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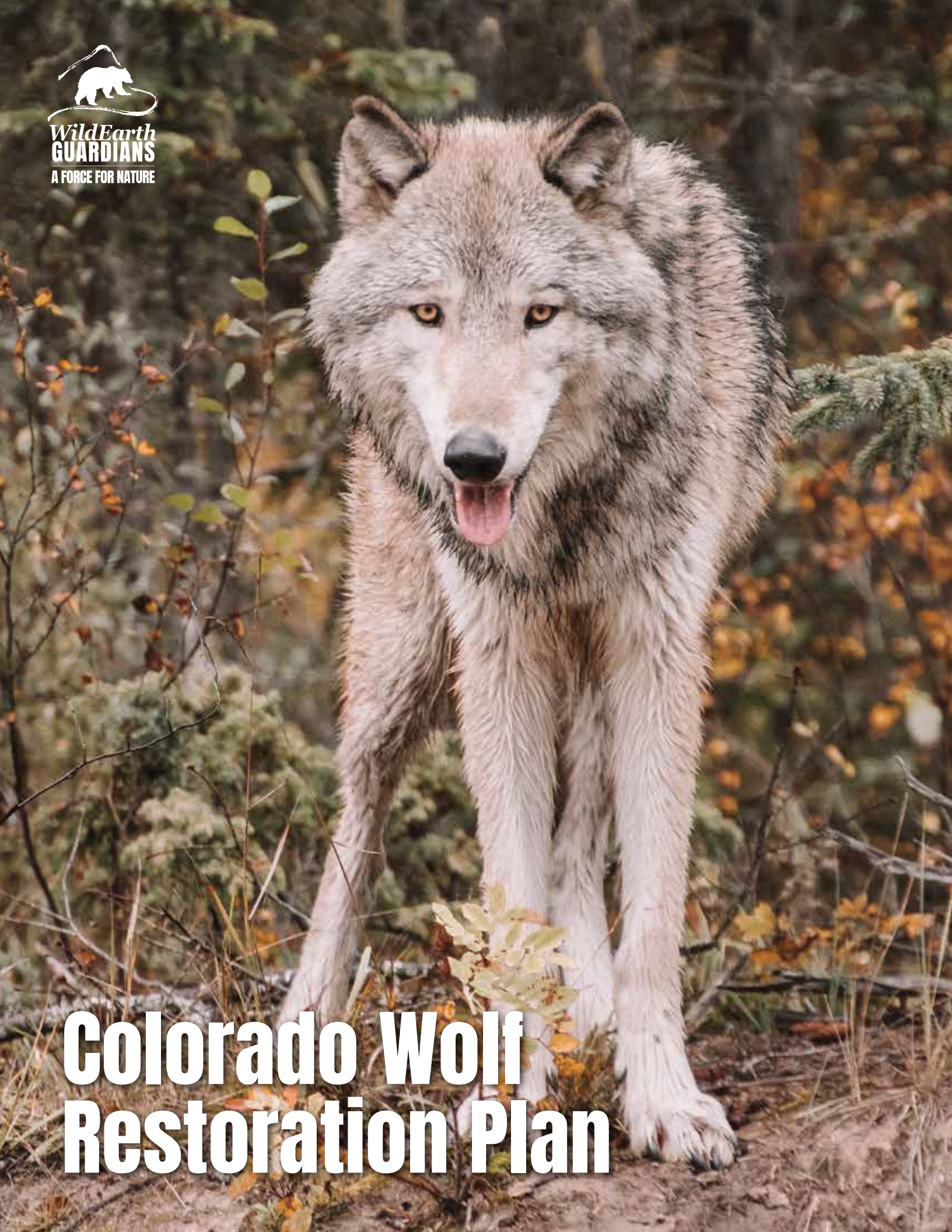

Colorado Wolf Restoration Plan

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The rough crags and pinnacles of the Colorado Rocky Mountains are, for many people, the first natural features that they associate with this region. Many also associate the Southern Rockies with abundant populations of elk. However, there's another, equally majestic icon, a dynamic counterpoint to the elk (Cervus canadensis), which once roamed across Colorado from the desert grasslands to the Rockies and the plains: the gray wolf (Canis lupus).

In 2021 a breeding pair of wolves migrated to Colorado from Wyoming and had six pups. Prior to these pups, Colorado's last wild-born wolf was trapped and killed by the U.S. Fish and Wildlife Service ("USFWS") in the San Juan Mountains in 1945, at the end of a 76-year campaign to eradicate the species on behalf of the livestock industry. The demise of that wolf heralded the ruin of an ecological process as profoundly important as wildfire: wolf predation. Only recently have we begun to appreciate the implications of extinguishing that process.

Colorado supports the largest herd of elk in the United States, creating a prey base far more abundant than that found in Yellowstone National Park. Without wolves chasing elk, riparian wetland trees and shrubs wither under intense browsing by sedentary elk. As go the willows, alders, cottonwoods and aspen, so go the nesting songbirds and the beavers that rely on those trees. As go the beavers, so go the streams and wetlands, and their fish and amphibians and so on. In short, removing wolves from Colorado's wild places has cascaded into a slowly building ecological disaster and biodiversity loss.

Colorado's Rocky Mountains need wolves, and wolves need the Colorado Rockies.

Purpose

The signatories of this plan have come together to articulate an inspired and ecologically-focused vision for wolf restoration in Colorado.

In November 2020, Colorado voters approved Proposition 114 to reintroduce gray wolves back into the state. Colorado Parks and Wildlife (CPW) has begun preparations to implement Proposition 114.

We feel that formal processes since the passage of Proposition 114 have minimized meaningful public input and uplifted the voices of ranchers, outfitters, trappers, and hunters over others en route to a plan that is likely to

limit the possibilities of wolves on the Colorado landscape. Discussions have focused on the negative impacts of wolves rather than positive ones. In critical ways, the spirit, and even the letter of Proposition 114, have been lost or undermined.

CPW convened two small groups for input on its wolf planning process: the Technical Working Group (TWG) comprised of wildlife management professionals, and a Stakeholder Advisory Group (SAG) drawn primarily from the livestock industry, hunters, and outfitters but also including wildlife conservationists. Both groups include county commissioners as well. It should be noted that neither of these bodies are required by law.

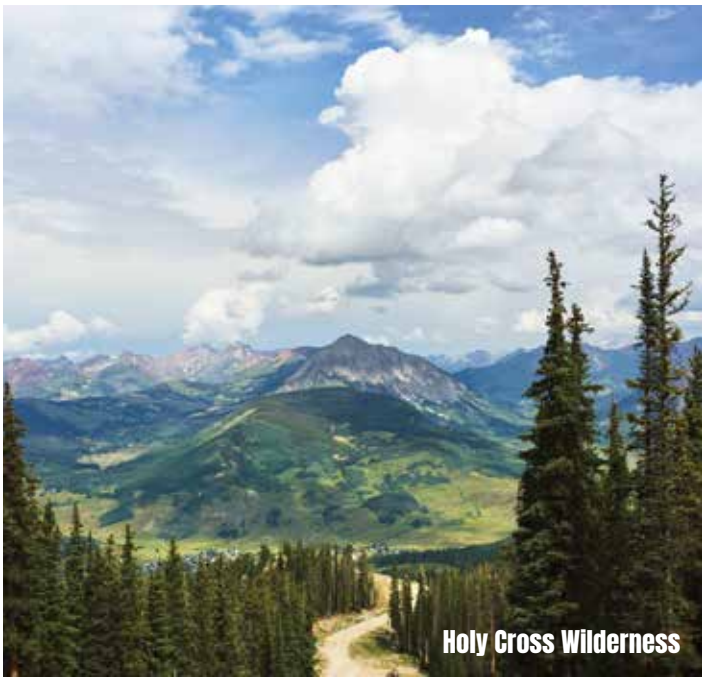
Members of the TWG and SAG have contributed time, energy, expertise, and perspective. But the makeup, structure, and facilitation of these bodies has tilted what should be an aspirational conversation towards a cynical one that has focused on livestock owner compensation, artificially limiting populations, and when, where, and how to kill wolves.

In contrast, the plan outlined below germinated from the notion that Colorado wolves represent immensely positive ecological, economic, and social opportunities for Coloradans and the Colorado landscapes that have been missing wolves for so long. Our emphasis is on ensuring the return of healthy and sustainable populations of gray wolves to Colorado and bringing about the benefits that wolves historically had on these landscapes. This draft plan is not intended to address every aspect of Colorado gray wolf reintroduction and restoration. Instead, it provides answers to what we see as some of the most important questions pertaining to wolf recovery and accentuates certain issues that we feel have been missing or minimized in formal processes to date.

We request that the CPW Commission incorporate our solutions and ideas into the final wolf restoration plan for Colorado.

Signatories

WildEarth Guardians • Center for Biological Diversity • Project Coyote • The Rewilding Institute • Green Latinos • Colorado Sierra Club • Humane Society of the United States • Herbal Gardens Wellness • Western Watersheds Project • Colorado Voters for Animals • Endangered Species Coalition • Animal Welfare Institute • Grand Canyon Wolf Recovery Project • Wolf Conservation Center


Holy Cross Wilderness

Outline of Topics

Considerations

1. Federal Endangered Species Act Considerations
2. Proposition 114
3. Mexican gray wolves
4. Best Available Science

Wolf Management Plan

1. Wolf Restoration
   a) Identification of areas for release of wolves
   b) Population goal
2. Wolf Management
   a) Management Phases
   b) Management Guidelines
3. Livestock Loss Compensation Considerations

Federal Endangered Species Act Considerations

Gray wolves are currently listed as an endangered species by both the federal government and the state of Colorado. Given the species' protected status under the federal Endangered Species Act (ESA), in order for the State of Colorado to reintroduce wolves, CPW would first need to obtain permission from the USFWS:

- CPW could obtain a "recovery permit" from the USFWS pursuant to ESA § 10(a)(1)(a), which would allow CPW to reintroduce wolves into the state while keeping wolves protected as a federally endangered species.
- Alternatively, § 10(j) of the ESA allows for the reintroduction and management of "experimental populations" of endangered or threatened species. CPW could coordinate with the USFWS to develop and promulgate a 10(j) rule for an experimental population of gray wolves to be released into Colorado and co-managed by the state. A 10(j) rule can allow exceptions to the ESA's take provisions for the experimental population, facilitating the management of wolves in Colorado.

Proposition 114

Proposition 114, codified as Colorado Revised Statutes ("C.R.S.") § 33-2-105.8, requires the state to begin reintroductions of "gray wolves" by December 31, 2023. It specifies non-game status for wolves, which precludes recreational hunting. It also requires the state to develop a wolf reintroduction plan "to restore and manage gray wolves in Colorado, using the best scientific data available" which must include:

(I) The selection of donor populations of gray wolves;

(II) The places, manner, and scheduling of reintroductions of gray wolves by the division [CPW], with such reintroductions being restricted to designated lands;

(III) Details for the restoration and management of gray wolves, including actions necessary for establishing and sustaining a self-sustaining population, as authorized by Section 33-2-104; and

(IV) Methodologies for determining when the gray wolf population is sustaining itself successfully and when to remove the gray wolf from the list of endangered or threatened species, as provided for in Section 33-2-105(2). (C.R.S. § 33-2-105.8(3)(a))

The statute then defines "designated lands" as "those west of the continental divide in Colorado that the commission determines are consistent with its plan to restore and manage gray wolves." C.R.S. § 33-2-105.8(5)(a).

In addition, Proposition 114 / C.R.S. § 33-2-105.8 states:

(1)(a) Historically, wolves were an essential part of the wild habitat of Colorado but were exterminated and have been functionally extinct for seventy-five years in the state; and

(1)(c) Once restored to Colorado, gray wolves will help restore a critical balance in nature.

Mexican Gray Wolves

It is the belief of the signatories of this plan that Mexican gray wolves *(Canis lupus baileyi)* should be present in Colorado. Specifically, they should be in the San Juan Mountains of southwestern Colorado, as recommended by wolf biologists who advise that Mexican wolf recovery will require a population of this subspecies in the southern Rocky Mountains in addition to the Mexican Wolf Experimental Population Area of central New Mexico and Arizona and the Grand Canyon ecoregion. Such a population would also be able to connect to the existing population at the southeastern edge of the Mogollon Plateau in Arizona and New Mexico, and would also have connectivity to a conceivable future population of Mexican wolves in the Grand Canyon ecoregion. These three connected populations (San Juan Mountains, Grand Canyon, Mogollon Plateau) could help to provide the genetic diversity and resilience to increase the likelihood of eventual recovery of the Mexican gray wolf subspecies (Carroll et al., 2014).

Occasional interbreeding of wolf subspecies in Colorado would benefit the existing Mexican wolf population in southwestern New Mexico and southeastern Arizona, which would be connected through long-distance dispersing wolves. The benefit would come in the form of diversifying the impoverished gene pool of the current Mexican wolf population (Hedrick et al., 2018). Conversely, if Mexican wolves are not present in the San Juan Mountains, this region will eventually be inhabited by reintroduced northern gray wolves, some of whom would similarly disperse and reach the current Mexican wolf population. The difference in scenarios is that, if Mexican wolves inhabit the San Juans, the center of subspecific intergradation would occur in west-central Colorado and not in central or southern New Mexico and Arizona. Were northern wolves to inhabit the San Juans, there is a risk of northern wolf genes swamping the gene pool of the Mexican wolf where it exists in the wild in the Southwest today. That risk of losing some of the uniqueness of the Mexican wolf is ameliorated through the presence of Mexican wolves in the San Juans.

CPW and the TWG have clearly stated their opposition to the inclusion of Mexican gray wolves in the Colorado wolf plan. We disagree. However in this plan we will not address the specifics of Mexican gray wolves in Colorado. We strongly believe that for the long-term viability of Mexican gray wolves in the United States, there should be a population in southern Colorado, whether by state action, federal action, or allowed dispersal.


BOB WICK

Dominguez-Escalante National Conservation Area

Best Available Science and Social Considerations

Not only does Proposition 114 require the use of the "best scientific data available," but a reliance on measurable, replicable, peer-reviewed science in any wolf conservation planning is essential. Wolf "management" policies adopted by agencies are frequently designed to respond to and appease those who oppose wolf recovery. Opposition to coexistence with wolves is often due to long-standing, ongoing fear, hatred, and ignorance regarding wolves and cannot continue to be the basis for state policies if wolf recovery and conservation are the goals.

Wolf recovery planning calls for more than just biological science about wolves. It calls for the ongoing integration of published, peer-reviewed literature, together with experts' contributions from the natural and social sciences and humanities, on the social, economic, and ethical issues surrounding wolf conservation, recovery, and management. Public input and economic considerations are also critical.

The Precautionary Principle is of particular relevance here. Species (including populations and subspecies) are genetically unique and irreplaceable—their loss is irreversible. Ecosystems vary across a vast range of parameters, and ecosystems (whether wetlands, forests, valley floors, etc.) cannot be presumed to be interchangeable, such that the loss of one can be compensated by the protection or restoration of another (IUCN, 2007).

In addition, a commitment to adaptive management is critical to wolf conservation planning.

Wolf conservation plans should be living, adaptable documents, updated as vital new information becomes available. At a minimum, a review and update of these plans should be performed every five years with newly available science and data pertaining to state-specific and regional threats to wolves, precautionary responses needed, and other management concerns. Plans should be modified to reflect new understandings, including increased threats to wolves in relation to problems of climate change, mass extinctions, and loss of habitat. Additionally, it would serve Colorado to actively seek public input on an ongoing basis or at regular intervals.

Finally, decision-makers should draw on Traditional Ecological Knowledge to effectively conserve wolves and educate the public.

Colorado Wolf Management Plan

1. Wolf Restoration

In order to fulfill the mandate of Proposition 114–to establish and maintain a self-sustaining population of gray wolves in Colorado–it is important that the CPW Commission consider the total carrying capacity of wolves in the Western Slope region, as well as dynamics of breeding pairs and wolf packs. While not a statutory requirement, it would serve the Western U.S. if Commissioners also consider reintroduction and management of wolves in Colorado vis a vis inadequate wolf populations to the north and south of the state.

a. Identification of Areas for Release of Wolves

Wolves will roam and disperse according to whims and factors beyond human control and even understanding. We have created a very conservative map of suitable wolf habitat throughout Colorado with the knowledge that it is extremely likely wolves will wander well outside of these areas. In fact, where Colorado's few wolves currently are is not deemed suitable habitat by our conservative model. However, this mapping exercise allows us to paint a coarse picture of where wolves may be likely to thrive and where it makes the most sense to reintroduce them.

We used criteria very similar to the Oregon Department of Fish and Wildlife (ODFW) in developing our potential habitat map. We believe that the methodology utilized by ODFW was based in logic and could be applied to similarly situated states such as Colorado. ODFW had the advantage of conducting this exercise after a number of wolf packs had been established in the state. Explaining their process, they stated:

> As part of a biological status review of gray wolves (Canis lupus) in Oregon, we developed a map of potential wolf range in Oregon and calculated the amount of potential range currently occupied by wolves. To develop our map of potential wolf range, we used landscape predictor variables similar to Larsen and Ripple (2006) who predicted wolf abundance and distribution in Oregon from wolf data collected in other states. Our approach was to create a simple 1-category map at a coarse resolution (1 km), indicating where wolves could potentially occur in Oregon. The 5 main predictors of wolf habitat from previous research are 1) forested areas (Mladenoff et al. 1995, Larsen and Ripple 2006, Oakleaf et al. 2006, Benson et al. 2015), 2) public ownership (Mladenoff et al. 1995, Carroll et al. 2003, Larsen and Ripple 2006), 3) prey availability (Mech and Peterson 2003, Peterson and Ciucci 2003, Larsen and Ripple 2006, Oakleaf et al. 2006), 4) low human presence (Belongie 2008), and 5) low road density (Mech et al. 1988, Kohn et al. 2001, Carroll et al. 2003, Larsen and Ripple 2006, Belongie 2008, Zimmermann et al. 2014, Benson et al. 2015). We used all these predictors for Oregon, except public ownership, because data from Oregon indicate that wolves use both private and public lands with forested cover. Our mapping process included extracting and merging spatial data related to land cover type, elk ranges, human population density, road density, cultivated or other land types altered by humans.
> (ODFW, 2015A)

For land cover, they included forested areas with 2,000-meter buffers to include forest edge habitats. They focused on elk habitat because elk are the primary prey of wolves where the two species coexist (Mech & Peterson, 2003). They did not also include deer habitat because deer are present in all elk habitat. They then overlaid these two maps—forested areas and elk habitat—to develop their master map.

After developing their master map, they started deleting areas. First, they deleted areas dominated by human development. This removal includes areas with (a) greater than 4 humans/km^2 plus a 1600-meter buffer; (b) areas with road densities greater than 3.5 km/km^2; and (c) lands identified as developed, cultivated, or hay/pasture plus a buffer of 1,000 meters.

Finally, they removed areas of contiguous potential range < 500 km^2, as that was the mean territory size of wolf packs in the Greater Yellowstone Ecosystem (Carroll et al., 2003). Note that the mean territory size of wolves in Oregon is much larger at 1,030 km^2 (as of 2015), which could be an indicator of habitat quality or lack of wolf population density (or both). Conversely, Minnesota has reported that the average pack territory size in 2019-20 was 117 km^2 (MNDNR, 2020).

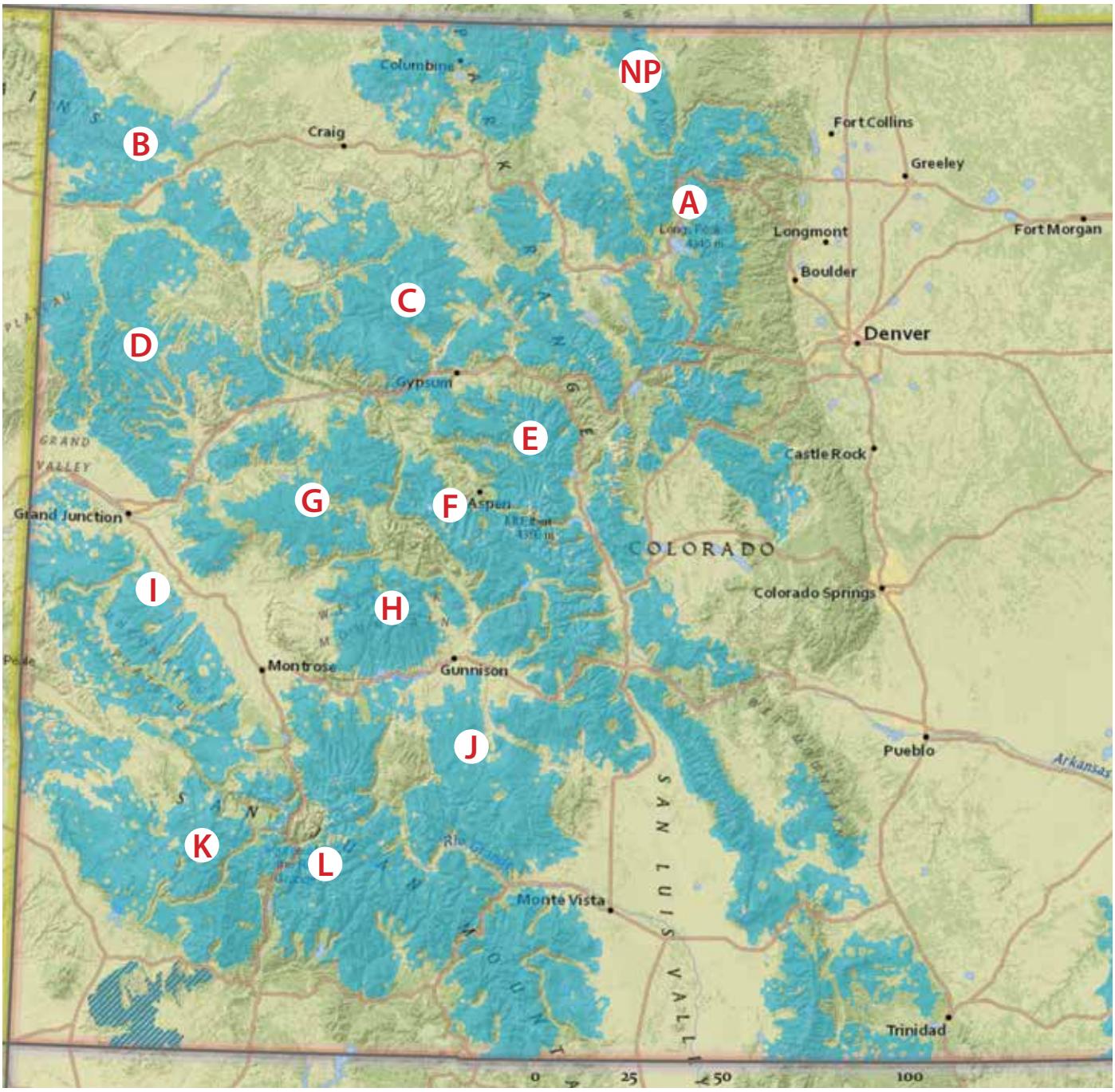
We followed ODFW's mapping protocol except in the final step where we removed areas of contiguous potential range < 450 km^2, as that is the average pack territory size in Montana measured over an extended period (MFWP, 2020). We chose a conservative estimate for our potential habitat map, but note that mean pack territory size might decrease where prey abundance is especially high and/or with time if recovery progresses and wolf densities increase (such that Colorado wolves might approach densities similar to Yellowstone or Minnesota).

The first phase of wolf reintroduction in Colorado should entail releasing one breeding pair in each of 12 pack zones, with the goal of establishing 13 successful breeding pairs persisting for 2 years—one pair in each of the 12 pack zones, plus the existing North Park pack.

Using this methodology, the best wolf habitat in Colorado totals 17,220,280 acres (69,688 km^2), with 11,670,787 acres (47,230 km^2) of that west of the Continental Divide where Proposition 114 specifies reintroduction to occur. Once established, wolves should be allowed to disperse east of the Continental Divide, which is an artificial boundary as far as wolves and other wildlife are concerned. Proposition 114 does not explicitly impose any limits on where wolves may be allowed to live in Colorado after they are reintroduced.

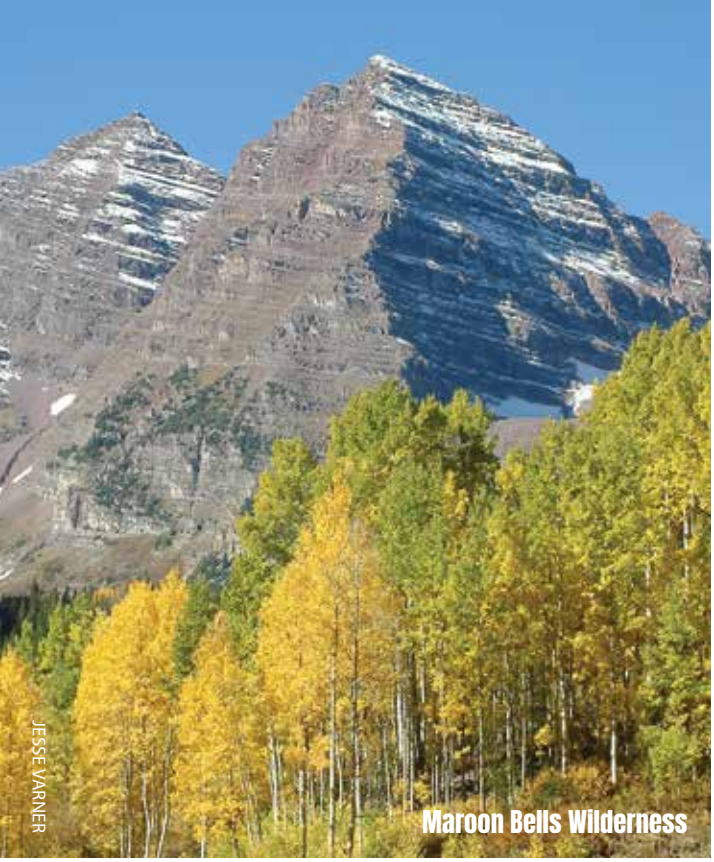
Twelve habitat zones should be used for reintroduction, with zones A through D north of I-70, and zones E through L south of I-70. (The 12 packs to be released are in addition to the already-established North Park pack). See the map below the descriptions for locations. We have identified CPW's primary overlapping elk data analysis unit (DAU) for each zone. A DAU is the geographic area that represents the year-round range of a big game herd and includes all the seasonal ranges of a specific herd. Each DAU is made up of one to several Game Management Units (GMU).

A. Rocky Mountain National Park.
1,090,970 acres (4,415 km^2). The primary habitat zone in the park, stretching south into the Arapaho-Roosevelt National Forest, is 285,900 acres (1,157 km^2), with another zone partially in the north of the park and primarily in the Arapaho-Roosevelt and Medicine Bow-Routt National Forests of 357,067 acres (1,445 km^2). There are additional nearby habitat zones further to the north [204,603 acres (828 km^2)] and west [243,399 acres (985 km^2)] of the park, as well.



The large blue-green tracts represent suitable wolf habitat in zones 450 km2 and larger. The 12 proposed wolf habitat zones, along with the location of the North Park pack ("NP") are marked. Note that the Southern Ute Reservation in SW Colorado qualifies as suitable wolf habitat. We have removed the area from consideration for reintroductions because, as a sovereign nation, the Southern Ute Indian Tribe has expressed opposition to having wolves reintroduced there.

Moreover, Rocky Mountain National Park is ideally suited for wolves, with one of Congress' stated purposes for establishing it in 1915 being "for the preservation of natural conditions." Its Master Plan clearly states that the goal of the Park is "the perpetuation of natural features in as near to pristine conditions as possible," with the "major emphasis on the perpetuation of natural processes." In addition, the west side of Rocky Mountain National Park was the most frequently suggested location for a wolf reintroduction site in public input provided to CPW at the start of the wolf reintroduction process in 2021 (Keystone Policy Center 2021).



The benefits of wolves reducing chronic wasting disease (CWD) in elk to Rocky Mountain National Park have been studied by Hobbs (2006). And the park is an ideal site for further studies on the effects of wolf reintroduction.

This habitat zone has good connectivity to the existing North Park pack territory to the northwest and the Flat Tops habitat zone to the west. Primary DAU: E-8.

B. Dinosaur National Monument.
770,968 acres (3,120 km^2). The National Monument is centered on a large habitat zone of 554,751 acres (2,245 km^2), with another habitat zone of 216,217 acres (875 km^2) to the southeast, connecting this area with both the Flat Tops habitat and the White River BLM habitat. This area would also provide a good connection to Wyoming and wolves from the Greater Yellowstone population. Primary DAU: E-1.

C. Flat Tops Wilderness, White River National Forest. 1,486,586 acres (6,016 km^2). The Flat Tops habitat zone is 757,378 acres (3,065 km^2), with other smaller zones adjacent totaling 729,208 acres (2,951 km^2). There is also good habitat connectivity between here and the Rocky Mountain National Park zone to the east, the Dinosaur National Monument zone to the northwest, the White River/Grand Junction BLM zone to the west, the Holy Cross-Frying Pan zone to the southeast, along with the North Park pack to the north. Primary DAU: E-6.

D. White River and Grand Junction Field Offices, BLM.
1,287,172 acres (5,209 km^2). This area is centered on a large habitat zone of 784,312 acres (3,174 km^2) north of Grand Junction and south of Dinosaur National Monument. To the west is a zone of 286,889 acres (1,161 km^2), and to the east is another zone of 215,970 acres (874 km^2). There is good connectivity to the Dinosaur National Monument habitat to the north, the Flat Tops habitat to the east, and possibly the West Grand Mesa Uncompahgre and Gunnison (GMUG) habitat to the southeast if crossing I-70 is feasible. Primary DAU: E-10.

E. Holy Cross and Hunter-Frying Pan Wildernesses, White River National Forest.
726,242 acres (2,939 km^2). This consists of a primary habitat zone of 547,091 acres (2,214 km^2), with close proximity to the Flat Tops zone across I-70. In fact, there are several nearby wildlife crossings to help facilitate crossing I-70 between the two habitat zones. This zone is also close to the Maroon Bells-Snowmass zone, which is to the south and west, along with a good habitat zone of 179,151 acres (725 km^2) on the east side of the divide. Primary DAU: E-16.

F. Maroon Bells-Snowmass Wilderness, White River and GMUG National Forests.
908,359 acres (3,676 km^2). A centrally located habitat zone of 549,809 acres (2,225 km^2) with two additional zones of 222,642 acres (901 km^2) and 135,908 acres (550 km^2) to the south. This habitat zone has excellent connectivity to the Holy Cross/Hunter-Frying Pan zone to the north, the West Elk zone to the southwest, and the GMUG zone to the west. Primary DAU: E-15.

G. West Grand Mesa-Uncompahgre-Gunnison National Forest.
836,698 acres (3,386 km^2). This habitat zone incorporates the Grand Mesa zones of 291,584 acres (1,180 km^2) and 145,792 acres (590 km^2), with another zone of 145,792 acres (590 km^2) centered on Battlement Mesa to the north and another of 253,530 acres (1,026 km^2) centered on Twin Peaks to the northeast. It is another centrally located zone, with connectivity to the White River/Grand Junction BLM zone to the

northwest (assuming I-70 is not a total barrier), the Maroon Bells-Snowmass zone to the east, the West Elk zone to the southeast, and the Dominguez-Escalante zone to the southwest. Primary DAU: E-14.

H. West Elk Wilderness, GMUG National Forest.
486,797 acres (1,970 km^2). This is the fifth largest designated wilderness area in Colorado and perhaps the least visited. The West Elk habitat zone is centrally located with the Maroon Bells-Snowmass zone to the northeast, the West GMUG zone to the northwest, and the Weminuche zone to the south. Primary DAU: E-41.

I. Dominguez-Escalante National Conservation Area.
1,070,213 acres (4,331 km^2). This area is within the BLM's Uncompahgre and Grand Junction Field Offices and the GMUG National Forest, centered on a zone of 251,553 acres (1,018 km^2) in and around the Dominguez-Escalante National Conservation Area, with additional zones of 263,167 acres (1,065 km^2), 256,989 acres (1,040 km^2), 130,472 acres (528 km^2), and 168,032 acres (680 km^2) surrounding it. It has connectivity to the West GMUG zone to the east, the Hermosa Creek zone to the south, and the Weminuche zone to the southeast. Primary DAU: E-20.

J. La Garita Wilderness, GMUG National Forest.
1,209,086 acres (4,893 km^2). Although partially on the east side of the divide, this habitat zone is substantial enough on the west side of the divide to more than accommodate a wolf pack. There is also another large zone of 377,824 acres (1,529 km^2) to the northeast and seamless connectivity to the huge Weminuche zone to the south and west. Primary DAU: E-25.

K. Hermosa Creek Wilderness, San Juan National Forest.
1,340,794 acres (5,426 km^2). Northwest of Durango, this zone is comprised of two zones of 707,710 acres (2,864 km^2) and 419,832 acres (1,699 km^2) on the San Juan National Forest with an additional zone of 213,252 acres (863 km^2) in the Tres Rios BLM Field Office. It is adjacent to the Dominguez-Escalante zone to the north and the Weminuche zone to the east. Primary DAU: E-24.

L. Weminuche Wilderness,[2] San Juan National Forest.
2,255,083 acres (9,126 km^2). The core of this area is 1,476,701 acres (5,976 km^2), based largely in Colorado's largest Wilderness Area: The Weminuche. It has excellent connectivity to the La Garita zone to the northeast, the Hermosa Creek zone to the west, the Dominguez-Escalante zone to the northwest, and

ROBERT THIGPEN

Weminuche Wilderness, San Juan National Forest

the West Elk zone to the north. In addition to centering the SW Colorado wolf populations, this zone is adjacent to two zones of 625,918 acres (2,533 km^2) and 152,464 acres (617 km^2) across the Continental Divide, largely on the Rio Grande National Forest to the southeast of the Weminuche, presenting an excellent opportunity for dispersal. Primary DAU: E-31.

Mapping corridors between these zones is also important, as inbreeding is a potentially serious threat to the long-term viability for small, isolated populations of wolves (Liberg, 2005; Fredrickson et al., 2007), but can be minimized through connectivity to adjacent populations. To ensure continued genetic diversity, genetic testing is an important feature of any management scheme as is the recruitment of wolves from different subpopulations for the initial reintroduction.

b. Population Goal

Three separate studies by scientists have shown that the region could again support over 1,000 wolves (Bennett, 1994; Carroll et al., 2003, 2006). There is suitable habitat for at least 150 packs, or approximately 750 wolves (with a range of 600-1,500), and that should stand as the minimum presence of wolves in Colorado to be achieved over time. This figure is supported by the geographic features of Colorado, the ample prey base for wolves found in the state, the importance of successful breeding pairs for building a sustainable population and basic conservation principles to ensure that Colorado's wolf population can indeed be "self-sustaining" over time, as mandated by state law.

In analyzing the capacity of the Colorado Rocky Mountains to support a wolf population, scientists examined several factors: 1)The density and distribution of elk and deer; 2) Road density (expressed as miles of road per square mile), where lower densities scored as better habitat; 3) Land ownership status (where public lands scored better than private lands); and 4) protected area status (where wilderness lands scored better than less protected areas).

JAMES CLERK MAXWELL

Dinosaur National Monument

The prey base in Colorado is no limitation to the wolf population. Using the approach suggested by Carbone and Gittleman (2002), the carrying capacity for wolves is based on available primary prey biomass:

Number of wolves = 0.62 x primary prey base, where primary prey biomass is scaled per 10,000 kg.

Colorado's current elk population—the largest in the world according to CPW—is 294,000 (Kaufman, 2022). Assuming a conservative 500 lbs. or 227 kg per elk, there is approximately 6,673.8 x 10,000 kg of primary prey base available to wolves across Colorado. 10,000 kilograms of prey supports about 90 kilograms of a given species of carnivore (Carbone & Gittleman, 2002), indicating available prey for approximately 4,138 wolves. The estimate does not factor in mule deer and other prey.

Land ownership status is also no issue, as approximately 65% of the Western Slope is federal or state public land. Much of these public lands enjoy some level of protection, and a significant portion are designated as wilderness areas.

Larger populations, regardless of species, have a reduced risk of extinction and can withstand longer periods of reduced population growth. On this basis, and using a population model developed by Bull et al. (2009), ODFW found that the "risk of conservation-failure was lower for populations that started with 100 or 150 wolves compared to the current population size observed in Oregon (N = 85; Fig. 6). These results highlight the importance of creating a buffer between extant population size and conservation-failure thresholds to allow for potential years of negative population growth" (ODFW, 2015B).

More important than total population is the number of successful breeding pairs, which is a proxy for the number of packs. The U.S. Fish and Wildlife Service used successful breeding pairs as their recovery measure "because wolf populations are maintained by packs that successfully raise pups" (USFWS, 1994; Mitchell et al., 2008). A successful breeding pair is defined as an adult male and an adult female wolf with at least two pups that survived to December 31 of the year of their birth. A wolf pack is defined as a group of four or more wolves traveling together in winter, with wolf packs normally consisting of four to seven animals (Mech & Boitani, 2003; Stahler et al., 2006; Vucetich et al., 2012). In Minnesota, average pack size is 3.6, with a range of two to seven (MNDNR 2020), and in Montana the mean pack size is 5.4 (MFWP, 2020). Oregon has seen a higher average pack size of 7.6 wolves per pack (ODFW, 2019). For our analysis, we assume a pack size of five with a range of four to seven wolves.[3]

Typically, only the top-ranking female and male wolves in each pack will breed and reproduce (Mech & Boitani, 2003). Wolves are usually, but not always, monogamous, with about 25% of packs evidencing multiple breeding pairs under polygamous matings in Yellowstone. They become fertile as two-year-olds and breeding females usually give birth once each spring to a litter of two to five pups and may continue to produce offspring annually until they are over 10 years old (Mech, 1970; Fuller et al., 2003). Pup survival to their first year is highly variable and can range anywhere from 30-60%, with lower survival rates in hunting and trapping scenarios (Ausband et al., 2015; Brainerd et al., 2008). Offspring usually remain with their parents for 10 to 54 months, meaning that packs may include the offspring from up to four breeding seasons (Mech & Boitani, 2003).

The importance of breeding pairs cannot be overstated:

> Pup production and recruitment affects wolf population growth and viability in two ways. At the end of the biological year, wolf pups typically represent a large fraction of the total wolf population (Fuller et al. 2003). Consequently, any reductions in pup recruitment will slow population growth rates of wolves in the short-term. In the long-term, reduced pup recruitment will affect the number of potential dispersing wolves in the population. Yearling wolves (i.e., recently recruited pups) are most likely to disperse and establish new territories (Gese and Mech 1991, Boyd and Pletscher 1999). Reduced pup recruitment will limit the number of potential dispersers in subsequent years, which should slow the rate of population growth because fewer dispersers will be available to establish territories and contribute to population level reproduction.
> (ODFW, 2015B)


RYAN FONKERT

San Luis Peak, La Garita Wilderness

Wolves remain at risk until existing populations are connected through dispersal and fulfill the conservation biology principles of representation, resiliency, and redundancy—the three Rs—for reducing extinction risk and maintaining self-sustaining populations (Shaffer et al., 2000). These principles are relied upon heavily in the fields of conservation biology when pertaining to endangered and imperiled species.

Proposition 114 calls for a "self-sustaining population" of gray wolves. Traill et al. (2007) standardized estimates of minimum viable population ("MVP") size for 212 species, including the gray wolf, and documented a median MVP of 4,169 individuals with a 95 percent confidence interval of 2,261 to 5,095. Reed et al. (2003) used population viability analysis to estimate MVPs for 102 species, including the gray wolf, and estimates a minimum viable adult population size (MVPA) of 1,403 wolves and a minimum viable adult population size corrected to 40 generations worth of data (MVPC) of 6,322 wolves. No region of the U.S. has wolf populations of that size.

Further, Frankham et al. (2014) suggested that genetically effective population sizes of at least 1,000 are required to ensure long-term genetic viability.

Colorado–through reintroduction and management–has the opportunity to buck the trend of inadequacy and create a legitimately self-sustaining wolf population as mandated by the clear language of Proposition 114 and enacted into law by the majority of Coloradans.

2. Wolf Management

a. Management Phases

Phase I, Reintroduction: Endangered, Tier 1 Species of Greatest Conservation Need (SGCN).
In Phase I, CPW will reintroduce one breeding pair in each of the 12 new pack zones, with the goal of establishing 13 successful breeding pairs persisting for at least 2 years—one pair in each of the 12 new pack zones plus the existing North Park pack—or approximately 60 wolves (with a range of 48-120).

Gray wolves are currently listed as Endangered under the state endangered species act; however, they are not listed as a Tier 1 SGCN and would need to be redesignated as such. They are now Tier 2 SGCN.

Tier 1 species are those that "are truly of the highest conservation priority in the state" according to the State Wildlife Action Plan (SWAP). The SWAP also highlights the importance of keystone species, further justifying Tier 1 status for gray wolves. Tier 2 species "remain important in light of forestalling population trends or habitat conditions that may lead to a threatened or endangered listing status, but the urgency of such action has been deemed to be less." Clearly, with the passage of Proposition 114, gray wolves must be deemed as the highest priority, or Tier 1.

Phase II, Establishment: Threatened, Tier 1 SGCN.
To reclassify gray wolves into Phase II, from state endangered to state threatened: a minimum of 30 successful breeding pairs must be present for 4 consecutive years, occupying 8 of the 13 pack zones. Alternatively, a total statewide population of 300 gray wolves for 4 consecutive years will qualify for reclassification into Phase II.

Phase III, Viability: Non-game, Tier 2 SGCN.
To reclassify gray wolves into Phase III, from state threatened to state nongame: 75 successful breeding pairs must be present for 4 consecutive years, occupying 10 of the 13 pack zones. Alternatively, a total statewide population of 750 gray wolves for 4 consecutive years will qualify for reclassification into Phase III.

In addition, to move into Phase III there must be a 50% decrease in elk and deer chronic wasting disease within the Primary DAUs of the occupied pack zones, measured by percent of tested elk and ungulates.

Nongame species have largely the same protections as endangered and threatened species under CPW regulation W-10, #1000.A., wherein harassment, taking, or possession of them is limited to specific circumstances.

The goal of Phase III is to reach 150 packs, or approximately 750 wolves (with a range of 600-1,500), allowing for connectivity to wolf populations in neighboring states. That shall be the ongoing goal for the minimum presence of wolves in Colorado. This goal is not to be considered a cap and it must be recognized that future scientific studies may reveal that different population goals should be set for viability, genetic diversity, connectivity and ecosystem health and function.

b. Management Guidelines

Killing wolves should not be permitted except in extremely limited circumstances. Non-lethal conflict prevention methods should be prioritized. There is strong evidence that legal killing of wolves begets illegal killing of wolves (Santiago-Ávila et al., 2020). A peer-reviewed study published last year tested "[t]wo opposing hypotheses" that "implementing lethal management may decrease poaching incidence (killing for tolerance) or increase it (facilitated illegal killing)" through analyzing mortality and disappearance data pertaining to Mexican wolves. The authors wanted to know whether wolf poaching (reported and unreported) in Arizona and New Mexico responded to changes in policy that reduced protections to allow more wolf-killing. They employed advanced biostatistical survival and competing risk methods to data on individual resightings, mortality and disappearances of collared Mexican wolves, supplemented with Bayesian factors to assess the strength of evidence. They found that lethal management incentivized illegal killing (Louchouarn et al., 2021).

Proactive non-lethal deterrent should be emphasized to minimize livestock losses and ensure proper recovery of wolves in Colorado. Several studies have proven a proactive non-lethal approach to reduce livestock conflict leads to better conflict mitigation. Treves et al. (2016) found various non-lethal techniques functionally effective at preventing conflicts with domestic animals across a variety of predatory species. In addition, husbandry practices such as adjusting calving timing and location, as well as increased human supervision by range riding over large grazing areas, have been proven effective at minimizing livestock losses (Bruns et al., 2020).

Killing wolves often fails to provide a long-term solution to wolf-livestock conflict. Killing wolves in response to livestock conflict has the highest variability of success when compared to non-lethal practices like fencing, deterrents, and shepherds (Bruns et al., 2020; Van Eeden et al., 2018). In addition, there is significant evidence showing that killing wolves may be less functionally effective at mitigating subsequent livestock losses than non-

lethal deterrents (Santiago-Avila et al., 2018; Treves et al., 2016). Killing carnivores can prove more costly than non-lethal deterrence measures and is less tolerated by the public (McManus et al., 2015; Bergstrom, 2017).

Further, the Oregon Wolf Plan raises serious questions around the efficacy of lethal removal:

> However, research into the effects of lethal removal are ambiguous, likely because studies are observational in nature and often related to the scale of analysis (e.g., pack level versus range-wide). One study found a positive relationship between lethal control at a statewide scale and future-year depredations, supporting the concept that lethal control had the opposite of its intended effect (Wielgus and Peebles 2014), though this finding was refuted by other studies (Poudyal et al. 2016, Kompaniyets and Evans 2017). Analysis of long-term statewide data in Minnesota showed that killing a high number of wolves did not result in fewer depredations the following year (Harper et al. 2008), but on a shorter term basis lethal control was effective in reducing further losses in sheep, and in cattle in some situations (e.g., if at least one adult male wolf was removed). (ODFW, 2019)

Before any harassment or take (killing) of wolves can occur, the CPW Commission must address the state regulations for the take of an endangered species. As previously noted, gray wolves are currently listed as "endangered" pursuant to Colorado's state endangered species act which, similar to the federal ESA, prohibits the "take" of any listed species, except "as provided in regulations issued by the commission." C.R.S. § 33-2-105(3). Our recommendations presume that, prior to reintroduction, Colorado will once again have management authority of wolves - pursuant to a federal process under the ESA as detailed above - but will retain their status as a state endangered species and subject to the protections outlined by law, thus requiring regulatory action by the CPW Commission.

We anticipate that with state management authority, the CPW Commission will reinstate the regulation it approved at its meeting on January 12-13, 2022 [a time prior to wolves' federal relisting in Colorado (*Defenders of Wildlife v. U.S. Fish & Wildlife Serv.,* 2022 WL 499838 (N.D. Cal. Feb. 10, 2022)]. Notably, this regulation only allowed for certain hazing techniques and explicitly forbade any lethal management of wolves as a state endangered species.

CPW regulation W-10, #1000.A.10. specified that:

> Livestock owners and their agents are authorized to use hazing techniques when necessary to prevent or reduce injury or damages to livestock and guard animals caused by gray wolves (Canis lupus).
>
> a. "Hazing techniques" means the use of:
> (i) Livestock guard animals,
> (ii) Fladry or electrified fladry,
> (iii) Cracker shells, rubber buckshot, rubber slugs, and bean bag rounds,

(iv) Scare devices or tactics including propane cannons, vehicles, ATVs, range riders, noisemakers, fox lights and motion- and radio-activated guard devices.

b. Hazing that results in the injury or death of a wolf is not permitted. Any person who injures or kills a wolf must report the same to the Division within 48 hours.[4]

The next regulation, W-10, #1001 was also added:

> Unless permitted by the division, it is unlawful for any person to place any olfactory attractant with the intent to lure gray wolves *(Canis lupus)*.

The current minimum penalty for illegal take of a listed species is $2,000, with a maximum penalty of $100,000 and up to 1 year imprisonment. C.R.S. § 33-6-109(3)(a).

The phases described below – and any management of wolves by the state– presume that a 10(j) rule for an experimental population of gray wolves in Colorado has been promulgated and is effective in the state.

Notably, the lethal removal of wolves on both state and federal public land shall only be permitted in extremely limited circumstances: Defense of self and defense of others, in all phases and when a wolf is caught in the act of biting, wounding, or killing livestock or working dogs in Phase III (pursuant to criteria as outlined below). We believe that native carnivores have an inherent right to exist on public land and therefore, killing wolves is never appropriate except in limited, extreme circumstances.

Phase I, Reintroduction: Endangered, Tier 1 SGCN.

- **Harassment is permitted only in accordance with CPW regulation W-10, #1000.A.10.**
- **Killing wolves is not authorized except** as allowed by CPW regulation W-10, #1002.B(1), including that any person may take threatened or endangered wildlife in defense of their life or the life of others.
  - o Such events must be reported to CPW within 24 hours.
  - o CPW will make public the findings of their investigation into the event in a timely manner.

Phase II, Establishment: Threatened, Tier 1 SGCN.

- **Harassment is permitted only in accordance with CPW regulation W-10, #1000.A.10.**
- **Wolf-Livestock Conflicts**
  - o When resident wolf use is determined, the area will be designated an "Area of Known Wolf Activity" and CPW will coordinate with local livestock owners on:
    - ~ Wolf behavior, management, and conservation;
    - ~ Procedures for documenting and reporting wolf activity to the Department including livestock losses;
    - ~ Non-lethal deterrence, incentives and available assistance aimed at minimizing conflicts between wolves and livestock in the Area of Known Wolf Activity.
  - o If a known wolf-caused livestock loss occurs in the area, it becomes an "Area of Depredating Wolves" and CPW will prepare and publicly disclose an area specific conflict deterrence plan.
  - o The conflict deterrence plan shall identify appropriate non-lethal measures according to which measures are likely to be most effective in given circumstances, including the nature of livestock operations, habitat, and landscape conditions specific to the area, as well as particular times of the year or period of livestock production. CPW shall consider the best available and most up to date scientific research, and available financial resources and/or partnerships that may aid in the successful implementation of the plan. CPW should update the plan as new data becomes available.
    - ~ Livestock owners are encouraged but not required to implement deterrence measures. Management actions are limited to non-lethal measures
  - o Relocation may occur for wolves that are inadvertently involved in a situation (e.g., caught in a trap) or are in an area that could cause harm to humans or wolves.
  - o All determinations will be made public.

- **Killing wolves**
  - o By the public
    - ~ In defense of their life or the life of other people, as per CPW regulation W-10, #1002.B(1).
      - Such events must be reported to CPW within 24 hours.
      - CPW will make public the findings of their investigation into the event in a timely manner.
  - o By CPW, *only on privately-owned land,* in cases of urgency as defined as when all of the following occur:
    - ~ There are 4 or more livestock losses on private land confirmed to be by the same wolf within 7 days; and
    - ~ CPW determines no identified circumstance exists that attracts or encourages wolf-livestock conflict; and
    - ~ No bait and attractants have been used; and
    - ~ CPW determines livestock owners in the area have worked to reduce conflicts and have documented the implementation of at least two (2) area specific conflict minimization techniques; and
    - ~ CPW determines the livestock losses are likely to keep occurring despite non-lethal measures; and
    - ~ The wolf identified is associated with the chronic livestock loss and killing it is likely to reduce the threat of livestock losses; and
    - ~ CPW determines that killing the wolf is not expected to harm the wolf population's ability to reach recovery objectives statewide.
    - ~ All determinations will be made publicly available, prior to the exercise of lethal force, including but not limited to summaries of confirmed livestock losses and associated investigation reports, maps of areas of known wolf activity and areas of depredating wolves, and area specific conflict deterrence plans.
    - ~ Authorization ends after the wolf is killed or leaves the area, or after 14 days if no wolf is killed.

Phase III, Viability: Non-game, Tier 2 SGCN.

- **Harassment is permitted only in accordance with CPW regulation W-10, #1000.A.10.**
- **Killing wolves**
  - o By the public
    - ~ In defense of their life or the life of others, as per CPW regulation W-10, #1002.B(1).
      - Such events must be reported to CPW within 24 hours.
      - CPW will make public the findings of their investigation into the event in a timely manner.
  - o By CPW, *only on privately-owned land,* when all of the following occur:
    - ~ Chronic livestock loss is occurring: 5 confirmed wolf-caused losses within the previous 3 months on private land OR because there are 4 or more livestock losses confirmed to be by the same wolf within 7 days; and
    - ~ CPW determines livestock owners in the area have worked to reduce conflicts and have documented the implementation of at least two (2) area-specific conflict minimization techniques; and
    - ~ CPW determines no identified circumstance exists that attracts or encourages wolf-livestock conflict; and
    - ~ CPW determines the livestock losses are likely to keep occurring despite non-lethal measures; and
    - ~ The wolf identified is associated with the chronic livestock loss and killing it is likely to reduce the threat of livestock losses; and
    - ~ CPW determines the lethal removal of wolves is not expected to harm the wolf population's ability to reach recovery objectives statewide.
    - ~ All determinations will be made publicly available, prior to the exercise of lethal force, including but not limited to summaries of confirmed livestock losses and associated investigation reports, maps of areas of known wolf activity and areas of depredating wolves, and area specific conflict deterrence plans.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- Authorization ends after the wolves are killed, leave the area, or 30 days pass in the case of chronic livestock loss. Authorization ends after the wolf is killed or leaves the area, or 14 days in the case of "urgency."

o By landowner, permittee, or their agents when
- A wolf is caught in the act of biting, wounding, or killing livestock or working dogs.
  - No bait or intentional attractants have drawn wolves to the area.
  - Must be reported to CPW within 24 hours.

3. Livestock Loss Compensation Considerations

Overall, we defer to CPW on wolf-caused livestock loss associated compensation. There are, however, a few considerations that are critical:

- **Proposition 114 requires fair compensation,** which must also be fair to the payer of monies, not just recipients. In addition, compensation should be a tool to help ensure that specified preventative measures were undertaken. There must also be limits on total compensation received; allowing unlimited compensation would be an engine to harness the payers of money behind the suppression of wolf numbers.
- **Only CPW—an agency with expertise in managing wildlife—should have the authority** to declare an event a wolf-caused loss. U.S. Department of Agriculture's (USDA) Wildlife Services—an agency in the business of killing wildlife—should not have that authority. The same holds true for any local law enforcement: they should not have authority to declare an event a wolf-caused loss. Only agents specifically trained or certified in determining cause of death of livestock should be allowed to make livestock loss determinations.

  In the early days of the return of wolves to Oregon, Wildlife Services agents and local sheriffs were quick to declare any dead cattle a wolf-caused loss, to the point they lost all credibility in determining whether an event was actually a wolf-caused loss. In fact, the Oregon Wolf Plan was amended to clarify that Wildlife Services did not have authority to declare a livestock loss event until the management of gray wolves had entered Phase III. Similar conflicts of interest have been uncovered in New Mexico (Roberts, 2022) and may occur throughout the USDA program.
- **Removing or rendering unpalatable the carcasses of non-wolf-killed livestock before** wolves potentially scavenge on them must be a prerequisite to any compensation for subsequent losses. In the early days of the return of wolves to Oregon, wolves were repeatedly drawn to livestock carcasses left in the field. When ODFW led an effort to remove carcasses and bury them after covering them with lime, wolf presence around active cattle pastures and allotments dropped dramatically. In addition, this group of signatories will consider a carcass an olfactory attractant prohibited under CPW regulation W-10, #1001.
- **Appropriate and properly implemented conflict minimization techniques** should be required for livestock loss compensation. Livestock owners who fail to employ conflict minimization techniques should not then expect compensation if a loss occurs. Conflict minimization includes not only nonlethal preventative tools (e.g., guardian animals, range riders, carcass and afterbirth removal, fences, fladry, scare devices) but also establishing a protective buffer around known wolf dens. Livestock should not be placed near wolf dens. If this buffer is violated, compensation should not be given for resulting livestock losses.

Endnotes

[1] Map 1 compiled by Melissa Cain, Western Watersheds Project, using datasets:
- 2019 NLCD Land Cover https://www.mrlc.gov/data/nlcd-2019-land-cover-conus
- 2022 CPW Elk Overall Range https://www.arcgis.com/home/item.html?id=804abf2794b346828eeff285bffe9259
- Population Density https://www.arcgis.com/home/item.html?id=9d8b54744c58437fa6f27dd62b13f9dc
- Road Density https://databasin.org/datasets/c05cdec0ab1b4cebacbf317e7c14ed4c/

Available as an interactive map at: https://arcg.is/iaLyr

[2] Roughly half of this area is east of the Continental Divide, meaning it is not eligible for reintroduction, per Prop 114. It is, however, available for wolf dispersal.

[3] The mean of "four to seven range" is 5.5 which is also the mean of the average pack size of these three locations. For simplicity's sake and because our operative numbers below are primarily packs and not numbers of individual wolves, we are using the whole number of "five" in this assumption.

[4] The regulation also provided that "Hazing must be consistent with federal law. If gray wolves are on the list of federally endangered or threatened species, hazing is prohibited unless authorized by the United States Fish and Wildlife Service." CPW regulation W-10, #1000.A.10 (c). This provision would be omitted if USFWS provides Colorado with management authority pursuant to the ESA 10(j).

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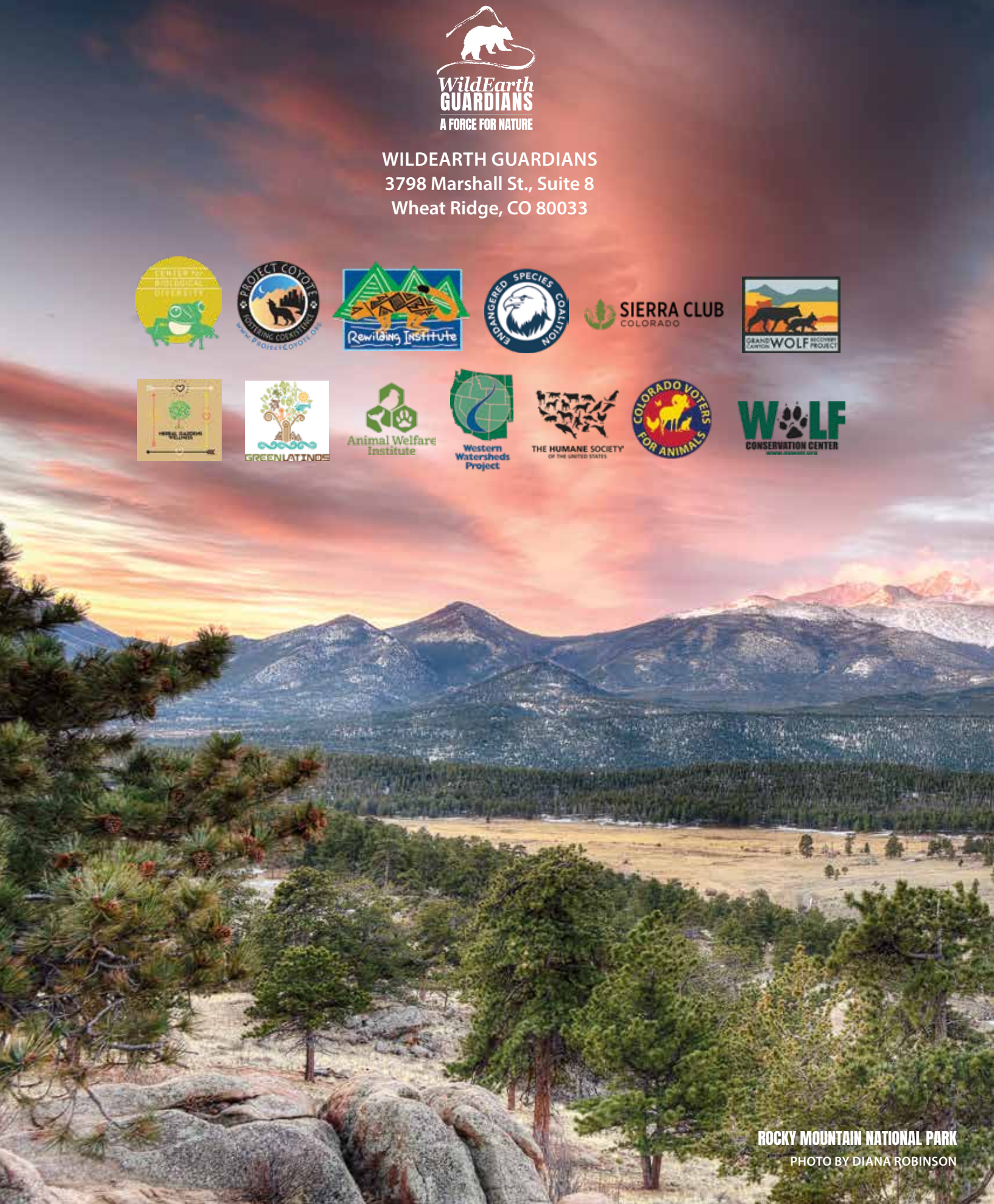

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