

COLORADO PARKS & WILDLIFE

# Human-Bear Conflicts





# Table of Contents

EXECUTIVE SUMMARY	4	ANALYSIS and ALTERNATIVES	19
BACKGROUND	5	Potential Management Strategies to Reduce Bear-Human Conflict	19
GENERAL BLACK BEAR MANAGEMENT AND HISTORY IN COLORADO	6	Recommendation for Legislative Action	19
Black Bear Ecology	6	Community Waste Disposal Practices	19
Black Bear Abundance	6	Additional Alternatives	19
Land Use and Human Population	6	Change Season Dates	19
Human-Black Bear Conflicts	7	Develop Systematic Statewide Data Collection Applications/Software to Track Conflicts	20
Agriculture Conflicts	7	Revise Statutes to Enable Wildlife Officers	20
Non-Agriculture Conflicts	8	Support Future Research to Quantify the Effectiveness of Human-Bear Conflict Reduction Methods	20
Management Practices	9	Partner with Communities to Allow the Harvest of Black Bears in Public Areas	20
Regulated Public Harvest	9	Secure Funding from Appropriate Sources to Support Additional Staff Dedicated to Bear Management	20
CPW Administrative Directives & Policies for Black Bear Conflicts	10	Increased Flexibility of Statutory Feeding Prohibitions	20
CPW Documents Directing Management for Human-Bear Conflicts	10	Increased Enforcement of Feeding Prohibitions	20
Administrative Directive OW-2, Predator Attack on Humans	11	Make it Illegal to Tamper With Any Bear Trap Set by CPW	20
Statutes and Regulations	11	Evaluate and Improve Existing Bear Conflict Information and Education	20
Citizen Initiative	11	Change Method of Take	21
Education	12		
Current CPW Research on Human-Bear Conflicts	12		
MANAGEMENT OPTIONS FOR REDUCING HUMAN-BEAR CONFLICTS	14	REFERENCES	22
Public Harvest	14	Historical Evolution of the Black Bear Incident Directive	22
Bear Attractants	14	Regulatory History of Black Bears in Colorado	23
Aversive Conditioning	15	Current Regulatory Status of Black Bears in Colorado	24
Animal Husbandry	15		
Habitat Considerations	16	SOURCES	25
Supplemental or Diversionary Feeding	16		
Translocation and Euthanasia	16		
Fertility Control	17		
Education	17		
Enforcement	18		

# EXECUTIVE SUMMARY

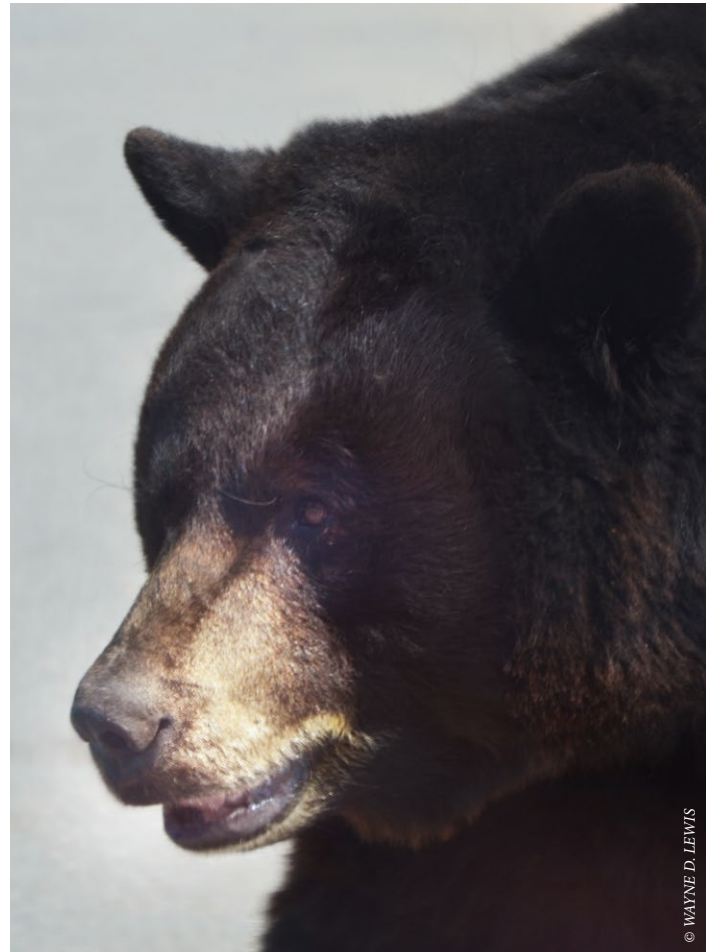
In response to a growing number of human-bear conflicts in Colorado, the General Assembly passed House Bill 15-1034 calling on Colorado Parks and Wildlife, the agency responsible for managing all of the state's wildlife, to provide information regarding the growing number of human-bear interactions and conflicts throughout the state, and to evaluate all available management options to properly manage black bear populations year-round to address bear-human conflicts and public safety.

The CPW experts assigned to develop this document are highly experienced and knowledgeable. A wide variety of information was compiled detailing the history of bear management in Colorado, recent research efforts, legal constraints on bear management and challenges associated with a growing human population.

Colorado Parks and Wildlife believes that bear conflicts could be mitigated through a variety of strategies that if implemented in partnership with local communities, and state and federal agencies, can reduce the number of human-bear conflicts within developed areas. In addition, it can help reduce the number of bears euthanized by wildlife managers due to concerns with human health and safety.

This report provides information about a variety of management options for reducing human-bear conflicts and background information that can help inform legislation or local ordinances.

The challenge is finding the proper balance between a growing human population and a robust bear population.





# BACKGROUND

Within the last several decades in Colorado, an increasing number of human-black bear encounters and conflicts in residential neighborhoods, campgrounds, wilderness and agricultural properties have generated media headlines, alarm from some citizens and concerns from local governments and the Colorado state legislature. Colorado Parks and Wildlife (CPW) is aware of the growing concerns and continues to seek effective means of reducing the number of serious conflicts by utilizing the tools and manpower currently at its disposal.

Along with the rapid expansion of human development and associated changes in land use in Colorado, black bears have learned to forage on a variety of widely available human-provided food, including garbage, livestock, crops, fruit trees, bird seed and pet food. When natural bear foods are limited by weather events such as a late freeze or prolonged drought, many bears turn to these alternative foods creating a “perfect storm” of increasing human-bear interactions and conflicts. Because black bears can quickly become conditioned to seek human-provided food when it is made available, bear conflicts frequently reoccur in given locations. In fact, CPW has mapped “black bear conflict areas” used to help guide land use planning and other efforts.

One of the primary concerns with any wildlife conflict is human health and safety. Although most human-bear interactions are relatively benign, typically consisting of bear sightings and normal bear behavior, the public’s anxieties are heightened when interactions occur within human populated areas.

Human injuries caused by bears remain rare in Colorado when compared to the overall size of human and bear populations. However as humans continue to encroach on bear habitat and bears continue utilizing human food sources, CPW believes the number of conflicts and encounters will increase, as will the likelihood of human injuries and deaths. In addition, financial compensation by the state due to landowner losses from bear depredation on livestock and other agricultural products will likely continue to rise.

For a growing number of Area and District Wildlife Managers, bear management activities are consuming an inordinate amount of staff time during spring, summer and fall, resulting in the near total exclusion of other critical responsibilities. Despite these efforts, the number of human bear interactions and conflicts continue to rise.

The common methods currently used by CPW to manage conflict bears include increasing bear harvest quotas, relocating nuisance bears, euthanizing aggressive bears and implementing aversive conditioning techniques. Further, to influence the public to properly store garbage and other foods, CPW continues a focused public outreach and education effort in conjunction with the enforcement of applicable laws.

During the 2015 legislative session, CPW was called upon by the General Assembly to study the issue and provide information and recommendations to reduce human-bear conflicts (House Bill 15-1304). The enacted legislation directs the Division of Parks and Wildlife to “gather information about, consider, and evaluate all available management tools to enhance the Division’s ability to properly manage black bear populations year round to address bear-human conflicts and public safety. The Division shall report its findings by December 31, 2015, to the Agriculture Livestock, and Natural Resources committee of the House of Representatives and the Agriculture, Natural Resources, and Energy committee of the senate, or their successor committees.”

This report fulfills the requirements of the law, providing information regarding historical bear management efforts, game damage, existing legal constraints to management, the challenges presented by the growing human population and ongoing research. The report also offers an evaluation of all available management tools that may enhance the division’s ability to reduce bear-human conflicts in urban or urban-interface areas.

Because of the resources at its disposal, including highly experienced and knowledgeable researchers and managers, CPW should remain the primary entity directing bear management. However, the agency is also aware that the challenge of reducing human bear interactions and conflicts cannot be adequately addressed without concerted cooperation and partnerships with city, county, state and federal governments, as well as the cooperation of all the citizens of Colorado.

Going forward, it is critical to keep in mind that all credible research and practical experience suggests that efforts to reduce bear populations alone will not reduce human conflicts. To address this problem effectively, simultaneous efforts must be made to influence human behavior and practices, including improvements to waste management methods and enacting and strictly enforcing effective local ordinances.

Absent those combined efforts, any single effort will likely fail and we will be revisiting this issue again in a few years.

# GENERAL BLACK BEAR MANAGEMENT AND HISTORY IN COLORADO

## Black Bear Ecology

Black bear, currently Colorado's only bear species, live primarily west of I-25, and east of I-25 mainly throughout the Black Forest/Palmer Divide, the Raton Mesa and eastward throughout Mesa de Maya and the Purgatorie River canyon country. They prefer forested or tall shrubland habitat but may move through open landscapes as they disperse, or enter adulthood.

This large-bodied omnivore can live up to 20 or 30 years depending on harvest<sup>1</sup> rates and the availability of a wide variety of naturally available food. Bears primarily eat vegetation such as grasses, forbs, berries, acorns, and seeds. They also eat insects or scavenge on carcasses, but also occasionally prey on newborn calves and fawns, beaver, marmots, deer, elk, or depredate on domestic livestock or agricultural products.

When a localized natural food failure occurs, black bears from the affected area become increasingly mobile and persistent in search of human food sources, including trash, fruit trees, pet food, bird feeders, livestock and agricultural products. The search becomes urgent and almost constant from about mid-August through late September, a period when bears' appetite naturally increases dramatically as they prepare for hibernation.

Bears that seek out human food resources often have interactions with people that lead to both public safety concerns and to a higher risk of bear mortality due to lethal removals by landowners or wildlife managers, electrocutions, vehicle collisions, etc. These circumstances have complicated Colorado Parks and Wildlife's ability to manage the species in balance with natural forage availability and human tolerance, leading to numerous, high-profile conflicts and incidents, generating much interest and concern.

## Black Bear Abundance

No statewide bear population estimates have occurred due to the extreme difficulties and high costs of observing such a solitary and elusive species. All inventory efforts in Colorado involve extrapolating information about known bear densities in small geographic areas and applying them to larger areas.

In a 1991 report to the Parks and Wildlife Commission, the state's wildlife managers estimated there were between 10,000 and 12,000 bears in the state. In 2002, using detailed satellite imagery, the estimate was refined and updated to *at least* 12,000 bears.

With the development of new scientific sampling methods and advances in genetic analysis in the late 1990's, wildlife managers began using "hair snag" samples and DNA to estimate bear populations, putting the current, conservative estimate at approximately 17,000 to 20,000 bears.



In Colorado, a mandatory check system is in place for all forms of human-caused bear mortality. Using this information, CPW wildlife managers estimate that the bear population has been declining since 2011, consistent with management goals established that year.

Because of wide variations in natural forage conditions across Colorado and the influence such variation has on human-bear conflicts, there is no direct or immediate relationship between changes in bear abundance and the amount of conflicts.

## Land Use and Human Population

Between 1980 and 2010, the human population in Colorado grew from 2.9 million to over 5 million<sup>2</sup>, one of the highest growth rates in the country. Growth was highest along the Front Range and in portions of western Colorado where natural and recreational amenities are abundant and where a significant portion of the state's black bear habitat exists. The pattern of rapid growth has fueled a dramatic increase in residential development, particularly in formerly rural and exurban areas.

State forecasters project that Colorado's population will exceed 7.1 million by 2040, adding to more residential housing, businesses, transportation networks, etc., primarily focused in some of the most productive bear habitat in the state.

Given that bears are highly mobile, have large home ranges, and can readily benefit from human foods, the expansion of human development within bear habitat creates a perfect storm for increasing rates of human-bear conflicts, even if the statewide bear population remains stable or continues to decrease.

<sup>2</sup>A common term for the regulated killing of wildlife through established hunting seasons.

## Human-Black Bear Conflicts

### Agriculture Conflicts

In 1933, Colorado's legislature gave landowners the authority<sup>3</sup> to kill black or grizzly bears (grizzly bears were extirpated in Colorado in 1979) found grazing on private lands, with the provision that landowners report the bear's death within 30 days. Some provision giving landowners the authority to kill conflict bears has remained in Colorado statutes to this day.

In 1996, the Colorado Department of Agriculture received "exclusive jurisdiction over the control of depredating animals that pose a threat to an agricultural product or resource" giving it the sole authority to determine the disposition of an individual bear found depredating on livestock; however, Colorado Parks and Wildlife retains the authority to manage black bear populations, body parts and all forms of recreational or scientific use. A Memorandum of Agreement between the agencies provides operational guidance, helping assure documentation of agriculture-related bear deaths and the legal disposition of bear carcasses.

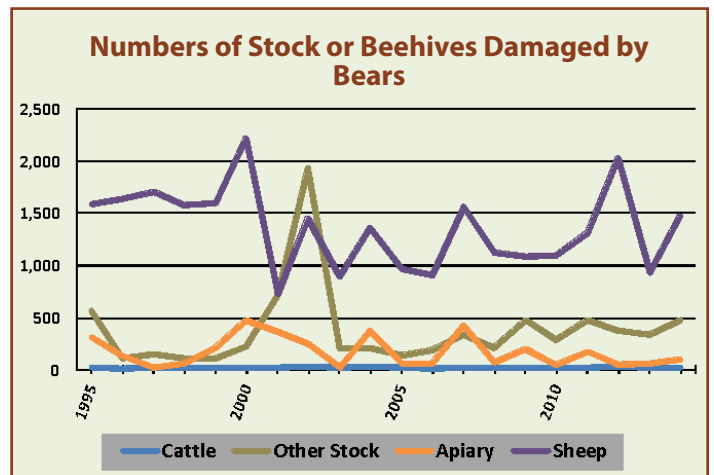
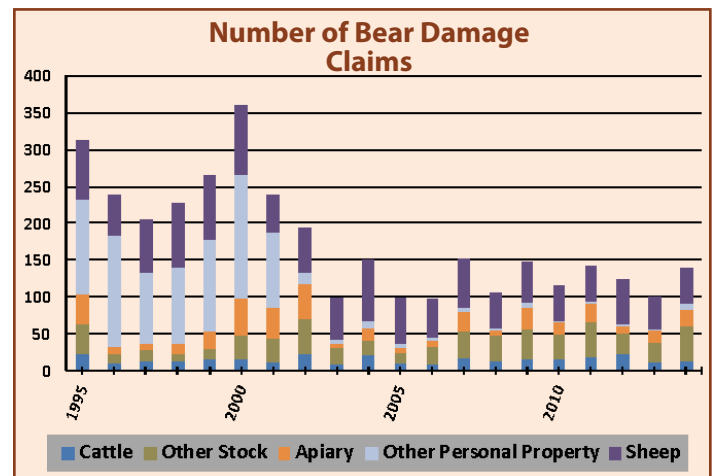
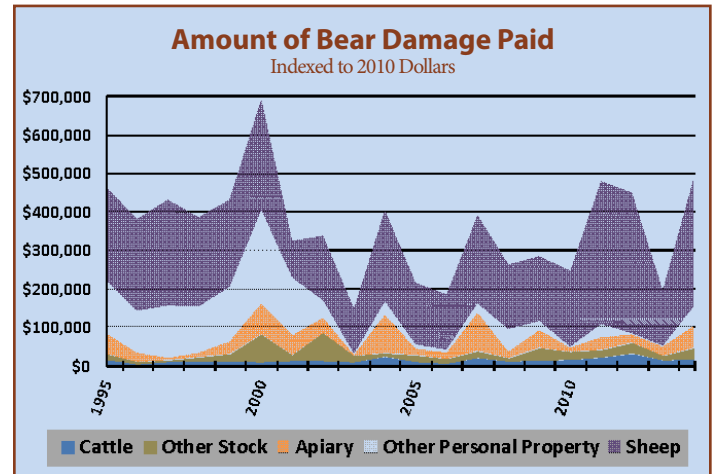
By law, the State of Colorado is liable for certain damages to private property caused by big game - including black bears. In 2002 the legislature limited the State's liability for damages to \$5,000 per head of livestock and to personal property used only for the production of raw agricultural products, effectively eliminating payments for non-agricultural personal property claims.

Although payments for black bear damage have generally declined when compared to earlier years, they remain a significant portion of CPW's budget, averaging approximately \$300,000 annually over the last decade with occasional spikes up to \$450,000. General tax funds are not used for these payments. The revenue for this program is derived from revenue generated primarily from the sale of hunting and fishing licenses.

Payments for domestic sheep killed by bear is the largest component of damage costs, rising significantly when natural bear forage is limited. Claims for other stock, including swine, fowl, goats, horses, rabbits, exotics, and some forms of hobby stock, have increased from around 200 to about 400 animals per year, largely as a result in the increasing popularity of having "backyard" stock in exurban communities.

CPW's data shows that most damage to livestock or crops begins approximately 2-3 weeks after the average den exit dates for bears. Sheep damage typically peaks the first week of July, and then continues through summer with two notable lulls; a two-week period beginning June 7 through June 21, then a second, less pronounced 7-day lull approximately during the first week in August.

Apiaries show a relatively consistent pattern of damage throughout the summer; however, bears preparing for denning have greater interest in the honey within beehives in August through September. Nearly all incidents of damage end by mid-October.



<sup>3</sup>The legislature codified what was previously considered to be "the law of the land."



## Non-Agriculture Conflicts

Human-bear conflict reports were not documented prior to 1995. From 2011-2015, conflict reports have been annually collected in each CPW region; however, data entry has not kept pace with reports of conflicts.

The trend line (below right) is likely a realistic representation of human-bear conflicts from 2011-15.

As with game damage, the number of human-bear conflict events increases substantially in years in which natural bear food conditions are poor; however, regardless of spikes, the general trend is about a 4% annual rate of growth in bear conflict reports. By comparison Colorado's human population grew from 3,811,074 in 1995 to 5,049,717 in 2010, or a 2% average growth rate.

Non-agricultural (neighborhoods, cities, towns, etc.) conflicts center around high-calorie human food sources, primarily trash but also includes bird seed, pet food, fruit trees, landfills and other organic food sources. Informing people about these potential bear attractants and ways to eliminate them is a common component of CPW's educational efforts.

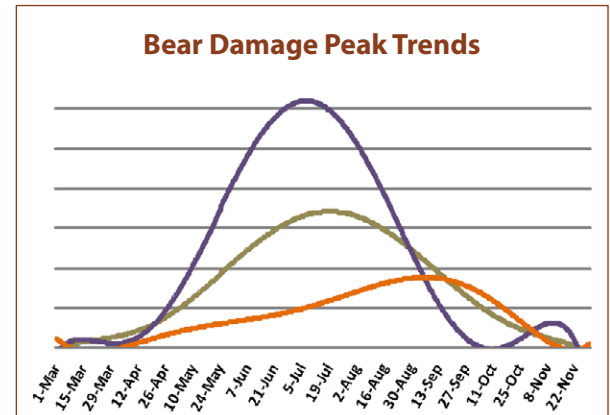
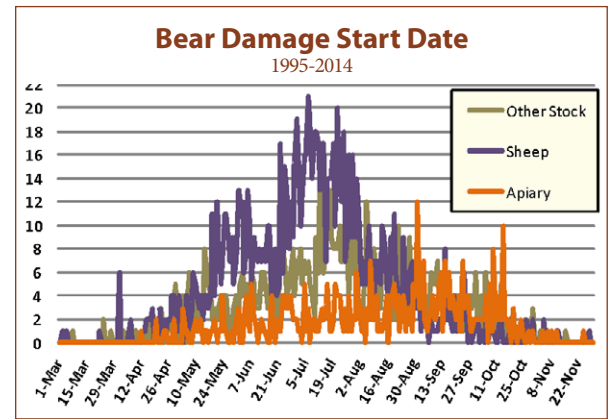
Bears have an extremely keen sense of smell and excellent memories. Once they have learned about a reliable source of food, they will often return. Once this occurs, it requires significant diligence on the part of people to keep these "food conditioned bears" from coming back and creating conflicts. Some communities have had success in reducing human-bear conflicts with the use of specially designed bear-resistant<sup>4</sup> cans, or by keeping trash within a garage or other secure location.

Landfills are another attractant that can cause bears to congregate in unnaturally high densities as they feed on the waste. This often leads to increased human-bear incidents in that area. There are practical and effective ways to exclude bears from landfills, but like purchasing or adapting trash containers to be bear resistant, there are financial considerations.

Bird feeders are another significant attractant. CPW recommends avoiding their use during active bear months, or hanging them in a manner that prevents a bear from accessing the feeder. In addition, pets should only be fed indoors.

Fruit trees are a semi-natural food source for bears. Conflict arises when trees are located close to a house or neighborhood attracting bears to the area. To eliminate a fruit bearing tree from becoming a bear attractant, the fruit must be picked regularly or protected through the use of electric fencing.

During periods of high-activity/conflicts the attention of the public is focused intently on the issue and what people can do to prevent attracting bears; however, in quiet years the request by wildlife managers for continued efforts toward solutions is typically met with disinterest.



<sup>4</sup> There are commercially available devices that can convert a typical trash container to be bear resistant.



## Management Practices

### Regulated Public Harvest

Hunting is the primary management tool used by CPW and other wildlife management agencies to regulate wildlife populations, including black bear.

Harvest of black bears can be compatible with increasing, stable or decreasing bear populations, depending on population management objectives and harvest regulations.

Wildlife management agencies can manipulate the numbers of bears that are harvested through license allocations, season length, season timing, bag limits, and the method of harvest.

Given the difficulty in estimating bear population sizes, the number of allocated hunting licenses has historically been conservative; however, increases in human-bear conflicts in Colorado have resulted in additional bear harvest licenses in most bear management areas, with the objective of reducing or stabilizing local bear populations.

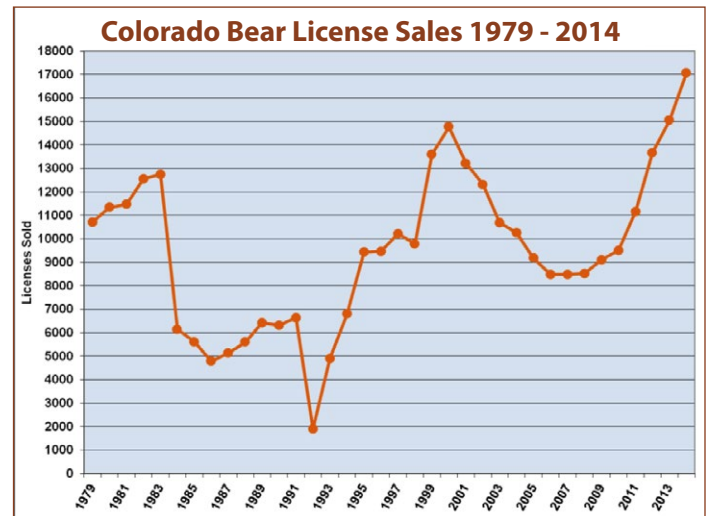
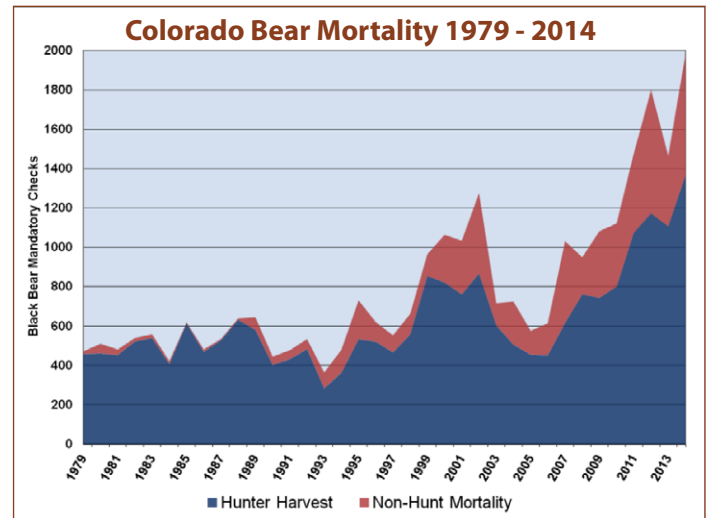
Within the context of the long-term sustainability of black bear populations in Colorado, CPW strives to provide abundant diversity of hunting opportunity while at the same time obtaining effective levels of harvest in order to manage the abundance of bears. Consequently, there are a variety of season dates and lengths, with different methods of take and rules for license availability.

The 1992 citizen initiative changed statutes to prohibit establishment of bear hunting seasons between March 1 and September 1<sup>5</sup>, annually and prohibits the use of bait and dogs as aids to taking black bears.<sup>6</sup>

Hunter harvest declined significantly in 1993, but by 1995 the agency had increased the limited September license numbers enough that hunter harvest equaled the average total harvest amounts in the years preceding the ballot initiative.

The process of determining how many licenses to allocate in a given area is primarily a function of how much bear mortality is desired in that area. Harvest mortality is one type of mortality that comprises total human caused mortality. Total mortality includes landowner, CPW and Wildlife Services conflict bear kills, road-killed bears, electrocutions, etc. On average, hunter harvest accounts for about 70% of all mortality and is the only form of mortality that can be adjusted by CPW.

License allocations in each season are recommended by CPW staff, but are ultimately approved by the Parks and Wildlife Commission as the final step of a much larger process integrating biological and social factors.



Bear management planning begins with examination of the biological factors that influence bears, such as population size, reproductive rates, survival rates, etc. Computer programs allow CPW managers to examine changes to hypothetical populations under differing harvest, forage and survival scenarios - a process known as “population modeling,” producing a suite of alternative mortality levels related to different management strategies that are designed to increase, decrease, or keep populations at the current size.

In addition to biological factors, CPW also conducts public outreach efforts to identify social factors critical for establishing a strategic direction. With this information, CPW develops management strategies for black bear populations by geographic area.

<sup>5</sup> Most black bear are in dens by about Oct. 31 through April

<sup>6</sup> CPW employees and Federal Wildlife Services employees are exempt when acting under agency authority exceptions, per CRS 33-3-106, to take bear in defense of livestock, real property, a motor vehicle, or human life.

These management strategies might focus on priorities for:

- Recreation - hunting, watchable wildlife
- Species conservation - ensuring black bear survival for future generations
- Human-bear conflicts - addressing increasing conflicts/interactions with people

Within the scope of each priority, monitoring metrics are established:

- Biological metrics - related to age and gender composition in harvest along with absolute mortality thresholds (the latter of which inform harvest objectives)
- Social metrics - related to acceptable levels of human-bear conflicts, monetary amounts of agricultural damage claims, and the amount of CPW employee staff time consumed by human-bear conflict management
- Recreation metrics - related to hunter success rates and hunting experience satisfaction.

Harvest objectives and license levels to achieve those objectives are directly related to the desired management strategy. Annual data is used in a feedback loop to help inform managers about what adjustments may be necessary to license allocations, which are then formulated and recommended to the Parks and Wildlife Commission.

## **CPW Administrative Directives & Policies for Black Bear Conflicts**

### **CPW Commission Policies**

- **Mammalian Predator Management** - Provides direction to CPW for managing predator populations when control methods to benefit other wildlife are being considered. Control measures will be directed by a predator management plan which must be approved by the Parks and Wildlife Commission and may include:
  - Habitat manipulation
  - Sport hunting
  - Direct removal by CPW staff
- **Prohibition of Diversionary or Supplemental Feeding of Black Bears**
  - Emphasizes that the management of black bear populations is based on natural forage availability without recourse to diversionary or supplemental feeding, excluding agency approved research
  - Periodic local natural food failures and related human conflicts will be considered but will not be used as the sole justification for increases in black bear harvest to reduce population levels
- **Adjustments to Black Bear Populations** - Undergoes a public process in developing or revising existing black bear management plans which consider:
  - Conservation of populations
  - Habitat quality
  - Levels of game damage
  - Levels of human conflict



## **CPW Documents Directing Management for Human-Bear Conflicts**

**Administrative Directive W-2, Black Bear Incidents** - This directive sets forth procedures to be followed in the control and prevention of black bear damage and for addressing public safety issue situations (other than an attack on a human). The Directive states that black bear conflict strategies will emphasize prevention and mitigation of damages and that efforts to deal with conflicts will be directed at the individual bear causing the nuisance or depredation incident.

There are three distinct categories of black bear incidents as determined by CPW personnel, each with their own management considerations:

- **Nuisance Bears** - bears which pose an immediate threat to or damage property, but do not threaten public safety:
  - No action combined with education effort
  - Deterrent methods combined with education effort
  - Capture, mark, and translocate
  - Any bear involved in two nuisance incidents will be destroyed by the CPW, Wildlife Services personnel, or by hunter harvest during an established season
  - A bear may be destroyed after or during one nuisance incident if CPW determines that the bear's behavior will not be altered by translocation.
- **Depredating Bears** - bears which have killed cattle, sheep, horses, alternative livestock or other hooved livestock:
  - Educate and assist livestock owners and other landowners to avoid situations and circumstances which encourage predators
  - Any bear which kills cattle, sheep, horses, alternative livestock or other hooved livestock can be destroyed or translocated
  - Previously translocated bears involved in these instances shall be destroyed

- **Dangerous Bears** - bears which pose an immediate threat to human health and safety:

- o Capture, ear tag, translocate a bear if it is deemed dangerous because of its location and not its behavior
- o Any previously translocated bear that is currently judged to be dangerous because of its location shall be destroyed
- o If the bear is dangerous because it poses an immediate threat to human safety, destroy and necropsy the bear - test for rabies if possible
- o A detailed investigative report on each incident involving dangerous bears is required
- o Bear incidents involving attacks or injuries to people will be immediately reported to superiors including the CPW Director.

CPW officers evaluate bear involvement, conduct the necessary investigation and when appropriate, provide claimants with information regarding game damage claim filing procedures. At all opportunities during these encounters, CPW provides education and information material to reduce human-bear conflicts.

A bear conflict data form is used for any bear incident that requires CPW on-site response, a bear that is translocated, one that is destroyed, or in situations the officer feels it is important to formally document the conflict.

Officers have discretion to deal with bear conflicts as follows:

- If a bear has been captured and handled for any of the above conflict situations a second time, the bear must be destroyed - commonly referred to as the “two-strike” policy
- To determine if a bear has been involved in a previous incident and trapped the bear will be tracked through the use of ear tags, lip tattoos and/or PIT tags as outlined in Appendix A of Directive W-2.



## Administrative Directive OW-2, Predator Attack on Humans

### Outlines procedures for handling any predator that may have attacked a person:

- Primary responsibility in the investigation is to protect and provide medical aid to surviving victims, protect officer safety, protect other public, and protect and collect evidence
- Stresses that every effort should be made to capture and/or kill the predator(s) involved, with the acknowledgement that absolute verification may not be possible
- After considering the totality of the circumstances, the removal of other predators in the immediate nearby area may be necessary to increase the likelihood that all predators involved are removed. This will be done primarily with the use of a houndsman and/or the use of bear trap

### Statutes and Regulations<sup>7</sup>

The regulatory history of black bears in Colorado is a reflection of the changing temperament of its citizens. From statehood in 1876 to today, black bears have evolved from a depredating nuisance species with no legal protection to a charismatic animal that elicits strong emotions from nearly every segment of society. There were early attempts by sportsmen in 1899 and again in 1916 to declare black bear a big game animal warranting legal protection and management, but the designation did not occur until 1933. Since then, many changes to the hunting season structure and dates have occurred, from altering the length and timing of the seasons to establishment of special bear only season.

### Citizen Initiative

In 1992, a citizen ballot initiative was drafted calling for the elimination of the spring bear hunting season and prohibiting the use of bait and dogs. The petition received 76,360 signatures, exceeding the required 50,000, placing it on the ballot as Proposed Amendment #10. It passed by a vote of 1,054,032 for and 458,260 against, receiving the third most votes of the proposed amendments that year.

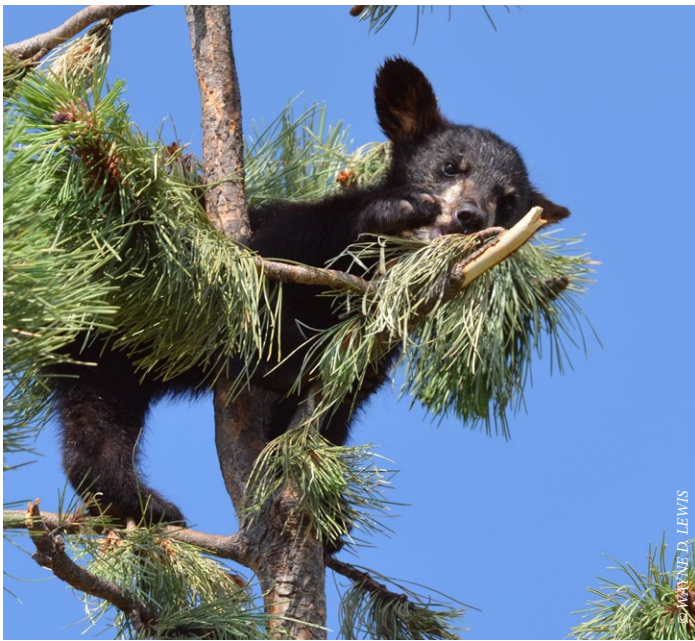
**CRS 33-4-101.3** was approved reflecting the intent of the voters of Colorado to prohibit the take of a black bear by any means from March 1 through September 1 of any calendar year and prohibited any person from taking a black bear with the use of bait or with the use of dogs.

The statute also defined bait as – “to place, expose, deposit, distribute, or scatter salt, minerals, grain, animal parts, or other food, so as to constitute a lure, attraction, or enticement for black bears on or over any area where hunters are attempting to take black bears.”

In April 1996, **Senate Bill 96-167** was approved, granting exclusive jurisdiction over the control of depredating animals through **CRS 35-40-101** and **35-40-102**, to the Commissioner of Agriculture.

<sup>7</sup>For a detailed regulatory history, see the Reference section at the end of this report.





The exclusive jurisdiction allows the Commissioner of Agriculture to:

- Adopt rules for the control of depredating animals with consultation from the Wildlife Commission
- Establish methods of controlling depredating animals, whether lethal or nonlethal
- Allows owners of agricultural products or resources and their agents or designees to control depredating animals
- Allows non-lethal methods of control or preventative activities

When depredating animals are determined to be at-risk species, the Commissioner of Agriculture is required to consult and receive approval from the Wildlife Commission for the take of at-risk species and to consider any alternatives to minimize the effect on the species.

Furthermore, the bill authorizes the Commissioner to promote the control of depredating animals through organized and systematic planning by cooperative agreements between any person, county, association or corporation and the commissioner or United States.

### Education

Research and observation offer conclusive evidence that human behavior, primarily carelessness with trash, bird feeders, pet food and other bear attractants, can increase the likelihood of human-bear conflicts in Colorado and throughout black bear range. While many of CPW's management efforts focus on altering the number and behavior of bears on the landscape, agency personnel also attempts to affect human behaviors that contribute to conflicts, especially those related to how people store garbage and other food attractants.

In addition to press releases, media outreach, information on the CPW website, signage and flyers in both Spanish and English, CPW formed volunteer Bear Aware teams<sup>8</sup> in 1998 to help influence human behavior by distributing specific guidance on how to minimize attractants and reduce conflicts. The programs began with strong partnerships within the communities and received financial and volunteer support from the community and CPW.

In contrast to the success of these teams, large-scale evaluations of passive education efforts (such as delivering leaflets to residents or putting stickers on garbage dumpsters) have not been as successful in achieving similar changes in human behavior or reductions in conflict.

In addition, several resort communities have many temporary residents and visitors coming in for a short time, or visiting for a weekend. Many of these visitors have little vested interest in the community and may not feel obligated to heed any advice to avoid attracting bears. CPW officers have reported that some visitors (in addition to a few locals) have tried to attract bears for photo opportunities by making trash available, or hand-feeding bears to bring them into range of their cameras.

The successful management of human behavior will likely vary by community. All efforts, including the development of Bear Aware teams, should be designed in such a way to respond to specific, actionable needs in single communities. While aspects of successful programs can serve as a template for other communities, a lack of funding, dedicated volunteers, or authority to make effective changes often hinder the success of these programs. What is not in doubt is building community partnerships and allocating resources to conflict management efforts are critical to ensuring a reduction in conflict.

### Current CPW Research on Human-Bear Conflicts

While human-bear conflicts are increasing in Colorado and across the country, there is uncertainty about whether these increases reflect recent changes in bear population trends or behavioral shifts to human food resources. Without a thorough understanding of the relationship between human-bear conflicts, bear behavior and bear population dynamics and human behavior, wildlife agencies cannot successfully identify management actions to reduce conflicts while maintaining healthy bear populations.

In 2011, in response to this issue, CPW initiated a comprehensive, six-year research project on human-bear conflicts. Specifically, the objectives of the project are to:

- Determine the influence of human development on bear behavior and population dynamics
- Test the effectiveness of urban bear-proofing for reducing human-bear conflicts
- Examine public attitudes and behaviors related to human-bear interactions
- Develop population and habitat models to support the sustainable monitoring and management of bears in Colorado

<sup>8</sup> In 2015, approximately 15 Bear Aware Teams are currently active in Colorado, including approximately 150 team members.





Most of the data for this project are being collected in the vicinity of Durango, Colorado, but regional and statewide information is also being used to meet project objectives. To date, the project has generated one of the largest datasets ever compiled on black bear ecology along the urban-wildland interface.

Most of the results from the research project will be published after all data have been collected (2017) and subsequently analyzed, but an initial paper was published in 2015 that examined black bear use of human development based on bear collar data collected in Durango (CO), Aspen (CO), and Lake Tahoe (NV). Investigators found that bear selection for human development was highly dynamic, varying as a function of changing environmental and physiological conditions. Bears increased use of human development in years when natural foods were scarce, throughout the summer-fall, as they aged, and as a function of gender, with males exhibiting greater use of development. While patterns were similar across study sites, bears at sites with poorer quality habitat (i.e., Lake Tahoe) selected development more consistently than bears at sites with higher quality habitat (Aspen and Durango).

These results have key implications for the management of human-bear conflicts. Wildlife agencies often assume that

bears exposed to human food will consistently exhibit nuisance behavior, but the results suggest that bear behavior is highly variable within and across years, and that bears may often use human food sources as a subsidy rather than relying on those resources outright. As a result, many bears may be considered 'conflict' individuals in a poor natural food year that otherwise exhibit natural foraging behavior in normal or good natural food years.

Because bear populations are very difficult to monitor, many people often assume that increases in human-bear conflicts reflect increases in bear population sizes. However, research suggests that bear selection for development may be increasing over time, particularly as Colorado's human population continues to grow and as individual bears get older and gain experience with human foods. This behavior may then be the source of additional conflicts without an associated increase in bear population size.

As human development continues to permeate bear habitat and as changing weather patterns reduce the availability of natural foods for bears in some years, the results of the study suggest that bear exposure to development and human foods will increase as will their selection for these resources.

# MANAGEMENT OPTIONS FOR REDUCING HUMAN-BEAR CONFLICTS

## Public Harvest

While hunting is the primary method for managing wildlife populations, including black bear, research has demonstrated that increasing harvest levels has not correlated with subsequent reductions in human-bear conflicts. Data from Virginia, Pennsylvania, New York, and Ontario (Canada) all demonstrated an increase in bear nuisance complaints despite increases in the number of bears harvested. Similar analyses from Wisconsin, Ontario and Japan all revealed no correlation between the number of bears harvested and the number of human-bear conflicts in subsequent years. Minnesota was the only state where harvest increased while conflicts also increased but then sharply declined; however, the decline is attributed to changes in waste management practices (increased use of bear-resistant containers) rather than changes in harvest. It should be noted that modern bear hunting seasons are generally not administered to drastically reduce bear populations to minimize human-bear conflicts, but rather to manage them for sustainable levels.

Hunting has likely been ineffective at reducing specific human-bear conflicts because of the mismatch between when and where bears are harvested and when and where conflicts occur. Black bear harvest occurs in the fall, typically away from human development, while human-bear conflicts often peak in mid-to-late summer in and around human development. Changes to harvest regulations that address this mismatch have the potential to increase the effectiveness of hunting as a tool for reducing conflict. New regulations that allow wildlife managers the flexibility to target the location and timing of harvest on a localized scale where significant bear-human conflict occurs could be a solution to the situation described above. It should be noted that these options have not been tested in Colorado. If implemented, they should be conducted on a trial basis and include adequate monitoring to determine effectiveness.

The use of “special management zones” on private lands has demonstrated that increased harvest can be achieved. However, it has not yet been determined if human-bear conflict levels were affected by the increased harvest. However, focusing hunting in special management zones can reduce pressure on CPW managers, allowing them to instead focus on other critical duties. Increased bear harvest in these zones benefits the agency by reducing the amount of time, expense and effort spent managing conflict bears and reducing the amount of bears euthanized by CPW managers. It also has the added benefit of allowing hunters to enjoy the state’s wildlife resources, including outdoor recreation and the ability to put fresh organic meat on the table for themselves and their families.



## Bear Attractants

A majority of the increases in human-bear conflicts in Colorado have occurred along the urban-wildland interface where there is an abundant supply of reliable, high-calorie foods in the form of garbage, fruit trees, vegetable gardens, pet food and bird feeders. As opportunistic foragers, bears readily exploit these resources, resulting in negative interactions with people.

Studies have demonstrated that bears recognize the benefits of human foods, but they also perceive the risks of foraging around human development. By reducing the availability of human foods for bears and the benefits of foraging in human populated areas, research suggests that bears are likely to increase their use of natural foods when the risks associated with foraging around human development outweigh the benefits.

Field studies have corroborated this pattern, as the use of bear-resistant food lockers and garbage containers have been successful at reducing conflicts within national parks and in some communities. For example, long-term data collected in Minnesota suggested that declines in conflicts were associated with changes in waste management practices, despite attempts to reduce conflicts through increased harvest. Of all the management techniques used to reduce human-bear conflicts, removing access to waste and other attractants has been the most successful to date.

Various exclusion and fencing techniques have been successfully used to properly store and protect food, waste, and other resources that attract bears. Garbage, the primary attractant for bears around human development, can be secured in bear-resistant containers that are designed for individual, commercial or community use. Food can be stored in bear-resistant lockers at campgrounds and within bear-resistant canisters for backcountry travel. Electric fencing is highly effective at protecting apiaries, fruit trees, hobby livestock, and other resources.



While eliminating bear access to human-provided foods has proved to be highly effective, it is often challenging to implement. Bear resistant materials including food lockers, garbage containers and fencing are often cost prohibitive for homeowners, landowners, municipalities and natural resource agencies. Even if the financial obstacles are overcome, some people forget to latch containers and lockers and continue to leave attractants outside of secure structures.

Given that human-bear conflicts tend to be concentrated in “hotspots” such as along riparian areas or adjacent to open-space, strategies to reduce attractants may be particularly beneficial if they are targeted within those areas that have high probabilities of conflict.

Additionally, strictly enforcing ordinances and regulations to encourage compliance can be effective but requires logistical and financial investments.



### **Aversive Conditioning**

The simple act of hazing a bear away has shown some benefit in dissuading bears from entering developed areas, but the benefits are very limited as some hazed bears often return immediately.

**Hazing with Dogs** - Trained dogs are able to keep up with a bear and chase it until it climbs a tree. The benefits of hazing bears with dogs have not been studied extensively, but its benefits seem to be limited to the location of the hazing episode and if attractants are not removed, it is likely that the offending bear or another will ultimately return.

**Deterrents** - Including chemical, auditory or visual. Through a variety of delivery systems, they can be used to disrupt or discourage a bear's immediate behavior. These deterrents include bear repellent sprays made from capsaicin, ammonia or bleach, car alarms or other motion-sensing light and sound devices with alternating patterns.

**Repellents** - Substances that produce discomfort. For example, the anthelmintic drug for gastrointestinal worm infestations also causes intestinal discomfort and can be used to condition a bear to associate the discomfort with an attractant. Lithium chloride has also been used in some studies. However, any repellents efficacy is only temporary and will become ineffective if not varied or followed up with more aggressive conditioning or removal of the attractant.

**Unwelcome Mats** - An “unwelcome mat” is designed to prevent a bear from approaching a door or a window and can be helpful in certain circumstances. These mats are typically constructed of plywood with nails spaced 2 inches apart protruding approximately 1 inch. When the bear steps on the protruding nails, it causes a painful reaction. Unwelcome mats can also be constructed with an electric fence charger. When a bear places a foot on the mat and has at least one foot on the ground next to the mat, it receives a shock.

**Non-Lethal Tools** - Include the use of pyrotechnics, bean bag rounds, rubber buckshot and rubber slugs. These methods can be effective on a small scale to inhibit nuisance behavior but may require repeated application; however, the effect is only temporary as the hazed bear will either resume its behavior at another location or return to the original location if the attractant is still available. Pyrotechnics and projectiles can be more effective if used in conjunction with other aversive conditioning techniques but again the effect is only temporary if the behavior is habituated and/or the attractant remains.

**TASER** - CPW has used TASERs since 2015 to influence bear behavior. Originally intended for brief capture operations such as using it as an immobilizer when removing wildlife entangled in fencing, the tool has shown some benefits as a deterrent when used on nuisance bears. As with any hazing technique, the amount and accessibility of attractants and the habituated state of the bear appear to limit its efficacy. Although the technique is still undergoing evaluation, preliminary results appear promising.

**Fencing** - Fences can be an effective deterrent; however, they can be cost prohibitive if the area or object being protected is large. In addition, to be effective against bears, they will need to be electrified, increasing costs.

### **Animal Husbandry**

Black bear predation on livestock can be reduced through a number of practices, including:

- The use of livestock herders
- Moving stock into pens or sheds overnight
- Keeping ewes in sheds during lambing
- Shifting birthing to fall where possible
- Avoiding pasturing stock near dense cover
- Rapid removal and burial of carcasses
- The use of livestock protection dogs<sup>9</sup>
- A combination of the above techniques

<sup>9</sup> Generally, large breeds that are trained to defend against predators

Some of these practices have limited utility in many places in Colorado and CPW does not have authority to require these practices; however, limiting statutory liability where any or all such practices, where possible, have not been applied, may be a consideration.

### Habitat Considerations

CPW does not have any form of land management authority over public or private lands, except those owned by the CPW. Although habitat manipulation can be effective, private property owners and municipalities are often resistant to the elimination, reduction, or herbicide application on fruit producing landscape trees and shrubs.

Bear conflicts associated with agricultural and ranching operations can be reduced by:

- Altering the species composition of forested landscapes near pastures or crop fields
- Removing brush and trees that serve as seasonal food sources or as hiding cover
- Avoid planting agricultural crops in fields located in close proximity to forested habitats

Residential conflicts can be reduced by:

- Removing fruit and nut-producing trees and shrubs on private property or in public parks, along roads or within city street landscaping
- Removing backyard vegetable gardens
- Considering the size, shape and location of forested areas when designing open spaces
- Replacement willows along riparian corridors with grasses to remove cover
- Treating existing fruit or nut bearing trees and shrubs with organic or chemical herbicides that reduce or eliminate subsequent fruit production

### Supplemental or Diversity Feeding

Research suggests that black bears utilizing high-energy, human foods grow faster and mature earlier than bears that utilize only natural foods. The result is an increase in population growth which runs counter to current bear management plans that seek to reduce or stabilize bear populations.

**Supplemental feeding** consists of placing natural or artificial food in the natural environment for use by bears on an annual, seasonal, or emergency basis to provide additional nutrition or make up for natural food shortages. The intent is to prevent starvation, increase reproduction, improve condition of individual bears or conserve vulnerable bear populations.

Supplemental feeding is not widely used by bear managers; however, some in the public will occasionally feed bears to view or photograph with the negative consequence of encouraging bears to continue seeking human food sources, creating bears that lose their fear of people i.e., “habituated bears.”

**Diversionsary feeding** is a limited, planned management action to provide alternative foods or relocate existing food items to lure bears away from locations or situations where they can come into conflict with humans and would have similar reproductive consequences as supplemental feeding.

Because bears that exploit human-related food resources are responsible for most human-bear conflicts, the Parks and Wildlife Commission has established a policy that precludes the use of supplementary or diversionsary feeding except as an approved research endeavor.

### Translocation and Euthanasia

Translocation<sup>10</sup> and lethal removal are management tools commonly used by wildlife agencies to reduce human-bear conflicts.

While bear translocations are fairly common, research shows that they are not always successful in reducing the nuisance behavior of the targeted bear or keeping them away from site of their original capture. Translocation reduces bear survival and is often associated with the return of individuals to their capture sites (33% of adults returned to the site of capture while 0% of subadults returned).

Colorado’s data suggests that translocation success for bears not known to be involved with repeated human-bear conflicts is 64% for adults and 58% for subadults; translocation success for bears with a history of conflicts is significantly lower.



<sup>10</sup> The process of trapping, tagging and moving bears to suitable bear habitat, typically 50 to 100 miles from where captured. Often limited by dwindling, available habitat or other factors.



Researchers recently used statewide data from Wisconsin to assess whether the action of translocating a bear was associated with reduced rates of future conflict in the vicinity of the capture location. They found that the number of bears translocated from a site did not decrease the risk of future conflict in the area or the number of conflict complaints. This pattern was attributed to the fact that while the nuisance behavior of one bear was eliminated by translocation, the capture site (the source/attractant) often continued to contribute to nuisance behavior by other bears.

While research on the effectiveness of translocation has been inconsistent, investigators have found that certain factors can limit success. In a state like Colorado, it is often difficult to find release locations that are far from the capture site, are high-quality bear habitat and far enough from human development or other human attractants.

When a bear poses a risk to human health and safety or is known to have caused previous conflict activity, it is often euthanized in accordance with CPW directives. Euthanasia is often used to remove bears that have caused bodily harm to people, livestock, broken into homes or structures, exhibited repeated aggressive behavior, or exhibited aggressive behavior one time and it is deemed necessary to euthanize by a wildlife officer.

Euthanasia eliminates future problems from a specific animal, but does not resolve issues (such as food attractants) that may have been responsible for exacerbating undesirable bear behavior and activity.

Trapping bears for either translocation or euthanasia is costly and labor intensive, requiring extensive time and resources from CPW and partnering agencies.



## Fertility Control

This option involves the use of chemical contraception (e.g. steroids, estrogens, and progestin) that is injected into a segment of the population.

Fertility control chemicals for wildlife are regulated by the Environmental Protection Agency, which has not approved any chemical fertility control on an experimental basis for any wild population of bears.

In most situations, fertility control agents may only slow population growth or stabilize the population at current levels. In reality, it is doubtful the cost or efficiency of delivery for contraceptive techniques would allow their use on free-ranging game populations. Fertility control cannot be considered a viable option for black bear population management until the efficacy, health impacts, behavioral changes, method of administration, and costs are scientifically evaluated.

## Education

It is clear that human behaviors, such as the storage of garbage and other food attractants, can affect bear behavior and the likelihood of human-black bear conflicts. Efforts to change human behaviors associated with creating black bear conflicts focus primarily on information and education, including Bear Aware teams, press releases, the “Living with Bears” page on the agency’s website, social media, interviews with television, newspapers and radio, flyers, signs and brochures.

Bear Aware is a network of trained Colorado Parks and Wildlife volunteers throughout the state who help their neighbors and communities prevent problems for themselves and for bears. CPW’s Bear Aware program was founded in 1998. Today there are approximately 15 teams statewide and 150 volunteers dedicated to helping people coexist with bears. Bear Aware volunteers do not have any enforcement authority, but can answer questions, offer practical advice and even make house calls. They also present educational programs and staff informational booths at events.

The effectiveness of Bear Aware Programs continues to be debated. In a study of the effects of educational efforts in motivating bear-proofing actions in Aspen, Colorado, researchers measured the effect of an educational effort modeled after the CPW Bear Aware materials on residential bear-proofing activities. Hanging signs with Bear Aware messages on dumpsters at communal residences (apartment buildings and townhome complexes) did not decrease the chance that the dumpster was left open, making trash accessible to bears. In addition, researchers contacted residents of several neighborhoods and delivered Bear Aware materials developed by CPW, such as brochures and a check-list of methods to reduce conflicts. They measured no change in the number of regular (non-bear-resistant) garbage containers or the number of homes at which trash was available to bears after residents received Bear Aware materials.

In an assessment of New York state's Bear Aware materials, researchers found that individuals who received educational materials focused on bear-proofing did not take more bear-proofing actions (such as keeping grills clean, feeding pets indoors, and keeping garbage secured) than people who did not receive materials, nor did they increase bear-proofing actions after receiving materials. For the minority of individuals that did take bear-proofing actions after seeing the materials (<13%), the most common reason for taking action was direct experience of conflict, not exposure to educational materials.

### Enforcement

With the on-going efforts to influence responsible trash and food practices, some Colorado communities have enacted ordinances requiring residents to keep garbage secured to prevent access by bears and wildlife. In some cities, residents are required to use a bear-proof garbage container; however, others leave the method of compliance up to the residents.

Many wildlife managers believe that strictly enforced bear-proofing ordinances are effective and will lead to a decrease in conflicts; however, lack of compliance has been a significant obstacle.

Researchers in Aspen, a community with heavy bear activity, assessed the effects of increased enforcement of the city's ordinance, which requires that all wildlife attractants be secured.

According to recent CPW research, when written warnings were issued by city officials, the number of compliant dumpsters increased by 30% when compared to areas that had not received enforcement efforts.

The penalties assessed due to lack of compliance appear to have some effect on motivating people to keep garbage secured from bears, but the effects may only last as long as enforcement is in place.



Due to limitations in staffing, it can be difficult to sustain high levels of enforcement of these ordinances each summer, year after year. As a result, CPW and city and county governments are interested in finding solutions to achieve a high level of voluntary compliance.

The research project described under “Current CPW Research about Black Bears” is an attempt to provide clarity on why individuals comply, or do not comply, with bear-proofing ordinances. Results from this assessment will be available in 2017.



# ANALYSIS and ALTERNATIVES

Black bear conservation remains one of North America's greatest wildlife management success stories. Under state wildlife agency management, black bears continue to expand into previously unoccupied ranges and established populations are increasing throughout the country. This growth is the result of regulated management programs established decades ago that focused on ensuring the long-term conservation of bear populations and their habitats using sound science as the foundation. We also recognize that the desire of our citizens to be actively engaged in bear management decision-making processes will continue to increase. CPW's ability to manage fish and wildlife populations, including black bears, in the future will require significant regulatory flexibility and adaptability while ensuring citizen engagement. As human populations continue to grow statewide and encroach on current bear habitat the likelihood of human-bear conflicts increasing is a reality. It is appropriate and necessary that CPW begin discussion about how to mitigate conflicts.

In response to the request of the General Assembly and in compliance with HB 15-1304, CPW has identified a range of alternative actions intended to mitigate human-bear conflicts in Colorado. Reducing human-bear conflict in wildland-urban interface and municipal settings will require a multifaceted approach with cooperation from federal, state, county, and local entities. While CPW is not recommending legislation on any of the particular management options at this time, we believe application of these management tools would be most appropriate for a designated period of time and in designated areas with a history of significant human-bear conflict.

## Potential Management Strategies to Reduce Bear-Human Conflict

Below is a list of alternative management strategies for consideration. This information is educational in nature and should be seen as a starting point for future management actions. It should also be noted that some of the listed management strategies are currently prohibited by statute or constitutional amendment. In an effort to provide the most comprehensive report, all available options have been included.

### Recommendation for Legislative Action

CPW believes the following recommendation would have the greatest impact on reducing human-bear conflicts in the urban environment.

#### Community Waste Disposal Practices (CPW, External, Legislative)

Improper waste disposal is the leading cause of human-bear conflicts in the wildland-urban interface and municipal settings. While some communities have adopted adequate waste disposal ordinances to mitigate human-bear conflict, many communities have refrained from doing so. Without strict enforcement of such waste disposal ordinances in each human-bear conflict area it will be difficult, if not impossible to reduce the number of human-bear conflicts. CPW believes this management strategy would have the greatest impact on reducing human-bear conflict in wildland-urban interface and municipal settings.

Enactment and enforcement of ordinances:

- o Require local municipalities to enact and effectively enforce ordinances requiring food items be secured from bears
- o Utilize appropriate funding to help absorb the initial costs of purchasing bear resistant trash containers
- o Create a partnership between CPW and local municipalities, waste management companies and landfills to enact and enforce effective trash ordinances and practices
- o Make any available grants or funding for municipalities dependent on the enactment and enforcement of trash ordinances aimed at reducing conflicts

### Additional Alternatives

The following are additional alternatives for consideration. This information is educational in nature and should be seen as a starting point for future considerations. Further analysis would need to be completed before action is taken. Wherever possible, CPW recommends that initial implementation be conducted on smaller scale so the true effectiveness could be measured and better understood. It should also be noted that some of the listed alternatives might currently be prohibited or controversial. In an effort to provide the most comprehensive report, all available options have been included.

#### Change Season Dates (Legislative)

Currently, Colorado Revised Statute 33-4-101.3 prohibits the hunting of black bears between the dates of March 1 through September 1. Many human-bear conflicts occur in late summer and early fall when the current season structure does not allow hunters to pursue and harvest the depredating animals. The following list of options could provide opportunities for hunters to pursue problem animals. These options would provide wildlife managers additional means to manage bears at times when conflicts are peaking.

- **Option 1 - Revise CRS 33-4-101.3(2):** Set statutory season closure dates to March 1-July 31 annually, allowing the Parks and Wildlife Commission to establish bear hunting season as early as August 1.

##### o Pros:

- Increased harvest of apiary conflict bears and human conflict bears (most incidents occur after August 1.)
- An August to September season would increase the likelihood of achieving harvest objectives because of increased bear vulnerability in fall foraging period

##### o Cons:

- Hunting in August is not likely to significantly improve harvest of bears involved in sheep or other livestock damage which occurs primarily in June and July
- Although it is illegal to harvest a sow with dependent cubs, if a cub was orphaned, it would survive at a lower rate than if reared by its mother through August. Cubs orphaned during August are highly mobile and visible. Research data shows that rehabilitation of such orphans can be highly successful.
- Proponents of the bear initiative and supporters of its intent may perceive this as overstepping the will of the voting public

- **Option 2 – Revise CRS 33-4-101.3(2):** Authorize special bear seasons August 1 – September 1 in specific locations to focus on bears creating human-wildlife conflict in the vicinity of municipalities or other places of special concern.

**o Pros:**

- Creates an opportunity to use licensed hunters to assist in managing human-bear conflicts at a localized level, reducing CPW staff time.
- An August to September season would increase the likelihood of resolving specific bear conflicts because of increased bear vulnerability in fall foraging period

**o Cons:**

- Hunting in August is not likely to significantly improve harvest of bears involved in sheep or other livestock damage which occurs primarily in June and July
- Although it is illegal to harvest a sow with dependent cubs, if a cub was orphaned, it would survive at a lower rate than if reared by its mother through August. Cubs orphaned during August are highly mobile and visible. Research data shows that rehabilitation of such orphans can be highly successful.
- Proponents of the bear initiative and supporters of its intent may perceive this as overstepping the will of the voting public

- **Option 3 - Repeal CRS 33-4-101.3(2):** Eliminate any season date restriction and allow the Parks and Wildlife Commission to establish season dates as necessary.

**o Pros:**

- Allows maximum season flexibility and ability to fine tune seasons to specific management needs throughout the year
- More hunters could harvest conflict bears throughout the year depending upon how extensive the PWC acts to liberalize seasons

**o Cons:**

- Increased risk of orphaned dependent cubs succumbing to starvation/predation mortality
- Proponents of the bear initiative are more likely to perceive this as legislative overstepping of the will of the voting public.

**Develop Systematic Statewide Data Collection Applications/Software to Track Conflicts (DNR, CPW, OIT)**

Develop, with guidance and input from end users, a statewide application (for smart phones, iPads, etc.) allowing managers to upload data in the field to an accessible and queryable statewide database.

**Revise Statutes to Enable Wildlife Officers (Legislative)**

When circumstances make it necessary to protect human health and safety, allow CPW personnel access to private property to haze, kill or trap an aggressive bear. In addition, remove the requirement to first seek approval from the Department of Health to set snares or capture bears.

**Support Future Research to Quantify the Effectiveness of Human-Bear Conflict Reduction Methods (CPW)**

Colorado Parks and Wildlife is a strong proponent of scientific research and data collection to determine the effectiveness of methods that can reduce human-bear conflicts. To ensure that the issue is addressed in a scientific manner, CPW will require appropriate funding and support to continue existing research and institute new research as needed.

**Partner with Communities to Allow the Harvest of Black Bears in Public Areas (External, CPW, Legislative)**

Providing hunters the ability to legally harvest wildlife, is one of the best methods of managing populations within the appropriate social and biological levels. Working with local municipalities and government entities, CPW will encourage and facilitate bear hunts in urban public areas, county open spaces and other similar areas where deemed appropriate and necessary to address local concerns.

**Secure Funding from Appropriate Sources to Support Additional Staff Dedicated to Bear Management**

Currently, the majority of funding for bear management comes from sportsmen's license dollars. Because bear conflicts involve a growing number of Colorado's citizens and affects most people in the state, it may require the use of additional funding sources to help address the growing challenge of human-bear conflicts. The funding will be used to hire additional FTEs, personal services and operations dollars for CPW staff positions dedicated to address human-bear conflicts within municipalities.

**Increased Flexibility of Statutory Feeding Prohibitions (Legislative)**

The current statute (CRS Title 33-6-131) limits the ability to enforce the law in a manner that encourages compliance. Consider changes to allow increased officer discretion to assertively enforce law in the case of an egregious violation. The current statute takes multiple warnings and progressive fines before consequences reach effective deterrent levels. It can take years before a person who habitually feeds bears is deterred from continuing their actions. This situation often leads to multiple habituated bears in areas where proper management is limited or extremely controversial.

**Increased Enforcement of Feeding Prohibitions (CPW)**

Colorado Parks and Wildlife officers will increase enforcement of current regulatory feeding prohibitions in the case of an egregious violation.

**Make it Illegal to Tamper With Any Bear Trap Set by CPW (Legislative, CPW)**

Because necessary bear management is often controversial and may not be in line with what some in the public may prefer, it has resulted in incidents where a trap is vandalized, rendering it inoperable. Effective bear management can be enhanced with a statute or regulation to make tampering with a trap illegal with associated fines and penalties.



## Evaluate and Improve Existing Bear Conflict Information and Education (CPW)

Currently CPW utilizes a focused public education campaign utilizing press releases, flyers and signage in both Spanish and English in some areas. In addition, CPW uses “Bear Aware Teams” - groups of volunteers that are trained to interact with their community to encourage compliance with ordinances and adoption of effective food and trash storage practices. Although the messages have been consistent, there are additional methods that can be utilized, including radio and television Public Service Announcements, possibly using the services of a well recognized Colorado citizen.

### Changes to Method of Take (Legislative)

- The 1992 citizen initiative prohibits the use of bait (salt, minerals, grain, animal parts, or other food) to lure, attract, or entice bears on or over any area where bear hunting is occurring, or the use of any number of dogs as an aid to taking bears. Changes to current methods of take could increase the harvest of certain bears. The following are two options for changing method of take if so desired
- **Option 1 - Revise CRS 33-4-101.3** to allow the use of bait and authorize the PWC to regulate such use:
  - **Pros:**
    - Would increase black bear hunting success rates during fall foraging periods (Aug. - Sept.) and spring (April-May), improving the ability to achieve harvest objectives. (Baiting in June and July would likely not be as effective at increasing success rates)
    - Certain baiting methods may reduce harvest of actively lactating bears and thus reduce risk of cub orphaning
  - **Cons:**
    - Proponents of the bear initiative and its intent are more likely to perceive this as legislative overstepping of the will of the voting public
    - May ignite an ethical debate about baiting and/or fair chase
    - Baiting may lead to more “food conditioned” bears, which according to the evidence, pose a greater risk to public safety
- **Option 2 - Revise CRS 33-4-101.3** to allow the use of dogs and authorize the PWC to regulate such use.
  - **Pros:**
    - The use of hounds could lead to higher success rates, increasing the ability to achieve harvest objectives
    - May increase their wariness of humans and will help reduce conflict (this is an opinion - actual evidence for this does not exist)
  - **Cons:**
    - The use of hounds for hunting large carnivores is not well-accepted among the non-hunting public.
    - The change may spark citizen debate and actions against the use of dogs for lions, bobcat, etc.
    - Proponents of the bear initiative and supporters of its intent may perceive this as legislative overstepping the will of the voting public.
    - The use of dogs during other big game seasons will likely result in conflicts between bear hunters using dogs and hunters pursuing other big game.

<sup>12</sup> In Colorado, it is illegal to kill a sow with cubs.

# REFERENCES

## Historical Evolution of the Black Bear Incident Directive

Administrative Directive W-2 was updated Feb. 1, 2007 and supersedes and replaces Administrative Directive W-2 (dated Jan. 3, 2000).

The current directive reflects the state statute that eliminated CPW's liability for certain damages to real or personal property caused by black bear. It also expressly allows for, with Area Wildlife Manager approval, the euthanasia of a bear during or after its first nuisance incident when a CPW employee believes the bear's behavior will not be altered by translocation (Administrative Directive W-2, IV, c, 1, e).

The current directive mentions an additional option for the lethal control of nuisance bears - a Special Game Damage License created by the Wildlife Commission. The current directive adds an Appendix B which outlines the use of Designated Agents for managing human-bear conflicts.

Administrative Directive W-2 (dated Jan. 3, 2000) superseded and replaced Administrative Directive A-39 (dated Feb. 4, 1994). Administrative Directive A-39 did not expressly include alternative livestock.

All three iterations of the Black Bear Incident Directive have an Appendix A. Directive A-39, Appendix A mandated that any bear that killed livestock with a collective value of five hundred dollars or more would be destroyed. This livestock value consideration was removed in Directive W-2 (dated January 3, 2000).

The passage of "Amendment 14"<sup>11</sup> and the enactment by the Colorado Legislature of SB 97-052 to implement the provisions of Amendment 14, which is codified as 33-6-201 through 209, C.R.S. (SB-52), requires that mutual understanding and policies and procedures for cooperation between the Colorado Department of Agriculture and CPW be developed and implemented. The MOU between the CDA and CPW dated February 9, 1998 includes language that provided exclusive jurisdiction for depredating animals to the CDA. The "Appendix A" for both revisions of Directive W-2 reflected the changes established by these bills and directed CPW staff in how they will work with CDA and Wildlife Services with regard to bear conflicts. The appendix reiterates that CPW officers will be the lead and have full discretion in handling non-depredating bears and Wildlife Services will assist if requested.

All counties having a contract with Wildlife Services for nuisance/depredating wildlife control are referred to as "Cooperating Counties."

For depredating bears, Wildlife Services will be contacted by the livestock operator. CPW will respond to determine validity of a claim and meet statutory responsibility for damage settlement. If Wildlife Services cannot not respond within 48 hours, CPW will take the lead and solve the conflict.

CPW officers have discretion to set a bear trap for depredating bears.

Any county which does not have a contract with Wildlife Services is referred to as a "Non-Cooperating County" and CPW personnel will handle and/or work with CDA on depredating bear calls.

If CPW traps a bear and CDA is on site, CDA has jurisdiction over the fate of the depredating bear.

In all trapping efforts, CPW and Wildlife Services will make every effort to capture the offending animal. Non-targeted captures will be handled by CPW policies.

Included in Appendix A are the procedures that CPW personnel will follow in setting a bear trap, the handling of trapped bears (which includes tranquilization), marking and release of the animal. Lethal control measures and disposal of carcass are also outlined if it is determined to be the appropriate course of action.

If a bear has been captured and handled a second time, the bear must be destroyed. This is commonly referred to as the "two-strike" policy and has been in all three versions of the Black Bear Incident directive.

To determine if a bear has been involved in a previous incident and trapped the bear will be tracked through the use of ear tags, lip tattoos and/or PIT tags as outlined in an Appendix to this Directive.

<sup>11</sup> Colorado's Anti-Trapping Initiative

## Regulatory History of Black Bears in Colorado

- 1933** - Bears declared a big game animal with a season set from Oct. 1 to Nov. 30. A depredating provision of stock-killing bears was included.
- 1945** - The wording “dispose of bears of any kind known to be stock-killing bears” changed to “dispose of bears of any kind known to be molesting livestock.” The language protecting females with cubs or cubs was not present. Limit 1 bear per season to any deer/elk license holder.
- 1948** - A special bear coupon was attached to deer/elk license to estimate bear harvest.
- 1955** - Special bear only season established, Sep. 1-30. Guides required and guides could use dogs.
- 1956-1958** - Special bear season dates changed to Aug. 15 to Oct. 31. First bear only license established.
- 1959-1963** - Special season discontinued. Black bear hunting only in Oct.-Nov. seasons concurrent with deer/elk seasons and hunting with dogs not allowed.
- 1964** - Special bear season resumed with dates Apr. 1 to Sep. 15. Hunting with dogs was allowed only in special season.
- 1965-1966** - Special bear season extended Apr. 1 to Sep. 30.
- 1967-1969** - Sportsmen’s License introduced. Bears could be taken on regular deer/elk licenses, sportsmen’s license, and bear license.
- 1970** - Special bear season changed to Apr. 1 to Jun 30. Language protecting cubs and females with cubs reinserted into big game brochure. By 1970 depredating animal language changed to “dispose of bears, mountain lions, coyotes, bobcats, or dogs of any kind known to inhabit areas grazed by livestock.”
- 1971-1975** - Additional season added to aid in controlling nuisance bears: entire state open Apr. 1 to Jun 30; most of the state open Jul. 1 to Sep. 30. Hunting with dogs allowed Apr. 1 through Sep. 30.

**1972** - Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and Presidential Executive Order #11643. Order #11643, Environmental Safeguards on Activities for Animal Damage Control on Federal Lands, restricted the use of chemical toxicants for killing predatory animals on federal lands, especially those with any secondary poisoning concerns, and restricted the use in any federal cooperative programs. FIFRA was first passed in 1947 and primarily dealt with registration of pesticides but was amended in 1972 with the Federal Environmental Pesticide Control Act regulating the use and sale of pesticides to protect human health and the environment. Use of pesticides against predators prior to 1972 is difficult to quantify since most use was undocumented. However, it cannot be ignored that there were pesticides used and the restrictions that were put in place in 1972 and later in 1996 did have an effect on the population of predators.

**1976-1982** - Sportsmen’s License discontinued after 1975. Bear could be taken only with bear license. Baiting expressly permitted for first time in 1978. Bear seasons: Apr 1 – Jun 30 most of the state; Jul 1 – Sep 30 limited units; concurrent with regular deer season statewide; concurrent with regular elk season statewide; concurrent with the concurrent deer and elk season statewide; or with archery or muzzleloader during the archery and muzzleloader seasons in select limited units. There were changes made year to year, such as the Apr 1 – Jun 30 season changing back to statewide or the Jul 1 – Sep 30 changing to Jul 1 – Aug 29. Hunting with dogs allowed during the April to either August or September time period. Seal requirement was added prior to 1980 but could not track down exact year.

**1984-1985** - Two season lengths for spring bear season: about 2/3 of state open Apr. 1 to Jun. 30; 1/3 of state open Apr. 1 to Jun. 15. In 1984 Bear Management Advisory Task Force convened and reported to the Wildlife Commission.

**1989-1991** - Seasons initiated to try to reduce harvest of females with cubs. Limited license numbers were set at 2000 with unlimited numbers for concurrent archery, muzzleloader, and regular rifle deer and elk in the fall. Bait and hounds were permitted in the spring and bait in the fall. With building public scrutiny on spring bear hunting and the use of bait and dogs, and in conjunction with recommendations from Division of Wildlife staff, the Wildlife Commission approved limiting 50% of the limited bear tags in 1992 to the spring with plans to limit it to 30% in 1993 and 10% in 1994. In response to the Wildlife Commission’s decision, a citizen ballot initiative was drafted.

## Current Regulatory Status of Black Bears in Colorado (CRS)

### 33-1-102. Definitions.

(2) “Big game” means elk, whitetail deer, mule deer, moose, rocky mountain bighorn sheep, desert bighorn sheep, rocky mountain goat, pronghorn antelope, black bear, mountain lion, and all species of large mammals that may be introduced or transplanted into this state for hunting or are classified as big game by the commission.

### 33-3-106. Excessive damage to property – permit to take wildlife – when – harassment by dogs.

(1)(a) Where wildlife is causing excessive damage to property, as determined by the division after consultation with the property owner, the division is authorized to issue a permit to the property owner, the property owner’s designee, or to such other person selected by the division to kill a specified number of the species of wildlife causing such excessive damage. Upon request by the property owner, whenever the wildlife causing the excessive damage exceeds the wildlife objective set by the division for that species for that geographical area for the current year, the division is encouraged to issue a permit under this section. Any determination by the division that the damage being caused is not excessive may, upon application by the property owner, be reviewed by the commission.

(b) No permit to take wildlife pursuant to this subsection (1) shall be issued or used in violation of any local restriction on firearm use.

(2) Any wildlife killed, as permitted under subsection (1) of this section, shall remain the property of the state and shall be field dressed promptly, and such killing shall be reported to the division within forty-eight hours; except that the killing of a bear or mountain lion shall be reported within five days.

(3) Nothing in this section shall make it unlawful to trap, kill, or otherwise dispose of bears, mountain lions, or dogs without a permit in situations when it is necessary to prevent them from inflicting death, damage, or injury to livestock, real property, a motor vehicle, or human life and additionally, in the case of dogs, when it is necessary to prevent them from inflicting death or injury to big game and to small game, birds, and mammals. Any wildlife killed as permitted under this subsection (3) shall remain the property of the state, and such killing shall be reported to the division within five days. The division may bring a civil action against the owner of any dog inflicting death or injury to any big game and to small game, birds, and mammals for the value of each game animal injured or killed. The minimum value of each animal shall be as set forth in section 33-6-110.

### 33-4-101.3. Black bears – declaration of intent – spring season hunting prohibited – prohibited means of taking – penalty.

(1) It is the intent of the voters of Colorado in adopting this measure to prohibit the taking of black bears when female black bears are rearing their cubs. It is the further intent of the voters of Colorado to promote the concept of fair chase in the taking of black bears by eliminating the use of bait and dogs. In considering proposed changes to the restrictions on the taking of black bears which are established in this measure, the Colorado general assembly shall take notice of the fact that this measure was adopted by a vote of the people at the 1992 general election.

(2) During the period from March 1 through September 1 of any calendar year, it is unlawful for any person to take a black bear by any means including but not limited to firearm or bow and arrow.

(3) It is unlawful for any person to take a black bear with the use of bait, or with the use of one or more dogs, at any time during any calendar year. In the event that a dog or dogs accidentally chases a black bear while the owner of person in control of such dog or dogs is in legal pursuit of other game, such owner or person in control of the dog or dogs shall not be charged with the illegal taking of a black bear so long as the dog or dogs are called off as soon as the mistake is realized and the black bear is not injured or killed.

(4) The provisions of this section shall not apply to employees or agents of the division of parks and wildlife or to field agents of the United States department of agriculture when such employees or agents are acting in their official capacity, nor shall this section apply to any person who lawfully takes a black bear in defense of livestock, real property, a motor vehicle, or human life pursuant to section 33-3-106.

(5) For purposes of this section, “bait” means to place, expose, deposit, distribute, or scatter salt, minerals, grain, animal parts, or other food, so as to constitute a lure, attraction, or enticement for black bears on or over any area where hunters are attempting to take black bears.

(6) Any person who violates any provision of this section is guilty of a class 1 misdemeanor and, upon conviction thereof, shall be punished as provided in section 18-1.3-501, C.R.S. In addition, persons convicted pursuant to this section shall have their wildlife license privileges suspended for five years and person convicted of a second or subsequent offense pursuant to this section shall have their wildlife license privileges suspended permanently.

(7) For the purposes of this section, “agent” means any qualified individual trained in wildlife procedures and operating under the direction of the division of parks and wildlife.

HISTORY: Source: Initiated 92: Entire section added, § 1, effective January 14, 1993.L. 2002: (4) amended and (7) added, p. 695, § 1, effective May 29; (6) amended, p. 1544, § 293, effective October 1.L. 2003: (4) amended, p. 1940, § 3, effective May 22.

Editor’s note: This section was added by an initiated measure, effective January 14, 1993, prohibiting the taking of black bears under certain circumstances. The vote count on the measure at the general election held November 3, 1992, was as follows:

FOR: 1,054,032

AGAINST: 458,260

### 33-6-131. Knowingly luring bears.

(1) Unless otherwise permitted by commission rule, it is unlawful for any person to place food or edible waste in the open with the intent of luring a wild bear to such food or edible waste.

(2)(a) This section shall not apply to acts related to agriculture, as defined in section 35-1-102(1), C.R.S.

(b) For the purposes of this section, “food or edible waste” shall include live animals or food that is grown in the open prior to such food being harvested.

(3) Any person who violates this section shall be given a warning. Upon a second or subsequent violation of this section, such



person is guilty of a misdemeanor and, upon conviction, shall be punished by a fine not to exceed:

- (a) One hundred dollars for a first offense;
- (b) Five hundred dollars for a second offense;
- (c) One thousand dollars for a third or subsequent offense.

#### Parks and Wildlife Commission regulation

##### #20(H). Possession of Edible and Nonedible Portions of Mountain Lions and Bears

The possession of the carcass, hide, skull, claws, or any part of any bear or lion is prohibited unless the animal was taken by a licensed hunter during an established hunting season or unless specifically authorized by the Division.

##### #241 – SPECIAL RESTRICTIONS

A. No person shall hunt, take or harass a bear in its den.

B. No cubs shall be killed nor shall any bear accompanied by one (1) or more cubs be killed. As used herein a “cub” shall mean any black bear less than one (1) year of age.

C. Inspection and Seal Required

1. Black bear taken by licensed hunters shall be personally presented to the Division or other official designated by the Division for inspection and sealing within 5 working days after the taking thereof. Bear heads and hides must be unfrozen when presented for inspection. If not unfrozen, the Division may retain heads and hides as necessary for thawing sufficient to extract a premolar tooth. No fee shall be required for the inspection and issuance of a legal possession seal, which shall remain attached to the hide until such hide is tanned.
2. Black bears shall not be transported, shipped or otherwise taken out of Colorado until the hide and skull are inspected and sealed by authorized personnel of the Division. Possession of any bear hide not having a seal attached within the 5 working days shall be unlawful and such hide shall become the property of the State.
3. Inspection and sealing shall be arranged by contacting the Division Officer or the Division office.
4. A mandatory check report shall be accurately completed by the hunter at the time of inspection.
5. At the time of the mandatory check, the Division shall be authorized to extract and retain a premolar tooth.
6. Individuals taking black bear under authority of 33-3-106(3) shall report the bear within five (5) days after the taking thereof as required by said statute and the carcass, hide and other parts of the bear shall remain the property of the state.

## Sources

Aldredge, M.W., D.P. Walsh, L.L. Sweanor, R.B. Davies, and A. Trujillo. 2015. Evaluation of translocation of black bears involved in human-bear conflicts in south-central Colorado. *Wildlife Society Bulletin* 39:334-340.

Alt, G. L. 1980. Rate of growth and size of Pennsylvania black bears. *Pennsylvania Game News* 51(12):7– 17.

Baruch-Mordo, S., S. W. Breck, K. R. Wilson, and J. Broderick. 2011. The Carrot or the Stick? Evaluation of Education and Enforcement as Management Tools for Human-Wildlife Conflicts. *PLoS ONE* 6; 1-8.

Baruch-Mordo, S., S. W. Breck, K. R. Wilson, and D. M. Theobald. 2008. Spatiotemporal Distribution of Black Bear-Human Conflicts in Colorado, USA. *Journal of Wildlife Management* 72:1853-1862.

Baruch-Mordo, S., C.T. Webb, S.W. Breck, and K.R. Wilson. 2013. Use of patch selection models as a decision support tool to evaluate mitigation strategies of human-wildlife conflict. *Biological Conservation* 160:263-271.

Don Carlos, A. W., A. D. Bright, T. L. Teel, and J. J. Vaske. 2009. Human-Black Bear Conflict in Urban Areas: An Integrated Approach to Management Response. *Human Dimensions of Wildlife* 14:174-184.

Fagerstone, K. A., M. A. Coffey, P. D. Curtis, R. A. Dolbeer, G. J. Killian, L. A. Miller, and L. M. Wilmont. 2002. Wildlife Fertility Control. *Wildlife Society Technical Review* 02-2. The Wildlife Society, Bethesda, Maryland, USA.

Fraker, M. A., P. D. Curtis, and M. Mansour. 2006. An analysis of the feasibility of using fertility control to manage New Jersey black bear populations. New Jersey Department of Environmental Protection, Division of Science, Research and Technology. Trenton, New Jersey, USA.

Garrott, R. A. 1991. Feral horse fertility control: potential and limitations. *Wildlife Society Bulletin* 19:52– 58.

Garrott, R. A. 1995. Effective management of free-ranging ungulate populations using contraception. *Wildlife Society Bulletin* 23:445–452.

Gore, M. L., B. A. Knuth, P. D. Curtis, and J. E. Shanahan. 2006. Education programs for reducing American black bear-human conflict: indicators of success? *Ursus* 17:75-80.

- Gore, M. L., B. A. Knuth, P. D. Curtis, and J. E. Shanahan. 2006. Stakeholder perceptions of risk associated with human-black bear conflicts in New York's Adirondack Park campgrounds: Implications for theory and practice. *Wildlife Society Bulletin* 34:36-43.
- Greenleaf, S.S., S.M. Matthews, R.G. Wright, J.J. Beecham, and H.M. Leithhead. 2009. Food habitat of American black bears as a metric for direct management of human-bear conflict in Yosemite Valley, Yosemite National Park, California. *Ursus* 20:94-101.
- Huygens, O.C., F. T. van Manen, D. A. Martorello, H. Hayashi, and J. Ishida. 2004. Relationships between Asiatic black bear kills and depredation costs in Nagano Prefecture, Japan. *Ursus* 15:197-202.
- Johnson, H.E., S.W. Breck, S. Baruch-Mordo, D.L. Lewis, C.W. Lackey, K.R. Wilson, J. Broderick, J.S. Mao, and J.P. Beckmann. 2015. Shifting perceptions of risk and reward: dynamic selection for human development by black bears in the western United States. *Biological Conservation* 187:164-172.
- Keane A., J.P.G. Jones, G. Edwards-Jones, and E.J. Milner-Gulland. 2008. The sleeping policeman: understanding issues of enforcement and compliance in conservation. *Animal Conservation* 11: 75-82.
- Lewis, D.L., S. Baruch-Mordo, K.R. Wilson, S.W. Breck, J.S. Mao, and J. Broderick. 2015. Foraging ecology of black bears in urban environments: guidance for human-bear conflict mitigation. *Ecosphere* 6:141.
- McArthur, K.L. 1981. Factors contributing to the effectiveness of black bear transplants. *Journal of Wildlife Management* 45:102-110.
- McLaughlin, C. R., C. J. Baker, A. Sallade and J. Tamblyn. 1981. Characteristics and movements of translocated nuisance black bears in north-central Pennsylvania. Pennsylvania Game Commission Report, Harrisburg, Pennsylvania, USA.
- McLean, P. K. and M. R. Pelton. 1990. Some demographic comparisons of wild and panhandler bears in the Smoky Mountains. *International Conference on Bear Research and Management* 8:105-112.
- Merkle, J.A., P.R. Krausman, N.J. Decesare, and J.J. Jonkel. 2011. Predicting spatial distribution of human-black bear interactions in urban areas. *Journal of Wildlife Management* 75:1121-1127.
- Morzillo, A. T., A. G. Mertig, J. W. Hollister, N. Garner, and J. G. Liu. 2010. Socioeconomic Factors Affecting Local Support for Black Bear Recovery Strategies. *Environmental Management* 45:1299-1311.
- Northeast Black Bear Technical Committee [NBBTC]. 2012. An evaluation of black bear management options. [http://www.dgif.virginia.gov/wildlife/bear/BearMgmtOptions\\_NEBBTC2012.pdf](http://www.dgif.virginia.gov/wildlife/bear/BearMgmtOptions_NEBBTC2012.pdf) Accessed September 29, 2015.
- Obbard, M.E., E.J. Howe, L.L. Wall, B. Allison, R. Black, P. Davis, L. Dix-Gibson, M. Gatt, and M.N. Hall. 2014. Relationships among food availability, harvest, and human-bear conflicts at landscape scales in Ontario, Canada. *Ursus* 25:98-110.
- Peine, J.D. 2001. Nuisance bears in communities: Strategies to reduce conflicts. *Human Dimensions of Wildlife* 6:223-237.
- Rogers, L. L. 1987. Effects of food supply and kinship on social behavior, movements, and population growth of black bears in northeastern Minnesota. *Wildlife Monographs* 97:1-72.
- Slagle, K., R. Zajac, J. Bruskotter, R. Wilson, and S. Prange. 2013. Building tolerance for bears: A communications experiment. *Journal of Wildlife Management* 77:863-869.
- Spencer, R.D., R.A. Beausoleil, and D.A. Mortorello. 2007. How agencies respond to human-black bear conflicts: a survey of wildlife agencies in North America. *Ursus* 18:217-229.
- Tate, J. and M. R. Pelton. 1983. Human-bear interactions in Great Smoky Mountains National Park. *International Conference on Bear Research and Management* 5:312-321.
- Tavss, E.A. 2005. Correlation of reduction in nuisance black bear complaints with implementation of (a) a non-violent program and (b) a hunt. Final Report to the New Jersey Fish and Game Council.
- Treves, A., K.J. Kapp, and D.M. MacFarland. 2010. American black bear nuisance complaints and hunter take. *Ursus* 21:30-42.
- Voyles, Z., A. Treves, and D. MacFarland. 2015. Spatiotemporal effects of nuisance black bear management actions in Wisconsin. *Ursus* 26:11-20.
- Zajac, R. M., J. T. Bruskotter, R. S. Wilson, and S. Prange. 2012. Learning to live with black bears: A psychological model of acceptance. *Journal of Wildlife Management* 76:1331-1340.







1313 Sherman St #618  
Denver, CO 80203

**[cpw.state.co.us](http://cpw.state.co.us)**

12/30/2015