IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

Civil Action No. 1:23-cv-03258-RMR

GUNNISON COUNTY STOCKGROWERS' ASSOCIATION, INC., a Colorado Nonprofit Corporation; and
COLORADO CATTLEMEN'S ASSOCIATION, a Colorado Nonprofit Corporation

Plaintiffs,

v.

U.S. FISH AND WILDLIFE SERVICE;
MARTHA WILLIAMS, in her official capacity as Director of the U.S. Fish and Wildlife Service;
COLORADO DIVISION OF PARKS AND WILDLIFE;
JEFF DAVIS, in his official capacity as Director of Colorado Parks and Wildlife;
ERIC ODELL, in his official capacity as Wolf Conservation Program Manager for Colorado Division of Parks and Wildlife; and
COLORADO PARKS AND WILDLIFE COMMISSION,

Defendants,

v.

CENTER FOR BIOLOGICAL DIVERSITY;
HUMANE SOCIETY OF THE UNITED STATES;
WESTERN WATERSHEDS PROJECT; and
WILDEARTH GUARDIANS.

Applicant Defendant– Intervenors.

APPENDIX IN SUPPORT OF MOTION TO INTERVENE
BY APPLICANT DEFENDANT-INTERVENORS

Pursuant to this Court's Uniform Civil Practice Standard 7.1(a)(3), Applicant Defendant-Intervenors Center for Biological Diversity, Humane Society of the United States, Western Watersheds

Project, and WildEarth Guardians hereby submit this Appendix in support of its Motion to Intervene. The Appendix contains:

(1) Declaration of Greta Anderson, with attachments.
(2) Declaration of Robert Edward.
(3) Declaration of Brett Henderson, with attachments
(4) Declaration of Wendy Keefover.
(5) Declaration of Lindsay Larris.
(6) Declaration of Erik Molvar.
(7) Declaration of Michael Robinson.
(8) Declaration of Delaney Rudy.
(9) Declaration of Debra Taylor.
(10) Declaration of Amanda Wight, with attachments.

DATED this 13th day of December, 2023.

/s/Thomas Delehanty
Thomas Delehanty
Colorado Bar No. 51887
Earthjustice
633 17th Street, Suite 1600
Denver, CO 80203
(303) 996-9628
tdelehanty@earthjustice.org
Attorney for Applicant Defendant-Intervenors Center for Biological Diversity, Humane Society of the United States and Western Watersheds Project

/s/Kelly E. Nokes
Kelly E. Nokes
Colorado Bar No. 51877
Western Environmental Law Center
P.O. Box 218
Buena Vista, CO 81211
(575) 613-8051
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Attorney for Applicant Defendant-Intervenor WildEarth Guardians

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DECLARTION OF GRETA ANDERSON

I, Greta Anderson, declare as follows:

1. I am a Deputy Director at the Western Watersheds Project, a position I have held with the organization since 2011.

2. I am a legal resident of Tucson, Arizona, where I live and work.

3. On December 13, 2023, I reached out to several contacts at the Colorado Ecological Services Field Office of the U.S. Fish and Wildlife Service. I asked for a copy of the permit for gray wolves issued under the authority of Section 10(a)(1)(A) of the Endangered Species Act.

4. Within a few hours on the same day, I received an email response from Liisa M. Hernández Niva, Acting Field Office Supervisor of the Colorado Ecological Services Field Office. She attached a copy of the permit that I requested in her email response to me.

5. I have attached to this declaration a true and accurate copy of the permit I received by email from Liisa M. Hernández Niva on December 13, 2023.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 13th day of December, 2023.

GRETA ANDERSON

NATIVE ENDANGERED SPECIES RECOVERY

Permit Number: ESPER4054943

Version Number: 0

Effective: 2023-11-06 **Expires:** 2028-11-05

Issuing Office:

Department of the Interior

U.S. FISH AND WILDLIFE SERVICE

ES Lakewood Permit Office
P.O.Box 25486
Lakewood, Colorado 80225-0489
permitsR6ES@fws.gov

Digitally signed by

Permittee:

Colorado Field Office
dba U.S. Fish and Wildlife Service
134 Union Blvd
Lakewood, Colorado 80228
U.S.A.

Name and Title of Principal Officer:

Lisa Niiva

Authority: Statutes and Regulations: 16 U.S.C. 1539 (a) 50 CFR 17.22, 50 CFR 13

Location where authorized activity may be conducted:

ON LANDS SPECIFIED WITHIN THE ATTACHED SPECIAL TERMS AND CONDITIONS

Reporting requirements:

See permit conditions for reporting requirements

Authorizations and Conditions:

A. General conditions set out in Subpart B of 50 CFR 13, and specific conditions contained in Federal regulations cited above, are hereby made a part of this permit. All activities authorized herein must be carried out in accordance with and for the purposes described in the application submitted. Continued validity, or renewal of this permit is subject to complete and timely compliance with all applicable conditions, including the filing of all required information and reports.

B. The validity of this permit is also conditioned upon strict observance of all applicable foreign, state, local tribal, or other federal law.

C. Valid for use by permittee named above.

Special Terms and Conditions
U.S. Fish and Wildlife Service
Colorado Field Office

1. **Take[1] authorization is as follows:**
   a. This Endangered Species Act (ESA) recovery permit is issued under the authority of section 10(a)(1)(A) of the ESA and its implementing regulations at 50 Code of Federal Regulations (CFR) 17.

   b. The permittee is authorized to purposefully take the following federally listed fish and wildlife species in conjunction with the following authorized activities for scientific purposes or to enhance the recovery, survival, and propagation of the species as specified in this recovery permit, in accordance with the Special Terms and Conditions stated herein.

Species Common (Scientific) Name	Status	Geographic Localities	Authorized Take Activities
Gray wolf (*Canis lupis)*	Endangered	Arizona, Colorado, Kansas, North Dakota, Nebraska, New Mexico, South Dakota, and Utah	Capture, handle, anesthetize, collar, track, tag, transport, relocate, and collect biological samples.
Mexican wolf (*Canis lupus baileyi*)	Endangered	Colorado and Utah	Capture, handle, anesthetize, collar, track, tag, transport, relocate, and collect biological samples.

2. **Geographic Areas:**
   a. Authorized activities are restricted to the geographic areas noted in the table above.

   b. Written authorization for property access shall be obtained by the permittee from the landowner or manager before entering Federal, State, Tribal, public, or privately owned lands to conduct authorized activities.

3. **Authorized Individuals:**
   a. Only individuals on the attached List of Authorized Individuals (List) are authorized to independently conduct activities under this permit. The List may limit activities or identify special conditions or circumstances under which listed individuals can conduct authorized activities. Each named individual shall be responsible for compliance with the

[1] Take, as defined by the Endangered Species Act (ESA), means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" for wildlife.

Special Terms and Conditions in this permit. The List must be attached to the permit's Special Terms and Conditions to be valid.

b. To request changes to the List, the permittee shall submit an amendment request to the U.S. Fish and Wildlife Service via the ePermits portal at https://fwsepermits.servicenowservices.com/fws. The following must be included in the amendment request:
   i. The name of each individual to be appended to the List;
   ii. Current position title and employer's name for each individual;
   iii. The resume/qualifications statement of each individual, detailing their education, training, and experience with the authorized species and authorized activities in this permit, or similar species and activities, and type of activity for which authorization is being requested;

4. General Permit Responsibilities:

a. Acceptance of this permit serves as evidence that the permittee understands and agrees to abide by the following regulations: 50 CFR Part 13 (general permit procedures), 50 CFR 17.22 (endangered wildlife), 50 CFR 17.32 (threatened wildlife), 50 CFR 17.62 (endangered plants), 50 CFR 17.72 (threatened plants), and/or 50 CFR 21.23 and 21.27 (migratory birds), as applicable and available at https://www.ecfr.gov/cgi-bin/ECFR?page=browse. In addition, the permittee must have all other applicable permits prior to the commencement of activities authorized in this permit.

b. Only individuals on the List are approved to independently conduct activities under this permit. The permittee is responsible for ensuring that all authorized individuals comply with the Special Terms and Conditions in this permit.

c. The permittee and all authorized individuals must carry an electronic or hard copy, including attachments, of this permit, while conducting authorized activities.

d. The Service requires that all handling of listed species shall be done in an expedient manner to minimize risk of injury and mortality to these individuals. Unless otherwise specified in this permit, captured individuals shall be released at their capture site as soon as authorized activities are completed or achieved.

e. To prevent the spread of invasive and nonnative species, all equipment, clothing, and boots must be cleaned to remove mud, debris, and vegetative material before arriving at a project area. Invasive species are organisms (includes nonnative pathogens and other microorganisms) that are nonnative to the ecosystem that is under consideration and whose introduction causes or is likely to cause economic or environmental harm or impact human health. Nonnative species are species that have been introduced into new areas which were not historically part of their native range. If any previously undocumented invasive species are observed in a project area, the Service requests that

the permittee contact the Project Leader (see attached list) to report their findings as soon as it is convenient and include the information in the respective annual report.

f. Ground-disturbing activities must be immediately stopped when human remains, or archaeological materials are discovered at a project location. Upon discovery, the permittee must immediately contact the Recovery Permit Coordinator for further guidance before reinitiating activities.

g. If the permittee wishes to continue work with listed species after the expiration date of this permit, a request for permit renewal must be received via the ePermits portal https://fwsepermits.servicenowservices.com/fws **at least 30 days prior to the expiration date**. As per 50 CFR §13.22 Renewal of permits, meeting this requirement allows the permittee to continue currently authorized activities until your renewal application is acted upon. If this requirement is not met, this permit becomes invalid on the expiration date.

h. Any new activities, changes in activities, or work in new geographic areas with same or new listed species will require this permit to be amended. The permittee is not authorized to conduct any of these changes or additions until they have requested and have received an amended permit.

i. A permit renewal or amendment application will be processed only after all reporting requirements have been met for the current and previous calendar years (see Reporting Requirements, below). If no activities have been conducted during the term of this permit for one or more authorized species, the Service may suspend this recovery permit, or those specific activities for an authorized species under this recovery permit, due to a lack of recovery benefit to the species.

j. Species listed on this permit may not be donated or transferred without written authorization from the Regional Recovery Permit Coordinator.

5. Species Specific Conditions for gray wolf and Mexican wolf:

a. Permittee may capture, handle, anesthetize, collar, track, tag, and collect biological samples.

i. Capture techniques that may be utilized include:

1. Various foot-hold traps may be used based on circumstances and objectives of the action if the Service has reviewed and approved the method as a safe alternative for capturing wolves.
2. Darting from the ground or aerial operations.
3. Net-gunning during helicopter operations.

ii. Other techniques may be used only after the Service has reviewed and approved the method as a safe alternative for capturing wolves.

b. Permittee may use state, tribal, or Service wildlife capture and handling protocols to anaesthetize individuals for the collection of biological samples, placement of tags, collars, or other invasive activities that necessitate the need to immobilize individuals.
   i. During immobilization, permittees may:
      1. Tag individual wolves utilizing various methods, including but not limited to tattoos, passive integrated transponder (PIT) tags, or ear tags for future identification of individual wolves.
      2. Administer appropriate first aid in response to injuries, illness, or adverse reaction.

c. Permittee may place tracking collars (global positioning system (GPS) or very high frequency (VHF)) on individual wolves for radiotelemetry monitoring or other demographic studies.
   i. Other novel tracking methods may also be used provided that the permittee has consulted with the Service and received approval for the method.
   ii. Permittee may collect tissue and/or biological samples such as feces, urine, hair, saliva, semen, ova, or blood for use in:
      1. Confirming identification.
      2. Conducting contaminant or disease analysis and testing.
      3. Conducting studies on the genetics, ecology, behavior, physiology, reproductive biology, and developmental biology of wolves.

d. Rescue and relocating:
   i. Permittee may transport and hold wolves for treatment or rehabilitation in the event of injury, or other threats when no other options are feasible.
   ii. In consultation with the Service and authorized on a case-by-case basis, relocating wolves for supporting recovery purposes may be conducted.
   iii. Mexican wolves that disperse into Colorado or Utah may be returned to Arizona or New Mexico upon coordination with the Mexican Wolf Recovery Coordinator.
   iv. Gray wolves may be relocated upon coordination with the gray wolf recovery coordinator.

e. Euthanize:
   i. Permittees may euthanize severely injured, diseased, or moribund individuals that are encountered in the wild or in captivity.

6. Reporting Requirements:

a. All accidental injury and mortality of individual species must be reported within 24 hours to the applicable project leader and the regional recovery permit coordinator. A detailed report must be provided to the project leader and regional recovery permit coordinator within 5 business days.

b. An annual report of activities conducted under this permit shall be submitted to the regional recovery permit coordinator. All reports must be submitted by **January 31** following each calendar year this permit is in effect. To track, document, and assess all project-specific activities conducted pursuant to this permit, the annual report must summarize all the activities conducted pursuant to this permit during the previous calendar year. Activities that are continuous (*i.e.,* overlapping in 2 or more calendar years), must be reported each year the activity is in effect. The annual report shall be in the following format:
   i. An introduction section addressing reasons and objectives for taking the species, as appropriate;
   ii. A methods section addressing data collection and analysis procedures, personnel working on the project, and effectiveness of the Special Terms and Conditions in minimizing take and/or habitat damage or destruction of the species;
   iii. A results section that summarizes the data collected, including information on any other federally listed species detected while conducting activities authorized under this permit; and
   iv. A conclusion section that specifically provides, at a minimum, application of the results to recommendations for the recovery of the species.

c. The annual report must include, but need not be limited to, the following information. The status of ongoing projects and studies under the permit must be briefly summarized as requested below. A comprehensive report(s) on completed projects and studies must be submitted with the respective annual report or any time during the calendar year at the time of completion.
   i. Summary presentation and brief discussion of significant research results and their importance with regards to recovery of the authorized species;
   ii. Maps and/or descriptions of locations (including GPS/GIS data, as appropriate) where authorized activities occurred;
   iii. The results of all survey or sampling efforts, including estimates of population size of any federally listed species, if possible;
   iv. Number of authorized species salvaged under the recovery permit, including capture locations and their deposition;
   v. Results of any genetic studies from bio-samples collected under this recovery permit;
   vi. Quantified take of the authorized species, including numbers of individuals unintentionally killed (including dates, locations, and circumstances of lethal take), and an estimate of the numbers of individuals otherwise harmed or harassed;
   vii. Quantified take of other listed species not authorized under this permit, including numbers of individuals unintentionally killed (including dates, locations, and circumstances of lethal take), and an estimate of the numbers of individuals otherwise harmed or harassed;

viii. Discovery information and documentation for any potential criminal activities that were reported to the Service's Office of Law Enforcement;
ix. Repositories where the specimens were sent, including salvaged specimens and any issued diagnostic or examination reports from a repository;
x. Other pertinent observations made during permitted activities regarding the status or ecology of the species;
xi. Reports or other documents that include information on human remains or significant archaeological materials if they were discovered at a project location;
xii. Reports or other documents that include information gathered under the authority of this permit, including the presence of any previously undocumented native or nonnative invasive species observed in a project area; and
xiii. Planned future activities if authorized under this permit.

d. If no authorized activities occur over the course of a calendar year, indication of such must be submitted to the regional recovery permit coordinator.

e. Failure to comply with reporting requirements may result in non-renewal or suspension/revocation of this permit.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

MAILING ADDRESS:
Post Office Box 25486
Denver Federal Center
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

LIST OF AUTHORIZED INDIVIDUALS
U.S. Fish and Wildlife Service
Colorado Field Office

1. Authorized to independently conduct all activities for the gray wolf and Mexican wolf:
   a. Scott Becker, Wolf Coordinator.

2. Supervised individuals (*i.e.,* individuals not authorized above) may conduct activities pursuant to this permit only under the direct, on-site supervision of the authorized individual(s) listed above. "On-site supervision" is defined as having an authorized individual at a distance close enough to enable the authorized individual to immediately assist a supervised individual, as needed, while the supervised individual is conducting an authorized activity. The U.S. Fish and Wildlife Service recommends that each supervised individual receive pre-instructions and/or training before attempting to conduct an authorized activity.

3. To request personnel changes to this List of Authorized Individuals, refer to Authorized Individuals, Section 3, in this recovery permit.

Assistant Regional Director, Ecological Services

This List of Authorized Individuals (List) is valid only when dated on or after the permit issuance date. This permit is considered invalid without this List.

Appendix / Contact List

ANNUAL REPORT SUBMISSION | SPECIES LEAD CONTACTS:

Annual reports, due by January 31, submitted electronically:

Region 6 wolf lead: Scott_Becker@fws.gov

OFFICES OF LAW ENFORCEMENT:

CO, KS, UT, WY Resident Agent in Charge: lizz_darling@fws.gov
(303)704-0005

NE, SD, ND, MT Resident Agent in Charge: jeremy_tenkley@fws.gov
(402)760-1890

Assistant Special Agent in Charge: erryl_wolgemuth@fws.gov
(614)732-3327

REGIONAL RECOVERY PERMIT COORDINATORS:

Southwest Region 2 Office: permitsR2es@fws.gov
P.O. Box 1306, Albuquerque, NM 87103-1306

Mountain-Prairie Region 6 Office: permitsR6ES@fws.gov
134 Union Blvd. Lakewood, CO 80228

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WILDEARTH GUARDIANS.

Applicant Defendant– Intervenors.

DECLARTION OF ROBERT EDWARD

I, Robert Edward, declare as follows:

1. I am a member of the Center for Biological Diversity, a national nongovernmental organization focused on wildlife and habitat conservation. I have been a member of the

organization since 2019. As a member and volunteer, I have a keen interest in the conservation and restoration of the Gray Wolf (*Canis lupus*) to the species' historical range, particularly Colorado.

2. I have been involved in the effort to restore wolves to Colorado since 1994, in both a professional and, later, volunteer capacity. I served as the President of the Rocky Mountain Wolf Action Fund from 2019 through 2021, helping to lead the campaign for Proposition 114 in Colorado in 2020 that resulted in the addition of CRS 33-2-105.8 to the Colorado Revised Status and mandated the restoration of gray wolves to Colorado, beginning no later than December 31, 2023. I was intimately involved in the crafting of the legislative language for the ballot measure.
3. As a member of the Center for Biological Diversity, I have advised on issues related to restoring wolves to Colorado, and acted as a liaison to the Center for Biological Diversity and other interested nonprofits regarding the effort. I rely on the Center for Biological Diversity, in part, to represent my interests in conserving gray wolves and other endangered wildlife.
4. I have a substantial interest in seeing wolf reintroduction begin, on schedule, by December 31, 2023, to ensure the decades of work that I have put into this project come to fruition. I further have an interest in ensuring that Colorado and the U.S. Fish and Wildlife Service honors the will of Colorado voters as manifest in the successful passage of Proposition 114 in 2020.
5. As one of the architects of the effort to restore wolves to Colorado, I have a substantial interest in ensuring that no delays to the planned start of wolf translocation to Colorado

occur. Such delays could cause irreparable harm to wolves captured from source populations if such procedural delays lead to prolonged captivity of these wild wolves. Extended captivity could cause the injury or death of these wolves.

6. I am a resident of Louisville, Colorado. I enjoy recreating in western Colorado, and I do so regularly. I am looking forward to the day when I might see wolves roaming in Colorado and will find solace in knowing that we have restored the ecological services that wolves provide to the state. Moreover, I am keenly interested in the restoration and protection of other species currently listed under the Endangered Species Act and cooperatively managed by Colorado Parks & Wildlife, including Canada Lynx (*Lynx canadensis*) and Wolverine (*Gulo gulo*).
7. While recreating in western Colorado, I have suffered distress at the repeated discovery of areas degraded by elk and deer, a consequence of the absence of wolves from Colorado for more the 80 years.
8. In summary, I have concrete and specific interests in gray wolf recovery in Colorado, as reflected by my years of advocacy for gray wolf reintroduction to the state. If the plaintiffs in this lawsuit succeed, my interests would be irreparably harmed because wolf releases to Colorado could be delayed or maybe even stopped. My professional, scientific, ecological, recreational, ethical, and aesthetic interests in gray wolf conservation would be protected if the Court denies the plaintiffs the relief they request.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 13th day of December, 2023.

_____

ROBERT EDWARD

IN THE UNITED STATES DISTRICT COURT
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WILDEARTH GUARDIANS.

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DECLARTION OF BRETT HENDERSON

I, Brett Andrew Henderson, declare as follows:

1. I have personal knowledge of the matters stated below, and if called as a witness, I could and would competently testify to them.

2. I live in Crested Butte, Colorado and have lived here for over 14 years. Before moving to Gunnison, Colorado in 2009, I earned a Studio Art Degree from Texas Christian University with an emphasis in photography. I moved to Gunnison to finish my Financial Accounting Degree at Western State University and to live in and experience the west and its expansive wild lands. Having grown up in cattle country west of Fort Worth, one of the draws to Colorado's West Slope was to have opportunities to readily explore expanses of public lands and have experiences with wild native fauna.

3. Since then, I have explored some of the most remote and expansive public lands in western Colorado and the western United States. For example, I have traversed all three districts of Canyonlands National Park in Utah, cobbling routes together both on and off-trail; explored remote canyons at the base of the Abajo Mountains in Utah; rowed the Grand Canyon in Arizona; traversed the Santa Catalina Mountains in Arizona; traversed the southern part of Teton National Park in Wyoming; and fly-fished extensively throughout New Mexico, Colorado, Wyoming, and Montana. I have also successfully hunted elk and mule deer throughout Gunnison County with archery and rifle.

A break in the storm captured while traversing the Santa Catalina Mountains, AZ.

Alpenglow at high alpine lake in Grand Teton National Park while on my honeymoon in September 2017.

4. I routinely capture my trips with photographs (some examples included here), video, and audio. I have made multiple videos documenting wildlife, like coyotes, black bears, and white-tailed ptarmigans, as well as time-lapses. I also post photos I take on these trips to my Instagram account for prospective customers and for pleasure.

Coyote on a vacant lot across the street from my house.

Moose on the loose in Taylor Park, Gunnison County, CO.

5. I am a current member of the Center for Biological Diversity. I am aware that the Center has over 84,000 active members, including many like me who live within the gray wolf's historical range and where they are planned to be reintroduced in Colorado. Because the Center and its membership value the gray wolf and its role in promoting healthy ecosystems, I am aware that the Center has worked and continues to work to protect and recover the gray wolf across their range through education, advocacy, scientific study, and litigation. I am also aware generally of the work the Center does to protect imperiled species great and small in Colorado that are listed under the Endangered Species Act ("ESA"), including Canada lynx, Uncompahgre fritillary, greenback cutthroat trout, and humpback chub.

6. I rely upon the Center in part to keep me informed and represent my interests in conserving wildlife and wildlife habitat, including gray wolf and other species listed under the

ESA. I read the Center's newsletters and have participated in action alerts to protect my region's biodiversity. I also follow the Center on social media to stay informed of wildlife and wildlife habitat issues that I care about and to learn of public engagement opportunities.

7. Over the course of my extensive outings in Colorado, Utah, Wyoming, and even Texas and Arizona, I have seen and had multiple encounters with coyotes and bears. I have seen coyote and bear tracks and scat in remote Utah desert washes. I have taken multiple photos of coyotes and have had moving close encounters with one joining me as I sat on a high alpine ridgeline during a mule deer hunt several years ago. Since I moved to Colorado, not a year has gone by that I have not seen a coyote or bear in the wild. I look forward to the day when one of these encounters will be with a gray wolf or Canada lynx. I even hike with a small monocular just for the purpose of observing wildlife and catching distant views of wildlife.

Sow with three cubs, taken a few miles outside Crested Butte, CO.

Bear claw marks on aspen in the West Elk Mountains, Colorado.

A cinnamon bear at sunset walking through a field of wildflowers, taken several miles south of my house in Crested Butte, CO.

8. I was really hoping to see or hear gray wolves when I traversed the Tetons with my wife for our honeymoon in September 2017. Our chosen route was through the southern range of Grand Teton National Park. We traveled through remote areas with many miles off-trail. Due to the very little presence of humans in these areas, it seemed like our chances of sighting or hearing wolves were hopefully increased. The fact that we hiked in areas shared with gray wolves made the trip even more special. Although we did not see or hear them on that trip as we had hoped, we cherished our time in their habitat.

9. The level of awareness that one must have when traveling through lands with native fauna like gray wolf and bear country is unrivaled. For me, this helps me immerse in the

present as I travel through what really feels like wild country. I know when I see bears and their sign, I am in an ecosystem that is truly wild and intact. Likewise, when I will get to see signs of gray wolves, a sight that would be made possible with reintroduction of the species in Colorado, I will also know that the ecosystem is truly wild and intact. At these times, I am experiencing the wildness that I have continual sought my entire life.

My hand next a coyote track in remote backcountry.

10. I have future plans to backpack and row/paddle in gray wolf habitat in Colorado. I have been hoping I would have these opportunities Summer 2024 in Gunnison County. For example, last summer I ran more than 500 miles in Gunnison County across public lands that would contain ideal habitat for gray wolves. Knowing I was traversing habitat where paws could be on the ground in only a few months was especially exciting. I generally hike, backpack, and run hundreds of miles each Summer and Fall. I am currently planning a backpacking trip in the Summer or Fall of 2024 in Eagle or Grand County with the specific hopes of seeing or hearing gray wolves. I also plan to backpack and run in the White River and Gunnison National Forests, including the Raggeds and Maroon Bells wilderness areas which lies between the Roaring Fork Valley and Crested Butte. I hope on these trips I will finally get to observe or hear a gray wolf as well as see their sign and maybe even document my observation by photo or video.

11. Since I was a child, I have been fascinated by coyotes, bears, and gray wolf. As shown in this declaration, I continuously seek out chances to experience wild predators and carnivores as well as other wildlife.

12. Gray wolves once thrived in Colorado. But their pockets of survival got smaller and smaller as government-funded hunters and settlers exterminated them as they were viewed as a threat to progress and livestock.

13. The West Elk, Raggeds, La Garita Mountains are right out my back door making it easy to regularly visit numerous areas within these mountain ranges. I have hiked and fished extensively through these drainages, and I will continue to keep doing so. Just in the last decade, I have gone to these areas every year to hike or fish. This summer I have plans to traverse the La

Garita Wilderness, of which the southern slopes are in the headwaters of the Rio Grande drainage and far from the beaten path.

14. I have enjoyed seeing coyotes, foxes, black bears and their sign when I am traveling through Western Slope landscapes. I would love to have similar experiences viewing gray wolves and Canada lynx. As a wildlife photographer and nature lover, it would be so inspiring to see one of these majestic wolves or lynx and to have an opportunity to capture it on camera within the landscapes I regularly visit and know better than any city.

15. I hunt elk and mule deer, and gray wolf recovery would improve these experiences for me. For me, one of the things I love about hunting is watching animals. Having the opportunity to see wildlife like gray wolf would make my hunting experiences even more wild. I would not hunt gray wolves because they are majestic keystone predators. They strengthen the gene pool of their prey, like the elk and mule deer that I hunt. I have been particularly perplexed that certain states have proposed holding gray wolf hunting seasons and allow for indiscriminate killing, like in Wyoming outside of the northwest corner of the State, because I know how imperiled they are and hunting such a species does not further its conservation. I am aware that lead bullets have negative impacts on wildlife and water quality. When I hunt with a rifle, I only use copper bullets to protect my family and friends that will eat the meat, the predators and other wildlife that may scavenge on the remains, as well as the water quality.

16. Having gray wolves reintroduced and recovered Colorado would be exciting. As wild as these mountains are, without all of their native flora and fauna, critical components of their wildness are simply missing. Restoring gray wolves back to their range in Colorado would be a re-wilding and restore an ecosystem that evolved with this invaluable species.

17. Colorado Parks and Wildlife will not adequately represent my interest in this case and has not adequately represented my interest thus far on the gray wolf reintroduction. For example, I strongly support firm requirements and funding for non-lethal strategies to reduce and avoid potential conflict between wolves and livestock. The current Colorado Wolf Restoration Management Plan, however, falls short and needs to be strengthened to ensure gray wolves that are introduced to Colorado are not killed due to preventable conflicts with livestock from the implementation of simple livestock husbandry best practices. This litigation may result in the State also taking actions that are not consistent with my interests.

18. As noted throughout, I have an interest in preservation of listed species beyond the gray wolf in Colorado. I am greatly concerned that Plaintiffs are seeking to set aside the annual renewal of the ESA Section 6 Cooperative agreement between Colorado and the Fish and Wildlife Service. If Plaintiffs are successful in this effort, it would hurt and affect the ability to successful recovery all listed species in the State and consequently harm my interest in seeing, documenting, and otherwise having encounters with these species when I am exploring Colorado public lands, whether that be during one of my 20 plus mile runs or during a mule deer hunt.

19. To summarize, I have suffered, and will foreseeably continue to suffer, direct injuries to my recreational, aesthetic, scientific, professional, spiritual, and other interests and activities if Plaintiffs are successful in delaying or otherwise preventing the reintroduction of gray wolves to Colorado. These are actual, ongoing, concrete injuries, traceable to the Plaintiffs' efforts in this litigation. If the Court denies Plaintiffs attempts and ensures the timely and successful reintroduction of gray wolves to Colorado, my interest in these animals will be protected.

In accordance with 28 U.S.C. § 1746 and under penalty of perjury, I swear that the foregoing is true and correct.

Executed on December 13, 2023, in Crested Butte, Colorado.

/s/ Brett A. Henderson

Brett A. Henderson

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

Civil Action No. 1:23-cv-03258-RMR

GUNNISON COUNTY STOCKGROWERS' ASSOCIATION, INC., a Colorado Nonprofit Corporation; and
COLORADO CATTLEMEN'S ASSOCIATION, a Colorado Nonprofit Corporation

Plaintiffs,

v.

U.S. FISH AND WILDLIFE SERVICE;
MARTHA WILLIAMS, in her official capacity as Director of the U.S. Fish and Wildlife Service;
COLORADO DIVISION OF PARKS AND WILDLIFE;
JEFF DAVIS, in his official capacity as Director of Colorado Parks and Wildlife;
ERIC ODELL, in his official capacity as Wolf Conservation Program Manager for Colorado Division of Parks and Wildlife; and
COLORADO PARKS AND WILDLIFE COMMISSION,

Defendants,

v.

CENTER FOR BIOLOGICAL DIVERSITY;
HUMANE SOCIETY OF THE UNITED STATES;
WESTERN WATERSHEDS PROJECT; and
WILDEARTH GUARDIANS.

Applicant Defendant– Intervenors.

DECLARTION OF WENDY KEEFOVER

I, Wendy Keefover, declare as follows:

1. I am an adult U.S. citizen residing in Broomfield, Colorado. I am a third generation Coloradoan and I have been a Colorado resident for most of my life except for a few

forays away from my home state: when I was an infant my parents lived and taught abroad taught for two years; in 1981, I was an exchange student living in Australia for approximately four months; from 1987 to 1994, I lived in Phoenix Arizona, and from 2008 to 2009, I lived in Bozeman, Montana.

2. I am a member of The Humane Society of the United States. In part, I rely on the Humane Society of the United States to represent my interests in conserving threatened and endangered species and their habitat – especially native carnivores, including gray wolves. Since 2014, I have also been employed by The Humane Society of the United States; my title is Senior Native Carnivore Protection Manager. Prior to my employment with The Humane Society of the United States, I worked as a legal assistant and pro bono coordinator at the Land and Water Fund of the Rockies from 1995 to 1998, and as Director of the Carnivore Protection Program for WildEarth Guardians from March 1998 through November 2013. I also served as a board member for WildEarth Guardians (then called "Sinapu") from 1994 through 1998. I have worked on native carnivore (wolf, grizzly bear, puma) issues for 30 years and mostly while living in the state of Colorado.
3. My deep and personal connection to wildlife and wild lands – both as an advocate and a lover of wildlife and wilderness – is what led me to change my career path away from legal services to become a professional wildlife advocate in 1998, and to pursue graduate studies focusing on conservation and animal protection issues beginning in 1998. Over the course of my career I have written or co-written at least nine reports concerning wolves, primarily focusing on the need to protect wolves on public lands and cease inhumane and ineffective government-sponsored killing.
4. For years I have personally supported and advocated for the reintroduction of wolves into Colorado. I supported and voted for Proposition 114.

5. I am an avid wildlife watcher, hiker, and wildlife photographer. I regularly visit wild areas in Colorado and the greater Rockies where I take great aesthetic and recreational pleasure in observing and photographing native wildlife and signs of wildlife – particularly native carnivores like wolves – in their natural, unspoiled habitat. Their presence fills me with a sense of purpose, connectedness, and well-being.
6. For example, I usually travel at least once per year to Yellowstone National Park in order to hike, observe and photograph the unique native wildlife that exists in the Greater Yellowstone Ecosystem. I visited Yellowstone three times in 2023, most recently in August. Since their successful reintroduction to the Park, I have seen wolves several times during these visits, most recently in 2023. During a visit in May 2022, I was fortunate enough to photograph a wolf.
7. I regularly hike on public lands in Colorado, especially the areas west of Boulder, Rocky Mountain National Park, and in and around South Park. The opportunity to view and photograph native wildlife is central to my enjoyment of Colorado's magnificent public places.
8. As a wildlife photographer, I intend to travel within the state to attempt to view and photograph Colorado's wolves on the public lands where they are likely to establish themselves once reintroduced. Next year, I look forward to traveling to state and federal lands near the reintroduction sites in the Roaring Fork Valley and Gunnison County in order to hike and attempt to photograph wolves.

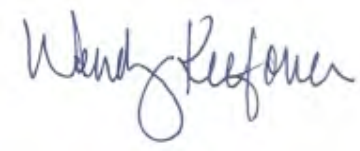
9. Should wolf reintroduction be halted – temporarily or permanently – it would directly harm my interests in recreating in wolf habitat in Colorado and in viewing and photographing wolves and their sign in the state I have called home for most of my life. Because I will be unable to view and photograph wolves, I will be deterred from planning

visits I would otherwise make to public lands where wolves are likely to establish themselves.

10. Moreover, as a Colorado citizen who supports wolf reintroduction and who voted for Proposition 114, I will be harmed by the feeling that my voice has been ignored and the democratic process has been thwarted if planned reintroduction is halted or delayed.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 13th day of December, 2023.



Wendy Keefover

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

Civil Action No. 1:23-cv-03258-RMR

GUNNISON COUNTY STOCKGROWERS' ASSOCIATION, INC., a Colorado Nonprofit Corporation; and
COLORADO CATTLEMEN'S ASSOCIATION, a Colorado Nonprofit Corporation

Plaintiffs,

v.

U.S. FISH AND WILDLIFE SERVICE;
MARTHA WILLIAMS, in her official capacity as Director of the U.S. Fish and Wildlife Service;
COLORADO DIVISION OF PARKS AND WILDLIFE;
JEFF DAVIS, in his official capacity as Director of Colorado Parks and Wildlife;
ERIC ODELL, in his official capacity as Wolf Conservation Program Manager for Colorado Division of Parks and Wildlife; and
COLORADO PARKS AND WILDLIFE COMMISSION,

Defendants,

v.

CENTER FOR BIOLOGICAL DIVERSITY;
HUMANE SOCIETY OF THE UNITED STATES;
WESTERN WATERSHEDS PROJECT; and
WILDEARTH GUARDIANS.

Applicant Defendant– Intervenors.

DECLARTION OF LINDSAY LARRIS

I, Lindsay K. Larris, declare as follows:

1. I have personal knowledge of the matters stated below and, if called as a witness, I could and would competently testify to them.

2. I reside in Lakewood, Colorado. I have lived in the Denver Metro Area since 2019.

3. I graduated from the University of Pennsylvania Law School in 2007 and have been actively barred as an attorney since that time, first in California and now in Colorado. I have been professionally focused on wildlife law and policy for the past nine years with a particular interest in native carnivores.

4. I am the Wildlife Program Director for WildEarth Guardians ("Guardians"), a position that I have held since March 2019. In my role as Wildlife Program Director, I direct Guardians' strategies and programs to protect and restore endangered, threatened and other imperiled species and the habitats they need to survive and thrive throughout the American West.

5. Founded as Forest Guardians in 1989, Guardians is an environmental protection, advocacy, educational, and service organization, existing as a non-profit corporation under the laws of both New Mexico and Colorado, and qualifying as a tax-exempt "501(c)(3)" organization under the rules of the Internal Revenue Service. Guardians' mission is to protect and restore the wildlife, wild places, wild rivers and health of the American West. At present, Guardians has approximately 180,000 members and supporters across the United States with more than 11,000 members and supporters in Colorado.

6. Guardians conducts an active endangered and threatened species protection campaign housed in our Wildlife Program. Guardians and its members and supporters have an interest in the conservation and protection of imperiled species across the West, including the gray wolf. Since at least 2009, Guardians has had a particular focus on wolf

reintroduction and restoration in Colorado noting the state as a key geographic area for connecting wolf populations across the West.

7. Guardians has been actively involved in the State of Colorado's efforts to reintroduce wolves via ballot initiative. Beginning in 2019, we endorsed the effort to put wolf reintroduction on the ballot ("Prop 114"), functioned as part of the broader coalition of the Rocky Mountain Wolf Project to get the necessary signatures to get Prop 114 on the ballot, and encouraged our members and supporters to vote "Yes" on Prop 114. Guardians continually messaged that "wolves belong in Colorado" and this campaign continues to be an important part of the Wildlife Program's work.

8. After Proposition 114 passed in 2020, there was a noticeable increase in anti-wolf sentiment in Northern Rocky Mountain states like Idaho and Montana that ultimately resulted in these states passing legislation and regulations to increase lethal management of wolves and liberalize hunting and trapping methods in order to. Fearing that this trend could happen in Colorado with wolf reintroduction by the end of 2023, I directed Wildlife Program staff and resources towards closely monitoring and engaging in the process of developing a wolf plan in the State of Colorado. My staff and I led a coalition in putting together our ideal vision of for Colorado wolf restoration and spoke about this plan with government officials, media, and other members of the public.

9. As part of my engagement in Colorado wolf reintroduction, I attended Colorado Parks and Wildlife (CPW) Commission meetings and wolf planning meetings across the state for the past 2.5 years, providing public testimony about the proposed wolf plan at most meetings. I have observed the numerous ways that the interests of livestock operators

have been thoughtfully considered in developing the state's wolf management plan by CPW staff as well as the Commissioners. It is my understanding that the State of Colorado has one of the most generous – if not the most generous – livestock compensation programs in the country as well as engaged full-time staff specifically hired for wolf-livestock conflict prevention. For 2.5 years, I have witnessed the care and concern that has gone into developing a wolf plan that painstakingly considers the interest of agricultural operators, particularly in those areas for planned reintroduction.

10. In addition to my professional interests in gray wolves, I have a strong personal affinity for wolves and desire to see their successful return to Colorado. In September 2020, I traveled to the Gila National Forest for the specific purpose of hoping to see or hear Mexican wolves ("lobos"). Camping in a remote location in the Gila on the first evening, shortly after nightfall, me and several Guardians' staff members heard a chorus of wolf howls from all directions. While we could not see lobos – or much else in the darkness – we could hear what sounded like at least a dozen lobos quite close to our campsite. This howling lasted for approximately 20 minutes and ended as abruptly as it began. It was one of the most amazing experiences of my life and I feel truly lucky to have had the opportunity to hear these wolves.

11. I have been anxiously awaiting the return of wolves to Colorado by December 31, 2023 as I hope to one day hear or see wolves in this state as well. I spend a great deal of time hiking in the areas on the Western Slope, in particular, in the Gunnison National Forest and White River National Forest. My fiancé and I spend most summer weekends hiking, floating and camping on the Western Slope and try to ski as much as possible in the

winter months. Even though I know the likelihood of seeing a wolf in Colorado will be low, I look forward to seeing the impact the return of wolves will have on our ecosystems and how it could help vegetation and ungulate populations across the state. My personal desire to see or hear a wolf in the Colorado wild is something that keeps me motivated and focused on the work that I do in my professional capacity.

12. My interests will be harmed if plaintiffs are successful in delaying or halting wolf reintroduction on professional level as well as a personal level. Professionally, I have spent the past 4 years encouraging Coloradans first to pass Prop 114 and then working to ensure that the State of Colorado developed a reintroduction plan that focused on the recovery and restoration of wolves across the landscape. Recovering wolves in Colorado has been a central component of WildEarth Guardians' mission and is of interest to not only our members and supporters in this state, but across the country who see the importance of what Colorado is doing in restoring a native species to its historic range. Personally, without wolves being reintroduced into Colorado I believe that I will never have the opportunity to experience them in the wild as their recovery without human assistance seems unlikely due to laws and regulations in our surrounding states to the north and west.

13. As someone who publicly supported a yes vote on Prop 114, my interest – as well as the interests of all of those Coloradans who supported this measure – will be impaired. The majority of Coloradan voters did vote to reintroduce wolves into the state by the end of 2023 and that interest of nearly one million people is at risk of harm if the Plaintiffs are successful in this case.

14. Moreover, while Plaintiffs only discuss wolves in their lawsuit, a finding that the Section 6 agreement that Colorado has with U.S. Fish and Wildlife is not legal would be disastrous for the many other threatened and endangered species found in Colorado who rely on that agreement for protection. Through this cooperative agreement, gravely imperiled species like the black-footed ferret, lesser prairie-chicken, and Canada lynx are able to receive state and federal support. WildEarth Guardians has been fighting for the protection and recovery of these species and their habitat - in addition to wolverine, Preble's meadow jumping mouse, and the humpback chub – for many years and the ability of the state and federal government to not have a cooperative agreement related to these species would impair our interest in their continued protection.

15. The final wolf management plan adopted by the State of Colorado did not adopt many of the recommendations made by WildEarth Guardians and other conservation groups who sought a much greater emphasis on wolf protection and recovery such as a no lethal management on public land, introduction of a population of Mexican wolves in the part of the recovery area, and multiple recovery zones that could sustain a minimum of 750 wolves. Similarly, despite WildEarth Guardians' comments and recommendations, U.S. Fish and Wildlife adopted a 10(j) rule for Colorado wolves that grants far too much flexibility to Colorado to manage what would otherwise be a fully-protected endangered species. As such, I do not believe that any of the named parties adequately represent the interests of WildEarth Guardians in wolf recovery and species conservation and protection more broadly.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 13th day of December, 2023.

LINDSAY LARRIS

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

Civil Action No. 1:23-cv-03258-RMR

GUNNISON COUNTY STOCKGROWERS' ASSOCIATION, INC., a Colorado Nonprofit Corporation; and
COLORADO CATTLEMEN'S ASSOCIATION, a Colorado Nonprofit Corporation

Plaintiffs,

v.

U.S. FISH AND WILDLIFE SERVICE;
MARTHA WILLIAMS, in her official capacity as Director of the U.S. Fish and Wildlife Service;
COLORADO DIVISION OF PARKS AND WILDLIFE;
JEFF DAVIS, in his official capacity as Director of Colorado Parks and Wildlife;
ERIC ODELL, in his official capacity as Wolf Conservation Program Manager for Colorado Division of Parks and Wildlife; and
COLORADO PARKS AND WILDLIFE COMMISSION,

Defendants,

v.

CENTER FOR BIOLOGICAL DIVERSITY;
HUMANE SOCIETY OF THE UNITED STATES;
WESTERN WATERSHEDS PROJECT; and
WILDEARTH GUARDIANS.

Applicant Defendant– Intervenors.

DECLARTION OF ERIK MOLVAR

I, Erik Molvar, declare as follows:

1. I live in Laramie, WY (1856 Harrison St A1, 82070). I have lived in Laramie since September 1, 2000.

2. I am the Executive Director of Western Watersheds Project, a position I have held since October 2016. Prior to that, I was Sagebrush Sea Campaign Director from Sept. 1, 2013 to September 30, 2016. The mission of Western Watersheds Project is to protect and restore wildlife and watersheds throughout the western United States. I began as a conservation professional with Biodiversity Conservation Alliance, a Wyoming conservation nonprofit dedicated to protecting native species and their habitats, in September 2000, and served as the Executive Director from 2004 to 2013.
3. Western Watersheds project has scores of members and supporters in Colorado who support wolf reintroduction, and have an interest in returning wolves to Colorado. Their interests would be harmed by any delays in wolf reintroduction in Colorado.
4. I am a wildlife biologist with findings published in peer-reviewed scientific journals on the effect of wolf and grizzly predation risk on moose behavior, on the ecological effects of moose herbivory, and on moose population dynamics. I received a Master of Science in wildlife management from the University of Alaska Fairbanks in December1992.
5. I first encountered wolves in Denali National Park in 1987 while traveling in Alaska and the Yukon for the summer. I later encountered wolves during the course of field research in Denali during the 1990s, and also had a memorable encounter while hunting moose in the Yanert Fork valley of Alaska. In this encounter, I spotted what I originally thought were a couple of foxes, which departed downhill and then began howling in a pitiful way - they were actually young-of-the-year wolf pups. From 30 yards uphill, the pack chimed in with resonant howls. I was surrounded by howling wolves, and turned in 360 degrees to memorize every aspect of the mountain setting and the auditory concert.

This is the most memorable wildlife encounter I have had in a rich lifetime of outdoor activities.

6. I later encountered a lone black wolf in Wyoming's Red Desert while pronghorn hunting circa September 2013. I did not speak of this encounter for 5 years following the encounter, because wolves in most of Wyoming are classified as a "predatory animal" subject to unlimited killing without license or bag limit, and I feared for the wolf's safety. It was a memorable sighting.

7. I am also the author of 17 hiking and outdoor books. In Colorado, this includes *Hiking Colorado's Maroon Bells - Snowmass Wilderness*, an area where I hiked all of the trails and provided the writing and photography for the book. I return to this area every 5 years or so to revise and update the hiking book; the next revision is planned for 2025. This area slated for wolf reintroduction in 2023. The presence of wolves, and their howls echoing from the peaks, will significantly increase the quality of my recreational experience when I visit the Maroon Bells, Hunter-Fryingpan, and Collegiate Peaks wilderness areas.

8. My interests will be harmed by delays in wolf reintroduction, because wolves exert important ecological influences on ecosystems. As the author of the scientific portion of WWP's petition to list wolves in Montana, Idaho, and Wyoming, I have comprehensively read the scientific literature and appreciate the resurgence of vegetation, songbirds, beavers, and watersheds. Further delay of wolves returning to the ecosystems of Colorado harms the ecological recovery in Colorado, which is central to WWP's mission.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 13th day of December, 2023.

ERIK MOLVAR

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

Civil Action No. 1:23-cv-03258-RMR

GUNNISON COUNTY STOCKGROWERS' ASSOCIATION, INC., a Colorado Nonprofit Corporation; and
COLORADO CATTLEMEN'S ASSOCIATION, a Colorado Nonprofit Corporation

Plaintiffs,

v.

U.S. FISH AND WILDLIFE SERVICE;
MARTHA WILLIAMS, in her official capacity as Director of the U.S. Fish and Wildlife Service;
COLORADO DIVISION OF PARKS AND WILDLIFE;
JEFF DAVIS, in his official capacity as Director of Colorado Parks and Wildlife;
ERIC ODELL, in his official capacity as Wolf Conservation Program Manager for Colorado Division of Parks and Wildlife; and
COLORADO PARKS AND WILDLIFE COMMISSION,

Defendants,

v.

CENTER FOR BIOLOGICAL DIVERSITY;
HUMANE SOCIETY OF THE UNITED STATES;
WESTERN WATERSHEDS PROJECT; and
WILDEARTH GUARDIANS.

Applicant Defendant– Intervenors.

DECLARTION OF MICHAEL ROBINSON

I, Michael J. Robinson, declare as follows:

1. I am now and have been a member of the Center for Biological Diversity (the "Center"), or one of its predecessors since the early 1990s. I have been employed by the Center (or

its predecessor groups) since 1997, and currently serve as a senior conservation advocate for the organization. In that capacity, I work as part of two organizational programs – carnivore conservation and endangered species – in our campaigns to recover the Mexican gray wolf, gray wolves in Colorado and a plethora of other imperiled animal and plant species.

2. The Center is a non-profit, 501(c)(3) organization based in Tucson, Arizona, dedicated to protecting and restoring imperiled species and natural ecosystems. The Center currently has over 84,000 members, including over 3,000 in Colorado.

3. Since 1997, I have lived in Pinos Altos, New Mexico, an unincorporated village in southwestern New Mexico. I live here because it is at the edge of (and even within walking distance of) the Gila National Forest, where Mexican gray wolves were reintroduced in 1998 and where I have seen an abundance of wildlife in my excursions by car, on foot in frequent day hikes and occasional backpacking trips, and also while paddling on the Gila River.

4. I lived in Colorado from 1988 through 1996. During that period, I backpacked and day-hiked extensively and relished occasional wild animal sightings. I also became aware through my reading that some animals, most notably gray wolves, no longer lived in Colorado because of a concerted effort to exterminate them. And I learned that wolves play an instrumental role in the health of their ecosystems.

5. On December 19, 1990, the *Rocky Mountain News* published my op-ed "Return of wolves would bring balance," which was the first public call for the reintroduction of wolves to Colorado. Up to that point, reintroduction of wolves to Yellowstone National

Park had been a focus for public discussion, with some lesser attention dedicated to the reintroduction of wolves to central Idaho. Wolves were eventually reintroduced to those two locales in 1995 and 1996.

6. In early 1991, I cofounded an organization dedicated to Colorado wolf reintroduction and served as executive director through 1996. During that span, the organization (which is no longer extant having later become part of a different organization, WildEarth Guardians) put on hundreds of educational slide shows, garnered local government and editorial board endorsements of reintroduction including on Colorado's western slope, and persuaded Rep. David Skaggs (D-Boulder) to introduce a $50,000 federal earmark, which passed Congress, and that funded the first habitat suitability study of and public opinion survey on Colorado wolf reintroduction. The study found that Colorado's prey base of elk and deer could support 1,128 wolves on Colorado's national forests alone. The survey determined that 71% of Coloradans supported reintroduction.
7. Since moving to New Mexico, I have visited Colorado periodically to see friends, backpack in the Rocky Mountains, and to organize the public to support wolf reintroduction and, more recently, to support protective policies for the soon-to-be-released wolves.
8. I have explored many public lands in the western U.S. including in Colorado by hiking, backpacking, floating rivers, and by car. I will continue to do so. Even before reintroduction to the northern Rockies, while backpacking in Yellowstone National Park in the early 1990's, I saw and heard a wolf (within a mile of where one had been shot by an outfitter the previous fall – which is fortuitously why we decided to backpack there).

I've also seen a Mexican gray wolf in the Gila National Forest and have found Mexican wolf tracks and scat dozens of times. I treasure those experiences to observe wolves and see their sign in the wild. Because wolf reintroduction to Colorado has now occupied (with some pauses) the last 33 years of my life, and I want to celebrate in a meaningful way, I intend to backpack in Colorado in whatever area the wolves establish a territory, hopefully as soon as summer of 2024.

9. In 2005, the University Press of Colorado published my book, *Predatory Bureaucracy: The Extermination of Wolves and the Transformation of the West*. *Predatory Bureaucracy* is an account of how the U.S. government exterminated wolves after the failure of state governments that tried to do so through bounties, and the effects on the ground and in society. The case study that occupies approximately a quarter of the 472-page book looks at Colorado, and in fact the book remains the most complete account in print of Colorado's original wolves. It took me 13 years to research and write.

10. For the Proposition 114 campaign, I worked with partners to put on PowerPoint presentations from Estes Park to Durango and in between to gin up support for signature-gathering. During the pandemic of 2020 I tried to be helpful from afar, including in coordinating with other Center for Biological Diversity staff in our targeted online advertising, and encouraging the Center's financial donations to the Rocky Mountain Wolf Action Fund which totaled tens of thousands of dollars.

11. To educate the public about wolves, I have set up information tables in public places and initiated discussions there with strangers, written op-eds for newspapers, and contributed to many news articles and broadcasts on wolves by providing information to reporters.

12. I continue to work towards a wolf restoration and management plan in Colorado that protects wolves' lives, ensures an ecologically-effective population (i.e. that helps other animal and even plant species), and that aids in recovery of the Mexican wolf through establishing a population of Mexican wolves in southwestern Colorado that would have natural connectivity (and most importantly reproductive connectivity) southward to the wolves near me and northward to reintroduced northern gray wolves in northwestern Colorado.
13. As a Center employee, I do investigation and monitoring for wolves. This has entailed filing dozens of Freedom of Information Act requests, and conducting hundreds of informal interviews of those involved in wolf management, scientists, and members of the public who have encountered wolves.
14. Separately, I have paid attention to the individual life trajectories (i.e. reported locations, conflicts with livestock, pairings with other wolves, pups produced, etc.) of more than a few wolves over the years, including wolves who have lived in Colorado. All too often, these wolves end up dead. The deaths of each of these wolves saddens me. I feel the immensity of so many killings as dispiriting.
15. My work with the Center has also included participating in decision making processes for the future of wolves in Colorado. In the past, that has included (but not been limited to) undertaking informal discussions with government officials, submitting written comments to government agencies, and testifying at public hearings.
16. Recovering wolves means more to me than simply the successful performance of my job. Wolf recovery in Colorado also reflects my belief based in science that wolves can

contribute to the natural balance of their ecosystems, and it reflects my deep appreciation for the landscapes and the natural biota of public lands in the southern Rocky Mountains. I would like to see and hear more wolves in the wild, and I would like to know that they are thriving.

17. The Center advocated extensively for a very different Colorado wolf plan than the one that Colorado Parks and Wildlife finalized. We also advocated for changes in the wolf management rule issued under Section 10(j) that the U.S. Fish and Wildlife Service did not adopt. For example, we advocated for a requirement for livestock owners to remove or render inedible the carrion from non-wolf-caused livestock deaths (i.e from poisonous weeds or disease) to prevent wolves from scavenging and then being proximate to vulnerable live domestic animals, a ban on killing wolves in consequence of them killing livestock on public lands, science-based recovery criteria including 750 wolves and connectivity to wolf populations north and south of Colorado, and introduction of Mexican wolves to southwestern Colorado to help save this genetically depauperate subspecies from inbreeding and to approximate the gradation of wolf types that existed before widespread extermination. For the fact that neither Colorado Parks and Wildlife nor Fish and Wildlife Service adopted our recommendations despite extensive science we proffered, and for other reasons, the state and federal government parties do not adequately represent my or the Center's interests in gray wolf conservation in Colorado.

18. If the plaintiffs in this case were to succeed, releases of wolves into Colorado would be delayed or maybe even stopped. Such a halt would injure my professional, recreational, scientific, aesthetical, and other interests in wolves and specifically their recovery in

Colorado. Without releases of wolves into Colorado, my opportunity to view or hear wolves, or observe signs of their presence, would be tremendously diminished. In addition, my longstanding interest in Colorado wolf conservation and recovery would be gravely set back, because wolves are unlikely to recover in Colorado without releases by people. This Court could protect my interests in Colorado wolves by denying the relief that plaintiffs request.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 13th day of December, 2023.

MICHAEL ROBINSON

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

Civil Action No. 1:23-cv-03258-RMR

GUNNISON COUNTY STOCKGROWERS' ASSOCIATION, INC., a Colorado Nonprofit Corporation; and
COLORADO CATTLEMEN'S ASSOCIATION, a Colorado Nonprofit Corporation

Plaintiffs,

v.

U.S. FISH AND WILDLIFE SERVICE;
MARTHA WILLIAMS, in her official capacity as Director of the U.S. Fish and Wildlife Service;
COLORADO DIVISION OF PARKS AND WILDLIFE;
JEFF DAVIS, in his official capacity as Director of Colorado Parks and Wildlife;
ERIC ODELL, in his official capacity as Wolf Conservation Program Manager for Colorado Division of Parks and Wildlife; and
COLORADO PARKS AND WILDLIFE COMMISSION,

Defendants,

v.

CENTER FOR BIOLOGICAL DIVERSITY;
HUMANE SOCIETY OF THE UNITED STATES;
WESTERN WATERSHEDS PROJECT; and
WILDEARTH GUARDIANS.

Applicant Defendant– Intervenors.

DECLARATION OF DELANEY RUDY

I, Delaney Rudy, declare as follows:

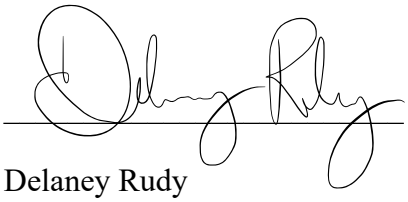
1. I live in Gunnison, CO, and have lived here since 2020. I also lived on the Western Slope of Colorado in the town of Paonia in 2016 and 2017. I was born in Colorado and raised

in the town of Evergreen. I have lived in Colorado all my life, with the exception of parts of my four years in college.

2. I am the Colorado Director of Western Watersheds Project. Prior to this employment, I worked for the US Forest Service for eight seasons as a trail crew member, wilderness ranger, wildland firefighter, and biological science technician. Six of those eight seasons I worked in western Colorado in the Paonia and Gunnison Ranger Districts, and I have worked closely with stakeholders that have immediate connection and interest in the Colorado wolf reintroduction. I have a thorough understanding of what is at stake for recreation, conservation, and ecological interests in Colorado.
3. I hold a BS in Biology from the University of Puget Sound with an ecology focus. My university coursework included plant ecology, animal physiology and behavior, and water resources, which enhance my understanding of the role wolves will play in contributing to healthy ecosystems in Colorado. I also contributed to a monitoring study on a captive breeding pair of Red Wolves for the Point Defiance Zoo as part of my undergraduate study, adding to my knowledge of the ecological role of wolves in the ecosystem. I am familiar with the scientific literature and appreciate the benefit that wolves provide to vegetation, other animal species, and watersheds as a whole. I have a vested interest in the benefit to ecological health that wolves will bring to Colorado.
4. I plan to live in western Colorado for the rest of my life, and I understand that perhaps the most tenuous aspect to life in western Colorado is the viability of our water resources. Water is precious and limited here, and climate change is expected to exacerbate Colorado's water problem. The science supports wolf presence on the landscape as an asset to watershed health and therefore, I have vested interest in their return to Colorado.
5. I spent two summers as a trail worker and wilderness ranger in the Bob Marshall Wilderness in the Rocky Mountain Ranger District in Northern Montana. During this time, we packed mules and horses for 10-day camping hitches into one of the most densely populated gray wolf habitats in the lower 48 states. I saw wolf sign, fresh tracks, and heard wolf calls regularly while working, camping, and caring for our livestock in the wilderness. I never had a problem with wolves bothering me or the livestock that I worked with, and I never felt threatened by their presence. My life experience represents evidence of wolf, human, and livestock coexistence.
6. I recreate regularly in the proposed wolf reintroduction area. Knowing that I share the land with wolves, and hearing their howls and seeing wolf prints, will significantly increase the quality of my recreational experience in the Gunnison Basin and beyond.
7. I voted yes on the ballot measure for Colorado Proposition 114, and therefore a delay in the wolf reintroduction poses a harm to me as a voter. As a citizen of the US and a lifelong Colorado resident, delaying the introduction would violate state law that I have vested interest in, and dishonor my democratic voice in my home state.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 13th day of December, 2023.



Delaney Rudy

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

Civil Action No. 1:23-cv-03258-RMR

GUNNISON COUNTY STOCKGROWERS' ASSOCIATION, INC., a Colorado Nonprofit Corporation; and
COLORADO CATTLEMEN'S ASSOCIATION, a Colorado Nonprofit Corporation

Plaintiffs,

v.

U.S. FISH AND WILDLIFE SERVICE;
MARTHA WILLIAMS, in her official capacity as Director of the U.S. Fish and Wildlife Service;
COLORADO DIVISION OF PARKS AND WILDLIFE;
JEFF DAVIS, in his official capacity as Director of Colorado Parks and Wildlife;
ERIC ODELL, in his official capacity as Wolf Conservation Program Manager for Colorado Division of Parks and Wildlife; and
COLORADO PARKS AND WILDLIFE COMMISSION,

Defendants,

v.

CENTER FOR BIOLOGICAL DIVERSITY;
HUMANE SOCIETY OF THE UNITED STATES;
WESTERN WATERSHEDS PROJECT; and
WILDEARTH GUARDIANS.

Applicant Defendant– Intervenors.

DECLARTION OF DEBRA TAYLOR

I, Debra Taylor, declare as follows:

1. My name is Debra Taylor. I am a resident of Denver, Colorado, and I also have a residence in Divide, Colorado. I have been a Colorado resident for the past 40 years.

2. I am a member of Western Watersheds Project, and have been a member of this organization since 2019.
3. I am also a current member of WildEarth Guardians. My husband and I became members of Sinapu 38 years ago, when it was a Boulder advocacy group. When Sinapu merged with WildEarth Guardians in 2008, we became members of WildEarth Guardians. We have maintained that membership in WildEarth Guardians for the past 15 years.
4. I am a frequent visitor to Colorado Wolf and Wildlife Center in Divide, Colorado, which has wolves that have been rescued available for viewing. I have also visited the Colorado Wild Animal Sanctuary in Kingsburg, Colorado, which also has wolves. I have been so moved by seeing wolves in these settings that I have become a donor to these organizations.
5. I have been a wolf-watcher in Yellowstone, starting in 1988. Immediately after the 1988 Yellowstone fires, I signed a petition seeking the reintroduction of wolves in Yellowstone. That reintroduction came to pass in 1995. I have returned to Yellowstone and saw wolves in the wild on two different occasions, in approximately 2007 and 2014.
6. I have gone on safaris in Africa on nine different occasions. On these safaris, our guides have impressed upon me the fact that large predators weed out the weak and the sick, prevent overpopulation of prey animals, and help maintain healthy ecosystems and adequate water for remaining animals.
7. I have read many scientific articles on wolves. They have impressed upon me the ecological importance of wolves. I have read about the trophic cascades that occurred after wolf reintroduction in Yellowstone, and how these cascades changed elk grazing

and browsing patterns, resulted in a resurgence of riparian shrubs, songbirds, and beavers. Wolves helped forests and waterways recover after the 1988 fires.

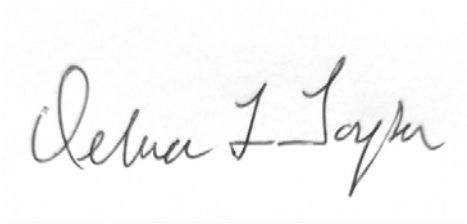
8. In 2018, I had a friend contact me about gathering signatures to put Proposition 114 on the ballot, which would require the reintroduction of wolves in Colorado by the end of December 2023. As part of this effort, I was gathering signatures in a dog park when a fracas between dogs knocked me over, dislocating my kneecap. I went back to the dog park to gather more signature on crutches. I personally gathered at least 640 signatures for that ballot initiative, and recruited several friends to also collect signatures. Ultimately, more than enough signatures were gathered, more than enough to place the ballot initiative on the ballot, and it went to a public vote in 2020.
9. Once Proposition 114 was on the ballot, I and my three friends also did phone banking in support of the ballot initiative, calling approximately 7,000 people between the four of us. The vast majority were enthusiastically supportive of wolf reintroduction, and I heard many stories about how people loved wolves and wanted them restored in Colorado
10. In November 2020, I voted in favor of Proposition 114. It was important to me to get wolves back in Colorado because I believe the wolves will reduce the numbers of prey animals infected with chronic wasting disease, a universally fatal brain prion. Before the ballot initiative, I had been studying prion diseases in my volunteer job in the clinical research library of St. Joseph's Hospital in Denver.
11. After the ballot initiative passed, I attended multiple Stakeholder Advisory Group meetings throughout the state to make public comment in support of wolf reintroduction. I spoke as a former child of a ranching family, encouraging the plan to require

coexistence between ranchers and wolves. Wolves, like dogs, have an extremely strong sense of smell and can smell sick animals, so I advocated to ranchers to keep their livestock healthy.

12. I would feel sick, and would be personally harmed, after my years of work and commitment to this issue, if the livestock industry is successful in blocking or delaying wolf reintroduction, especially after the lengths the state officials have gone to ensure that the livestock industry will receive an extremely generous payout in the form of livestock loss compensation as part of the wolf plan.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 13th day of December, 2023.



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DEBRA TAYLOR

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

Civil Action No. 1:23-cv-03258-RMR

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CENTER FOR BIOLOGICAL DIVERSITY;
HUMANE SOCIETY OF THE UNITED STATES;
WESTERN WATERSHEDS PROJECT; and
WILDEARTH GUARDIANS.

Applicant Defendant– Intervenors.

DECLARTION OF AMANDA WIGHT

I, Amanda Wight, declare as follows:

1. I am the Senior Program Manager in the Humane Society of the United States' ("HSUS") Wildlife Protection department.

2. The HSUS is a nonprofit animal protection organization headquartered in Washington, D.C., with millions of members and supporters, including many in Colorado.
3. The HSUS' mission is to reduce animal suffering and create meaningful societal change by actively advocating against animal cruelty, working to enforce existing laws, promoting sensible public polices, and educating the public about animal issues. Native carnivore protection has historically been, and remains, a core program area of HSUS' Wildlife Protection department. Since 1954, HSUS has worked to protect some of America's most iconic native carnivores, including gray wolves, mountain lions, black bears, grizzly bears, bobcats, and lynx through public education, training, and policy advocacy. The HSUS' wildlife protection campaign works to accomplish this by informing its members and the public about trapping, trophy hunting, and other cruel and inhumane practices inflicted on native carnivores; advocating for federal, state, and local policies to protect and restore native carnivore populations; and working with livestock producers, state wildlife managers, law enforcement, and other stakeholders to encourage humane coexistence with native carnivores.
4. In my role at HSUS, I am responsible for managing and executing the organization's grassroots and policy advocacy for gray wolves, a species whose protection and recovery has been a core priority of HSUS and its membership since its inception. My responsibilities include drafting substantive comments on state and federal rulemakings affecting wolves, testifying on wolf protection issues at state agency meetings, working with state directors to promote wolf protection legislation and regulations, serving on

wolf-related stakeholder working groups, and organizing member and volunteer wolf advocacy efforts.

5. Consistent with HSUS' organizational commitment to the recovery and protection of gray wolves throughout their range, following the passage of Proposition 114 HSUS has committed substantial staff time, funding, and other organizational resources to advocating for wolves in Colorado and engaging in efforts to promote humane coexistence with the reintroduced population, including by making grants to other organizations working to promote coexistence with wolves in Colorado.
6. In February 2020, I attended a two-day stakeholder workshop organized by Dr. Rebecca Niemiec at Colorado State University and researchers from the Center for Human-Carnivore Coexistence in Glenwood Springs, CO. The goal of the workshop was to begin building relationships between interested stakeholders and facilitate coexistence with wolves when they are restored to Colorado.
7. Throughout the development of the Colorado Parks and Wildlife's ("CPW") wolf restoration and management plan, HSUS staff attended meetings and public hearings, testified, and submitted comments to the Stakeholder Advisory Group and the Parks and Wildlife Commission, and encouraged our supporters to do the same through emails, action alerts, calls with volunteers, and social media. Additionally, HSUS circulated toolkits and guides to our members with information and tips for taking action to advocate for humane wolf stewardship and conservation in the management plan.
8. Specifically, HSUS staff testified during a virtual town hall on wolves in August 2021; attended a CPW wolf Stakeholder Advisory Group meeting in Denver at CPW

headquarters in 2022; testified before the Parks and Wildlife Commission on proposed regulations regarding hazing techniques for wolves in January 2022; testified and submitted written comments during the June and August 2022 meetings of the Stakeholder Advisory Group; testified and submitted written comments at the July 2022, September 2022, January 2023, April 2023, and May 2023 Parks and Wildlife Commission meetings; attended two public hearings on the wolf management and conservation plan in January 2023; and submitted comments on the draft wolf management and conservation plan in February 2023.

9. During this time, HSUS also frequently engaged with the media to comment on wolf reintroduction, submitted our own letters to the editor and op-eds, and encouraged our supporters to contact their local newspapers.

10. In July 2022, HSUS joined a group of 14 conservation and wildlife organizations, led by WildEarth Guardians, in the development and release of a "Colorado Wolf Restoration Plan," which is a science-based proposal to guide wolf reintroduction and recovery in Colorado.

11. On July 30, 2022, the HSUS led a sign-on letter to acting CPW director Heather Dugan requesting that the CPW radio collar wolves to prevent their poaching.

12. In August 2022, HSUS released a poll demonstrating that Colorado voters do not want wolves to eventually be trophy hunted or trapped after they are restored to Colorado. The results of that poll are available here: https://blog.humanesociety.org/wp-content/uploads/2022/08/CO-Statewide-Public-Opinion-Survey-083022.pdf.

13. Through a Colorado Open Records Act request, the engagement of a livestock-loss forensics expert, Carter Niemeyer, who wrote a report, and subsequent national media coverage, including in Newsweek, HSUS revealed that disease, not non-existent wolves, killed 41 cattle in Meeker, CO in the fall of 2022. An HSUS employee published a widely circulated op-ed on the topic in *Writers on the Range*, and a different HSUS employee testified about the issue at a February 2023 CPW hearing in Brighton, CO.
14. In September 2022, an HSUS employee attended a weekend retreat where livestock growers and wildlife advocates met along with representatives from of Colorado State University to discuss wolves and livestock growers' concerns about wolves, and visit various Colorado ranches.
15. In March and April 2023, HSUS strongly opposed Colorado SB 23-256, which would have substantially delayed the reintroduction of wolves into the state. HSUS created fact sheets, generated media coverage, engaged our supporters, lobbied, and testified and submitted comments. Simultaneously, HSUS supported Colorado SB 23-255, a bill to fund livestock growers in the rare event of livestock losses by wolves.
16. In 2023, HSUS also opposed a federal bill introduced by Colorado Rep. Lauren Boebert to delist gray wolves by creating fact sheets and writing letters to members of Congress.
17. HSUS also engaged significantly with the federal rulemaking process that culminated in the U.S. Fish and Wildlife Service's final 10(j) rule establishing a nonessential experimental population of the gray wolf in Colorado. In August 2022, we submitted comments to agency during its NEPA scoping process. In April 2023, we submitted

substantive comments to agency on the proposed 10(j) rule, emphasizing the need for coexistence and nonlethal conflict response.

18. HSUS meets regularly with other conservation organizations to share information and strategize about advocacy for wolf restoration and recovery in Colorado. An HSUS employee currently organizes and facilities these meetings, which occur weekly or bi-weekly.

19. The activities described above represent a substantial commitment of organizational resources over a period of years. These efforts were undertaken because the successful recovery of, and humane coexistence with, wolves in Colorado is of major importance to HSUS and its members in Colorado and across the country.

20. HSUS and its members have direct and significant interests in the outcome of this litigation. If the planned reintroduction of wolves into Colorado is halted or delayed, it would directly harm HSUS and its members' interests. It would impair HSUS' organizational mission to promote wolf recovery and coexistence in Colorado and negate the value of the resources that HSUS has committed to achieving this goal. If reintroduction is enjoined pending further NEPA review, it would require HSUS to expend additional resources engaging with a duplicative and unnecessary federal administrative process.

21. Attached as Exhibit A is a true and accurate copy of Kareiva *et al.*'s 2022 paper "A new era of wolf management demands better data and a more inclusive process," published in the journal Conservation Science and Practice.

22. Attached as Exhibit B is a true and accurate pre-publication copy of Treves *et al.*'s 2024 paper "Evaluating Fact Claims Accompanying Policies to Liberalize the Killing of Wolves."

23. Attached as Exhibit C is a true and accurate copy of the minutes of the Idaho Department of Agriculture's Wolf Depredation Control Board's September 12, 2022 meeting, downloaded from https://wolfboard.idaho.gov/wp-content/uploads/2023/05/2_IWDCB_September-2022_Minutes.pdf.

24. Attached as Exhibit D is a true and accurate excerpt from the United States Department of Agriculture, National Agricultural Statistics Service, Northwest Regional Field Office's 2023 publication "2022 Idaho Annual Statistical Bulletin," downloaded from https://www.nass.usda.gov/Statistics_by_State/Idaho/Publications/Annual_Statistical_Bulletin/2022/ID_ANN_2022.pdf.

25. Attached as Exhibit E is a true and accurate excerpt from the Montana Fish, Wildlife, and Parks Department's 2023 publication "Montana Gray Wolf Program, 2022 Annual Report," downloaded from https://fwp.mt.gov/binaries/content/assets/fwp/conservation/wolf/draft-2022-wolf-report_final_6.21.23.pdf.

26. Attached as Exhibit F is a true and accurate excerpt from the United States Department of Agriculture, National Agricultural Statistics Service's 2023 publication "Montana Agricultural Statistics 2023," downloaded from https://www.nass.usda.gov/Statistics_by_State/Montana/Publications/Annual_Statistical_Bulletin/2023/Montana-Annual-Bulletin-2023.pdf.

27. Attached as Exhibit G is a true and accurate excerpt from the Wyoming Game and Fish Department's 2023 publication "Wyoming Gray Wolf Monitoring and Management: 2022 Annual Report," downloaded from https://wgfd.wyo.gov/WGFD/media/content/PDF/Wildlife/Large%20Carnivore/WYWolf_AnnualReport_2022.pdf.

28. Attached as Exhibit H is a true and accurate excerpt from the United States Department of Agriculture, National Agricultural Statistics Service's 2023 publication "Wyoming Agricultural Statistics 2023," downloaded from https://www.nass.usda.gov/Statistics_by_State/Wyoming/Publications/Annual_Statistical_Bulletin/WY-2023-Bulletin.pdf.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

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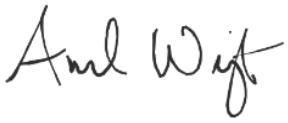

AMANDA WIGHT

Received: 6 May 2022 | Revised: 12 September 2022 | Accepted: 14 September 2022

DOI: 10.1111/csp2.12821

PERSPECTIVE

Conservation Science and Practice
A journal of the Society for Conservation Biology
Open Access
WILEY

A new era of wolf management demands better data and a more inclusive process

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Funding information
Leslie K. Williams, Grant/Award Number: personal philanthropy

Abstract

Hunting and trapping of gray wolves (*Canis lupus*) has increased dramatically in the "lower 48" states of the United States. We assess the data used to justify the intense hunting pressure on wolves, and find an absence of accessible biological data. We find there is a clear need for more transparent reporting of livestock losses, wolf kills, and especially the numbers and types of nontarget species captured in traps set for wolves. Also lacking is a full accounting of benefits and costs of hunting wolves, with a noteworthy failure to incorporate the ecosystem functions served by wolves. As apex predators, wolves warrant multi-objective management as opposed to management focused largely on livestock interests and concerns.

KEYWORDS

data needs, inclusive decisions, multiple objectives, nonlethal predator control, wolf killing, wolf management, wolf trapping

1 | EVOLVING WOLF MANAGEMENT OBJECTIVES IN THE US

The gray wolf, *Canis lupus*, once was abundant throughout most of the Northern Hemisphere. In the "lower 48" states of the US alone, wolves historically numbered at least 380,000, and likely closer to 2,000,000 (Seton, 1929). In the 1800s to the mid-twentieth century, the US government (Wildlife Services and Animal Damage Control branches of the United States Department of Agriculture, henceforth USDA) nearly exterminated wolves in the lower 48 through a program of shooting, poisoning, and trapping. Wolf numbers may have fallen as low as 300 or 400, as they were extirpated from all of the lower 48 states except Minnesota by 1970 (Musiani & Paquet, 2004).

After receiving protection under the US Endangered Species Act (ESA) in 1974, gray wolf populations underwent a remarkable recovery. The resurgence of wolf numbers to at least 6000 individuals and the successful reintroduction of gray wolves into the Greater Yellowstone area and Idaho are counted among the great conservation wins of the last century (Smith & Bangs, 2009; Wayne & Hedrick, 2011). These positive trends spurred Congress in 2011 to require the Secretary of Interior to remove the protected status of the Northern Rocky Mountain population of gray wolves (H.R.1473 – Department of Defense and Full-Year Continuing

Appropriations Act, 2011). In 2020, gray wolves in the rest of the lower 48 states (with the exception of the Mexican gray wolf of the southwest) were delisted; a decision that was reversed in court in February 2022. USFWS scientists had recommended delisting under the assumption that state wildlife biologists would manage wolf populations responsibly, using the best available science (Ashe, 2021). However, in the 2020–2021 hunting season over 1000 wolves total were killed in Idaho, Montana, Wyoming, and Wisconsin by state-sanctioned hunting (Jones, 2022; Main, 2021; Mills, 2022; Montana Fish, Wildlife, & Parks, 2022), leading to public outcry and calls for reinstating federal protections for all wolves in the lower 48 (McNamee, 2022).

Over the course of the last two centuries, wolf management in the US shifted from the straightforward goal of eliminating all wolves to another straightforward goal of protecting wolves and recovering wolf numbers (Musiani & Paquet, 2004). Today, the heated debate between conservationists and ranchers surrounding wolf control reveals a new challenge. No longer is wolf management about eradicating vermin, and no longer is it about doing everything possible to bring wolves back from the brink of extinction. Now the objectives entail managing wolves for their ecological and intrinsic value, while learning to live with what might be locally abundant wolves and mitigating the damage wolves might do to rancher livelihoods. It is worth noting that the challenge of learning to live with fierce predators, which were once hunted to near extinction but have now bounced back, is an increasingly common phenomenon. In the US alone alligators, grizzly bears, and great white sharks represent other instances of apex predators recovering and thereby exacerbating human-wildlife conflict (Guerra, 2019; Gunther et al., 2004; Langley, 2010).

Here we discuss some of the data that ought to be brought to bear in decisions about wolf protection and management, as states seek to protect ranching livelihoods as well as restore fully-functioning ecosystems that include their top predators. We argue that decision-making about wolf management will be best served by (1) greater transparency and data standardization and (2) a more complete consideration of the costs and benefits of wolves, wolf hunting, and alternative management approaches. This is not to suggest wolf management is simply a matter of data and science. The many stakeholders invested in the fate of wolves represent diverse values, a variety of economic interests, and different cultures. While science and data cannot resolve these differences, they can provide a common platform of evidence about which to debate and negotiate.

2 | LACK OF TRANSPARENCY AND AN ABSENCE OF REAL-TIME DATA ACCESS

Basic biological data that should inform wolf management decisions include, but are not necessarily limited to, estimates of wolf numbers, damage to livestock caused by wolves, number of wolves killed, and nontarget animals unintentionally trapped. Key data often are not easily accessed and, in some cases, are obtainable only through Freedom of Information Act requests.

The primary sources of data are USDA reports on livestock losses, the USDA Wildlife Services reports on wolf hunting and trapping, and each state's individual wildlife reports. USDA livestock losses are reported at most once every 5 years. Meanwhile, state wildlife reports tend to be annual reports. Unfortunately, the data from these annual reports are not curated in any centralized on-line database that the public and researchers could examine. Transparent, publicly available data are especially critical in light of accusations of erroneous data and public pressure on scientists who speak out against existing wolf management (Schontzler, 2010; Wuerthner, 2022).

Below, we delve into two key metrics—livestock losses attributable to wolves and deaths of nontarget animals in traps set to capture wolves.

2.1 | The magnitude of livestock losses due to wolves

Approximately every 5 years the USDA reports estimates of livestock losses, state by state, with losses attributed to non-predator causes (e.g., weather, disease) and predator causes (e.g., wolves, coyotes). Using the most recent USDA reports available (USDA, 2015 for cattle and USDA, 2020 for sheep) we focused on the four lower 48 states that harbor substantial wolf populations and that recently increased hunting and trapping of wolves (Idaho, Wyoming, Montana, and Wisconsin). In these four states, 3% of total cattle inventory and 10% of total sheep inventory were counted as "unwanted losses." Of those unwanted losses, the vast majority of livestock deaths were due to non-predator causes, such as health problems, weather, parasites, and birthing problems (Figure 1). In contrast, the percent of livestock killed by wolves never exceeded 0.21% for sheep and 0.05% for cattle (Figure 1).

These minimal livestock losses attributed to wolves are even more noteworthy because they are likely overestimated. In particular, the USDA combines confirmed cases (kills) and "probable" cases into one "loss" figure,

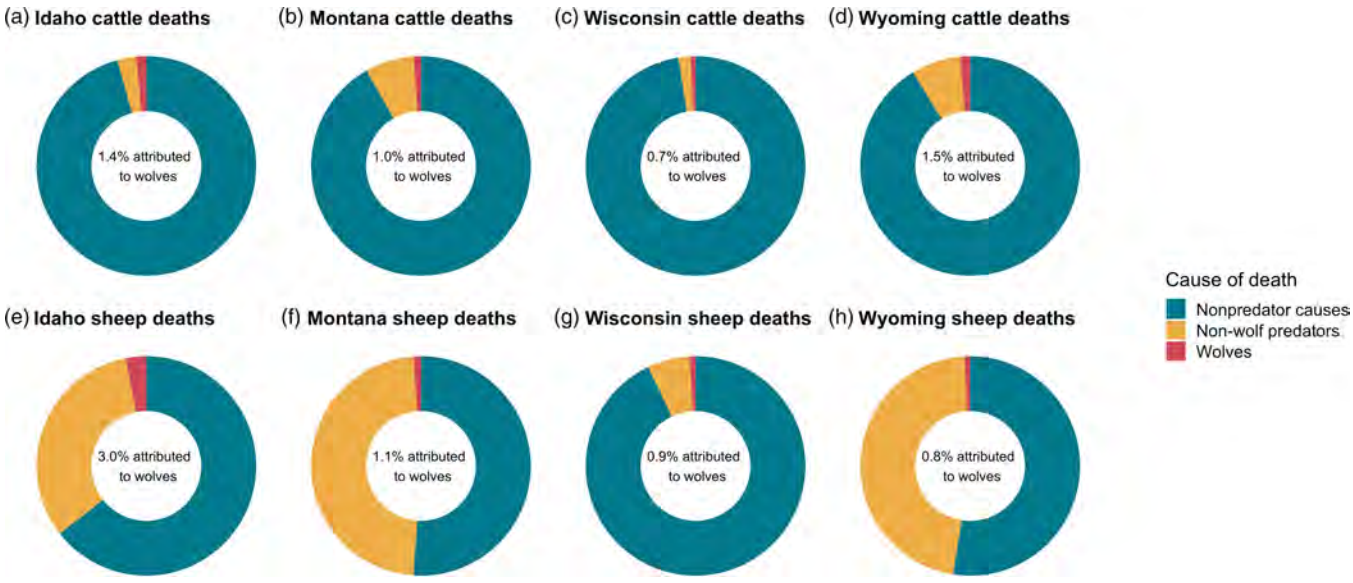

FIGURE 1 Causes of unwanted livestock deaths. (a–d) Causes of unwanted cattle deaths in (a) Idaho, (b) Montana, (c) Wisconsin, and (d) Wyoming. (e–h) Causes of unwanted sheep deaths in (e) Idaho, (f) Montana, (g) Wisconsin, and (h) Wyoming. Data for cattle from USDA (2015); data for sheep from USDA (2020)

which will be biased upward unless every "probable" kill is in fact caused by a wolf. Second, the USDA's livestock loss estimates are based on unverified mailed surveys, which are then extrapolated to a statewide estimate (USDA, 2015). To get a sense of the accuracy of the wolf depredation extrapolations reported by the USDA, we compared these USDA estimates to the number of confirmed wolf-caused kills reported by on-the-ground state wildlife agencies. This exercise revealed greater than a tenfold difference between livestock kills confirmed by state biologists and those extrapolated by the USDA from mailed surveys. For example, in 2015 the USDA reported a total of 2834 cattle losses due to wolves across the three states of Idaho, Montana, and Wyoming. Meanwhile, wildlife agencies across these same three states in the same 2015 calendar year confirmed only 148 total cattle killed by wolves (Coltrane et al., 2015; Idaho Department of Fish and Game, 2015; Wyoming Game and Fish Department et al., 2018). Given the historical vilification of wolves and the discrepancies in available data, there is a clear need for better verification of wolf-caused deaths. Consider, for example, that in Idaho confirmed wolf kills have included livestock with no bite marks or injury under the assumption that "the cattle exert so much energy trying to escape wolves that they later die from the effort" (Ridler, 2018).

Further complicating the attribution of livestock deaths to wolves is the fact that multiple species prey upon livestock in any given region. The cause of death for livestock is not always clear, and if there has been any decomposition before inspection it is much harder to determine. In addition, a whistleblower from the USDA Wildlife Services has publicly charged the Wildlife Services with corrupt practices (Roberts, 2022). This whistleblower, who was the Director of Wildlife Services for the state of New Mexico, remarked, "My guys in the field were going and rubber-stamping anything these people asked them to." While this New Mexico report applies to Mexican gray wolves, a USDA Wildlife Services district supervisor in Montana reports similar corruption in Montana due to the influence of the ranching lobby, stating "we were the hired gun of the livestock industry" (Roberts, 2022).

Despite the negligible wolf damage evident in Figure 1, wolves are being targeted under the guise of livestock protection. For example, Idaho's most recent wolf management progress report (Hayden, 2017), states that the current management approach prioritizes lethal management of wolves, including "public hunting and trapping as a preferred means of managing wolves." However, if reducing unwanted livestock losses were a priority, then one would focus on better livestock husbandry and losses due to health and weather—not on the few cattle killed by wolves (Figure 1). A recent systematic review of 119 gray wolf dietary studies revealed that wolves prefer wild prey over domesticated livestock, and when they do attack livestock, prefer animals that graze freely in small numbers as opposed to larger or fenced herds (Janeiro-Otero et al., 2020). These results suggest that wildlife management that sought to build robust populations of wild prey species for wolves would not only benefit the hunting community, but also could

reduce livestock damage. An alternative hypothesis is that livestock losses are rare precisely because wolves are being vigorously hunted and trapped and consequently are sufficiently few that their damage is limited. However, as is discussed below, there is little evidence to support the hypothesis that lethal wolf control is effective at reducing livestock losses.

2.2 | Collateral damage due to wolf harvest

States differ in the methods of wolf hunting that are allowed, as well as requirements for reporting deaths of nontarget wildlife. Methods for killing wolves that have been sanctioned by these states include: baiting, foothold traps, snares, a wide variety of firearms often in combination with night vision scopes or thermal imaging, electronic calls, bow and arrow, hunting from airplanes, hunting with packs of dogs, and hunting from snowmobiles and other off-road vehicles. Much of the wolf hunt entails indiscriminate traps and snares that also capture other species, such as domestic dogs and cats, and nontarget wildlife such as deer and bobcats. In part because of a lack of data transparency, and also because some traps may be lost or are not checked, it is hard to quantify the full extent of nontarget deaths. However, data obtained by a FOIA request in Idaho reveal that in some years the number of nontarget animals caught is similar to, or even exceeds, the number of wolves trapped (Fignure 2). Overall, between 2012 and 2019, nontarget species accounted for nearly half (47%) of the animals caught in Idaho's wolf traps (Figure 2). During this period, traps set for wolves in Idaho caught game species such as deer, elk and moose, as well as mountain lions, domestic dogs, and a smattering of rare species including lynx, eagle, and wolverine (Cole, 2020). Data from Montana indicate a similar composition of species accidentally caught in traps set for wolves (Figure 3).

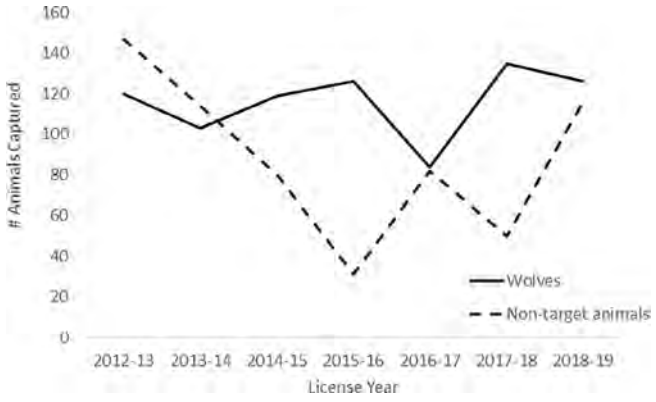

FIGURE 2 Captures of wolves and other animals for wolf traps set in Idaho during the 2012/2013 to 2018/2019 trapping seasons. A total of 813 wolves and 614 nontarget animals were reported captured for this 7-year period. Accidental captures included game species such as deer, elk, and moose, as well as mountain lions, domestic dogs, and a smattering of rare species including lynx, eagle, and wolverine. Data extracted from Cole (2020), who in turn obtained data via a public records request to the Idaho Department of Fish and Game. Reports of nontarget fish ($n = 2$) and wolves ($n = 4$) were omitted

Discussions of trapping and snaring wolves as a wildlife management strategy consistently fail to account for the unintended consequences of collateral damage. Any calculus of the benefits and costs of trapping wolves needs to include the inevitable harm caused to nontarget organisms—harms that include unnecessary suffering of individual animals, as well as potential population consequences. The true magnitude of these nontarget captures is difficult to know given the high likelihood of under-reporting for nontarget casualties.

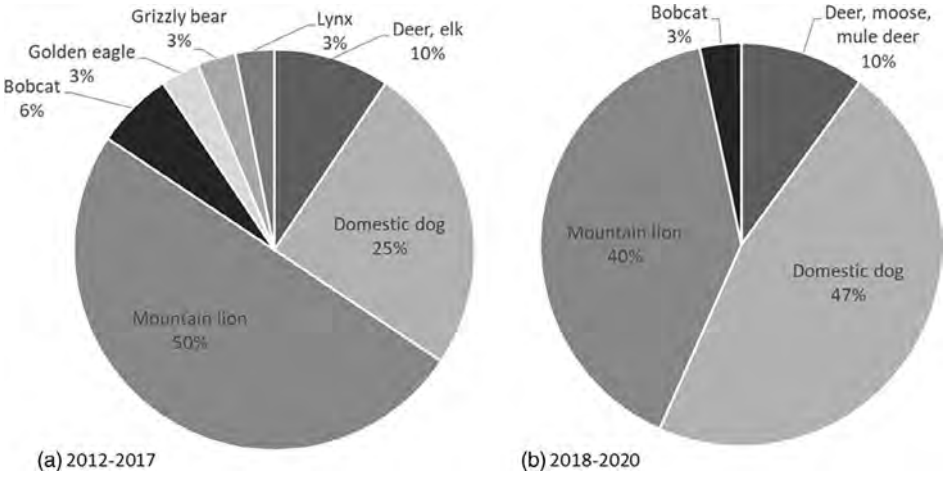

FIGURE 3 Composition of incidental captures reported for wolf traps set in Montana. (a) Thirty-two total reports of nontarget captures in license years 2012–2017. Data from Inman (2018). (b) Thirty total reports of nontarget captures in license years 2018–2020. Data courtesy of trap free Montana public lands, obtained from Montana fish, wildlife and Parks

3 | A FULLER LEDGER OF COSTS AND BENEFITS

As wolf management responds to multiple objectives, tough decisions must weigh damage to livestock against the benefits of wolves, and against the explicit costs and unintended consequences of expansive trapping and hunting programs. Currently, the economic losses experienced by ranchers have been a central focus of wolf management conversations. Ranchers and hunters should continue to have a significant voice, but their objectives must be balanced with a more thorough accounting of the economic costs and benefits of wolves and wolf management strategies, as well as the cultural value of wolves. For example, Raynor et al. (2021) examine the economic damage caused by wolves and find no evidence that wolves are a net economic negative. This is because wolves reduce deer-vehicle collisions by as much as 20% by altering the behavior, as well as the abundance, of their deer prey (Raynor et al., 2021). Wolves are also an important part of the Yellowstone National Park tourist experience, where they are estimated to bring in $82 million annually to the states of Idaho, Montana, and Wyoming (RRC Associates, 2022).

Ecosystem benefits of wolves should also weigh heavily into decision-making. Wolves both directly and indirectly shape their ecosystems, altering productivity and functioning from the top-down (Frank, 2008; Gable et al., 2020). Historically, wolves played a major ecological role in North America as a top carnivore: their predation on elk, deer, and buffalo held these and other herbivores at sufficiently low numbers such that overgrazing rarely occurred (Hermans et al., 2014). For this reason, Treves et al. (2021) argue that wolves should be protected as predators, and ideally managed at a regional level. Some studies find that even at relatively low numbers, wolves can profoundly impact an ecosystem by reducing the intensity of grazing in riparian zones (because they either kill or scare off deer and elk). For example, riparian grazing increases the erosion of sediment into streams, and conversely the reduction of grazing due to wolves can yield less turbid water (Estes et al., 2011; Ripple & Beschta, 2003, 2012).

An additional benefit of wolves is the possibility they enhance the health of their prey populations by targeting sick and weak individuals (Stahler et al., 2006). By picking off sick prey, wolves could in theory cleanse prey populations. This hypothesis is currently being tested in response to the idea that wolves could be used "as first responders against a deadly brain disease" (chronic wasting disease) that threatens to infect Yellowstone's large elk and deer herds (Robbins, 2020). Initial analyses suggest that wolves could substantially reduce the prevalence of chronic wasting disease in deer and elk in Yellowstone (Brandell et al., 2022). Wolves could also impact human health via their interaction with prey that harbor SARS-COV-2. Thus far SARS-COV-2 has been found in deer in 24 states, with evidence of mutation and evolution of the virus within deer populations (Mallapaty, 2022). The concern is that some new variant of the virus could jump back from deer to humans (Kuchipudi et al., 2022). While any link between wolves and reduced disease spillover from deer is speculative, it is an example of the interconnectedness of species in ecosystems and the fallacy of viewing wolves only through the prism of livestock damage.

The challenge, of course, is to balance the ecosystem benefits that wolves provide with the costs of livestock losses attributed to wolves. The solution could come, at least in part, from nonlethal deterrents. Nonlethal solutions can be effective at preventing wolf-livestock conflict (Espuno et al., 2004; Treves et al., 2016). Nonlethal methods are not a silver bullet solution, but the use of fladry, enclosures, electrified fencing, and well-trained livestock guardian dogs can be more effective than lethal control, even at large scales (Bruns et al., 2020; van Eeden et al., 2018, Treves et al., 2016). Even something as simple as fencing cattle as opposed to having them range freely can make a big difference in the magnitude of livestock losses—especially if wild prey are abundant (Janeiro-Otero et al., 2020).

While ranchers may fear that nonlethal methods could be ineffective, it is worth noting that there is little evidence that lethal methods reduce livestock losses. In fact, several studies have documented instances in which lethal methods are ineffective or counterproductive because they worsen conflict (Lennox et al., 2018; Santiago-Avila et al., 2018; Treves et al., 2016; Wielgus & Peebles, 2014). There is some indication that lethal interventions against wolves may simply spread conflict to neighboring livestock owners (Santiago-Avila et al., 2018). In addition, lethal removal of wolves disrupts pack stability which results in pack dissolution, increased dispersal, and could lead to more attacks on livestock by single pack-less wolves (see Haber, 1996; Santiago-Avila et al., 2018; Wielgus & Peebles, 2014). These results may also explain why Wielgus and Peebles (2014) found that lethal wolf removal was associated with increased livestock loss at the population level the following year.

While sheep operations often use nonlethal predator control methods, cattle operations have a lower rate of uptake: only 10.1% of cattle operations in Idaho, 14.5% of cattle operations in Montana, and 14% of cattle operations in Wyoming used nonlethal methods (USDA, 2015). Economic costs likely hinder adoption of these approaches. Maintaining guard dogs and visual deterrents can be a

considerable time and financial expense for ranchers compared to shooting or trapping wolves. For example, the lifetime cost of using livestock guardian dogs as a nonlethal depredation tool was estimated at nearly $6000 per dog (Bruno & Saitone, 2019). However, considerable public funds are also spent on lethal control measures. Idaho, for example, budgeted $1 M to kill wolves in 2022 (Ridler, 2022). This single-year $1 M fund could cover the lifetime costs (including purchase, food, training, and veterinary care) of 168 fully-trained livestock guardian dogs. If funds were regularly redirected to support nonlethal methods, livestock losses might be reduced without disruption of key ecosystem services.

4 | WHAT WOULD INCLUSIVE AND EVIDENCE-BASED WOLF MANAGEMENT LOOK LIKE?

Much of the discussion surrounding recent hunting of wolves has been framed in terms of extinction risk and the administration of the ESA. However, wolf management that seeks merely to avoid extirpation is a mistake, because such a framing fails to address the value of larger populations of wolves. Management plans often determine population goals based on existing population sizes, rather than incorporating community dynamics to restore ecological interactions (Soulé et al., 2003). Instead, Soulé et al. (2003) stated that "conservation plans should contain a requirement for ecologically effective population densities; these are densities that maintain critical interactions and help ensure against ecosystem degradation." Apex predators such as wolves can have outsized or "cascading" impacts on ecosystems (Estes et al., 2011), and, because of this, their management demands special consideration. Currently, states are allowing large numbers of wolves to be killed without compelling evidence that the benefits (the presumed prevention of livestock losses) outweigh the costs, including the economic costs of lethal control programs and the ecosystem-level disruptions caused by suppressed wolf populations.

The failure to consider the negative impacts of wolf killing is especially noteworthy in the case of trapping and snaring wolves from Yellowstone National Park (hereafter YNP). In only six months of the 2021–2022 hunting season in Montana, at least 25 wolves from YNP were killed when they wandered outside the park boundary a number that represents one fifth of the YNP wolf population (Partlow, 2022). The Superintendent for YNP asked Montana Governor Gianforte to limit wolf hunts in the northern neighborhood of the park, but his requests were ignored, and the Governor himself trapped and killed a radio-collared wolf from YNP in 2021 (Associated Press, 2022). It is highly unlikely that these Yellowstone wolves represent a threat to livestock, since in the last 3 years there has been only one documented livestock kill attributed to wolves in the county that encompasses the hunting districts bordering YNP (Partlow, 2022). Almost 5 million people visited YNP in 2021–that is more than four times the size of the entire population of Montana. Montana ranchers certainly deserve a voice in wolf management, but so too do the many visitors who come to see YNP's spectacular wildlife.

In recent decisions to kill increasing numbers of wolves, the goal of protecting ranchers from livestock losses has played an outsized role. But wolf management largely takes place on, and certainly has major implications for, public lands. As such, wolf management cannot be beholden to any single special interest group, whether that group is ranchers, hunters, or nature viewers. Decisions about wolf management should inclusively involve all stakeholders, including Native American tribes whose lands overlap with wolf populations. Species do not exist in a vacuum. The public and cultural value of wolves must be balanced in management decisions. It is not surprising that some ranchers resent any restrictions on their ability to kill what they may view as vermin, especially when advocates for wolves are "outsiders". But just as the rancher's perspective warrants consideration, so too do the concerns of the broader public who may view wolves and Yellowstone as a national treasure. A multiobjective and thoughtful decision process could bridge these differences and yield a balanced solution.

Yet even the most inclusive and best-run stakeholder discussions will get nowhere without transparent and up-to-date data that provides all parties with key information. That foundation of data is currently lacking for wolves. Certainly, it is challenging to coordinate and standardize data collection across a variety of state and federal agencies. Yet such standardization has been achieved in other contexts. An example of a complex fish and wildlife management challenge that is well supported by on-line data across state boundaries can be found in the Columbia River Basin DART (Data Access in Real Time—see https://www.cbr.washington.edu/dart/overview). DART includes a glossary, metadata, maps of all data sites, and both annual and monthly real-time data from 47 different sites across three states (https://www.cbr.washington.edu/dart/dartmap). While DART does not resolve conflicting objectives such as tribal harvest, salmon conservation, and irrigation, it does focus the debate around a standardized data set to which everyone has easy access. Given the iconic role of wolves as top predators in North America, we advocate for a concerted effort to collate data on wolf numbers, wolf depredation of livestock, wolf losses to hunting and

trapping, collateral damage from indiscriminate trapping, and the costs and impacts of nonlethal methods–in a standard way across states. If coordinating methods across states proves impractical, at least any and all relevant data should be made easily available. Currently, public debate about wolf management is confused and confusing because of an absence of a transparent database around which different viewpoints can assess their merits.

The fundamental question is how best to balance the full ledger of ecological, economic, and social/cultural costs and benefits associated with wolves, wolf hunting, and alternative methods of wolf management. Moving forward, wolf management should be inclusive and embrace a systems approach that takes a broader perspective on the overall costs and benefits.

AUTHOR CONTRIBUTIONS

Desiree Felix and Elishebah Tate-Pulliam scoured state fish and wildlife reports to find salient data on wolf kills and wolf hunting regulations. Madison Miketa took the lead on nonlethal methods and analyzing USDA data on livestock losses. Kim Bean provided information on the conflict between ranchers and wolf advocates. Michelle Marvier and Peter Kareiva wrote the first draft of the manuscript after synthesizing input provided by co-authors. Samantha Atwood edited the manuscript and helped design the research from the very beginning. All authors read, reviewed, and edited the manuscript.

ACKNOWLEDGMENT

This research was funded in part by a grant from Leslie K. Williams in support of wolf conservation and ecosystem management.

CONFLICT OF INTEREST

None of the authors have any conflicts of interest or financial interests that are pertinent to this research.

DATA AVAILABILITY STATEMENT

All data are from USDA or State Wildlife Agency reports and websites and are publicly available. These public sources are cited in the text. No original data were collected for the manuscript.

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How to cite this article: Kareiva, P., Attwood, S. K., Bean, K., Felix, D., Marvier, M., Miketa, M. L., & Tate-Pulliam, E. (2022). A new era of wolf management demands better data and a more inclusive process. *Conservation Science and Practice*, e12821. https://doi.org/10.1111/csp2.12821

Evaluating Fact Claims Accompanying Policies to Liberalize the Killing of Wolves

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Abstract

Predators can support ecosystem health and diversity disproportionate to their numbers. Nevertheless, several U.S. state governments recently initiated killing grey wolves non-selectively and in large numbers. Among the justifications, governments claim that wolf-killing would: (1) increase human safety;(2) raise human tolerance for surviving wolves; (3) prevent livestock loss; and (4) increase wild ungulate populations. We reviewed the research into these assertions of fact and found scant evidence to support or refute fact claim (1). We found evidence against (2) from 6 regions (Wisconsin, Michigan, Minnesota, Arizona/New Mexico, North Carolina, U.S., and Finland) and weak support from 2 regions (Scandinavia and Montana, U.S.). For claims (3) and (4), we found evidence to suggest equivocal or no effects (either positive or negative) of wolf-killing. Several studies that present the best evidence in their subfields find that killing wolves likely led to counter-productive outcomes of intolerance in attitudes and wolf-poaching or higher livestock losses. We also summarized reported benefits associated with wolves, which might be lost if policies for widespread wolf-killing continue or spread. Here, we propose several hypotheses to explain the use of unsupported claims and the omission of

other fact claims such as benefits, which also help to explain expansion of wolf-killing recently. The 3 non-mutually exclusive hypotheses for unsupported claims refer to the reliability of trusted messengers, misinterpreting scientific uncertainty, and interest group politics. Finally, we summarize explanations for the partisan politics behind wolf-killing and the potential harms of unsupported fact claims to good governance and democratic policy formulation.

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Keywords: human safety, lethal management, policy, predator, tolerance, ungulates

INTRODUCTION

Worldwide consensus among ecologists provides strong evidence that predators can support ecosystem health and diversity out of proportion to their numerical abundances (Estes *et al.* 2011; Peterson *et al.* 2014; Ripple *et al.* 2014). For example, increasing evidence suggests that grey wolves (*Canis lupus*) play disproportionate roles in influencing deer (*Odocoileus* spp.) behavioral ecology, forest diversity and ecology, and perhaps even disease ecology and deer-vehicle collisions (Hebblewhite *et al.* 2005; Wild *et al.* 2011; Callan *et al.* 2013; Waller and Reo 2018; Tanner *et al.* 2019; Raynor *et al.* 2021), withstanding an ongoing debate over the strength of wolves' effects in Yellowstone National Park. Perhaps related, the U.S. public has become more positive about wolves over the past half century (George *et al.* 2016; Slagle *et al.* 2017). Nevertheless, in 2021 some U.S. state governments began pursuing rapid efforts to reduce wolf populations through programs that included incentivized hunting (e.g., bounties) and liberalized (even unlimited) hunting, trapping, and

hounding seasons. These policies differ from previous policies that balanced different interests in living and dead wolves, and which allowed wolves to maintain and sometimes increase their populations (Brown 2008; Bruskotter *et al.* 2010; 2011, 2013). For example, Wisconsin reduced its wolf population by >27% in <1 year and then proposed a second wolf-hunt in the same year (Treves *et al.* 2021a; Treves and Louchouarn 2022); Idaho, Montana, and Wyoming politicians articulated a goal to reduce their wolf populations even more; for Idaho by 90% (Oppie 2021) and enacted policies to help to reach that goal in 2021 and 2022 (Brown and Samuels 2021).

Here we address 4 fact claims (assertions of fact) commonly provided in policies for permitting or encouraging an increase in the legal killing of wolves and other large carnivores: (1) increasing human safety, (2) raising human tolerance for surviving wolves, (3) preventing livestock loss, and (4) increasing wild ungulate populations. We evaluate the fact claims (hereafter 'claims') by summarizing published scientific meta-analyses and systematic reviews in addition to reviewing >36 newer scientific studies on the social and ecological effects of killing wolves.

Claim 1: Killing wolves will increase human safety

Wolves can, and in rare circumstances have, attacked people (Linnell and Bjerke 2002; McNay 2002; Linnell *et al.* 2021). Thus, one justification governments provide for killing wolves has been to increase human safety. In Appendix 1, we present reports and statements by officials from the States of Michigan, Idaho, and Montana that show how claims about human safety have been used to raise fears or justify government funding and promotion of wolf-killing programs (including both the legalization and the liberalization of existing legal mechanisms, hereafter simply wolf-killing). Despite such warnings, no humans have been killed by wolves in the

Northern Rockies since their reintroduction and no humans have been killed in the western Great Lakes region since written records have been kept. Wolves pose so little risk to people that aggressive killing programs proposed by U.S. states are almost certainly unable to reduce risk further as the following reviews showed.

Linnell *et al.* (2002, 2021) compiled documented reports of wolf attacks on humans. The more recent study found evidence of 489 human victims of wolf attacks spanning 2002 to 2020 around the world, 26 of which were fatal, plus an equal number that were either too poorly documented to verify or almost certainly not caused by wolves. Rabies explained 77% of the above attacks and 59% of fatalities, and the geographic distribution of attacks correlated with rabies incidence across Eurasia. These researchers classified 14% of attacks as "predatory", which accounted for 36% of the fatalities. The remaining attacks were classified as "provoked/defensive". In Europe and North America, they "found evidence for 12 attacks (with 14 victims), of which 2 (both in North America) were fatal across a period of 18 years" (*Linnell et al.* 2021, p.3); however, there remains disagreement about the involvement of wolves in the Saskatchewan case, with investigating experts disagreeing with the provincial inquest, and a third opinion offered by independent investigators (P. Paquet report missing). Linnell *et al.* (2021) conclude "Considering that there are close to 60,000 wolves in North America and 15,000 in Europe, all sharing space with hundreds of millions of people it is apparent that the risks associated with a wolf attack are above zero, but far too low to calculate." (Linnell *et al.* 2021). Occasionally, wolf attacks may be precipitated by incidents of accidental or purposeful conditioning of wild wolves, whereby wolves learn to associate humans with food or lose fear of people via habituation (McNay 2002). However, there is no evidence that such behavior is now as widespread as it may have been before the 20th century when wild prey were more scarce

(Linnell and Bjerke 2002). Indeed, Linnell and Alleau 2016, p.364) wrote that recent and historical predatory attacks on people in Europe "…are all associated with a very specific set of circumstances… [including]… landscapes with very fragmented habitat, low densities of wild prey, wolf dependence on livestock and anthropogenic foods, and high human densities living poor rural lifestyles." Given the recolonization and repopulation of many wild prey populations eaten by grey wolves, the conditions for wolf attacks on people, such as hungry wolves or wolves habituated to feeding on carcasses of livestock or humans, have probably diminished. Therefore, they concluded, "Despite the need to recognize that the potential for wolf attacks on people is greater than zero and management plans and procedures should take these into account, it is still so small that it is impossible to calculate in a meaningful manner" (Linnell and Alleau 2016, p.365).

Finally, a rabid or threatening individual wolf might be seen as a hazard necessitating a law enforcement response. However, that situation bears no logical relationship to a policy that implements widespread wolf-killing to address perceived threats to human safety. The 2 North American fatalities cited above are alleged to have occurred in Alaska, U.S. and Saskatchewan, Canada, rather than the jurisdictions whose governments we referenced above that have recently enacted policies of widespread wolf-killing. Even if one adds human injury cases to the tally, the odds that non-selective, public hunting, trapping, or hounding methods to kill wolves over wide areas will remove the rare wolf that attacks a human seem too low to calculate. Because our purpose is to evaluate the governmental claims relating to human safety (Appendix 1) -- rather than the reality of fear of wolves or the possible rhetorical gains a politician might perceive from claiming to protect human safety -- we must conclude that this claim is unsupported by evidence.

Claim 2: Killing wolves will increase human tolerance for wolves

Governments often claim that killing wolves increases public tolerance (or decreases intolerance) for wolves and their conservation (Refsnider 2009; Bruskotter *et al.* 2013; Chapron and Treves 2017b; Epstein *et al.* 2019). For example, the U.S. Fish & Wildlife Service in federal court in 2005 tried unsuccessfully to convince a federal court that allowing some legal killing of wolves would benefit their recovery and slow illegal killing. Yet, scientific evidence indicates that policies that liberalize the killing of wolves generally have not improved public tolerance for wolves (Treves and Bruskotter 2014). At most, following legalization or liberalization of wolf-killing, some scientists documented a decrease in self-reported tolerance in small demographic groups, such as male residents of grey wolf range in Wisconsin who are familiar with hunting (Hogberg et al. 2015), or respondents' own forecasts of increased tolerance among livestock owners (Hogberg *et al.* 2015; Richardson 2022). The claims surrounding self-reported improvements in tolerance have rarely been tested objectively.

The best evidence for change in individual attitudes as a result of policy changes for wolf-killing comes from the U.S., where researchers assessed human attitudes using long-term, repeated measures (same individuals) before and after policy changes that legalized or liberalized wolf-killing or conversely, tightened protections for grey wolves. In total, 3 independent studies, from Wisconsin and Montana (Appendix 2), have addressed the issue. In the Wisconsin cases, tolerance for grey wolves declined after wolf-killing began or accelerated (Treves *et al.* 2013; Browne-Nuñez *et al.* 2015; Hogberg *et al.* 2015). In Montana, tolerance did not change pre/post the implementation of a public wolf-hunt but increased slightly from baseline several years later (Appendix 2). Although before-and-after comparisons lack the strength of inference of randomized, controlled trials, the Wisconsin research teams conducted both focus groups

(Browne-Nuñez *et al.* 2015) and mail-back questionnaires of the same individuals resampled periodically (Hogberg *et al.* 2015), both methods after policies for wolf-killing had changed.

Policies may fail to affect tolerance if they are perceived by the intended targets as insufficient to reduce risks or costs of the hazards, or there may be a lag between the time the policy is enacted and subsequent changes in tolerance. The Wisconsin studies show a 12-yr lag during which time tolerance for grey wolves declined among Euroamericans in the face of such policies. These factors could explain both the growing intolerance witnessed in Wisconsin and the lack of change witnessed in the 2012 and 2018 studies in Montana. Finally, the definition of 'public' in the hypothesis that wolf-killing improves public tolerance has not been systematically scrutinized. Again, studies in Wisconsin suggest different 'publics', or audiences, will have different tolerances for grey wolves (Naughton-Treves *et al.* 2003; Treves *et al.* 2009; Shelley *et al.* 2011). Indeed, studies that examined the nuances of attitudes among the intolerant reported small minorities (<25%) held extreme vies (Treves and Martin 2011; Montag *et al.* 2003), whereas the majorities in both Wisconsin and Montana heled intermediate attitudes to grey wolves. Given recent findings that majorities in every state disfavor killing grey wolves after livestock fell prey (Manfredo *et al.* 2020), liberalizing wolf-killing is likely to backfire with these groups that are numerous (e.g., urbanites or mutualists) or legally influential (e.g., Ojibwe). The minority who might be targeted by government seeking to improve tolerance for grey wolves, e.g., non-tribal male residents of grey wolf range with familiarity of hunting (Hogberg *et al.* 2015) or elk-hunting permit holders in Montana, have so far not shown the desired changes (Appendix 2).

A second way to examine the effect of policy on tolerance is to examine tolerance within a society across regions with different policies. To that end, Kaczensky *et al.* (2004) compared

attitudes toward brown bears (*Ursus arctos*) in a region of Slovenia where bears are protected and exhibit high conflicts with livestock to a region where bears are harvested as a game species and exhibit minimal conflict with livestock. They found no difference in attitudes toward bears across regions. Similarly, Bruskotter *et al.* (2018) found no differences in attitudes towards grey wolves across 3 regions of the U.S. with different wolf management policies and histories (Bruskotter *et al.* 2018). However, a follow-up study found lower levels of tolerance in areas with wolves among certain sub-groups (i.e., hunters, ranchers; Carlson et al. 2020). Research suggests that tolerance for wolves is strongly affected by social group and cultural group identity (Naughton-Treves *et al.* 2003; Shelley *et al.* 2011; Lute and Gore 2014), both of which are influenced by powerful social norms that change more slowly than policies (Marchini and Macdonald 2012; Kinzig *et al.* 2013). Researchers have proposed a variety of mechanisms that may cause attitudes to change both at the individual and societal level, e.g., (Ericsson, Bostedt, and Kindberg 2007; Karlsson and Sjöström 2007; Heberlein and Ericsson 2008; Bruskotter *et al.* 2017). A full review of these mechanisms is beyond our scope. However, a few findings are worth summarizing: (*i*) at the societal level, the U.S. public at large has become substantially more positive towards wolves over the past half-century (George *et al.* 2016; Slagle *et al.* 2017); and(*ii*) improving tolerance is strongly associated with changing social conditions, e.g., increased urbanization, education, income (Teel and Manfredo 2010; Bruskotter *et al.* 2017; Manfredo *et al.* 2019, 2020, 2021). While these findings raise intriguing hypotheses, experimental studies would be useful to better understand causal mechanisms, e.g., (Slagle *et al.* 2013). Collectively, however, existing evidence indicates that tolerance for grey wolves across society in general is largely unaffected by management policies.

Tolerance measured through poaching behavior

Other studies have assessed the effects of wolf-killing policies on tolerance more directly by examining hazard and incidence rates of poaching (illegal killing of grey or red wolves). In 3 populations of wolves, growth rates decreased, independent of the number of wolves killed legally, following liberalization of wolf-killing (Chapron and Treves 2016), withstanding challenges that presented no new data (Pepin *et al.* 2017; Stien 2017) or made errors (Olson *et al.* 2017). Indeed, the latter in particular was rebutted (Chapron and Treves 2017a,b), leaving the case stronger. Indeed, the latter authors' hypothesis that poaching would increase after wolf-killing was legalized or liberalized was corroborated by four independent studies using analyses for Mexican grey wolves (Louchouarn *et al.* 2021), Michigan grey wolves (Louchouarn 2023), Wisconsin grey wolves (Santiago-Ávila *et al.* 2020; Santiago-Ávila and Treves 2022), and North Carolina red wolves (Santiago-Ávila *et al.* 2022). Independently, Oliynyk (2023) showed that human-caused mortality in Minnesota's grey wolves rose long-term and apparently permanently after the state held its first public wolf-hunt. Therefore, an overwhelming body of evidence contradicts the suggestion that liberalizing wolf-killing would lessen poaching or intolerance.

Slower population growth was inferred to reflect a hidden cause of mortality, called "cryptic poaching" (Liberg *et al.* 2012). Failure to account for cryptic poaching – for example, discarding information on missing radio-collared wolves – can obscure the dynamics of poaching and bias population models (Treves *et al.* 2017; Santiago-Ávila *et al.* 2020; Agan *et al.* 2021; Santiago-Ávila and Treves 2022); contra (Hill *et al.* 2022). For example, research on radio-collared, grey wolves in Wisconsin, Mexican grey wolves in Arizona and New Mexico, and red wolves (C. *rufus*) in North Carolina, all revealed patterns of human poaching behaviour in relation to policy (Santiago-Ávila *et al.* 2020; Louchouarn *et al.* 2021; Santiago-Ávila *et al.* 2022; Santiago-Ávila and Treves 2022). Moreover, the latest studies follow new Open Science rules for registered

reports that reduce publication biases (Sanders *et al.* 2017), following current standards of evidence accepted by the global scientific community.

In summary, research to date has found that the ratio of reported poaching to cryptic poaching, and the sum of all poaching, varies with 1) policy on hunting bears, deer, and coyotes (*Canis latrans*); 2) U.S. federal policy on grey wolf protection; and 3) the methods used to census grey wolves. The relative increase in poaching rates and the ratio of reported ot cryptic poaching appear to vary by wolf population in ways not yet explained by theory. More policy and management variables are likely to surface when more teams investigate anthropogenic influences on the rates of both disappearance of marked carnivores and reported poaching. In short, liberalizing wolf-killing did not raise tolerance when tolerance was measured behaviorally, via poaching rates. Therefore, intention to poach is a behavioural measure of tolerance corroborating the attitudinal measures of tolerance in the previous paragraphs at least for U.S. populations.

Two studies from Nordic countries provided potentially credible research to suggest that grey wolf policy can reduce poaching albeit with unresolved shortcomings. In the first from Scandinavia, the investigators believe legalizing wolf-hunting reduced losses of breeding wolves (Liberg *et al.* 2020). However, that conclusion was questioned on statistical grounds for inappropriate survival analyses, and an unusual and possibly incorrect population-level model (Treves *et al.* 2020). Namely, the models ignored an apparent positive correlation between liberalizing killing and rising rates of illegal killing and disappearance, in favor of a claim about a negative correlation that did not seem to account for collinearity or autocorrelation (Treves *et al.* 2020). Also, Liberg *et al.* (2020) neither accounted for deaths of non-breeding wolves nor addressed the findings from the second Nordic study. In Finland, the number of wolves

poached diminished following seasons of higher legal wolf-killing (Suutarinen and Kojola 2017, 2018). Those authors hypothesized that the more legal killing occurred, the lower the risk of poaching because wolves were removed legally before they could be removed illegally (Suutarinen and Kojola 2017, 2018). Moreover, as Santiago-Ávila et al. (2020) and Louchouarn et al. (2021) pointed out, when the government pre-emptively removes grey wolves suspected of problems before they can be killed illegally, it is difficult to claim humans are exhibiting greater tolerance (Santiago-Ávila *et al.* 2020; Louchouarn *et al.* 2021).

Collectively, virtually all studies of grey wolf-poaching support the hypothesis that governments send a signal to would-be poachers that wolves are low in value, or that the government needs the support of poachers to control wolf populations (Chapron and Treves 2016). Most such policy signals seem to be unintentional but of late state governments have sent explicit signals to would-be poachers. For example, Idaho recently contributed funds to pay bounties for dead wolves (Bruhl 2021), which could inspire poachers in other states to draw on Idaho bounties. Also, in years past, the same agency defied federal regulations protecting wolves by announcing that they would no longer allow their own personnel to investigate reports of grey wolf poaching (Kramer 2010). Such signals encourage law-breaking and disrespect for democratic governance. Thus, we predict the recent state wolf policies have led and will continue to lower tolerance for wolves and increase wolf killing. We find no support for claim 2 and substantial evidence of a counter-productive effect on tolerance.

Claim 3: Killing wolves will prevent domestic animal losses

One of the long-standing reasons for humans to kill grey wolves and other threatening animals is to protect domestic animals (Treves and Bonacic 2016). For example, the U.S. Department of Agriculture's Wildlife Services division was created largely to kill offending animals

(Robinson 2005; USDA APHIS 2015), and local jurisdictions also do so in the U.S. and beyond (Bjorge and Gunson 1983; Fritts *et al.* 1992; Musiani *et al.* 2005; Epstein and Chapron 2018; Darpö 2020). Killing grey wolves or other predators perceived as a threat to domestic animals should be considered against the backdrop of the major causes of livestock death worldwide, i.e., weather, disease, accidents and in some cases, thefts. Hundreds of studies have shown that these factors in combinations that vary by site swamp losses to predators (Murray Berger 2006; Sillero-Zubiri *et al.* 2007).

In the case of determining whether the lethal removal of grey wolves increases livestock protection, the best evidence would come from before-and-after comparisons of interventions with random sampling (Khorozyan 2022) and other safeguards against research bias, such as crossover designs and open science protections against research bias and publication bias (Treves *et al.* 2016, 2019). No such studies exist for wolf-killing. To date, research on protecting livestock from wolves' ranges from before-and-after comparisons without randomization to lower standard, correlational analyses that leave numerous potentially confounding variables uncontrolled (Treves *et al.* 2016, 2019; Eklund *et al.* 2017; van Eeden *et al.* 2018b).

Studies with the highest (silver) standard for before-and-after comparisons of wolf-killing without randomization drew somewhat variable conclusions. From Slovenia, (Krofel *et al.* 2011) found no significant, annual reduction in livestock losses after years with high wolf-killing [also see reanalysis in (Treves *et al.* 2016, 2019). Studying 9 French sites with grey wolves, Grente (2021) reported that 5 showed no effect of killing grey wolves, 3 showed the desired decline in livestock losses, and 1 showed counter-productive increases in livestock losses (Table 1). The 2 U.S. studies disagree on the effects of wolf-killing on future livestock

losses (Bradley *et al.* 2015; Santiago-Avila *ert al.* 2018). Although many Northern Rockies wildlife agencies rely on the former study, it remains irreproducible for 3 reasons (Santiago-Avila *et al.* 2018a,b). Namely, the latter authors corresponded and conversed directly with the lead author and analyst of (Bradley *et al.* 2015), in an effort to repeat the methods. Bradley and Robinson were unable to recall a key step in the recurrence analysis. Second, the methods incorporated an inherent bias favouring the effectiveness of the lethal treatment by counting delayed grey wolf immigration into vacant territories as if these were delays to kill livestock (conservative decisions in intervention studies would favour the control condition or null hypothesis not the treatment); and finally the study by Bradley et al. (2015) remains irreproducible because the data were not shared originally nor upon request. Failures by state governments to share data transparently undermine claims about science-based management. By contrast, (Santiago-Avila *et al.* 2018a,b) made the recurrence methods reproducible, adapted the methods to the data for Michigan's grey wolf control program, and shared all data. That study found no net benefits for livestock or their owners from killing grey wolves (Table 1). They also reported a non-significant tripling of risk for cattle in neighboring townships after 1 or more wolves were killed at farms within 19.2 km of the farm that had received lethal management of wolves. Therefore, 3 of 4 studies suggest wolf-killing, as practiced in the U.S., France, and Slovenia, did not prevent future livestock losses reliably and can perversely raise such losses (Table 1). In every review thus far published on the effectiveness of lethal methods as a way to protect livestock from predators in general, authors from nearly 30 countries report occasional counter-productive effects resulting in higher livestock losses after predator-killing (Miller *et al.* 2016; Eklund *et al.* 2017; Lennox *et al.* 2018; Moreira-Arce *et al.* 2018; van Eeden *et al.* 2018a, 2018b; Khorozyan and Waltert 2019, 2020; Treves *et al.* 2019). Therefore,

the risk of raising livestock losses should be attached to government claims if they continue to be made – for reasons of transparency, scientific integrity, and public trust.

In contrast, the effectiveness of non-lethal methods and the standards of evidence used for their study have been higher than for lethal methods in situations involving grey wolves (Appendix 3). Although eradication of all wild predators might protect livestock from predation (Breitenmoser 1998; Riley *et al.* 2004; Nilsen *et al.* 2007), less drastic killing can produce variable and unpredictable results for grey wolves and other large carnivores (Elbroch and Treves 2023).

Killing one carnivore may leave survivors more prone to kill livestock thereafter. Survivors may be younger, less experienced or find themselves competing for food with immigrants for long periods—any of these situations may lead a hungry wolf to find the most predictable and vulnerable prey, often livestock; see review by (Elbroch and Treves 2023). Removing apex carnivores may also result in higher abundances of subordinate carnivores of the same species or other species (Newby and Brown 1958; Crooks and Soulé 1999; Elbroch and Treves 2023). Therefore, killing large predators like grey wolves may have varied effects on other animals including domestic ones (Krofel *et al.* 2007; Prugh *et al.* 2009; Allen *et al.* 2016; Minnie, Gaylard, and Kerley 2016; Newsome *et al.* 2017; Nattrass *et al.* 2019; Elbroch *et al.* 2020). For example, the eradication of the Tasmanian thylacine (*Thylacinus cynocephalus*) seems to have left niche vacancies for the smaller dingoes (*Canis familiaris dingo*) and red foxes (*Vulpes vulpes*) to become the dominant livestock predators of Australia and Tasmania (Greentree *et al.* 2000; Allen and Sparkes 2001; Sillero-Zubiri *et al.* 2007; Newsome *et al.* 2017). Or consider the expansion of range by coyotes (*C. latrans*) in the wake of extermination of red and grey wolves across many U.S. states and Canadian provinces (Gompper 2002; Hinton *et al.* 2016), and an associated increase in complaints of losses from sheep owners (Murray Berger 2006).

Furthermore, elimination of one or a few grey wolves can cause currently unpredictable behavioural consequences for survivors of the same species and members of other species including wild and domestic prey reviewed in (Elbroch and Treves 2023).

Claim 4: Killing wolves will improve wild ungulate abundances

Governments have for a century or more justified killing grey wolves to increase hunting opportunity for ungulates, such as elk (*Cervus canadensis*) and deer (Leopold 1933 reprinted 1986; 1949; Harbo and Dean 1983; Theberge and Gauthier 1985). Grey wolves are capable of reducing wild ungulate populations (Ripple and Beschta 2012); however the effect of grey wolves on ungulate abundances depends on other factors, such as ungulate vulnerability driven by winter severity (Vucetich and Peterson 2009; Peterson *et al.* 2014), local primary productivity (Melis *et al.* 2009), the abundance of ungulates relative to their carrying capacity (Ballard *et al.* 2001) , the diversity of the local carnivore guild and potential for multiple ungulate predators (Griffin *et al.* 2011), and the abundance of alternative prey (i.e. apparent competition (Wittmer *et al.* 2005). A recent meta-analysis of the outcomes of carnivore removal on geographically diverse ungulate populations estimated that predator removals resulted in increased juvenile survival and recruitment on average, but equivocal effects on average adult ungulate abundance, which should be the metric that determines if efforts to increase huntable population size or hunting opportunity succeeded (Clark and Hebblewhite 2021). Also, it was not uncommon for counter-productive effects lowering ungulate abundance after predator-killing (Clark and Hebblewhite 2021). A meta-analysis of female elk survival from western North America (Brodie *et al.* 2013) concluded that the best way to increase ungulate abundance was instead to decrease human harvest rather than predators. Indeed, the theory of density-

dependent growth of ungulate populations provides an explanation why killing a few predators could diminish ungulate numbers, "Female deer productivity is related to habitat quality. Habitat quality tends to decrease over time with increased deer density. As a result, it is entirely possible that a denser deer population will actually produce less young per year, and hence have a lower potential yield." (Martin 2023). Indeed, the Isle Royale long-term study of moose and wolf dynamics seems to prove that habitat quality and climate are far better predictors of abundance than wolf numbers while we still lack strong theory to predict the short-term effects of any of those variables (Vucetich and Peterson 2009).

The exceptions to these general patterns are predator effects on small ungulate populations. Predation can harm rare ungulate populations via apparent competition. However, the underlying circumstances that lead to apparent competition are generally created by anthropogenic influences on ecosystems (Wittmer *et al.* 2005). Even in cases of rare ungulates, however, intensive grey wolf killing must be maintained to increase ungulate population growth rates. For example, Hervieux *et al. (*2014) in a controversial analysis claimed that killing 841 grey wolves over 7 years, (approximately a 45% reduction in mid-winter wolf abundance), was sufficient to increase population growth rates of endangered woodland caribou in their study area, but insufficient to increase caribou abundance. Critics of that study have questioned many aspects of that claim, particularly the mistargeting the major sources of caribou mortality or misidentifying the true causes of population decline (Proulx 2017a; 2017b).

Reports from all U.S. states with grey wolf populations indicate that opportunities to hunt wild ungulates have not been diminished statewide by increased wolf populations. Indeed, recent records from Idaho, Montana, and Wyoming indicate that the number of elk killed

by hunters in recent years is stable to increasing in those 3 states, as are elk populations. Data from Idaho, Montana and Wyoming were summarized here: (Center for Human-Carnivore Coexistence 2020). In Wisconsin, the 35-year period from 1975-2010 saw the state deer population grow from 600,000 to >1 million (Waller and Reo 2018), while the wolf population grew from 0 to 700 approximately (Wiedenhoeft *et al.* 2020). Also, hunters took 200,000 deer in the 1980s as compared to 500-600,000 in the 2000s (Waller and Reo 2018). Collectively, these data and the scientific studies suggest that the positive effects of killing wolves on wild ungulate abundance are slighte, may be negative in reality, and remain unpredictable.

A mismatch between goals of wolf-killing and approaches taken

Three of the 4 fact claims we have reviewed seem most commonly to be motivated by negative interactions with individual wolves or wolf packs, rather than populations of wolves. The exception may be the fourth relating to wild ungulates. Therefore, one should address policy interventions for 3 of the 4 claims in the most efficient and effective way to mitigate the costs and risks posed by individual wolves. This logic suggests that policies for targeted removal should be improved and tailored to specific individual grey wolves and local situations, rather than wolf-killing aimed at reducing the entire wolf population across wide areas. A return to policies and studies of targeted removal of confirmed culprits with a record of posing threats to humans and domestic animals seems reasonable. This strategy has long been understood as the most effective strategy for coyotes (Knowlton *et al.* 1999), and there is no scientific reason yet to a different outcome for grey wolves.

Our inference is especially important in instances when killing succeeds in reducing the wolf population but misses the individual wolves responsible for livestock loss or human safety

concerns; in such situations, the conflicts driving claims 1-3 are likely to continue unabated and calls for more killing may persist or escalate. Regarding claim 4, reducing wolves to increase ungulate abundance rarely works for any but the smallest ungulate populations for the reasons we describe in the previous section, Furthermore, any benefit of wolf-killing (to ungulate hunters) should be weighed against the benefits of maintaining or increasing grey wolf abundance.

Killing wolves reduces benefits of coexistence between humans and wolves

Ideal public policy maximizes the benefits (minus associated costs of) management interventions. Thus, having considered the various risks (i.e., to human safety, livestock, and wild ungulates), we find it appropriate to detail potential benefits to humans associated with coexisting with, rather than killing, wolves. In general, research shows that most audiences appreciate wolves and other carnivores, e.g., cougars (*Puma concolor*) and coyotes (Bruskotter *et al.* 2018; Manfredo *et al.* 2020), and that people report both financial and non-financial benefits of wildlife (Kellert 1985; Williams *et al.* 2002; Naughton-Treves *et al.* 2003). One subpopulation of wolves in Yellowstone National Park, for example, has produced net financial benefits beyond the boundaries of the park and revenues that far exceeded the costs of reintroduction (Duffield and Neher 1996; Duffield, Neher, and Patterson 2008). Findings from Wisconsin suggest that counties hosting 1 or more packs of wolves report fewer deer-vehicle collisions and reduced human injuries and fatalities, saving millions of dollars (Raynor *et al.* 2021). The studies of benefits of wolves have often grown out of an awareness that wolves were changing the behaviour of deer and elk and some evidence of broader ecosystem effects of wolves.

Many studies suggest grey wolves can benefit ecosystems through their effects on their prey and their ecological communities. For example, wolves may reduce the incidence or transmission of zoonotic and wildlife diseases (Wild *et al.* 2011; Tanner *et al.* 2019), increase scavenger diversity, reviewed in (Smith *et al.* 2003), and reduce deer damage to vegetation, reviewed in (Martin *et al.* 2020). Regarding the latter, rare understory plants fared better near the center of grey wolf pack territories in Wisconsin (Callan *et al.* 2013). Also, forests were more biodiverse, more mature, had higher tree volumes and regeneration rates, and resisted non-native plant invasions in the presence of wolves (Waller and Reo 2018). Though such effects may vary with conditions, research suggests wolves enhance biodiversity via direct and indirect pathways that begin with limiting ungulate herbivory, or by altering the competition between prey species. A persistent debate about Yellowstone's wolves notwithstanding, scientific consensus holds that top predators generally play such roles in ecosystem diversity, resilience, and health (Estes *et al.* 2011; LaBarge *et al.* 2022).

Killing grey wolves is not cost-free, and so we need to weigh the use of public funds for killing against the benefits minus the costs of maintaining wolves or expanding their ranges. It is not at all clear that aggressive killing of grey wolves will significantly reduce the real or perceived risks associated with living with wolves. Conversely, it is likely that the large-scale killing of grey wolves as proposed by some governments will substantially diminish the benefits associated with their presence. We highlight the need for formal comparisons between the benefits associated with apex carnivores and the economic costs long attributed to wolves (Gilbert *et al.* 2021), to set policies that optimize wolves' beneficial contributions to ecosystems and human communities.

Why do governments cite weak or unsupported claims for killing grey wolves and omit the benefits of wolves?

The scarcity of scientific evidence for the claims made to justify killing grey wolves leads to an obvious question: why are governments making such claims? Conversely, why don't more governments cite the human benefits and ecosystem advantages of grey wolf recolonization? To begin with, 3 non-exclusive explanations seem plausible.

1. Policy makers may believe their wolf-killing claims are true because of the source of their information or their existing belief system. The trusted messenger theory of communication sciences predicts that messages are believed or embraced more quickly, and that they shape behaviour more effectively when delivered by a trusted messenger (Dunwoody 2007; Kinzig *et al.* 2013). Further, people tend to filter information and retain what supports their existing belief and value systems (Kinzig *et al.* 2013; Bruskotter, Vucetich, and Wilson 2016; Antonelli and Perrigo 2018; Byerly *et al.* 2018; Kinka and Young 2019). That propensity has led at times to predator management that conflates value-based decisions with evidence-informed decisions (Mitchell *et al.* 2018; Koot *et al.* 2020; Santiago-Ávila 2020; Treves *et al.* 2021b). If a trusted messenger delivers inaccurate information, policy-makers may find themselves weighing apparently contradictory science and then selecting that which they trust more based on the identity of the messengers or their inherent biases and beliefs on the subject.

2. Policy-makers advancing wolf-killing with unsupported claims may not know the scientific evidence or may think the science is unclear enough to support their claims. We view this as unlikely because peer-reviewed scientific evidence has been presented repeatedly to debunk the claims via public comments, litigation, and official federal peer reviews, since 2013 (Bruskotter *et al.* 2013; Treves *et al.* 2021b). For example, the litigation and federal

agency peer reviews have addressed some or all of the claims surrounding grey wolf protection and wolf-killing in Wisconsin, the northern Rockies, and nationwide (Atkins 2019) and Humane Society of the U.S. (2014. 2017) respectively. Furthermore, the suggestion that scientific uncertainty about the 4 claims among scientists left policy-makers with equivocal recommendations, has a prerequisite of transparent debate between experts with diverse views. We know of no such policy review or debate. In general, hunting plans in North America lack the hallmarks of independent review and transparency, as revealed by a close reading of 666 such plans and a survey of the agency staff responsible for writing and carrying out such plans (Artelle *et al.* 2018a,b).

3. Policy-makers may know their claims are unlikely to be true, and these policies instead reflect internal values or external pressures acting on their decisions (Chapron and Lopez-Bao 2014; Darimont *et al.* 2018). This possibility finds circumstantial support in several other claims made by current governments to justify wolf-killing. One such value-based claim is that hunters, trappers, and hound-hunters should be given additional hunting opportunities, or that the reduction in the number of hunters requires agencies to create unlimited harvest to meet objectives previously achievable with limited take and more hunters. The value-based claim is that governments are creating more opportunities for these people via aggressive grey wolf policies. Although such justifications are not entirely in the domain of facts that scientists can evaluate, they are dubious on their face because of a logical flaw. Reducing carnivore abundance comes at the expense of carnivore hunters, who lose hunting opportunities over the long term (Mitchell *et al.* 2018). A more plausible political pressure for widespread wolf-killing comes from electoral politics. Recent research documenting the relationship between voting for the reintroduction of grey wolves (a Colorado ballot measure in the 2020 election)

and presidential voting may provide insights into the internal and external pressures that may be acting on policy makers and their constituents. That study found the strongest predictor of voting for grey wolf restoration at the precinct level was the proportion that voted for the Democratic candidate for president (Ditmer *et al.* 2022). Specifically, as Democratic voting increased, support for grey wolf restoration increased. Similarly, other research shows that political party affiliation and socio-political identity were strong predictors of attitudes toward carnivore policies in other jurisdictions (Hamilton *et al.* 2020; van Eeden *et al.* 2021), however, see (Carlson *et al.* 2020). Partisan politics also predicted rates of poaching of grey wolves in Michigan, U.S. (Louchouarn 2023).

Collectively, these data suggest that the general issue of how to manage wolves has become politicized precisely at a time when the U.S. electorate is extremely polarized as well (McCoy *et al.* 2018). In such environments, the wolf policies pursued by governments may not serve a clear purpose that can be defended scientifically. Wolf-killing policies align with the positions of interest groups that are themselves aligned with a conservative agenda, e.g., agricultural groups, hunting groups (Clark and Milloy 2014). Because these groups traditionally hold great sway with wildlife policy-making bodies, there is little risk for decision-makers in supporting such policies, e.g., (Chapron and Lopez-Bao 2014). In contrast, pursuit of policies viewed as supportive of wolves may carry substantial risk for policy-makers, wildlife commissioners, and wildlife managers. Indeed, research in psychology has long shown how pressure to conform to group settings can powerfully influence decision-makers (Asch 1951, 1952, 1956). Moreover, the dynamics of multiple individual decision-makers acting in concert may complicate the policy analysis.

Regardless of the underlying causal explanation for why governments are using unsupported claims about costs and ignoring claims of benefits, the effect is corrosive on a constitutional democracy like that of the U.S., particularly one whose environmental assets are held in trust for current and future generations (Geer 1896; Hughes 1979; USA 1989). Reliance on unlikely or false factual claims undermines both public policy and the authorities from which it emanates. As public trustees for wildlife under U.S. common law and sometimes statute, elected and appointed government officials have a professional, legal, and ethical duty to avoid unlikely or false claims about public interests. Such conduct misleads the sovereign public.

Acknowledgments

We thank J. Vucetich for an early review of the section on wild ungulates and we thank reviewers. Authors declare no competing interests. AT presents a full CV and long-term funding for scrutiny of potentially competing interests at http://faculty.nelson.wisc.edu/treves/CCC.php.

Author contributions

All authors contributed equally.

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Table 1. Three studies comparing livestock losses before and after grey wolves were killed. See main text summary of Santiago-Ávila *et al.* (2018a) for explanation of why Bradley *et al.* (2015) was omitted as irreproducible.

Effect	France [a] (% of regions showing a given effect of killing wolves)	Slovenia [b] (entire country, % of years with the given effect of killing wolves)	Michigan U.P. [c] (change in hazard ratios %)
Desired reduction in livestock predation	33%	28%	-25% [c]
Undesirable increase in livestock predation	11%	65%	+75% [c]
No effect	55%	7%	Overall [c]

[a] France: 9 regions (Grente 2021), reporting the author's summary conclusions.

[b] Slovenia: nationwide (Krofel *et al.* 2011; Treves *et al.* 2016). The latetr reanalyzed the former using a non-randomzied before-and-after control-impact design. Neither study found an efefct of wolf-killing on subsequent livestock losses.

[c] Michigan, USA: (Santiago-Avila *et al.* 2018a,b). Although the overall effects of killing grey wolves was non-significant, we present the relative probabilities computed as changes in hazard ratios for target farms and non-target farms 19.2-28.8 km away (both -25% meaning lower risk) in contrast to non-target farms within 19.2 km (+75% meaning higher risk).

ABOUT THE AUTHORS

Adrian Treves is the founder and director of the Carnivore Coexistence Lab, and Professor of Environmental Studies at the University of Wisconsin–Madison. He earned his PhD at Harvard University in 1997. His research focuses on ecology, scientific integrity, public trust principles, and agro-ecosystems where crops and domestic animals overlap carnivore habitat. He and his lab http://faculty.nelson.wisc.edu/treves/ are best known for gold-standard experiments on non-lethal prevention of predation on domestic animals, estimates of illegal wolf-killing and cryptic poaching, risk maps to predict human-carnivore conflict sites, and public trust principles.

Appendix 1. Unsupported claims about threats to human safety.

Officials in 3 states alleged threats to human safety that did not materialize or were found inaccurate.

In 2016, Michigan state officials alleged grey wolf threats to human safety to justify wolf-hunting. A subsequent investigation uncovered that these stories were fabrications, leading 1 biologist to recant his story and a state Senator to apologize on the Capital floor for providing a misleading account (Barnes 2019).

Similarly, arguing against a proposed reintroduction of grey wolves into Yellowstone National Park in the mid-1990s, U.S. Senator Conrad Burns (R-Montana) predicted "there'll be a dead child within a year [of reintroduction]" , (Schullery 2003). Also, in 2011, Idaho's legislature declared: "The uncontrolled proliferation of imported wolves on private land has produced a clear and present danger to humans…dramatically inhibiting previously safe activities such as walking, picnicking, biking, berry picking, hunting and fishing."

Concerns about human safety in other grey wolf range in other areas have been tremendously exaggerated, apparently for political gain (Chapron and Lopez-Bao 2014; Darimont *et al.* 2018).

Appendix 2. Wisconsin and Montana studies of change in attitudes before-and-after wolf killing was liberalized.

Three independent studies measured changes in human attitude before and after changes in grey wolf-killing policies. Hogberg et al. (2015) used a mail-back survey to resample individuals in 2013, after the inaugural Wisconsin wolf-hunt in 2012, and compared their responses to those of the same individuals measured in 2009. She found the largest declines in individual tolerance for wolves among non-tribal men who lived in wolf range who self-identified as hunters, i.e., they hunted regularly in the past, or had hunted in the last 2 yrs (Hogberg *et al.* 2015).

Browne-Nuñez et al. (2015) convened focus groups of deer hunters, hound hunters, and livestock owners and analyzed anonymous questionnaires filled out by the same participants in a mixed-methods approach to understand attitudes to grey wolf-killing before and after changes in wolf policy that liberalized wolf-killing (Browne-Nuñez *et al.* 2015). Focus groups conducted after the change in policy showed increased calls for more wolf-killing via public hunts, little or no change in tolerance for wolves, and no quantitative change in the inclination to kill wolves illegally.

Multiple surveys conducted by Montana Fish Wildlife & Parks (MFWP) provide mixed evidence for the idea that liberalized killing can create tolerance (though, to our knowledge, these studies have not been peer reviewed). A report from 2012 compared data from surveys conducted before and after a 2011 wolf-hunt. That study used a single item to identify tolerance for wolves: "…how tolerant are you with wolves being on the Montana landscape" (Lewis *et al.* 2012). Researchers found that pre- and post-hunt responses did not differ across any of 4 sampled populations (i.e., Montana residents, private landowners, wolf license holders and deer/elk license holders) concluding, "…tolerance amongst survey respondents for each of the 4 survey [groups] was the same before and after the 2011 wolf hunt." (Lewis *et al.* 2012). This

survey was replicated with the same 4 groups in 2017 using identical methods, but different respondents. That study found increases in tolerance from the 2012 survey across all 4 survey groups (Lewis *et al.* 2018). However, a key group representing those holding wolf-hunting permits, changed least and it is unclear if the change exceeded the margin of error. The survey group that changed most were general Montana residents. Independent research, however, estimated that the majority of Montana residents (65.9%) opposed the statement, "Wolves that kill livestock should be lethally removed" and 84.6% were not active hunters defined as having hunted in the past and in the last 12 mo (Manfredo *et al.* 2020). Therefore, the subgroup in the Montana state survey that shifted most to become more tolerant of wolves was the subgroup least likely to kill wolves legally or illegally of the 3 subgroups. Regardless, the MFWP study did not address mechanisms of change, so it is unclear what role liberalized killing played or whether their responses reflected other widespread demographic changes in attitudes to wolves over time (George *et al.* 2016; Slagle *et al.* 2017). Moreover, the same study found that more than half of the MT residents sampled opposed wolf trapping (a primary means of reducing wolves), though a majority in all groups supported hunting generally (Lewis *et al.* 2018).

In summary, the longitudinal studies that resampled the same individuals before and after changes in policy or intensification of grey-wolf-killing policies did not find the desired outcome and instead, sometimes found the opposite pattern of attitudinal changes. Therefore, the policies followed by multiple U.S. state and federal agencies of legalizing or liberalizing grey-wolf-killing do not seem to have improved negative attitudes to grey wolves among the members of the public that were most negative (Treves and Martin 2011; Montag *et al.* 2003).

Appendix 3. Non-lethal methods proven effective for protecting livestock or deterring grey wolves in randomized, controlled trials

Randomized, controlled trials (RCT) indicate at least 4 forms of non-lethal interventions to protect livestock are more effective against grey wolves than lethal methods (Treves, Krofel, and McManus 2016; Treves *et al.* 2019; Bruns, Waltert, and Khorozyan 2020), including

(I) fladry, a Polish word for a visual deterrent, consisting of flagging hung from fence-lines (Davidson-Nelson and Gehring 2010) and in captive trials, was tested without livestock, and non-randomized before-and-after comparisons with and without electrification of the flagging, also see electrified fladry in (Lance *et al.* 2010);

(II) specialized dog breeds bonded to livestock (not people), and often used in combination with fencing or night-time enclosures (Gehring *et al.* 2010);

(III) low-stress livestock handling practiced by 'range riders' or specially trained herdsmen periodically visiting cattle on public, open-range pastures (Louchouarn and Treves 2023); and

(IV) Also note that shock collars seemed effective in deterring grey wolves from treated pastures (Rossler *et al.* 2012).

Indeed, many other non-lethal methods have proven effective against other predators and in other conditions (van Eeden et al. 2018; Treves et al. 2019), including methods that are likely to work on wolves such as electric fences but still awaiting unbiased RCT on grey wolves (Khorozyan 2021).

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IDAHO WOLF DEPREDATION CONTROL BOARD
Minutes of September 12, 2022, Meeting

BOARD MEMBERS PRESENT: Celia Gould, ISDA (Co-chair)

Ed Schriever, Idaho Fish and Game (Co-chair)

Chanel Tewalt, ISDA

Richard Savage

Jerry Cloninger

DEPARTMENT STAFF: Kelly Nielsen, ISDA

Denise Lauerman, ISDA

Dallas Burkhalter, Office of Attorney General – ISDA

Tricia Hebdon, Idaho Fish and Game

OTHERS PRESENT: Jared Hedelius – USDA Wildlife Services, Idaho Office

Donna Ralston – USDA Wildlife Services, Idaho Office

Justin Webb – Foundation for Wildlife Management

Patxi Larrocea-Phillips – Idaho Wool Growers Association

Trevor Walch – Predator Control Corp

Butch Suor – Self

Suzanne Stone – IWCN – International Wildlife Coexistence Network

Michel Liao – Timberline High school – TREE

Brad Carlson – Capital Press

The meeting was called to order by Co-chair Schriever at 10 a.m. MT.

INTRODUCTIONS

Board members, staff members, and others present introduced themselves.

APPROVAL OF MINUTES (ACTION ITEM)

Co-chair Gould made a motion to approve the minutes of the June 21, 2022, meeting. It was seconded by Jerry Cloninger. Motion carried.

PUBLIC COMMENT (3-minutes per person)

Justin Webb spoke and handed out a proposal to meeting attendees for the Foundation for Wildlife Management – F4WM. Justin stated that F4WM would like to propose an additional cost share agreement with the WDCB, to reimburse sportsmen wolf harvest expenses, strictly within Chronic Livestock Depredation units, at up to $2,000 per wolf, through a 3:1 cost share plan (WDCB/F4WM). He also stated that if accepted by the WDCB, the proposal will maximize the potential of carrying the increased reimbursement amount through the entirety of the trapping season within Chronic Livestock Depredation Units, while maximizing increased wolf harvest promotion throughout predation management zones through implementation of the current F4WM/IDFG cost share agreement.

Butch Suor, spoke, stating that if the goal of the board is to lessen the wolf population, they should give more money to private contractors to achieve this since the board's methods are not working and they have spent a lot of money.

Suzanne Stone, with International Wildlife Coexistence Network – IWCN, encouraged others to expand the non-lethal wolf control methods which are results-driven and cost effective. She offered an open invitation to see the efforts, the sheep super-highway, the loss of two wolves in 15-years, to compare loss rate versus other areas, and encouraged everyone to work with the Legislature to expand the law.

Michel Liao, Timberline High School student member of the Environmental Club TREE, shared the story of the Timberline Pack, named for the school's mascot. The students were sad to hear that the pack was killed by government officials. He spoke of the Wood River Wolf Project which promotes the coexistence of livestock and wolves and the importance of working with the legislature to expand the law for non-lethal control methods. He stated how important it is to send the correct message to the young people.

REVIEW OF REPORTS

FINANCIAL REPORT

Kelly Nielsen gave an overview of the Financial Report, including the total budget, total expenses to date, total revenue to date, and beginning cash balance for FY2023. The Wolf Depredation Control Board receives funding from several different entities.

WILDLIFE SERVICES REPORT

Jared Hedelius gave an overview of the quarterly and yearly Wildlife Services Report for FY2022. Wildlife Services has completed a total of 33 investigations for the last quarter with 15 investigations that involved confirmed depredations, one probable involved depredation, and 14 possible/unknown wolf depredations. Jared stated that for FY2022, Wildlife Services completed 157 investigations in which 85 involved confirmed depredations, eight involved probable depredations, and 55 were possible/unknown wolf depredations. Jared discussed fixed wing flights, removing four wolves, and helicopter flights, removing 26 wolves. He also discussed the summary of employee hours worked, which was 4,000 hours

less than the year previous. Jared stated that the trend for conflicts seems to be coming down and for the new fiscal year, continues to go down so far. See attached report.

APPROVAL OF INVOICES (ACTION ITEMS)

Co-chair Gould made a motion to approve the three invoices for Wildlife Services for payment as written. It was seconded by Richard Savage. Motion carried.

OTHER BUSINESS

Co-chair Schriever stated that Wildlife Services needs to have an agreement for any unforeseen circumstances. He stated that Idaho Department of Fish and Game has done some other things. IDFG repaid $200,000 for legal harvest of wolves. Overall, harvest of wolves has been similar to the last five years, however, more removals occurred in areas with chronic losses. Justin Webb proposed a sportsman harvest in areas of long-term chronic conflict.

Co-chair Schriever stated that the Wolf Depredation Control Board needs to weigh in, take all these things into account, and then think about others doing wolf collaring. Put the information out there for future meetings.

Jerry Cloninger inquired about the $300,000 surplus for Wildlife Services, co-chair Schriever stated that the board shouldn't sign a work-order for the same amount as last year, that some margin of safety is needed, but not as much as the current surplus. Discussion to be continued in future meetings.

Co-chair Schriever brought up the point that the Wolf Depredation Control Board has no responsibility to manage wolf population in Idaho, that is the responsibility of the Idaho Fish and Game Commission. This board manages funds to manage conflicts.

The next meeting to be held on October 17, 2022, at 10 a.m.

ADJOURNMENT

11:08 p.m.

2022 IDAHO ANNUAL STATISTICAL BULLETIN

Compiled by
United States Department of Agriculture
National Agricultural Statistics Service
Northwest Regional Field Office

Dennis Koong- Director
Steve Anderson – Deputy Director

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NORTHWEST REGION STAFF

Washington		Alaska
Bianca Pruneda	Molly Conn	John Alexander
Eric Stebbins	Angelica Espino	
Wendy Vance	Alan Funk	Idaho
Brian Ardoin	Christina Harlow	Benjamin Johnson
Kyle Bowman	Kelly Jefferson	
Mark Cerise	Jessica Lemenager	Oregon
Charles Clark	Scott Peterson	Dave Losh
Ann Clemon	Mali Viste	Gene Pierce

U. S. Department of Agriculture
National Agricultural Statistics Service
Hubert Hamer, Administrator

All Cattle and Calves by County — Idaho: January 1, 2018-2022

County	2018	2019	2020	2021	2022
	(head)	(head)	(head)	(head)	(head)
Ada	52,000	53,000	52,000	53,000	55,000
Adams	16,500	17,000	17,000	17,000	17,000
Bannock	21,000	21,500	21,000	21,500	22,000
Bear Lake	28,000	29,000	28,500	29,000	29,500
Benewah	1,000	1,000	1,000	1,000	1,000
Bingham	97,000	100,000	99,000	100,000	100,000
Blaine	9,500	10,000	9,800	9,900	10,000
Boise	2,500	2,500	2,300	2,500	2,500
Bonner	4,000	4,000	4,000	4,200	4,300
Bonneville	58,000	60,000	59,000	60,000	61,000
Boundary	4,900	5,000	5,000	5,000	5,100
Butte	9,000	9,500	9,100	9,400	9,500
Camas	5,700	6,000	5,900	6,000	6,100
Canyon	135,000	140,000	140,000	140,000	145,000
Caribou	25,000	26,000	25,500	26,000	26,500
Cassia	280,000	290,000	290,000	290,000	295,000
Clark	8,000	8,500	8,300	8,400	8,500
Clearwater	2,900	3,000	3,000	3,000	3,000
Custer	31,000	32,000	31,500	32,000	32,500
Elmore	170,000	175,000	170,000	175,000	180,000
Franklin	34,000	34,500	34,000	34,500	35,000
Fremont	14,000	14,500	14,000	14,200	14,500
Gem	24,000	23,500	23,500	23,500	24,000
Gooding	315,000	325,000	325,000	325,000	330,000
Idaho	26,000	27,000	26,500	27,000	27,500
Jefferson	84,000	87,000	86,000	87,000	89,000
Jerome	260,000	270,000	265,000	270,000	275,000
Kootenai	5,500	5,700	5,600	5,700	5,800
Latah	5,500	5,700	5,600	5,700	5,800
Lemhi	35,000	36,000	35,000	36,000	36,500
Lewis	4,500	4,900	4,700	4,800	4,900
Lincoln	76,000	79,000	78,000	79,000	80,000
Madison	13,500	14,000	13,900	14,100	14,500
Minidoka	42,000	43,500	42,500	44,000	44,000
Nez Perce	13,000	13,400	13,200	13,400	13,500
Oneida	23,000	24,000	23,500	24,000	24,500
Owyhee	155,000	160,000	160,000	160,000	165,000
Payette	57,000	59,000	58,000	59,000	60,000
Power	27,000	28,500	27,500	28,500	29,000
Shoshone	300	300	300	300	300
Teton	6,700	7,000	7,000	7,000	7,200
Twin Falls	200,000	205,000	200,000	205,000	210,000
Valley	7,000	7,500	7,300	7,400	7,500
Washington	31,000	32,000	32,000	32,000	33,000
Other counties	-	-	-	-	-
Idaho	2,420,000	2,500,000	2,470,000	2,500,000	2,550,000

- Represents zero.

Sheep and Lamb Inventory by Class — Idaho: January 1, 2013-2022

Year	All sheep and lambs	Total market sheep	Total breeding sheep	Breeding sheep		Replacement lambs
				Ewes	Rams	
	(head)	(head)	(head)	(head)	(head)	(head)
2013	235,000	48,000	187,000	152,000	5,000	30,000
2014	250,000	60,000	190,000	155,000	5,000	30,000
2015	260,000	73,000	187,000	150,000	6,000	31,000
2016	255,000	70,000	185,000	146,000	5,000	34,000
2017	250,000	66,000	184,000	138,000	5,000	41,000
2018	235,000	50,000	185,000	141,000	5,000	39,000
2019	220,000	50,000	170,000	130,000	5,000	35,000
2020	230,000	65,000	165,000	125,000	5,000	35,000
2021	230,000	75,000	155,000	120,000	5,000	30,000
2022	230,000	85,000	145,000	113,000	5,000	27,000

Sheep and Lambs Inventory, Supply, and Disposition — Idaho: 2012-2021

[The sum of the beginning of year inventory, lamb crop, farm slaughter, deaths, and end of year inventory.]

Year	Inventory [1] beginning of year	Lamb crop	Farm slaughter [2]	Deaths		Inventory end of year
			Sheep & Lambs	Sheep	Lambs	
	(1,000 head)	(1,000 head)	(1,000 head)	(1,000 head)	(1,000 head)	(1,000 head)
2012	240	205	2.5	9	12	235
2013	235	190	2.5	7	10	250
2014	250	185	2.6	7	9	260
2015	260	180	2.6	9	11	255
2016	255	160	2.6	9	9	250
2017	250	160	2.6	8	8	235
2018	235	160	2.1	7	9	220
2019	220	160	1.5	7	9	230
2020	230	150	1.5	7	9	230
2021	230	145	1.5	7	9	230

[1] Inventory includes new crop lambs.
[2] Excludes custom slaughter for farmers at commercial establishments.

This report presents information on the status, distribution, and management of wolves in the State of Montana, from January 1, 2022 to December 31, 2022.

This report is also available at: https://fwp.mt.gov/conservation/wildlife-management/wolf

Suggested Citation: Parks, M., K. Podruzny, S. Sells, T. Parks, N. Lance, W. Cole, T. Smucker. S. Bhattacharjee 2023. Montana Gray Wolf Conservation and Management 2022 Annual Report. Montana Fish, Wildlife & Parks. Helena, Montana. 53 pages.

EXECUTIVE SUMMARY

Wolf recovery in Montana began in the early 1980s. The federal wolf recovery goal of 30 breeding pairs for 3 consecutive years in the Northern Rocky Mountains (NRM) of Montana, Idaho and Wyoming was met by 2002. Montana's state Wolf Conservation and Management Plan of 2004 was based on the work of a citizen's advisory council and was approved by the United States Fish and Wildlife Service (USFWS). The wolf population in the NRM tripled between the time recovery goals were met and when wolves were ultimately delisted by congressional action during 2011. At present, Montana Fish, Wildlife and Parks (FWP) implements the 2004 state management plan using a combination of sportsman license dollars and federal Pittman-Robertson funds (excise tax on firearms, ammunition, and hunting equipment) to monitor the wolf population, regulate harvest, collar packs in livestock areas, coordinate and authorize research, and direct problem wolf control under certain circumstances.

The primary means of monitoring wolf distribution, numbers, and trend in Montana is now Integrated Patch Occupancy Modeling, or "iPOM." The iPOM method uses annual hunter effort surveys, known wolf locations, habitat covariates, and estimates of wolf territory size and pack size to estimate wolf distribution and population size across the state. iPOM estimates of wolf population size are the preferred monitoring method due to accuracy, confidence intervals, and cost efficiency. The 2022 iPOM estimate of wolf population size was 1,087 wolves (95% C.I. = 984 – 1,199; Fig. 1).

Wolf hunting was recommended as a management tool in the 2004 Montana Wolf Conservation and Management Plan. Calendar year 2022 included parts of two hunting/trapping seasons for wolves. During calendar year 2022, 134 wolves were harvested during the spring, and 114 wolves were harvested during the fall for a total of 248 (Fig. 1). Sales of license year 2021/22 wolf hunting licenses generated $283,358 for wolf monitoring and management in Montana.

Wildlife Services (WS) confirmed the loss of 103 livestock to wolves during 2022, including 58 cattle and 41 sheep; and 4 livestock guard dogs were also killed by wolves (Fig. 1). This total was similar to numbers during 2011-2021. During 2022 the Montana Livestock Loss Board paid $96,545.50 for livestock that were confirmed by WS as killed by wolves or probable wolf kills. Forty-five wolves were killed in response to depredation or to reduce the potential for further depredation. Of the 45 wolves, 35 were killed by WS and 10 were lawfully taken by private citizens. FWP's Wolf Specialists radio-collared 19 wolves during 2022 to meet the legislative requirement for collaring livestock packs and to aid in population monitoring and research efforts.

Montana's wolf population grew steadily from the early 1980s when there were less than 10 in the state. After wolf numbers approached 1,250 in 2011 and wolves were delisted, the wolf population has decreased slightly and may be stabilizing at about 1,160 wolves (Fig. 1). Stabilization of population size may be related to the onset of wolf hunting and trapping seasons, whereas reduced livestock depredation in recent years is most likely related to more aggressive depredation control actions (DeCesare et al. 2018). Montana's wolf population remains well above delisting thresholds (7 – 8x). Wolf license sales have generated nearly $5.1 million for wolf management and monitoring since 2009.

Montana

AGRICULTURAL STATISTICS 2023

Cattle & Calves: Number by Class & Calf Crop – Montana: January 1, 2019-2023

Class	2019	2020	2021	2022	2023
	(head)	(head)	(head)	(head)	(head)
All Cattle & Calves	2,500,000	2,500,000	2,450,000	2,210,000	2,160,000
Cows & Heifers, That Have Calved	1,460,000	1,440,000	1,400,000	1,310,000	1,280,000
Beef Cows	1,448,000	1,428,000	1,389,000	1,299,000	1,270,000
Milk Cows	12,000	12,000	11,000	11,000	10,000
Calves, Under 500 Pounds	80,000	80,000	100,000	85,000	70,000
Steers, 500 Pounds & Over	240,000	250,000	250,000	210,000	215,000
Heifers, 500 Pounds & Over					
Beef Cow Replacements	380,000	390,000	380,000	320,000	310,000
Milk Cow Replacements	8,000	5,000	4,000	4,000	4,000
Other Heifers	232,000	230,000	216,000	186,000	186,000
Bulls, 500 Pounds & Over	100,000	105,000	100,000	95,000	95,000
Cattle on Feed	40,000	50,000	53,000	43,000	40,000
Calf Crop	1,420,000	1,390,000	1,310,000	1,270,000	(1)
Unit	Value of Inventory [2]				
Value per Head (dollars)	1,310	1,300	1,270	1,350	1,510
Value of Inventory (dollars)	3,275,000	3,250,000	3,111,500	2,983,500	3,261,600

1 Data available 2024

2 Value of all Cattle & Calves

Milk & Cream: Marketings, Used on Farm, Income, & Value – Montana: 2018-2022

	Unit	2018	2019	2020	2021	2022
Combined Marketings of Milk & Cream						
Milk Sold [1]	(million pounds)	269	254	248	238	220
Average Price						
Per 100 Pounds of Milk [2]	(dollars)	16.00	18.30	18.60	18.10	25.30
Per Pound of Milkfat	(dollars)	4.21	4.79	4.83	4.71	6.55
Value of Milk Marketings	($1,000)	43,040	46,482	46,128	43,078	55,660
Used for Milk, Cream, & Butter by Producers						
Milk Utilized	(million pounds)	2.00	2.00	2.00	2.00	1.00
Value	(dollars)	320,000	366,000	372,000	362,000	253,000
Milk Used on Farm for Feed	(million pounds)	3.00	3.00	4.00	3.00	2.00
Gross Producer Income [3]	($1,000)	43,360	46,848	46,500	43,440	55,913
Value of Milk Produced [4]	($1,000)	43,840	47,397	47,244	43,983	56,419

[1] Milk sold to plants & dealers as whole milk & equivalent amounts of milk for cream. Includes milk produced by dealers' own herds & small amounts sold directly to consumers. Includes milk produced by institutional herds.
[2] Average price for marketing year.
[3] Cash receipts from marketings of milk & cream, plus value of milk used for home consumption.
[4] Includes value of milk fed to calves.

Sheep & Lambs: Lamb Crop, Farm Slaughter, & Death Loss – Montana: 2014-2023

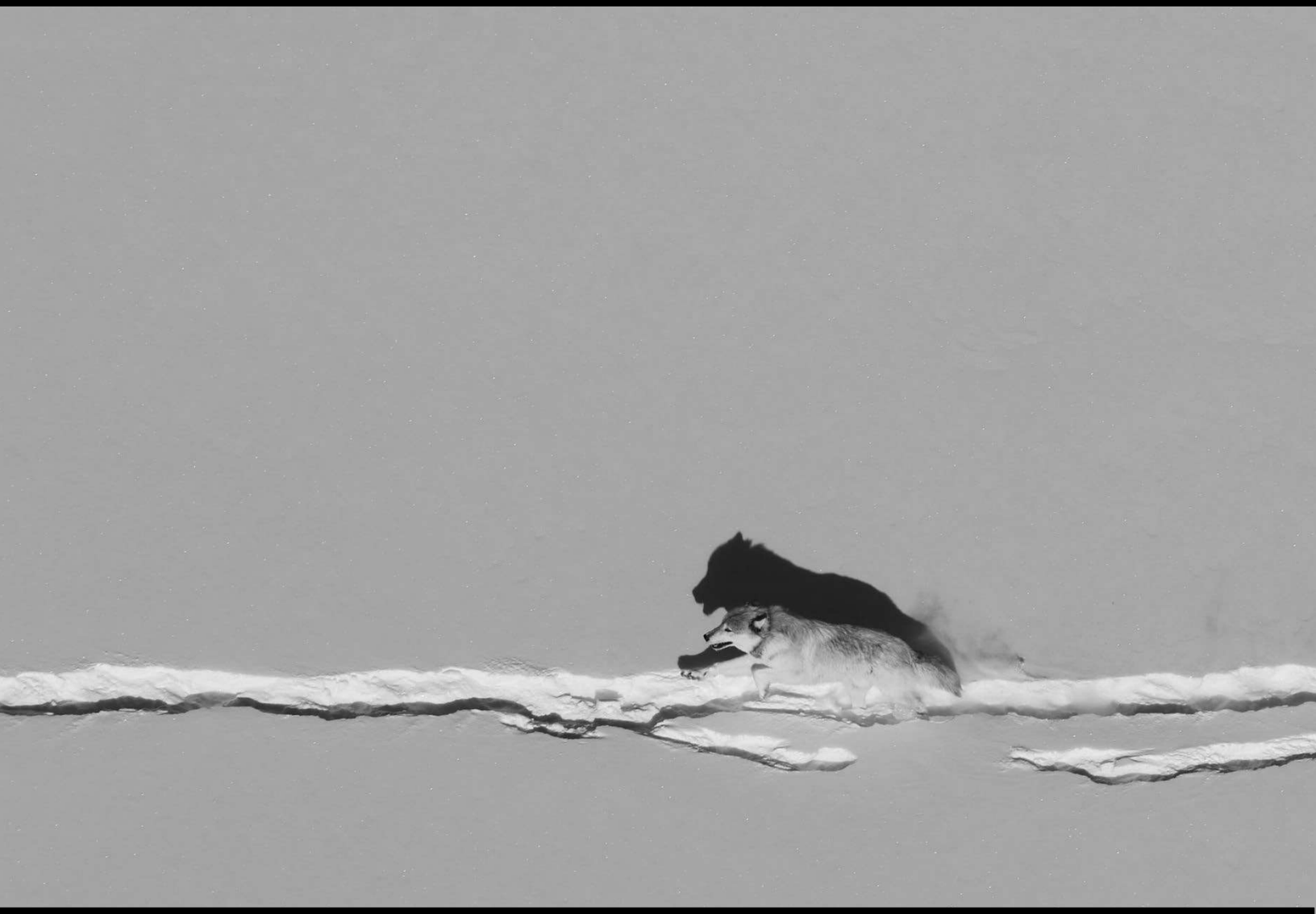
Year	Ewes 1 Year & Older January 1	Lamb Crop [2]	Farm Slaughter [3]	Deaths	
				Sheep	Lambs
	(head)	(head)	(head)	(head)	(head)
2014	155,000	200,000	1,500	12,000	15,000
2015	153,000	190,000	1,500	11,000	16,000
2016	159,000	190,000	1,900	11,000	16,000
2017	159,000	190,000	1,900	11,000	16,000
2018	150,000	180,000	1,900	11,000	17,000
2019	141,000	172,000	1,500	11,000	17,000
2020	131,000	169,000	2,000	10,000	19,000
2021	130,000	158,000	2,000	10,000	16,000
2022	122,000	150,000	2,000	9,000	15,000
2023	118,000	(4)	(4)	(4)	(4)

Wool: Production, Price, & Value – Montana: 2013-2022

Year	Sheep Shorn	Weight per Fleece	Production	Price per Pound	Value of Production [1]
	(1,000 head)	(pounds)	(1,000 pounds)	(dollars)	($1,000)
2013	200.0	8.9	1,770	2.20	3,894
2014	185.0	9.0	1,660	2.05	3,403
2015	205.0	9.0	1,840	1.90	3,496
2016	200.0	9.0	1,800	1.90	3,420
2017	195.0	9.0	1,750	1.90	3,325
2018	180.0	8.9	1,610	2.50	4,025
2019	170.0	8.9	1,510	2.50	3,775
2020	180.0	8.7	1,560	2.20	3,432
2021	170.0	8.8	1,490	2.20	3,278
2022	160.0	8.8	1,400	2.25	3,150

[1] Production multiplied by marketing year average price.

WYOMING GRAY WOLF MONITORING AND MANAGEMENT: 2022 ANNUAL REPORT



Prepared by the Wyoming Game and Fish Department in cooperation with the National Park Service, U.S. Fish and Wildlife Service, USDA-APHIS-Wildlife Services, and Eastern Shoshone and Northern Arapahoe Tribal Fish and Game Department to report the status and management of the gray wolf population in Wyoming from January 1, 2022 through December 31, 2022.

EXECUTIVE SUMMARY

At the end of 2022, the gray wolf (wolf) population in Wyoming remained above minimum recovery criteria, making 2022 the 21st consecutive year Wyoming has exceeded the numerical, distributional, and temporal recovery criteria established for wolves by the U.S. Fish and Wildlife Service. At least 338 wolves in ≥41 packs (including ≥23 breeding pairs) inhabited Wyoming statewide on December 31, 2022. Of the total, there were ≥163 wolves and ≥23 packs (including ≥12 breeding pairs) in the Wolf Trophy Game Management Area (WTGMA), ≥108 wolves and ≥10 packs (including ≥7 breeding pairs) in Yellowstone National Park, ≥18 wolves and ≥3 packs (including ≥2 breeding pairs) in the Wind River Reservation, and ≥49 wolves and ≥5 packs (including ≥2 breeding pairs) resided in areas where wolves are designated primarily as predatory animals in Wyoming. A total of 95 wolf mortalities were documented statewide in Wyoming in 2022: 53 in the WTGMA, 33 in areas where wolves are primarily designated as predatory animals, 7 in Yellowstone National Park, and 2 in the Wind River Reservation. Mortality was from both human causes = 85 (89% of mortalities) and natural causes = 10 (11%). Fifty wolves were captured and radio-collared for monitoring and research in 2022.

In 2022, the Wyoming Game and Fish Department implemented a wolf hunting season with the biological objective to stabilize the wolf population at approximately 160 wolves in the WTGMA. A mortality limit of 47 wolves was divided between 13 hunt areas in the WTGMA and 1 hunt area in the Seasonal WTGMA (hunt area 12). Wolf hunting seasons were open from September 15 to December 31, 2022 with the exception of hunt area 12 (opened on October 15, 2022) and hunt area 13 (closed March 31, 2023). The hunting season for each hunt area closed at the season end date or when the mortality limit in the hunt area was met, whichever occurred first. A total of 31 wolves were killed during the 2022 wolf hunting season. In addition, the 2021 wolf hunting season extended from January 1 to March 31, 2022 in hunt area 13, during which 2 wolves were taken.

Wolves were confirmed to have killed or injured 97 head of livestock (46 cattle, 46 sheep, and 5 horses) statewide in Wyoming in 2022. Wolf-livestock conflicts in the WTGMA remained similar from 2021-2022. Twenty-one wolves were lethally and legally removed by agencies or the public in an effort to reduce livestock losses to wolves (15 in the WTGMA, 6 in predatory animal areas in WYO).

Suggested Citation: Wyoming Game and Fish Department, U.S. Fish and Wildlife Service, National Park Service, USDA-APHIS-Wildlife Services, and Eastern Shoshone and Northern Arapahoe Tribal Fish and Game Department. 2023. Wyoming Gray Wolf Monitoring and Management 2022 Annual Report. K.J. Mills, *ed*. Wyoming Game and Fish Department, 5400 Bishop Blvd. Cheyenne, WY 82006.

Available for download at:
https://wgfd.wyo.gov/WGFD/media/content/PDF/Wildlife/Large%20Carnivore/WYWOLF_ANNUALREPORT_2022.pdf

COVER PHOTO: 1259M, breeding male of the Togwotee pack, observed during a big game survey flight on February 9, 2023. Credit: Mark Gocke.

Wyoming

AGRICULTURAL STATISTICS 2023

USDA

AGRICULTURE COUNTS

Cattle & Calves: Number by Class & Calf Crop – Wyoming: January 1, 2019–2023

Class	2019	2020	2021	2022	2023
	(head)	(head)	(head)	(head)	(head)
All Cattle & Calves	1,300,000	1,320,000	1,300,000	1,260,000	1,240,000
Cows & Heifers, That Have Calved	720,000	730,000	710,000	690,000	680,000
Beef Cows	714,000	724,000	702,000	681,000	671,000
Milk Cows	6,000	6,000	8,000	9,000	9,000
Calves, Under 500 Pounds	100,000	100,000	100,000	90,000	85,000
Steers, 500 Pounds & Over	150,000	155,000	170,000	160,000	165,000
Heifers, 500 Pounds & Over					
Beef Cow Replacements	160,000	160,000	150,000	145,000	140,000
Milk Cow Replacements	4,000	4,000	4,000	5,000	6,000
Other Heifers	126,000	126,000	126,000	135,000	129,000
Bulls, 500 Pounds & Over	40,000	45,000	40,000	35,000	35,000
Cattle on Feed	65,000	70,000	70,000	69,000	72,000
Calf Crop	670,000	660,000	660,000	640,000	(1)
Unit	Value of Inventory [2]				
Value per Head (dollars)	1,260	1,250	1,270	1,320	1,430
Value of Inventory ($1,000)	1,638,000	1,650,000	1,651,000	1,663,200	1,773,200

[1] Data available 2024
[2] Value of all cattle & calves.

Cattle & Calves: Production, Marketings, & Income – Wyoming: 2018–2022

Unit	2018	2019	2020	2021	2022
Production [1] (1,000 lbs)	566,719	575,769	569,187	575,444	548,500
Marketings [2] (1,000 lbs)	784,800	743,400	786,150	791,550	734,850
Value of Production ($1,000)	685,793	695,814	643,174	731,853	823,263
Value of Sales [3] ($1,000)	943,416	888,139	887,850	995,837	1,082,124
Value of Home Consumption ($1,000)	4,052	3,965	4,514	6,610	6,079
Gross Income ($1,000)	947,468	892,104	892,364	1,002,447	1,088,203

[1] Includes custom slaughter for use on farms where produced & state out-shipments, but excludes inter-farm sales within the state.
[2] Excludes custom slaughter at commercial establishments. Production & marketings are live weight in pounds.
[3] Excludes inter-farm in-state sales.

Cattle & Calves: Balance Sheet – Wyoming: 2018–2022

Inventory Additions & Removals	2018	2019	2020	2021	2022
	(head)	(head)	(head)	(head)	(head)
Inventory Beginning of Year	1,320,000	1,300,000	1,320,000	1,300,000	1,260,000
Calf Crop	670,000	670,000	660,000	660,000	640,000
In-Shipments	280,000	270,000	290,000	272,000	250,000
Marketings [1]					
Cattle	824,500	786,000	829,000	836,000	772,000
Calves	101,000	85,500	95,500	95,500	95,500
Farm Slaughter Cattle & Calves [2]	500	500	500	500	500
Deaths					
Cattle	13,000	16,000	14,000	12,000	13,000
Calves	31,000	32,000	31,000	28,000	29,000
Inventory End of Year	1,300,000	1,320,000	1,320,000	1,260,000	1,240,000

[1] Includes custom slaughter for use on farms where produced & State out-shipments, but excludes inter-farm sales within the State.
[2] Excludes custom slaughter at commercial establishments.

Commercial Cattle Slaughter – Wyoming: Monthly 2021 & 2022

Month	Number Slaughtered		Total Live Weight		Average Live Weight	
	2021	2022	2021	2022	2021	2022
	(head)	(head)	(1,000 pounds)	(1,000 pounds)	(pounds)	(pounds)
January	1,000	1,100	1,169	1,400	1,216	1,231
February	1,100	1,200	1,288	1,433	1,194	1,192
March	1,100	1,200	1,321	1,427	1,165	1,197
April	1,100	1,000	1,276	1,171	1,214	1,159
May	900	1,000	983	1,160	1,154	1,190
June	1,100	1,200	1,366	1,376	1,193	1,155
July	900	1,000	1,076	1,209	1,191	1,176
August	1,000	1,100	1,233	1,274	1,226	1,202
September	900	1,000	1,084	1,176	1,194	1,164
October	800	800	954	923	1,235	1,192
November	1,000	1,100	1,221	1,226	1,224	1,157
December	1,100	1,100	1,324	1,264	1,233	1,166
Annual Total [1]	11,900	12,700	14,295	15,039	1,203	1,182

[1] Totals may not add due to rounding.

Commercial Hog Slaughter – Wyoming: Monthly 2021 & 2022

Month	Number Slaughtered		Total Live Weight		Average Live Weight	
	2021	2022	2021	2022	2021	2022
	(head)	(head)	(pounds)	(pounds)	(pounds)	(pounds)
January	300	300	72,000	79,000	275	281
February	300	300	90,000	94,000	281	277
March	300	200	79,000	53,000	294	268
April	400	300	103,000	94,000	282	291
May	800	800	223,000	212,000	288	252
June	500	500	137,000	136,000	278	265
July	600	500	146,000	122,000	258	261
August	1,100	1,100	289,000	265,000	267	252
September	400	400	111,000	105,000	286	239
October	200	100	65,000	40,000	279	274
November	300	300	84,000	72,000	312	262
December	300	200	83,000	46,000	277	267
Annual Total	5,300	5,100	1,482,000	1,320,000	279	261

Sheep & Lambs: Inventory by Class & Lamb Crop – Wyoming: January 1, 2019–2023

Class	2019	2020	2021	2022	2023
	(head)	(head)	(head)	(head)	(head)
All Sheep & Lambs [1]	350,000	340,000	340,000	330,000	335,000
Sheep & Lambs Kept for Breeding					
All Breeding Sheep & Lambs	265,000	265,000	270,000	260,000	255,000
Ewes	215,000	215,000	220,000	215,000	205,000
Rams	7,000	7,000	7,000	7,000	7,000
Replacement Lambs	43,000	43,000	43,000	38,000	43,000
Market Sheep & Lambs					
Total Market Sheep & Lambs	85,000	75,000	70,000	70,000	80,000
Market Sheep	2,000	2,000	3,000	2,000	3,000
Market Lambs	83,000	73,000	67,000	68,000	77,000
Market Lambs by Size Group					
Under 65 Pounds	1,000	4,000	2,000	2,000	2,000
65 - 84 Pounds	12,000	7,000	6,000	8,000	7,000
85 - 105 Pounds	32,000	25,000	34,000	26,000	31,000
Over 105 Pounds	38,000	37,000	25,000	32,000	37,000
Deaths					
Sheep	12,000	11,000	11,000	10,000	(2)
Lambs	12,000	10,500	14,000	12,000	(2)
Units	Lamb Crop & Value of Inventory				
Lamb Crop [3] (head)	225,000	230,000	240,000	230,000	(2)
Lambing Rate [4] (lambs/100 ewes)	105	107	109	101	(2)
Value per Head [5] (dollars)	209	215	212	225	238

[1] All sheep includes new crop lambs. New crop lambs are lambs born after September 30, the previous year.
[3] Data not available until January 2024.
[3] Total for the year. Lamb crop defined as lambs marked, docked or branded.
[4] Not strictly a lambing rate. Represents lamb crop expressed as a percent of ewes 1 year old & older on hand at the beginning of the year.
[5] Average value of all sheep, including lambs, at the beginning of the year.