

National Caucus of Environmental Legislators

# Carnivores & Coexistence Briefing Book



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Environmental Legislators





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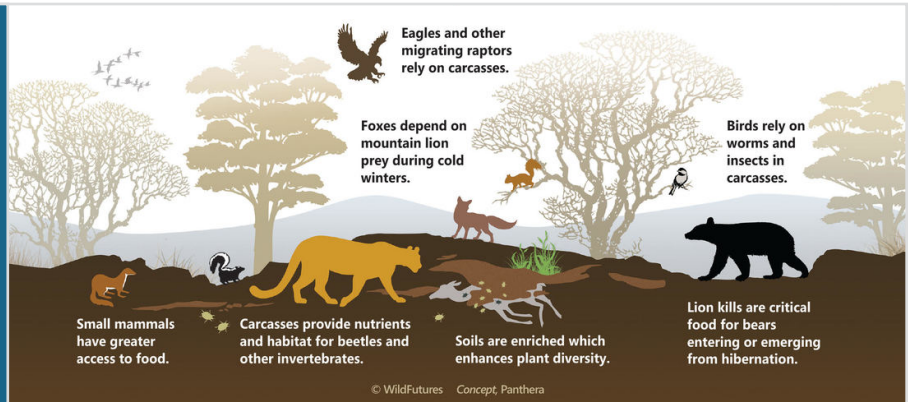


## Overview

Carnivores play a critical role in maintaining ecosystem health and biodiversity, as well as [protecting ecosystems against climate change](#). However, carnivores in North America - such as mountain lions, wolves, bobcats, and coyotes - have been targeted since settlement by Europeans, and many species were hunted for bounties until the 1970s. In fact, bounties are still paid in a few states. With recent recognition of their benefits, movements to conserve or even reintroduce carnivores are gaining support. Despite this progress, some states still allow activities that target carnivores, such as wildlife killing contests, unregulated hunting, and trapping. This briefing book provides an overview of the importance of carnivores, the threats they face, and policy options for ensuring their long-term viability.

### Example: Mountain Lions Increase an Ecosystem's Health and Biodiversity

Graphic Source: WildFutures (original).



## Key Points



**1. Population Decline:** Globally, [three-quarters](#) of the world's carnivore species -including otters, wolves, and polar bears- are in steady decline due to human-related activities such as hunting, vehicle collisions, habitat degradation, and climate change.



**2. Ecosystem Benefits:** Carnivores [shape their ecosystems](#) by keeping prey populations below the densities that damage vegetation and lead to starvation, and reducing animal disease breakouts.



**3. Irreplaceability:** Humans cannot replace the benefits of carnivores via hunting. Recreational hunters [target animals](#) based on characteristics like body size, whereas carnivores often [target weak and sick animals](#), which supports population health.



**4. Lethal Control and Conflict:** There is [limited scientific evidence](#) that killing carnivores serves to prevent human-carnivore conflicts, instead it often exacerbates conflicts. Nevertheless, lethal removal is common across the US for many carnivore species.



**5. Non-Lethal Deterrence:** Numerous [non-lethal methods](#) exist for reducing livestock-carnivore conflicts that are more effective than lethal removal. Non-lethal methods include the use of livestock guardian dogs, increasing the presence of humans around domestic animals, and nighttime enclosures or barriers.



**6. Self-Regulation:** Most large carnivores [limit their own population](#) densities. This means that they do not require hunting by humans to keep their populations in check.



## Frequently Asked Question About Carnivore Species

### What are carnivores and which species live in the United States?

Carnivores are animals that mostly eat meat. Carnivores in the U.S. include coyotes, gray wolves, red wolves, bobcats, lynx, mountain lions, wolverines, sea otters, orcas, sharks, alligators, and many others. Black bears and grizzly bears are omnivores, but the threats they face and their benefits to ecosystems are similar to those of other carnivores, so they are included in this briefing book.

### What are the benefits of carnivores?

Many carnivores are considered 'keystone' species, meaning a species that many others in an ecosystem depend on. Scientists have uncovered many examples of these beneficial species relations, such as [mountain lions](#) and [raptors](#) improving the population health of their prey animals by selectively preying on old, sick, and weak individuals. Carnivores also reduce the amount of time grazing animals spend in risky open areas such as along streams and roadways, helping reduce [stream degradation](#) and [deer-vehicle collisions](#), respectively. Other [benefits of carnivores](#) include reducing the spread of disease, cycling nutrients back into the soil, and providing food sources for other animals. Beyond their ecosystem benefits, carnivores provide direct benefits to humans. For example, wolves of the Greater Yellowstone Ecosystem [generate](#) tens of millions of dollars in economic activity through ecotourism and thousands of jobs each year for local communities. One [study](#) estimates that a living bobcat in Yellowstone generates over \$300,000 per year in economic activity.

### What threats do carnivores face?

Habitat loss and fragmentation are one of the main threats carnivores face given that many of these species require large territories for their survival. Over-exploitation by humans is another major threat, both from legal hunting and trapping as well as illegal killing. Climate change compounds these threats by degrading carnivore habitats and pushing the species into closer proximity with people, further raising their vulnerability to human threats and retaliation from conflicts.

### Are carnivores a major source of mortality for livestock?

Around [5% of cattle losses](#) are a result of carnivores, which includes losses from feral and free-roaming dogs. By far, the greatest sources of mortality for all livestock animals are disease, health problems, and weather events. Nevertheless, livestock losses from carnivores are not distributed evenly, and some producers can be acutely impacted by these incidents. Most incidents are preventable through appropriate practices which may require additional investment from producers and support from state, federal, and Tribal governments.

### What are the connections between carnivores and climate change?

While climate change is a threat to carnivores, these species can also help [reduce the impacts of climate change](#). For example, the presence of otters in coastal ecosystems promotes kelp growth, which serves as a natural barrier to storm surges. Carnivores can even help with [climate mitigation](#), keeping plant-eating organisms in check and thereby helping maintain plant communities that [naturally sequester carbon](#).





## Overview

Thousands of animals die every year in wildlife killing contests, events where participants compete to kill the greatest number, the largest, the youngest, or the most females of a targeted species for prizes and entertainment. These contests are not monitored by state wildlife agencies and often take place on public land. Wildlife killing contests are legal in all but eight states including Arizona, California, Colorado, Maryland, Massachusetts, New Mexico, Vermont, and Washington (with a possible ninth state, New York, if the governor signs legislation). In 2023, [Illinois](#), [Nevada](#), [New Jersey](#), and [Virginia](#) introduced bills to ban these contests.

## Policy Options

### 1. Prohibit or Limit Awards and Prizes for Killing Animals:

Some states have taken comprehensive action against different types of wildlife killing contests. In 2014, [California](#) became the first and only state where it is unlawful to offer a prize or other inducement as a reward for the taking of a game bird, mammal, fish, reptile, or amphibian in an individual contest, tournament, or derby. In 2021, [Washington](#) prohibited all wildlife killing contests that allow an unlimited bag limit (the number of animals that can be killed) and capped prizes at \$2000.

**2. Prohibit Contests for Certain Species:** States can also take targeted action to increase protections for specific carnivore species against wildlife killing contests. Maryland [S.B.200](#) (Enacted, 2021) prohibits sponsoring, conducting, or participating in a killing contest for coyote, fox, or raccoon for prizes or monetary rewards. The state wildlife commissions in [Arizona](#) and [Massachusetts](#) both voted to ban contests targeting predator and furbearer species in 2019. New Mexico [S.B.76](#) (Enacted, 2019) and Vermont [H.636](#) (Enacted, 2018) banned coyote killing contests. The [Colorado Parks and Wildlife Commission](#) voted to ban killing contests that target most furbearer species and certain small-game species in 2020.

**3. Local Resolutions:** Cities and counties in [Arizona](#), [New Mexico](#), [Nevada](#), [Minnesota](#), and other states have passed resolutions condemning killing contests.

## KEY POINTS

- Every year, wildlife killing contests target bobcats, cougars, coyotes, crows, foxes, porcupines, prairie dogs, rabbits, raccoons, squirrels, and wolves. Most of the targeted species have few or no protections and can therefore be killed en masse with no oversight from the state's wildlife agency. ([Project Coyote](#))
- Killing contests may undermine the public's view of ethical hunting. ([The Wildlife Society](#))  
As the Vermont Fish & Wildlife Department has stated, the contest events "could possibly jeopardize the future of hunting and affect access to private lands for all hunters."
- There is no scientific evidence that killing contests protect livestock or serve other wildlife management purposes. Indiscriminate killing may increase animals' populations and create more conflicts by disrupting species' self-regulating behaviors. ([National Geographic](#))





## Overview

While carnivores do occasionally come into conflict with people, livestock, and pets, most conflicts are preventable through non-lethal interventions that states can support. Additionally, because of the emotional nature of potential conflict and a perceived lack of control, risks from carnivores are often overstated by local residents and agriculture producers who fear additional threats to their livelihoods. Policy options include the use of incentives or requirements to encourage agriculture producers to deter carnivores non-lethally, and educating the public about carnivore coexistence.

## Policy Options

### 1. Incentives for Agriculture Producers

- **Grant programs:** [Washington](#) provides grants to help ranchers hire range riders, or individuals paid to watch over livestock in areas where large carnivores are present. Oregon [H.B.2698](#) (Introduced, 2023) instructs the Department of Agriculture to establish a grant program for the purpose of facilitating nonlethal deterrence by agriculture producers.
- **Compensation for the presence of carnivores:** In 2007, a program was established in [Arizona and Northern Mexico](#) that compensates landowners for documented presence of jaguars on their properties. In 2014, a similar program was established in [New Mexico](#) for Mexican wolves. Studies show that these “pay-for-presence” programs are [more effective](#) at preventing conflicts than programs that compensate producers for livestock loss.
- **Compensation for loss of livestock:** States including [Oregon](#), [Washington](#), [Wyoming](#), [Montana](#), and [Colorado](#) compensate landowners for livestock lost to carnivores. It is important that these programs compensate landowners as close as possible to the market value of costs incurred as to not create incentives for livestock loss.

**2. Local Programs:** Some counties and municipalities have created their own incentive programs to encourage non-lethal conflict prevention. These could be replicated at the state level. For example, a nonprofit in [Montana](#) helps landowners remove dead livestock carcasses from their property to avoid attracting carnivores, a program in [Oregon](#) helps ranchers purchase livestock guardian dogs, and a [California](#) program helps ranchers pay for livestock protection infrastructure.



### Case Study: Wood River Wolf Project

The [Wood River Wolf Project](#) is the longest-running, non-lethal wolf conflict prevention program in North America. In 2008, a cadre of ranchers, scientists, conservation organizations, federal government agencies, and county officials began collaborating to reduce sheep losses from wolves in Blaine County, Idaho by using a variety of nonlethal strategies. These included use of fladry (flagging posted on fences which can deter wolves), livestock guardian dogs, range riders, reducing attractants (e.g. removing carcasses), penning sheep at night, increasing human presence, light and sound devices, opportunistic hazing of wolves, and changing of the timing and location of grazing based on wolf movement and denning periods. A [seven-year study](#) of the project published in 2017 compared depredation rates within the project area boundary to an adjacent area where nonlethal strategies were not used. The adjacent area saw a 3.5 times higher likelihood of sheep depredation than in the study area. The study area also had a 90% lower rate of sheep losses to wolves compared to the rest of Idaho.





### 3. Requirements and Restrictions

- **Exhaust non-lethal methods first:** California [Fish and Game Code § 4801.5](#) requires that producers exhaust non-lethal methods –such as use of nighttime animal enclosures or hazing– to prevent mountain lion-livestock conflicts before resorting to lethal removal.
- **Prohibit intentional feeding of wildlife:** Connecticut [H.B.5160](#) (Introduced, 2023) prohibits the intentional feeding of black bears and creates a grant program for non-lethal human-bear conflict prevention. The bill also establishes guidelines for rehabilitating orphaned cubs and funding to compensate for property damage caused by black bears.

### 4. Funding for Carnivore Coexistence

- **Funding for nonlethal conflict prevention:** Maryland [S.B.310](#) (Enacted, 2023) alters the Black Bear Damage Reimbursement Fund to authorize grants for projects that mitigate damages caused by black bears and reduce conflicts between black bears and humans; authorizes the Governor to include at least \$50,000 in the annual budget bill for the Fund. Colorado [H.B.1265](#) (Enacted, 2023) creates the “Born to be Wild” special license plate and directs the revenue to fund non-lethal mitigation and conflict-prevention with gray wolves.
- **Removing requirements to use lethal conflict prevention:** Nevada [A.B.70](#) (Enacted, 2023) revises provisions related to the authorized uses of revenue for a \$3 Predator Fee on hunting license applications; removes a requirement to use 80% of revenue from the Fee for lethal removal of predators; allows hunters to select how the Fee is expended.
- **Terminating contracts with Wildlife Services:** Many counties in the U.S. have contracts with USDA Wildlife Services, a federal agency that [spends millions](#) of taxpayer dollars annually to kill carnivores. [Marin County, California](#) ended its contract in 2000, replacing it with a non-lethal conflict prevention program that resulted in a 62% decline in livestock loss from 2002 to 2011.
- **Federal funding:** Several federal programs are available to state wildlife agencies and their partners that can be used for carnivore coexistence, including [Pittman-Robertson Grants](#), the [Multistate Conservation Grant Program](#), the [State Wildlife Grants Program](#), and for endangered species, the [Cooperative Endangered Species Conservation Fund Grants](#). States can direct their wildlife agency to use this funding for carnivore coexistence.

**5. Public Education and Awareness:** States can enact policies that establish unintrusive and high-impact public awareness campaigns for the conservation of carnivore species such as Missouri [H.B.976](#) (Introduced, 2023), which would designate April 22 as “Missouri Black Bear Day” and encourage citizens to participate in events and activities that provide education about efforts to conserve Missouri’s black bears.



## Overview

In nearly all states, it is legal to trap carnivores recreationally or when a carnivore is believed to have attacked domestic animals. Trapping can lead to considerable animal suffering, as well as the incidental capture, injury, or death of non-target species including endangered species, pets, and even humans.

## Policy Options

**1. Trapping Bans:** New Mexico [S.B.32](#) (Enacted, 2021) bans the use of a trap, snare, or wildlife poison for the purposes of capturing, injuring, or killing an animal on all public lands. California [A.B.273](#) (Enacted, 2019) prohibits all recreational and commercial fur trapping, and Hawaii [§13-123-22](#) prohibits a person from possessing or using animal traps.

**2. Banning Specific Types of Traps:** The four main types of traps are: bodygrip, leghold, snare (certain types are referred to as a cable restraint), and cage or box traps. See [here](#) for a more detailed overview of trap types and state laws governing their use. [Massachusetts](#) became one of the first states to ban steel jaw leghold traps in 1975, and banned the use of all traps except cage and box traps in 1997 via ballot initiative. [Colorado](#), [Oklahoma](#), and [Washington](#) have passed legislation or regulations that limit trappers to live box and cage traps or leghold traps with padded jaws.

**3. Mandatory Reporting:** [Vermont S.201](#) (Enacted, 2022) requires the Commissioner of Fish and Wildlife to submit an annual report on the number of nontarget animals killed or injured by trapping. As of 2017, only [four states](#) require that trappers report non-target animals (Alabama, Idaho, Nevada, and Washington).

**4. Mandatory Labeling:** Maryland [H.B.406](#) (Enacted, 2023) requires that trappers register and clearly label all traps that are placed in the field.



### Case Study: The Piikani Nation Grizzly Treaty of Solidarity - Learning From Tribal Leadership on Grizzly Protection

Indigenous peoples have observed, hunted, and lived alongside carnivores for tens of thousands of years. Tribal expertise on carnivores is as complex and varied as tribal nations and communities today, with nuanced relationships to culture, treaty histories, treaty rights, and best management practices for their region and carnivore populations. Tribal governments and Indigenous knowledge-keepers continued the time-immemorial practice of carnivore management in 2017 when the US Fish and Wildlife Service removed the Greater Yellowstone Ecosystem grizzly bear population from the endangered species list. This delisting gave states the authority to initiate hunting and trapping seasons for grizzly bears in the areas surrounding Yellowstone National Park. In response, over 200 Tribal Nations signed on to the [Piikani Nation Treaty](#) calling for the immediate re-listing of grizzly bears. The treaty also called for government-to-government consultation, independent scientific review, a moratorium until all impacted Tribal Nations are consulted, and grizzly bear reintroduction rather than trophy hunting. In 2018, the Tribes prevailed and protections were reinstated.





**5. Mandatory Check Times:** Approximately 40 states have a daily mandatory trap-check time for live traps, meaning traps must be checked at least once every 24 hours. In 2021, the Oregon Fish and Game Commission approved [Oregon Fish and Game Code § 498.172](#), which shortens the mandatory trap check time from 72 hours to 48 hours.

**6. Setback Distance:** Many states prohibit the placement of traps within a specified distance from certain features such as residential or commercial buildings, roads, and trails. [Arizona](#) has one of the largest setback distances, requiring that traps be set at least a half-mile from the nearest building occupied by people and fifty feet from any trail. See [here](#) (pp. 74) for more information on setback requirements by state.

**7. Private Land Regulations:** Most states have more lenient rules for traps placed on private land compared to public land. For example, [Arizona](#) does not allow foothold traps on public land, but does allow these traps on private land. The New Mexico [S.B.32](#) (Enacted, 2021) trapping ban only applies to public land. Private land trapping is still legal in the state.

**8. Training and Courses:** As of 2016, at least 15 states do not require that trappers take an education or training course in order to receive a license. See [this resource](#) (pp. 12 and 141) for an overview of which states do not require courses. Massachusetts [H.911](#) (Introduced, 2023) requires trappers to complete a trapping training course.



## Overview

Recreational hunting is one of the [primary](#) sources of mortality for many carnivore species in the United States. Many states manage carnivore hunting with the stated objectives of reducing human-carnivore conflicts and protecting prey species that are desirable for hunting, such as elk and deer. However, research shows that carnivore populations are self-regulating and beneficial to ecosystems including their prey. The killing of carnivores by humans can harm family and social structure within carnivore populations and lead to more human-carnivore conflicts in the long run. Several countries have banned recreational hunting of carnivores in some form including Costa Rica, Columbia, Brazil, Kenya, Zambia, and Malawi. Carnivore hunting is legal in most US states.

## Policy Options

**1. Prohibiting Recreational Carnivore Hunting:** In 1990, [California](#) banned the recreational hunting of mountain lions via ballot initiative. Illinois [S.B.3049](#) (Enacted, 2014) banned the hunting of wolves, black bears, and mountain lions. Colorado [S.B.31](#) (Introduced, 2022) would have banned the recreational hunting of mountain lions, Canada lynx, and bobcats, but the measure did not pass.

**2. Limiting Recreational Carnivore Hunting:** There are steps states can take to limit recreational hunting pressure on carnivores to ensure long-term population viability while still allowing some hunting. This can be accomplished by reducing (1) hunting limits, (2) the length of hunting seasons, and/or (3) the proportion of female individuals in the carnivore population that can be killed.

- **Hunting limits:** A hunting limit is the percent or number of individuals in a carnivore population that wildlife managers determine can be killed by hunters. Researchers recommend considering population dynamics, changing habitat conditions, effects of hunting on human-carnivore conflict, and avoiding over-reliance on hunter reporting when establishing limits for carnivores, but most states do not adequately account for these factors. See Appendix 1 for more details.
- **Season length:** Some states allow year-long hunting for many carnivore species, while others close hunting at times when carnivores vulnerable including summer in arid states, times when carnivores are rearing offspring, and/or during winter for non-hibernating carnivores when they are at [increased risk](#) for poaching. [Washington](#) and [Arizona](#) have approved rules related to limiting the hunting season for certain carnivore species; [Minnesota](#) and [Maine](#) have introduced legislation.
- **Female sub-limits:** Some states have established stricter hunting limits for females (generally referred to as a 'female sub-limit') to better protect females and to prevent [orphaning](#) of their young, including [New Mexico](#), [Colorado](#), and [Arizona](#).

**3. Reclassifying Carnivore Management Status:** Many carnivore species are defined in statute in a way that allows for their unlimited killing, such as by classifying them as a 'varmint' or 'pest'. Reclassifying a carnivore species as a regulated game ensures that wildlife managers will monitor population trends and establish hunting limits and seasons. [Rhode Island](#) and [Iowa](#) in 2023 would add black bear to the list of species that can only be hunted in accordance with rules and regulations adopted by each state's wildlife agency.





**4. Restricting Unfair Hunting Devices:** Some states restrict the use of technologies that give hunters an unfair advantage when hunting carnivores and other wildlife:

- **Electronic calls:** These devices are used to mimic wildlife noises in order to attract other species. The calls were recently banned for hunting mountain lions in [Colorado](#), except in one management zone.
- **Vision enhancement devices:** [Alaska](#) prohibits the use of night vision, infrared devices, and drones for aiding in the take of wildlife.
- **Trail cameras:** These motion-activated devices were recently banned for hunting purposes in Utah [H.B.295](#) (Enacted, 2021) and [Arizona](#).
- **GPS devices and data:** Montana [S.B.349](#) (Enacted, 2019) made it illegal to obtain and use coordinate data for hunting purposes, such as from GPS collars.

**5. Restricting Unfair Hunting Methods:** Several states limit hunting methods that are considered to be cruel or unfair such as baiting, hounding, or use of motorized vehicles.

- **Baiting:** All but nine states (AK, ID, ME, MI, MN, NH, UT, WI, and WY) prohibit bear baiting, the practice of leaving out piles of food to attract bears to a particular location so they are easier to kill, which can create [sites for disease transmission](#).
- **Hounding:** Most states do not allow the use of hounds to pursue animals since the practice can [result](#) in injury or death for hounds and nontarget wildlife, as well as damage to property. However, many states carve out exceptions for large carnivores such as black bears, mountain lions, and other 'furbearers.' [Washington](#) and [Oregon](#) banned certain types of hounding via ballot initiative, [Vermont](#) enacted legislation in 2022, and [Oregon](#) and [Vermont](#) introduced legislation in 2023 against hounding.
- **Motorized pursuit:** Some states allow carnivore hunting with motorized vehicles such as snowmobiles and all-terrain vehicles. Wyoming [H.B.288](#) (Introduced, 2019) would have banned the use of snowmobiles to run down animals.

**6. Wanton Waste:** Wanton waste is the failure to utilize edible meat of an animal for human consumption. In [Montana](#), hunters may not waste, even unintentionally, any portion of an animal carcass that is suitable for human consumption. Most states' wanton waste laws apply to all legally hunted animals, although [Wyoming](#), [Idaho](#), [Nevada](#), and [New Mexico](#) exclude certain carnivore species. New Mexico [H.B.261](#) (Introduced, 2023) would update the state's wanton waste laws to include mountain lions and black bears.

**7. Poaching Regulations:** Poaching, or the illegal killing of wildlife, can be deterred by increasing penalties, encouraging people to report poaching, and providing more funding for enforcement. However, even legal recreational hunting can [exacerbate](#) rates of poaching. Several states have increased fines and penalties for poaching in recent years including [Indiana](#) (2020), [New Mexico](#) (2017), and [Oregon](#) (2017).



## Other Carnivore Conservation Options



**Carnivore Reintroduction:** Many carnivore species have been extirpated from their native range. In recognition of their benefits and public support for reintroduction, [Colorado](#) passed a bill in 2022 that appropriates \$1,100,000 from the General Fund to be used for the reintroduction and management of gray wolves.



**Funding for Carnivore Conservation Activities:** Several states are taking steps to provide more funding for ongoing carnivore conservation activities, such as habitat restoration and connectivity, population monitoring, and translocation to improve genetic diversity. Texas [H.B.4041](#) (Enacted, 2023) appropriates \$96,000 out of the State Highway Fund for the ocelot and jaguarundi monitoring project. [California](#) set aside \$10 million in the 2022-2023 budget for the world's largest wildlife bridge designed to connect two, genetically isolated sub-populations of mountain lions in the Los Angeles area. Montana [H.B.945](#) (Introduced, 2023) would provide protections for grizzly bears including funding for translocation of grizzly bears to promote genetic exchange between ecosystems.



**Improving Representation and Decision-Making on Behalf of Carnivores:** Some states have boards and advisory committees that make recommendations to decision-makers regarding management of carnivores. These boards often primarily represent hunting and agricultural interests, but states can take steps to help ensure that other the needs of carnivore populations are adequately considered. Michigan [H.B.4855](#) (Introduced, 2023) would appoint two new members to the Michigan Wolf Management Advisory Council, one from an organization that recognizes and promotes primarily non-consumptive wildlife use, and one with a background in zoology, wildlife management, or a related discipline of science.



**Restricting Poisonous Substances Known to Harm Carnivores:** A number of poisonous substances can cause harm to wildlife. One of the most acute examples for carnivores are second generation anticoagulant rodenticides. California [A.B.1788](#) (Enacted, 2020) bans the use of second generation anticoagulant rodenticides until the California Department of Pesticide Regulation, in consultation with the Department of Fish and Wildlife, reviews the impacts of these substances and approves regulations necessary to ensure that their continued use does not result in significant adverse effects to non target wildlife.

## Additional Resources

### 1. [Wildlife Agency Relevance and Funding](#) | NCEL

For more resources on updating the mission, authority, governance, and funding structure of state wildlife agencies, the entities tasked with managing and conserving carnivores.

### 2. [Comprehensive resource bank for wolf conservation planning: A resource to advance science, inclusivity, and ethical practices](#) | *Endangered Species Coalition*

### 3. [Fuzzy Math: Wildlife Services Should Improve Its Economic Analysis of Predator Control](#) | NRDC

### 4. [What is Coexistence?](#) | *Mountain Lion Foundation*

### 5. [Low-stress livestock handling protects cattle in a five-predator habitat \(peer reviewed\)](#) | *Journal of Life & Environment*

Provides insights and best practices from the only empirically-tested range rider program in North America.

### 6. [Sharing land with bears: Insights towards effective coexistence \(peer reviewed\)](#) | *Journal of Nature Conservation*

### 7. [Why might removing carnivores maintain or increase risks for domestic animals \(peer reviewed\)](#) | *'Biological Conservation'*





## Appendix 1: Considerations for Improving Hunting Limits

Carnivore populations are self-regulating and play an important role in maintaining ecosystem health. Recreational hunting is not needed to maintain carnivore populations, protect their prey species, or prevent conflicts. However, for states that do allow carnivore hunting, researchers recommend accounting for the following before allowing new or additional hunting.

- **Population Dynamics:** Managers can avoid unsustainable hunting by studying state-level carnivore population dynamics (growth and declines) across multiple years, and avoid applying population dynamics from other states. For example, the rate of sustainable human-caused mortality in wolves from [Alaska](#) is widely misapplied to lower 48 state wolf populations, which lack steady sources of immigrant wolves.
- **Changing Habitat Conditions:** Most large carnivores require relatively large areas of land with ample prey to maintain a viable population, both of which can be reduced by climate change and land use change. For example, in the [arid Western US](#), climate change is reducing the availability of suitable habitat for mountain lions and bringing them into closer proximity with people.
- **Hunting and Human-Carnivore Conflict:** There is very little evidence that hunting reduces human-carnivore conflicts, and considerable evidence that hunting worsens these conflicts. Researchers in [Michigan](#) found that hunting black bears with hounds increased human-bear conflicts, and researchers in [California](#) found that lethal removal of mountain lions causes more depredation of livestock by mountain lions in subsequent years.
- **Unreliable Reporting by Hunters:** Most states require hunters to report when they have killed an animal so that managers can monitor whether hunting limits have been reached and to help estimate the population of hunted animals. Hunters do not always report or report accurately, which can lead to over-estimates of the sustainable level of hunting. For example, researchers in [Wyoming](#) found that using hunter-reported age and sex data for bobcats resulted in overestimates of bobcat abundance.



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