livestock producers who experience an incidence of depredation from wolves should have the option of applying for damage payments from either the wolf damage fund or the Defenders of Wildlife Bailey Compensation Trust, but not both of these programs.

C. Verification and Notification Process

Verification, notification, reporting, and payment processes should be as efficient and straightforward as possible. Livestock producers should report any suspected wolf depredations (injuries or death) or the disruption of livestock or guarding animals to Wildlife Services directly (or the DWM if Wildlife Services is not available), as is the case for other wildlife species such as mountain lions. Any evidence at the scene should be protected from disturbance. Wildlife Services also investigates incidents involving

domestic pets or dogs, guarding animals such as llamas, and alternative livestock. A rapid agency field response is imperative so that evidence may be examined as soon as possible after an incident⁸.

Wildlife Service agents complete an investigative report form summarizing the type and extent of damage, physical evidence, and a description of the site. Details regarding documentation of game damage claims can be found in the Colorado Wildlife Commission regulations at <http://wildlife.state.co.us/regulations/ch17.pdf>. If Wildlife Services or CDOW personnel are not available to investigate, then the livestock producer should fill out a report form and record that third-party verification was requested but not fulfilled. The report is ultimately filed with the CDOW and/or utilized by the Defenders of Wildlife Program for making a damage payment determination. The CDOW should establish a database to tabulate, summarize, and assess trends in wolf-livestock conflicts.

⁸ The response will depend, in part, on where the nearest Wildlife Service personnel are located. They are not stationed statewide.

VII. PREY POPULATIONS: CONSERVATION AND MANAGEMENT

A. Predator - Prey Interactions

All wildlife populations are inherently variable through time and across a diversity of habitats. Populations fluctuate through time and are influenced by a variety of environmental factors that also change through time, including, but not limited to weather, disease, habitat availability and condition, human impacts, and predation. These factors combine to form complex interactions that make it very difficult to determine the actual cause of population fluctuations. Management may affect some factors but not others, and at best only moderates the fluctuations. Regardless, management programs should recognize that predator-prey interactions are another natural factor affecting ungulates and one that will also change through time.

Impacts from wolves on prey populations may be negative, positive, or both. On a site specific basis, in Game Management Units (GMUs) where wild ungulate populations are under State management objectives and/or declining, wolf predation could contribute to this negative trend. It is possible that some elk and deer hunters might see opportunity decreased due to herd reduction or movement. On the other hand, in GMUs where deer or elk populations exceed population objectives, wolf presence and predation may help the CDOW to achieve population management objectives, and may have related ecological effects such as reduced grazing/browsing by elk to an extent that allows vegetation to regenerate. There is evidence to suggest that wolves cull inferior and vulnerable animals from herds (Mech and Peterson 2003).

It is important to: a) acknowledge hunter concerns about potential negative impacts to ungulate herd numbers or recruitment as wolf numbers increase over time; b) understand that the status of ungulate populations and resulting hunter opportunity are significant factors in some rural communities; and c) monitor and manage prey and predator interactions to maintain the public's opportunity to hunt a wide variety of species under a variety of circumstances, and to do so in a sustainable, responsible manner. Some hunters do not believe that hunter opportunity for ungulates should be significantly diminished by accommodating a wolf presence in Colorado. Some hunters will appreciate the challenges presented by having an additional predator in the ecosystem, such as changes in herd behavior or location. The financial investments and compromises made by the hunting public to restore ungulate populations are significant. Safeguarding those investments for present and future generations is an important priority for many of Colorado's citizens and the CDOW.

B. Wild Ungulate Management

Wild ungulate management balances many factors, including population density distribution and composition; habitat condition; landowner tolerance; hunter opportunity;

and the environmental factors influencing populations. The precision with which the CDOW manages ungulate populations is not intended to mitigate the impacts of a single limiting factor such as wolf predation, lion predation, or other mortality sources in and of themselves. Instead, wild ungulate populations are managed by taking into consideration a variety of factors. It is challenging to quantify the exact impact of one factor independent of the other factors, particularly because many of the factors influencing ungulate populations are interrelated. Since elk and mule deer are expected to be the primary prey species of wolves in Colorado, the CDOW should consider wolf predation, along with the other factors.

Monitoring of prey species is an important aspect of wolf management. CDOW regularly surveys ungulate populations across habitats, using a variety of techniques. Precise survey objectives vary by species, location, and season. Information gathered from live populations is also supplemented by harvest information gathered at hunter check stations or through the annual telephone harvest survey. This information will be important to assess whether wolves are impacting wild ungulate populations.

Management of Deer and Elk Populations

The success of major predators including mountain lions, wolves and human hunters rests on the same foundation - the productivity and perpetuation of deer and elk populations. Colorado has long been recognized as a national leader in game management and a premier destination for North American big game hunters. The CDOW should continue to strive to maintain healthy, viable wildlife populations and their habitats through the application of sound wildlife management principles.

Deer and elk populations are managed in Data Analysis Units (DAUs), which are geographic areas composed of one or more GMUs. A DAU plan is developed for each DAU; these plans include specific goals for overall population and sex ratios (i.e., buck:doe ratios for deer and bull:cow ratios for elk). Current policy for the management of deer and elk directs the CDOW to achieve population objectives within the carrying capacity of their habitat and to move on a statewide basis toward 15-20 males per 100 females (see http://wildlife.state.co.us/hunt/BigGame/pdf/BGSS_Policy_Final_6-15.pdf). Specific objectives for individual DAU's vary and are established by considering reproductive capacity, habitat quality and carrying capacity, hunter preferences, economic effects and land accessibility among other appropriate factors. In any individual unit, if the two-year average post-hunt male/female ratio falls or is predicted to fall below 15/100, the CDOW evaluates and reports the factors that may be contributing to the decrease and implements management actions where possible to increase the ratio as quickly as practicable. The CDOW recognizes that density and age structure-related reductions in productivity and survival can occur in big game populations. In such cases, female harvest and reduced male/female ratios may increase productivity and survival and are considered as possible management tools at the DAU level.

The CDOW recognizes that predator control is a viable and legitimate wildlife management tool that should be available to wildlife managers when needed, and that the management of predators may include measures to control predator populations when

necessary to limit their impact on habitat and prey species. When predator populations are inhibiting the ability of the CDOW to attain management objectives for other wildlife populations and the CDOW determines that predator control actions are necessary, such control actions should be directed by a species management plan that contains information addressing predator management and strategies to implement predator control. Wildlife managers and administrators implementing predator management and/or predator control strategies should also consider ecological relationships that will be affected.

VIII. BUDGET AND FUNDRAISING

The Working Group recommends that funding for wolf management come from sources other than hunting license sales. The Working Group also recommends that CDOW identify specific funding sources.

A. Budget Line Items

The Working Group identified the following budget items associated with implementation of the Wolf Management Plan. This list is by no means complete and changes/additions will likely occur during the development of a detailed implementation plan.

Professional Staff

- Colorado Division of Wildlife
- USDA-APHIS Wildlife Services
- Colorado Department of Agriculture
- Counties

Population Monitoring and Research

- Recording and plotting sightings
- Tracking
- Trapping
- Radio-collaring
- Monitoring
- Communication with livestock producers
- Responding to questions about predators, prey and ecosystem functions

Management Measures

- Preventative Measures
- Control Measures

Education

- Public education
- Wolf management and depredation education for CDOW/Wildlife Services field investigators
- Effective means to live with wolves and proper use of management tools
- Kill verification and reporting procedures for livestock producers

Law Enforcement

Damage Payments

Travel

B. CDOW Budgeting Process

The CDOW receives funds from a variety of sources, including license fees, federal excise taxes on hunting and fishing equipment, the Great Outdoors Colorado program, the non-game tax check-off, the federal State Wildlife Grants program, and other grants and donations. The internal budgeting process does not earmark funds from specific sources for specific projects. However, there is a mechanism for applying specific grants, donations or other funding sources to particular projects, such as wolf management. Because of the differing matching requirements of the various funding sources, the CDOW Planning, Budgeting and Evaluation (PBE) unit manages the specific use of these funding sources. Those conducting a given project request funding for the project through the budgeting process, but do not request the use of specific funds. Decisions on which projects to fund are made through a four-stage process. The CDOW's senior staff make final decisions on which projects will be funded and the PBE unit then uses the appropriate mix of sources to fund each project.

In the case of wolves, sportsmen have expressed their concerns about the use of license fees, Pittman/Robertson, and Dingell/Johnson dollars for wolf management. It is likely that the primary funding sources for wolf management would be State Wildlife Grants, Great Outdoors Colorado, and the Nongame Wildlife Tax Checkoff.

C. Possible Funding Sources

The Working Group identified a number of possible sources of funding for wolf management. They are not all viewed as equally probable.

1) Special Interest License Plates

Special interest license plates have generated significant amounts of funding for wildlife purposes in other states, e.g., in Florida for panthers and manatees. However there is a constitutional requirement in Colorado that proceeds from the sale of license plates must go to maintenance of highways. There is a procedure for directing some funds from license plate sales to a species (e.g. the State eagle plate which provides some funding to the Raptor Education Foundation - see <http://www.usaref.org/LicensePlates.htm>), however such funding requires a certain level of sales.

2) Fundraising through Non-Governmental Organizations

Private NGOs, such as those with conservation or wildlife missions, raise funds from donations and fundraising activities and can donate these to the CDOW for wolf management purposes.

3) Special Appropriations from Congress

Idaho, Montana, and Wyoming submitted a request for a special appropriation for wolf management to Congress. This might be a potential avenue for Colorado as well.

4) Insurance for Livestock Depredation

Based on preliminary information, this does not seem like a viable option.

5) Wolf Conservation Program (like the CDOW Prairie Conservation Program)

The CDOW has a Prairie Conservation Program to pay landowners a certain amount per acre for Colorado species conservation partnerships. It is focused on easements for lands that have values for species. The Prairie Conservation Program protects habitat for imperiled species, and is so far limited to Preble's meadow jumping mouse, short grass prairie species, and Gunnison sage grouse. Each year, landowners submit proposals that can be incorporated into legal agreements (e.g., easements, fee titles, and management agreements).

In the wolf context, a similar program might help attract funding to compensate a livestock producer for lost grazing opportunity if they agreed to allow a wolf den on a particular site (i.e., for keeping the cattle away from a den site). An implications to keep in mind is the possible impact on neighboring landowners who might experience higher depredation rates as a result of their neighbors encouraging and/or tolerating wolf presence. Funds for such a program should not come from the game cash fund.

6) ESA Section 6 Grants

Grants under Section 6 of the ESA from USFWS can be earmarked for specific purposes. These would apply south of Interstate 70 while wolves are still listed as endangered under the federal ESA.

7) Defenders of Wildlife Compensation Program

Defenders of Wildlife, a non-profit wildlife advocacy organization, pays compensation to ranchers for confirmed and probable losses and provides funding for proactive measures to reduce depredation on livestock by wolves.

8) Colorado State Income Tax Non-Game Wildlife Checkoff

Colorado citizens can donate a portion of their state income tax refund to the CDOW for non-game, threatened, and endangered species management.

9) Northern Rocky Mountain and Gray Wolf National Management Trust

This is a Fish and Wildlife Foundation Trust that is mentioned in the Montana Wolf Management Plan (pg. 56). It was anticipated to be operational by 2003 and to generate \$40 million for management of bears and wolves. As of December 2004 it had not gotten underway.

10) Earmarking Existing Sources of CDOW Funding for Wolves, e.g., State Wildlife Grants (Conservation and Reinvestment Act (CARA)) and Great Outdoors Colorado (GOCO)

These programs already supply funding to the CDOW. The question was raised about whether any of that funding could be specifically earmarked for wolf management.

Congress has appropriated money annually for CARA, although it has never been enacted per se. CARA was initially proposed to allocate \$350 million annually to the states for wildlife, although only \$60 - \$85 million has been appropriated.

GOCO provides base funding to the CDOW, but it would be up to the CDOW to decide if it wanted to earmark any of the GOCO funds specifically for wolves. The CDOW does send a proposal every year to GOCO saying where they are going to spend GOCO money, but they do not seek GOCO dollars for specific projects. GOCO can provide direction as to how its dollars are spent, but the CDOW prefers to retain control.

Eventually it might be productive to pursue an excise tax on outdoor gear with wolves as a possible focal point. However, the group acknowledges that it would be difficult if not impossible to find support nationally for an excise tax in today's political environment. The focus now should probably be on making the annual State Wildlife Grants (CARA) allocation permanent and larger.

11) Fines Dedicated to Wolf Management

Fines for illegal take of wolves could be used to support wolf management.

12) Volunteer Matching Funds

CDOW's Gray Wolf Management Survey completed in October 2004 found that 230 individuals indicated a willingness to participate in wolf management. The hours donated by such volunteers can be used as matching funds required in federal and private grants and could result in several hundred thousand dollars in matching funds per year.

APPENDIX A

ABBREVIATIONS

APHIS: U.S. Department of Agriculture Animal and Plant Health Inspection Service

CARA: Conservation and Reinvestment Act

CDOA: Colorado Department of Agriculture

CDOW: Colorado Division of Wildlife

DAU: data analysis unit

DWM: District Wildlife Manager

ESA: Endangered Species Act

GMU: game management unit

GOCO: Great Outdoors Colorado

GYA: Greater Yellowstone Area

NEP: non-essential experimental population

NGO: non-governmental organization

OGT: Operation Game Thief

PBE: CDOW's Planning Budgeting and Evaluation Unit

SWDPS: Southwestern Distinct Population Segment

USDA: U.S. Department of Agriculture

USFWS: U.S. Fish and Wildlife Service

WDPS: Western Distinct Population Segment

YNP: Yellowstone National Park

APPENDIX B

COLORADO WOLF MANAGEMENT WORKING GROUP, TECHNICAL TEAM AND FACILITATION TEAM MEMBERS

Working Group members served as individuals, not as representatives of the organizations with which they are affiliated.

Working Group Members

Local Government

Tom Bender
Commissioner, Larimer County

Les Hampton
Commissioner, Moffat County

Wildlife Biologists

Delwin Benson
Colorado State University

Anne Ruggles
Bear Canyon Consulting

Livestock Producers

Robert Bray
Rancher

Bonnie Kline
Colorado Wool Growers Association

Duke Phillips
Rancher

Jean Stetson
Rancher

Environmentalists/Wildlife Advocates

Rob Edward
Sinapu

Mark Pearson
San Juan Citizen's Alliance

Dyanne Singler
National Wildlife Federation

Gary Wockner
Colorado State University

Sportsmen

Mike Bond

Dick Steele

Agency Technical Team Members

Cynthia Bush
Colorado Division of Wildlife

Michelle Cowardin
Colorado Division of Wildlife

Stefanie Dalgard
Colorado Office of Economic
Development and International Trade

Joe Duda
Colorado State Forest Service
Colorado State University

Michael Francis
Colorado Division of Wildlife
Bureau of Reclamation

Jim Grady
Colorado Department of Agriculture

Jon Kindler
Colorado Division of Wildlife

Paige Lewis
Colorado State Forest Service

Susan Linner
U.S. Fish and Wildlife Service
Colorado Ecological Services Office

Raul Morales
Bureau of Land Management

Cay Ogden
National Park Service

Dan Prenzlów
Colorado Division of Wildlife

Gary Skiba
Colorado Division of Wildlife

Greg Sundstrom
Colorado State Forest Service

Pam Wagner
Colorado Division of Wildlife

Nancy Warren
U.S.D.A. Forest Service
Rocky Mountain Region

Janet Wise
National Park Service

Michael Yeary
USDA – APHIS, Wildlife Services

Meridian Facilitation Team

Holly Dobson
Administrative Support Coordinator

Connie Lewis
Facilitation Team Leader

Jennifer Pratt Miles
Facilitator

APPENDIX C

LITERATURE CITED

- Ballard, Warren B. and Douglas G. Larsen. 1987. Implications of Predator-Prey Relationships to Moose Management. Swedish Wildlife Research. Suppl. 1. p. 581-602.
- Ballard, W.B., J.S Whitman, C.L. Gardner. 1987. Ecology of an Exploited Wolf Population in South-Central Alaska. Wildlife Monographs N 98.
- Bangs, E.E., S.H. Fritts, J.A. Fontaine, D.W. Smith, K.M. Murphy, C.M. Mack, and C.C. Niemeyer. 1998. Status of gray wolf restoration in Montana, Idaho, and Wyoming. Wildlife Society Bulletin, 26:785-798.
- Bangs E. and J. Shivik. 2001. Managing wolf conflict with livestock in the Northwestern United States. Carnivore Damage Prevention News, No. 3: 2-5.
- Bennett, L.E. Colorado Gray Wolf Recovery. 1994. A Biological Feasibility Study: Final Report to the U.S. Fish and Wildlife Service. Univ. of Wyoming Fish and Wildlife Cooperative Research Unit.
- Beschta, R.L. 2003. Cottonwoods, elk, and wolves in the Lamar Valley of Yellowstone National Park. Ecological Applications 13: 1295-1309.
- Boitani, L. 2003. Wolf conservation and recovery. Pp. 317-340 *in* Mech, L.D. and L. Boitani, eds. Wolves: behavior, ecology, and conservation. University of Chicago Press, Chicago, IL.
- Boyd, D. K., R.R. Ream, D.H. Pletscher, M.W. Fairchild. 1993. Variation in denning and parturition dates of a wild gray wolf, *Canis lupus*, in the Rocky Mountains. Canadian Field Naturalist, 107(3): 359-360.
- Boyd, D.K., R.R. Ream, D.H. Pletscher, M.W. Fairchild. 1994. Prey taken by colonizing wolves and hunters in the Glacier National Park Area. Journal of Wildlife Management, 58(2): 289-295.
- Boyd, D.K., P.C Paquet, S. Donelon, R.R. Ream, C.C. White. 1995. Transboundary movements of a recolonizing wolf population in the Rocky Mountains. Pp.135-140 *in* Carbyn, L.N., S.H. Fritts, and D.R. Seip, eds. *Ecology and Conservation of Wolves in a Changing World*. Edmonton, Alberta: Canadian Circumpolar Institute; 1995.
- Boyd, D.K., S.H. Forbes, D.H. Pletscher, and F.H. Allendorf. 2001. Identification of Rocky Mountain gray wolves. Journal of Mammalogy 75:14-17.

- Boyd-Heger, D.K. 1997. Dispersal, genetic relationships, and landscape use by colonizing wolves in the central Rocky Mountains. PhD. Dissertation, University of Montana, Missoula.
- Boyd-Heger, D. 1998. Wolf recovery: review and implications. Pp. 92-93 in Fascione, N. and Ridgely, H. comps. Restoring the wolf conference proceedings. November 12-14, 1998; Seattle, WA; 92-93.
- Boyd, D.K. and G.K. Neale. 1992. An adult cougar, *Felis concolor*, killed by gray wolves, *Canis lupus*, in glacier National Park, Montana. Canadian Field Naturalist, 106:524-525.
- Boyd, D.K. and D.H. Pletscher. 1999. Characteristics of dispersal in a colonizing wolf population in the central Rocky Mountains. Journal of Wildlife Management 63:1094-1108.
- Brown, J.S. 1999. Vigilance, patch use, and habitat selection: foraging under predation risk. Evolutionary Ecology Research 1:49-71.
- Bradley, E.H. and D.H. Pletscher. 2004. Assessing factors related to wolf depredation of cattle in fenced pastures in Montana and Idaho. Presentation given at The Wildlife Society Annual Meeting. Alberta, Canada.
- Carbyn, S.H. Fritts, and D.R. Seip, eds. *Ecology and Conservation of Wolves in a Changing World*. Edmonton, Alberta: Canadian Circumpolar Institute; 1995.
- Carroll, C., M.K. Phillips, N.H. Schmuaker, and D.W. Smith. 2003. Impacts of landscape change on wolf restoration success: planning a reintroduction program based on static and dynamic spatial models. Conservation Biology 17:536-548.
- Colorado Division of Wildlife. 2004. FY 04 Game Damage Claims Annual Report. 21 pp.
- Colorado Canine and Feline Advisory Group. 1998. Report to the Colorado General Assembly. 12 pp.
- Decker, D.J. and K.G. Purdy. 1988. Toward a concept of wildlife acceptance capacity in wildlife management. Wildlife Society Bulletin 16:53-57.
- Defenders of Wildlife. The Bailey Wildlife Foundation Wolf Compensation Trust. 2004. Accessed 11//04. <http://www.defenders.org/wolfcomp.html>.
- Estes, James A. 1996. Predators and ecosystem management. Wildlife Society Bulletin 24(3): 390-396.

- Estes, J.A., K. Crooks, and R. Holt. 2001. Predators, ecological role of. Pp. 857-878 in S.A. Levin, ed. *Encyclopedia of Biodiversity*. Academic Press, Vol. 4.
- Fischer, H. 1989. Restoring the wolf – Defenders launches a compensation fund. *Defenders* 64:9,36.
- Fritts, S.H., and L.D. Mech. 1981. Dynamics, movements, and feeding ecology of a newly protected wolf population in northwestern Minnesota. *Wildlife Monographs* No. 80. 79 pp.
- Fritts, S.H., R.O. Stephenson, R.D. Hayes, and L. Boitani. 2003. Wolves and humans. Pp. 289-316 in L.D. Mech and L. Boitani, eds. *Wolves: behavior, ecology, and conservation*. University of Chicago Press, Chicago. 448 pp.
- Fritts, S.H. & L.N. Carbyn. 1995. Population viability, nature reserves, and the outlook for gray wolf conservation in North America. *Restoration Ecology* 3(1): 26-38.
- Fritts, S.H., E.E. Bangs, J.F. Gore. 1994. The relationship of wolf recovery to habitat conservation and biodiversity in the northwestern United States. *Landscape and Urban Planning* 28: 23-32.
- Fritts, S.H., E.E. Bangs, J.A. Fontaine, W.G. Brewster, J.F. Gore. 1995. Restoring wolves to the northern Rocky Mountains of the United States. Pp. 107-126 in L.N. Carbyn, S.H. Fritts, and D.R. Seip eds. *Ecology and Conservation of Wolves in a Changing World*. Edmonton, Alberta: Canadian Circumpolar Institute.
- Gese, E.M. and L.D. Mech. 1991. Dispersal of wolves (*Canis lupus*) in northeastern Minnesota, 1969-1989. *Canadian Journal of Zoology* 69:2946-2955.
- Ginsberg, J.R. and D.W. Macdonald. 1990. *Foxes, wolves, jackals, and dogs: An action plan for the conservation of canids*. IUCN World Conservation Union, Gland, Switzerland. 117 pp.
- Gunderson, L. 1999. Resilience, Flexibility and adaptive management—antidotes for spurious certitude? *Conservation Ecology* 3(1):7
<<http://www.consecol.org/vol3/iss1/art7>>
- Holling, C.S. ed. 1978. *Adaptive environmental management and assessment*. Wiley.
- Hope, J. 1994. Wolves and wolf hybrids as pets are big business but a bad idea. *Smithsonian*, June: 34-45.
- Johnson, M., D.H. Pletscher, D.K. Boyd. 1994. Serologic investigations of canine parvovirus and canine distemper in relation to wolf, *Canis lupus*, pup mortalities. *Journal of Wildlife Diseases* 30(2): 270-273.

- Kreeger, T.J. 2003. The Internal Wolf: Physiology, Pathology, and Pharmacology. Pp. 192-217 in L.D. Mech and L. Boitani, eds. *Wolves: behavior, ecology, and conservation*. University of Chicago Press, Chicago. 448 pp.
- Kunkel, K.E., T.K. Ruth, D.H. Pletscher, and M.G. Hornocker. 1999. Winter prey selection by wolves and cougars in and near Glacier National Park, Montana. *Journal of Wildlife Management* 63(3): 901-910.
- Lancia, R.A., C.E. Braun, M.W. Collopy, R.D. Dueser, J.G. Kie, C.J. Martinka, J.D. Nichols, T.D. Nudds, W.R. Porath, and N.G. Tilghman. 1996. ARM! for the future: adaptive resource management in the wildlife profession. *Wildlife Society Bulletin* 24:436-442.
- Leopold, A.S. 1959. *Wildlife of Mexico: The game birds and mammals*. University of California Press, Berkeley, California.
- Ligon and Pullianen. 1944. Pp. 249, 289 in Young, S.P. and E. Goldman. *The Wolves of North America*. The American Wildlife Institute, Washington, D.C. 632 pp.
- Mack, C.M. and K. Laudon. 1998. Idaho wolf recovery project: recovery and management of gray wolves in Idaho. Annual Report 1995-1998. Nez Perce Tribe, Department of Wildlife Management, Lapwai, ID. 19pp.
- McBride, R.T. 1980. The Mexican Wolf (*Canis lupus baileyi*): A historical review and observations on its status and distribution. Endangered Species Report 8, U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 38pp.
- McClaren, B.E. and R.O. Peterson. 1994. Wolves, moose, and tree rings on Isle Royale. *Science* 266:1555-1558.
- McNay, M.E. 2002. Wolf-human interactions in Alaska and Canada: a review of the case history. *Wildlife Society Bulletin* 30: 831-843.
- Mech, L.D. 1970. *The wolf: the ecology and behavior of an endangered species*. University of Minnesota Press, Minneapolis. 384pp.
- Mech, L.D. 1991. *The way of the wolf*. Voyageur Press, Stillwater, Minn. 120pp.
- Mech, L.D. 1995. The Challenge and Opportunity of Recovering Wolf Populations. *Conservation Biology*, 9:270-278.
- Mech L.D. 1995. What do we know about wolves and what more do we need to learn? Pp. 537-548 in L.N. Carbyn, S.H. Fritts, and D.R. Seip eds. *Ecology and Conservation of Wolves in a Changing World*. Edmonton, Alberta: Canadian Circumpolar Institute.

- Mech, L.D., L.G. Adams, T.J. Meier, J.W. Burch, and B.W. Dale. 1998. The wolves of Denali. University of Minnesota Press. Minneapolis, MN.
- Mech, L.D. and S.M. Goyal. 1993. Canine parvovirus effect on wolf population change and pup survival. *Journal of Wildlife Disease* 29:330-333.
- Mech, L.D. and R.O. Peterson. 2003. Wolf-prey relations, Pp. 131-160 in L.D. Mech and L. Boitani, eds. *Wolves: behavior, ecology, and conservation*. University of Chicago Press, Chicago. 448pp.
- Miller, B., B. Dugelby, D. Foreman, C. Martinez del Rio, R. Noss, M. Phillips, R. Reading, M.E. Soulé, J. Terborgh, L. Wilcox. 2001. The importance of large carnivores to healthy ecosystems. *Endangered Species Update* 18:202-210.
- Montag, J.M, M.E. Patterson, B. Sutton. 2003. Political and social viability of predator compensation programs in the West, Final Project Report. University of Montana, Missoula.
- Montana Fish Wildlife and Parks. 2002. Montana Wolf Conservation and Management Planning Document. Smith, D. pers comm.
- Montana Fish Wildlife and Parks. 2002. Montana Wolf Conservation and Management Planning Document. Thiers T. pers comm.
- Montana Fish Wildlife and Parks. 2002. Montana Wolf Conservation and Management Planning Document. Vore, J. pers comm.
- National Research Council. 1997. Wolves, bears, and their prey in Alaska. National Academy Press. Washington, D.C.
- Nowak, R.N. 1995. Another look at wolf taxonomy. Pp. 375-397 in L. N. Carbyn, ed. *Wolves in Canada and Alaska: their status, biology, and management*. Canadian Wildlife Service Rep. Ser. No. 45, Ottawa, Ont.
- Oakleaf, J.K., C. Mack, and D.L. Murray. 2003. Effects of wolves on livestock calf survival and movements in central Idaho. *Journal of Wildlife Management* 67:299-306.
- Oakleaf, J.K., D. Stark, P. Overy and N. Smith. 2004. Mexican Wolf Recovery: Technical Component of the Five-Year Program Review and Assessment
- Pletscher, D.H., R.R. Ream, D.K. Boyd, M.W. Fairchild, K.E. Kunkel. 1997. Population dynamics of a recolonizing wolf population. *Journal of Wildlife Management*. 61(2):459-465.

- Post, E., R.O. Peterson, N.C. Stenseth, and B.E. McClaren. 1999. Ecosystem consequences of wolf behavioural response to climate. *Nature* 401:905-907.
- Power, M.E., D. Tilman, J.A. Estes, B.A. Menge, W.J. Bond, L.S. Mills, G. Daily, J.C. Castilla, J. Lubchenco, and R.T. Paine. 1996. Challenges in the quest for keystones. *Bioscience* 46(8):609-620.
- Ream, R.R., W. Fairchild, D.K. Boyd, and D.H. Pletscher. 1991. Population dynamics and home range changes in a colonizing wolf population. pp. 349-366, *in* R.B. Keiter and M.S. Boyce, eds. *The greater Yellowstone area: redefining America's wilderness heritage*. Yale University Press. New Haven, CT.
- Riley, S.J. and D.J. Decker. 2000. Wildlife stakeholder acceptance capacity for cougars in Montana. *Wildlife Society Bulletin* 28(4): 931-939.
- Ripple, W.J. and R.L. Beschta. 2004. Wolves, elk, willows, and trophic cascades in the upper Gallatin Range of Southwestern Montana, USA. *Forest Ecology and Management*. 200: 161–181.
- Ripple, W.J., E.J. Larsen, R.A. Renkin, and D.W. Smith. 2001. Trophic cascades among wolves, elk and aspen on Yellowstone National Park's northern range. *Biological Conservation* 102: 227-234.
- Schmitz, O.J. 1998. Direct and indirect effects of predation and predation risk in old-field interaction webs. *American Naturalist* 151:327-340.
- Schoener, T.W. and D.A. Spiller. 1999. Indirect effects in an experimentally staged invasion by a major predator. *American Naturalist* 153:347-358.
- Shindler, Bruce, Kirstin Aldred Cheek, George H. Stankey. 1999. Monitoring and evaluation citizen-agency interactions: a framework developed for adaptive management. USDA Forest Service Gen. Tech. Rep. PNW-GTR-452. Portland, OR.
- Smith, D.W. 1998. Yellowstone Wolf Project: Annual Report, 1997. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming. YCR-NR-98-2.
- Smith, D.W., K.M. Murphy, and D.S. Guernsey. 2000. Yellowstone Wolf Project: Annual Report, 1999. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-NR-2000-01.
- Soulé, M.E., et. al. 2003. Ecological Effectiveness: Conservation Goals for Interactive Species. *Conservation Biology*, 17(5): 1238-1250.

- Stahler, D., B. Heinrich, and D. Smith. 2001. Common ravens preferentially associate with gray wolves as a foraging strategy. Abstract *in* Proceedings of the 13th Annual North American Interagency Wolf Conference, April 2001, Chico Hot Springs.
- Stephenson, R.O., W.B. Ballard, C.A. Smith, and K. Richardson. 1995. Wolf biology and management in Alaska 1981-1992. Pp. 43-54 *in* L.N. Carbyn, S.H. Fritts, and D.R. Seip, eds. Ecology and conservation of wolves in a changing world. Circumpolar Institute, Edmonton, Alberta.
- Thompson, W.L., G.C. White, and C. Gowan. 1998. Monitoring vertebrate populations. Academic Press, NY.
- United States Fish and Wildlife Service. 1982. Mexican wolf Recovery Plan. USFWS. Alburquerque, NM. 103pp.
- United States Fish and Wildlife Service. 1994. The reintroduction of gray wolves to Yellowstone National Park and central Idaho: Final Environmental Impact Statement. U.S. Fish and Wildlife Service. Denver, CO.
- United States Fish and Wildlife Service. 2000. Proposal to reclassify and remove the gray wolf from the list of endangered and threatened wildlife in portions of the conterminous United States. Federal Register 65(135): 43449-43496.
- United States Fish and Wildlife Service, Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2001. Rocky Mountain Wolf Recovery 2000 Annual Report. USFWS, Helena, MT. 35pp. <http://mountain-prairie.fws.gov/wolf/annualrpt00->
- United States Fish and Wildlife Service, Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2003. Rocky Mountain Wolf Recovery 2002 Annual Report. T. Meier, ed. USFWS, Ecological Services, 100 N Park, Suite 320, Helena MT. <http://mountain-prairie.fws.gov/wolf/annualrpt02->
- Wayne, R.K. 1992. On the use of morphologic and molecular genetic characters to investigate species status. Conservation Biology. 6(4):590-603.
- White, Paula A. and Diane K. Boyd. 1989. A Cougar, Felis Concolor, Kitten Killed and Eaten by Gray Wolves, Canis Lupis, in Glacier National Park, Montana. Canadian Field-Naturalist, 103(3): 408-409.
- Wisconsin Department of Natural Resources. 1999. Wisconsin Wolf Management Plan. PUBL-ER-099 99. Wisconsin Department of Natural Resources, Madison. 74pp.
- Wydeven, A.P., R.N. Schultz, and R.P. Thiel. 1995. Monitoring of a recovering gray wolf population in Wisconsin, 1979-1991. Pp. 147-156 *in* Carbyn, L.N., S.H. Fritts,

D.R. Seip. Ecology and conservation of wolves in a changing world. Canadian Circumpolar Institute, Occasional Publication No. 35. Edmonton, Alberta.

Youmans, H. 1999. Project overview. Pages 1.1-1.18 *in* Joslin, G. and H. Youmans, coordinators. Effects of recreation on Rocky Mountain wildlife: A Review for Montana. Committee on Effects of Recreation on Wildlife. Montana Chapter of The Wildlife Society. 307 pp.

Young, S.P. and E.A. Goldman. 1944. *The Wolves of North America*. The American Wildlife Institute, Washington, D.C. 632 pp.

APPENDIX D

COLORADO WOLF MANAGEMENT SCOPING REPORT SUMMARY

OVERVIEW AND COMMENTS REGARDING WOLF PRESENCE IN COLORADO

The Colorado Division of Wildlife conducted a scoping process in the spring of 2004 to solicit input from the citizens of Colorado about issues to be addressed by the Wolf Management Working Group. Six meetings were held around the State and comments were also accepted by email and regular mail.

A total of 261 comments were received during the scoping period. The majority (57 percent) of these submissions were comments written on 3x5 cards during the public meetings (Figure 1). The 3x5 comment cards were anonymous but the distribution of the numbers of comments received at each meeting shows that a majority (69 percent) of the comment cards were submitted at Front Range meetings (Figure 2).

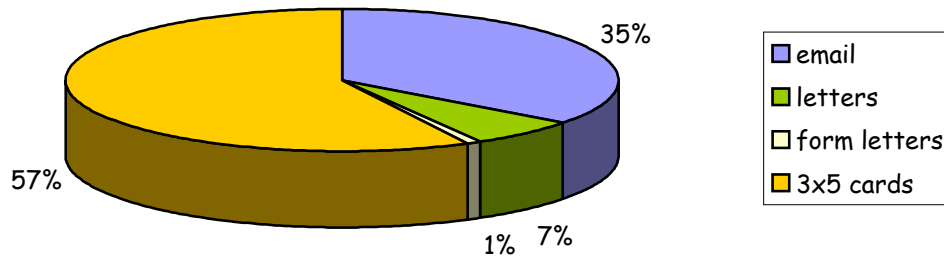


Figure 1 – Distribution of Types of Comments

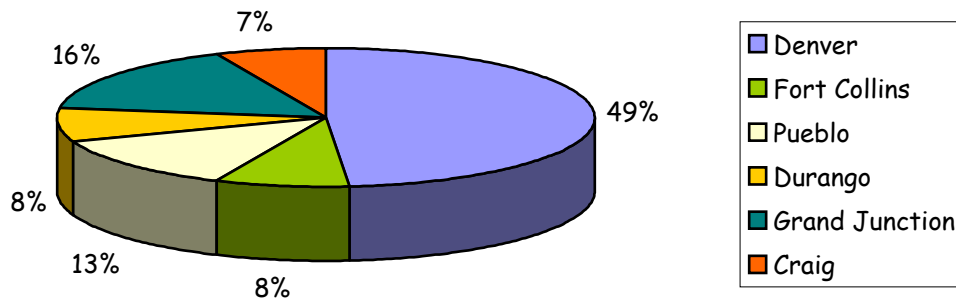


Figure 2 – Number of 3x5 Comment Cards Received at Each Public Meeting

A more specific geographic analysis was completed for the emails and letters because their origin could be determined. The largest percentage (44 percent) of the emails and letters came from the Front Range (Figure 3). These emails and letters were also classified as either supporting wolves in Colorado or not supporting them. The majority (73 percent) of these were categorized as supporting wolves in Colorado (Figure 4).

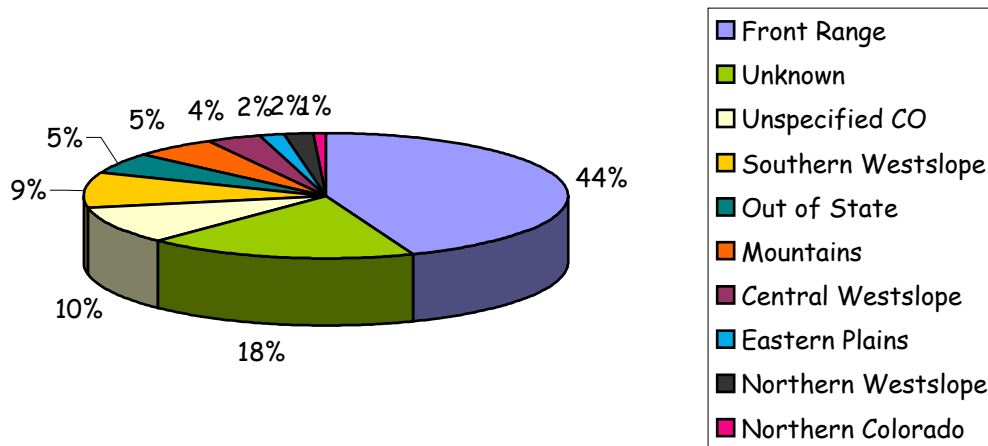


Figure 3 – Geographic Distribution of Email and Letter Comments

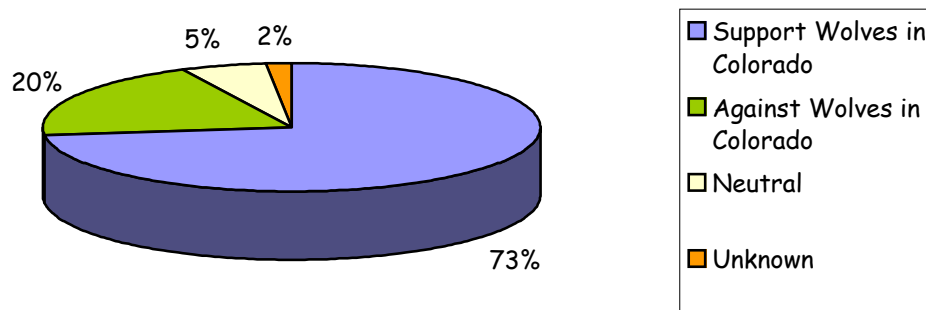


Figure 4 – Categorization of Emails and Letters for Support of Wolves in Colorado

The external scoping shows clearly that more comments were received from the Front Range, where support for wolves is high. So not surprisingly, the majority of comments received reflect a pro-wolf attitude about wolves in Colorado. However, it is important to state that the scoping process was not intended to be a voting contest, but instead a process to clarify, define the scope of, and frame the issues. The above analysis of demographics and attitudes was presented only to provide the Working Group with the proper context with which to view the results of the content analysis presented in the Scoping Report.

The issues that emerged from the scoping process were categorized as follows: Wolf Presence in Colorado; Ecosystem Issues; Livestock Interests; Human Risk; Public Policy; Management of Wolves Once in Colorado; Economics; and Development of a Management Plan. The Scoping Report also included a section on Attitudes and Perceptions.

Only the section of the Scoping Report regarding *Issue 1, Wolf Presence in Colorado, subsection: Migration and Subsequent Protection of Wolves* is presented below. Copies of the full Scoping Report can be obtained from the Colorado Division of Wildlife.

Issue 1 – Wolf Presence in Colorado

Although nearly all of the comments relate to the presence of wolves in the state, many individuals made specific comments advocating for, or speaking against, the reintroduction of wolves or the presence of wolves in the state. Of the nearly 780 individual comments, 30 percent were identified as specific to this issue. Within the larger issue of the desirability of wolf presence in the state, the comments were organized into two groups: issues concerned with the reintroduction of wolves and issues regarding the presence and population management of wolves once they are in the state, whether through migration or a reintroduction program.

Migration and Subsequent Protection of Wolves

Many individuals did not specifically advocate or oppose the reintroduction of wolves to the state, but did express opinions regarding whether wolves should be protected once here. Of the letters and emails that were received, 73 percent were identified as supporting the presence of wolves in the state, while 20 percent were opposed. Among those who support wolves in the state, many support protection and management of wolves once they arrive, but do not endorse reintroduction. Several individuals expressed their belief that polls have shown that a majority of Coloradoans support wolf presence in the state as a natural part of the ecosystem. Some asked that a vote be taken on this issue. In the Grand Junction meeting consideration was requested for the geography and population of Colorado and whether that limited the wolf presence.

Those who support wolves in the state point to a wide variety of other benefits that they perceive wolf presence would bring to Colorado. The most frequently cited benefit includes issues pertaining to ecosystem health and balance, economic benefits from tourism, a desire for restoration of the historic balance, and human values. These issues will be specifically discussed under other issues in this report.

Among the comments of those identified as opposed to wolves in the state, nearly 30 percent indicated opposition to any protection for wolves. A commenter from Las Animas County indicated that every person he called in the county was unanimously opposed to wolves in the state. As with those who support wolf presence in Colorado, there are many reasons for the opposition including fear of predation of livestock, cultural attitudes about the wolf, concern for big game herds, and the economic costs of management. These issues are discussed later as specific issues. One individual speaking at the Durango meeting felt that there are already too many factors negatively impacting the economics of ranching.

Some also indicated that although they considered themselves pro-wolf, they cannot endorse wolf presence. These individuals feel that wolves will be so harassed and persecuted that it would not be ethical to bring them into the state. One commentator felt that only if rancher's needs can be satisfactorily addressed would it be right to allow wolves into Colorado.

APPENDIX E

ROLE OF THE COLORADO WILDLIFE COMMISSION

The Colorado Legislature has declared that:

(1) It is the policy of the state of Colorado that the wildlife and their environment are to be protected, preserved, enhanced, and managed for the use, benefit, and enjoyment of the people of this state and its visitors. It is further declared to be the policy of this state that there shall be provided a comprehensive program designed to offer the greatest possible variety of wildlife-related recreational opportunity to the people of this state and its visitors and that, to carry out such program and policy, there shall be a continuous operation of planning, acquisition, and development of wildlife habitats and facilitates for wildlife-related opportunities. (CRS 33-1-101).

The legislature further declared that the Division of Wildlife “shall be under the jurisdiction of a commission” (CRS 33-1-103) and that “the commission is responsible for all wildlife management, for licensing requirements, and for the promulgation of rules, regulations, and orders concerning wildlife programs” (CRS 33-1-104).

The Commission is an eleven-member board appointed by the governor and confirmed by the Senate. Nine commissioners are voting members and two are non-voting members – the Executive Director for the Colorado Department of Natural Resources, and the State Agriculture Commissioner. Commission members are unpaid volunteers who represent five different geographic areas in Colorado. To further ensure representation of the varied values and interests of Coloradoans, one member is appointed from each of the following groups: livestock producers, agricultural or produce growers, sportsmen or outfitters, sportsmen or sportswomen, wildlife organizations, and boards of county commissioners. The remaining three commissioners are appointed from the public at large.

The commission meets six times a year to consider changes in Division of Wildlife regulations and policies. Major changes are usually discussed over three Commission meetings. The public can participate by submitting comments in writing or giving them orally at Commission meetings.

Requirements for selection to the commission other than residency in the district and membership in the user group to be represented include residency in Colorado and confirmation by the Senate (CRS 33-1-103 (b)).