Public Comments Processing
Attn: FWS–R6–ES–2022-0100
U.S. Fish and Wildlife Service
MS: PRB/3W
5275 Leesburg Pike
Falls Church, VA 22041-3808
Submitted Electronically via http://www.regulations.gov.

RE: Public Comments – Docket No. FWS–R6–ES–2022–0100 – Endangered and Threatened Wildlife and Plants; Establishment of a Nonessential Experimental Population of the Gray Wolf in Colorado; Proposed Rule; Availability of Draft Environmental Impact Statement; 88 Fed. Reg. 10,258 (Feb. 17, 2023)

Please accept the following comments submitted in response to the U.S. Fish & Wildlife Service's ("Service's") proposed rule under the Endangered Species Act ("ESA"), 16 U.S.C. § 1531*et seq.*, Section 10(j), 16 U.S.C. § 1539(j), for establishing an experimental population of the gray wolf in Colorado (hereinafter "Draft Rule") and associated Draft Environmental Impact Statement ("DEIS") prepared pursuant to the National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4331 *et seq*.

Comments are organized as: I)Background; II) Other elements that should be considered; III) Other approaches that should be considered to assess environmental impacts to resources analyzed in the draft EIS; IV) Responses to the Service's requested information, including: 1) The proposed geographic boundary of the NEP; 2) Information pertaining to the conservation status of gray wolves and how it relates to the proposed reintroduction and rulemaking efforts; 3) The adequacy of the proposed regulations for the NEP; and 4) Whether to allow lethal management of gray wolves that are having a significant impact to ungulate populations; and V) Literature Cited.

I.   BACKGROUND

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.

With the passage of Proposition 114 in 2020, Coloradans elected to restore a "critical balance in nature". by bringing back this keystone carnivore to Colorado's wildlands. Prop 114, codified as Colorado Revised Statutes ("C.R.S.") § 33-2-105.8 states: "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 "[o]nce restored to Colorado, gray wolves will help restore a critical balance in nature." C.R.S. §§ 33-2-105.8(1)(a), (1)(c).

Colorado state statute 33-2-105.8 requires the state to begin reintroductions of gray wolves by December 31, 2023 and specifies that wolves are to be managed with a non-game status wolves, which precludes recreational hunting. 33-2-105.8 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: (1) The selection of donor populations of gray wolves; (2) The places, manner, and scheduling of

reintroductions of gray wolves by the division (CPW), with such reintroductions being restricted to designated lands; (3) 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 (4) 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 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).

II.   OTHER ELEMENTS THAT SHOULD BE CONSIDERED

Mexican gray wolves (Canis lupus baileyi) should be allowed to connect with Colorado's gray wolves through migration. Mexican gray wolves are in urgent need of genetic rescue (1). Mexican gray wolves should be allowed to freely enter Colorado to enable increased genetic diversity.

III.   OTHER APPROACHES THAT SHOULD BE CONSIDERED TO ASSESS ENVIRONMENTAL IMPACTS TO RESOURCES ANALYZED.

As indicated by liberal wolf-killing laws in the Northern Rockies, human persecution continues to be a serious threat to wolf recovery and conservation: Idaho reported 495 wolves killed in 2021 and 396 in 2022; Montana reported 273 wolves killed in their 2021-22 season and 193 killed in the 2022-23 season as of Feb. 6, 2023; and in Wyoming in 2021, 109 of the states 423 wolves were killed (2,3,4). These numbers do not include illegal killing.

Research informs that although wolves seem to be well equipped to recover from fairly high levels of human offtake, given their short time to sexual maturity and ability to produce large litters, these measures of recovery are at the population level and can disguise disruption occurring at the pack level. Ultimately, researchers concluded that smaller packs are more vulnerable to human-caused mortality and larger packs are more resilient to hunting pressure and disease. Further, that the impacts of the deaths on wolf packs, that lost a breeding leader faced the equivalent of losing four to five lower-ranking pack members. Essentially, the loss of even one wolf, especially a leader, can result in the collapse of the entire pack (17).

An "Assessment of the Success of the 10(j) Rule and the Effectiveness of Endangered Species Act Experimental Populations" designation found that the presence or absence of threats to each reintroduced population is the most common explanation for the current status (recovered or not recovered) of reintroduced populations (5).

THUS, THE FOLLOWING POLICIES SHOULD GUIDE THE 10(J) RULE:

> A. REQUIRE IMPLEMENTATION OF NON-LETHAL LIVESTOCK-WOLF CONFLICT PREVENTION ON BOTH PRIVATE AND PUBLIC LANDS.
> i.   There is strong evidence that proper implementation of proactive livestock-wolf conflict avoidance strategies is more effective than lethal control strategies in preventing livestock depredation.

- Researchers have found a variety of non-lethal techniques functionally effective at preventing conflicts with domestic animals across a variety of predatory species (6).
- Animal husbandry practices such as adjusting calving timing and location, shed lambing, synchronized birthing, increased human supervision by range riding over large grazing areas, carcass removal and livestock guardian dogs have been proven effective at minimizing livestock losses (7,8,9).

ii. Recent studies in the Northern Rocky Mountains and the Great Lakes have documented the effectiveness of non-lethal methods in conflict prevention and mitigation (10, 11, 12, 13). The literature referenced above also indicates that non-lethal approaches, both proactive and reactive, lead to better conflict mitigation.

iii. There is stronger evidence suggesting lethal management often fails to provide a long-term solution to wolf predation and has the least consistent success rates when compared to non-lethal practices (14,15,16).

B. LETHAL MANAGEMENT OF WOLVES SHOULD NOT BE PERMITTED EXCEPT IN EXTREMELY LIMITED CIRCUMSTANCES, should be conducted only by CPW professionals, never be conducted by Wildlife Services, never be conducted by private individuals, and only be conducted on privately-owned land, never on publicly owned land.

i. In defense of human life or if a wolf is perceived to be a threat to human life and safety.

ii. Regarding livestock, those extremely limited circumstances or cases of urgency are defined by all of the following conditions being met: 1)There are 4 or more livestock losses on private land confirmed to be by the same wolf within 7 days; 2) FWS determines that no identified circumstance exists that attracts or encourages wolf-livestock conflict; 3) no carrion or unusual odor attracted the wolf to livestock prior to wolf attacks on stock; 4) FWS confirms livestock owners in the area have worked to reduce conflicts and have documented the appropriate implementation of at least two area-specific conflict minimization techniques; 5) FWS determines the livestock losses are likely to keep occurring despite non-lethal measures; 6) the identified wolf caused the chronic livestock loss and killing it is likely to reduce the threat of livestock losses; and 7) FWS determines that killing the wolf is not expected to harm the wolf population's ability to reach recovery objectives statewide.

iii. All determinations regarding cause of livestock death should 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. Take authorization should end after the wolf is killed or leaves the area, or after 14 days if no wolf is killed.

IV.   RESPONSES TO THE SERVICE'S REQUESTED INFORMATION.

1. THE PROPOSED GEOGRAPHIC BOUNDARY OF THE NEP

If wolves are restored to Colorado as an experimental population under section 10(j) of the Endangered Species Act, the boundary of the potential 10(j) experimental population should be expanded beyond Colorado's state borders to protect the Colorado population from take in areas where wolves currently lack ESA protection. Creating a buffer zone protects wolves thereby enabling wolf recovery and protects our investment wolf restoration.

> A. The NEP boundary should be extended to encompass the northwest portion of Utah that falls with the Northern Rocky Mountains Distinct Population Segment and should also extend north of the Colorado state border into Wyoming up to Interstate 80. Currently wolves in Wyoming are classified as predators and can be killed year-round by any means .

> Without a buffer zone, even wolves living inside protected landscapes such as Yellowstone and Denali National Parks, have been killed just outside the edge of the protective boundary (18 and 20).

2. INFORMATION PERTAINING TO THE CONSERVATION STATUS OF GRAY WOLVES AND HOW IT RELATES TO THE PROPOSED REINTRODUCTION AND RULEMAKING EFFORTS.

MANAGEMENT "FLEXIBILITY" CREATED UNDER A 10(J) RULE WILL NOT IMPROVE RECOVERY PROBABILITIES FOR GRAY WOLVES. Evidence from previous wolf reintroduction efforts where the 10(j) rule has been implemented do not support this proposition. To the contrary, evidence documents that the 10(j) rule has undermined recovery of wolves in the United States by exacerbating both legal and illegal wolf killing (6,24,25).

Colorado's wolf reintroduction has thus become essential to the conservation of gray wolves. But to contribute to conservation of gray wolves, in Colorado wolves must have full endangered species status with appurtenant critical habitat protections.

> A Red wolf (*Canis rufus*): For the red wolf, the "experimental, nonessential" designation "was given to the newly introduced population of red wolves to provide greater flexibility in management and protection under the Endangered Species Act, and to gain acceptance from the public and encourage cooperation from local landowners" (50). The agency's 10(j) rule "has had negative long-term consequences for the recovery of the red wolf" by "perpetuating the threats that caused the red wolf to decline to near-extinction." As of 2020, the red wolf population in the wild has declined to 7 individuals, with illegal poaching as the single largest cause of mortality (51). For red wolves, the "experimental, nonessential" status has failed to contribute to the conservation of the species, or to "gain acceptance from the public" and encourage cooperation from local landowners.

> B. Mexican gray wolves (*Canis lupus baileyi*): Mexican gray wolves are also managed with an "experimental, nonessential" reintroduction program but which has struggled to attain minimum viable populations. One of the most salient reasons for this is the large numbers of Mexican wolves removed in response to livestock losses. Many of these lethal removals have turned on fraudulent claims by ranchers (52). The system under which the Livestock Indemnity Program issues compensation to ranchers for purported losses to Mexican wolves appears to actively incentivize the inflation of livestock losses to wolves, as these inflated numbers (and lax

agency accountability in investigating them) lead to inflated payments to unscrupulous ranchers.

FWS first issued a section 10(j) rule for Mexican gray wolves in 1998 and revised that rule in 2015. The 2015 rule was then challenged by environmental and hunting groups, and a court struck down the rule as "arbitrary and capricious" in violation of the Administrative Procedure Act. The court found that although the rule would promote the short-term survival of the species, it would not further recovery in contravention of the ESA's requirement that the release of an experimental population "further the conservation of [the] species." The problem was the provisions of the rule that capped the number of reintroduced animals and created more flexibility to manage human-wolf conflicts in response to opposition to the reintroduction from certain states and private landowners

C. Gray wolves (*Canis lupus*) in the Yellowstone Ecosystem were reintroduced under an "experimental, nonessential" designation to help increase "social tolerance" of wolves. Given hunting and trapping regulations in the surrounding states, it's obvious that this designation did not increase social tolerance for the wolves in the states surrounding Yellowstone National Park nor did the rule contribute to the conservation of the gray wolves.

  i.   In Wyoming, aggressive wolf hunting regulations classify gray wolves as a "predatory animal" that can be killed across 85% of the state, with no license, bag limits, or seasonal restrictions on killing. In Wyoming the practice of 'coyote whacking' is applied to wolves – running down and running over animals with snowmobiles to the point where they are sufficiently broken that they can be easily dispatched with a pistol or by whacking them against the side of a snowmobile.

  ii.   In Idaho, the state legislature is funding $1 million a year to pay bounties on wolf killing. Idaho's draft management plan for managing wolves through 2028 has been released to the public, and if it stands, the state will kill - and for the next five years continue to kill - all but 500 or fewer wolves statewide. Today, the number of wolves surviving in the state is unknown because Idaho is using an unreliable system to count wolves. If the proposed management plan comes to fruition, the wolf population will be significantly diminished to 500 or less resulting in the killing of approximately 60% or more of Idaho's current wild residents.

  iii. In Montana, 19 of Yellowstone National Parks wolves were shot near the boundary of Yellowstone National Park in the 2022/2023 hunting season, sometimes baited and lured beyond the Park boundary so they could be' legally' be killed. Altogether 25 of the Park's wolves were killed in 2022/2023 – about one-fifth of the wolf population in the Park. In all 273 wolves were killed in Montana in the 2022/2023 hunting season (2).

        Montana has legalized the use of bait to lure wolves off protected lands. Aerial hunting has been authorized, as is hunting after dark with night vision and bright lights to disorient wolves. Snares, indiscriminate tools that routinely kill other wild animals and pets, are now permitted.

These barbaric practices provide abundant evidence that "social tolerance" for wolves has not been increased by liberalized wolf killing regulations.

D. Designating wolves in Colorado with a 10(j) status would downgrade protections from endangered status to experimental, non-essential status which has been shown to increase illegal killing (poaching) and decrease tolerance for wolves.

Best available science informs that legal killing begets illegal killing. Experimental, nonessential status downgrades introduced endangered species to the level of Candidate Species (50) which liberalizes killing wolves which, as informed by best available science, aggravates illegal killing (poaching).

    i.   Researchers found strong evidence that Mexican wolves were 121% more likely to disappear during periods of reduced protections than during periods of stricter protections, with only slight changes in legal removals by the agency (25). These results indicate that liberalized legal killing decreased the perceived value of wolves to would-be poachers or decreased the risk of being caught thereby increased wolf mortality. The results also indicate that the assumption that some legal predator-killing might increase tolerance for a wolf (and thus reduce poaching) is not supported by evidence.

E. ENDANGERED SPECIES STATUS PROVIDES MORE PROTECTIONS AND MORE CONSERVATION BENEFITS THAN "EXPERIMENTAL, NONESSENTIAL" STATUS.

    i.   Section 10 designations often exclude the designation of Critical Habitat. Designation of Critical Habitat prevents "adverse modification" of habitat critical to the conservation of the species thereby conferring numerous conservation benefits (53) that are unavailable to "experimental, nonessential" populations.

The Endangered Species Act requires the Secretary of the Interior invoking subsection 10(j) to make a finding that the 10(j) rule is consistent with the Act's purposes, which include conservation of the ecosystems on which endangered species depend . Thus, the upcoming 10(j) rule must not only ensure the conservation of wolves in Colorado; it also must advance ecosystem conservation in Colorado.

If gray wolves are reintroduced in Colorado under an "experimental, nonessential" 10(j) rule, they would be deprived of such habitat protections, to the detriment of recovery. For example, if new roads were constructed, or currently closed and gated roads were reopened to motor vehicle use through critical wolf habitat, wolf recovery could be hindered by poachers who would now have easy access to previously secure habitats used during denning and other sensitive times of year. By contrast "endangered" status (and the requisite designation of Critical Habitat) would present a legal bar to such adverse modification of wolf habitats.

F. THE ENDANGERED SPECIES ACT (ESA) REQUIRES THAT MANAGEMENT MUST CONTRIBUTE TO THE CONSERVATION OF THE SPECIES. Evidence from wolf reintroductions in the Northern Rockies, Arizona and New Mexico, indicates that the lessening of ESA protections under a 10(j) rule would likely also undermine wolf recovery in Colorado.

i. Subsection 10(j) of the Endangered Species Act requires conservation of reintroduced wildlife populations and their ecosystems: "the Secretary must find by regulation that such release will further the conservation of the species. "(54). The Act's definition of conservation is "to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary."(55)

ii. However, the sort of flexibility provided in this proposed 10(j) has prevented recovery of Mexican gray wolves in Arizona and New Mexico. After 25 years, the Mexican gray wolf population has reached only 241 individuals (136 wolves in New Mexico and 105 in Arizona) and continues to be plagued with inbreeding depression.

iii. Implementing the proposed 10(j) to manage the reintroduction of wolves to Colorado undermines the purpose of the ESA and will not lead to wolf restoration or conservation of a self-sustaining population of gray wolves which is essential for the restoration of a critical natural balance to Colorado's public lands as directed by Proposition 114.
   o In a recent study, "Human-caused Mortality Triggers Pack Instability in Gray Wolves," researchers confirm the devastating effects that human killing of wolves has on pack-level biological processes which impact pack persistence and reproduction (17).
   o Earlier research confirms the negative impacts of breeder loss on social structure, reproduction and population growth in social canids such as gray wolves, detailing the setbacks packs suffer including pack disintegration, when a breeding wolf is lost from a pack (18).
   o Gordon Haber, wolf biologist in Denali National Park for 43 years, wrote in his 2013 book, Among Wolves, "For wolves, shooting and trapping causes significant impacts—lasting long after numbers have recovered—on wolf family social structure, behavior, hunting patterns, distribution, territories, genetic variations, and mortality patterns of survivors and recolonizers. Wolf social organization and success are based on two evolutionary strategies that are rare among vertebrates: (1) Cooperative breeding/rearing—non-breeders altruistically attend the breeding pair, as well as cooperatively nurse, babysit, teach, guard, and raise pups; and (2) cooperative hunting—adults cooperate in stalking and killing prey" (20). In sum, Human killing of wolves destroys the fabric of wolf families and their survivability undermining wolf conservation.

G. ESA regulations implementing subsection 10(j) specify that rules must be grounded in best scientific and commercial data available: In making such a finding the Secretary shall utilize the best scientific and commercial data available to consider . . . [t]he likelihood that any such experimental population will become established and survive in the foreseeable future . . . [t]he relative effects that establishment of an experimental population will have on the recovery of the species; and . . . [t]he extent to which the introduced population may be affected by existing or anticipated Federal or State actions or private activities within or adjacent to the experimental population area" (54).

i. The proposed 10(j) rule is not grounded in the best available science of wolf ecology or biology. Best available science informs that wolf pack survivability is reduced by human killing of family members and ecological effectiveness is diminished. Instead, rather than contributing to conservation of wolves, lethal management subverts wolf conservation by legitimizing legal wolf killing and exacerbating illegal wolf killing.

ii. Best available science informs that lethal management is ineffective and exacerbates livestock losses to wolves.

iii. Best available science informs that non-lethal livestock-carnivore strategies are effective in preventing livestock depredations and maintain wolf family structure.

H. Best commercial data available informs that: In Yellowstone in the annual economic impact of wolf restoration was estimated in 2005 at $35.5 billion (35). Visitation to Yellowstone during 2005 was 2,835,651, but by 2017, park visits had risen 145% to 4,116,525; An estimate of the proportion increase in annual economic impact, adjusted for 23% inflation over the period, is $65.5 million annually (19). Furthermore, wolf watchers help spread these economic benefits over time, as they visit outside the peak summer season and stay longer than most Yellowstone visitors; In 1995, the first year wolves were transplanted to the park, 130 tour companies operated in the park with commercial use authorizations (CUAs). By 2019, over 300 CuAs had been issued (19).

TO REMEDY THE INSUFFICIENCIES IN THE PROPOSED 10(J) RULE THE RULE AND ENABLE THE CONSERVATION OF GRAY WOLVES WITH BEST AVAILABLE SCIENCE THE RULE SHOULD BE AMENDED AS FOLLOWS:

i. Require livestock-wolf conflict prevention: Allow lethal take on private and public land only after all reasonable non-lethal livestock-carnivore conflict prevention strategies have first been exhausted.
ii. Killing wolves should never be the first line of defense and killing wolves to prevent livestock attacks should never be allowed on Colorado's public lands.
iii. Livestock who are turned out to graze on large public land allotments die for many reasons including weather, disease, injury (22).
    o Wolves, mountain lions, black bears and other native carnivores should not become scapegoats.
iv. Killing wolves can exacerbate conflicts with livestock by disrupting the stable social structures that wolves rely on. Numerous scientific reviews have questioned the scientific merit and efficacy of lethal predator control.
v. Non-lethal methods to *prevent* conflicts are more effective, ethical and economical than killing wolves.
vi. Most scientific research today suggests the deployment of an array of non-lethal tools is the most consistently effective way to prevent these types of incidents, including barriers such as fencing or fladry, human presence and light/sound deterrents. That is especially true when comparing the effectiveness of non-lethal methods in the scientific literature to lethal methods, which have been found to be highly variable and even

counterproductive for preventing incidents. Lethal methods in response to incidents may exacerbate conflict through the disruption of wolf families, which often disband after they lose a member to human-caused killing. Such break up of wolf families increases the risk that otherwise cooperative hunters that prefer wild prey will turn to domesticated animals. Killing wolves is not the correct answer(56).

3. THE ADEQUACY OF THE PROPOSED REGULATIONS FOR THE NON-ESSENTIAL EXPERIMENTAL POPULATION (NEP).

The proposed 10(j) rule is inadequate because: 1)the proposed regulations focus on lethal control, ignoring the negative consequences of wolf killing on pack structure and function and the necessity of maintaining intact wolf packs that are ecologically effective; 2) ignores the successes and conservation benefits of non-lethal livestock-wolf conflict prevention strategies; 3) ignores the ineffective and negative consequences and of lethal management; and 4) ignores the best available science regarding Minimum Viable Population size that is necessary to enable long-term viability.

A. Killing wolves has many unintended and negative consequences.

i.   Human-caused wolf mortality triggers pack instability often resulting in pack dissolution (10). Pack-level measures show that even the loss of a single wolf, especially a leader, can have detrimental effects on pack persistence, mortalities and reproduction (18).
ii.   Although wolves seem to be well equipped to recover from fairly high levels of human offtake given their short time to sexual maturity and ability to produce large litters, these measures of recovery are at the population level and can disguise disruption occurring at the pack level.
iii. Each family member plays a role essential to the survival of the pack thus the loss of family members can reduce pack survival. Small packs or individuals have a harder time bringing down large prey which diminishes their ability to accomplish their keystone ecological role in initiating trophic cascades (19).
iv.   Wolves pass down learned survival information through generations. Killing wolves, results in survival knowledge and experience being lost before it can be passed on to young wolves reducing the potential for pack survival (20).

B. Killing wolves to prevent conflict with livestock is not effective, does not advance wolf conservation and further, and has been documented to increase livestock-wolf conflict.

i.   Scientific research informs that killing wolves in response to livestock loss leads to more livestock deaths, not less. Several reasons exist for this outcome: If lethal control takes place during the breeding season and a member of the breeding pair is removed it may lead to pack instability and increased breeding pairs; loss of a breeder in a pack during or near breeding season can result in dissolution of territorial social groups, smaller pack sizes and compensatory density dependent effects – such as increased per-capita reproduction; Culling of wolves may also cause frequent breeder turnover and related social disruption – which can result in

reduced effective prey use (through loss of knowledge of prey sources and ability to subdue prey) which may also result in increased livestock depredations (21).

iv. As informed by the evidence in wolf country in the Northern Rocky Mountains, even without implementing conflict avoidance methods, livestock losses will be minimal (22). Wolves should not be killed on public or private land to prevent the very minimal losses to livestock that can be expected in Colorado.

v. Any take permits issued under the 10(j) rule should only be given to Colorado Parks and Wildlife staff, and not to private individuals or to individuals associated with USDA- Wildlife Services which has been implicated in the deaths of the endangered Mexican gray wolf (23).

vi. Incidental take of non-target wolves in traps or snares should be prosecuted.

vii. Predator poisons including sodium cyanide and Compound1080, which are administered by the USDA-Wildlife Services on private lands, should not be permitted for use in wolves' range or potential future range.

C. INCREASE TOLERANCE FOR GRAY WOLVES THROUGH FUNDING FOR EDUCATION AND SUPPORT FOR PROACTIVE LIVESTOCK-WOLF CONFLICT PREVENTION STRATEGIES. Evidence does not support the U.S.FWS' contention that management flexibility provided by the 10(j) rule will advance conservation by building tolerance for wolves. Instead, when the government kills a protected species, the perceived value of each individual of that species may decline and may instead promote illegal behavior such as poaching.

i. Evidence does not support the U.S.FWS' premise that the regulatory flexibility provided by 10(j) (killing wolves involved in livestock depredation) will improve wolf reintroduction success (6).

ii. There is strong evidence that legal killing of wolves begets illegal killing of wolves (24) and that lethal management incentivized illegal killing (25).

iii. Researchers found that granting management flexibility (killing) for endangered species to address illegal behavior (poaching) may instead promote such behavior. Scientific research shows that allowing wolf (*Canis lupus*) culling was substantially more likely to increase poaching than reduce it: when the government kills a protected species, the perceived value of each individual of that species may decline and may instead promote such illegal behavior (6).

D. INCREASE CPW'S RECOVERY GOALS FOR GRAY WOLF POPULATION SIZE IN COLORADO AND CONNECTIVITY WITH POPULATIONS IN OTHER STATES TO ENABLE LONG-TERM POPULATION VIABILITY. USFWS' recovery goals do not include connectivity to other populations which is necessary to ensure a sufficiently large Colorado population that enables long term viability.

i. 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 (26,27).

ii.　No region of the U.S. has wolf populations of that size. Thus, wolves remain at risk of extinction until existing populations are connected through dispersal across the Rocky Mountain cordillera.

iii.　Determination of wolf recovery should be based on the "3Rs"; resiliency, redundancy, and representation (28). These principles are espoused by the U.S. Fish and Wildlife Service and should be used to steward wolf population recovery in Colorado and determine when gray wolf populations are ready for delisting.

E. COLORADO WOLF RESTORATION HAS MANY BENEFITS BUT THOSE BENEFITS CAN ONLY BE REALIZED IF WOLF FAMILIES ARE INTACT. As directed by Proposition 114, restoring an ecologically effective population of wolves to Colorado's public wildlands will facilitate wolf conservation thereby helping restore a critical balance to Colorado's public wildlands.

i.　Wolves remain absent from approximately 70 percent of their suitable habitat(29)

ii.　Flexible "take" regulations undermine the many benefits that wolves bring to natural ecosystems, biodiversity, and human economies. Killing wolves can destroy family structure thereby diminishing the ability of wolves to perform their ecological roles which then lessens positive ecological effects (19).

iii.　Positive impacts of wolves include their contribution to enhancing biodiversity (19); improving ecosystem processes and function (Berger et al. 2008), mitigation of climate warming and enhancing resilience to climate warming (31,32); improving ungulate population health by selectively removing old and diseased individuals (19), including individuals infected with Chronic Wasting Disease with research indicating that wolf predation may suppress disease emergence or limit prevalence (33); benefit Colorado's struggling Canada lynx population by reducing coyote population abundance (34); and infusing local tourism economies with tens of millions of dollars (35,36).

  o　Wolf tourism will benefit local economies (37,38,39). Visitation to Yellowstone during 2005 was 2,835,651, but by 2017, park visits had risen 145% to 4,116,525. An estimate of the annual economic impact [of wolves], adjusted for 23% inflation over this period, is $65.5 million annually (19).

  o　Predators not only mitigate the cause of climate change (excess atmospheric carbon) but also influence—directly and indirectly—climate impacts on their prey and on entire ecological communities (32). Further, healthy, intact food webs make ecosystems more resilient to environmental changes (31). Thus, repatriating predators to their historic ranges has enormous potential not only to provide well-known ecological services, but also to improve ecosystem resilience to climate change and drive down atmospheric carbon levels (32).

  By moderating deer and moose populations, wolves have created massive carbon sinks that help trap CO_2 emissions thereby combatting climate change. Researchers estimated an increase in CO_2 storage between 46 million and 99 million metric tons that is attributed to the work of wolves in our forests - equivalent to a year of tailpipe emissions from between 33 and 71 million cars (40).

4. WHETHER TO ALLOW LEGAL MANAGEMENT OF GRAY WOLVES THAT ARE HAVING A SIGNIFICANT IMPACT TO UNGULATE POPULATIONS,

Elk abundance is not a measure of ecosystem health. Quite the opposite- over abundant elk populations diminish biodiversity, which is a measure of ecosystem health and resilience to large-scale perturbations such as climate warming. Additionally, gray wolves keep elk moving, trim the herd to be in balance with the capacity of the land and selectively remove the weak and diseased, thereby improving the health of both the elk populations and the ecosystem upon which they depend by enhancing biodiversity

A. SCIENTIFIC DATA FROM THE NORTHERN ROCKY MOUNTAINS INDICATE THAT WOLVES HAVE NOT CAUSED HARM TO THE BIG GAME HUNTING INDUSTRY AND THAT INSTEAD, ELK POPULATIONS HAVE INCREASED IN THOSE STATES SINCE WOLF REINTRODUCTION THERE. More than two decades of evidence from the Northern Rockies does not support the proposition that wolves may have a significant and negative effect on ungulate populations. Since 1995, when 31 wolves were transported to Yellowstone and 37 to central Idaho, elk numbers have increased. Idaho had 103,448 elk in 1995, but by 2018, the population had grown to 110,300. Montana had 109,500 elk in 1995, which increased to 139,470 in 2018 and 141,785 by 2021.

    i. Predator/prey relations are extremely difficult to understand well enough to conclude that killing wolves would bring about an increase in ungulate numbers.

    ii. Many factors influence ungulate population abundance including habitat loss and fragmentation, climate warming, disease, and human hunting and poaching (19, 41,42).

        o Declines in the northern Yellowstone North elk herd in the December 1994 elk count were due to a combination of factors including human hunters participating in the late season hunt primarily killing young, fertile adult females, other predators including cougars and grizzly bear predation especially on fawns (19).

        Although wolves contributed to the elk decline there is doubt regarding the size and timing of their contribution – the basic biology of wolves suggest though that they had only a modest influence on elk population dynamics given their hunting success rate that rarely exceeds 20% (19).

B. Best available science informs that killing carnivores, including wolves, will not 'grow' ungulate herds (43,44,45).

    i. To the contrary, wolves improve ungulate herd health by selectively removing the weak, diseased and older animals (19).

    ii. Comprehensive studies, including those conducted in Colorado (36) and Idaho (39) show that killing native carnivores failed to grow deer herds.

        In Colorado, researchers found that predation by lions and coyotes was largely a compensatory form of mortality, with predators selecting deer in poorer condition, thus minimizing the effect of predators on deer population dynamics (43).

iii.   According to the North American Model of Conservation, ungulate populations are "owned" by all citizens and managed as a public trust; killing wolves to appease a small user group (big game hunters) is inappropriate.

iv.   Impacting prey population dynamics is the principal means by which wolves can help to restore a critical balance in nature which is the aim of C.R.S. 33-2-105.8(1)(c) and will act to improve ecosystem resilience to large scale environmental perturbations such as climate warming.

v.   A recent meta-analysis of predator-prey studies exploring the overall effect of predator removal on wild ungulate populations found predator removal had low and variable effectiveness for increasing such populations (37). A recent study in Alberta, CA also shows that "increasing large-predator populations do not necessarily reduce hunter harvest of elk" and that sustainable hunting of elk has continued, and populations have increased with increasing large predator populations (38).

vi.   Another recent study analyzing 4 decades of efforts in Alaska, US to reduce abundance of large predators, including gray wolves, brown and black bears, found: (1) no positive correlations between killing of bears and subsequent moose hunting, (2) moose hunting was negatively correlated with the prior year's wolf killing (weak relationship) and (3) no differences in mean moose hunting during periods of recent liberalized killing of predators relative to prior periods (39).

LITERATURE CITED

1. Hendricks, S. A., Schweizer, R. M., & Wayne, R. K. (2019). Conservation genomics illuminates the adaptive uniqueness of North American gray wolves. *Conservation Genetics,* 20(1), 29-43.
2. Montana Gray Wolf Program 2021 Annual Report. Available online: https://fwp.mt.gov/binaries/content/assets/fwp/conservation/wolf/final-draft-2021-wolf-report-7.28.pdf
3. Idaho Fish and Game. Idaho's wolf population has dropped by about 13 percent. Available online: https://idfg.idaho.gov/article/idahos-wolf-population-has-dropped-about-13-percent#:~:text=Other%20wolf%20mortality%20includes%20those,than%20the%20last%205%20years.
4. Wyoming Gray Wolf Monitoring and Management: 2021 ANNUAL REPORT. Available online: https://wgfd.wyo.gov/WGFD/media/content/PDF/Wildlife/Large%20Carnivore/2021-Wyoming-Wolf-Annual-Report.pdf
5. Sapienza, H & Li, Y-W. 2021. An Assessment of Endangered Species Act Experimental Populations. Washington, D.C.: Environmental Policy Innovation Center.
6. Treves, A., Krofel, M., McManus, J. S. .2016. Predator control should not be a shot in the dark. Frontiers in Ecology and the Environment, 14(7), 380–288. https://doi.org/10.1002/fee.1312
7. U.S. Department of Agriculture (USDA). 2023.Wildlife Damage Management Technical Series: Gray Wolves. Available online: https://www.aphis.usda.gov/wildlife_damage/reports/Wildlife%20Damage%20Management%20Technical%20Series/gray-wolves.pdf
8. Moreira-Arce,D., C. S. Ugarte, F. Zorondo-Rodríguez and J. A. Simonetti. 2017. Management Tools to Reduce Carnivore-Livestock Conflicts: Current Gap and Future Challenges. Rangeland Ecology & Management, 71(3):389-394.
9. Bruns, A., M. Waltert, I. Khorozyan. 2020. The effectiveness of livestock protection measures against wolves (Canis lupus) and implications for their co-existence with humans. Global Ecology Conservation, 21, e00868. https://doi.org/10.1016/j.gecco.2019.e00868
10. Davidson-Nelson, S. J., & Gehring, T. M. (2010). Testing fladry as a nonlethal management tool for wolves and coyotes in Michigan. Human–Wildlife Interactions, 4, 87–94. 11.
11. Gehring, T. M., VerCauteren, K. C., Provost, M. L., & Cellar, A. C. (2010). Utility of livestock-protection dogs for deterring wildlife from cattle farms. Wildlife Research, 37(8), 715–721.12.
12. Stone, S. A., Breck, S. W., Timberlake, J., Haswell, P. M., Najera, F., Bean, B. S., & Thornhill, D. J. (2017). Adaptive use of nonlethal strategies for minimizing Wolf-sheep conflict in Idaho. Journal of Mammalogy. https://doi.org/10.1093/jmammal/gyw18813.
13. Wilson, S. M., Bradley, E. H., & Neudecker, G. A. (2018). Learning to live with wolves: Community based conservation in the Blackfoot Valley of Montana. Human-Wildlife Interactions, 12(1), 156–156.14.
14. Bruns, A., M. Waltert, I. Khorozyan. 2020. The effectiveness of livestock protection measures against wolves (Canis lupus) and implications for their co-existence with humans. Global Ecology Conservation, 21, e00868. https://doi.org/10.1016/j.gecco.2019.e00868
15. Santiago-Ávila, F. J., Cornman, A. M., & Treves, A. (2018a). Killing wolves to prevent predation on livestock may protect one farm but harm neighbors. PLoS ONE, 13(1), 1–20. https://doi.org/10.1371/journal.pone.018972916.

16. Santiago-Ávila, F. J., Cornman, A. M., & Treves, A. (2018b). Correction: Killing wolves to prevent predation on livestock may protect one farm but harm neighbors. PLoS One, 209716.

17. Cassidy, K.A., B. L Borg, K.J. Klauder, M. S. Sorum, R. Thomas-Kuzilik, S. R. Dewey, J.A. Stephenson, D. R. Stahler, T. D. Gable, J. K. Bump, A. T. Homkes, S. K. Windels, and D. W. Smith. 2023. Human-caused mortality triggers pack instability in gray wolves. Frontiers in Ecology and the Environment. Available online: https://doi.org/10.1002/fee.2597

17. Borg BL, Brainerd SM, Meier TJ, and Prugh LR. 2015. Impacts of breeder loss on social structure, reproduction and population growth in a social canid. *J Anim Ecol* **84**: 177–87. Available online: https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1365-2656.12256

18. Smith,D.W., D.R. Stahler, and D.R. MacNulty, eds. 2020. Yellowstone Wolves: Science and Discovery in the World's First National Park.The University of Chicago Press. 339 pp.

19. Holleman, M. 2013. Among Wolves: Gordon Haber's Insights into Alaska's Most Misunderstood Animal. University of Alaska Press. 310 pp.

20. Wielgus R.B., Peebles KA (2014) Effects of Wolf Mortality on Livestock Depredations. PLoS ONE 9(12): e113505. https://doi.org/10.1371/journal.pone.0113505

21. The Humane Society of the United States. (2019). Government data confirm that wolves have a negligible effect on U.S. cattle and sheep industries. https://www.humanesociety.org/sites/default/files/docs/HSUS-Wolf-Livestock-Mar 19Final.pdf.

22. Roberts, S. 2022, May 24. Cry wolf: Endangered Mexican gray wolf recovery is being "sabotaged" by ranchers who claim the canines are killing cattle-and the federal employees who sign off reports. The Intercept. https://theintercept.com/2022/05/24/mexican-gray-wolf-endangered-wildlife-services-fraud/

23. Santiago-Ávila, F. J., Chappell, R. J., Treves, A. (2020). Liberalizing the killing of endangered wolves was associated with more disappearances of collared individuals in Wisconsin, USA. Scientific Reports, 10(1), 1-14. https://doi.org/10.1038/s41598-020-70837-x

24. Louchouarn, N.X., Santiago-Ávila, F.J., Parsons, D.R., Treves, A. (2021). Evaluating how lethal management affects poaching of Mexican wolves. Royal Society Open Science, 8(3), 200330. https://doi.org/10.1098/rsos.200330

25. Traill, L., Bradshaw, C., Brook, B.. 2007. Minimum Viable Population Size: a meta analysis of 30 years of published estimates. Biological Connection, 139, 159-166. https://coreybradshaw.files.wordpress.com/2011/03/traill-et-al2007-biol-conserv.pd

26. Reed, D., O'Grady, J., Brook, B., Ballou, J., Frankham, R. (2003). Estimates of minimum viable population sizes for vertebrates and factors influencing those estimates. Biological Conservation, 113(1), 23-34. https://doi. org/10.1016/S0006-3207(02)00346-4

27. Shaffer, M.L., Stein, B.A. (2000). Safeguarding our precious heritage. In B.A. Stein, L.S. Kutner, J.S. Adams, (Eds.), Precious Heritage: The Status of Biodiversity in the United States (pp. 301-322). Oxford University Press.

28. Carroll, C., M. K. Phillips, C. A. Lopez-Gonzalez, N. H. Schumaker. 2006. Defining Recovery Goals and Strategies for Endangered Species: The Wolf as a Case Study. BioScience, Volume 56, Issue 1, January 2006, Pages 25–37, https://doi.org/10.1641/0006-3568(2006)056[0025:DRGASF]2.0.CO;2

29. Berger,M.,E. M. Gese, and J. Berger. 2008. Indirect Effects and Traditional Trophic Cascades: A Test Involving Wolves, Coyotes, and Pronghorn. Ecology, 89(3) pp. 818–828

30. Wilmers, CC, Getz WM (2005) Gray Wolves as Climate Change Buffers in Yellowstone. PLoS Biol 3(4): e92. https://doi.org/10.1371/journal.pbio.0030092
31. Wilmers, C.C, C. Darimont, and M. Hebblewhite. 2013. Restoring Predators as a Hedge against Climate Change. Environmental Science.
32. Wild, M., T. Hobbs, M. S. Graham, and M. W. Miller. 2011. The role of predation in disease control: a comparison of selective and nonselective removal on prion disease dynamics in deer. Journal of Wildlife Diseases, 47(1), 2011, pp. 78–93
33. Ripple, W. J., Wirsing, A. J., Beschta, R. L., & Buskirk, S. W. (2011). Can restoring wolves aid in lynx recovery? Wildlife Society Bulletin, 35(4), 514-518.
34. Duffield, J., C. Neher, and D. Patterson. 2006. Wolves and People in Yellowstone: Impacts on the Regional Economy. The University of Montana. Missoula, MT 59812
35. Ripple, W. J., J. A. Estes, R. L. Beschta, C. C. Wilmers, E. G. Ritchie, M. Hebblewhite, J. Berger, B. Elmhagen, M. Letnic, M. P. Nelson, O. J. Schmitz, D. W. Smith, A. D. Wallach, and A. J. Wirsing. 2014. "Status and Ecological Effects of the World's Largest Carnivores." Science 343, no. 6167: 151-+. http://dx.doi.org/10.1126/science.1241484.
36. Department of Commerce- Bureau of Economic Analysis. (2021). Outdoor recreation satellite account, U.S. and prototype for states, 2020. https://www.bea.gov/data/special-topics/outdoor-recreation.
37. Honey, M., Johnson, J., Menke, C., Cruz, A. R., Karwacki, J., & Durham, W. H. (2016). The comparative economic value of bear viewing and bear hunting in the Great Bear Rainforest. Journal of Ecotourism, 15(3), 199-240.
38. Loomis, J. (2016). Economic values of wolves in Denali National Park and Preserve (DNPP): Concepts, literature synthesis, data gaps and study plan.
39. Wilmers, C. C., and O.J. Schmitz. 2016. Effects of gray wolf-induced trophic cascades on ecosystem carbon cycling. Ecosphere 7:e01501.
40. Forrester, T. D., & H.U. Wittmer. 2013. A review of the population dynamics of mule deer and black-tailed deer Odocoileus hemionus in North America. Mammal Review, 43(4), 292-308.
41. Monteith, K. L., Bleich, V. C., Stephenson, T. R., Pierce, B. M., Conner, M. M., Kie, J. G., & R.T. Bowyer. 2014. Life-history characteristics of mule deer: Effects of nutrition in a variable environment. Wildlife Monographs, 186(1), 1-62.
42. Bishop, C. J., White, G. C., Freddy, D. J., Watkins, B. E., & T.R. Stephenson. 2009. Effect of enhanced nutrition on mule deer population rate of change. Wildlife Monographs, 172(1), 1-28;

44. Clark, T. J., & Hebblewhite, M. (2020) Predator control may not increase ungulate populations in the future: A formal meta-analysis. Journal of Applied Ecology, 58(4), 812–824.

45. Trump, T., Knopff, K., Morehouse, A., & Boyce, M. S. (2022). Sustainable elk harvests in Alberta with increasing predator populations. PLOS ONE, 17(10), 1–13. https://doi.org/10.1371/journal.pone.0269407

46. Miller, S. D., Person, D. K., & Bowyer, R. T. (2022). Efficacy of Killing Large Carnivores to Enhance Moose Harvests: New Insights from a Long-Term View. Diversity, 14(11), 939. https://doi.org/10.3390/d14110939

47. Mitchell, C.D., Chaney, R., Aho, K., Kie, J.G., & R.T. Bowyer. 2015. Population density if Dall's sheep in Alaska: effects of predator harvest? Mamm. Res. 60:21-28.;

48. Mosnier, A., Boisjoly, D., Courtois, R., & J.P. Ouellet. 2008. Extensive predator space use can limit the efficacy of a control program. The Journal of Wildlife Management, 72(2), 483-491.
49. Hurley,M.A., J. W. Unsworth, P. Zager, M. Hebblewhite, E. O. Garton, D. M. Montgomery, J.R. Skalski, C. L. Maycock. 2011. Demographic response of mule deer to experimental reduction of coyotes and mountain lions in southeastern Idaho. Wildlife Monograph. https://doi.org/10.1002/wmon.4
50. Waddell, W., and D. Rabon Jr. 2012. Extirpated in the wild: Recovering the red wolf. RAWA Mag. 13: 22-24.
51. Agan, S.W., A. Treves, and L.L. Willey. 2021. Estimating poaching risk for the critically endangered wild red wolf (Canis rufus). PLoS ONE 16(5): e0244261. https://doi.org/10.1371/journal.pone.0244261.
52. The Intercept. May 24th, 2022. Cry wolf. https://theintercept.com/2022/05/24/mexican-gray-wolf-endangered-wildlife-services-fraud/
53. Congressional Research Service. 2021. The Endangered Species Act: Overview and implementation. Congressional Research Service Report R46677, 54 pp.
54. 50 C.F.R § 1781.
55. 16 U.S.C. § 1532(3)
56. Scientists Letter on Colorado Draft Wolf Plan. Comments on Colorado's Wolf Restoration and Management Plan Via: https://engagecpw.org/draft-wolf-plan-comments.