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Tirzio Lopez, Vice Chair, New Mexico Game Commissioners
New Mexico Department of Game and Fish
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Re: Comments on NMDGF's black bear (*Ursus americanus*) four-year rulemaking process

Dear Director Sloane, Vice Chair Lopez, and Commissioners:

On behalf of the Humane Society of the United States, Animal Protection New Mexico, the Rio Grande Chapter of the Sierra Club, and our members and supporters in New Mexico, we thank you for this opportunity to comment on New Mexico Department of Game and Fish's four-year, proposed rule for black bears. Given the immense uncertainties New Mexico black bears face, we request that NMDGF reduce their proposed bear-kill quotas by at least 50%. We provide a summary overview of our comments and full, cited comments follow.

Summary:

A. New Mexico's black bear population density and abundance determinations made by department of Game and Fish personnel have been wholly insufficient, are undiscoverable and therefore must be assumed to be scientifically indefensible. Since the public has not been provided with tangible reasons to trust the department's conclusions, the Game Commission must lower statewide black bear quotas. The NMDGF has redacted (blacked out) population data from our public information requests, making a study of their population calculations (peer review) impossible. The process involving NMDGF's proposal to raise the black bear quotas has been unnecessarily secretive, and the public has been kept in the dark. Instead, NMDGF initially developed a document totaling 1.5 pages that encompassed both its proposed black bear (*Ursus americanus*) and cougar (*Puma concolor*) rule changes and then suddenly updated that document with a few more pages in early August. NMDGF will accept comments on its proposed rules until an unknown date in September, at which time it will prepare final draft rules for both bears and cougars that will be posted to its website. It is uncertain if the public will have an opportunity to review and comment on these final draft rules before the Game Commission makes its decision in October. The public has little information about the studies NMDGF relies upon to make population determinations, and we have seen no population management objectives (other than implicit hunter satisfaction and future hunting opportunities). In other words, the process by which these rules were drafted and the public engaged, is a failed course of action.

NMDGF's bear-population determinations are based upon an unscientific and crumbling foundation because New Mexico's bear studies are woefully outdated. Those old studies were conducted in New Mexico's best bear habitats. Then NMDGF took those high-density numbers and mysteriously generalized them statewide—artificially inflating estimated population figures that likely have no basis in reality.

NMDGF has not embarked on year-to-year population studies so it is not possible to know how bear populations are trending and thus whether current hunting is sustainable, much less whether increasing hunting quotas will be. NMDGF's claims, that New Mexico bear management is sustainable, are not backed up by current empirical data.

NMDGF has not factored in climate instability into its bear hunting proposals. It has not considered the 20-year *megadrought*—a drought not seen since 800 A.D.—and the historic wildfires which killed bears and destroyed their habitats, including last year's wildfires (the largest in New Mexico's recorded history), into its quota-setting process. Because New Mexico's bear population suffers from low genetic diversity, because those populations are poorly connected to others and because the climate crisis will only worsen, New Mexico's bears face a bleak future that will not be able to withstand over-hunting.

When an activity potentially threatens the environment, the *precautionary principle* warns that the proponent of that activity assumes the burden of proof and must act with restraint. NMDGF has not met this burden but rather has thrown caution to the wind with bear quotas that are likely to damage New Mexico's black bear populations. **For those reasons, the Game Commission must lower statewide black bear quotas to prevent inbreeding and the loss of bear populations that are uniquely adapted to New Mexico's arid habitats**.

B. **NMDGF proposes *not* to count all sources of bear mortality as part of its quotas, including disease, predator-control kills, human-bear conflict kills, road-killed bears and the significant amount of annual bear poaching**. Black bears are slow to reproduce and can only withstand **between 4% and 10% total mortality**, and failing to include total mortality amounts to flawed wildlife management. For all of these reasons, **the Game Commission should not only reject any increase in hunting quotas but also should call for quota reductions statewide.**

C. **Hounding bears with packs of radio-collared hounds is not fair chase hunting and using archery equipment is cruel and results in uncounted wounding losses.** Hounding harms non-target species, including deer and domestic livestock and results in deaths and injuries to *federally protected Mexican wolves*, bear cubs, and results in deadly fights between bears and hounds. It causes both bears and hounds to die from heat exhaustion. Using archery equipment to hunt bears results in prolonged deaths of bears and wounding losses that are never counted in bear quotas**.** For these reasons, **the Game Commission must abolish hound hunting of bears and the use of archery equipment to hunt bears.**

D. **Researchers have found that black bear hunting does not resolve human-bear conflicts, and, may in fact, worsen them. Also, trophy hunting bears does not reduce attacks on humans—but keeping dogs on leashes in bear country does.** NMDGF must engage Bear Wise or Bear Smart strategies to prevent future conflicts in both urban and rural areas—because human-bear conflicts are entirely preventable with planning.

E. **New Mexico's wildlife managers should develop a comprehensive management plan informed by the best available science**. That management plan should clearly spell out goals and objectives so the public and decisionmakers alike are not kept in the dark. No such plan currently exists. The public is being kept in the dark about even the most basic aspects of the department's bear management plans in New Mexico.

F. **Family oriented black bears hold intrinsic, social and economic values, and provide incalculable benefits to their ecosystems.** Highly intelligent, devoted black bear mothers spend up to two years raising their very few cubs they produce. Among other myriad benefits they provide, bears also spread more seed than birds. Furthermore, the public loves viewing and photographing bears. For these reasons, the Game Commission must conserve and protect black bears for future generations.

G. **New Mexico law confirms that black bears must be conserved for all citizens.** It is axiomatic that "agencies are created by statute, and limited to the power and authority expressly granted or necessarily implied by those statutes." *Qwest Corp. v. New Mexico Pub. Reg. Comm'n*, 140 N.M. 440, 446 (N.M. 2006). Thus "the Legislature, not the administrative agency, declares the policy and establishes…standards to which the agency must conform." *State ex rel. Taylor v. Johnson*, 125 N.M. 343, 349 (N.M. 1998). Here, the New Mexico Legislature created the Game Commission in order "to provide an adequate…system for the protection of the game and fish of New Mexico" and "to provide for their…protection, regulation, and conservation…" N.M.S.A. § 17-1-1. In promulgating rules and regulations pertaining to hunting, the Legislature expressly directed the Commission to give "due regard" to "the distribution, abundance…and breeding habits" of particular species. N.M.S.A. § 17-1-26. And, like all New Mexico agencies, the Game Commission may not establish rules that are "not supported by substantial evidence" or that are enacted "arbitrary or capriciously." N.M.S.A. § 39-3-1.1(D). Taken together, the

statutory scheme authorizing this rulemaking requires evidence-driven, scientific management that seeks to sustainably maintain wildlife populations.

H. Conclusion. Because so many uncertainties exist with NMDGF's proposed black bear rule, we provide these comprehensive comments, including **all journal articles cited herein as part of the administrative record and are available here: https://drive.google.com/drive/folders/1u_FlDR1428yw5ZInlPf3GqeTeorOfDJO?usp=sharing.** This is done with the hope that the final rule will be informed by sound science and developed with clear objectives and goals, including for reducing human-bear conflicts, ensuring that black bear populations in New Mexico are genetically fit for long-term adaption in the face of so many threats to their persistence, including loss of habitats and travel corridors, extreme droughts, and severe, wholly unprecedented wildfires.

The Game Commission must reject the proposed black bear quota increases as they have no basis in science and could lead to the loss of New Mexico's uniquely adapted bear populations. The Game Commission must include in its final quotas all sources of mortality. Given the immense uncertainties New Mexico black bears face, we request that NMDGF reduce their proposed bear-kill quotas by at least 50%.

To prevent the harm to non-target species including Mexican wolves, deer and domestic livestock the Game Commission must disallow the hounding of black bears. Hounding of bears is a controversial practice that is not fair-chase hunting, and has no place in New Mexico's hunting regulations. The Game Commission must also disallow archery equipment to hunt bears because it does not result in quick, clean kills but prolongs a cruel death that can results in dead bears not being counted toward quotas. Black bears are ecologically important to their ecosystems. They hold inherent values and are much beloved by the public. The NMDGF must create a comprehensive rule supported by scientific justification for management of black bears and begin to work on a credible, long-term black bear management plan that outlines goals and objectives, including conserving New Mexico's black bears for future generations. Additionally, we believe the public has the right to expect NMDGF to disseminate final draft rules, along with discoverable and detailed scientific justification for those rules using the best available science, rather than providing vague, indefensible, incomplete, and incoherent rules that shift throughout the comment process.

Comments:

1. New Mexico's black bear population densities and abundance are unknown; therefore, bears should be managed conservatively

Based on the April 28, 2023 Game Commission hearing[1] and proposed rule, it appears that NMDGF will increase hunting quotas for black bears. NMDGF relies on density estimates from studies conducted by Matthew J. Gould, Cecily Costello and NDMGF staff. However, the results of the studies conducted by Gould and Costello relied on data that were collected during the years 2012-2014 and 1992-2000, respectively, and therefore applied to New Mexico's bear populations 10 to 30 years ago. Substantial changes to bear management in New Mexico have occurred since those studies were completed and the results of those studies are outdated and no longer applicable to the contemporary populations in the state. Consequently, the current health and sustainability of bear populations in those Zones are entirely uncertain and NMDGFs' claims that bear populations are growing, or that their management (e.g., hunts, control kills and other sources of bear mortality) is "sustainable," are not based on relevant, contemporary science. Although NMDGF obtained contemporary densities and abundances of a few New Mexico bear populations (in Zones 1 and 10 only) in recent years (2019-2021), those studies and the corresponding results have not been subjected to any sort of expert peer-review process, which is critical to ensuring validity and reliability. Furthermore, no multi-year bear studies in any Zone have been conducted to estimate population growth rates from which sustainable yields could be reliably determined. Thus, NMDGF continues to rely on outdated research results that no longer reflect the current status of bear populations in most Zones, and it has yet to estimate contemporary population growth rates in any Zone to identify what sustainable harvest rates actually might be.

[1] New Mexico Game Commission meeting. Stewart Liley presentation concerning the bear and cougar, 4-year rule https://youtu.be/ia22iBwnbVs at timestamp 1: 30.

In their study of 667 North American wildlife management plans, Artelle et al. (2018) and others found that some or most of the four fundamental "hallmarks of science" (measurable objectives, evidence, transparency and independent review) were absent from most state or provincial wildlife management plans in the U.S. and Canada.[2] Sixty percent of the management plans reviewed contained fewer than half of those hallmarks necessary to meet standard scientific criteria.[3] Artelle and others found that governmental wildlife agencies failed to state their objectives for management, have quantitative information about wildlife population sizes, provide transparency about how hunting rates were estimated, or use independent peer review of their plans.[4] They write: "Our findings suggest that the assumed scientific basis of wildlife management across much of the United States and Canada might warrant reconsideration."[5] NMDGF grossly lacks all "hallmarks of science" in their bear management, particularly considering that NMDGF has yet to develop a black bear management plan for New Mexico.

Large-bodied carnivores such as black bears are sparsely populated across vast areas, invest in few offspring, provide extended parental care to their young and reproduce slowly.[6] Bears are capable of self-regulation[7] and are regulated by habitat and climatic conditions. Considering these biological factors, they rely on social stability to maintain resiliency.[8] Without social stability, bears can experience sexually selected infanticide; that is, when a resident, adult male is removed, subadult males vie for his home range and mates. These newcomers kill the adult male's offspring to spur females back into breeding so the newcomers can pass on their genetic materials.[9] Gosselin et al. (2015) state: "In species with sexually selected infanticide ("SSI"), hunting may decrease juvenile survival by increasing male turnover." This study and others show that hunting mortality can harm social organization of species, because it promotes male turnover and thus increases sexually selected infanticide upon cubs of deceased males.[10] Wildlife agencies do not measure these added mortalities that result from the hunting of a single bear.

Bears reproduce slowly and are highly susceptible to overkill.[11] Females generally give birth to litters of cubs only every 2-3 years. Cub survival in one peer-reviewed Colorado study was about 55%.[12] In other words, nearly 1 in 2 cubs dies within their first year of life. Cubs die from many factors including vehicle collisions, predation or starvation. The intervals are dictated by bear biology, weather and climate. Bears will keep their cubs to 15-24 months, or longer if the cubs are underweight. But if there are droughts or frosts, bears' foods can be unavailable to them—which both reduces reproduction potential and increases the intervals between litters of cubs and cub survival itself.[13] Compared to other

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[2] Kyle A. Artelle et al., "Hallmarks of science missing from North American wildlife management," *Science Advances* 4, no. 3 (2018).
[3] Ibid.
[4] Ibid.
[5] Artelle et al., "Hallmarks of science missing from North American wildlife management," p. 3.
[6] A. D. Wallach et al., "What is an apex predator?," *Oikos* 124, no. 11 (2015).
[7] Wallach et al., "What is an apex predator?."
[8] J. L. Weaver, P. C. Paquet, and L. F. Ruggiero, "Resilience and conservation of large carnivores in the Rocky Mountains," *Conservation Biology* 10, no. 4 (1996); Wallach et al., "What is an apex predator?."
[9] S. C. Frank et al., "Indirect effects of bear hunting: a review from Scandinavia," *Ursus* 28, no. 2 (2017); Jacinthe Gosselin et al., "The relative importance of direct and indirect effects of hunting mortality on the population dynamics of brown bears," *Proceedings of the Royal Society B* 282 (2015); M. Leclerc et al., "Hunting promotes spatial reorganization and sexually selected infanticide," *Scientific Report* 7, no. 45222 (2017); J. E. Swenson, "Implications of sexually selected infanticide for the hunting of large carnivores," in *Animal Behavior and Wildlife Conservation*, ed. M. Festa-Bianchet and M Apolloio (Washington, D.C.: Island Press, 2003); J. E. Swenson et al., "Infanticide caused by hunting of male bears," *Nature* 386 (1997); D. C. Norton et al., "Female American black bears do not alter space use or movements to reduce infanticide risk," *PLoS One* 13, no. 9 (2018).
[10] Frank et al., "Indirect effects of bear hunting: a review from Scandinavia."; Swenson et al., "Infanticide caused by hunting of male bears."; Norton et al., "Female American black bears do not alter space use or movements to reduce infanticide risk."
[11] D. L. Garshelis and H. Hristienko, "State and provincial estimates of American black bear numbers versus assessments of population trend," *Ursus* 17, no. 1 (2006).
[12] Heather E. Johnson, David L. Lewis, and Stewart W. Breck, "Individual and population fitness consequences associated with large carnivore use of residential development," *Ecosphere* 11, no. 5 (2020).
[13] Craig McLaughlin, "Black bear assessment and strategic plan," *Maine Department of Inland Fisheries and Wildlife* (1999); Thomas D. Beck et al., "Sociological and ethical considerations of black bear hunting," *Proceedings of the Western Black Bear Workshop* 5 (1995); Julie A. Beston, "Variation in life history and demography of the American black bear," *Journal of Wildlife Management* 75, no. 7 (2011).

mammals, black bears have few offspring. Generally, females are not considered to be adults until they are 3 to 6 years old, but females are capable of breeding until age 21.[14] Fecundity varies with age:

- Female bears 5 years old or younger, or 17 years old or older, are typically barren or will give birth to only one cub.[15]
- Bears who are between 6 and 16 years old typically produce twins.[16]
- Females between 10-12 years old, the prime breeding age for black bears, are more likely to birth triplets if sufficient food is available to them—particularly natural foods.[17]

In Colorado bear studies, the female cohort of the population declined by 57% because of human-caused mortalities from vehicle collisions, hunting, and predator control, which coincided with widespread unavailability of natural foods, and these losses would not have been detected by wildlife managers without rigorous, multi-year population monitoring in place.[18] Laufenberg et al. (2018) write:

> We documented a 57% decline in female bear abundance immediately following the natural food shortage coinciding with an increase in human-caused bear mortality (e.g., vehicle collisions, harvest, and lethal removals) primarily in developed areas. We also detected a change in the spatial distribution of female bears with fewer bears occurring near human development in years immediately following the food shortage, likely as a consequence of high mortality near human infrastructure during the food shortage. Given expected future increases in human development and climate-induced food shortages, we expect that bear dynamics may be increasingly influenced by human-caused mortality, which will be difficult to detect with current management practices. To ensure long-term sustainability of bear populations, we recommend that wildlife agencies invest in monitoring programs that can accurately track bear populations, incorporate non-harvest human-caused mortality into management models, and work to reduce human-caused mortality, particularly in years with natural food shortages.[19]

In fact, black bear biologists warn that managers must limit recreational black bear killing to reduce total mortality, and especially during years of poor natural food production, which is readily predicted by weather events.[20]

Bears reproduce slowly and females rarely migrate—they prefer to live near their natal areas—and this compounds the harms from trophy hunting and other sources of mortality that affect black bear populations.[21] The loss of females reduces a bear population's ability to bounce back as those females are the key to sustaining the population.[22]

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[14] Johnson, Lewis, and Breck, "Individual and population fitness consequences associated with large carnivore use of residential development."; Garshelis and Hristienko, "State and provincial estimates of American black bear numbers versus assessments of population trend."; Beston, "Variation in life history and demography of the American black bear."
[15] Johnson, Lewis, and Breck, "Individual and population fitness consequences associated with large carnivore use of residential development."
[16] Johnson, Lewis, and Breck, "Individual and population fitness consequences associated with large carnivore use of residential development."
[17] Johnson, Lewis, and Breck, "Individual and population fitness consequences associated with large carnivore use of residential development."
[18] Jared S. Laufenberg et al., "Compounding effects of human development and a natural food shortage on a black bear population along a human development-wildland interface," *Biological Conservation* 224 (2018).
[19] Emphasis added. Laufenberg et al., "Compounding effects of human development and a natural food shortage on a black bear population along a human development-wildland interface," p. 184.
[20] H. E. Johnson et al., "Human development and climate affect hibernation in a large carnivore with implications for human-carnivore conflicts," *Journal of Applied Ecology* 55, no. 2 (2018).
[21] Laufenberg et al., "Compounding effects of human development and a natural food shortage on a black bear population along a human development-wildland interface."
[22] Heather Johnson et al., "Assessing Ecological and Social Outcomes of a Bear-Proofing Experiment," *The Journal of Wildlife Management* (2018).

Bear biologists suggest that the total annual human-caused mortality that a black bear population can sustain is between only 4% to 10% of the population; more than that is super-additive mortality.[23] New Mexico permits between 8-12% offtake, which is too high. Additive mortality can increase the total death rate of a population,[24] whereas "super-additive mortality" describes a population decline larger than expected from documented mortality. This can occur through the killing of some individuals (by humans), which then indirectly increases the risk of death for others (e.g., infanticide in bears) or through failures of immigration and births to compensate.[25] **Also, New Mexico must continue to factor in total mortality from all causes into its so-called bear "harvest limits," including from poaching, road kills, disease and predator-control actions.**

Bear poaching is a significant source of mortality for bears in New Mexico. Costello et al. (2001) write:

> Among adult and subadult bears, most mortality was human-caused. In addition to hunting, illegal kills and depredation kills were significant sources of mortality for these bears. Illegal kills were documented on both study areas, and many of the unexplained losses were probably due to illegal kills followed by destruction of the transmitters.[26]

Agency bear biologists in Washington state reported that approximately 20% of their study bears were poached, and even more of their bears died from wounding losses.[27] NMDGF must consider additive, unanticipated losses because of well-documented sloppy human behaviors around bowhunting and wildlife poaching. Unsurprisingly, black bear poaching is widely documented in the U.S., to the point that it threatens black bear survival in some regions.[28] Allowing the hunting of a species induces and increases the numbers of animals killed by poachers because of the perception by some that these species have no value when legal hunting is permitted.[29]

In sum, researchers find that few wildlife agencies have scientifically credible wildlife management plans, and in the case of New Mexico black bears, no plan exists at all. Thus, we respectfully request that NMDGF develop a sound black bear management plan that details population objectives in each Zone, provides justification for those objectives, and describes what monitoring will be implemented to evaluate whether objectives were achieved or not. Unless bear populations are continuously monitored, wildlife managers assume their populations are stable, when in fact, they could be losing nearly 60% of the female population. Therefore, New Mexico must invest in long-term population monitoring to ensure bear populations are safe. And finally, New Mexico must limit overall take to between 4% and 10% of the population rather than the current 8% to 12%, and that must include all causes of mortality such as poaching and road kill.

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[23] Beston, "Variation in life history and demography of the American black bear."; Lindsay Welfelt, Richard Beausoleil, and Robert Wielgus, "Factors Associated with black bear density and implications for management," *The Journal of Wildlife Management* (2019).

[24] Scott Creel and Jay Rotella, "Meta-Analysis of Relationships between Human Offtake, Total Mortality and Population Dynamics of Gray Wolves (*Canis lupus*)," *PLoS ONE* 5, no. 9 (2010).

[25] Creel and Rotella, "Meta-Analysis of Relationships between Human Offtake, Total Mortality and Population Dynamics of Gray Wolves (*Canis lupus*)."

[26] C. M. Costello et al., "A Study of Black Bear Ecology in New Mexico with Models for Population Dynamics and Habitat Suitability: Final Report: Federal Aid in Wildlife Restoration Project W-131-R.," *New Mexico Department of Game and Fish* (2001): p. 55.

[27] G. M. Koehler and D. J. Pierce, "Survival, cause-specific mortality, sex, and ages of American black bears in Washington state, USA," *Ursus* 16, no. 2 (2005).

[28] Caitlin M. Glymph, "Spatially explicit model of areas between suitable black bear habitat in east Texas and black bear populations in Louisiana, Arkansas, and Oklahoma" (Masters M.A., Stephen F. Austin State University, 2017); B. J. Wear, R. Eastridge, and J. D. Clark, "Factors affecting settling, survival, and viability of black bears reintroduced to Felsenthal National Wildlife Refuge, Arkansas," *Wildlife Society Bulletin* 33, no. 4 (2005), https://doi.org/10.2193/0091-7648(2005)33[1363:FASSAV]2.0.CO;2, http://pubs.er.usgs.gov/publication/70027414; California Department of Fish and Game, "Black bear management plan," *https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=82769&inline* (1998).

[29] Guillaume Chapron and Adrian Treves, "Blood does not buy goodwill: allowing culling increases poaching of a large carnivore," *Proceedings of the Royal Society of London B: Biological Sciences* 283, no. 1830 (2016).

2. Methods for estimating bear populations must be credible

NMDGF's methods to estimate bear density/abundance in some Zones during 2012-2014 (i.e., the Gould et al. (2018) study)[30] and during 2019-2021 (NMDGF 2023)[31] were in the framework of recommended best practices/best methods for estimating density and abundance of black bears (e.g., noninvasive hair-traps to obtain genetic detection data from which demographic parameters are estimated using spatially explicit models). We appreciate the care that went into measuring these bears' numbers using noninvasive methods. However, the estimates from Gould et al. (2018) are now 9-11 years old, exceeding the average black bear generation time and average lifespan of most black bears, and are therefore outdated and do not reflect the contemporary status of bear populations in those Zones.

Additionally, both Gould et al. (2018) and NMDGF (2023) contain a major flaw. Those studies only sampled, and therefore only produced density/abundance estimates for, primary bear habitats in the surveyed Zones (i.e., the "best" or "optimal" habitats). Secondary bear habitats were not sampled and, consequently, basing management ("harvest" limits) on those estimates has a high risk of leading to unsustainable killing rates.[32] In stark contrast to NDMGF's (2023) erroneous claim that, "although bears use secondary and edge habitat, these habitats were not included in density estimation, *resulting in conservative estimates*," sampling only primary habitats and disregarding secondary and edge habitats actually results in *overly optimistic density estimates* (i.e., positively biased overestimates). This occurs because bear densities are expected to be highest in primary, or optimal, habitats, whereas secondary and edge habitats (i.e., suboptimal) should be expected to have lower bear densities. Had all three habitat classes been sampled, then the mean density point estimate for each Zone likely would have been much lower, because density would have been averaged across habitat classes. This is a fundamental feature of density estimation with spatial capture-recapture models when spatial variation in density as a function of habitat suitability/availability is ignored.[33]

For Zones in which density estimates have not been produced, NMDGF relies on the extrapolation of density estimates to multiple classes of presumed bear habitats. However, NMDGF's approach to extrapolating densities to other areas is highly problematic.[34] The bear habitat suitability model relied on old GPS collar data, much of which was collected in localized parts of the state that did not represent the ecological conditions present throughout most of the state, which was supplemented with mortality data, much of which was not a random sample of the population.[35] NMDGF and T. Perry used a similar habitat-based extrapolation approach when developing their cougar habitat suitability model to which cougar densities from other jurisdictions with dissimilar habitat types were prescribed to habitat classes for prescribing harvest limits. Recent research by Murphy et al. (2019) and NMDGF (2023) demonstrated that the results of that cougar habitat suitability model were grossly unreliable and severely overestimated cougar density in multiple Zones, which caused NMDGF to prescribe harvest limits that resulted in overharvest of the local populations by an average of 70%.[36] That substantial discrepancy between scientific research results and a very poor habitat suitability model is what caused NMDGF to considerably reduce cougar harvest limits in Zones B, Q, and the former Zone F prior to and during the 2020 rulemaking process and for the current 2024 Rule. Thus, given NMDGF's bear habitat model relied on similarly poor-quality data, it is reasonable to assume that NMDGF's extrapolation of bear densities based on habitat classes is severely flawed.

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[30] Matthew J. Gould et al., "Density of American black bears in New Mexico," *The Journal of Wildlife Management* 82, no. 4 (2018).
[31] New Mexico Department of Game and Fish, "Research summary 2019-2021: Estimating black bear abundance using spatial capture-recapture in Bear Management Zones 1 and 10," *Santa Fe, NM* (2023).
[32] Gould et al., "Density of American black bears in New Mexico."
[33] Daniel W. Linden, Alexej P. K. Sirén, and Peter J. Pekins, "Integrating telemetry data into spatial capture–recapture modifies inferences on multi-scale resource selection," *Ecosphere* 9, no. 4 (2018); K. M. Proffitt et al., "Integrating resource selection into spatial capture-recapture models for large carnivores," *Ecosphere* 6, no. 11 (2015); Jacob M. Humm et al., "Spatially explicit population estimates for black bears based on cluster sampling," *The Journal of Wildlife Management* 81, no. 7 (2017).
[34] Tom Beck et al., *Cougar Management Guidelines* (Bainbridge Island, WA: WildFutures, 2005); Sean M. Murphy et al., "Review of puma density estimates reveals sources of bias and variation, and the need for standardization," *Global Ecology and Conservation* 35 (2022).
[35] New Mexico Department of Game and Fish, "New-Mexico-Bear-Habitat-Model," *https://beta.wildlife.state.nm.us/download/new-mexico-bear-habitat-model/* (2015).
[36] New Mexico Department of Game and Fish, Research summary 2018-2021: Estimating cougar density and population size in New Mexico using spatial mark-resight models, (2023).

Unless they are intensively studying a bear population, state wildlife agencies generally poorly assess the total mortality that bears sustain and may increase quotas when they should be decreasing them.[37] Bears may not be occupying available habitat because of human presence.[38] Garshelis and Hristienko (2006) caution that many state wildlife managers fail to adequately investigate population sizes and trends, but rather rely on guesswork to estimate bear numbers.[39] Population trends must be determined using reliable methodologies; however, sightings, predation events, and kill levels are not reliable means to indexing a population.[40]

Kill ("harvest") numbers/rates are not a valid means to index a live population and tell nothing about the demographics or trajectory of a population—particularly the fates of adult females, the most important demographic of a (bear) population.[41] This methodology has no public accountability associated with it and is not based in sound science. In their study, Welfelt et al. (2019) found bear densities range widely by region, and that managers had overestimated the population of bears in western Washington—including cubs—by 50%.[42] The implications for New Mexico are particularly salient, given that black bear habitat is also widely varied by region, and black bears are often a forest obligate.[43] Density estimates from studies conducted in optimal quality habitats where animals are abundant can be extrapolated only cautiously to areas with similar habitats and landscape characteristics.[44]

To reliably estimate population sizes, densities, and growth rates of New Mexico's bear populations statewide, and monitor the harms from human-caused mortalities and climate change on bear population demographics, we suggest reading the following contemporary studies.[45]

- J. D. Alston, J. D. Clark, D. B. Gibbs and J. Hast. (2022). Density, harvest rates, and growth of a reintroduced American black bear population. The Journal of Wildlife Management Vol. 86.

- Humm, J. and Clark, J.D. (2021). Estimates of Abundance and Harvest Rates of Female Black Bears Across a Large Spatial Extent. Jour. Wild. Mgmt., 85: 1321-1331.

- Hooker, M.J., Chandler, R.B., Bond, B.T. and Chamberlain, M.J. (2020). Assessing Population Viability of Black Bears using Spatial Capture-Recapture Models. Jour. Wild. Mgmt., 84: 1100-1113.

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[37] Laufenberg et al., "Compounding effects of human development and a natural food shortage on a black bear population along a human development-wildland interface."; Welfelt, Beausoleil, and Wielgus, "Factors Associated with black bear density and implications for management."
[38] Welfelt, Beausoleil, and Wielgus, "Factors Associated with black bear density and implications for management."
[39] Garshelis and Hristienko, "State and provincial estimates of American black bear numbers versus assessments of population trend.", p. 6
[40] Beck et al., *Cougar Management Guidelines*. Nick Salafsky and Richard Margoluis, "Threat Reduction Assessment: a Practical and Cost-Effective Approach to Evaluating Conservation and Development Projects," *Conservation Biology* 13, no. 4 (1999). Nick Salafsky and Richard Margoluis, "What Conservation Can Learn from Other Fields about Monitoring and Evaluation," *BioScience* 53, no. 2 (2003).
[41] Keita Fukasawa, Yutaka Osada, and Hayato Iijima, "Is harvest size a valid indirect measure of abundance for evaluating the population size of game animals using harvest-based estimation?," *Wildlife Biology* 2020 (2020); Garshelis and Hristienko, "State and provincial estimates of American black bear numbers versus assessments of population trend."; Beck et al., *Cougar Management Guidelines*; Kenneth A. Logan and Linda L. Sweanor, *Desert puma: evolutionary ecology and conservation of an enduring carnivore* (Washington, DC: Island Press, 2001).
[42] Welfelt, Beausoleil, and Wielgus, "Factors Associated with black bear density and implications for management."
[43] Rahel Sollmann et al., "Habitat associations in a recolonizing, low-density black bear population," *Ecosphere* 7, no. 8 (2016).
[44] Beck et al., *Cougar Management Guidelines*., p. 47-8. Murphy et al., "Review of puma density estimates reveals sources of bias and variation, and the need for standardization."
[45] Joshua D. Alston et al., "Density, harvest rates, and growth of a reintroduced American black bear population," *The Journal of Wildlife Management* 86, no. 8 (2022); Jacob Humm and Joseph Clark, "Estimates of Abundance and Harvest Rates of Female Black Bears Across a Large Spatial Extent," *The Journal of Wildlife Management* 85 (2021); Michael J. Hooker et al., "Assessing Population Viability of Black Bears using Spatial Capture-Recapture Models," *The Journal of Wildlife Management* 84, no. 6 (2020); Humm et al., "Spatially explicit population estimates for black bears based on cluster sampling."

In sum, New Mexico extrapolates black bear densities from bear habitats classified as "excellent" based on a poor-quality and unvalidated habitat suitability model that has never been subjected to expert peer-review, to areas where habitats are presumably of poorer quality—and thus hunting limits, predator control operations and other forms of legal mortality are set too high. We respectfully request that New Mexico engage in long-term population monitoring and reduce the proposed "harvest limits" by at least 50%.

3. Genetic characteristics of New Mexico's black bears signify problems and future troubles

Gould et al. (2022) found that genetic diversity is on the lower end of moderate in most New Mexico bear populations (hovers around He = 0.5-0.6) and that migration rates (gene flow) among those populations are low, except between bear populations in the Jemez/San Juan and Sangre de Cristo ranges where migration rates are high.[46] However, predicted ecological effects from climate change, transportation infrastructure development, and the border wall will likely have negative effects on migration rates among bear populations, which would be expected to reduce genetic diversity and genetic effective population sizes in some of those populations, particularly in southern New Mexico.[47] Yet, the potential severity and extent of those effects remains unknown. Additionally, NMDGF's current bear management rule does not account for the potential effects that hunter kill may have on the long-term sustainability of their populations; essentially, NMDGF has not explained what the consequences of changing "harvest limits" might be for any bear population, or if previously prescribed "harvest limits" have ever achieved management objectives, because long-term monitoring of populations is not conducted, and a long-term demographic monitoring plan does not exist.

Zone boundaries mostly ignore ecoregions and therefore are not based on ecological conditions but are instead based on arbitrary political/anthropogenic boundaries. The current Zone delineations also do not reflect contemporary population structure; for example, Gould et al. (2022) used hair samples collected from bears and conducted population genetics analyses, the results of which identified 9 distinct subpopulations of bears in New Mexico. Yet, NMDGF implements bear management in 14 separate Zones. Some Zones, such as Zone 9, contain multiple subpopulations but NMDGF's management is implemented as if the Zone is comprised of a single population. The delineations of other zones result in fragmentation of a single subpopulation with inconsistent management applied to the subpopulation; for instance, Zones 11, 12, and 13 all encompass the same bear subpopulation, but harvest limits differ among those Zones, resulting in inconsistent and unjustifiable management variation on the same subpopulation, which has unknown consequences because multi-year monitoring has not been applied to this subpopulation.

Additionally, we oppose the agency's proposal to commence bear hunting earlier in Zones 12 and 13. The bear densities that Gould et al. (2018) estimated for Zones 12 and 13 were the lowest among all the study areas, and were also among the *10 lowest spatially explicit black bear densities estimated across the entire U.S.* Therefore, starting the season in Zones 12 and 13 earlier—just so that hunters could trophy hunt more bears to reach artificial "harvest limits"—will increase the risk of overkill and development of subsequent demographic and potential genetic consequences.

In sum, black bears must be managed conservatively if they are to persist for future generations. The NMDGF must engage in multi-year population monitoring projects and ensure that bears in each Zone have access to other populations to ensure their populations are large enough for long-term adaption. New Mexico should develop a black bear management plan in which travel corridors are mapped between populations. We respectfully request that NMDGF reduce bear "harvest limits" in Zones 4, 5, 8, 12, and 13 by 10% to account for the fact that the density estimates were likely positively biased from only sampling primary (highest quality) bear habitats in those Zones. For all other bear Zones, we recommend "harvest limits" be reduced by at least 5*0%* until studies can be conducted in those Zones. The density estimates from Gould et al. (2018) were likely positively biased because all the sampling occurred in primary habitats and therefore did not account for spatial variation in density (that is, lower densities) that likely exists in secondary and tertiary habitats in those zones; and reduce bear "harvest limits" in all other zones by at least 50% until additional demographic studies can be conducted in those zones. Considering additional challenges that bears face from

[46] Matthew J. Gould et al., "Pleistocene–Holocene vicariance, not Anthropocene landscape change, explains the genetic structure of American black bear (Ursus americanus) populations in the American Southwest and northern Mexico," *Ecology and Evolution* 12, no. 10 (2022).
[47] Gould et al., "Pleistocene–Holocene vicariance, not Anthropocene landscape change, explains the genetic structure of American black bear (Ursus americanus) populations in the American Southwest and northern Mexico."

persistent drought, higher overall temperatures, and the risk of even more habitat destruction from catastrophic wildfire as outlined below, even greater reductions in "harvest limits" are warranted. Moreover, given the lack of population growth rate estimates for black bears in any of the zones, a conservative approach is called for. Killing beyond 5-10% of the estimated population size is unjustifiable if "sustainability" is the management objective.

4. Bears did not evolve to face the climate crisis—thus they must be managed carefully

A hotter planet risks species extinction, changes plant phenology (affecting black bears' food resources), reduces insulating snow cover for den sites, increases parasite invasions and increases drought in the West (harming both plants and setting the stage for severe wildfires). This is a difficult time for New Mexico's black bears to attempt to survive.

In 2019, a Paris conference of the Science-Policy Platform on Biodiversity and Ecosystem Services issued a press release from 145 participants from 50 countries who had assessed changes on Planet Earth for the past five decades and found that *one million species face extinction*, the most in human history. They reported that the species extinction rate is accelerating and is the greatest ever over the last 10 million years. They also stated that regarding climate change, Planet Earth's temperature is increasing at "+/-0.2 (+/-0.1) degrees Celsius per decade" and that "for global warming of 1.5 to 2 degrees, the majority of terrestrial species ranges are projected to shrink profoundly."[48] (IPBES issued an updated report in 2023.[49]) The consequence of this warming, according to two dozen academics on fire ecology, is a "hotter climate and a markedly different biosphere."[50]

The loss of Earth's megafauna has so concerned preeminent biologists that dozens of them convened, and in 2011, produced a seminal and alarming paper, *Trophic Downgrading of Planet Earth*.[51] In it, the biologists, Estes et al. (2011), warn that the loss of top carnivores and other megafauna will increase pandemics, make ecosystems dysfunctional and accelerate the harms from climate change.[52] Black bears are megafauna, the third largest bear species and third largest mammalian carnivore in North America, and are gravely threatened by climate change:

- Climate warming will change trophic effects that include the profusion of parasites and disease.[53]
- With warmer winters and extended fall and spring seasons, climate change will drive the expansion of ticks and tick-borne diseases to more northern latitudes and to higher altitudes.[54] Increases in temperature facilitate the proliferation of parasitic organisms,[55] including the potential for the spread of sarcoptic mange in black bears from the eastern U.S.[56]

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[48] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), "Nature's Dangerous Decline 'Unprecedented' Species Extinction Rates 'Accelerating': Current global response insufficient. 'Transformative changes' needed to restore and protect nature; Opposition from vested interests can be overcome for public good. Most comprehensive assessment of its kind; 1,000,000 species threatened with extinction," news release, 2019.
[49] Intergovernmental Panel on Climate Change, Climate change 2023: Synthesis Report: Summary for Policymakers, (2023).
[50] L. T. Kelly et al., "Fire and biodiversity in the Anthropocene," *Science* 370, no. 6519 (2020): p. 2.
[51] A Estes, James & Terborgh, John & Brashares, Justin & E Power, Mary & Berger, Joel & Bond, William & R Carpenter, Stephen & Essington, Timothy & D Holt, Robert & Jackson, Jeremy & Marquis, Robert & Oksanen, Lauri & Oksanen, Tarja & Paine, Robert & Pikitch, Ellen & Ripple, William & Sandin, Stuart & Scheffer, Marten & W Schoener, Thomas & Wardle, David. (2011). Trophic Downgrading of Planet Earth. Science (New York, N.Y.). 333. 301-6. 10.1126/science.1205106.
[52] J. A. Estes et al., "Trophic Downgrading of Planet Earth," *Science* 333, no. 6040 (2011).
[53] K. S. McKelvey and P. C. Buotte, "Climate change and wildlife in the Northern Rockies Region," in *Climate change vulnerability and adaptation in the Northern Rocky Mountains*, ed. Jessica E. Halofsky et al. (Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain, 2018).
[54] Filipe Dantas-Torres, *Climate change, biodiversity, ticks and tick-borne diseases: The butterfly effect*, vol. 4 (2015).
[55] Erica E. Short, Cyril Caminade, and Bolaji N. Thomas, "Climate Change Contribution to the Emergence or Re-Emergence of Parasitic Diseases," *Infectious Diseases: Research and Treatment* 10 (2017). Kristin A. Clothier et al., "Generalized dermatophytosis caused by Trichophyton equinum in 8 juvenile black bears in California," *Journal of Veterinary Diagnostic Investigation* (2021).
[56] Kevin D. Niedringhaus et al., "The emergence and expansion of sarcoptic mange in American black bears (Ursus americanus) in the United States," *Veterinary Parasitology: Regional Studies and Reports* 17 (2019).

- More stochastic weather events are occurring, and snow cover is increasingly lost,[57] which reduces the insulating properties associated with some bears' dens.[58]
- Rising temperatures have resulted in changed plant phenology, which is the timing of flowering, germination and leaving.[59] For bears, this means that some of their natural foods such as acorns (hard mast crops) or raspberries (soft mast crops) will be unavailable in some years because of drought, fires, or late spring frosts.
- Declining species' diversity could exacerbate phenological changes associated with warming.[60] Climate change affects temperatures and moisture, affecting precipitation amounts and thus plant growth, which could further degrade black bears' food supplies.[61]
- An important study on brown bears is applicable to black bears, because they too cannot withstand much movement in warm weather because of their inability to sweat (while wearing a thick fur coat and building fat layers for hibernation).[62] It found that a warming climate limits bears' foraging abilities because they are subject to hyperthermia, that is, the inability to dissipate heat from their bodies to stay sufficiently cool.[63] Bears adjust to the heat by foraging in habitats that have sufficient shade to stay cool. But these adjustments could affect their abilities to forage as efficiently[64] as canopy cover is consumed by increasingly severe wildfires that remove mature trees that black bears rely upon for shade cover during the day and—especially bear cubs—use as escape routes from predators.
- And in the Western United States, drought has intensified to extremes not seen in the past 20 years.[65] Drought begets wildfire, and more severe droughts alter historic fire regimes.[66] As discussed below, wildfires pose grave threats to black bears.

In the face of hotter, dryer habitats in New Mexico, NMDGF must reduce quotas on black bears because they face so many obstacles to their long-term persistence.

5. New Mexico's black bears face unprecedented droughts and wildfires

Kelly et al. (2020), in a review article published in *Science* that was authored by two dozen biologists who reviewed 29,000 journal articles on fire, warn of extinction risk from fire regimes that are different from the ones that species have evolved with; that is, the "type, frequency, intensity, seasonality and spatial dimensions of recurrent fire."[67] For wildlife, the variations in intensity and occurrence of fire can reduce food and shelter, and reduce animals' ability to "recolonize regenerating habitats," and in the case of severe fires, lead to mortality.[68]

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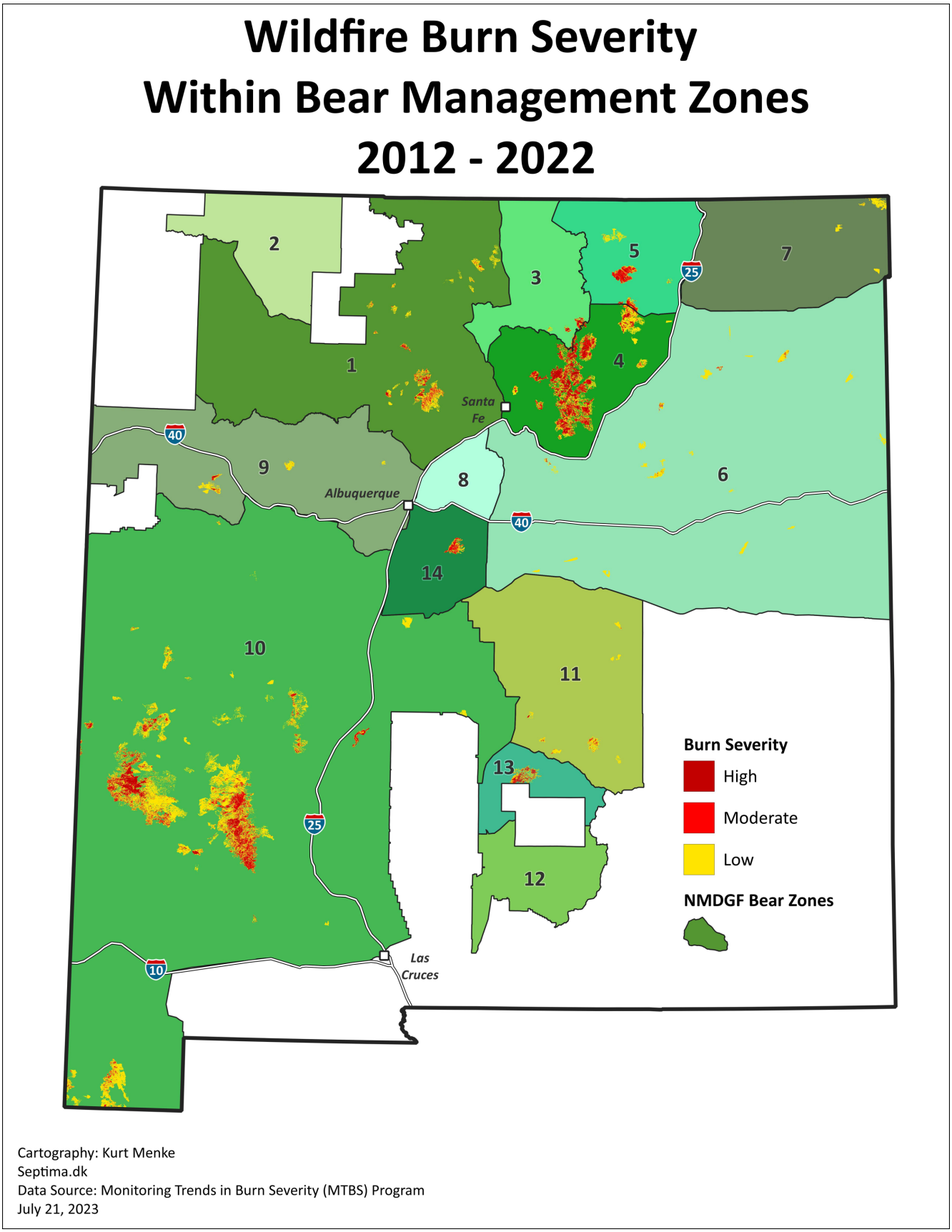
[57] Dantas-Torres, *Climate change, biodiversity, ticks and tick-borne diseases: The butterfly effect*, 4, p. 8.
[58] K. E. Pigeon, S. D. Cote, and G. B. Stenhouse, "Assessing Den Selection and Den Characteristics of Grizzly Bears," *Journal of Wildlife Management* 80, no. 5 (2016).
[59] Amelia A. Wolf, Erika S. Zavaleta, and Paul C. Selmants, "Flowering phenology shifts in response to biodiversity loss," *Proceedings of the National Academy of Sciences* 114, no. 13 (2017).
[60] Wolf, Zavaleta, and Selmants, "Flowering phenology shifts in response to biodiversity loss."
[61] McKelvey and Buotte, "Climate change and wildlife in the Northern Rockies Region."
[62] Beck et al., "Sociological and ethical considerations of black bear hunting."; Bernd Heinrich, *Why we run: A natural history* (Harper Perennial, 2002).
[63] K. E. Pigeon et al., "Staying cool in a changing landscape: the influence of maximum daily ambient temperature on grizzly bear habitat selection," *Oecologia* 181, no. 4 (2016).
[64] Pigeon et al., "Staying cool in a changing landscape: the influence of maximum daily ambient temperature on grizzly bear habitat selection."
[65] Nadja Popovich, "How severe is the Western drought? See for yourself," *The New York Times* (https://www.nytimes.com/interactive/2021/06/11/climate/california-western-drought-map.html?searchResultPosition=2) 2021; A. Park Williams, Benjamin Cook, and Jason Smerdon, "Rapid intensification of the emerging southwestern North American megadrought in 2020–2021," *Nature Climate Change* 12 (2022).
[66] Kelly et al., "Fire and biodiversity in the Anthropocene."
[67] Kelly et al., "Fire and biodiversity in the Anthropocene," p. 1.
[68] Kelly et al., "Fire and biodiversity in the Anthropocene."

Fig 1. Menke (2023) Wildfire Burn Severity – Within NM's Bear Management Zones, 2012-2022



Kurt Menke's (2023) methods for making his black bear habitat burn severity GIS map (Fig. 1), are:

> The burn severity data were acquired from the **Monitoring Trends in Burn Severity (MTBS)** program (https://www.mtbs.gov/direct-download). They offer Burn Severity Mosaics by year and state from 1984-2021. The 2022 data were acquired for each individual fire in New Mexico from the **BAER Imagery Support Data Download** site https://burnseverity.cr.usgs.gov/baer/baer-imagery-support-data-download. These MTBS/BAER data are satellite-derived data representing post-fire vegetation conditions. They have four classes, representing high, moderate, low, and unburned burn severity. The data are provided as raster datasets with 30 meter pixel resolution. The differences between the MTBS and BAER programs can be read here: https://www.mtbs.gov/baer. The **Bear Management Zones (BMZ)** were acquired from the **New Mexico Department of Game and Fish** (https://www.wildlife.state.nm.us/hunting/maps/big-game-unit-maps-pdfs/). They are aggregates of the Game Management Units. The GMU's were dissolved based on the BMZ attribute to create a BMZ GIS layer. For the map and statistics, only the low-, moderate- and high-burn severity classes were used. **QGIS** version 3.32 was used for all maps and statistics *(QGIS.org (2023). QGIS Geographic Information System. Open Source Geospatial Foundation Project. http://qgis.org)*. The animation was created by creating maps of each year. Those were then converted into an MP4 video file using **FFMPG** (https://www.ffmpeg.org/). The QGIS Zonal Histogram processing algorithm was used to generate the statistics. This algorithm outputs the pixel count for each burn severity class by Bear Management Zone.

Williams et al. (2022) found that the southwestern region of the United States experienced a "megadrought" in 2020-2021, the driest period since 800 A.D.[69] The United Nations released its 2022 report, "Spreading like wildfire: the rising threat of extraordinary landscape fire," authored by 50 researchers who found that the risk of wildfires worldwide could increase by 57% by the end of the century with some regions of the world in great danger.[70] Amidst these warnings, in 2022, New Mexico experienced two of the largest fires in its recorded history, the Calf Canyon/Hermits Peak fire and the Black Fire—and those were not the only fires in the state that year.

Fire suppression, climate change and logging have changed the forests in the West over the past century.[71] For New Mexico black bears, this means that they face fire regimes different than those with which they evolved. Invasive and pervasive cheat grass (*Bromus tectorum*) has increased fuel loads in the West.[72] Recent wildfires are hotter and kill mature trees because of fuel-load buildup.[73] Western fire-adapted forests generally had experienced frequent fires on a 10 to 20-year time scale, but now burn at fire intervals between 70-90 years.[74] The result is that forests are now characterized by denser stands of trees with few trees older than 250 years and with diameters greater than 60 cm.[75]

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[69] Williams, Cook, and Smerdon, "Rapid intensification of the emerging southwestern North American megadrought in 2020–2021."
[70] United Nations Environment Programme, "Spreading like wildlife — The rising threat of extraordinary landscape fires," (2022).
[71] Brett J. Furnas, Benjamin R. Goldstein, and Peter J. Figura, "Intermediate fire severity diversity promotes richness of forest carnivores in California," *Diversity and Distributions* (2021); Stanley Clifton Cunningham et al., "Black bear habitat use in burned and unburned areas, central Arizona," *Wildlife Society Bulletin* 31 (2003); Susan M. Bard and James W. Cain, "Investigation of bed and den site selection by American black bears (Ursus americanus) in a landscape impacted by forest restoration treatments and wildfires," *Forest Ecology and Management* 460 (2020).
[72] Kelly et al., "Fire and biodiversity in the Anthropocene."
[73] Cunningham et al., "Black bear habitat use in burned and unburned areas, central Arizona."; Bard and Cain, "Investigation of bed and den site selection by American black bears (Ursus americanus) in a landscape impacted by forest restoration treatments and wildfires."
[74] Furnas, Goldstein, and Figura, "Intermediate fire severity diversity promotes richness of forest carnivores in California."Citing Van de Water and Safford 2011.
[75] Furnas, Goldstein, and Figura, "Intermediate fire severity diversity promotes richness of forest carnivores in California."Citing Beaty & Taylor 2007 and Youngblood et al. 2004.

These smaller diameter trees grow in dense forests that are apt to experience stand-replacing fires.[76] Large fires leave a mosaic or burn patches of different levels of burn severity.[77]

For black bears, who prefer larger diameter trees for denning, resting and canopy cover for foraging, catastrophic fires can have negative, near-term consequences.[78] Females with and without cubs choose nocturnal and diurnal bed sites during their active season near "refuge" trees; that is, trees with coarse bark so the bears could readily climb up the tree if disturbed, and those bed sites were in high canopy cover.[79]

In fire ecology, the severity of the fire is highly variable. Lewis et al. (2022) write:

> Fire severity . . . occurs across a gradient, which is characterized by **unburned forest** (where fire has not occurred for an extended period of time), **low fire severity** (where fire burns in the understory and does not kill mature trees), **moderate fire severity** (where fire kills some mature trees, but others survive), and **high fire severity** (where fire kills most or all trees, or at least top-kills them where the above ground portion of the tree is killed, but the root system remains alive). Wildfires are often characterized as mixed-severity, where a heterogeneous pattern of multiple fire severity types occur, especially for wildfires occurring over relatively large areas (Baker, 2009; Perry et al., 2011; Odion et al., 2014). **As fire severity increases, forest canopy cover decreases,** but **some plants can subsequently exhibit prolific regeneration through resprouting, suckering, or seed germination**; for example, some grasses, forbs, shrubs, and trees can exhibit a pulse of growth post fire (Lentile et al., 2007; Baker, 2009). In particular, fire-adapted species, such as aspen (*Populus tremuloides*) and Gambel oak (*Quercus gambelii*), can demonstrate rapid and widespread regeneration and growth in areas of moderate to high fire severity (Brown and DeByle, 1989; Bartos et al., 1994; Bailey and Whitham, 2002; Mack et al., 2008; Wan et al., 2014; Clement et al., 2019). **Importantly, heterogeneity in plant quantity and quality across the gradient of fire severity is expected to influence animal populations and habitat use**.[80]

In their camera trap study of the effects of fires in California between 2009 and 2018 on black bears, mountain lions and a host of mesocarnivores such as skunks, foxes, ringtails and bobcats, Furnas et al. (2021) found the greatest carnivore richness in areas that experienced *intermediate* fire severity – that is, on landscapes where fires occurred on a 10-year timescale.[81] Furnas et al. (2021) found that frequent, low severity fires provide short-term benefits for carnivores, with about a "10-year pulse" of increased growing space for plants that feed bears (omnivorous carnivores) and small mammal prey (thus providing indirect benefits to obligate carnivores).[82] Furnas et al. (2021) add that, "Low severity fire can also create forest openings, snags and logs while retaining large diameter overstorey

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[76] Furnas, Goldstein, and Figura, "Intermediate fire severity diversity promotes richness of forest carnivores in California."Citing McIntyre et al. 2015.
[77] Jesse S. Lewis et al., "Mixed-severity wildfire shapes habitat use of large herbivores and carnivores," *Forest Ecology and Management* 506 (2022).
[78] See for example: Furnas, Goldstein, and Figura, "Intermediate fire severity diversity promotes richness of forest carnivores in California."; Evelyn L. Bull, James J. Akenson, and Mark G. Henjum, "Characteristics of Black Bear Dens in Trees and Logs in Northeastern Oregon," *Northwestern Naturalist* 81, no. 3 (2000); Shari L. Ketcham and John L. Koprowski, "Impacts of wildlife on wildlife in Arizona: A synthesis" (paper presented at the Merging science and management in a rapidly changing world: Biodiversity and management of the Madrean Archipelago III and 7th Conference on Research and Resource Management in the Southwestern Deserts, Tucson, AZ, 2013). Pigeon et al., "Staying cool in a changing landscape: the influence of maximum daily ambient temperature on grizzly bear habitat selection."
[79] Susan A Mansfield et al., "Bed site selection by female North American black bears (Ursus americanus)," *Journal of Mammalogy* (2021).
[80] Emphasis added. Lewis et al., "Mixed-severity wildfire shapes habitat use of large herbivores and carnivores," p. 2.
[81] Furnas, Goldstein, and Figura, "Intermediate fire severity diversity promotes richness of forest carnivores in California."
[82] Furnas, Goldstein, and Figura, "Intermediate fire severity diversity promotes richness of forest carnivores in California."Citing Amacher et al. 2008, Roberts et al. 2015, Kelleyhouse 1980 and Swanson et al. 2010.

trees"[83] – the denning habitat preferred by bears in some ecosystems.[84] Snags, broken at the top, can provide important den sites for black bears.[85] However, the 2022 New Mexico fires were not "low-severity fires,"[86] but were instead "'trans-apocalyptic'"[87]—leaving moonscapes for bears and other wildlife with which to attempt to cope.

Bard and Cain (2020) studied the effects of fire-mitigation projects (tree thinning followed by fire) on bears' dens and sleep sites in the Jemez Mountains, New Mexico. They found that black bears preferred undisturbed sites far more than sites that had burned.[88] Bard and Cain (2020) provide that fire fragmented habitats (citing Mitchell and Powell 2003) exposed bears to reduced cover (citing White et al. 2001 and Tredick et al. 2016) and increased interactions between bears and hunters, and interactions with others bears (citing Linnell et al. 2000 and Stewart et al. 2013).[89] Costello et al. (2003) found that hard mast species (e.g., acorns, juniper and piñon) affect black bear productivity in New Mexico.[90] Yet, fires and forest treatments can reduce their availability temporarily (which can mean starvation and/or low cub production).[91] Bard and Cain (2020) concluded that bears will need to adapt to new fire regimes and fire treatments in the age of the Anthropocene. Accordingly, while small-scale disturbance is ultimately beneficial to vegetative regeneration, land managers need to consider bears' needs before beginning forest treatments that alter bear habitats and food sources.[92]

In a recently published fire study conducted in the White Mountains of Arizona, using data from GPS-collared bears and resource selection models, Crabb et al. (2022) found that bears significantly decreased their use of areas that incurred high-severity burns immediately following the Wallow Fire that occurred in Arizona during 2011 (to date, Arizona's largest wildfire, which burned 538,049 acres).[93] That study clearly demonstrated that areas which were previously suitable bear habitat but then incurred high burn severity were left unsuitable for bears. In a separate follow-up study that used camera-trapping data and occupancy models, Lewis et al. (2022) evaluated five levels of burn severity (unburned, low, moderate, moderate/high and high)[94] and found that black bears' use of high severity burned areas within the Wallow Fire footprint likely did not increase until *seven years* following the fire.[95] Lewis et al. (2022) found that low-fire severity such as prescribed burns, which do not remove the forest canopy, provide only a "pulse" of regrowth of about one to three years before the vegetation returns to a pre-fire state.[96] Conversely, in places where fire severity is worse and the canopy cover is lost, the pulse in plant quantity and quality extends to ten or more years.[97] Yet, the losses of mature trees in New Mexico's landscapes can have negative near-term

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[83] Furnas, Goldstein, and Figura, "Intermediate fire severity diversity promotes richness of forest carnivores in California."
[84] Furnas, Goldstein, and Figura, "Intermediate fire severity diversity promotes richness of forest carnivores in California."(Citing Agee 1998); Bull, Akenson, and Henjum, "Characteristics of Black Bear Dens in Trees and Logs in Northeastern Oregon."
[85] Bull, Akenson, and Henjum, "Characteristics of Black Bear Dens in Trees and Logs in Northeastern Oregon."
[86] Furnas, Goldstein, and Figura, "Intermediate fire severity diversity promotes richness of forest carnivores in California."
[87] Elizabeth Well, "This Isn't the California I Married," *The New York Times* (https://www.nytimes.com/2022/01/03/magazine/california-widfires.html?action=click&module=RelatedLinks&pgtype=Article), Jan. 3, 2022.
[88] Bard and Cain, "Investigation of bed and den site selection by American black bears (Ursus americanus) in a landscape impacted by forest restoration treatments and wildfires."
[89] Bard and Cain, "Investigation of bed and den site selection by American black bears (Ursus americanus) in a landscape impacted by forest restoration treatments and wildfires."
[90] Cecily M. Costello et al., "Relationship of Variable Mast Production to American Black Bear Reproductive Parameters in New Mexico," *Ursus* 14, no. 1 (2003), https://doi.org/10.2307/3872951, http://www.jstor.org/stable/3872951.
[91] Bard and Cain, "Investigation of bed and den site selection by American black bears (Ursus americanus) in a landscape impacted by forest restoration treatments and wildfires." Costello et al., "Relationship of Variable Mast Production to American Black Bear Reproductive Parameters in New Mexico."
[92] Bard and Cain, "Investigation of bed and den site selection by American black bears (Ursus americanus) in a landscape impacted by forest restoration treatments and wildfires."
[93] Michelle L. Crabb et al., "Black bear spatial responses to the Wallow Wildfire in Arizona," *The Journal of Wildlife Management* 86, no. 3 (2022).
[94] Lewis et al., "Mixed-severity wildfire shapes habitat use of large herbivores and carnivores."
[95] Lewis et al., "Mixed-severity wildfire shapes habitat use of large herbivores and carnivores."
[96] Lewis et al., "Mixed-severity wildfire shapes habitat use of large herbivores and carnivores."Citing Severson and Rinne 1990 and Sittler et al. 2019.
[97] Lewis et al., "Mixed-severity wildfire shapes habitat use of large herbivores and carnivores."Citing Bartos et al. 1994 and Wan et al. 2014.

consequences for black bears as discussed above. And it could take centuries to replace these mature trees, and ecosystems may forever be changed by the unintentional introduction of invasive species.[98]

Bears require canopy cover to escape heat for day sleeping and for foraging, and large tree snags for den sites during hibernation. Large trees also provide escape for bear cubs. Fires expose bears to hunters and intraspecific strife, and can remove vital food sources, particularly mast crops needed for survival and cub production. Ultimately, severe fires harm New Mexico's black bears' habitat, and are also detrimental to black bear populations and harm the bears' welfare as we discuss below.

6. Severe wildfires are detrimental to black bear populations and harm their welfare.

a. Catastrophic wildfires reduce black bear survival and reproduction

In two studies published about the catastrophic 1996 fire in the Four Peaks area of the Mazatzal Mountains of Arizona,[99] the immediate aftermath was an increase in black bear mortality, especially to the female demographic.[100] Researchers found a population "significantly skewed toward males (4M:1F)" (but in a nearby control area where there was no fire, the ratio was one to one, male to female).[101]

On top of that mortality, 12 breeding females who survived subsequently gave birth to 16 cubs in years between 1997-1999, but none of the cubs survived—most likely because of infanticide by starving male bears, or by the cubs succumbing to starvation themselves.[102] After the Four Peaks fire, both males and females with cubs were forced to share islands of vegetated habitat to avoid midday heat, but this exposed the cubs to cannibalistic males.[103] (In another study of a catastrophic fire, researchers noted that bears who moved into the burned area later fed on ungulate carcasses.[104])

[98] Kelly et al., "Fire and biodiversity in the Anthropocene." Lewis et al., "Mixed-severity wildfire shapes habitat use of large herbivores and carnivores."
[99] Stan C. Cunningham and Warren B. Ballard, "Effects of wildfire on black bear demographics in central Arizona," *Wildlife Society Bulletin* 32, no. 3 (2004); Cunningham et al., "Black bear habitat use in burned and unburned areas, central Arizona."
[100] Cunningham and Ballard, "Effects of wildfire on black bear demographics in central Arizona."
[101] Cunningham and Ballard, "Effects of wildfire on black bear demographics in central Arizona."
[102] Cunningham and Ballard, "Effects of wildfire on black bear demographics in central Arizona."; Cunningham et al., "Black bear habitat use in burned and unburned areas, central Arizona."
[103] Cunningham et al., "Black bear habitat use in burned and unburned areas, central Arizona."
[104] The study was conducted by Blanchard and Knight (1999) and cited by Cunningham and Ballard (2004).Cunningham and Ballard, "Effects of wildfire on black bear demographics in central Arizona."

PHOTO BY Rich Beausoleil; A female black bear cub who survived the 2014 Carlton Complex fire in Washington. She was rescued by Rich Beausoleil, bear and cougar specialist for Washington Department of Fish and Wildlife, and others. Named "Cinder," the cub had crawled out of the fire on knees and elbows and was badly burned on her limbs and face and she suffered from malnutrition and dehydration. She was flown to a burn rehab center in Nevada. Cinder and her rescuers spawned a children's book. Rehabilitated back to health, Cinder was released into the wild in 2017 with a radio collar. Later, wildlife agents found Cinder's skeletal remains after she was shot near the release site and her radio collar disabled.

a. Wildfires cause suffering and death to black bears

Bears in the path of wildfires are subject to a variety of harms. Most wildlife victims of wildfires die from smoke inhalation that causes asphyxiation,[105] which is a distressful experience.[106] Wildfires tend to move across landscapes rapidly and with high-intensity heat, usually *above* 63°C (145°F).[107] Wildlife caught in wildfires or their aftermath experience a variety of travails, including injury, mortality, stress, disease or starvation.[108] Young wildlife are more prone to injury or mortality.[109] And rather than evacuating, wildlife may stay in burrows, rock cavities or dens, leading to smoke inhalation and potential asphyxiation.[110]

Bears, like other wildlife, can experience burns to the face and limbs, like Cinder the cub pictured above.[111] Burned skin can trap intense temperatures inside of an animal's body, leading to further subcutaneous burns.[112] If an animal's body is burned by more than half, death or euthanasia is the invariable outcome, but if the animal's joints or claws are

[105] Ketcham and Koprowski, "Impacts of wildlife on wildlife in Arizona: A synthesis."Citing Bock and Lynch 1970, Buech et al. 1977, Bluan and Barrett 1971, Chew et al. 1959, Harrison and Murad 1972 and Lyon et al. 2000.)
[106] Jara Gutiérrez and Javier de Miguel, "Fires in nature: a review of the challenges for wild animals," *European Journal of Ecology* 7, no. 1 (2021).
[107] Ketcham and Koprowski, "Impacts of wildlife on wildlife in Arizona: A synthesis."
[108] Gutiérrez and de Miguel, "Fires in nature: a review of the challenges for wild animals." Ketcham and Koprowski, "Impacts of wildlife on wildlife in Arizona: A synthesis." R. A. Beausoleil, "Burned Bear Rescued, Rehabilitated, and Released in Washington," *International Bear News* 24, no. 3 (2015).
[109] Ketcham and Koprowski, "Impacts of wildlife on wildlife in Arizona: A synthesis."
[110] Ketcham and Koprowski, "Impacts of wildlife on wildlife in Arizona: A synthesis."
[111] Gutiérrez and de Miguel, "Fires in nature: a review of the challenges for wild animals."Citing Rethorst et al. 2018. Beausoleil, "Burned Bear Rescued, Rehabilitated, and Released in Washington."
[112] Gutiérrez and de Miguel, "Fires in nature: a review of the challenges for wild animals."

burned, locomotion and tree-climbing are inhibited.[113] Wildlife fleeing from fires can be struck by vehicles.[114] Because of the timing of most fires – at the end of summer – fires can hinder population recovery, breeding and reproduction.[115] Springtime wildfires also harm reproduction, harming populations.[116]

In sum, in the western United States the effects of global warming are already severe, with record-setting droughts and wildfires affecting black bears. The immediate result of catastrophic fires is the direct death of bears, particularly females, and the trauma for surviving bears includes the loss of food and thermal cover from daytime heat. Fires could reduce reproduction for at least three years. If the ground is bare, bears may be forced to congregate in island patches of vegetation, exposing cubs to cannibalism by male bears. Bears are not heat adapted, they bed in the daytime using canopy cover, and need shade to forage.

7. New Mexico should abolish hounding and archery as legal bear-hunting methods because they inflict unnecessary stress, injury and suffering on bears

In numerous studies, both the general public and hunters themselves object to hunting activities that are viewed as unfair, unsporting, inhumane or unsustainable. Many hunting advocates condemn such actions as a violation of the hunter's ethical code because methods like bear hounding are not perceived as "fair chase" hunting.[117]

In his book Beyond Fair Chase: The Ethic and Tradition of Hunting, Jim Posewitz explained the concept of fair chase: "The ethical hunter must make many fair-chase choices . . . luring animals with bait or hunting in certain seasons sometimes is viewed as giving unfair advantage to the hunter. If there is a doubt, advantage must be given to the animal being hunted."

a. Hounding black bears is unethical, cruel, indefensible and unsporting and harms federally protected Mexican gray wolves

Hounding, which is using packs of dogs to pursue bears, is considered unsporting even among many hunters because it gives unfair advantage to the hunter.[118] When bears are out of their dens, they should be feeding, not fleeing and wasting their energy reserves to evade hounds. What's more, those packs of virtually monitored, GPS radio-collared hounds can harm, disturb, maul or kill wildlife including bear cubs, Mexican gray wolves, deer fawns and ground-nesting birds.[119] Dogs may even chase bears into roadways, where oncoming vehicles could strike either the pursuers or the pursued. Hounds invariably run on lands where it is not legal to do so, whether on private land or on special refuges such as national parks where hounds are not permitted. This often creates strife between hunters and landowners as hounding dogs frequently trespass on their property.[120]

Using hounds to chase bears pits dogs against bears, and either species can be injured or killed, particularly if the bear is bayed on the ground. Sometimes dogs kill the bears themselves, especially dependent cubs.

Hounding even pits dogs against Mexican wolves (*lobos*), a federally protected species threatened with extinction. This amounts to state-sanctioned dog fighting. The extent of incidents in New Mexico and Arizona should be disclosed as part of the new black bear rule, and governmental agencies have a duty to disclose the numbers of these

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[113] Gutiérrez and de Miguel, "Fires in nature: a review of the challenges for wild animals."
[114] Gutiérrez and de Miguel, "Fires in nature: a review of the challenges for wild animals."
[115] Gutiérrez and de Miguel, "Fires in nature: a review of the challenges for wild animals."
[116] Ketcham and Koprowski, "Impacts of wildlife on wildlife in Arizona: A synthesis."
[117] J. Posewitz, *Beyond Fair Chase: The Ethic and Tradition of Hunting* (Helena, Montana: Falcon Press, 1994).
[118] C.W. Ryan, J.W. Edwards, and M.D. Duda, "West Virginia residents: Attitudes and opinions toward American black bear hunting," *Ursus* 2 (2009); T. L. Teel, R. S. Krannich, and R. H. Schmidt, "Utah stakeholders' attitudes toward selected cougar and black bear management practices," *Wildlife Society Bulletin* 30, no. 1 (2002).
[119] Hank Hristienko and Jr. McDonald, John E., "Going in the 21st century: a perspective on trends and controversies in the management of the black bear " *Ursus* 18, no. 1 (2007); Stefano Grignolio et al., "Effects of hunting with hounds on a non-target species living on the edge of a protected area," *Biological Conservation* 144, no. 1 (2011); Emiliano Mori, "Porcupines in the landscape of fear: effect of hunting with dogs on the behaviour of a non-target species," *Mammal Research* 62, no. 3 (2017).
[120] Hristienko and McDonald, "Going in the 21st century: a perspective on trends and controversies in the management of the black bear ".

incidents.[121] The welfare of *lobos* and their ongoing recovery are of great concern and high value to the American public.

Pursuit during hot weather can cause physical stress to both dogs and bears.[122] Bears that have engaged in prolonged pursuits experience physiological stress because their pelts and fat layer (that they are building in anticipation of hibernation) can make them overheat—possibly leading to death or, for pregnant bears, the loss of their fetuses. In poor food years, pursuing bears with hounds makes bears expend energy they require to survive hibernation. Hounds disrupt feeding patterns for bears who are chased and nearby bears who are not.[123]

If bears are bayed on the ground, hunters cannot identify their sex, which is a concern if the bear is a female with dependent cubs. If the mother is killed, young-of-the year cubs will die from starvation, exposure or predation.[124] In research conducted in Maine, houndsmen were ineffective in determining if a female had cubs, because the mother would secure her cubs in a separate tree other than the one she occupied to escape the hounds.[125]

The main purpose of hounding is to tree the bears for the purpose of close-range identification and shooting. While some argue that hounding is a selective method for choosing the age or sex of an animal,[126] researchers who have done empirical study contend it is difficult for hunters to determine the age and sex of a treed bear.[127] Inman and Vaughan (2002) found that one-third of treed bear were wrongly sexed by houndsmen.[128] This is a concern because of orphaning issues.

In sum, for all the foregoing reasons, NMDGF must eliminate black bear hounding in New Mexico.

b. Cruel archery equipment should never be permitted to hunt black bears

Arrows can leave wounded animals to die slowly and painfully. A study of modern archery equipment found up to 27% of deer shot by archers die slowly rather than from quick, clean kills.[129] And black bears are even more difficult than deer to kill with an arrow because of their massive muscles and heavy bones.[130] For instance, during the 2022 California bear archery season, Arcadia residents reported that a bear was seen moaning in distress in a backyard with an arrow sticking out of the bear's side. Officials with the California Department of Fish and Wildlife were unable to locate the wounded bear.[131] In New Jersey, a veterinarian removed an arrow that pierced a

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[121] See e.g., Adrian Treves and Laura Menefee, "Adverse effects of hunting with hounds on participants and bystanders," *bioRxiv* (2022).
[122] Hristienko and McDonald, "Going in the 21st century: a perspective on trends and controversies in the management of the black bear ".
[123] Beck et al., "Sociological and ethical considerations of black bear hunting." A. Ordiz et al., "Do bears know they are being hunted?," *Biological Conservation* 152 (2012).
[124] Cubs will stay with their mothers between 14-18 months. Born in the den between January and February, bears leave the den usually in late April, but they are not weaned until the months between July and September. The cubs will go back into the den for their second winter with their mother. They will stay with her until May – July, when the family breaks up (because the female goes back into estrus). Considered subadults at that point, the cubs must find their own home range, which is more difficult of males as they have to disperse further from the natal area – to avoid inbreeding.
[125] Beck et al., "Sociological and ethical considerations of black bear hunting."
[126] Hristienko and McDonald, "Going in the 21st century: a perspective on trends and controversies in the management of the black bear ".
[127] Beck et al., "Sociological and ethical considerations of black bear hunting."; M. C. Boulay, D.H. Jackson, and D.A. Immell, "Preliminary assessment of a ballot initiative banning two methods of bear hunting in Oregon: Effects on bear harvest," *Ursus* 11 (1999).
[128] K. H. Inman and M. R. Vaughan, "Hunter effort and success rates of hunting bears with hounds in Virginia," *Ursus* 13 (2002).
[129] Andy M. Pedersen, Seth M. Berry, and Jeffery C. Bossart, "Wounding rates of white-tailed deer with modern archery equipment," *Proceedings of Annu. Conf. SEAFWA* (2008).
[130] Vermont Fish & Wildlife Dept., "Bear hunting tips and techniques," *https://vtfishandwildlife.com/hunt/hunting-and-trapping-opportunities/black-bear/bear-hunting-tips-and-techniques* (2022).
[131] *Big bear with arrow sticking out of it wanders into backyard of L.A.-area home*, aired Sep. 5 2022.

bear's mouth and head but did not kill the animal.[132] State bear biologists in Washington state reported that 18% of their collared bears died either from wounding loss or went unreported to the state.[133] New Mexico must consider the additive and unanticipated losses that occur because of well-documented, sloppy bowhunting practices.

In sum, for all the foregoing reasons, NMDGF must eliminate archery hunting for New Mexico's black bears.

8. Permitting black bear hounding will expose the Department and Commission to liability under the federal Endangered Species Act

Authorizing private citizens to hunt black bears and cougars with the aid of hounds risks causing unlawful take of federally protected Mexican wolves (aka *lobos*) that will expose the Department and Commission to liability under the Endangered Species Act. Occupied Mexican wolf range in New Mexico overlaps substantially with occupied black bear and cougar ranges where hound hunting will be permitted under the proposed rule. Encounters between Mexican wolves and hunting hounds have already been reported in Arizona and New Mexico, and more will inevitably occur if hound hunting is authorized in Mexican wolf range. Hounding facilitates wolf poaching.[134] The risk of contact is magnified when dogs roam beyond the visual or auditory range of hunters.[135] Dogs used to hound bears or cougars often run some distance beyond this range, potentially straying into wolf rendezvous or den sites or other areas where wolves are concentrated.[136] Additionally, the baying sounds made by dogs while hounding can draw territorial wolves, who may interpret these noises as a challenge.[137] In Wisconsin, despite extensive hound hunting and resulting in interactions with wolves (who guard food resources and pups from the hounds),[138] other than one incident,[139] Wisconsin failed to collect data on how many wolves (or non-target animals) were harmed by hounds.[140] Additionally, encounters with hunting hounds can disturb essential behavioral patterns[141] and result in the transfer of disease from hounds to Mexican wolves, including distemper and parvovirus, both deadly canid diseases.[142]

Hounding black bears and cougars constitutes take under the federal Endangered Species Act ("ESA"). Section 9 of the ESA prohibits the unauthorized "take" of an endangered species. 16 U.S.C. 1538(a)(1)(B). The ESA defines "take" to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct." Id. § 1532(19). "Take" includes direct as well as indirect harm and need not be purposeful. See Babbit v. Sweet Home Chapter of Communities for a Great Oregon, 515 U.S. 687, 704 (1995). A take may even be the result of an accident. See National Wildlife Federation v. Burlington Northern Railroad, 23 F.3d 1508, 1512 (9th Cir. 1994).

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[132] Jeff Goldman, "Arrow removed from N.J. bear shot in face, mouth," *NJ.com* (https://www.nj.com/news/2014/05/nj_vet_removes_arrow_from_bear_that_was_shot_in_face_mouth.html) 2014.
[133] Koehler and Pierce, "Survival, cause-specific mortality, sex, and ages of American black bears in Washington state, USA."
[134] Francisco J. Santiago-Ávila and Adrian Treves, "Poaching of protected wolves fluctuated seasonally and with non-wolf hunting," *Scientific Reports* 12, no. 1 (2022).
[135] Adrian. P. Wydeven et al., "Characteristic of wolf packs in Wisconsin: Identification of traits influencing depredation," in *People and predators: From conflicts to coexistence*, ed. Nina Fascione, Aimee Delach, and Martin E. Smith (Washington, D.C.: Island Press, 2004).
[136] Wisconsin Department of Natural Resources, "Guidance for hunters and pet owners: reducing conflicts between wolves and dogs," (2023).
[137]Wisconsin Department of Natural Resources, "Guidance for hunters and pet owners: reducing conflicts between wolves and dogs."
[138] Treves and Menefee, "Adverse effects of hunting with hounds on participants and bystanders."; J. K. Bump et al., "Bear-Baiting May Exacerbate Wolf-Hunting Dog Conflict," *Plos One* 8, no. 4 (2013); Treves and Menefee, "Adverse effects of hunting with hounds on participants and bystanders."
[139] Randy Johnson and Anna Schneider, "Wisconsin Wolf Season Report: February 2021," *https://widnr.widen.net/s/k8vtcgjwkf/wolf-season-report-february-2021* (2021).
[140] Treves and Menefee, "Adverse effects of hunting with hounds on participants and bystanders."
[141] Wydeven et al., "Characteristic of wolf packs in Wisconsin: Identification of traits influencing depredation," , p. 41.
[142] Philip W. Hedrick, Rhonda N. Lee, and Colleen Buchanan, "Canine Parvovirus Enteritis, Canine Distemper, and Major Histocompatibility Complex Genetic Variation in Mexican Wolves," *Journal of Wildlife Diseases* 39, no. 4 (2003).

The ESA's take prohibition applies equally to threatened species and members of experimental populations, unless otherwise indicated by a species-specific rule promulgated by the FWS pursuant to ESA § 4(d). See 50 C.F.R. 17.31(a). The species-specific rule for Mexican wolves allows for no exception to the prohibition on take caused by hounds. 50 C.F.R. 17.84(k)(5). Accordingly, the ESA protects Mexican wolves from take or attempted take caused by hounds.

These ESA protections apply equally against hounding authorized by a state official or agency. It is unlawful for any person to "cause [an ESA violation] to be committed." 16 U.S.C. § 1538(g). The term "person" includes "any officer, employee, agent, department, or instrumentality … of any State, municipality, or political subdivision of a State … [or] any State, municipality, or political subdivision of a State …." Id. § 1532(13). Thus, the ESA "not only prohibits the acts of those parties that directly exact the taking, but also bans those acts of a third party that bring about the acts exacting a taking…. [A] governmental third party pursuant to whose authority an actor directly exacts a taking … may be deemed to have violated the provisions of the ESA." Strahan v. Coxe, 127 F.3d 155, 163 (1st Cir. 1997) (emphasis added) (holding that Massachusetts exacted a taking by issuing licenses and permits authorizing gillnet and lobster pot fishing—activities known to incidentally injure Northern right whales). As in Strahan, state hunting and trapping schemes violate the ESA's section 9 prohibition on take when "a risk of taking exists [even] if trappers comply with all applicable laws and regulations in place." Animal Prot. Inst., Ctr. for Biological Diversity v. Holsten, 541 F. Supp. 2d 1073, 1079 (D. Minn. 2008) (holding Commissioner of the Minnesota Department of Natural Resources liable for incidental killing of lynx); see also Strahan v. Sec'y, Massachusetts Exec. Off. of Energy & Envtl. Affs., 458 F. Supp. 3d 76, 95 (D. Mass. 2020)(holding Massachusetts Executive Office of Energy and Environmental Affairs and Director of Massachusetts Division of Marine Fisheries liable for incidental trapping of Northern right whales); Ctr. for Biological Diversity v. C.L. Otter, No. 1:14-CV-258-BLW, 2016 WL 233193 (D. Idaho Jan. 8, 2016) (holding Idaho Governor and others liable for incidental trapping of lynx), on reconsideration, sub nom. Ctr. for Biological Diversity v. Otter, No. 1:14-CV-258-BLW, 2018 WL 539329 (D. Idaho Jan. 24, 2018); Red Wolf Coal. v. N. Carolina Wildlife Res. Comm'n, No. 2:13-CV-60-BO, 2014 WL 1922234 (E.D.N.C. May 13, 2014) (holding North Carolina Wildlife Resources Commission liable for incidental take of red wolves).

In short, using hunting hounds results in the illegal take as defined by the Endangered Species Act of Mexican wolves and can facilitate more lobo poaching.

9. Bear hunting does not reduce human-bear conflicts in the long-term, and it may exacerbate them

Wildlife managers regularly opine that regulated bear hunting seasons are the only tool available for effective population control of free-ranging black bears and are therefore critical to prevent human-bear conflicts. That notion has been overturned by a litany of studies that find that bear hunting does not effectively reduce conflicts for the long term. Lackey et al. (2018), in their review of human-bear conflicts state:

> From a broad perspective, more bears mean more conflict, as bears encounter humans more frequently. Yet the relationship between abundance and conflict is not consistent. For a bear population near carrying capacity, lowering the population by 20% may have little effect on conflict depending upon the context of the conflict (e.g., urban vs. agricultural), availability of natural food, and prevalence of anthropogenic attractants. Conversely, smaller bear populations or small components of a bear population can cause a great deal of conflict if anthropogenic food is readily available and natural food is greatly diminished.[143]

In other words, agencies' continuous assertions that bear population size drives human-bear conflict is incorrect and oversimplified. Lackey et al. (2018) suggest that even a small bear population can cause a lot of conflict. The answer to human-bear conflict is not killing, but instead not attracting bears to the area in the first place. Northrup et al. (2023) found that while a new spring bear hunting season resulted in a "significant" increase in *harvest*, "there was no concomitant reduction in interactions or incidents and, in fact, these [interactions or incidents] were higher in areas with the new spring season relative to control areas."[144]

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[143] C. W. Lackey et al., "Human-Black Bear Conflicts: A review of common management practices. Human-Widlife Interactions," *Monograph* 2 (2018).

[144] Joseph M. Northrup et al., "Experimental test of the efficacy of hunting for controlling human–wildlife conflict," *The Journal of Wildlife Management* (2023).

In fact, numerous studies cite the fact that killing bears does not stop human-bear conflicts, even as it does radically reduce bear populations.[145] And trophy hunting bears does not make people safer, because hunters are not killing the bears attracted to people's yards in order to feast on unsecured garbage, bird feeders, pet food, and animal feed.

Bear biologists Obbard et al. (2014) write: "We found no significant correlations between [black bear] harvest and subsequent HBC [human-bear conflicts]. Although it may be intuitive to assume that harvesting more bears should reduce HBC, empirical support for this assumption is lacking despite considerable research."[146] Obbard et al. (2014) cite six studies in addition to their own findings (Garshelis 1989, Treves and Karanth 2003, Huygens et al. 2004, Tavss 2005, Treves 2009, Howe et al. 2010, Treves et al. 2010). Since Obbard et al. (2014) published, many other biologists, who are cited here, have also confirmed that trophy hunting bears does not reduce conflicts with humans, but it can harm bear populations.[147] (Tavss (2005) is a New Jersey-specific study.)

Khorozyan and Waltert (2020) write:

> We conducted a meta-analysis of 77 cases from 48 publications and used the relative risk of damage to compare the effectiveness of non-invasive interventions, invasive management (translocations) and lethal control (shooting) against bears. We show that the most effective interventions are electric fences (95% confidence interval = 79.2–100% reduction in damage), calving control (100%) and livestock replacement (99.8%), but the latter two approaches were applied in only one case each and need more testing. Deterrents varied widely in their effectiveness (13.7–79.5%) and we recommend applying these during the peak periods of damage infliction. We found shooting (− 34.2 to 100%) to have a short-term positive effect with its effectiveness decreasing significantly and linearly over time. We did not find relationships between bear density and intervention effectiveness, possibly due to differences in spatial scales at which they were measured (large scales for densities and local fine scales for effectiveness).[148]

While food is the root cause of most negative human-bear interactions, Herrero et al. (2011) write: "Each year, millions of interactions between people and black bears occur without any injury to a person, although by 2 years of age most black bears have the physical capacity to kill a person."[149] And most black bear attacks on humans are

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[145] E. J. Howe et al., "Do public complaints reflect trends in human-bear conflict?," *Ursus* 21, no. 2 (2010); M. E. Obbard et al., "Relationships among food availability, harvest, and human-bear conflict at landscape scales in Ontario, Canada," *Ursus* 25, no. 2 (2014).; M. A. Barrett et al., "Testing Bear-Resistant Trash Cans in Residential Areas of Florida," *Southeastern Naturalist* 13, no. 1 (2014); S. Baruch-Mordo et al., "Stochasticity in Natural Forage Production Affects Use of Urban Areas by Black Bears: Implications to Management of Human-Bear Conflicts," *Plos One* 9, no. 1 (2014); D. L. Garshelis et al., "Is diversionary feeding an effective tool for reducing human-bear conflicts? Case studies from North America and Europe," *Ursus* 28, no. 1 (2017); Johnson et al., "Human development and climate affect hibernation in a large carnivore with implications for human-carnivore conflicts."; Laufenberg et al., "Compounding effects of human development and a natural food shortage on a black bear population along a human development-wildland interface."; D. L. Lewis et al., "Foraging ecology of black bears in urban environments: guidance for human-bear conflict mitigation," *Ecosphere* 6, no. 8 (2015); Elizabeth F. Pienaar, David Telesco, and Sarah Barrett, "Understanding People's Willingness to Implement Measures to Manage Human-Bear Conflict in Florida," *Journal of Wildlife Management* 79, no. 5 (2015).

[146] Obbard et al., "Relationships among Food Availability, Harvest, and Human-Bear Conflict at Landscape Scales in Ontario, Canada."

[147] H. E. Johnson et al., "Shifting perceptions of risk and reward: Dynamic selection for human development by black bears in the western United States," *Biological Conservation* 187 (2015); Johnson et al., "Human development and climate affect hibernation in a large carnivore with implications for human-carnivore conflicts."; Baruch-Mordo et al., "Stochasticity in Natural Forage Production Affects Use of Urban Areas by Black Bears: Implications to Management of Human-Bear Conflicts."; Garshelis et al., "Is diversionary feeding an effective tool for reducing human-bear conflicts? Case studies from North America and Europe."; Barrett et al., "Testing Bear-Resistant Trash Cans in Residential Areas of Florida."; Pienaar, Telesco, and Barrett, "Understanding People's Willingness to Implement Measures to Manage Human-Bear Conflict in Florida."

[148] Khorozyan, I. and M. Waltert, "Variation and Conservation Implications of the Effectiveness of Anti-Bear Interventions," *Scientific Reports* 10 no. 1 (2020).

[149] S. Herrero et al., "Fatal Attacks by American Black Bear on People: 1900-2009," *Journal of Wildlife Management* 75, no. 3 (2011): 599.

caused by unleashed dogs.[150] Furthermore, in a recent nationwide analysis of bears killed via hunting and bear attacks on humans during 2000–2017, Keefover and Murphy (2023) found that despite a ~3% average annual increase in the number of bears killed by hunters across the U.S., those increases had no influence on the frequency or distribution of bear attacks on humans (i.e., killing more bears did not reduce the number of bear attacks).[151]

Wildlife management agencies often wrongly presume that an increase in human-bear conflicts is a result of a growing bear population, but bears may simply be modifying their behaviors in response to deleterious environmental circumstances, including a lack of food.[152]

As Johnson et al. (2018) and others suggest, because North American habitats are altered by human development and are changed by the climate crisis, wildlife managers must adapt and work to reduce human-bear conflicts, rather than rely upon lethal removals.[153] When bears must live alongside humans, their chances for survival decrease dramatically because of vehicle collisions and agency actions.[154] Large native carnivores face extinction,[155] so it is incumbent upon wildlife agencies to conserve rather than overexploit them, including by building safe passages through roadways and human-dominated landscapes.[156] Expanded human development into bear habitats during the climate crisis exacerbates bear mortalities, and then agencies react by increasing trophy hunting quotas, when they should actually be taking steps to *reduce* overall black bear mortalities.[157]

In Durango, Colorado, Johnson et al. (2018) set up a bear trash-proofing experiment. They gave two study groups of residents bear-resistant trash containers, enhanced those residents' bear-aware education, served residents with warnings, and worked with the city to increase law enforcement. Meanwhile, two control groups of residents did not receive free bear-proof trash cans, enhanced education, warnings, or law enforcement. The outcome was significant: the study groups that received additional intervention saw bear conflicts decline by 60%.[158] During this study, bears learned to leave the areas where residents complied with trash laws and shifted to areas of the city where human foods were readily abundant.[159] Johnson et al. (2018) emphasize that law enforcement was a key factor in reducing bear conflicts in Durango.[160] At the 6th International Human-Bear Conflict Workshop, Venumiere-Lefebvre et al.

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[150] Janel M.; Scharhag et al., "Characteristics of Non-Fatal Attacks by Black Bears: Conterminous United States, 2000–2017," *Human-Wildlife Interactions* 15, no. 1 (2021).
[151] W. Keefover and S.M. Murphy, "Violating the public's trust: No evidence that black bear hunting reduces attacks" (paper presented at the Pathways 2023: Managing wildlife in an era of mutualism, Colorado State University, Fort Collins, USA., 2023).
[152] Johnson et al., "Human development and climate affect hibernation in a large carnivore with implications for human-carnivore conflicts."; Johnson et al., "Shifting perceptions of risk and reward: Dynamic selection for human development by black bears in the western United States."; Obbard et al., "Relationships among food availability, harvest, and human-bear conflict at landscape scales in Ontario, Canada.""
[153] Johnson et al., "Human development and climate affect hibernation in a large carnivore with implications for human-carnivore conflicts."; D. L. Lewis et al., "Modeling black bear population dynamics in a human-dominated stochastic environment," *Ecological Modelling* 294 (2014).
[154] Johnson et al., "Human development and climate affect hibernation in a large carnivore with implications for human-carnivore conflicts."; Johnson et al., "Shifting perceptions of risk and reward: Dynamic selection for human development by black bears in the western United States."; J. P. Beckmann and J. Berger, "Rapid ecological and behavioural changes in carnivores: the responses of black bears (*Ursus americanus*) to altered food," *Journal of Zoology* 261 (2003).
[155] Estes et al., "Trophic Downgrading of Planet Earth."; Chris T. Darimont et al., "The unique ecology of human predators," *Science* 349, no. 6250 (2015); William J. Ripple et al., "Extinction risk is most acute for the world's largest and smallest vertebrates," *Proceedings of the National Academy of Sciences* 114, no. 40 (2017); Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), "Nature's Dangerous Decline 'Unprecedented' Species Extinction Rates 'Accelerating': Current global response insufficient. 'Transformative changes' needed to restore and protect nature; Opposition from vested interests can be overcome for public good. Most comprehensive assessment of its kind; 1,000,000 species threatened with extinction."
[156] Maria Psaralexi et al., "Exploring 15 years of brown bear (*Ursus arctos*)-vehicle collisions in northwestern Greece," *Nature Conservation* 47 (2022).
[157] Laufenberg et al., "Compounding effects of human development and a natural food shortage on a black bear population along a human development-wildland interface."
[158] Johnson et al., "Assessing Ecological and Social Outcomes of a Bear-Proofing Experiment."
[159] Remington J. Moll et al., "An apex carnivore's life history mediates a predator cascade," *Oecologia* 196, no. 1 (2021).
[160] Moll et al., "An apex carnivore's life history mediates a predator cascade."

(2022) reported that now 98% of trash cans in Durango, Colorado are bear resistant with two-thirds having automatic locking lids, which increased compliance dramatically—researchers reported 92% compliance with automatically locking lids.[161]

Colorado Parks and Wildlife gave away one million dollars as part of a grant program to 29 communities representing local government and NGOs to work on long-term solutions to reduce human-bear conflicts.[162]

The goal of the Colorado program is to unify local communities so they can provide regional strategies toward meaningful, long-term solutions to prevent future human-bear conflicts. Those solutions include efforts in education, research, bear-resistant infrastructure (such as bear-resistant trash cans and dumpsters), increased law enforcement and hazing. Program personnel positions could include enforcement officers for compliance with ordinances prohibiting wildlife feeding, and fruit-gleaning coordinators. The program also matched funds from municipalities, counties, and other stakeholders to encourage coordinated regional solutions toward reducing human-bear conflict. (In 2023, Maryland passed a similar bill.)

For bear-aware education campaigns to achieve success, they must focus on the benefits that bears provide to society.[163] Researchers have found that education campaigns designed solely to change human behaviors will fail, because changing human behavior is difficult. They conclude that only a few will be motivated to make changes to accommodate bears, unless people understand the tremendous ecosystem and economic benefits that result from bears existing on the landscape.[164] And while food is the root cause of most negative human-bear interactions, again we emphasize that researchers Herrero et al. (2011) find that while bears are large and powerful animals, millions of interactions between people and black bears occur every year that do not result in any injury to a person.[165]

In sum, New Mexico needs to increase non-lethal measures to reduce human-bear conflicts. These issues boil down to human behaviors that require education.

10. Family oriented black bears hold intrinsic value, and provide incalculable benefits to their ecosystems

Highly sentient, bears' have the largest brain size of any carnivore.[166] Their intelligence has been compared to that of great apes; for example, they are able to estimate quantities (that is, count) and assess moving stimuli and subsets of

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[161] Cassandre Venumiere-Lefebvre et al., "Follow-up evaluation on the effectiveness of a large-scale effort to use bear-resistant garbage cans, including automatic and manual-locking cans, for limiting conflict in Durango, CO" (paper presented at the 6th International Human-Bear Workshop, Lake Tahoe, NV, 2022).

[162] See bill here: https://leg.colorado.gov/bills/hb21-1326 and 3 news releases here: https://www.colorado.gov/governor/news/8451-gov-polis-and-colorado-parks-and-wildlife-take-action-save-communities-money-keep ; https://cpw.state.co.us/Documents/WildlifeSpecies/LivingWithWildlife/Human-Bear-Conflict-Reduction-Grant-Program-Plan.pdf; https://cpw.state.co.us/aboutus/Pages/News-Release-Details.aspx?NewsID=3636

[163] K. Slagle et al., "Building tolerance for bears: A communications experiment," *Journal of Wildlife Management* 77, no. 4 (2013); Stacy A. Lischka et al., "Understanding and managing human tolerance for a large carnivore in a residential system," *Biological Conservation* 238 (2019); Stacy A. Lischka et al., "Psychological drivers of risk-reducing behaviors to limit human–wildlife conflict," *Conservation Biology* 34, no. 6 (2020); A. W. Don Carlos et al., "Human–Black Bear Conflict in Urban Areas: An Integrated Approach to Management Response," *Human Dimensions of Wildlife* 14, no. 3 (2009).

[164] A. M. Dietsch et al., "Education is not a panacea for reducing human-black bear conflicts," *Ecological Modelling* 367 (2018); M. L. Gore and B. A. Knuth, "Mass media effect on the operating environment of a wildlife-related risk-communication campaign," *Journal of Wildlife Management* 73, no. 8 (2009); Slagle et al., "Building tolerance for bears: A communications experiment."

[165] Herrero et al., "Fatal Attacks by American Black Bear on People: 1900-2009," 599.

[166] Ian Stirling, Kristin Laidre, and Erik W. Born, "Do wild polar bears (Usus maritimus) use tools when hunting walruses," *Arctic* 74, no. 2 (2021); M. Cattet et al., "An evaluation of long-term capture effects in ursids: Implications for wildlife welfare and research," *Journal of Mammalogy* 89, no. 4 (2008), https://doi.org/10.1644/08-mamm-a-095.1; V. B. Deecke, "Tool-use in the brown bear (Ursus arctos)," *Animal Cognition* 15, no. 4 (2012).

stimuli.[167] They form close social attachments with kin.[168] Cubs learn foraging styles from their mothers,[169] and they spend prolonged periods raising and nurturing young.[170] They can use tools,[171] and they have a right-paw bias while foraging.[172]

Black bears are an important umbrella species that increases the biological diversity of their forest ecosystems. For example, black bears eat fruits and deposit them across long distances, [173] and they disperse more seeds than birds.[174] Bears cause small-scale ecological disturbances to the canopy that allow sun to filter to the forest floor creating greater biological diversity.[175] Bears break logs while grubbing, which helps the decomposition process and facilitates the return of nutrients to the soil. They also recycle carrion.[176] In one study, researchers found that black bears were the dominant species moving salmon from streams into riparian zones. Bears ate about half of the salmon, leaving remnants that contributed to greater tree ring growth.[177] They also found higher plant growth along the riparian areas where bear trails existed and where bears' urine deposit was high.[178] When black bears are out of the den, they also protect gray foxes from competition with coyotes and bobcats, who avoid bears.[179] In this way, bears create a non-lethal "trophic cascade," meaning that bears indirectly benefit gray foxes. And by changing the makeup of the smaller carnivores in the ecosystem, this in turn can affect rodent populations and seed dispersal.[180] Bears recycle carrion, and steal food from other carnivores.[181]

In sum, black bears are highly intelligent, family-oriented animals who are also vital to their ecosystems, including by spreading seeds.

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[167] Jennifer Vonk and Michael J. Beran, "Bears 'count' too: quantity estimation and comparison in black bears, Ursus americanus," *Animal Behaviour* 84, no. 1 (2012); Jennifer Vonk, Stephanie E. Jett, and Kelly W. Mosteller, "Concept formation in American black bears, Ursus americanus," *Animal Behaviour* 84, no. 4 (2012).

[168] Deecke, "Tool-use in the brown bear (Ursus arctos)."; Silvana Mattiello et al., "Effect of the change of social environment on the behavior of a captive brown bear (Ursus arctos)," *Journal of Veterinary Behavior: Clinical Applications and Research* 9, no. 3 (2014).

[169] Rachel Mazur and Victoria Seher, "Socially learned foraging behaviour in wild black bears, Ursus americanus," *Animal Behaviour* 75, no. 4 (2008).

[170] Black bears are highly sentient. *See e.g.,* John L. Gittleman, "Carnivore Life History Patterns: Allometric, Phylogenetic, and Ecological Associations," 127, no. 6 (1986); T. E. Reimchen and M. A. Spoljaric, "Right paw foraging bias in wild black bear (Ursus americanus kermodei)," *Laterality: Asymmetries of Body, Brain and Cognition* 16, no. 4 (2011); Vonk, Jett, and Mosteller, "Concept formation in American black bears, Ursus americanus."; Vonk and Beran, "Bears 'count' too: quantity estimation and comparison in black bears, Ursus americanus."; Mazur and Seher, "Socially learned foraging behaviour in wild black bears, Ursus americanus."; Cattet et al., "An evaluation of long-term capture effects in ursids: Implications for wildlife welfare and research."

[171] Stirling, Laidre, and Born, "Do wild polar bears (Usus maritimus) use tools when hunting walruses."; Deecke, "Tool-use in the brown bear (Ursus arctos)."

[172] Reimchen and Spoljaric, "Right paw foraging bias in wild black bear (Ursus americanus kermodei).".

[173] M. S. Enders and S. B. Vander Wall, "Black bears Ursus americanus are effective seed dispersers, with a little help from their friends," *Oikos* 121, no. 4 (2012).

[174] L. E. F. Harrer and T. Levi, "The primacy of bears as seed dispersers in salmon-bearing ecosystems," *Ecosphere* 9, no. 1 (2018).

[175] K. Takahashi and K. Takahashi, "Spatial distribution and size of small canopy gaps created by Japanese black bears: estimating gap size using dropped branch measurements," *Bmc Ecology* 13 (2013).

[176] Bull, Akenson, and Henjum, "Characteristics of Black Bear Dens in Trees and Logs in Northeastern Oregon."

[177] T. E. Reimchen and C. H. Fox, "Fine-scale spatiotemporal influences of salmon on growth and nitrogen signatures of Sitka spruce tree rings," *Bmc Ecology* 13 (2013).

[178] Moll et al., "An apex carnivore's life history mediates a predator cascade."

[179] Moll et al., "An apex carnivore's life history mediates a predator cascade."

[180] *Moll et al., "An apex carnivore's life history mediates a predator cascade."*

[181] L. Mark Elbroch et al., "Nowhere to hide: Pumas, black bears, and competition refuges," *Behavioral Ecology* 26, no. 1 (2015); Maximilian L. Allen, L. Mark Elbroch, and Heiko U. Wittmer, "Can't bear the competition: Energetic losses from kleptoparasitism by a dominant scavenger may alter foraging behaviors of an apex predator," *Basic and Applied Ecology* 51 (2021); Bull, Akenson, and Henjum, "Characteristics of Black Bear Dens in Trees and Logs in Northeastern Oregon."

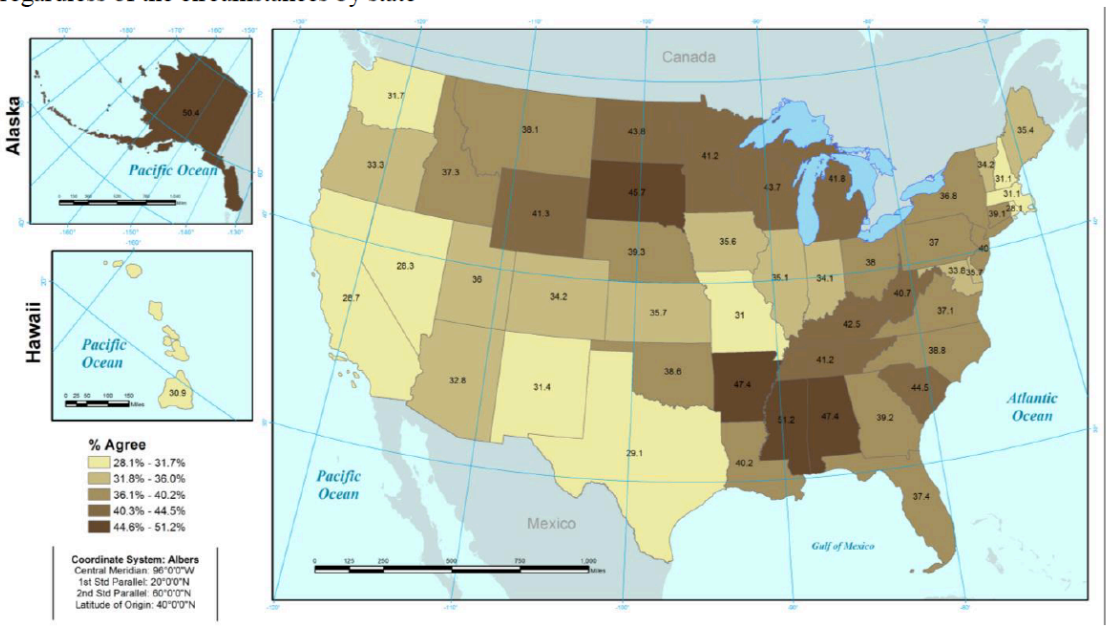
11. New Mexicans' wildlife values should be measured using social science, and their views respected

In the past, NMDGF used the term "social carrying capacity" to inform its bear management protocols. But the term "social carrying capacity" is arbitrary and unsupported by peer-reviewed science, and therefore should be dropped if it is still in use by NMDGF.

Americans believe that black bears hold intrinsic value; that is, bears are inherently valuable beyond their benefits to society or even their ecosystems. A 2019 study of adult U.S. residents also found that 81% believe that wildlife hold intrinsic value.[182] As Bruskotter et al. (2015) write, ". . . most people believe that wildlife possess 'intrinsic value,' which suggests that wildlife should be treated with regard for their own welfare, not just their utility (or lack thereof) to humans."[183] Black bears have more value alive than dead, and a vast majority of Americans agree that wildlife have intrinsic value independent of their utility to people. This is another reason that black bear conservation, not hunting, should be the focus of black bear management in New Mexico. New Mexicans are highly tolerant of black bears. See Fig. 2.

Fig. 2. Manfredo et al. (2018) found that only 31.4% of New Mexicans want a black bear removed even if that bear attacks a person. New Mexico's public is one of the most bear-tolerant in the U.S.

Map 18: Percent who agree that if a black bear attacks a person, that bear should be lethally removed regardless of the circumstances by state



- According to the American Values Project, New Mexico residents are highly tolerant of black bears. In fact, 68.6% of New Mexico residents surveyed would not want a bear *who attacked a person* lethally removed.[184] Fig. 2.
- In 2019, the National Shooting Sports Foundation and Responsive Management—both pro-hunting and -trapping entities—found that 66% of Americans disapprove of trophy hunting.[185]

[182] J.T. Bruskotter, M.P. Nelson, and J.A Vucetich, "Does nature possess intrinsic value? An empirical assessment of Americans' beliefs.," (2015).
[183] J. T. Bruskotter, M. P. Nelson, and J. A. Vucetich, "Hunted predators: Intrinsic value," *Science* 349, no. 6254 (2015).
[184] M. J. Manfredo et al., America's Wildlife Values: The Social Context of Wildlife Management in the U.S., (Fort Collins, Colorado: Colorado State University, Department of Natural Resources, 2018).
[185] National Shooting Sports Foundation and Responsive Management, "Americans' attitudes toward hunting, fishing, sport shooting and trapping 2019," (2019).

- More than two dozen polls commissioned by the Humane Society of the United States have found that about two-thirds of Americans dislike trophy hunting, and some of the polls specifically queried the public about black bear hunting and found similar opposition.[186]

Black bears are a highly valued American carnivore and one of the most photographed in the U.S.[187] According to the U.S. Fish and Wildlife Service, only 6.6% of New Mexico residents held paid hunting licenses in 2023.[188] And of that small percentage, a much smaller number are trophy hunters (about 2% of all hunters)—who, according to a 2020 economic study, depend largely on funding provided by others to continue their hobby.[189] Trophy hunting of black bears is unpopular.

While some consume the meat and fat of bears, the pursuing and killing of bears is commonly described as "trophy hunting," not only by other state agencies and the bear hunting industry itself, but also by myriad scholars.[190] Trophy hunters' primary motivation is to kill black bears for photo opportunities and to obtain and display bear parts, including heads, hides, claws and capes.[191] Trophy hunters kill animals *primarily* for bragging rights, but not for food. Hunting large carnivores for food is unsustainable.[192] Darimont et al. (2017) write:

> First, inedible species, like carnivores commonly targeted by trophy hunters, make nutritional and sharing hypotheses implausible. Second, evidence for show-off behaviour appears clear. Trophy hunters commonly pose for photographs with their prey, with the heads, hides and ornamentation prepared for display.[193]

Furthermore, studies show that New Mexico cannot kill its way out of human-bear conflicts—doing so would mean black bear extirpation.[194] As Stringham (2013) suggests, agencies' protocols for black bears are often too rigid and

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[186] Remington Research Group, "Florida voters oppose a Florida black bear hunt," *http://www.humanesociety.org/news/press_releases/2015/02/poll-fl-bear-hunt-020315.html* (2015); Remington Research Group, "Trophy Hunting: U.S. National Survey," (2015); Remington Research Group, "Vast Majority of Americans Oppose Elephant and Lion Trophy Hunting," *http://www.humanesociety.org/news/press_releases/2017/12/trophy-hunting-poll-120517.html* (December 5, 2017 2017); Remington Research Group, "State of Missouri: Public Opinion," (2019); Remington Research Group, "California public opinion," (Dec. 21 2020); Remington Research Group, "Colorado Statewide Public Opinion (black bear, mountain lion and bobcat)," (Dec. 2020); Remington Research Group, "Colorado Public Opinion (trapping & trophy hunting wild cats and bears)," (2021); Remington Research Group, "National public opinion (on trophy hunting)," *https://www.humanesociety.org/sites/default/files/docs/HSUS_Trophy-Hunting-National-Public-Opinion-01-10-22.pdf* (2022).

[187] Slagle et al., "Building tolerance for bears: A communications experiment."

[188] U.S. Fish and Wildlife Service, "Hunting licenses, holders and costs by apportionment year," *https://us-east-1.quicksight.aws.amazon.com/sn/accounts/329180516311/dashboards/48b2aa9c-43a9-4ea6-887e-5465bd70140b* (2023).

[189] Cameron Murray, "Trophy hunters of native carnivores benefit from wildlife conservation funded by others," *A report for the Humane Society of the United States* https://www.humanesociety.org/sites/default/files/docs/HSUS_Trophy-Hunting-Economics-2020.pdf (2020).

[190] Chelsea Batavia et al., "The elephant (head) in the room: A critical look at trophy hunting," *Conservation Letters* (2018); M. Brower, "Trophy shots: Early north American photographs of nonhuman animals and the display of masculine prowess," *Society & Animals* 13, no. 1 (2005); C. T. Darimont and K. R. Child, "What Enables Size-Selective Trophy Hunting of Wildlife?," *Plos One* 9, no. 8 (2014); Chris T. Darimont, Brian F. Codding, and Kristen Hawkes, "Why men trophy hunt," *Biology Letters* 13, no. 3 (2017); Stephen L. Eliason, "A Statewide Examination of Hunting and Trophy Nonhuman Animals: Perspectives of Montana Hunters," *Society & Animals* 16, no. 3 (2008); S. L. Eliason, "Reconstructing Dead Nonhuman Animals: Motivations for Becoming a Taxidermist," *Society & Animals* 20, no. 1 (2012); P. J. Johnson et al., "Size, Rarity and Charisma: Valuing African Wildlife Trophies," *Plos One* 5, no. 9 (2010). Benjamin Ghasemi, "Trophy hunting and conservation: Do the major ethical theories converge in opposition to trophy hunting?," *People and Nature* 3 (2021); Chris T. Darimont et al., "Large carnivore hunting and the social license to hunt," *Conservation Biology* (2020).

[191] Darimont, Codding, and Hawkes, "Why men trophy hunt."; Batavia et al., "The elephant (head) in the room: A critical look at trophy hunting."

[192] Darimont et al., "The unique ecology of human predators."

[193] Darimont, Codding, and Hawkes, "Why men trophy hunt."

[194] Howe et al., "Do public complaints reflect trends in human-bear conflict?."; Obbard et al., "Relationships among food availability, harvest, and human-bear conflict at landscape scales in Ontario, Canada."

simplistic to conform with modern societal values that prioritize humaneness and conservation over wanton killing.[195] For instance, he suggests that agencies should not kill bears unless they are a true public safety hazard—not because someone felt frightened when they saw one.[196] What Americans value are efforts to co-exist with wildlife, even wildlife Americans historically believed were "scary."[197]

According to the Bureau of Economic Analysis-Department of Commerce, outdoor recreation in New Mexico generated $2.3 billion for the state's economy in 2021. Fig. 3. Of that figure, hunting and trapping generated $8,418,000 ($8.4 million), which equals about 0.4% of the total outdoor recreation dollars spent in New Mexico. Skiing and snowboarding generated $39,421,000—about five times more than hunting and trapping. And people spent 94 times more on travel and tourism in New Mexico than on hunting and trapping.[198] Fig. 3.

Fig. 3. Outdoor recreation spending in New Mexico (2021), Data from U.S. Bureau of Econ. Analysis, show that hunters and trappers spend a mere 0.4% of all outdoor recreation in New Mexico.

Sample activities	Spending [thousands of dollars]	% of total
Hunting and trapping	8,418	**0.4**
Climbing, hiking, tent camping	22,322	**1.0**
Skiing and snowboarding	39,421	**1.7**
Equestrian	53,536	**2.3**
Travel and tourism	788,269	**34.6**
Total Outdoor Recreation	2,279,181	**100.0**

New Mexico's wildlife agency is poorly funded, too. Southwick Associates (2021) write that New Mexico is "lagging behind other western states" in "identifying stable conservation funding." Its future needs for funding are between $37.5 million to $48.4 million annually, but the agency is only achieving "below $10.2 million annual funding level."[199]

New Mexico must seek out new ways to broaden its funding sources. For example, in 2022 the Colorado Legislature passed a law to fund Colorado Parks and Wildlife (CPW). **The Keep Colorado Wild Pass**, allows motorists registering their vehicles to opt into a low cost, $29 per year parks pass. The law is expected to generate a new $36 million annually to CPW.[200] The agency states, "The first $32.5 million will go toward state park maintenance and development, the next $2.5 million will go towards search and rescue teams and $1 million to the Colorado Avalanche Information Center. Any revenue beyond that will go to wildlife projects and outdoor educational programs." Extra funds will go toward administering the state wildlife action plan to conserve rare, threatened, and endangered species.[201] New Mexico could achieve a similar program. As BEA and National Park Service data show, New Mexicans are committed to outdoor recreation. The National Park Service's 2023 data show that a record 156 million dollars was spent by visitors to New Mexico's national park gateway regions in 2021. Fig. 4. The NPS writes:

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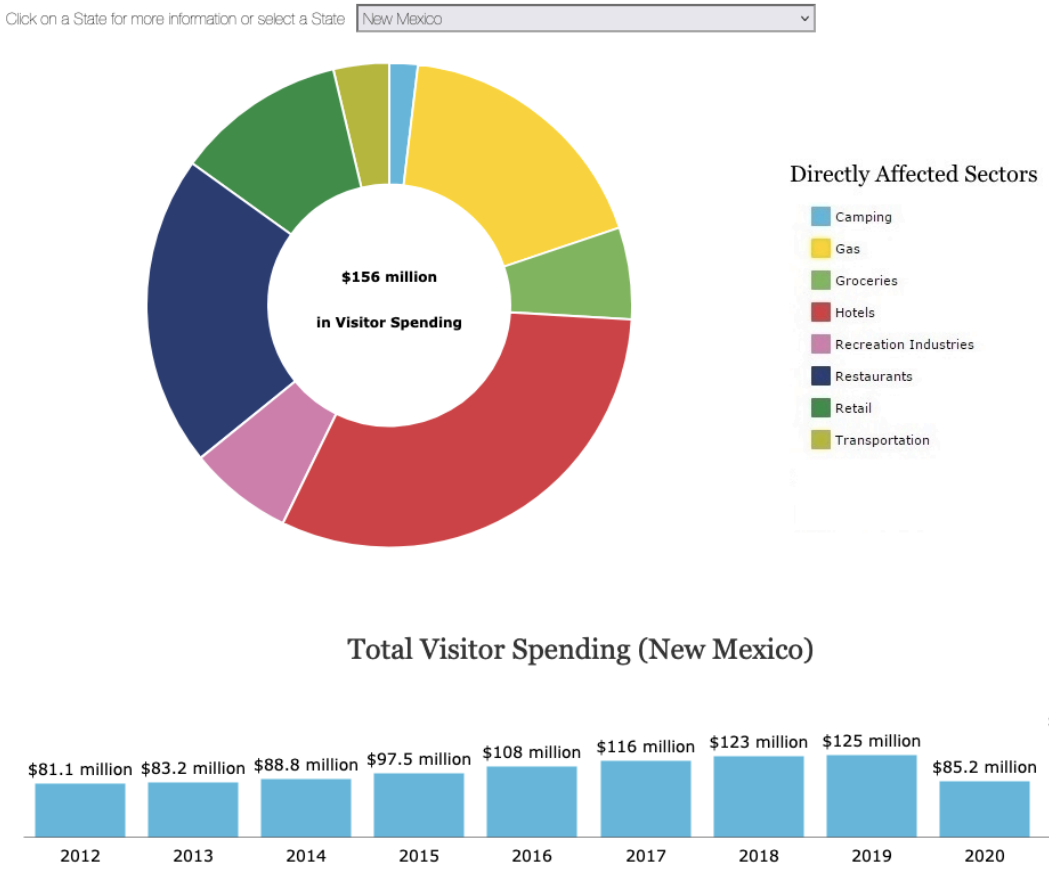
[195] Stephen R. Stringham, "Managing risk from bears and other potentially lethal wildlife: predictability, accountability, and liability," *Human-Wildlife Interactions* 7, no. 1 (2013).
[196] *Id.*
[197] Manfredo et al., Short America's Wildlife Values: The Social Context of Wildlife Management in the U.S; Michael J. Manfredo et al., "Social value shift in favour of biodiversity conservation in the United States," *Nature Sustainability* 4, no. 4 (2021); Kelly A. George et al., "Changes in attitudes toward animals in the United States from 1978 to 2014," *Biological Conservation* 201 (2016).
[198] Dept. of Commerce Bureau of Economic Analysis, "Outdoor Recreation Satellite Account, U.S. and Prototype for States, 2023," *https://www.bea.gov/data/special-topics/outdoor-recreation* (2023).
[199] Southwick Associates, "New Mexico Department of Game and Fish Future Funding Study," *https://www.wildlife.state.nm.us/download/publications/reports-studies/New-Mexico-Department-of-Game-and-Fish-Future-Funding-Study.pdf* (2021).
[200] Colorado Parks and Wildlife, "Keep Colorado Wild Pass," *https://cpw.state.co.us/aboutus/Pages/Keep-Colorado-Wild-Pass.aspx?utm_source=digital&utm_medium=google&utm_campaign=2022-keepcoloradowild-digital&gclid=Cj0KCQjw756lBhDMARIsAEI0AgkmhxaO764WnwYV0ErrAf49AE21U_IGmrf84PhVDRPLPZcnDam6PlkaAo75EALw_wcB*.
[201] Colorado Parks and Wildlife, "Keep Colorado Wild Pass."

In 2021, 2.4 million park visitors spent an estimated $156 million in local gateway regions while visiting National Park Service lands in New Mexico. These expenditures supported a total of 2,080 jobs, $61.9 million in labor income, $106 million in value added, and $196 million in economic output in the New Mexico economy.[202]

Fig. 4. Visitor spending in New Mexico's national parks from 2012 to 2021.



Lastly, we know from numerous studies that wildlife watching tourism, including bear watching, is lucrative and brings in exponentially more money than hunting or trapping wildlife.[203] To put it simply, once an animal is killed, no one else has the opportunity to view or photograph that animal.

In sum, wildlife watchers and other non-hunting-related outdoor recreationists are the biggest contributors to New Mexico's economy when compared with funds from the hunting and trapping community. Most New Mexicans do not approve of black bear hunting, which is trophy hunting. New Mexico could adopt a vehicle registration program that would help the state to fund its parks and wildlife projects from the mainstream public.

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[202] National Park Service, "National Park Spending Effects (2021)," *https://www.nps.gov/subjects/socialscience/vse.htm* (2023).

[203] Leslie Richardson et al., "The economics of roadside bear viewing," *Journal of Environmental Management* 140 (2014); John Loomis et al., "A method to value nature-related webcam viewing: the value of virtual use with application to brown bear webcam viewing," *Journal of Environmental Economics and Policy* 7, no. 4 (2018); Martha Honey et al., "Economic impact of bear viewing and bear hunting: The Great Bear Rainforest of British Columbia," (2014); L. M. Elbroch et al., "Contrasting bobcat values," *Biological Conservation* (2017).

12. Conclusion

Because of many human-caused factors, life for New Mexico's rare and beloved black bears is becoming increasingly difficult. They face habitat loss, severe fires, and diminishing food sources and travel corridors. Much more must be done to protect and conserve them. Given the immense uncertainties New Mexico black bears face, we request that NMDGF reduce their proposed bear-kill quotas by at least 50%.

Sincerely yours,

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