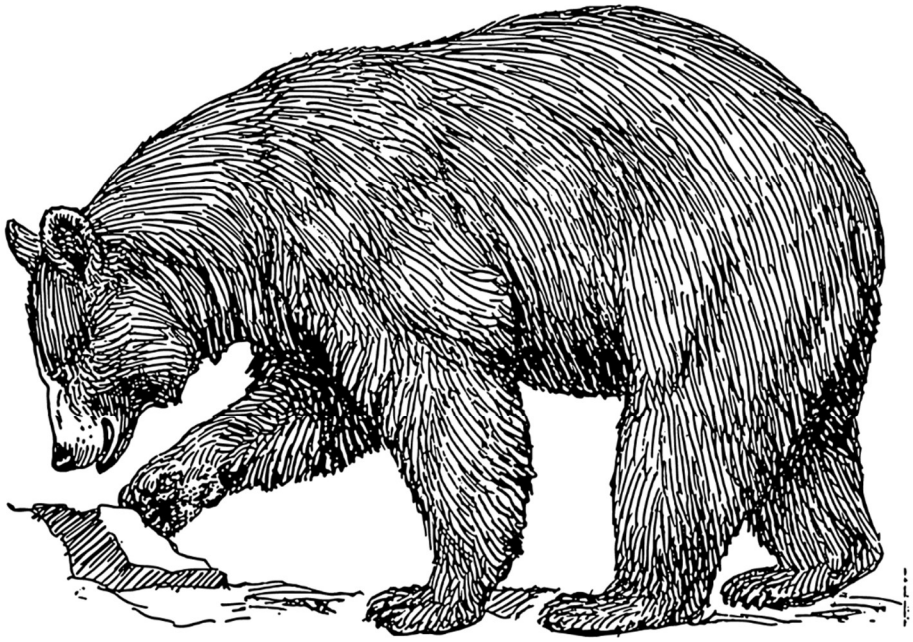
Virginia Bear Management Plan 2023-2032



Virginia Department of Wildlife Resources

EXECUTIVE SUMMARY

Black bears (*Ursus americanus*) capture human admiration and interest like few other wildlife species. As a reflection of strength, images of bears are often used as icons for countries and athletic teams. Because of their intelligence and ingenuity, bears are perceived to have human-like emotional qualities. Expanding black bear populations have proven the adaptability and resilience of the species, but black bears are still recognized as indicators of ecological health and symbols of the American wilderness. Many citizens simply value bears because they exist in their native ecosystems. Many residents take pleasure in watching, hunting, or photographing this fascinating mammal; however, bears may also inflict damage to personal property and crops, and may sometimes be perceived as a safety risk.

Bears were plentiful and widespread when Jamestown was settled in 1607. By 1900, habitat changes and over-harvest of bears for food and hides had nearly extirpated the species but for isolated small populations in remote areas. Since the early 1900s, harvest management, reforestation, public land purchases, oak forest maturation, bear restoration efforts, and natural range expansions have all contributed to bear population growth in Virginia. With the resulting increase in bear populations, bear management objectives have changed from restoring to stabilizing populations over much of the Commonwealth. Although many people have welcomed this growing population, the abundance of bears can also create concerns for other citizens. Active management is necessary to maintain bear populations and habitat for the benefit of present and future generations.

The first two editions of the Virginia Black Bear Management Plan (hereafter Plan), completed in 2001 and 2012, have provided the blueprint for black bear management to meet the then Virginia Department of Game and Inland Fisheries' (VDGIF) former mission of managing "wildlife…to maintain optimum populations…to serve the needs of the Commonwealth". Although the Department of Wildlife Resources' (VDWR) mission statement has changed (see Introduction section), maintaining optimum bear populations that balance positive demands (e.g., hunting, viewing) with negative demands (e.g., agricultural damage, residential bear conflicts) is still a primary goal of this revised plan. The previous and new editions of the Plan have all identified areas where bear populations should be managed to increase, decrease, or remain the same. A focus of this new plan is encouraging humans to coexist with bears.

Although VDWR has traditionally incorporated public input into bear management decisions, it was not until development of the first Plan that a diverse cross section of stakeholders formally participated in a process to establish direction for bear management. To revise the Plan in 2012 and then again in 2023, similar stakeholder involvement processes were used to incorporate public values (e.g., economic, sociological, and political) and biological considerations.

Embodying the interests of all Virginians, the revised Plan reflects the values of a diverse public about what should be accomplished with bear management in Virginia. Bear stakeholders focused on making value choices about bear management, while wildlife professionals focused on the technical aspects of bear management. Three committees contributed to the plan: the Citizen Advisory Committee (CAC), the Interagency Advisory Committee (IAC), and the Bear Plan Technical Committee (BPTC). The CAC, representing a cross section of bear-related interests (e.g., hunters, agricultural producers, homeowners, conservation organizations, and animal welfare interests), was responsible for identifying the goals and prioritizing the outcomes for bear management. The BPTC, composed of DWR staff with technical expertise in bear management, designed objectives and strategies based on values identified by the CAC. The IAC, composed of professionals from natural resource agencies and local governments, provided input and review on both values and technical components throughout the process. Like the processes in 2001 and 2012, additional public input was obtained from surveys and broad public review of the draft Plan.

The Plan contains two main sections: the technical portion and the Mission, Goals, Objectives and Strategies portion. The technical portion describes the life history and biology of bears, status (supply and demand), and historical and current management programs and issues in Virginia. The Plan

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includes a mission statement and six goals that address the areas of populations, habitat, recreation, human-bear conflicts, and bear health and welfare:

Mission for Bear Management:

Sustainably manage black bears as a wild, free-roaming public trust resource in a manner that serves the needs and interests of the citizens of the Commonwealth.

Manage black bear populations, bear habitat, bear-related recreation, human-bear conflicts, and bear health and welfare using sound, applied science-based approaches that:

- *are flexible;*
- *are proactive;*
- *are ecologically responsible;*
- *are ethical;*
- *have impacts at relevant scales (local, regional);*
- *are applied consistently;*
- *are accountable and transparent;*
- *are collaborative with other agencies, partners, and the public;*
- *are holistic, considering consequences on other species, neighbors, and stakeholders; and,*
- *foster public awareness, understanding, and engagement through accurate and objective bear-related information and education.*

Goal 1 - Population Viability

Ensure the long-term viability of bear populations in each of the eight Viability Regions in Virginia.

Goal 2 - Population and Cultural Carrying Capacity (CCC)

Manage current and projected bear populations at levels adaptable to a changing CCC (e.g. land use, property concerns, economics, recreational opportunities).

- *The goal of maintaining or achieving long-term population viability (per Goal 1) is of higher priority, even when CCC is exceeded.*
- *Both public attitudes and bear population size should be managed to meet current and projected bear CCC objectives.*
- *Maintain black bear populations while recognizing ecological considerations and balancing the needs of other species.*
- *Regulated hunting is the preferred method of direct population management, where appropriate and feasible*

Goal 3 - Habitat Conservation and Management

Manage and conserve black bear habitat in Virginia consistent with long-term bear population objectives, with emphasis on areas of special significance (e.g., areas with source populations and habitat linkages) considering potential habitat changes, and potential human-bear interactions. Conservation may consist of habitat management or protection that benefits multiple species.

Goal 4 – Bear-related Recreation

Provide and promote a diversity of bear-related recreational opportunities (e.g., hunting, non-hunting) for a diverse public that minimize human-bear conflicts, encourage responsible and rewarding outdoor

experiences, and promote keeping bears wild. Recreational opportunities should not support activities that prevent attainment of black bear population objectives. Recreational methods should be consistent with and respect the rights of landowners and others. Harvested bears should be utilized.

Goal 5 - Human-Bear Conflicts

Foster coexistence with bears by preventing and reducing human-bear conflicts (e.g., agricultural, residential, recreational, vehicular, human health and safety) while:

- *Attaining bear population and recreation objectives;*
- *Minimizing loss of property and income;*
- *Fostering practices that keep bears wild;*
- *Promoting shared responsibility (personal, community, agency) for human-bear conflicts;*
- *Prioritizing use of nonlethal methods to resolve conflicts;*
- *Using hunting as the preferred method when lethal alternatives are required to manage conflicts;*
- *Increasing tolerance and appreciation of bears;*
- *Encouraging utilization of bears that are killed, where appropriate and feasible.*

Goal 6 – Bear Health and Welfare

Promote the health and welfare of wild black bears while attaining other bear plan goals. Foster respect for wild bears both as individual animals and as members of a naturally functioning population.

Specific objectives were developed to help guide the attainment of each goal and can be found in the body of the report following each goal statement. Potential strategies then follow each objective that clarify ways in which each objective should be achieved.

The revised Plan will guide bear management across the Commonwealth through 2032. The Plan identifies generally what, when, and how bear projects are implemented and will provide guidance to the VDWR Board of Directors, VDWR administrators and staff, and the public on bear program priorities, management activities, hunting regulations, and annual budgeting for the next 10 years. It is important to emphasize that (1) the Plan is strategic (aspirational) rather than operational, and (2) bear management is the shared responsibility of DWR, other agencies, partners, and the public.

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INTRODUCTION

Many people would consider black bears to be the monarchs of Virginia's wild kingdom. While most Virginians may never see a wild bear, there is great interest in observing, photographing, or hunting bears, or just knowing they exist in the Commonwealth. Unfortunately, bears sometimes damage agricultural crops or residential property, and perceived safety concerns involving black bears have increased in recent years. Black bear management throughout the United States has become increasingly complex with a growing number of contentious issues surrounding bear hunting, human-bear conflicts, and bear health and welfare. Diverse public values and opinions associated with black bears provide unique management challenges for the Virginia Department of Wildlife Resources (VDWR).

The VDWR, under the direction of a Governor-appointed Board of Directors, is charged specifically by the General Assembly with the management of the state's wildlife resources. The Code of Virginia expresses many legal mandates for the Board and VDWR, prominent among which are management of wildlife species (§29.1-103), public education (§29.1-109), law enforcement (§29.1-109), and regulations (§29.1-501). To help clarify and interpret the role of VDWR in managing wildlife in Virginia, the Board of Wildlife Resources has adopted a mission statement:

- **Conserve** and manage wildlife populations and habitat for the benefit of present and future generations.
- **Connect** people to Virginia's outdoors through boating, education, fishing, hunting, trapping, wildlife viewing, and other wildlife-related activities.
- **Protect** people and property by promoting safe outdoor experiences and managing human-wildlife conflicts.

To accomplish the mission of the VDWR, the Board of Wildlife Resources provided further guidance in goals (see Mission, Goals, Objectives, and Strategies section of this plan).

What the Virginia Black Bear Management Plan Is

The Plan describes the history of the bear management program, its current status (supply and demand), and the future management directions. The plan establishes a framework through 2032 of what generally needs to be done and how it should be done. By clarifying management goals and objectives of the VDWR relating to bears, this plan will help Board members, VDWR administrators, VDWR staff, and the public to effectively address bear issues. As the basis for guiding black bear management activities, decisions, and projects, the plan also informs the General Assembly and the public of what the VDWR intends to accomplish. This is a strategic plan to provide an overall direction and goals (e.g., proposing regulated hunting as the preferred method to control bear populations) and not an operational plan that would provide the details of specific strategies (e.g., establishing specific number of days of hunting).

How the Plan was Developed

Wildlife managers traditionally have focused on technical or scientific aspects of resource management. Science-based principles have played a major role in the success of bear management programs in the past, but consideration for public values was often lacking. Because VDWR's mission is to serve the people of the Commonwealth, the process used to develop the bear plan incorporated both public values (e.g., economic, sociological, and political) and biological considerations.

VDWR's first statewide Plan was developed in 2001 to fulfill its mandate to manage black bears in Virginia. The 10-year plan represented the bear-related interests of all citizens, not just select groups of people. Diverse stakeholders representing homeowners, agricultural producers, naturalists, and hunters contributed toward this end. The planning process encouraged black bear stakeholders to focus on making

value choices about their resource, while wildlife professionals focused on the technical aspects of bear management.

The original 2001 Plan was revised in 2012 using a similar process. Key accomplishments of the revision were updating technical chapters (data, programs, etc.) and engaging multiple Stakeholder Advisory Committees (SACs) to significantly update goals, objectives, and strategies of the plan. To broaden input, VDWR also solicited citizen opinions about bear management through a randomized statewide telephone survey of Virginia residents co-developed and conducted by Responsive Management in 2010. VDWR staff with responsibilities and expertise in bear management provided technical facts for informed SAC deliberations about public values and goals. Additional public input was gained through *VDWR hunter surveys,* circulation of draft technical chapters among wildlife professionals, solicited input on draft population objectives during the 2011 biennial hunting regulations review process, and through a public comment period of the draft plan revision via the internet and in writing. The VDWR Board of Wildlife Resources endorsed the 2012 Plan at the January 29, 2013 Board Meeting.

The process used to revise the current plan (2023-2032) was similar to the two earlier efforts, with several enhancements. A consultant with Conservation Management Institute at Virginia Tech who was involved with previous DWR species plan revisions helped design the process, facilitate meetings, and conduct a structured decision-making (SDM) process to select bear population management objectives. In the spring of 2020, Responsive Management conducted a statewide phone survey of residents, bear hunters, and agricultural producers to obtain opinions about various bear management topics, including perceptions of bear population size, a key component of the SDM model.

Three committees contributed to the plan development: the Citizen Advisory Committee (CAC), the Interagency Advisory Committee (IAC), and the Bear Plan Technical Committee (BPTC) (Appendix 1). The CAC, representing a cross section of bear-related interests (e.g., hunters, agricultural producers, homeowners, conservation organizations, and animal welfare interests), was responsible for identifying the goals and prioritizing the outcomes for bear management. The BPTC, composed of DWR staff with technical expertise in bear management, designed objectives and strategies based on values identified by the CAC and provided technical data for the SDM model. The IAC, composed of professionals from natural resource agencies and local governments, provided input and review on both values and technical components throughout the process. A small group of stakeholders, who were not on any of these committees, previewed the full draft plan during July 2023 (Appendix 2) before it was provided to the general public for an open review and comment period in August 2023. The general public also had the opportunity to review draft bear population objectives during January 2023. The VDWR Board of Wildlife Resources endorsed the 2023-32 Plan on *October X, 2023* [anticipated].

Plan Format

The revised Plan includes updated sections relating to the life history of black bears, the bear program history in Virginia, Virginia's bear program status (supply and demand), supporting documents, and accomplishments of the 2012 Plan. Within the context of the VDWR mission statement, six program goals focus on bear populations, habitat, bear-related recreation, and human-bear conflicts. Specific objectives have been established to help guide the attainment of these goals, whereas potential strategies clarify how each objective might be achieved.

Interim Changes to the Objectives and Strategies of the Plan

The Virginia Black Bear Management Plan is designed to provide guidance and priorities to help manage Virginia's bear population through 2032. A Plan life of 10 years was chosen for several reasons; goals should remain relatively constant over that time, a mechanism exists for interim changes in objectives and strategies, and limitations in staff and resources preclude more frequent revisions. However, the plan should be a dynamic and flexible tool that remains responsive to changing social,

environmental, technical, and administrative conditions. To keep the Plan relevant and responsive to the programmatic goal directions provided by the public, specific objectives and strategies may be added, deleted, or amended by VDWR as new circumstances demand. Substantial and thoughtful public investments have produced the final revised Plan. DWR staff will submit any interim updates to the CAC and IAC for review. Updated objectives will be provided as addenda to the Plan on the agency website.

Acknowledgements

The meaningful involvement of stakeholders (some of whom participated in the development of previous bear plan revisions) from throughout the Commonwealth was crucial to the successful representation of the bear-related interests and public values of all Virginians. The commitment and dedication provided by the Citizens Advisory Committee and Interagency Advisory Committee (Appendix 1) not only made a difference in the quality of the final plan, but also enriched the process throughout.

A special thanks is due David Steffen, who as a consultant with CMI at Virginia Tech, helped at every step designing and implementing the plan revision process. He devoted countless hours to developing and employing a more defensible model for updating bear population objectives using the first-ever structured decision-making process as a component of a DWR species management plan revision. Dave also helped update sections of the technical chapters and appendices, and he offered his analysis skills to help summarize harvest data and update population estimates for bears, both of which were invaluable during vacancies for the bear biologist position.

Appreciation is extended for the work of DWR's Bear Plan Technical Committee (BPTC, Appendix 1) for reviewing and updating the revised technical information and for providing their expertise to the SDM model at numerous steps along the way. Technical research for and writing of the technical chapters of the plan was primarily provided by Robert Alonso (VA Tech). Carl Tugend, Katie Martin, and Nelson Lafon of DWR made sure committee meetings ran smoothly and wrote components of the Plan, with assistance from David Steffen and members of the BPTC. Colleen Turner of DWR reviewed and summarized comments received from the public regarding draft population objectives. Jaime Sajecki provided a review of an early draft of the Plan and assisted with formatting.

We also greatly appreciate the work of Responsive Management Staff in conducting the statewide survey. The data obtained from this effort was critical to the development of more defensible bear population objectives as well as providing an update to results from a similar survey 10 years earlier. We would also like to thank Stefanie Taillon of Virginia Farm Bureau for her assistance making sure the survey found wide distribution among the organization's membership.

Last but not least, we would like to extend our gratitude to all the individuals, whether public or agency staff, who took the time to review draft versions of the plan (and population objectives) and provide constructive input. The Virginia Chapter of the American Bear Foundation and the Humane Society of the United States provided thoughtful reviews of an early draft of the Plan.

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HISTORY

LIFE HISTORY OF BLACK BEARS

Black bears are the most common and widespread of the three bear species in North America. Although their historical distribution was larger, black bears are found in at least 41 states and all Canadian provinces except Prince Edward Island. Largely extirpated from the Midwestern states, populations remain in parts of most every eastern state (including all the southeastern states). As one of the most studied mammals in North America, much is known about the life history and population characteristics of black bears in Virginia and throughout their range.

Physical Characteristics

The fur of the eastern black bear is most commonly uniformly black, sometimes with a unique V- or Y shaped white blaze on the chest that can be used as an individual identifier. Other color phases of the black bear (e.g., brown, cinnamon, white, and bluish) are rare in the east and usually associated with populations in western North America. The white and bluish phases are very rare and only present in small areas of western Canada and Alaska.

Black bears have non-retractable claws used for gathering food, climbing trees, marking territory and defense. Unlike most carnivores that walk on their toes, bears walk on the soles of their feet like humans. Even so, a running bear can reach speeds of 35 mph. Black bears are excellent tree climbers, documented to climb up to 100 feet within 30 seconds. Even cubs as young as four months old can climb adeptly. Bears are also exceptional swimmers.

Although their vision is likely poor at extended ranges, black bears have better eyesight at short distances and can see in color. This helps them find insects and small colorful berries while foraging. Relying primarily on their nose, bears have a keen sense of smell that is among the best within land mammals. Like most mammals, their hearing also is good.

The black bear is Virginia's second largest land mammal (only elk is larger). Male bears are typically larger than females. In Virginia, adult male bears are typically five to six feet long, two to three feet tall, and weigh 175 - 400 pounds. Some males, however, may weigh in excess of 500 pounds. Adult females generally weigh 150 - 200 pounds but can weigh more than 250 pounds.

Bear size and weight vary widely depending on time of year and differences in habitat quality. An 880-pound bear harvested in eastern North Carolina during the 1998-1999 hunting season is the largest black bear documented in North America. Although unconfirmed, a 962-pound black bear was reportedly killed in Madison County, VA in 1887. A 740-pound male was harvested in Suffolk, VA during the 2000 hunting season. Western black bears are generally smaller than the bears found in the eastern United States.

Food Habits

Black bears are omnivorous and opportunistic feeders that feed on both plant and animal matter. This type of foraging flexibility means that dietary items will often vary throughout their geographic range based upon local habitat types and can also change due to annual and seasonal differences in food availability. In general, black bear diet mostly consists of vegetative matter including berries and fruits (soft mast), nuts and acorns (hard mast), grasses, fungi, and broad leaf vegetation. In addition, bears will also consume a variety of animal matter. Common animal diet items include insects, insect larva, fawns or calves of ungulates (e.g., deer, elk), and carrion, with less consumption of small rodents or other mammals and birds. Although bears can kill rabbits, mice, squirrels, groundhogs, some types of livestock, and deer fawns, vegetative matter generally makes up the bulk of their annual diets.

Research conducted across the state of Virginia has shown broad variability in diet items throughout the state. When bears emerge from winter dens in spring, food is scarce. The spring diet of

bears in Virginia consists primarily of succulent new herbaceous plant growth such as forbs and grasses. In early spring, bears may also focus on foods associated with humans (e.g., birdseed, dog food, garbage) due to their high caloric value and a limited amount of natural food sources. Later in the spring, bears find insects and larvae in snags, decaying logs, and under rocks.

As the year progresses, soft mast and insect matter becomes an important source of nutrition during both summer and early fall. Important summer foods include squawroot, blueberries, huckleberries, blackberries, wild grapes, dogwood, serviceberry, wild strawberries, mountain-ash, hawthorn, common chokecherry, pokeberry, and sassafras. Research from Shenandoah National Park (SNP) in the early 1980's and the early 1990's found a summer diet dominated by varying amounts of soft mast and squawroot with a smaller but notable amount of insect matter. Research in the Great Dismal Swamp (GDS) showed a shifting diet through the summer, starting with a diet dominated by soft mast in early summer, changing to a diet dominated by crops and less soft mast later in the summer. Recent research in the mountains of western Virginia from 2012-2015 also found soft mast to be the largest component of summer diet, but with much higher consumption of invertebrates, deer (scavenged or predated), and hard mast than observed in previous studies. The variability of summer diets by bears among regions and years in Virginia show how adaptable bears can be to variations in food availability.

During the fall, foods that are high in protein, carbohydrates, or fat that promote weight gain prior to denning are critical for bears. Bear diets during the fall consist mostly of soft and hard mast including acorns, hickory nuts, beechnuts, hazelnuts, grapes, and black gum fruit. Foraging for up to 20 hours a day during the fall in preparation for hibernation, bears can gain as much as one to two pounds per day. During good mast years, bears may more than double their body weight between August and December. Availability of fall foods may influence reproductive success, survival, food habits, nutrition, habitat use, movement patterns, home range, denning behavior, and bear interactions with humans. As with summer diets, fall diets have been found to vary regionally, annually, and seasonally. In SNP diets shifted from primarily soft mast in the early fall to a diet of mostly hard mast in the late fall. In Bath County, Virginia a different pattern has been observed, with fall diet consisting of over 50% animal matter (deer tissue, most likely from scavenging carcasses, as well as some amounts of small mammal and insect matter) and only small amounts of hard mast and soft mast. The fall variation in bear diet is likely correlated with annual variations in hard mast production.

Home Range, Movements & Activity

To meet nutritional and social needs throughout the year, black bears utilize individual home ranges for survival and reproduction (e.g. acquiring food, mating, and raising offspring). Bear home range size is determined by habitat quality, time of year, population density, sex, reproductive status, and age. Productive and diverse habitats result in smaller home range sizes with more overlapping bear use. Although bears may occupy the same general area, females can be territorial toward unrelated females when resources are limited. However, adult females can be tolerant of female offspring and will let grown female offspring occupy a portion of their home range. Male offspring are only tolerated for an additional year or so before their mother and other adult males force them to disperse. As a result, these young males may travel great distances in search of new home ranges. In addition, females with cubs will avoid male bears. Males that overlap with other males have been found to generally avoid being in the same place at the same time. On average, males have larger home ranges than females, and females with cubs tend to have smaller home ranges than solitary females.

Similar to dietary patterns in bears throughout Virginia, home range size is highly variable throughout the state, likely due to regional habitat differences as well as landscape changes that can occur through time. In Virginia, average male home range size has ranged from 15.4 mi^2 - 90.1 mi^2 and average female home range sizes has ranged from 3.6 mi^2 - 15.7 mi^2. Variability in home range size for each sex depends on location and year. Changes in home range size throughout different regions of Virginia demonstrate the adaptable nature of black bears to the diversity of habitats.

Black bears are generally most active at dawn and dusk, but activity and significant movements may occur during daylight as well as nighttime hours. When food is scarce, bears may travel extensive distances. Possibly due to increased foraging prior to denning, research in western Virginia found increased distances traveled outside of their general home ranges and an increase in the number of long-distance movements. In poor mast years, bears may range two to four times further than during good mast years. In years of mast crop failure, bears may move from forested areas in search of more abundant foods such as agricultural crops or other human-related food sources like birdseed or trash. Human-bear conflicts increase when bears respond to natural food shortages by moving into nontraditional habitats.

Habitat Requirements

Like all wild animals, bears need food, water, cover, and space to exist. Bears are commonly associated with forested cover but make use of a variety of habitat types to meet all their seasonal needs. Even with expanding human populations and land-use changes, bears have continued to thrive because of their adaptability to a variety of habitat types.

Important black bear habitat components include adequate access to food, dense cover, den sites, and travel corridors. Ideal habitat includes combinations of mast producing trees, early successional habitats (i.e., young forests created and maintained by timber/land management practices or other natural disturbances), edges of various successional stages, streamside management zones, and wildlife clearings.

Despite their adaptable food habits, black bears require extensive areas of diverse habitat types. Thought to be a wilderness species earlier in the 20th century, black bears have demonstrated their adaptability and ability to thrive in areas where forested habitats are interspersed among other land uses. Black bears are often found in large, contiguous tracts of forested lands but smaller blocks of forested habitat that are linked by forested corridors will also satisfy daily and seasonal needs.

Land-use changes that create isolated populations through fragmentation of black bear habitats have serious implications for population viability. Roads with heavy traffic volumes have been shown to limit bear movements. Bear movements that are restricted by heavily used roads may interrupt habitat linkages and contribute to fragmentation concerns.

Denning Behavior

Bears enter a period of winter dormancy for up to six months as an adaptation to food shortages and severe weather conditions. With body temperatures that drop only 9-14 degrees Fahrenheit, black bears are not considered true hibernators such as marmots, snakes, and some species of snail, wood frogs woodchucks, ground squirrels, and bats. Body temperatures of true hibernators drop to within one degree Fahrenheit of the surrounding conditions. Bear metabolisms fall by 50-60% and heart rates decrease 40-80%. While in the den, bears do not eat, drink, defecate, or urinate. Unlike true hibernating mammals, bears may be easily aroused from their winter dens.

Bears often den in confined spaces to reduce heat loss and conserve energy. Brush piles, snags, rock cavities and crevices, hollow trees, ground excavations, open ground nests, and even human structures may serve as den sites. In western Virginia, nearly 60 to 70% of all den sites are in hollow trees. Large northern red and chestnut oaks are almost exclusively selected as den trees. In contrast, research in the Piedmont and in the GDS found 98% and 97%, respectively, of females utilized ground-level dens. Den reuse among years in Virginia is less than 12%, although some bears may prefer the same type of den (e.g., trees, rock cavities) year after year.

Timing of den entrance depends upon age, sex, female reproductive status, weather conditions, and food availability. Bears may enter winter dens earlier during poor mast years, which conserves accumulated resources. When mast crops are good, bears typically enter dens later to take advantage of additional opportunities to feed and gain weight. During particularly mild winters, some bears (especially males and females with yearlings) may not den at all. Usually pregnant females enter dens first, followed by subadults, and then adult males. Individual bears enter dens in Virginia as early as November or as late

as the beginning of January. Den emergence usually occurs in reverse order of den entrance. Males emerge first, followed by subadults. Females with cubs are last to emerge from winter dens, typically between mid-March and mid-April. In Virginia, bears in the western mountains and SNP tend to enter dens slightly earlier and emerge later than bears in GDS.

Bears may lose up to 25-30% of their body weight while they are denning. Even after den emergence, bears may continue to lose weight while they search for scarce early spring foods, most of which may be of low nutritional value. Female bears nursing cubs are particularly nutritionally stressed after leaving their dens because they have allocated a great deal of their much-needed reserves to their offspring.

Reproduction

Black bears in Virginia generally breed between mid-May and mid-August, with a peak in early July. However, the fertilized eggs do not implant on the uterine wall and begin to grow until early December. Implantation will not occur if the female bear has not put on enough weight for both her and the cubs to survive the long denning period with no food. This delayed implantation ensures that cubs are born in the security of the winter den when females are in the best nutritional condition. If the female has not met her nutritional needs or is sick or injured, the fertilized egg will be resorbed so she can breed again the following summer.

In Virginia, cubs are born in mid-to-late January (ranging between late December to early March) after a six- to seven-week gestation period. Cubs are born helpless, hairless and with their eyes closed, weighing only about eight ounces (only $1/300^{th}$ to $1/500^{th}$ the size of their mother). Common litter sizes are usually one, two, or three cubs; but four cubs are not uncommon in areas with abundant food sources. There have been a few anecdotal reports in Virginia of females with five cubs. Litters generally have equal numbers of male and female cubs.

Females usually become sexually mature in Virginia at three to four years of age. Females may breed as early as two and a half years old and give birth at age three or may delay reproduction until age seven or older. Although rare, one and a half year-old females have been found to breed at times in Virginia, but none are known to have successfully raised litters.

The timing of the breeding season, the age at which cubs are first produced, the interval between litters, and the number of cubs produced per litter may be linked to female nutritional condition. Females normally give birth once every two years. Cubs remain with their mother through their first summer and the following den season. Females rarely breed while they are still raising cubs, although if a female prematurely loses her entire litter prior to the regular breeding season, she may breed again. Inexperienced or young mothers may lose their first few litters before successfully raising any cubs. Approximately 16-18 months after birth, the cubs leave their mother when the female is ready to breed again. Although black bears have traditionally been thoughts of as solitary, recent studies have revealed that bears do interact regularly, especially within matrilinear hierarchies.

Mortality and Disease

In Virginia, the annual rate of cub mortality in the first year is about 20%. Cub losses are primarily due to predation (e.g., birds of prey, foxes, bobcats, coyotes, other bears) or separation from their mother by loss or abandonment.

Mortality related to human activity has the greatest impact on black bear survival in Virginia. With no predators except humans, and occasionally other adult bears, adult bears have very low natural mortality rates (<2% per year) unless a disease outbreak is impacting localized populations (see below). Especially in unhunted populations, bears may live up to 30 years or longer. While road kills, poaching, and bears killed to reduce property damage all contribute to mortality, annual hunter harvest is the most significant mortality factor for adult bears in Virginia. Research results from the Cooperative Alleghany Bear Study (CABS) at Virginia Tech (1994-2004) estimated an annual bear hunting mortality rate of 16%

in the western mountains. Refuges can help improve black bear survival by reducing the impact of direct human mortality factors. Bear sanctuaries have been used effectively to protect core populations of breeding females.

As bears concentrate around available food when it is scarce (especially in poor acorn years), they may become more vulnerable to harvest by hunters. Older bears (especially males), displacing younger bears, may have higher harvest rates around available food sources. Archery hunter success increases in Virginia during years with poor mast conditions. Most vehicle collisions occur during the summer and fall when feeding activity has increased and bears prepare for winter dens. Especially during poor mast years, road kills become a more significant mortality source as bears exhibit even greater movements in search of food. A high percentage of bear-vehicle collisions also occur in the early summer months as yearling black bears disperse from their natal range and adult male movements increase prior to the breeding season.

Black bear survival has been generally unaffected by parasites and diseases. As an emerging concern, sarcoptic mange has been detected in increasing numbers, primarily around the Shenandoah Valley and northern Blue Ridge Mountains (Figure 1). Sarcoptic mange is a highly contagious skin disease caused by a mite (*Sarcoptes scabiei*) and can be spread by direct contact with infested animals or indirectly through the sharing of food, objects, and areas with infested animals. Clinical signs of mange include intense itching, hair loss, and thickened dry skin covered by scabs and crusting. Mange can sometimes alter behavior making bears unaware of their surroundings. Not all cases of mange are fatal, and in the wild some bears can clear the initial infestation and survive a bout with mange and recover. That said, sometimes cases may progress and lead to total hair loss, emaciation, and ultimately death. Currently, it is unknown how mange might affect bear populations and to date no population wide impacts have been definitively attributed to mange; however, on a smaller geographic scale, localized population effects have been observed in recent years. Since 2014, DWR has been monitoring reports of sarcoptic mange in Virginia's black bears. From 2014 to 2017 reports were sporadic and primarily focused in the northwestern mountain counties of Frederick and Shenandoah. Since 2018, reports have increased in frequency and geographic spread, and mange has been confirmed in 23 counties (Figure 1). Research efforts are ongoing to gain a better understanding on the nature of mange transmission, understanding rates of recovery and mortality, and geographic spread of mange throughout the state. Sarcoptic mange can be transmitted to humans, pets, other domestic animals, and some other species of wildlife that have come into direct contact with either an infested bear or an area occupied by or an item that touched an infested bear.

Population Dynamics

Bears have relatively low reproductive rates compared to other mammals in North America. Although this low reproductive potential is offset by low natural mortality rates, population growth rates for bears are relatively low compared to other mammals. When densities are low and resources are abundant, unhunted black bear populations have a maximum growth potential of about 25% per year where populations could double every three years. One study in the Catskill Mountains of New York observed a population to nearly double within a two-year period. By comparison, deer populations may increase at a maximum rate of about 100% per year (doubling the population annually). Because the population growth rate is influenced by a variety of factors such as available food, habitat quality, availability of males, number of breeding females, population size, and human-induced mortality, actual growth rates are usually much less than the maximum.

Black bear hunting mortality is generally considered to be an additive loss to the population (that is, hunting losses add to the existing natural mortality) and can result in reduced population growth. Unlike deer populations, reductions in bear densities (via hunting) generally do not stimulate added reproduction and population growth rates. However, bear population growth can still occur when annual hunting mortality removes fewer bears than the annual recruitment (bears added to the population through

births). Low population growth capability and limited reproductive potential can lead to relatively slow population recovery from over-harvest or low population levels.

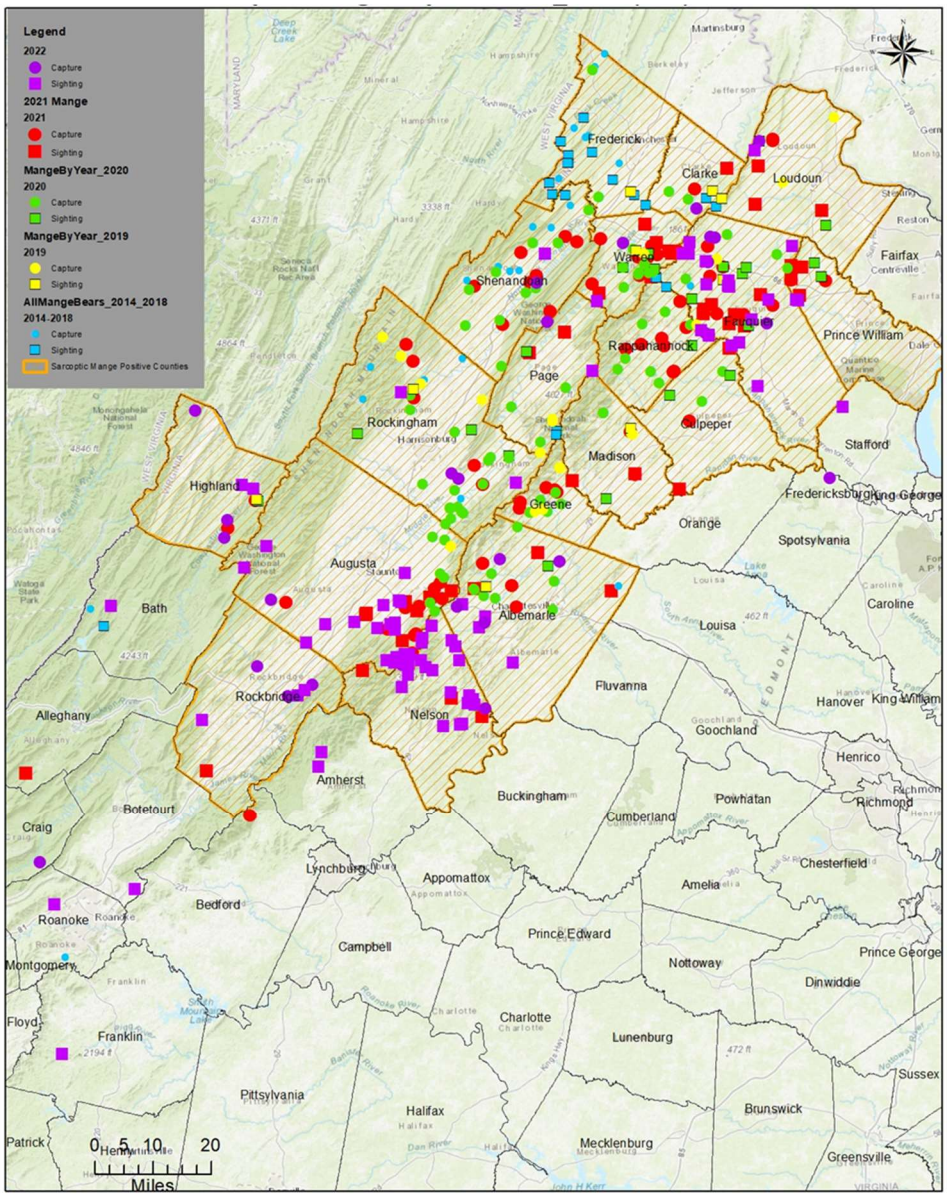

Figure 1. Reports of sarcoptic mange in black bears (2014-2022)

In some situations, selective hunting may not always be an additive mortality factor depending on how hunting regulations are structured. The removal of adult males from a previously unhunted bear population in Alberta seemed to stimulate population growth. With fewer adult males, this population increase was attributed to decreased dispersal by subadult bears (largely males) and increased subadult survival rates.

Bear populations cannot grow indefinitely. Bear population growth and density will become limited as habitat resources (e.g., food supplies, den sites) and social behaviors become limiting. Eventually the biological carrying capacity (BCC), which is the maximum number of bears an area can support over an extended period, will be reached. The BCC for black bears is unknown for Virginia and other areas around North America. Certainly, lower than the BCC, black bear populations have been

documented to reach densities as high 2.2 bears/mi^2 in Alberta, Canada. In Virginia, previous research indicates that the Great Dismal Swamp National Wildlife Refuge had densities of about 1.5 bears/mi^2 with even higher densities (up to 3.5 bears/mi^2) in some areas of western Virginia.

The population regulating mechanisms at BCC for black bears are unknown. Theories include BCC regulation through socio-biological factors (e.g., dispersal), increased predation by large male bears on younger bears, and increased cub mortality resulting from poor nutritional condition of the mother. A minimally viable black bear population is the smallest isolated number of individuals that are able to reproduce and maintain the population from one generation to another. Population viability depends on changes that may occur in reproduction and survival. Based on computer modeling, black bear populations in Florida that consisted of at least 40 animals remained viable for over 100 years. Long-term viability was not affected by inbreeding depression, periodic reproductive failures, or survival declines. Smaller populations ($n < 40$) had increased risks for long-term survival.

BLACK BEAR PROGRAM HISTORY

Population Declines

Although black bears probably were abundant and occurred throughout pre-colonial Virginia, specific information is very limited. Prior to European settlement, Native Americans throughout the southeastern United States used bears for food, clothing, weapons, and ornaments. The first recorded description of black bears in the southeastern United States came from the Roanoke Island Colony of North Carolina during the 1580s. Bears were abundant in the vicinity of Jamestown when English settlers arrived in 1607 and were found in all regions of Virginia.

Rapidly growing human populations had early impacts on Virginia's bear population due to habitat changes and overexploitation. By 1739, bears reportedly were only found in the western mountains and eastern swamp areas of Virginia. By 1836, bears seemed to have been eliminated from most of the Tidewater and Piedmont areas of Virginia but were still plentiful in the mountains and in the Dismal Swamp. During the mid-1800s, bear skins and meat were still commonly shipped to other markets from rail yards in western Virginia. Bounties, which had been offered since the American Revolution, provided added incentive for the demise of bear populations in Virginia. Large areas of forested lands were also cleared during the 1800s to support iron smelting furnaces. Introduced around 1900, the narrow-gauge railroad also accelerated the removal of timber from the southern Appalachians. Typical agricultural practices during the late 1800s and early 1900s involved extensive deforestation, burning, grazing, and cultivation, which further reduced habitat for bears. By 1900, the majority of bears had been extirpated in Virginia with only remnant populations remaining in the Dismal Swamp and in the mountainous regions of some western counties.

The American chestnut, thought to be one of the most important wildlife plants in the east due to reliable annual production of nutritious mast, made up 25% of hardwood forests in the early 1900s. Some ridges in virgin forests of the Appalachian Mountains were primarily chestnut. The devastating loss of the American chestnut in Virginia due to the introduction of a foreign fungus most likely began in Bedford Virginia as early as 1903. By 1950, this species (with the exception of non-resistant sprouts) had disappeared from the forests. The loss of this major mast producing species most likely compounded the effects of critical habitat loss for bears.

Population Recovery

Following the period of unsustainable agricultural practices and extensive deforestation in the late 1800's and early 1900's, soil fertility and land productivity were drastically reduced. Once productivity declined, farmlands were abandoned, and slowly began reverting back to forest. These reverting farmlands enabled bears to reoccupy newly forested habitats over time.

Congressional approval of the Weeks Act in 1911 made it possible to purchase and protect deforested land in Virginia and begin forest reformation. The first land purchase for National Forests in Virginia was 13,450 acres in the Mt. Rogers area in 1911. This purchase later became part of the Unaka National Forest in 1920. Established in 1916, the Natural Bridge National Forest was Virginia's first National Forest. The Jefferson National Forest was created in 1936 by combining lands from the Natural Bridge and Unaka National Forests. Shenandoah National Forest was created in 1917 and was eventually renamed the George Washington National Forest. In 1995, the George Washington and Jefferson National Forests were combined as one administrative unit with some 1.7 million acres of National Forest in Virginia, assuring large forested areas for bear habitat. The creation of Shenandoah National Park in 1936 provided additional protection for bears and habitat on its nearly 200,000 acres.

In 1938, the Virginia Game Commission and the U.S. Forest Service (USFS) executed a formal agreement (the oldest of its kind in the United States) to fund additional wildlife habitat and management work on National Forests within the state. The National Forest Permit, a required purchase by hunters and anglers using USFS managed land, continues to support wildlife management on Forest Service lands in Virginia today.

To help control harvests, black bears were listed as a game species during the 1930-31 season when statewide bear hunting was permitted only between November 15 and January 31. There were no daily or seasonal bag limits. If reported immediately to the game warden, bears damaging property could be killed throughout the year. Because county Boards of Supervisors retained the right to prescribe additional bear hunting seasons, Alleghany and Highland counties had extended bear hunting seasons due to incidences of livestock predation.

With harvest controls and improving habitats, bears had started reclaiming their range in Scott, Wise, Washington, and Russell counties by 1937. In 1942 bears were being reported in Grayson and Greene counties. In 1945, bear numbers appeared stable in the Dismal Swamp area but were increasing in the mountainous portions of Rockingham, Highland, and Augusta Counties. Low populations south of Rockbridge County limited hunting opportunities. More bears also were being seen in Frederick, Warren, Rappahannock, Madison, Bland, Wythe, Smyth, and Lee counties by 1947. The establishment of the Great Dismal Swamp National Wildlife Refuge in 1974 helped protect valuable habitat for Virginia's eastern bear population.

In 1974, bear hunting was closed in 67 low-density counties and only allowed from December 1-January 31 (assuming the seasons were still Nov. 15-Jan.31 as listed above) in the counties that remained open to bear hunting. These closures effectively delayed the bear hunting season (where it was still open), reduced the hunting mortality rates, and temporarily decreased the bear harvest. The hunting regulation changes appeared to stimulate population growth and associated harvests through the early 2000s (see next chapter, Figure 12). Statewide bear harvests during the 25-year period after 1974 increased at an average annual rate of 6.4% yearly. Delaying the hunting season also seemed to provide an even greater reduction in female mortality as an added stimulation for population growth. Because females enter winter dens earlier than males, the later opening likely helped to protect those females who had already entered winter dens. The average percent females in the harvest during the period 1962-1973 was 46.4% but was lower (37.7%) during the subsequent decades of population growth (1974- 2009). Over the past decade, average percent female harvest remained similar during 2012-2016 (39%), but has increased in more recent years (2017-2021) to 44% as objectives have been established to stabilize or reduce bear populations over large portions of the state.

Despite a wealth of bear research in Virginia, historic population estimates and distributions are of questionable accuracy. In 1950, reports indicated that bears could be found in 35 of 95 Virginia counties with an estimated population as high as 1,500 bears. In 1957, the bear population in Virginia was estimated to be just over 1,100 animals, inhabiting 4,296 square miles, with an additional 750 square miles of potential range.

To bolster populations in the Mt. Rogers area, bears (usually from human-bear conflicts in other parts of the state) were relocated from the Northern Mountains and Shenandoah Valley area to southwest Virginia. In 1989, the first of 210 bears were relocated to portions of Grayson, Smyth, Washington, and

Wythe Counties that were closed to hunting. These supplemental stockings reestablished bear populations in this region.

Figures 2-7 reflect bear distributions in Virginia since 1950. While the early maps (derived from a number of sources) were of questionable accuracy, these figures clearly show the expanding distribution of bears over the last 70 years in Virginia. Today, as a result of the combined benefits of hunting regulation controls, reforestation, public land purchases, oak forest maturation, bear restoration efforts, and management-based research, bear populations have grown and re-established throughout the state.

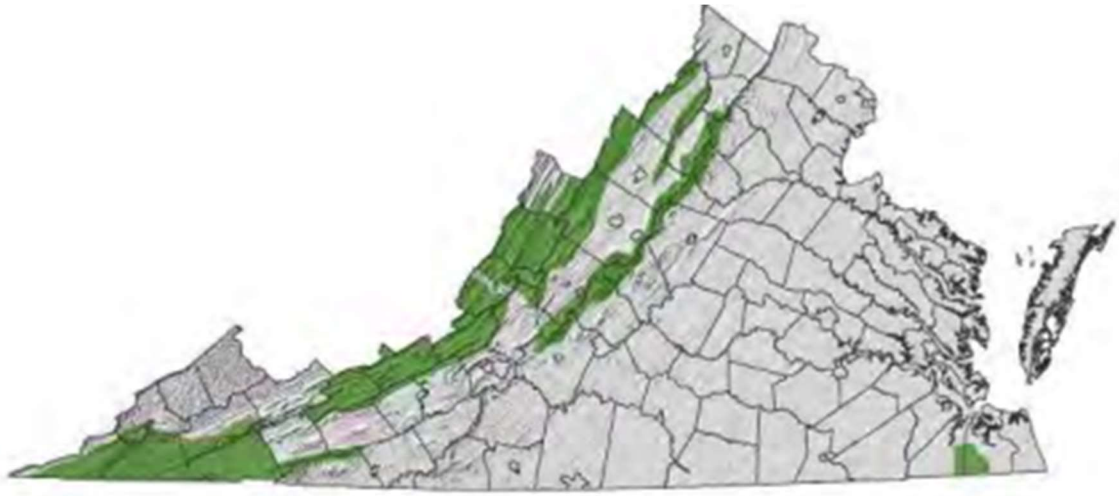

Figure 2. Distribution of black bears in Virginia in 1950.

Figure 3. Distribution of black bears in Virginia in 1974.

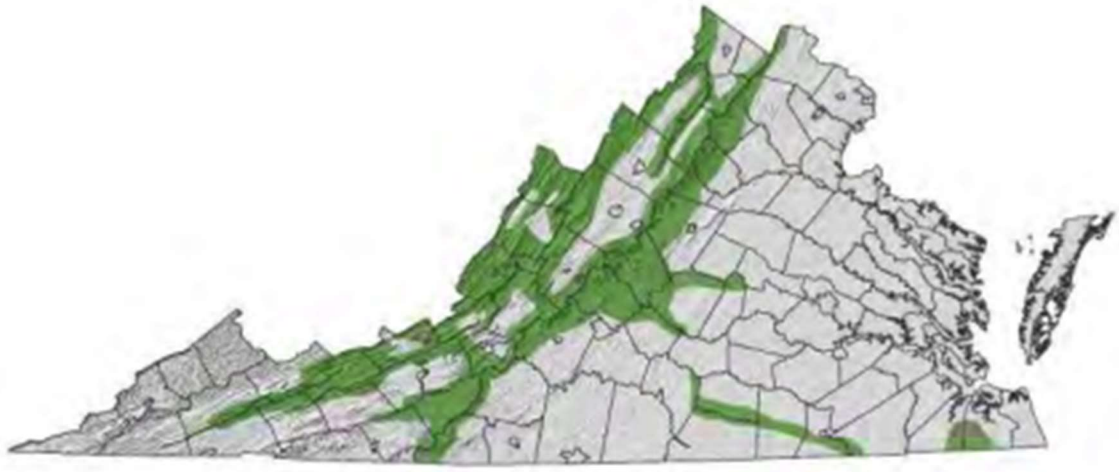

Figure 4. Distribution of black bears in Virginia in 1983.

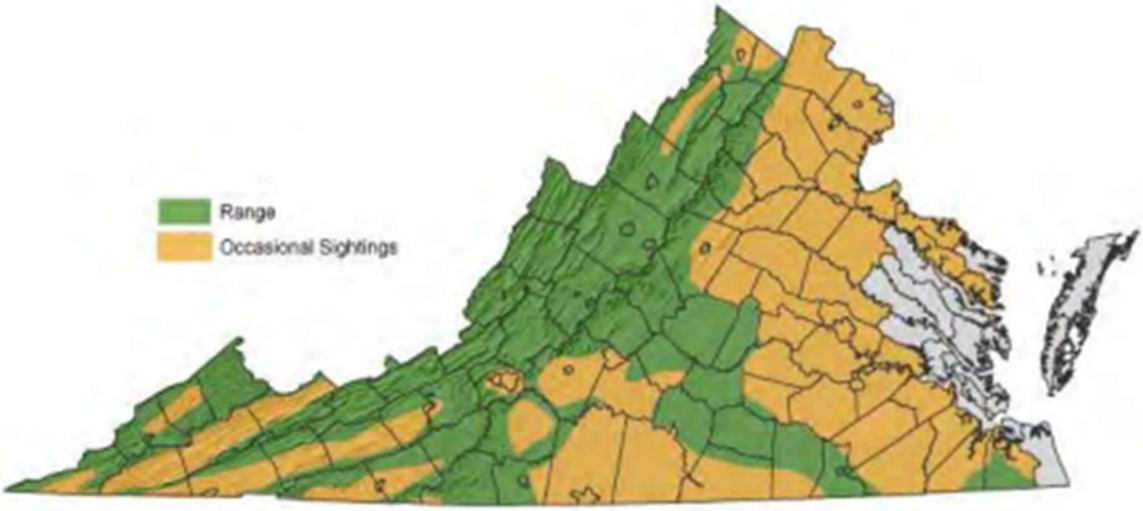

Figure 5. Distribution of black bears in Virginia in 2001.

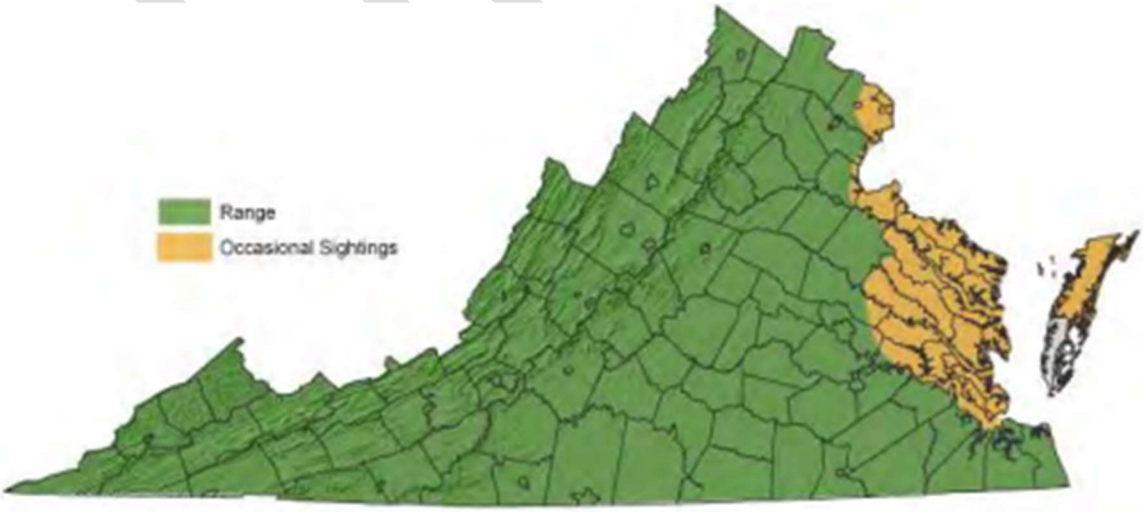

Figure 6. Distribution of black bears in Virginia in 2010.

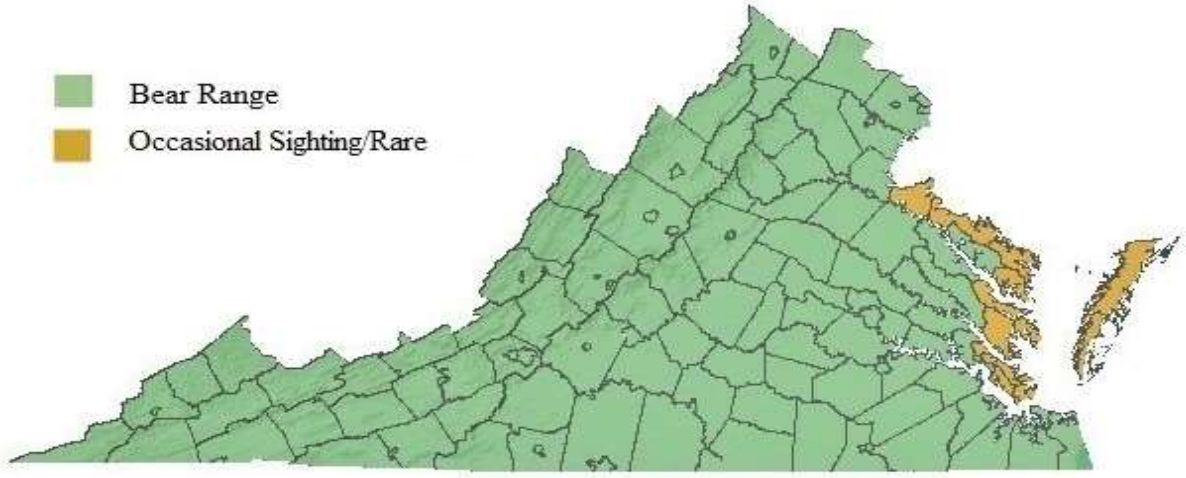

Figure 7. Distribution of black bears in Virginia in 2021.

Harvest and mast monitoring programs

No simple methods exist for estimating key population parameters (e.g., recruitment rates, mortality rates, population growth rates, density) to assess black bear population status over large regions. Definitive estimates of these parameters can only be obtained through expensive and site-specific research. As in most other states, Virginia uses a combination of indices derived from harvest, human bear interactions, age structure, habitat conditions, and miscellaneous mortalities to monitor status of black bear populations.

Hunting harvest data are a principal source of information for monitoring black bear population status in Virginia. Black bear harvest data have been collected since 1928 when harvest numbers were estimated by county Game Wardens. Beginning in 1947, a mandatory check station system was initiated. Through the years, as many as 1,500 check stations across the state have provided annual harvest information on black bears, white-tailed deer, and wild turkey. To ensure additional quality in bear harvest data, regulation changes for the 1991 bear hunting season designated special bear checking stations. In addition to recording the usual harvest data (e.g., sex, weapon, location), these special bear check stations also: (1) determined presence of ear tags or lip tattoos, (2) recorded whether bear hounds were used, (3) and extracted a small premolar tooth for age determination. Beginning in 2019, bear hunters were able to report their harvests through the DWR's automated harvest reporting system (i.e., phone, online, or a mobile application) which was first developed for deer in 2004. Using this new system, hunters were still required to provide all data collected at check stations, including submission of a tooth by mail. Beginning in 2021 special bear checking stations were discontinued (as were all big game check stations), requiring hunters to report all bear harvests through the automated harvest reporting system. The automated reporting system has continued to be an effective method of obtaining quality harvest data, including submission of teeth for aging bears. During 2019-2021, 73% of successful bear hunters who reported their harvest electronically submitted teeth for aging.

Harvest information historically collected in Virginia has enabled detailed assessments of population status. Population reconstruction is especially useful as an analysis method that provides minimum population estimates based on age-specific enumeration of bears that die over time. Subsequent to the establishment of the special bear checking stations, over 25 years of quality bear harvest and age structure data have provided the basis for population reconstruction models as indices of mortality rates, recruitment, and trends in bear population size.

Because of the importance to bears and other wildlife, Virginia game managers began recording estimates of mast production in 1950. Den entrance dates, recruitment, and bear harvests are influenced by mast production. Surveys of mast production have helped to establish trends between mast crops, hunter harvests, and population trends. In 1957, the mast ratings changed from a single estimate for all mast to individual ratings for different mast-producing species. Today, mast surveys (both hard and soft) continue to be conducted across the Commonwealth.

Supplemental Feeding

Because of concerns associated with supplemental feeding that include littering, habituation of bears to people, disease implications for bears and other wildlife, changes in bear behavior, hunting in the area of feeding locations and an abnormal reliance on artificial foods, supplemental feeding of bears on DWR-owned lands and national forest lands was banned in 1999. Further feeding restrictions were imposed in 2003 to address human-bear conflict concerns when any feeding of bears (even inadvertent feeding) was made illegal anywhere in Virginia. In 2010, legislative action was taken to strengthen DWR's ability to regulate and enforce the advertent and inadvertent feeding of bears (Code of Virginia §29.1-501), in large part to enhance human-bear conflict management. The current law reads:

It shall be unlawful for any person as defined in § 1-230 of the Code of Virginia to place, distribute, or allow the placement of food, minerals, carrion, trash, or similar substances to feed or attract bear. Nor, upon notification by department personnel, shall any person continue to place, distribute, or allow the placement of any food, mineral, carrion, trash, or similar substances for any purpose if the placement of these materials results in the presence of bear. After such notification, such person shall be in violation of this section if the placing, distribution, or presence of such food, minerals, carrion, trash, or similar substances continues. This section shall not apply to wildlife management activities conducted or authorized by the department.

The Code enhancement specifically identifies trash in the list of attractants and expanded the definition of responsible parties to include the legal definition of a person (Code of Virginia §1-230). This definition of person includes *any individual, corporation, partnership, association, cooperative, limited liability company, trust, joint venture, government, political subdivision, or any other legal or commercial entity and any successor, representative, agent, agency, or instrumentality thereof.*

Human-Bear Conflicts

Dating back to the colonial period, Virginians have had concerns about the damage caused by black bears. Following World War II, when bear populations were still relatively low, the Virginia Game Commission felt bear populations should not be allowed to increase due to their negative impact on livestock, particularly in the western counties of the state.

Bounties on bears have had a long tradition in Virginia since the first bounty during the American Revolution. By 1920, bear bounties were worth $20. Although county bear bounties were abolished in 1977 by the General Assembly, the bounties had not been paid in some 35 years. Highland County probably had the last remaining bounty on bears in the country.

To help relieve depredation conflicts in 1969, the Virginia Game Commission began to move bears that had become accustomed to human-related food sources or caused damage to remote locations. Typical depredation incidents included damage to agricultural crops (primarily field corn), stored livestock feed, livestock (cattle, sheep, hogs, goats, chickens), fruit trees (peach, cherry, apple) and apiaries. Personal property damage included trash dispersal, bird feeder or building damage, and other problems. During the period from 1980-2001, more than 50 bears were being moved annually. With a shift in emphasis toward local homeowner and landowner responsibility for managing bear attractants, the number of bears moved every year has declined since 2001.

Beginning in the 1930s or 1940s and under the supervision of a Game Warden, livestock-killing bears could be pursued with dogs at any time within 24-hours of the depredation. The provision to

immediately pursue livestock-killing bears with dogs has since been rescinded. Prior to 1998 (per §29.1-529), Game Wardens were required to issue kill permits to landowners experiencing bear damage. A legislative change in 1998 gave the DWR the option of translocating depredating bears before issuing a kill permit. Additional changes in 1999 stipulated that only commercial agriculture operations experiencing damage were eligible to receive a kill permit. Further changes to the code in 2008 allowed for the option of authorizing additional non-lethal control measures including the option to use dogs for pursuit of bears in agricultural damage situations where appropriate. Currently both lethal and non-lethal options are available under §29.1- 529.

After 1942, some counties in Virginia administered a program to compensate landowners for damage caused by deer or bear. To fund these programs in participating counties, deer and bear hunters were required to purchase "Damage Stamps". Mostly concerned with deer damage, the damage stamp program declined after interest peaked in the late 1970s when 18 counties participated. Dropping the damage stamp requirement in 2009, Smyth County was the last county to participate in the damage stamp program.

Currently, DWR assists agricultural producers impacted by bear damage through a variety of efforts including outreach and education, onsite technical assistance, and direct removals by licensed hunters and kill permits. To alleviate bear damage to crops while also reducing the issuance of kill permits, DWR developed two limited site-specific hunter-based programs. From 2008-2018, special Bear Population Reduction Program (BPOP) permits were issued to several farmers under authority of 4VAC 15-40-240 (Animal Population Control) which allowed licensed hunters to take bears on enrolled properties outside of normal seasons. In 2019, DWR established the Bear Damage Control Assistance Program (BDCAP) as a replacement for BPOP. As a pilot program for one season, BDCAP provided permits to several eligible farmers who were experiencing bear damage to kill more bears during the hunting season than they could under regular hunting regulations. After one year the program was discontinued based on input from the 2019 permittees; DWR staff concluded that success was unlikely without modifications to the program.

DWR utilizes a variety of methods to mitigate human-bear conflict issues that may arise between bears and the general population. DWR proactively works to provide Virginia residents and visitors with educational materials and information on living and recreating in bear habitat (https://dwr.virginia.gov/wildlife/bear/). In addition, social media outlets and video footage has increased opportunities to reach various demographics, expand the geographic range of outreach, and develop collaborative relationships with partner organizations. DWR partners with the BearWise® program, which was launched in 2018, to provide information for preventing conflicts and resolving problems. BearWise® was developed by black bear biologists in the southeastern US and is supported by state wildlife agencies to provide information and solutions that help people, neighborhoods and communities prevent problems and keep bears wild. Prior to BearWise®, DWR developed its own Bear Aware outreach campaign for bears, resulting in webpages, videos, and printed materials. The agency also partnered with the Get Bear Smart Society in an effort to recognize communities who took proactive steps to reduce conflicts with bears. Wintergreen Property Owner's Association is the only Bear Smart Community in Virginia.

Since 2013, Virginia residents and visitors have been contacting the Virginia Wildlife Conflict Helpline (Helpline) for assistance with wildlife encounters. The Helpline is a collaborative effort between the Virginia Department of Wildlife Resources and the US Department of Agriculture Wildlife Services program to provide a single source of consistent, expert technical assistance and education to people experiencing human-wildlife conflicts. The Helpline assists by collecting information on emerging issues, including human-bear conflicts and diseases and providing this information back to DWR regional biologists and species specialists. In addition, the Helpline provides a first response to informing the public with self-help tools and distribution of fliers, leaflets, media articles and other materials depending upon the circumstances. DWR staff may follow up with callers in situations that require additional support.

Recognizing that reports of human-bear interactions have generally been increasing, particularly with bears accessing and feeding on garbage, DWR started a cost-share program in 2013 to mitigate negative human-bear interactions with non-lethal methods. The program, now called Virginia BearWise® Community Cost-Share Program, provides funding assistance for municipal and county governments to secure or remove human-created food sources and attractants. As a shared responsibility between DWR and local governments, funds for this program are awarded to localities through an application and review process. Since 2014, $193,972 have been allocated to 28 different localities.

Historical Hunting Regulation Changes

Due to reduced bear populations in the early 1900's, most historic hunting regulation changes were designed to encourage population growth in an effort to restore populations. Since the establishment of the first hunting season in 1930, Virginia bear hunting regulations have changed frequently to address population management, damage control, and hunting recreation objectives. Key historic regulations that represent milestones in bear management throughout the state are listed below.

Hunting over bait

Hunting bears and other game animals over bait has been unlawful in Virginia since 1936 (since 1922 for wild turkeys). In 2014, to fulfill a Senate resolution, DWR completed a report on hunting over bait for game species throughout the state. In addition, DWR worked with Responsive Management to collect survey data on Virginia residents' and hunters' opinions regarding hunting over bait. Surveys indicated that 68% and 66% of residents and hunters, respectively, disapproved of hunting any species over bait; and specifically for black bear, 71% of residents and 66% of hunters disapproved of the practice. As the most common reason for disapproval (by both residents and hunters), baiting was not perceived as "fair chase". As well, 67% of residents and 58% of hunters expressed opposition to changing the current prohibition against hunting over bait. Based on these survey results and other concerns about the potential to artificially increase game populations beyond BCC, alter wild animal behavior, increase wildlife disease transmission, and escalate wildlife-human conflicts, DWR recommended continuing the prohibition on hunting over bait.

Seasonal bag limit

The Virginia Game Commission established a seasonal limit of one bear per hunter in 1940.

Protection of cubs

To protect cubs from hunter harvests, a minimum weight requirement was established in 1954; harvested bears needed to weigh at least 100 pounds (live weight). In 1955, the minimum weight was reduced to 75 pounds (live weight). In 1972, the minimum live weight for harvest was changed back to 100 pounds (or 75 pounds with the internal organs removed). Harvesting a female accompanied by cubs was outlawed beginning with the 1973-1974 season.

Bear trapping

Beginning with the 1959-1960 season, the use of steel, leg-hold traps to capture black bears became illegal.

Season changes & overlap with deer hunting season

DRAFT

Beginning with the 1956-1957 hunting season, bear and deer seasons in the western mountains were separated to minimize bear harvest by deer hunters and to eliminate conflicts between bear dogs and deer hunters. The separation of bear and deer hunting lasted four years. Beginning with the 1960-1961 season, the bear and deer seasons again ran concurrently, but bear hounds were not allowed during the first week. Starting with the 1967-1968 season, an additional week of bear hunting with dogs, prior to the opening of deer-gun season, was allowed. As a result, more than 60% of the annual bear harvest occurred during the first two weeks of the bear season (i.e., the week prior to deer season and the opening week of deer season).

County closures & season reductions

In 1974, a statewide bear season was eliminated when 67 low-density counties were closed to all bear hunting. The newly closed counties were those that had fewer than 10 bears legally harvested since 1947. In other counties that remained open, the first two weeks of the season were closed, effectively shortening, and delaying the bear hunting season. These season reductions helped protect bears and stimulate population growth after 1974.

Omnibus Bill

To simplify wildlife regulations and allocate more responsibility to DWR, a bill passed in 1987 rescinded local legislative acts related to bear management. This bill allowed DWR to change the long, liberal bear hunting seasons found in Bland, Giles, Grayson, Montgomery, Pulaski, Smyth, Tazewell, Washington, and Wythe counties. More restrictive bear season regulations were implemented in these counties during 1989. The bill also enabled season changes in the Tidewater counties/cities of Isle of Wight, Nansemond (Suffolk), Norfolk (Chesapeake), and Princess Anne (Virginia Beach).

Dismal Swamp regulations

Since the 1930s, bear hunting seasons in eastern Virginia traditionally have been different from those found in the mountainous region. In 1987, to protect females and promote population growth, the opening day of the bear season was moved from October 1 to the fourth Monday in November and coincided with the rest of the state. In response to population increases and conflicts around the Great Dismal Swamp National Wildlife Refuge, the opening date in 1997 was moved to the first Monday in November for the cities of Chesapeake and Suffolk. Tied to the earlier gun deer seasons, the earlier opening date for bear hunting was designed to increase the harvest of bears by hunters in this region.

Bear-dog training season

To provide hound hunters additional recreation and the opportunity to train and condition dogs before any other harvest season, a September bear-dog training season was initiated in 1992 for 24 counties/cities. Neither carrying weapons nor harvesting bears are permitted during the bear-dog-training season. Depending on the calendar year, this season was generally four weeks long; but in some years, it was a 5-week season (e.g., 1995, 2000, and 2001). Beginning in 1995, Sunday hunting during the dog training season was permitted because weapons were not allowed. Although the season length was not changed, the entire dog-training season was shifted 1 week earlier (i.e., the last Saturday in August through the last Saturday in September) in 1997 to avoid a 1-day overlap with the opening of deer archery season. The localities for dog training were expanded to 27 and 31 counties/cities in 1997 and 1999, respectively.

Regulation Changes during the 2001-2010 Management Plan Period

Based on public bear management directions provided by the 2001-2010 Virginia Black Bear Management Plan, several notable changes in hunting seasons occurred to address recreation, population, and human-bear conflict objectives.

Archery season expansions

To help address growing populations, provide additional recreational opportunities, and to collect additional population information, a statewide archery season was established for bears in 2003. Prior to 2003, archery bear hunting was limited to only those counties or cities (n=31) that also had firearms hunting for bears. In 2009, the archery season for bears was extended in length by two weeks to run concurrently with the deer archery season.

Muzzleloader seasons established

A 4-day muzzleloader season was implemented in 2003 for the counties surrounding Shenandoah National Park and most of the Piedmont and Tidewater areas of Virginia (this included over 65 counties/cities). A key objective of this season was to stabilize population growth around Shenandoah National Park, as well as provide additional recreational opportunities and population information in other areas. To address other unmet population objectives, the 2009 muzzleloader season was expanded into 12 additional counties and increased in length to either a 6-day or a 12-day season.

Firearms season expansions

Responding to increasing bear populations and Plan objectives, a 2-week firearms season (with and without hounds) was added to 21 additional counties (or portions of counties) in 2003. Hound hunting was generally not allowed in the Piedmont portions of these new areas, but additional bear-hound hunting opportunities were expanded for three southwest Virginia counties during 2006. In a continued attempt to address population objectives, firearms hunting seasons for bears were expanded in 2009 to include all counties/cities in Virginia (except for the Eastern Shore). These additional firearms hunting opportunities included a new 6-week season for the northern Piedmont (dogs permitted), a new 1-week season for the southern Piedmont (dogs permitted), and an extra firearms hunting day that was concurrent with the deer season for the northwestern mountains. Except for some restrictions during the western deer seasons, dog hunting for bears was allowed during firearms seasons in most counties in Virginia (unless prohibited by local ordinance). In 2011, firearms season was expanded in southwest Virginia by one week.

In response to bear population increases and human-bear conflicts around the Great Dismal Swamp National Wildlife Refuge, the southeast firearms seasons was also expanded. Virginia Beach was included in the hunting area during 2003 with an earlier opening (October 1) established for the entire area in 2008.

Bear-dog training expansions

The bear-dog training season was also added to new areas of eight additional southwestern counties in 2003. In 2006, an earlier opening date (second Saturday of August) provided additional recreational time and more optimum timing for assistance with corn damage by increasing the bear dog training season length from the usual 4-week season to generally a 7-week season. As a precursor to firearms hunting with hounds, a 2-week training season (Sundays excluded) also was opened in the southside counties of Lunenburg, Mecklenburg, Brunswick, and Greensville during 2006. In 2009, the second week of this training season was incorporated into the new 1-week firearms season established for these counties. Legislative amendments to dog training hours were made in 2008 when hunting hours for dog training were extended to 4½ hours after sunset (instead of a half hour after sunset). In 2012, hunting hours were again expanded to be from 4:00am to 10:00 pm.

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Recent Hunting Regulation Changes during the 2012-2021 Management Plan Period

Since the last Plan revision in 2012, DWR has continued to address plan goals and objectives. During the Plan period, changes were made to address human-bear conflicts, population objectives, and hunting recreation. Increases in bear harvest opportunities do not necessarily result in decreases in human-bear conflicts; the relationship between bear harvest and conflicts depends, among other things, on the scale and timing of both as well as the type of attractant leading to the particular conflict.

Bear license established

In 2015 a separate bear hunting license was established to hunt bears in Virginia. Prior to the establishment of this license, bears were included as part of a combined bear/deer/turkey hunting license. The separate license has enabled more detailed tracking of bear hunter numbers, effort, and success. Since 2019, there has been a shift away from the purchase of bear licenses and toward Sportsman's licenses (combination license including deer, bear, and turkey along with fishing) which were reduced in price that year.

Sunday hunting

In 2014 the Virginia General Assembly passed legislation that generally enabled Sunday hunting on private lands. However, hunters using dogs were still not allowed to hunt bears on Sundays with a gun, firearm, or other weapons.

Youth/Apprentice season established

In 2013 a youth/apprentice hunting day (on the second Saturday of October) was established to provide new hunters an opportunity outside of the regular hunting seasons. With the legalization of Sunday hunting in 2014, the youth/apprentice opportunity was expanded to also include Sunday, creating a weekend specifically for youth/apprentice hunting opportunity.

Muzzleloader season adjustments

To help meet population and recreation objectives, the muzzleloader bear season was expanded to a 1-week uniform statewide season in 2011. Notably, this season added a muzzleloader season to 19 counties in southwestern Virginia.

Firearms/Open season adjustments

During the Plan period, further season expansions were implemented to address growing bear populations. In 2011 one week of firearms hunting (without hounds) was added in 12 counties or portions thereof in the southwestern portion of the state east of I-81. Five weeks of firearms season was also removed from 17 counties with lower bear densities located in eastern Virginia where population objectives were to increase bear populations. In addition, 1 week of firearms hunting was added in 9 counties or portions thereof in the southwestern part of the state west of I-81 followed by the addition of two more weeks in those counties in 2013. In 2019 two weeks of firearms season were added to 35 counties in south-central and eastern Virginia and two weeks were added in 11 counties or portions thereof in southwestern Virginia south of I-81. Further, one week of firearms season was added to 7 counties or portions thereof in southwestern Virginia north of I-81 in 2019.

In 2017 a new 3-day early firearms season (including dogs, if permitted during the general firearms season) was established in 37 counties in the northern and western parts of the state where bear

population objectives were not being met. The season ran from the last Saturday in September and for two days following. In 2019 the 3-day early firearms season was expanded into 5 more counties. As an "open" season, any lawful weapon can be used.

In 2023, two weeks of general firearms season was added in 35 counties in southern and eastern Virginia and the 3-day early firearms season was removed from 26 counties in northern and western Virginia. These changes addressed both recent and longer-term population trends in black bear populations to achieve population objectives. Black bear populations in several southern and eastern management zones supported stepwise approaches to increase bear harvest to stabilize bear populations. In contrast, recent bear population declines observed in several western and northern management zones necessitated reductions in harvest.

Bear-dog training expansions

Hound training opportunities have expanded throughout Virginia, and over time, changes were made to alleviate confusion from season expansions and to simplify the regulations statewide. In 2013 a two-week November training season was established in 33 counties and portions of 2 more counties in the southeastern part of Virginia. In addition, a two-week training season was established in September in 4 more counties in southcentral Virginia, which was expanded by one week in 2014, and then again in 2015. In 2015 a six-week training season was established in portions of 5 counties and 3 full counties in the southwestern Blue Ridge and Piedmont. In 2017 for all counties with an established training season in August and/or September (counties along the Blue Ridge and west and some counties in southcentral and southeastern portion of the state) the training season was expanded to 8 weeks starting on August 1st.

Important Bear Research in Virginia

Contributing to the wealth of knowledge about bears in the Commonwealth, Virginia has been fortunate to have many significant research studies conducted on black bears within the state. These studies have resulted from collaborative efforts among the Virginia Department of Wildlife Resources, the Department of Fisheries and Wildlife Sciences at Virginia Tech, the Cooperative Wildlife Research Unit at Virginia Tech, Shenandoah National Park, the Great Dismal Swamp National Wildlife Refuge, the U.S. Forest Service, the Virginia Bear Hunters Association, Westvaco, and the Virginia Department of Transportation. Some of the key Virginia studies have been:

(1) 1955-57: This study collected information about the distribution, population, cub growth rates, productivity rates, and damage of black bears throughout Virginia.

(2) 1958-60: A black bear tagging study obtained basic mortality and population information on Virginia's bears. Areas included in the study were the Big Levels Game Refuge in eastern Augusta County in the Blue Ridge Mountain Range and the North River section of western Augusta and Rockingham Counties in the Allegheny Mountain Range.

(3) 1972-77: A 5-year black bear sexing and aging study on Shenandoah National Park (SNP) lands established baseline biological information needed to develop sound bear management strategies.

(4) 1982-94: Continued research in Shenandoah National Park focused on population dynamics, movements, habitat requirements, and impacts of gypsy moth deforestation.

(5) 1984-87: Conducted on the protected population of the Great Dismal Swamp National Wildlife Refuge, this study gathered information on sex ratios, age structure, reproduction, survival rates, mortality factors, population size, food habits, home range, and denning ecology.

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(6) 1988-2009: Using captive bears at the Black Bear Research Center (BBRC) at Virginia Tech, the goal of this research was to develop an understanding of the role of nutrition in bear reproduction, the role of females in regulating populations, and bone density changes in denning females.

(7) 1990-1992: This study evaluated the survival, reproduction, movements, costs, and efficacy of translocating nuisance bears to establish a population at Mt. Rogers National Recreation Area.

(8) 1994-2004: The Cooperative Alleghany Bear Study (CABS) was initiated in spring 1994 to fill gaps in knowledge about demographics of Virginia's hunted bear population. Initially planned as a 5-year study on 1 study area (centered in Augusta and Rockingham counties) in western Virginia, the project eventually grew into a 10- year study on 2 study areas (with the addition of the southern study area centered in Giles County). The objective was to develop an understanding of the dynamics of Virginia's hunted black bear population so wildlife managers could evaluate population trends to effectively manage the population.

(9) 1999-2001: A 2-year study of black bear denning ecology on the industrial forestlands of the Westvaco Corporation involved trapping and monitoring bears in Botetourt County in Virginia and Hardy, Hampshire, Pendleton, Randolph, and Greenbrier Counties in West Virginia.

(10) 2000-2002: Focusing on the Great Dismal Swamp National Wildlife Refuge, a multiple-year study was designed to evaluate the impact of roads on bear movements, document the incidence of bear-vehicle collisions, and estimate bear population size.

(11) 2002-2004: With an emphasis on bear (and deer) applications, research focused on evaluating the accuracy of population reconstruction models and provided guidance to managers on how to best use this population analysis approach and interpret the results.

(12) 2003-2005: Population densities and genetic isolation of black bears were investigated at three national wildlife refuges including the Great Dismal Swamp National Wildlife Refuge and two additional refuges in eastern North Carolina.

(13) 2011 - 2015: As part of the Virginia Appalachian Coyote Study (VACS I) dietary habits of black bears were analyzed and compared to bobcat and coyote diets in Rockingham and Bath counties.

(14) 2012-2016. The BBRC at Virginia Tech held 19 captive bears to study cub growth and development, maternal effects, pseudopregnancy, and hibernation ecology. The BBRC has also been used to test different designs for bear-proof garbage cans. Additionally, in collaboration with VACS II (see below), bears at the BBRC were fed white-tailed deer meat to determine if analysis of bear scats could provide genetic profiles of the deer they consumed, as a potential way to identify the number of individual deer consumed by bears in the wild.

(15) 2016-Present: The Central Piedmont Project originally started as a means to provide potential surrogate females for orphan black bear cubs but has grown to utilize GPS collar data to determine home range size, movement patterns, habitat use, and denning chronology of black bears in the Piedmont region of Virginia.

(16) 2016-2023: The Virginia Appalachian Carnivore Study (VACS II) evaluated the potential impacts of bobcats, coyotes, and black bears on the deer population in Bath County. Dietary, habitat, and activity overlap among these three carnivores was also evaluated. VACS II also investigated activity and use patterns of bears, as well as behavior and foraging ecology.

(17) 2023-2026: DWR, in partnership with Virginia Tech, will begin a study to investigate Population and Demographic Impacts of Sarcoptic Mange on VA Black Bears and Implications on Harvest Season Structure based on Predictive Densities in Mange and Non-Mange Affected Areas.

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BLACK BEAR PROGRAM SUPPLY AND DEMAND

SUPPLY

Bear Habitat Supply

There are six ecoregions (Middle Atlantic Coastal Plain, Southern Appalachian Piedmont, Blue Ridge Mountains, Northern Ridge, and Valley and Northern and Southern Cumberland Mountains) representing two major landscape units (Atlantic Coastal Plain and Appalachian Highlands) in Virginia (Figure 8). These different landscapes create a diversity of habitat types and forest communities. Northern hardwoods or oak/hickory/pine forest types characterize mountainous areas. Oak/hickory forests are the typical climax forests in the Piedmont. Coastal Plain habitats include coastal marshes along with pine, pine/oak, and bottomland/hardwood forests.

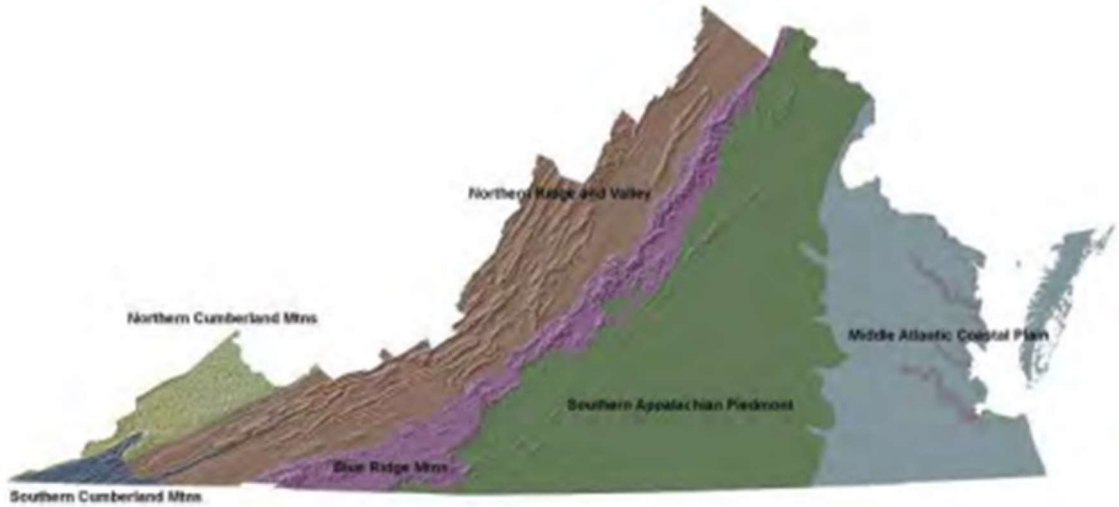

Figure 8. Virginia's ecoregions (DWR)

Soils along narrow ridges and steep slopes in the Cumberland Mountains and Ridge and Valley provinces are usually shallow and low in fertility. Valley soils, derived from shale and limestone, are relatively fertile. Blue Ridge soils tend to be deeper and more fertile than Ridge and Valley and Cumberland Mountain soils. Piedmont soils are characterized by sandy loam soils with red clay subsoils. They are generally acidic and low in organic material, phosphorus, and nitrogen. Coastal Plain soils are typically sandy and low in fertility.

Forests represent 62% (16.1 million acres) of Virginia's land area. Agricultural lands constitute 32% (8.2 million acres) of the Commonwealth. With extensive forested areas and a variety of habitat types in all ecoregions, most of Virginia can be considered potential bear habitat. Only a few areas in Virginia with landscapes composed of limited or fragmented forested cover, very intensive agriculture, and extensive urbanization would be considered unsuitable for bears (Figures 9-11).

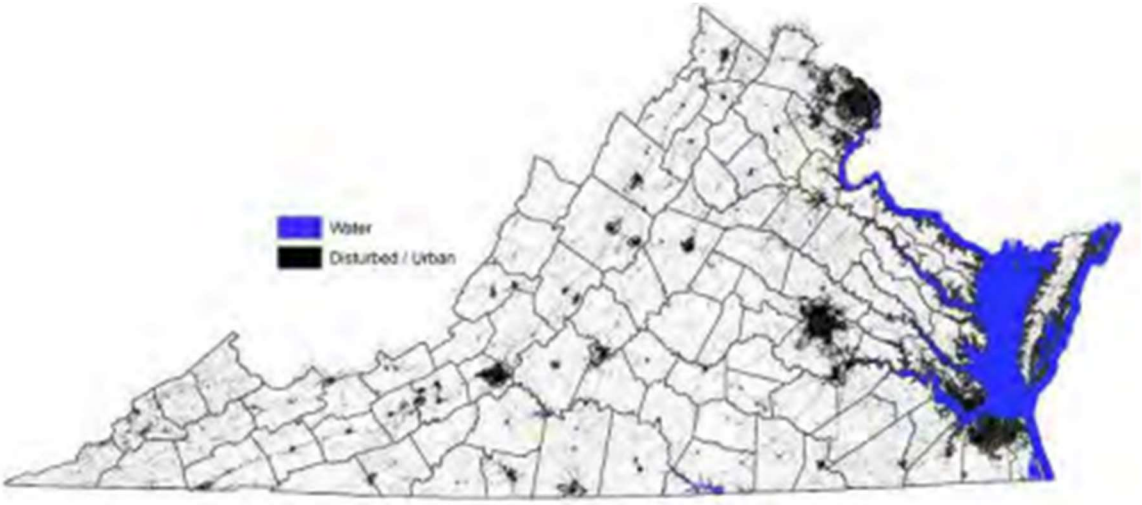

Figure 9. Land cover of Virginia: Disturbed, urban, and water areas.

Figure 10. Land cover of Virginia: Forested areas by type.

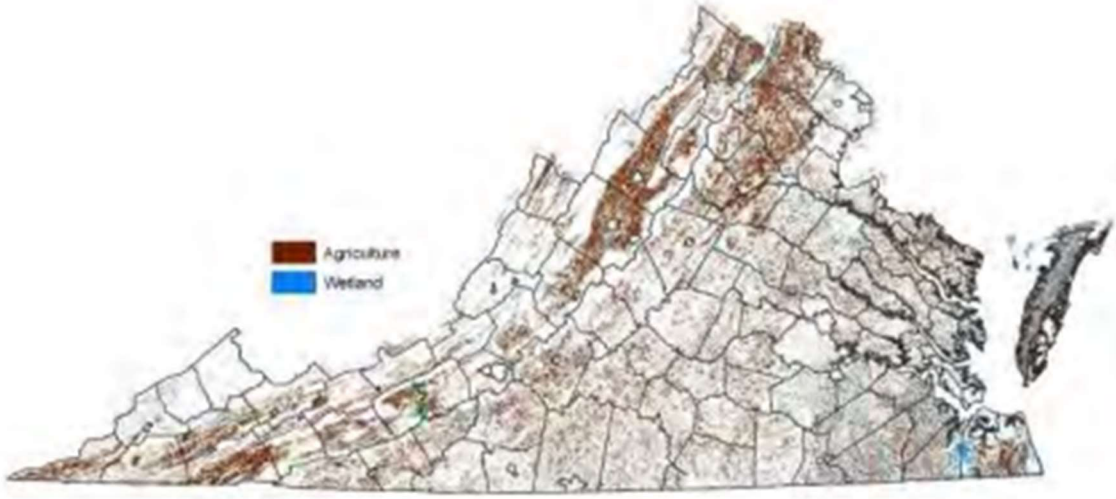

Figure 11. Land cover of Virginia: Agriculture and wetlands.

Over the past few decades Virginia's forested land has remained stable. Losses of forested land by conversion to developed land over the past decade were offset by agricultural lands that transitioned into forest. In 2020 hardwood-dominated forests accounted for 78% of Virginia's forests with the remaining 22% as pine. Most forested lands are in private ownership (81%) with 18% publicly owned and 1% forest industry owned. The largest public land holding is the Forest Service National Forest with 1.6 million acres.

Although the amount of forested land has remained stable, changes in forest composition and interspersion may affect future bear populations in some areas. For example, decreased timber harvest during the last 30 years on National Forest and other western public lands has likely reduced forest habitat diversity throughout western Virginia. In addition, an older forest age structure and the senescence of oaks can lead to a decrease in production of hard mast food for bears. As these western forests reach a climax stage, future forest succession will be primarily dominated by shade tolerant or late successional species such as red maple, American beech, and flowering dogwood rather than oak and hickory unless large scale disturbance regimes are implemented to set back succession. Further, recent conversions of forested wetlands to agriculture, loss of habitat to development, and the resultant habitat fragmentation from these changes in the coastal plain may be detrimental for local bear populations. Bear population viability in the Great Dismal Swamp may be reduced as habitat fragmentation and loss of linkages to other coastal bears in North Carolina create a more isolated bear population. High traffic volume roads may also become barriers to bear movement and add to fragmentation effects.

Bear Population Supply

Population Monitoring

As with most wildlife species, no economically practical methods exist to accurately and precisely estimate black bear population size on an annual basis across the entire state of Virginia. Population estimation techniques that involve capturing and marking bears, conducting surveys (e.g., camera, hair snare, bait station), or genetic analysis are viable on smaller study areas but are cost prohibitive at the regional or statewide scale. VDWR, Virginia Tech, and other partners have used such methods for time-bound research on local bear populations (e.g., Cooperative Alleghany Bear Study, Virginia Appalachian Carnivore Study) and will continue to do so. The newly initiated research project with Virginia Tech on population and demographic impacts of sarcoptic mange will employ hair snare surveys combined with spatially explicit capture-recapture based DNA extraction across a number of counties in western Virginia. This technique has been used by other researchers at large scales (e.g., Humm and Clark 2021). However, unless innovations can be made to reduce costs in scaling up such techniques, it is neither practical nor cost effective to employ intensive methodology to monitor long-established bear populations at regional or statewide scales over the long term when other indices are readily available. Indices of bear population status, trends, and relative density are primarily derived from harvest-based data of total kill and age structure. In addition, metrics independent of bear harvest are considered, including those related to complaints, disease incidence, and sighting (e.g., annual bowhunter survey).

Population reconstruction modeling based on harvest totals by age class provide the most sensitive annual population indices at a statewide and bear management zone scale. This method has been evaluated for accuracy and precision and found to be robust for reconstructed population estimates and trends for bear and deer (Davis et al. 2007). After the implementation of mandatory tooth collections to determine age in the early 1990s, population reconstruction indices have been calculated since 1996. Unfortunately, population reconstruction estimates lag several years behind the actual collection of age and kill data. For example, because the indices depend on harvest and age data collected from the 2021-2022 hunting seasons (the most recent age data available), the most current population reconstruction estimates are from 2019.

Because population reconstruction modeling as used in Virginia does not incorporate unknown factors such as non-hunting mortality or unhunted segments of the bear population, results do not provide absolute estimates of the total population size. However, since hunting mortality is the greatest source of mortality for adult bears, population reconstruction results represent valuable indices to population size and provide a good metric to follow population trends. While difficult to determine with accuracy, the actual bear population size might be roughly two times greater than the index results from population reconstruction.

As an additional index of population trends, the long-term trend in harvest totals has generally mirrored the trend observed from population reconstruction since 1996 (Figure 12). Although year-to-year harvest totals can vary widely due to many factors other than changes in the size of the bear population (e.g., mast conditions, weather, hunting pressure, hunting season changes, den entrance dates), the harvest trend over multiple years has followed the index trend of population change.

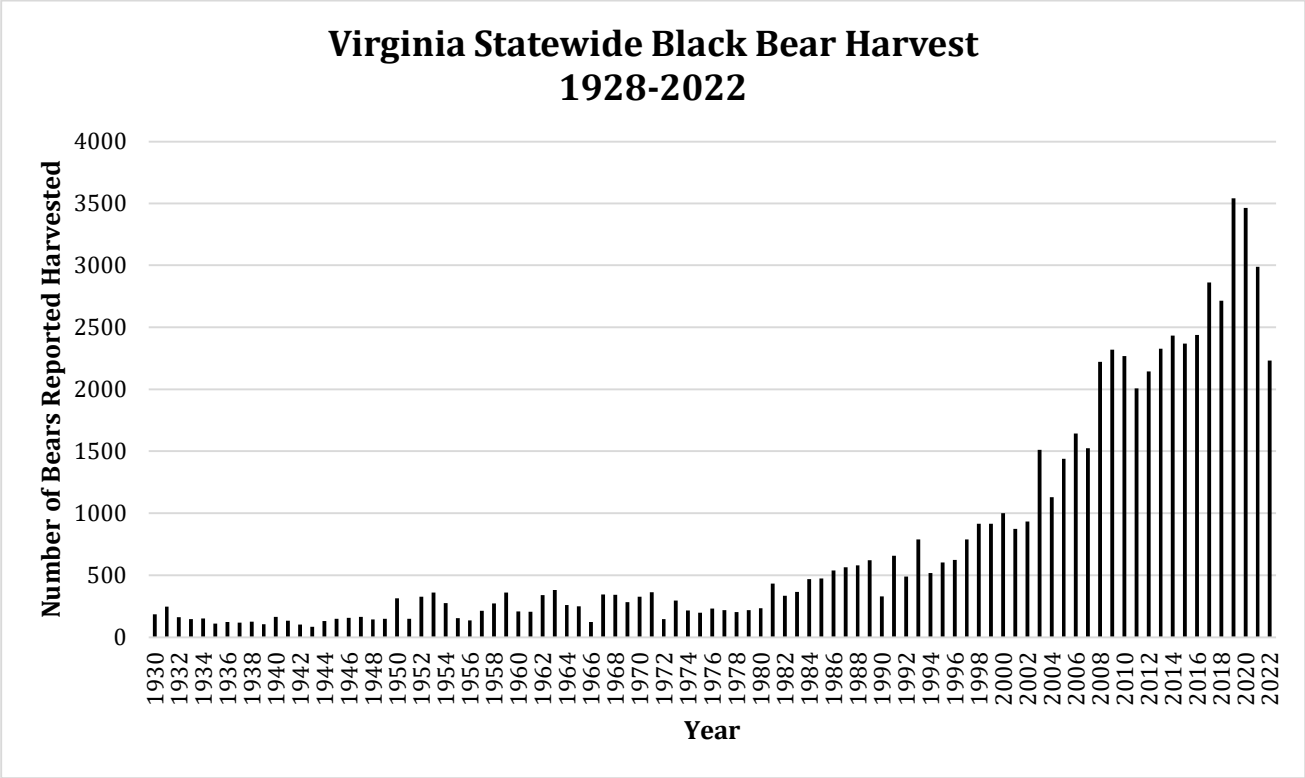

Figure 12. The Virginia statewide annual black bear harvest (1928-2022)

Population Distribution and Density

Black bears, with a wide range in the United States and Canada, are established across most of Virginia and may be seen in almost any county (see History; Figure 7). Research has provided density estimates for a few intensively studied areas in Virginia. Past densities have been estimated to be >1.5 bears/ mi^2 in Shenandoah National Park (in 1992), about 1 bear/mi^2 in the Great Dismal Swamp (1987), 1.5 bears/ mi^2 in the Great Dismal Swamp (2004), and 3.5 bears/ mi^2 in western Rockingham County (2001), however these densities represent snapshots in time as bear populations can change across years. On a broader scale, absolute density estimates are generally unknown across the state. However, population reconstruction index estimates per 100 square miles of forested habitat in each bear management zone provide indices of relative bear densities across the state (Figure 13) developed using harvest and age data through the 2020-21 bear season; due to a 3-year lag time described above, this

provided a reconstructed population estimate for 2018. The highest bear densities are found in the western mountains (especially in Zone 4) and around the Great Dismal Swamp (Zone 20). The lowest densities generally occur in Tidewater and across most of the Coastal Plain.

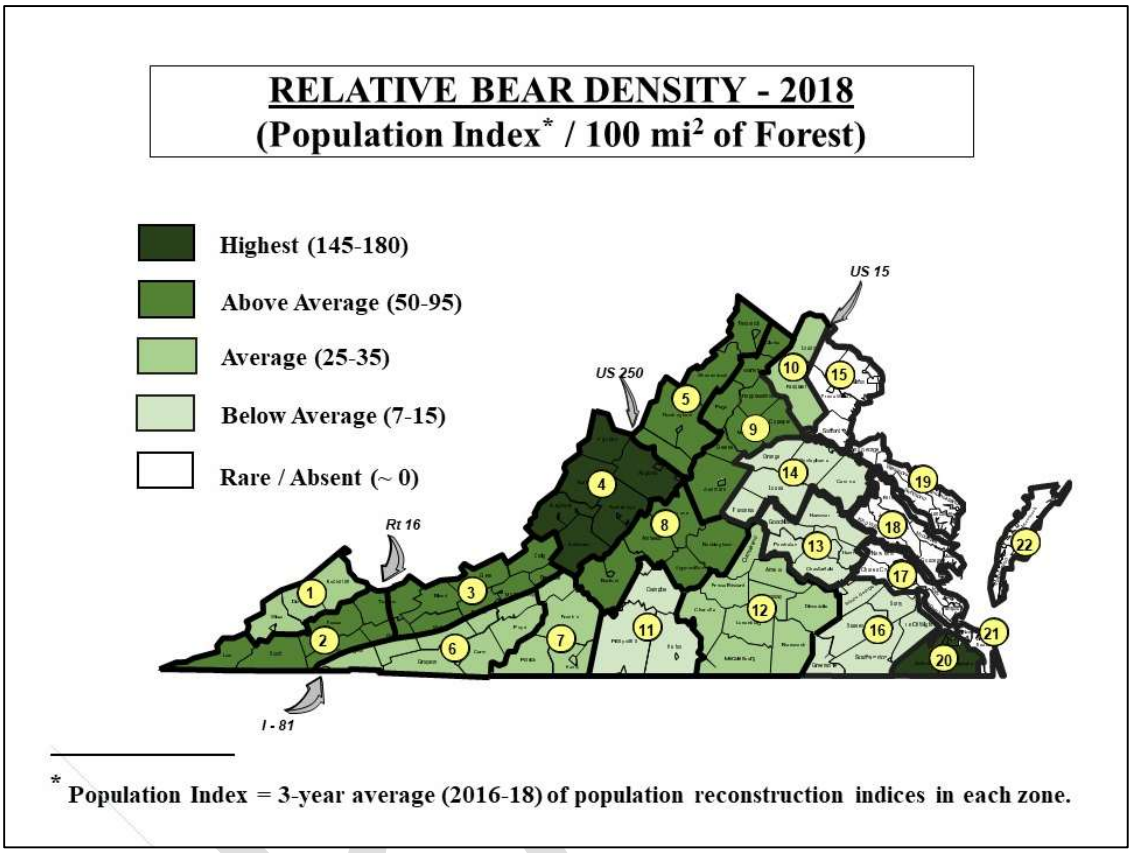

Figure 13. Relative bear density (population index/100mi2 forests) by bear management zone in Virginia in 2018.

Due to a 3-year lag, these estimated relied on harvest and age data through the 2020-21 bear hunting season.

Population Trends

Zone-specific and statewide population trends were based on the finite rate of annual population change (λ, lambda). Exponential regressions provided estimates of λ:

$$Nt = N0 * \lambda t,$$

where Nt = population index at time t and N0 = initial population index at t = 0. Both population reconstruction estimates (Nt) and harvest totals were used as population indices.

The finite population rate of change (λ) also can be expressed as an average annual percent rate of change (R) where:

$$R = 100*(\lambda-1).$$

Especially over the past 50 years, bear populations have increased in Virginia and throughout the eastern United States. Harvest management controls, reforestation, public land purchases, oak forest maturation, bear restoration efforts, and natural range expansions have all contributed to bear population growth in Virginia. Harvest trends have shown significant increases since 1974 when hunting regulations were changed to reduce the hunting mortality on adult females (Figure 12). Over the last 20 years (since 2002), trends in harvest ($\lambda = 1.056$) and population modeling ($\lambda = 1.068$) suggest that the statewide bear population has been increasing at an annual rate of about 6-7%.

While population growth has continued throughout the state (Figure 14) and in most bear management zones (Appendix 3) since 2011 for the duration of the 2012-21 Bear Management Plan, population growth has generally been slower than occurred during the previous 10-year period of 2002-2011 (Table 1). Management zones with relatively new populations of bears (e.g., 1, 7, 11, 16) have exhibited the fastest annual growth rates since 2011 (R = 14-17%), while the slowest growth (R = 0 - 5%) has occurred in management zones with long-established populations (e.g., 4, 5, 20). Additionally, some of these zones with longer established populations have shown indications of stabilizing or even declining towards established population objectives.

By themselves, harvest and population reconstruction indices do not provide definitive information on bear population status. However, their combined results make a strong case for determining bear population status and health across Virginia.

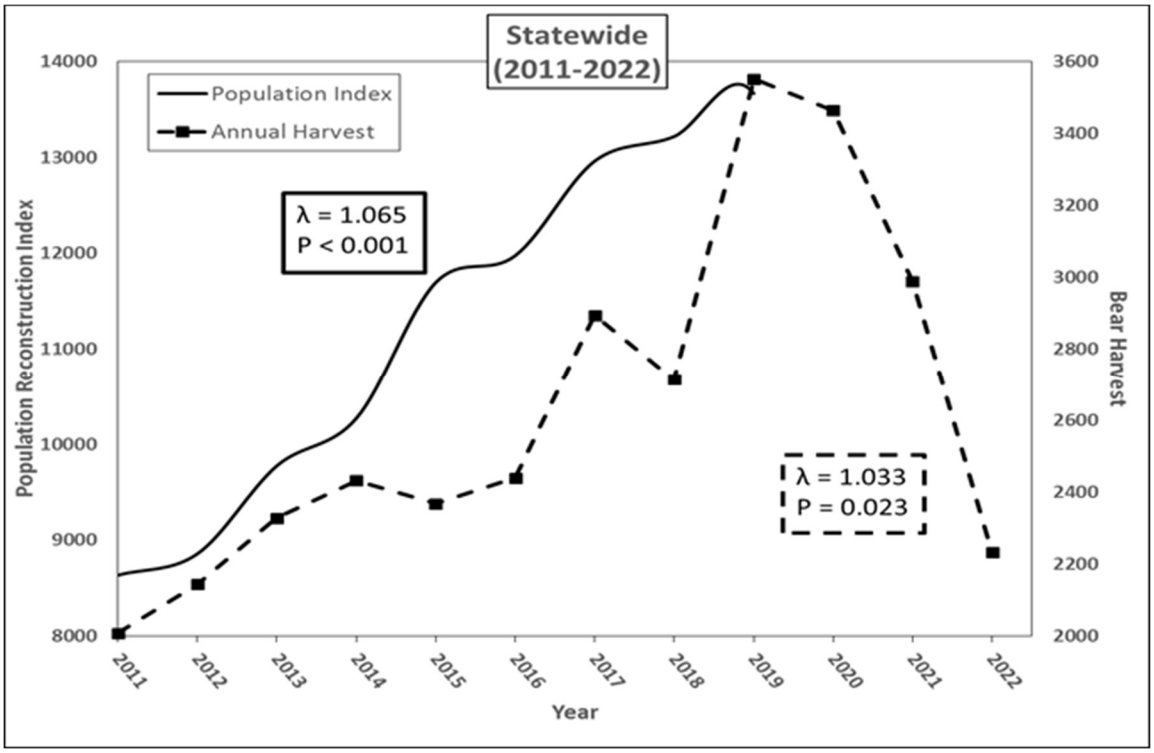

Figure 14. Statewide population and harvest trends in Virginia (2011-2022).

Table 1. Zone-specific population trends and estimates of the finite rate of population change (λ, lambda) based on bear population reconstruction and total harvest in Virginia for the time periods of 2002-2011 and 2011-2022. Significant trends ($P < 0.05$) are indicated by **bold values** of λ.

	2002-2011 Trends 1				2011-2022 Trends			
	Population Reconstruction		Total Harvest		Population Reconstruction 2		Total Harvest	
Zone	λ	P	λ	P	λ	P	λ	P
1	1.252	< 0.001	1.306	0.004	1.141	< 0.001	1.110	< 0.001
2	1.172	< 0.001	1.183	0.004	1.090	< 0.001	1.060	0.054
3	1.094	< 0.001	1.114	0.004	1.075	< 0.001	1.052	0.009
4	1.090	< 0.001	1.102	0.001	1.048	< 0.001	1.012	0.433
5	1.041	0.001	1.041	0.025	0.982	0.090	0.928	0.017
6	1.130	< 0.001	1.119	0.023	1.077	< 0.001	1.038	0.069
7	1.178	< 0.001	1.208	0.004	1.139	< 0.001	1.076	0.012
8	1.114	< 0.001	1.133	< 0.001	1.125	< 0.001	1.077	< 0.001
9	0.993	0.594	1.011	0.659	1.021	0.139	0.923	0.046
10	1.179	< 0.001	1.196	0.034	1.052	< 0.001	0.954	0.259
11	1.383	< 0.001	1.433	0.001	1.172	< 0.001	1.159	< 0.001
12	1.365	< 0.001	1.411	< 0.001	1.138	< 0.001	1.148	< 0.001
13+14	1.395	< 0.001	1.409	0.004	1.127	< 0.001	1.090	0.002
16	1.578	0.009	0.896	0.460	1.180	< 0.001	1.299	< 0.001
20	1.094	< 0.001	1.120	0.012	1.043	< 0.001	1.014	0.399
Statewide	1.078	< 0.001	1.092	0.001	1.065	< 0.001	1.033	0.023

1 Trends for Zones 1, 6, 7, 10, 11, 12, and 13+14 are from 2003-2011 and trends for Zone 16 are from 2007-2011.

2 Population reconstruction trends are from 2011-2019.

DEMAND

Bear Hunting Demands

Hunter motivations

Individuals hunt for many reasons (e.g., companionship, being close to nature, skill and challenge, meat consumption). For example, family customs and camaraderie are important motivations for Virginia bear hunters who use hounds. Family and community traditions are important reasons for participation in bear hunting as well as the value of spending time with hunting companions and the enjoyment of working with their dogs.

In the 2019-2020 DWR hunter survey, 46% of all hunters ranked bear hunting as moderately important or higher, an increase from 38% in the 2004-2005 survey. Deer hunting was the most important kind of hunting in 2019-20 with 96% of hunters considering it moderately important or higher following by hunting spring (75%) and fall turkeys (57%). The importance of bear hunting (46%) was similar to squirrel (52%), rabbit (43%), and waterfowl (43%) hunting, and ranked higher than hunting for other species (e.g., quail -30%, fox -25%, and raccoons-20%). These general rankings have remained relatively stable for the past decade.

DWR surveys have asked successful bear hunters what they did with their bear after harvest. The most common use of the bear was meat consumption (76%). Over 42% of those who had ever harvested a bear in Virginia had it mounted, 31% tanned the hide, nearly 26% preserved the skull, and 22% donated the meat. Only 4% said they used the bear for ornamentation or clothing.

Many hunters in Virginia are not interested in hunting bears. The 2018-2019 DWR hunter survey explored why hunters may not be interested in hunting bears. Eighty-one (81) % of hunters indicated that they had no interest in harvesting a bear and 69% indicated that had no interest in bear meat. More hunters agreed than disagreed that they did not want to buy a bear license (48% vs. 24%) or handle/transport a bear carcass (38% vs 29%).

Types of bear hunting

In Virginia, hunters generally pursue bears using five different techniques: firearms with dogs, firearms without dogs, archery, muzzleloader hunting, and chasing with dogs without a weapon (during the dog-training season). As of 2022, the bear hound training season offers between two to ten weeks of opportunity depending upon location, the archery season offers six weeks of opportunity, and the muzzleloader season provides hunters one week of opportunity. The “open” or firearms season, which allows hunters to harvest a bear with any legal method (including archery equipment, muzzleloaders, approved firearms, and hounds) varies in length by location from 5 weeks in the Piedmont to the longest season in far southeast Virginia with 14 weeks of opportunity (Figure 15). The traditional bear hunting counties in the western portion of Virginia have approximately six weeks of firearms season and an additional three-day early season in the southwestern part of the state; hounds can be used during the early three-day season, the Saturday of the youth and apprentice weekend in October, and during portions of the firearms season, depending on the area (e.g., generally after the close of deer firearms season in western Virginia).

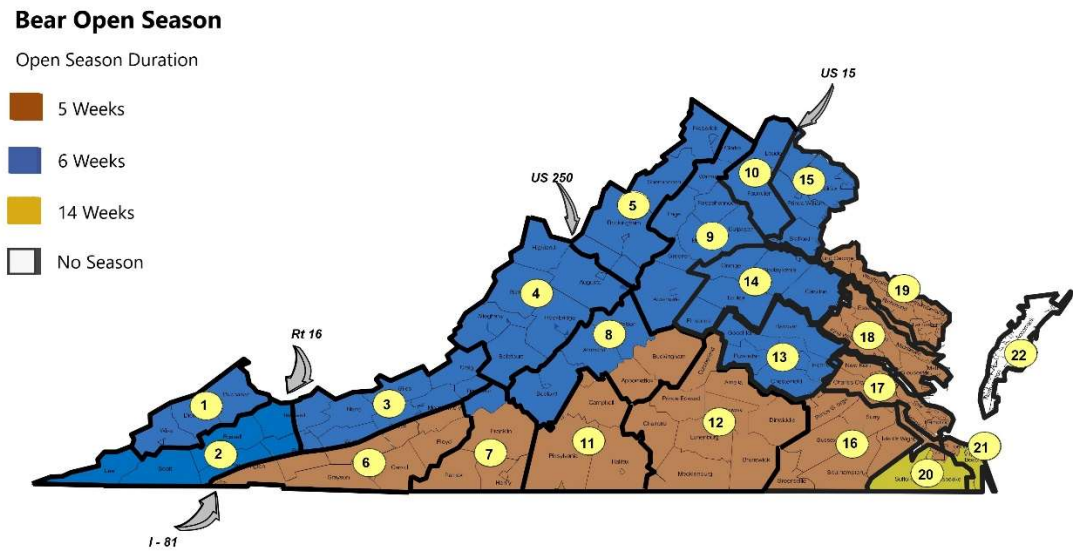

Figure 15. Bear Open Season duration in Virginia (2023).

While many bear hunters use more than one method, most bear hunters use firearms without dogs sometime during the season. Of hunters that specifically hunted for bears during the 2015-2016 bear season (the last hunter survey with this information), 53.9% used firearms without dogs, 46.1% hunted during muzzleloader season, 35.9% hunted during the archery season and 29.7% hunted during firearms season with dogs. Both bear hunters that used dogs during the hunting season and those that did not use dogs during hunting utilized the non-harvest chase (dog-training) season during August and September. Approximately 76.6% of bear hound hunters and 31.6% of bear hunters that did not use hounds during the hunting season participated in this non-harvest season, accounting for a total of 42.4% of all bear hunters utilizing the non-harvest training season.

In the 2019 - 2020 survey of all hunters, 57.4% of hunters agreed (slightly, moderately, or strongly agreed) that they would like the opportunity to harvest a bear. During 2015-2016, 66.3% of all hunters indicated they would harvest a bear if the right opportunity arose while hunting other species. In addition, a more specific survey of bear hunters in 2020 indicated that 50% hunt bear while primarily hunting other game, 26% hunt specifically for black bear, and 24% do both. Having opportunities to kill a bear while specifically hunting for deer or other wildlife was ranked as the most important aspect of hunting black bears. Next, in order of importance, was firearms hunting specifically for bears without dogs, followed by muzzleloader hunting specifically for bears, and then archery hunting specifically for bears. The lowest in importance were hunting bears with dogs with intent to harvest and chasing bears with dogs with no intent to harvest.

Hunter effort and harvest

According to the 2019-2020 hunter survey, approximately 25,051 hunters spent 251,017 hunter-days hunting black bears. This number of hunters should be considered a minimum estimate, as an analysis of data from the 2020 Responsive Management survey estimated that 44,000 resident hunters pursued bears. Hunter-days are defined as the total sum of all days hunted by all bear hunters (i.e., four hunters hunting for two days each generates eight hunter-days of bear hunting effort). On average, bear hunters spent 10.0 days bear hunting with 9.7% annual success rate (defined as the successful harvest of a bear) during the 2019-2020 seasons.

The number of bear hunters and their hunting effort have generally been increasing over the last 30 years. Since the establishment of a specific bear license in 2015, the license has been purchased by both resident and non-resident hunters (Figure 16). Although, the number of resident bear licenses sold has trended downward starting in 2019, this is likely due to a shift in hunters purchasing more Sportsman's licenses (combination license including deer, bear, and turkey along with fishing) when the price was reduced. Analysis of the 2020 Responsive Management survey data suggests that 87% of hunters who purchased a bear license actually hunted bears, as compared to 61% of hunters who purchased a Sportsman's license. Over the past three years purchases of the Sportsman's package has increased. The number of non-resident hunters has slowly increased, from 925 licenses purchased in 2015 up to 1,755 licenses purchased in 2022. In addition, over the past three decades (1990 - 2020) the overall total number of bear hunters has slowly increased, averaging 17,879 annually during 1990 – 1999, growing to an annual average of 23,171 during 2010 - 2019 (Figure 17). Similarly, the overall total number of days hunted by bear hunters has also increased, annually averaging 115,620 total days hunted during 1990 - 1999 and growing to 182,838 total days hunted during 2010 - 2019 (Figure 18). These trends are likely due to increased hunter opportunity as a result of expanding bear populations and hunting seasons throughout the state.

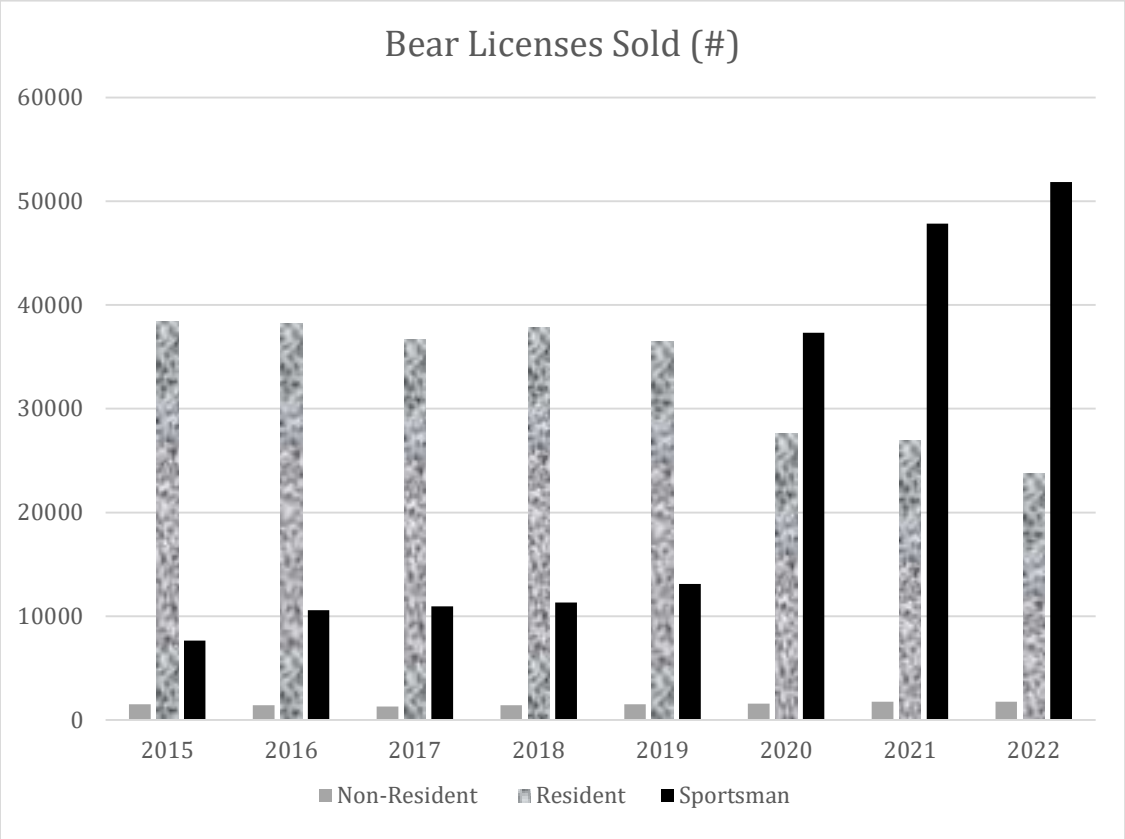

Figure 16. Bear License sales from the 2015 - 2022 hunting seasons.

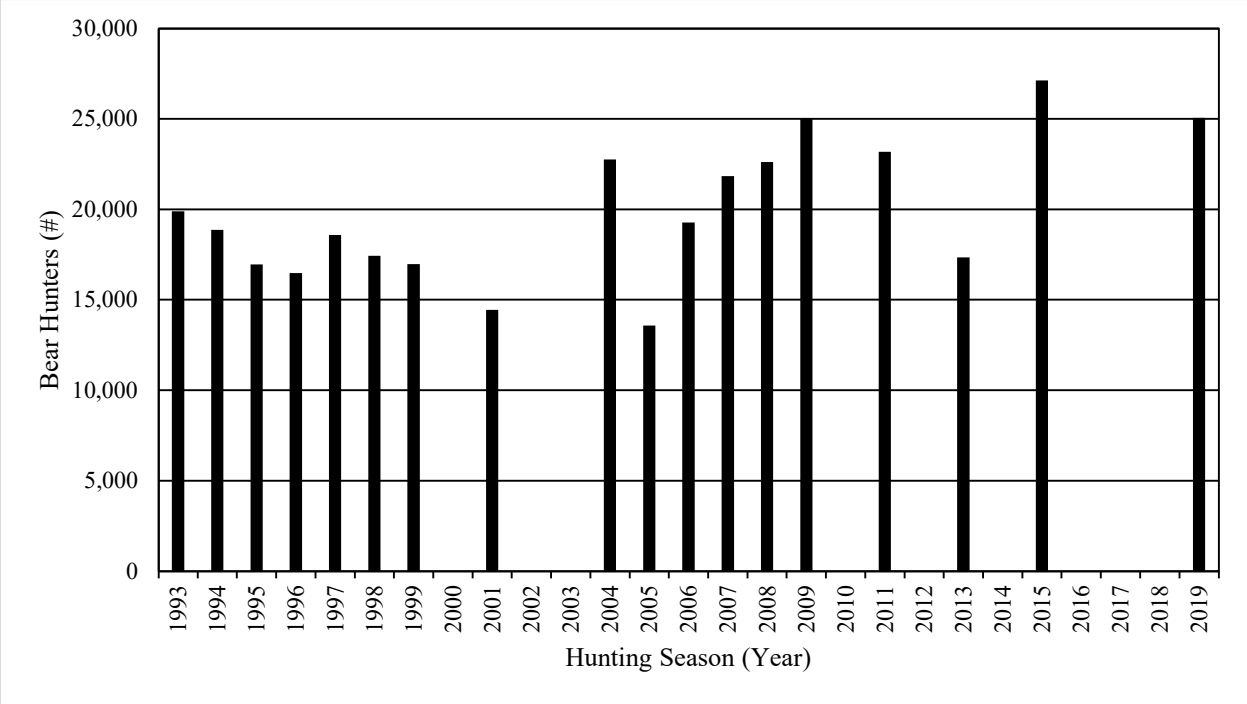

Figure 17. Number of black bear hunters in Virginia between 1993 and 2019 based on hunter surveys. Surveys were not conducted during 2016 and 2017, and effort data was not collected in 2018.

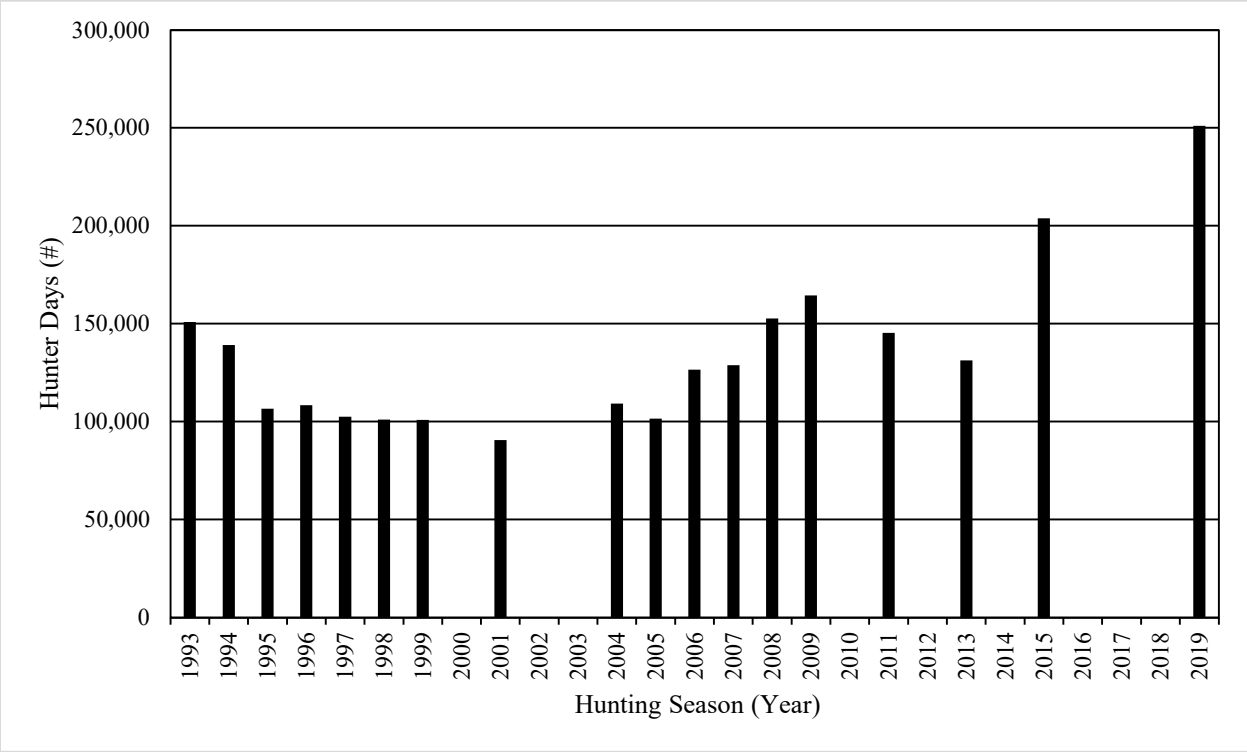

Figure 18. Black bear hunting effort (hunter-days) in Virginia between 1993 and 2019 based on hunter surveys.

Surveys were not conducted during 2016 and 2017, and effort data was not collected in 2018.

During 2017-2022 bear hunting seasons, the firearms season accounted for an average of 47% of total bear harvest, followed by the archery season (23%), the 3-day early season (13%), the muzzleloader season (12%), and the youth/apprentice weekend (4%). During this 5-year period, the highest percentage of female bears were harvested during the 3-day season (56%) and the lowest percentage of female bears were taken during the firearms season (41%); this difference is likely related to earlier denning by female bears and hunter selectivity for male bears during the firearms season. An estimated 41% of total bears harvested during 2017-2022 were taken by hunters using hounds; 64% were taken by hound hunters across all seasons when hounds could be used. Season estimates for the proportion of bears harvested by hunters using hounds were as follows: 3-day early firearms season (44%), firearms season (68%), and youth/apprentice weekend (85%).

Based on data from the 2018-2019 DWR hunter survey (attitudinal data only were collected), most successful bear hunters (64.4%) reported that they were specifically hunting bear, while 34.4% killed their bears while deer hunting, and 1.1% were successful while hunting for species other than deer. This is in contrast to some previous seasons where the most successful bear hunters were hunting deer. For example, during the 2015-2016 seasons 60.0% of successful bear hunters were hunting deer, 8.0% were hunting other species, and 32.0% were hunting specifically for bear. Some of the variation in hunter success might be explained by small numbers of respondents to this question in the surveys. In addition, these differences may also have biological reasons, such as changes in mast crops from year to year, which may change bear movement and activity patterns and may also change hunter strategies.

Archery harvests have historically comprised a larger proportion of total bear harvest in years with poor mast conditions. During the seven worst mast years on record from 1989 - 2010, the archery harvest averaged 31.7% of the total harvest (range: 23.5 - 44.1%). In the remaining 14 years with better mast production, the archery harvest averaged much less at 18.6% of the total harvest. In the years since (2011-2021) this relationship has held but has been much weaker; archery represented 20% of total bear harvest during the 3 best oak mast years and 25% during the 3 worst years. These trends could be the result of higher rates of movement to find forage early during the archery seasons when mast crops are poor. Conversely, with stronger mast crops and an abundance of food on the landscape that persists longer into early winter, bears may not need to move as much during the archery season to find food and may stay out of the den longer to take advantage of good food resources, thereby making them more susceptible to harvest later in the year such as during firearms season.

Concerns about bear hunting

Surveys of the public across the country have generally indicated approval for hunting and to a lesser extent bear hunting in particular. A 2014 survey (Responsive Management 2014) found that a large majority (83%) of Virginian citizens supported legal, regulated hunting in general with only 12% opposed. Although with lower approval than for other hunting, there still tended to be support for bear hunting among Virginia residents; 58% of Virginians supported the hunting of bears compared to 34% who opposed bear hunting. Virginians opposed to bear hunting were primarily opposed because they had a general opposition to all hunting, thought hunting would reduce bear populations that were already too low or felt that killing bears was cruel and inhumane.

Although there has been general approval across the United States for black bear hunting, bear hunting has also created controversies. Citizen initiatives to restrict black bear hunting or bear management options have produced varied results in many states including California, Colorado, Florida, Idaho, Maine, Maryland, Massachusetts, Michigan, New Jersey, Oregon, Utah, Washington, and Wyoming. Black bear hunting controversies have primarily focused on how, when and whether black bears should be hunted.

Different methods of bear hunting generate varied opinions among the public and hunters. When asked about removing the ban on hunting over bait for black bear in 2014, 71% of residents and 66% of hunters disapproved of changing the current ban to allow baiting. The most commonly cited reason for this disapproval for both the residents and hunters was that baiting was not perceived as “fair chase”. Of

the different methods of bear hunting surveyed in Virginia during 2010 (Responsive Management 2010), Virginia citizens had the most support for bear hunting with firearms without the use of hounds (57%), followed by archery bear hunting (46% support). Only 24% of Virginians supported firearms hunting with hounds or a hound-training season where bears are not harvested. Even among other Virginia hunters, there was much less support for firearms bear hunting with hounds (48%) or a chase-only season (47%) than for firearms hunting without hounds (91%) and archery hunting (79%). Other research in Virginia targeting specific stakeholder groups (Lafon et. Al 2003) has also showed varying levels of support for hunting of bears and specifically hunting bears with the use of archery equipment or hounds.

Past surveys in Virginia have shown similar concerns from other hunters about hound hunting for bears. In 1993, 49% of hunters were neutral about the bear chase season, with 32% opposing and 19% favoring. Among bear hunters, 54% of the non-hound bear hunters did not favor the chase season. As would be expected, a large majority (82%) of the hound bear hunters favored the training season in Virginia. During the mid-1970s in Virginia, 74% of the opportunistic bear hunters (i.e., those hunters who were primarily hunting deer, but would harvest a bear if they had the opportunity) were opposed to hunting bears with hounds.

The use of hounds for bear hunting has been controversial in many states. Hunting with hounds for bears was banned by public ballot initiatives during the 1990s in Colorado, Massachusetts, Oregon, and Washington. Similar voter initiatives in Maine, Michigan, and Idaho failed, and hound hunting for bears continues in these states. Based on research and surveys from around the country, the primary reasons given by the public and hunters opposed to bear hunting with hounds are that it is perceived to be inhumane and unethical, which leads to an unfair advantage for the hunter. The use of advanced technology (e.g., two-way radios, tracking collars, four wheel-drive vehicles) and road access contributes to the perception of an unfair advantage for bear hunters using hounds. To some people, chasing is inhumane or abusive to bears, while others think that bear hounds chase all wildlife. Because bear hounds may be killed or injured while hunting, animal welfare concerns sometimes are extended to the hounds themselves. Other concerns for bears are based on presumed impacts on reproduction and movement, behavioral changes and physiological stress. There is no evidence that hound-hunting, as currently practiced, is detrimental to bear populations in Virginia; in fact, hound-hunting remains an important tool in achieving bear population objectives in some areas.

Due to relatively large acreage requirements, bear chases sometimes extend onto posted properties, leading to concerns by some landowners about hound and/or hunter trespass, violation of privacy, and interference from bear hunters who use dogs. Investigations of some complaints reveal that no trespass violations occurred. The Department has traditionally addressed these bear hound-hunting issues on a case-by-case basis. For example, in 2003 the Department facilitated a collaboration between landowners and bear hunters in the Fort Lewis Mountain area of Roanoke County that yielded written guidelines of acceptable behavior for both parties and a reduction in conflicts. Both the 2001-2010 and 2012-2021 Bear Management Plans have identified issues associated with use of hounds, contained goals and objectives to maintain hound-hunting while ensuring hunting ethics and respect for citizen rights, and identified strategies to address these objectives. During 2007-09, the Department, in conjunction with Virginia Tech, undertook the Hunting with Hounds in Virginia: A Way Forward process to address the aforementioned issues more comprehensively (see Supporting Documents).

Public concern about bear hunting is not the only source of controversy. Even among bear hunters, there are sometimes issues about hunting seasons that may be viewed as too liberal with concerns about overexploitation. Hunter disagreements also often focus on the allocation of the bear harvest and hunting opportunities among hunter groups (e.g., archery hunters, firearms hunters with hounds, firearms hunters without hounds).

DRAFT

Bear Damage Demands

Bear management demands are not only related to hunter recreation. Concurrent with the growing bear populations and growing human populations in Virginia, conflicts associated with bears also have been increasing. While most Virginia residents (67%, Responsive Management 2020) believed that people and black bears can live in the same locality without conflict, diverse bear-related problems can affect both residential and agricultural areas. The Virginia Wildlife Conflict Helpline has seen an increase in the number of calls concerning bears since establishment of the helpline in 2013 (Figure 19). Calls involving bears involved a variety of concerns; including calls that just reported sightings; concerns about potential or perceived threats to human safety; damage and threats to livestock, pets, crops, and beehives; damage to property; calls about individual bear welfare concerns (orphan or injured), and bears that were potentially infested with mange. In developed or residential areas, problems often center on damage to bird feeders, scavenging from garbage cans, feeding on pet food, foraging at garbage dumps, automobile accidents, and simple public sightings. Agricultural problems include destruction of unsecured beehives, eating or destroying crops (corn, fruit trees), feeding on grain at livestock feeders, damage to trees, and killing of livestock. Although public perceptions may differ, many of these issues are not necessarily severe and may be easily resolved. With its combination of rural and urban environments in close proximity to bear habitat, any of these problems can occur almost anywhere in Virginia.

Male bears typically are involved in most of the human-bear conflicts. Prior to 2001 when bears were more commonly translocated by DWR, 73% of the bears captured for relocation due to conflicts were male. Because males travel greater distances than females, especially around the breeding season, they may also be more likely to cause problems for people. Adult males displace females and younger bears at prime feeding sites (including human-related food sources). Dispersing subadult males are also prime contributors to human-bear conflicts. Because translocation of bears is not an effective tool for addressing the underlying issue that leads to conflicts, DWR stopped the translocation of almost all bears involved in nuisance complaints in the early 2000s; thus, the sex ratio of bears involved in human-bear conflicts more recently is less often known.

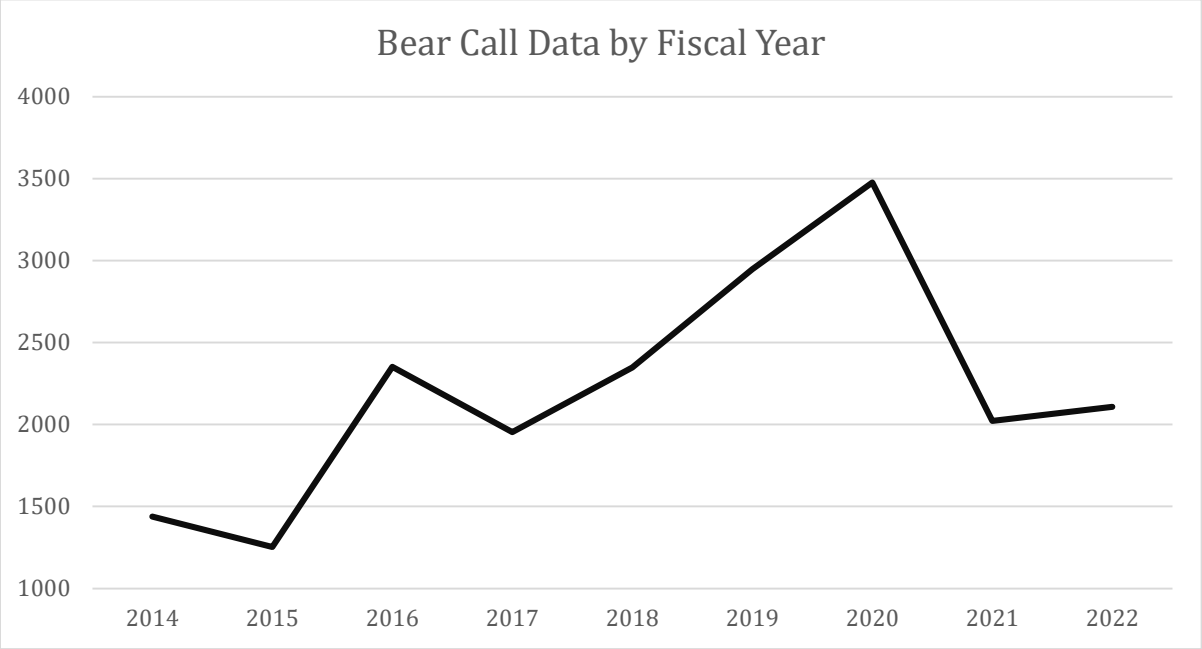

Figure 19. Bear call data received by the Virginia Wildlife Conflict Helpline from FY 2014 – FY 2022.

Residential bear concerns

High populations of both bears and humans commonly coexist together in many parts of North America, including in Virginia. However, concerns about bears around residences have become more prevalent with increasing bear and human populations. Problems involving black bears in residential areas are especially complex. Diverse residential/urban problems range from issues like a non-interactive sighting that is perceived as a threat to relatively serious issues such as a bear in the city center being harassed by humans and disrupting traffic. Misinformation about black bears often results in uncertainties and unrealistic and unfounded fears. In contrast to conservation approaches that focus primarily on decreasing human-wildlife conflicts, findings from a recent study by Lischka et al. suggest that communication approaches aimed at increasing public tolerance for carnivores could be improved by emphasizing the benefits and positive impacts of living with these species.

While rural residents may be more likely to interact with bears than urban or suburban residents, bears visiting urban and suburban areas due to unsecured food attractants have become more common. When surveyed in 2020, 59% of rural and semi-rural residents were comfortable with having black bears in their neighborhood; however, among the general population of Virginia, 42% of all residents were comfortable with black bears in their neighborhood. Approximately 15% of Virginia citizens stated that bears were a problem in their neighborhood with 3% feeling they were a major problem and another 12% believing bears were a minor problem. Most residents (82%) indicated that bears were not a problem at all. Over the last two years 11% of Virginia residents had actually experienced a problem associated with a bear, a notable increase since a similar survey in 2010 (2%). Bears getting into garbage or birdfeeders are the top complaints, as they have been for the past two decades (2001-2020). Residential bear complaints occur primarily from April through October, with peak months generally in May and June. In years of poor acorn production, residential complaints can continue well into December.

Vehicle-bear collisions

Vehicle-bear collisions have become more of a concern with expanding bear populations and increased traffic volumes. Although road-killed bears are difficult to document accurately (i.e., an unknown number are unreported), their frequency may be increasing. Statewide, a minimum average of 143 vehicle-bear collisions occurred from 2017-2021 annually, up from a minimum average of 30 reported annually prior to 2012. DWR continues to work with VDOT and auto insurance companies to improve methods for collecting and reporting animal-vehicle collisions (e.g., police and motorist reports, carcass pickups, insurance claims). Virginia law requires motorists who kill a deer or bear to report it to local law enforcement or a DWR Conservation Police Officer, whereupon the officer can award the carcass to the driver (§ 29.1-539).

Constructing wildlife crossings with fencing (or adding fencing to existing underpasses large enough for bear use) are the most effective means of reducing bear crashes and connecting their habitat. Virginia has one underpass with features and associated fencing designed specifically for bears on Rt. 17 near the Great Dismal Swamp. Bears began using this structure the second year after it was constructed. VDOT has also added fencing to existing underpasses on I-64 in Albemarle County, which has significantly reduced large animal-vehicle collisions while significantly increased the use of the structures by bears.

Virginia was one of the first states to have a legislatively mandated Corridor Action Plan, completed in 2023, which is the result of a cooperative effort between the VDWR, VDOT, Virginia Department of Conservation and Recreation, and the Virginia Department of Forestry. This plan emphasizes protection of vital wildlife habitat corridors and reduction of wildlife-vehicle conflicts, such as collisions, to promote driver safety. Wildlife corridors connect fragmented habitats separated by human activities or infrastructure; this habitat connectivity is vital to the long-term sustainability of wildlife biodiversity.

DRAFT

Agricultural bear damage

DWR has documented agricultural damage by black bears for over 70 years, and 58% of recently surveyed agricultural producers consider bears problematic where they farm (18% major problem; 40% minor problem). Thirty-three percent reported some form of conflict with bears. In that same survey 47% of producers at least mostly agreed that DWR should be responsible for reducing damage by bears to crops or livestock with an additional 22% slightly agreeing with that statement. Agricultural concerns include damage to field and sweet corn, peanuts, beehives, orchards (peach, apple, cherry) and the occasional killing of livestock (goats, sheep, cattle, chickens, hogs). Agricultural producers often request assistance from DWR for problems associated with bears. Assistance is provided in the form of education, assistance with exclusion devices, or issuance of kill permits as per Virginia Code§ 29.1-529. From 2004-2020, there was an upward trend of kill permits issued and bears killed on kill permits but in the last two years those trends have declined (Figure 20).

While there can be a great deal of annual fluctuations, in 2020, requesters of kill permits cited damage to corn by bears as the most common agricultural problem (55% of agricultural complaints), followed by livestock/livestock feed (12%). Additional complaints include damage to orchards, apiaries, poultry, and peanuts. Bee damage is most prevalent from April through June, but also may be common in October and November. Fruit trees may be damaged from the end of June through October. Damage to corn occurs primarily during the short period of the milk stage of development which begins about mid-July in most years. Grape vineyards (ripening time through August), wheat (sprouting time through maturity), oats, soybeans and peanuts (September - November) are other crops that may experience bear damage. Bear predation on livestock usually involves adult sheep and lambs, mostly in the spring, although in years of poor natural foods, livestock predation is reported during October-November.

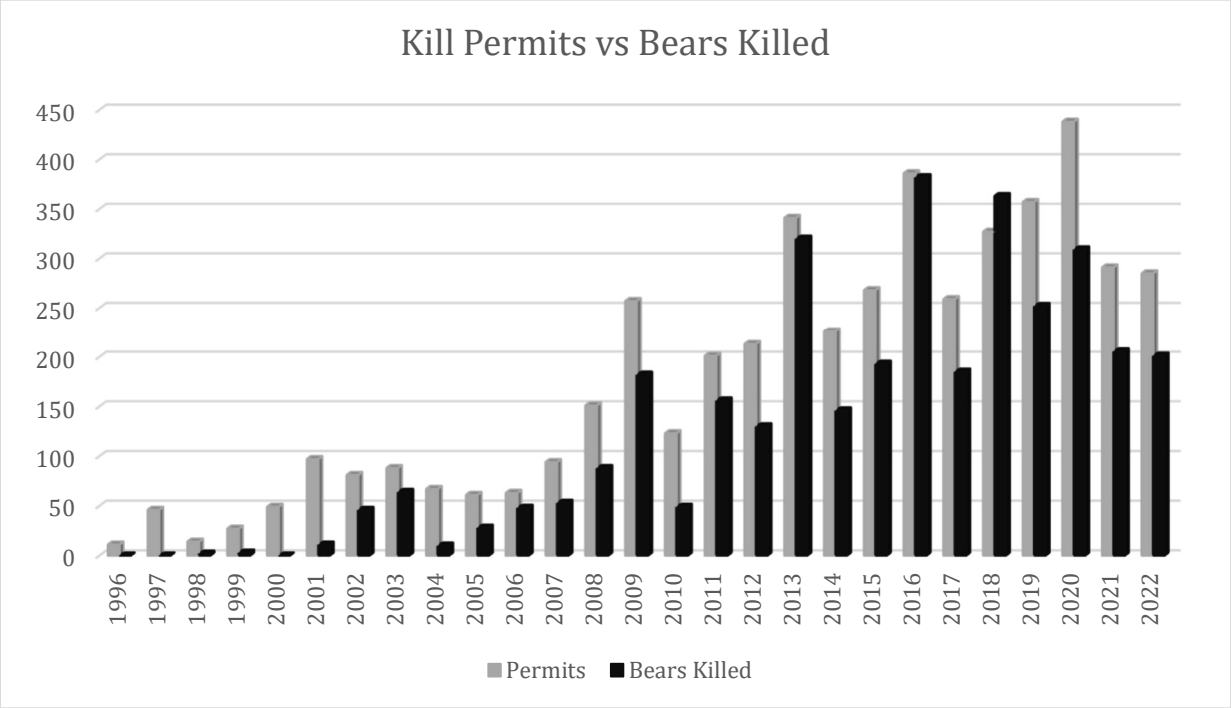

Figure 20. Number of black bear kill permits issued by DWR and number of bears reported or estimated to have been killed on these permits (1996 - 2022).

Due to reporting changes, estimates of bears killed during 2019-2022 are based on the average ratio of bears killed to permits issued for the previous 10 year period.

Human safety concerns and bear attacks

Black bears are usually nonaggressive, shy, elusive, and harmless to people. Despite many human-bear encounters, black bears pose little physical danger to humans. According to research completed by Herrero et al. in 2011 and other reports from the media following that paper, there have been approximately 78 documented human fatalities due to black bears in North America from 1900 - 2021. Of the fatal attacks, 58 were in Alaska or Canada and only 20 occurred in the lower 48 states. From the 2011 research it was found that in most incidences (88%), these fatalities were attributed to predatory attacks in remote areas by bears having little prior contact with people. Although rare, fatal attacks have also involved bears that have lost their wariness of people. No bear-inflicted human fatality has ever been documented in Virginia and the risk of a black bear attack on a human is extremely low. Since 2007, 9 human-bear encounters have been documented in Virginia which resulted in some type of human injury (8 of which were minor or superficial injuries). Of these encounters, one was hunting related and over half of the encounters involved a dog. The presence of dogs has frequently been associated with black bear attacks in other areas. There has been one incidence of a confirmed case of rabies in a black bear that occurred in 2012. The bear exhibited the furious form of rabies and attacked a four-wheeler with two people on it. The bear was dispatched without injury to any person.

Public opinions regarding human-bear interactions

A 2020 survey conducted by Responsive Management indicated that 64% of Virginians at least mostly agree that residents who live in areas with bears should be responsible for reducing conflict with bears. Further, 73% mostly agreed that outdoor recreationists who recreate in areas with bears should also be responsible for the reduction of human bear-conflict.

While a variety of approaches are generally available to mitigate concerns with human-bear conflicts, a 2010 survey by Responsive Management indicated that management options elicit varied public opinions about their acceptability. Generally, the public prefers non-lethal options for managing bears. The majority of Virginia residents opposed the destruction of a bear that causes property damage to a home or building (71%), causes damage to agricultural crops or livestock (61%) or harms a pet (53%). On the other hand, most people would support destroying a black bear that was aggressive toward humans (76%) or made an unprovoked attack on a human (79%).

The 2010 survey showed that the public supported requirements imposed on residents who attract bears. There was a majority of support (57%) for requiring residents to take down bird feeders that were actually attracting bears, but support was split (42% support, 48% oppose) for generally prohibiting residents in high bear density areas from using birdfeeders or feeding other wildlife. The majority of Virginians (57%) also supported fines for people who attract bears to their property, either intentionally or unintentionally.

There was overwhelming public support (85%) on the 2010 survey, most of it strong support, for requiring people to use bear-resistant garbage containers in areas frequented by bears; 66% of Virginians were also willing to pay for a bear-proof container (e.g., $10 per month for 12 months). A large majority (84%) of Virginia residents also felt that counties with bear populations should also be required to make open dumpsters bear-resistant.

Most Virginia residents (53%) in 2010 disagreed that people should be compensated for bear damage to their property (34% agree). However, there was some support to compensate farmers for agricultural damage by black bears (47% agree, 41% disagree), with the greatest support for compensating property owners for bear damage to livestock (53% agree, 37% disagree).

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Deer hunter concerns about the potential impact of bears on deer populations

Predation of deer has become an increasing concern among some hunters in Virginia over the last couple of decades. Deer hunter concerns about bear predation on deer have been focused in the mountains of western Virginia, where deer habitats tend to be poor and deer herds have low recruitment rates. Deer populations have declined in these areas during the same time that bears and coyotes have exhibited strong population growth and range expansion in Virginia. To investigate these concerns, several research projects have been conducted in western Virginia over the last decade.

Black bears have been known to predate on ungulate young throughout their geographic range including white-tailed deer, mule deer, elk, moose, and caribou. Consistent with deer hunter observations, a broad-scale study during 1997-2018 in the counties west of the Blue Ridge found a negative relationship between bear observations and white-tailed deer recruitment. However, forest maturation during this time period might also help explain the increasing bear population and decline in deer recruitment. In addition to potential bear predation, a variety of other factors (e.g., habitat quality, population size relative to BCC) may also be affecting deer recruitment and population density.

The Virginia Appalachian Deer Study in Bath County during 2019-20 found that black bears were the most common fawn predator accounting for 62% of known predation events and 46% of the total fawn mortality. Other studies (e.g., Louisiana, Michigan, Pennsylvania) have also found that black bears were primary fawn predators.

However, understanding predation species and rates does not fully explain the dynamics of fawn predation and recruitment. A Pennsylvania study found that primary fawn predators can change depending upon the habitat (e.g., coyotes were the top fawn predator in an agricultural area, bears were the top predator in a forested area). In addition, research in Louisiana and in Michigan suggests there may be an upper limit to fawn predation mortality rates in multi-predator systems and that these predator-specific mortality rates are likely compensatory. In Bath County, research on the Virginia Appalachian Carnivore Study found that all the potential fawn predators (bobcats, black bears, and coyotes) have substantially overlapping habitat use, diet, and daily activity patterns and might explain why fawn predation appears to be compensatory in multi-predator systems. That is, if black bear predation on fawns was reduced in Bath County, then bobcats and/or coyotes might increase their predation rates on fawns, compensating for reduced bear-fawn predation and lead to no overall net reduction in predation.

As well, research in Delaware in an area without established predator populations and no fawn predation events found that overall fawn survival rates from areas without predation were comparable to areas where fawn predation occurs. Therefore, fawn predation may not necessarily be a limiting factor for deer population growth; other factors such as poor fawn condition, disease, and birth defects may lead to similar survival rates of fawns, regardless of the predation rates.

In a large research review on deer-predator relationships, it was found that when a deer herd is close to biological carrying capacity (BCC), reducing one cause of deer mortality often results in that factor being replaced by another form of mortality. In contrast, when a deer herd is well below BCC mortality sources can add up. Whether or not fawn predation in Virginia actually limits deer population growth is a primary question that remains open and is highly complex. In the Bath County, Virginia deer study (2019-20), the deer population model suggested that fawn mortality rates were not preventing the population from sustaining or perhaps even growing slowly. In summary, the nature of fawn predation is site specific and could be dependent upon a number of factors, including habitat types, habitat quality, the predator community in an area, underlying densities of each fawn predator, and local deer densities. In addition, impacts from predation may change through time depending upon how close the deer population is to BCC.

Illegal and Market Bear Demands

According to DWR Law Enforcement, while still occurring, there appears to be a decline in the poaching and illegal trafficking of black bear parts in the state in recent years. Until recently, the steady

decline of the Asiatic black bear (Ursus thibetanus) and continued demand for bear gall bladders and other bear-related products by the Asian market had made the American black bear a natural target for wildlife commerce. Bile from gall bladders of black bears has been a prized medicine in Asia with unsubstantiated, but traditional, uses for liver disease, impotence, blood disorders, hemorrhoids, and digestive ailments. Bear gall bladders have sold for $250 to $10,000 each in some Asian countries. Although bear farming for bile production gained momentum in Asia, bile from wild bears has been preferred due to the belief that it is more potent. Bear paws have sold for $24-$254 per meal in some Asian restaurants. As a highly revered animal, consumption of bear parts by some Asians has a mystical value. Pet bear cubs have sold for as much as $5,000 each in parts of Asia. The acceptance and use of eastern medicine in North America in recent decades also created a domestic demand for some bear products.

In the late 1990's into the early 2000's, Virginia's Joint Operations SOUP and VIPER uncovered evidence of the existence of extensive illegal taking and trade in black bear parts from Virginia, including Shenandoah National Park, primarily with Asian markets in the Mid-Atlantic states and overseas. It was found that over many years hundreds of whole bears, gall bladders, bear paws and other bear parts originating in Virginia were being trafficked to Washington, D.C., Maryland, West Virginia, North Carolina, New Jersey, New York, California and overseas with a direct connection identified between Virginia and South Korea, as well as links to other countries. Hundreds of state violations federal violations were documented (Glod 1999, Huso 2004, NPS 2004). Although the full extent of the trade remains unknown, anecdotal evidence suggests there are relatively few bear losses due to illegal harvest and/or poaching activities, and it is believed that these activities are not currently having a significant impact on the overall statewide bear population.

In Virginia, an individual found guilty of killing a bear illegally faces a class 1 misdemeanor. In Virginia, class 1 misdemeanors are the most severe type of misdemeanor crime. This misdemeanor is punishable by up to a year in jail, a fine of $2,500, or possibly both punishments compounded. In addition, a replacement cost of $3,000 can be assessed for each bear killed illegally, under provisions of Code of Virginia 29.1-551. If a female bear is killed before the weaning of her cubs the individual being charged may face an additional replacement cost of $3,000 per cub.

Wildlife Watching Bear Demands

Non-hunting wildlife recreation (e.g., wildlife viewing) has increased significantly over the last several decades. Wildlife watching activities (e.g., observing, photographing, etc.) are important to Virginians. Wildlife watching participants made up 81% of all wildlife-associated recreation in Virginia followed by fishing (30%) and hunting (14%). Over 2.1 million Virginia residents participated in some type of wildlife watching activity in Virginia in 2016 with related expenditures estimated at $3.2 billion (Rockville Institute, 2020). Nearly all of Virginia wildlife viewers do so around their homes (Virginia Wildlife Viewing Plan, 2021).

A 1999 telephone survey indicated that black bears (74%) were second only to eagles and hawks (81%) as the animals Virginians were most interested in taking a trip to see. When asked in 2010 to rate the importance of seeing a black bear in their wildlife viewing experience, 68% of Virginia residents felt it was important. The 2020 survey indicated that 11% of Virginia residents have specifically taken a trip to see a black bear in the last two years, ranging from 6% to 17% depending upon the location of residents in the survey.

Animal Welfare Concerns about Sick, Injured, or Orphaned Bears

Concern for animal welfare has been growing over the last few decades in Virginia. An independent study conducted for DWR in 2000 found that all constituent groups surveyed expressed high levels of interest in receiving information from DWR on what to do with injured wildlife. This resulted in

a recommendation that the Agency take a lead role in "providing information on and coordinating responses to…rehabilitation of injured wildlife."

As a result of this concern and increased interest from the public, wildlife rehabilitation, defined as providing care to sick, injured, or orphan wildlife for eventual release back to the wild has increased over the past decade. Orphan black bear cubs have been rehabilitated or fostered to surrogate females when feasible since the inception of the Black Bear Research Center (BBRC) at Virginia Tech in 1986. From 1986-2009, orphan cubs were either placed with collared black bear sows in the wild or sows held in captivity at the BBRC. Bears held at the BBRC were released each spring after a short period of captivity for research purposes. After the closure of the BBRC in 2009, DWR had limited options available for handling orphan or injured black bear cubs of the year. In 2011 the Wildlife Center of Virginia (WCV) became the only wildlife rehabilitation center in Virginia permitted to accept orphan and/or injured black bear cubs or yearlings into their facility in Waynesboro, VA. Since 2011, 95 cubs have been rehabilitated and released back to the wild from the WCV.

While rehabilitation has been documented as a feasible option for rearing black bear cubs for eventual release, often the best approach is utilizing a wild sow in her den to act as a surrogate to an orphan cub. Fostering orphan cubs to surrogate mothers has been documented in numerous other states and has been utilized successfully in VA when orphan cubs are found during the months of January-March. Beginning in 2016, DWR initiated a sow radio -collaring project to better utilize and find denning sows with cubs in the wild. Since the winter of 2017, 15 cubs have been successfully placed with foster sows.

Very few zoos or other facilities in Virginia hold any species of bears (native or exotic). All facilities seeking to hold a native black bear must go through the VDWR permitting process which includes review by the VDWR bear project team before a permit is issued or amended. The capacity of a facility, their intended use of the bear, the facility and habitat, along with the health and welfare of any bear held are important considerations for the decision to allow bears to be held in captivity.

Sarcoptic mange, described in Chapter 1 (Mortality and Disease), garners concern for the welfare of individual bears as well as the health of bear populations. Often bears exhibiting symptoms of a late-stage mange infestation are very noticeable to the public due to their inability to find sufficient resources (food or shelter) in their natural environments and their propensity to inhabit residential areas or man-made structures during these end stages. Animals in this condition are often extremely emaciated, exhibit neurological symptoms (showing signs of depression), and in many cases are not able to survive the infestation. Since these animals are often highly visible to the public, cases are frequently reported through the Wildlife Conflict Helpline.

Increased concern for individual animal health and welfare has unfortunately led to attempts by citizens to feed, treat, and/or capture mange infested bears to take them to a rehabilitation center. From 2014-2019, 16 (7 adults, 9 juveniles) mange-infested bears were treated in conjunction with the Wildlife Center of Virginia and later released back to their capture location by DWR staff. While some of these bears had to be euthanized or died during treatment due to extremely poor condition or prognosis, many were able to clear the initial mange infestation symptoms following treatment and time in captivity. However, upon release back to their capture locations, the majority of treated bears (that were tracked with GPS collars or identified with ear tags) were later humanely dispatched due to severe re-infestations of sarcoptic mange. Such experiences in Virginia and other states, along with other issues associated with the treatment of wild animals (e.g., capture stress, mite resistance, and the introduction of antibiotics into the human food chain, reinfestation), make the treatment of sarcoptic mange in wild bear populations unfeasible at this time. Research is ongoing in Virginia and numerous other states to obtain additional information about sarcoptic mange, the effects on individual bears, and the potential impacts to bear populations where infestations are occurring.

Other Public Bear Values and Demands

Black bears capture human admiration and interest like few other wildlife species. As a reflection of strength, bears often are used as icons for countries and athletic teams. With their resemblance to humans, intelligence, and ingenuity, bears are have social and emotional intelligence and were the fourth most commonly mentioned animal in titles of children's books in the United States during the 1970s (following horses, dogs and cats).

As a symbol of the American wilderness, bears are valuable to many citizens simply because they exist in their native ecosystems. The majority of Virginia residents in 2010 (Responsive Management 2010) believed it was important to have black bears in Virginia (81%) and that bears were an important part of Virginia's ecosystem (85%). The majority of residents (64%) who have seen a black bear rated the experience as positive with relatively few people (4%) having a negative experience.

Bear Population Demands

<u>Public opinions about current bear populations</u>

As of 2020, most Virginia citizens were satisfied (either slightly, mostly, or completely) with the size of the current statewide black bear population (Responsive Management 2020). Of the people that had an opinion (20% didn't know), 66% of Virginia citizens were satisfied and only 9% were dissatisfied with the size of the current bear population; 25% were neither dissatisfied nor satisfied. Scored on a 7-point scale where

1 = completely dissatisfied,
2 = mostly dissatisfied,
3 = slightly dissatisfied,
4 = neither dissatisfied/satisfied,
5 = slightly satisfied,
6 = mostly satisfied, and
7 = completely satisfied,

Virginia citizens where slightly-to-mostly satisfied with the current bear population (statewide mean satisfaction score = 5.25).

However, depending on their bear-related experiences, interests in bears, and where they live, Virginia citizens represent widely diverse groups of stakeholders often with very different opinions about bear populations. Important groups of stakeholders with especially heightened interests in bears include bear hunters, agricultural producers, bear-country residents, and ecologically minded citizens.

In a 2020 survey of license holders (Responsive Management 2020), a large majority of bear hunters (75%) were satisfied with the size of the current black bear population where they hunt; only 17% were dissatisfied and 8% were neither satisfied nor dissatisfied. On average, bear hunters were uniformly satisfied with the current bear populations where they hunted (statewide mean satisfaction score = 5.11) (Figure 21). Only bear hunters in Zone 1 tended to be neither satisfied nor dissatisfied with the bear population.

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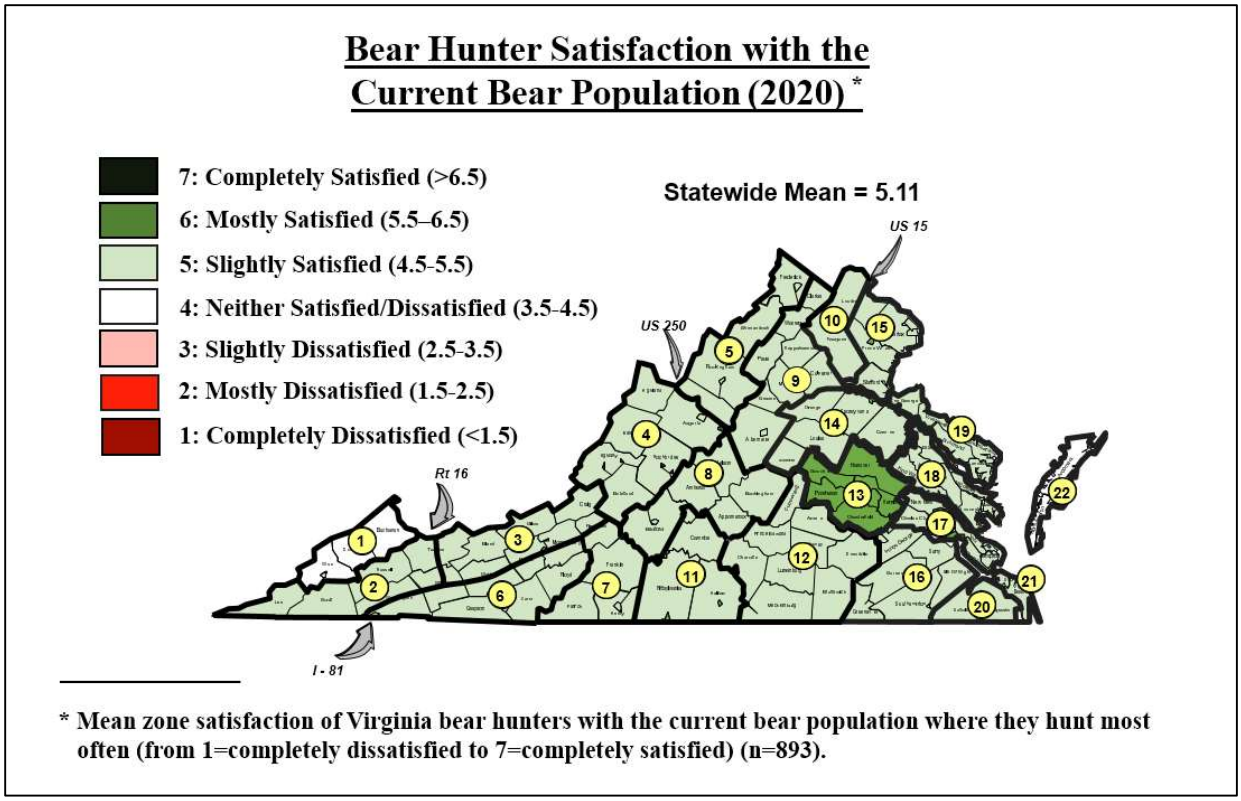

Figure 21. Satisfactions of bear hunters with the 2020 bear population in the zone where they hunted most often.

A 2020 survey of all Virginia Farm Bureau members (Responsive Management 2020) found that agricultural producers were generally satisfied with the bear populations where they farmed. Most agricultural producers (55%) were satisfied with the size of the current black bear population where they farmed; 29% were dissatisfied and 16% were neither satisfied nor dissatisfied. Because many farmers raise commodities that are not especially vulnerable to bear depredations (e.g., tobacco, cotton), opinions about bear populations and damage vary widely among agricultural producers. For the purposes of bear management, the agricultural stakeholders of specific interest are the vulnerable subgroup of farmers who produce commodities which often have damage from bears. Although they do not embody the full spectrum of agricultural producers who might be vulnerable to bear damage, Farm Bureau members who produced either (1) both cattle and grain, or (2) bees/honey had especially negative opinions about bear populations where they farm. As such, the satisfactions/dissatisfactions with bear populations of this subgroup were assumed to represent the opinions of all agricultural interests vulnerable to bear damage. Relative to where they farmed, vulnerable agricultural producer satisfactions with current bear populations varied widely across the state (statewide mean satisfaction score = 3.86, Figure 22). Vulnerable producers were generally dissatisfied with current population levels in the western zones (especially in zones 1 and 2) where bear populations are relatively high (Figure 13), but more satisfied in eastern areas with lower bear densities.

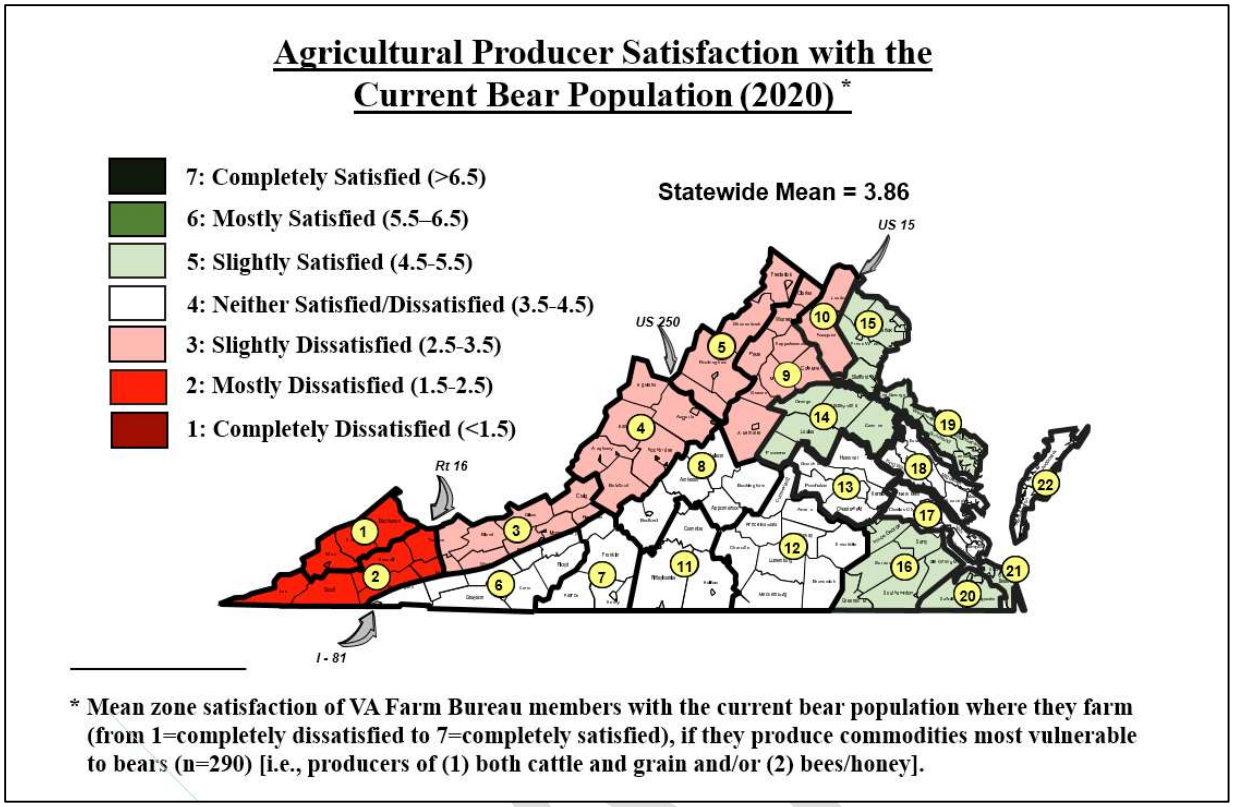

Figure 22. Satisfactions of vulnerable agricultural producers with the 2020 bear population in the zone where they farm.

Considering those residents who viewed bear concerns as an important consideration for bear management, people were generally satisfied with the current bear populations in their neighborhoods (mean satisfaction score = 5.60) (Figure 23). Although seemingly contradictory, top reasons for residents not being fully satisfied with the bear populations in their neighborhood included the lack of opportunities to see or photograph bears, bears had caused problems to homes and property, and the perception that bears were a threat to safety.

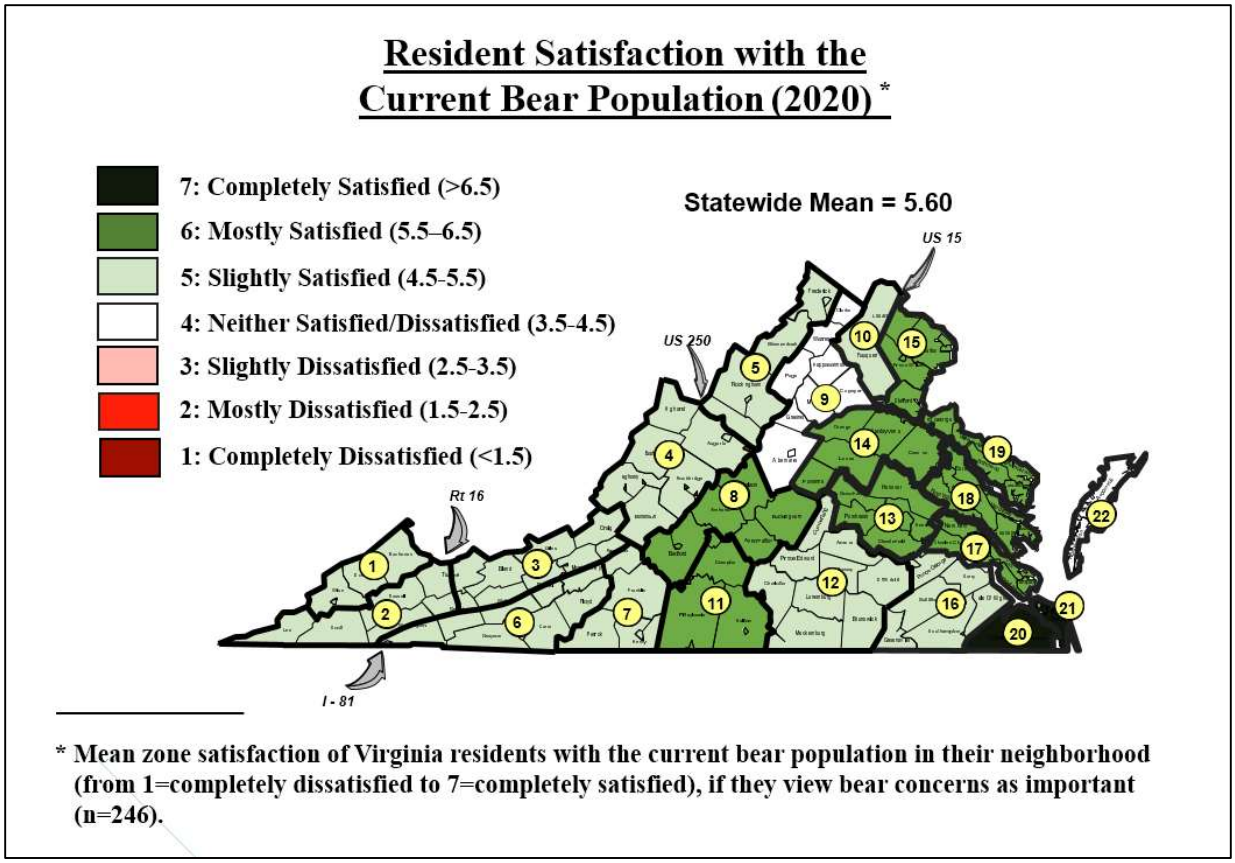

Figure 23. Satisfactions of residents (who view bear concerns as important) with the 2020 bear population in the zone where they live.

Citizens with keen conservation and ecological interests can have especially strong feelings regarding the management of wildlife populations and natural resources. Screening questions in the 2020 survey of Virginia citizens (Responsive Management 2020) identified the quartile of respondents with the greatest ecological interests. When asked about their satisfaction with current bear populations throughout the state, these ecologically minded citizens were more satisfied than any other stakeholder group (mean satisfaction score = 5.74).

Public opinions about population management alternatives

Different public demands for recreation, damage management, and environmental interests, also result in different stakeholder desires and expectations for future population levels of bears. While zone-specific variations will exist, statewide satisfactions with hypothetical population level alternatives provide general insight about the different desires and perceptions among stakeholder groups (Table 2).

Compared to other population alternatives (great increase, slight increase, slight decrease, great decrease), bear hunters, residents, and ecologically minded citizens all expressed the highest level of satisfaction with the current bear populations (Table 2). To varying degrees, any potential increase or decrease in bear population levels resulted in lower levels of satisfaction for these stakeholder groups. While remaining relatively high, satisfactions actually decreased for both bear hunters and ecologically minded citizens with any population increase. Bear hunters and ecologically minded citizens expressed their strongest dissatisfaction with a great decrease in population levels (mean satisfaction scores of 2.62

and 1.99, respectively). Unlike bear hunters and ecologically minded citizens, residents would be most dissatisfied with a great increase in their neighborhood population levels (mean satisfaction score = 2.11).

Table 2. Mean statewide satisfaction 1 of different Virginia stakeholder groups (at meaningful scales of interest) with bear population management alternatives during 2020.

Stakeholder Group	Scale	Population Management Alternative				
		Great Increase	Slight Increase	Current Size	Slight Decrease	Great Decrease
Bear Hunters	Where they hunt most often	4.42	4.84	5.11	3.37	2.62
Vulnerable Agricultural Producers	Where they farm	2.17	2.80	3.86	4.09	4.17
Residents	In their neighborhood	2.11	2.98	5.60	4.34	3.53
Ecologically Minded Citizens	Throughout the state	4.37	5.32	5.74	3.28	1.99

1 = Completely dissatisfied
2 = Mostly dissatisfied
3 = Slightly dissatisfied
4 = Neither dissatisfied nor satisfied
5 = Slightly satisfied
6 = Mostly satisfied
7 = Completely satisfied

Not surprisingly, and different from other stakeholders, vulnerable agricultural producers would generally be most satisfied with a great decrease in population size (statewide mean satisfaction score = 4.17). But similar to residents, vulnerable agricultural producers would also be most dissatisfied with a great increase in population size (statewide mean satisfaction score = 2.17).

Cultural Carrying Capacity

The joint impact of all public demands for bears (both negative and positive demands) results in the cultural carrying capacity (CCC). Sometimes called the wildlife stakeholder acceptance capacity, the cultural carrying capacity is the relative population level of bears that is acceptable to a community of stakeholders (i.e., the number of bears that can coexist compatibly with the human population in a given area) (Carpenter et al. 2000). The CCC is a function of both perceived and real outcomes (considering both beneficial and undesirable outcomes) associated with interactions between people and bear populations (Lischka et al. 2008). It is different for each constituency, location, and point in time. For example, a farmer experiencing corn damage from bears in August may have exceeded their tolerance and desire fewer bears in the area. However, for the park visitor hoping to see a black bear, population levels may be too low to provide sufficient viewing opportunities during the fall.

Although difficult to quantity, the CCC is ultimately a balance of and trade-off among the suite of diverse public demands involving social, economic, political, and biological perspectives. Based not only on stakeholder desires for perceived outcomes (e.g., assuming that a lower population of bears will result in less damage, assuming that more bears will improve hunting recreation), specific CCC population objectives should also include the actual outcomes on the fundamental goals of bear management (e.g., the real reduction in damage, that hunting recreation actually improved). While often subjectively derived, more objective determinations of CCC population levels can be aided by formal processes such

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as structured decision making to select population alternatives based on optimal trade-offs among important bear management goals and outcomes (Runge et al. 2013).

Especially in areas with higher human populations, the CCC is usually well below the BCC because the public acceptance and tolerance for bears will be exceeded before the habitat or other factors become limiting. In general, public values and tolerance for bears will limit CCC population desires to be well below biological carrying capacity.

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SUPPORTING DOCUMENTS

Life History and Biology of American Black Bear

The life history and biology of black bear are not covered in this plan. Persons interested in the life history and biology of Black bear should consult any or all of the following references:

- Demarais, S and P. R. Krausman. 2000. Ecology and management of large mammals in North America. Prentice Hall. 389 pp.
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An Evaluation of Bear Management Options

Adapted from the Northeast Black Bear Technical Committee publication: An Evaluation of Black Bear Management Options (2012). https://www.wildlife.state.nh.us/hunting/documents/bear-mgt-options.pdf

An Evaluation of Black Bear Management Options was co-edited by Jeremy E. Hurst, with the New York State Department of Environmental Conservation, Christopher W. Ryan and Colin P. Carpenter with the West Virginia Division of Natural Resources, and Jaime L. Sajecki with the Virginia Department of Game and Inland Fisheries. Regional contributions and technical review were provided by agency biologists who serve as members of the Northeast Black Bear Technical Committee, National Park Service biologists, Wildlife Conservation Society and additional black bear biologists in the southeastern United States.

Major Content Areas:
(1) Use hunting/ Trapping as a bear management tool;
(2) Minimize non hunting human mortality (poaching);
(3) Use of non-lethal techniques to reduce bear-vehicle collisions (wildlife crossings);
(4) Control bear populations with habitat management;
(5) Fertility control involves the use of chemical contraception (e.g. steroids, estrogens, and progestin);
(6) Allow nature to take its course;
(7) Public Education
(8) Remove/Secure food attractants to alleviate human bear conflicts;
(9) Use adverse conditioning and repellants to manage conflicts with bear populations;
(10) Use of Kill permits or capture and kill methods to resolve human bear conflict;
(11) Trap and transfer conflict bears to other locations;
(12) Damage compensations Programs to help alleviate financial cost of bear conflict;
(13) Supplemental feeding to augment natural food supplies

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This document concluded that management of black bear populations and mitigation of human bear conflicts involve integration of many management options, and no single option is best for every circumstance. However, the importance of public education and changes in human behavior for decreasing negative interactions between people and bears cannot be overemphasized. Many tools used in bear management programs only result in short-term solutions to resolving conflicts between people and bears. Successful bear management programs must incorporate bear population control measures with comprehensive education and attractant management programs to reduce human-bear conflicts.

Human-Black Bear Conflict: A Review of the Most Common Management Practices

Carl W. Lackey (Nevada Department of Wildlife), Stewart W. Breck (USDA-WS-National Wildlife Research Center), Brian Wakeling (Nevada Department of Wildlife; Association of Fish and Wildlife Agencies), Bryant White (Association of Fish and Wildlife Agencies). Produced by Association of Fish and Wildlife Services
https://www.fishwildlife.org/application/files/7315/2243/9066/DRAFT_AFWA_Human_bear_conflict_management_3-15-2018_R.pdf.

This publication provides wildlife professionals who respond to human bear conflicts with an appraisal of the most common techniques used for mitigating conflicts as well as the strengths and challenges of each technique in a single document. Because reducing conflict involves changing human behavior (e.g., securing trash), we begin with an assessment of the public's desires and role in conflict resolution in the context of the North American Model of Wildlife Conservation.

Major content areas include:
- The North American Model of Wildlife Conservation and human-bear conflicts
- Status of the American Black Bear
- Status of Human-Black Bear Conflict
- Methods to Address Human-Bear Conflicts
    - Public Education
    - Law and Ordinance Enforcement
    - Exclusionary Methods
    - Capture and Release
    - Aversive Conditioning
    - Repellents
    - Damage Compensation Programs
    - Supplemental & Diversionary Feeding
    - Depredation (Kill) Permits
    - Management Bears (Agency Kill)
    - Privatized Conflict Management
- Black bear Population Management
    - Regulated Hunting and Trapping
    - Control of Non-Hunting Mortality
    - Fertility Control
    - Habitat Management
    - No Intervention
- Agency Policy

This document stresses the need for public involvement when alleviating human bear conflicts. Integrating proven techniques into a long-term strategy will be more successful than seeking simple, quick fixes. Although non-lethal methods may reduce problems at specific sites, it is becoming increasingly unpopular to rhetorically blame bears for conflicts by labeling them as problem bears or

nuisance bears. Ultimately human behavior must change by reducing anthropogenic resources that cause human-bear conflicts. This process requires a different suite of tools and should be the primary focus for bear managers interested in lowering the potential for conflict.

Hunting with Hounds in Virginia

VDGIF. 2008. Hunting with hounds in Virginia: a way forward. Technical Report, Richmond, VA.

This 121-page peer-reviewed report was written by VDWR (then VDGIF) technical staff to inform the Hunting with Hounds in Virginia: A Way Forward process during 2007-2009. Major sections of the report included:

- Background information on the history and tradition of hound-hunting, modern trends impacting the sport, and rationale for addressing the issues in Virginia.
- A description of hound-hunting as currently practiced, including distribution of different styles and hunting for different species with hounds (e.g., deer, bear, foxes).
- Values associated with hound-hunting: biological, sociological, and economic.
- Concerns associated with hound-hunting: biological, sociological, and economic.
- Legal aspects of hound-hunting in Virginia, including state, federal, and local laws; a comparison of laws among states; and pragmatic issues impacting law enforcement.
- Approaches used to address the issues, ranging from nonregulatory approaches (e.g., education, hunter self-governance, stakeholder collaboration, property access management) to regulatory or statutory approaches (e.g., dog/hunter/club registration or permits, dog management laws, closures by season or area, complete prohibitions).

Hunting over Bait in Virginia

VDGIF. 2014. A study report on the effects of removing the prohibition against hunting over bait in Virginia. Report of Senate Joint Resolution 79. Richmond, VA. https://dwr.virginia.gov/hunting/study-reporthunting-over-bait.pdf. A video of staff presenting this report to the Board of VDGIF is available at: https://www.youtube.com/watch?v=qjNeuGYZS80.

Virginia Senate Joint Resolution 79, referred for study by the Senate Rules Committee following the 2014 General Assembly, directed VDWR (then VDGIF) to "study the effects of a removal of the prohibition against hunting over bait." VDGIF submitted a report to the General Assembly in November 2014 recommending that the prohibition on hunting over bait be maintained. The report outlined biological and sociological concerns with hunting over bait, including the following:

- Baiting frequently results in overabundant wildlife populations, especially deer, which can cause significant damage to human property (e.g., vehicles, crops) and wildlife habitat by over-browsing native vegetation.
- Baiting alters natural animal behavior, making them less "wild," which can lead to increased intra- and interspecific competition and increased conflicts between wildlife and people, habituation, and human safety issues.
- Baiting repeatedly and artificially congregates wildlife at the same location and increases the risk of disease introduction, amplification, and spill-over into other wildlife species, domestic livestock, and humans.
- A majority of hunters and non-hunters in Virginia and nationwide oppose hunting over bait because they think it violates the principle of "fair chase" hunting. Baiting jeopardizes the Public Trust, can create conflicts between hunters and between landowners, and erodes hunter image and agency credibility.

ACCOMPLISHMENTS OF THE 2012-2021 VIRGINIA BEAR MANAGEMENT PLAN

Progress in Meeting Plan Objectives

The 2012-2021 Virginia Bear Management Plan contained 26 objectives. The table and Figure 24 below provide a summary of progress toward meeting each objective since plan implementation in 2012 through October 2022. It is important to emphasize that the 2012-2021 Virginia Bear Management Plan, like other species management plans developed by DWR (e.g., deer, wild turkey, elk), was more aspirational than operational. Such plans intentionally include more than can be accomplished with finite resources; therefore, objectives of lower priority would not have received as much focus as others.

Objective by Goal Area	**Objective Met? (2012-2022)**	**Explanation**
Goal 1 - Population Viability		
Objective 1. To determine the viability status of the northern Piedmont and northern Tidewater black bear populations by 1/1/2017.	N. Piedmont –Yes N. Tidewater – No (Limited)	Harvest levels in N. Tidewater area are too low to assess population viability. Bears are rare to absent in most of this area; however, sufficient reports/observations around periphery of area lead local biological staff to conclude there is a marginally viable population. For the N. Piedmont Populations appear to be growing.
Objective 2. To establish minimum population and habitat criteria required for achievement of long-term viability in the northern Piedmont and northern Tidewater black bear populations by 1/1/2017.	N. Piedmont - Yes N. Tidewater - No	Minimum population and habitat criteria for population viability were not specifically assessed; however, bear population trends by Bear Management Zones with adequate harvest numbers for reconstructions were assessed.
Objective 3. To determine the most important risk factors that may prevent attainment and/or maintenance of the long-term viability of all eight Viability Region black bear populations by 1/1/2017.	No	This objective was not explored specifically; however, changes in CCC are likely to be most impactful. Specifically, trends in increasing human populations, development, and subsequent loss of habitat also have the potential to negatively affect bear populations. Impacts of disease (e.g., mange) on long-term bear viability are thought to be low, but is being closely monitored.
Objective 4. To implement management programs that achieve or maintain the long-term viability of all eight Viability Region black bear populations by 1/1/2018.	Yes	Population impacts of hunting seasons are evaluated annually and specific hunting regulations are examined every two years. Hunting seasons have been conservative in regions where viability is most likely to be of concern.

Objective 1. To meet and maintain bear population objectives at current or potential cultural carrying capacity (CCC) in each Bear Management Zone through 2021.	Mixed	Yes (or tentatively yes) in 10 zones; no (or tentatively no) in 8 zones; insufficient data in 4 zones. See section below entitled "Progress in Meeting Bear Population Objectives"
Objective 2. Assess and update bear population CCC objectives in each Zone through 2021.	Yes	A combination of public surveys, Wildlife Conflict Helpline data, kill permit issuance, and other metrics are used to assess shifts in CCC. Pop Objectives were amended in 2017 to meet CCC objectives.
Objective 3. In areas that have potential for conflict with the Zone objective (e.g., Zone 16, Zone 18, urban areas adjacent to established bear populations), change CCC to be consistent with population objectives through 2021.	Yes	Public survey results from 2020 along with population reconstruction suggests that public tolerance for bears has increased. Education about coexisting with bears has been a focus during this time.
Objective 4. To develop or continue management programs for local bear management areas within the larger management Zones through 2021.	Yes	This is ongoing, and examples include: kill permits, BearWise® Cost Share program for localities, BearWise® educational program, Master Naturalist educational program, BPOP and BCDAP (discontinued), fence equipment loaning program.
Goal 3 - Habitat Conservation and Management		
Objective 1. To refine specific bear habitat quality and associated habitat needs (e.g., amount, composition, linkages, diversity) that meet minimum population viability criteria for black bear populations through 2021.	Mixed	Habitat does not appear at this time to be a limiting factor for bear population viability. Suitable corridors and opportunities for improving connectivity were identified for wildlife species generally through the Virginia Wildlife Corridor Action Plan.
Objective 2. To ensure habitat requirements meet minimum bear population viability criteria in each of the eight Viability Regions for black bear populations through 2021	Mixed	See Objective 1 above.
Goal 4 – Recreational Opportunities		
Objective 1. To determine non-hunting demands/desires and satisfactions for bear recreation by 1/1/2017.	No	Public survey was completed in 2020 but did not specifically address non-hunting recreational demands.

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Objective 2. Inform the public about non-hunting recreational opportunities through 2021	Yes	The Virginia Wildlife Viewing Plan was completed with an emphasis on opportunities for viewing all wildlife. Statewide education programs specific to bears are ongoing (e.g., schools, nature clubs, festivals, direct work with communities).
Objective 3. To determine black bear hunter satisfactions (distinct qualities associated with hunting methods) and constraints to hunting participation in Virginia by 1/1/2016.	Mixed	Public survey conducted in 2020, bowhunter survey conducted annually, and general hunter survey conducted several times provided data. Dialogue/communication with bear hunters, general public, and landowners (private and public) is ongoing.
Objective 4. Consistent with black bear population objectives, to maintain diverse recreational bear hunting satisfactions from archery, muzzleloader, firearms without the use of dogs, firearms with the use of dogs, and bear-dog training seasons through 2021.	Yes	Maintain seasons for all legal hunting methods and added an early 3-day firearms season for bears only. Added and expanded seasons across the bear zones to meet management objectives.
Objective 5. Identify and manage for appropriate allocation of hunting opportunities among hunting methods by 1/1/2014.	Yes	Bi-annual regulations cycle accounts for appropriate allocations and changes in seasons
Objective 6. To develop and promote recreational programs and regulations that keep bears from being habituated to humans or human related food sources through 2021.	Yes	Ongoing public education, regulate and enforcement of applicable laws, provide on ground technical assistance.
Goal 5 - Ethics of Bear-Related Recreation		
Objective 1. To identify, describe, and document bear hunting activities (e.g., when, where, type of hunting) that result in conflicts with landowners and other Virginia citizens by 1/1/2015.	Mixed	Documented through public comments and law enforcement. Not all conflicts are documented.
Objective 2. Implement programs to reduce conflicts between bear hunting activities and other Virginia citizens (especially landowners) by at least 25% by 2021.	Mixed	Case by case efforts between hunters and private landowners but no holistic campaign. Fostering a working relationship between agricultural producers and bear hunters. Non- lethal kill permits allow for the utilization of hounds to haze bears.
Objective 3. To describe fair,	Mixed	Guides for bear hunting, educational programs, and

sportsmanlike, humane, and ethical bear hunting methods (including utilization) and implement programs that ensure compliance with these methods by 1/1/2015.		videos for a variety of recreational groups. Maintained and enforced laws related to bears. Have not done additional surveys/focus groups.
Objective 4. To identify and manage non-hunting bear-related recreational activities that result in conflict with Virginia citizens by 1/1/2018.	Mixed	Have maintained and enforce laws pertaining to feeding. Provide guidance on securing of attractants for recreationists and residents (e.g., BearWise® program)
Goal 6 - Human-Bear Problems		
Objective 1. To implement and review explicit and cost-effective response policies/guidelines that utilize both non-lethal and lethal options for managing bear complaints through 2021.	Yes	Revised our policies/ guidelines, formulated consistent protocols for response to conflict, provide educational programs, updated, and provided educational handouts.
Objective 2. Encourage and support effective bear management options to reduce negative human bear interactions through 2021.	Yes	BearWise® programs, educational materials and programs, Wildlife Conflict Helpline, recreational hunting, kill permits, enforcement of feeding laws.
Objective 3. To identify, develop, and implement site-specific management options for unique bear management situations through 2021.	Mixed	BearWise® programs, educational materials and programs, Wildlife Conflict Helpline, recreational hunting, kill permits, enforcement of feeding laws. Discontinued BPOP/BDCAP; replacements can be considered.
Objective 4. Promote citizen initiatives that prevent negative human-bear interactions though 2021.	Yes	Bear Aware program and now BearWise® program. Provide input on local ordinances.
Objective 5. To reduce the requests for out-of-season bear kill permits for agricultural bear damage by at least 50%, by 2016	No; mixed	Kill permit issuance has not decreased in many areas. Developed non-lethal alternatives, educational and technical resources, fostering a working relationship with agricultural producers and hunters. Have tried to clarify interpretation of kill permit code to standardize statewide.

Progress in Meeting Bear Population Objectives

Population objectives were revised for all bear management zones in 2012; objectives were revised again for 6 mountain zones (i.e., 2,3,4,5,9, and 10) in 2017. Figure 24 below shows the objectives and whether they were met over the corresponding time periods.

Primary data used to assess whether these objectives were met included trends in harvest data and population reconstruction modeling based on harvest totals by age class (Appendix 3). Although population reconstruction correlates with harvests over the long term, such estimates lag several years behind the actual collection of age and kill data. Secondary data used to assess population trends include

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metrics associated with complaints, kill permit issuance, reports of mange, etc. as well as anecdotal information provided by hunters, farmers, residents, and staff.

For some of the zones where objectives were changed in 2017, more years of data will be required to definitively assess trends. With variability observed in bear harvest year to year, 5 years was an insufficient time period to determine if some trends were statistically significant; therefore, determinations about trends in these zones are tentative. In several Tidewater and N. Piedmont zones (i.e., 15, 17, 18, and 19), harvest levels and other data were insufficient to determine a trend.

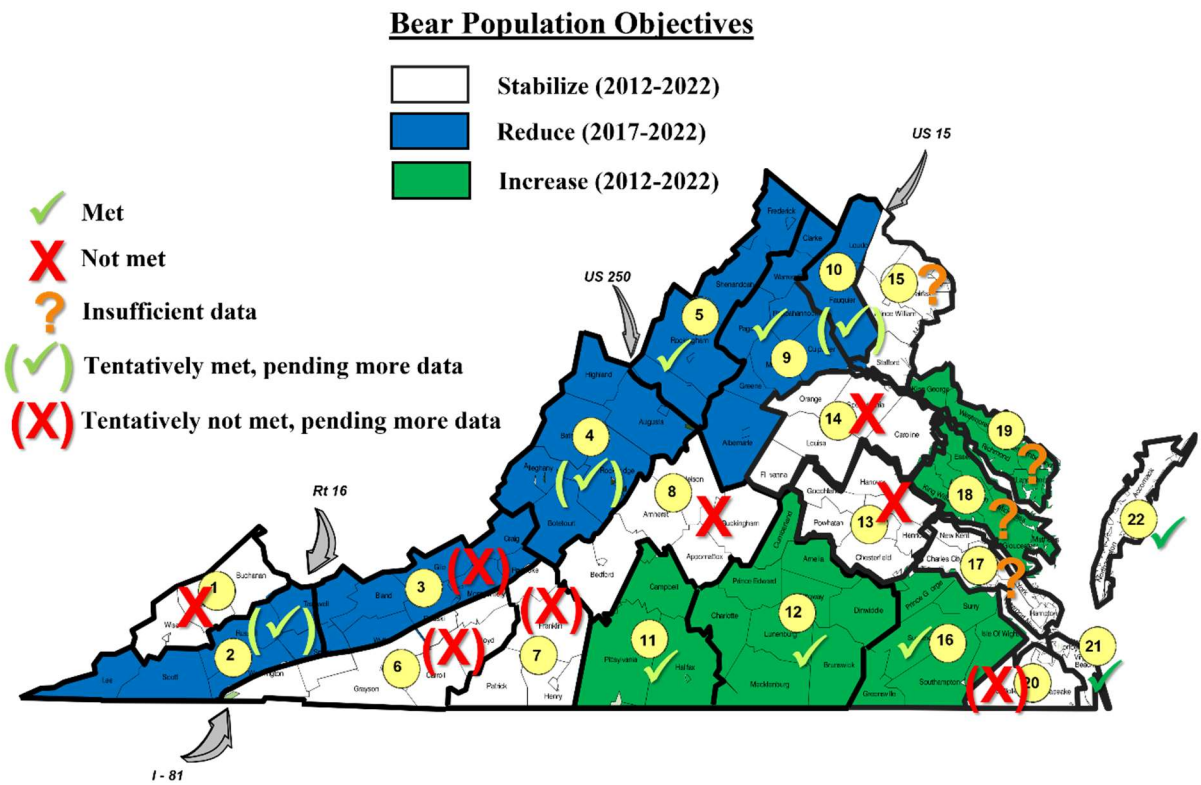

Figure 24. Progress in meeting bear management objectives by zone over relevant time periods.

MISSION, GOALS, OBJECTIVES, AND STRATEGIES

This section of the plan outlines and describes the goals for black bear management in Virginia through 2032. At the highest level, these bear management goals align with the mission and goals of the Virginia Department of Wildlife Resources (DWR), which are to:

- **Conserve** and manage wildlife populations and habitat for the benefit of present and future generations.
  - DWR Goal 1: Conserve sustainable and diverse native wildlife populations and ecosystems.
  - DWR Goal 2: Manage wildlife populations and habitats to meet the balanced needs among diverse human communities.
- **Connect** people to Virginia's outdoors through boating, education, fishing, hunting, trapping, wildlife viewing, and other wildlife-related activities.
  - DWR Goal 3: Recruit, retain, and re-engage people who enjoy wildlife and boating activities.
  - DWR Goal 4: Promote people's awareness and appreciation of their role in wildlife conservation.
- **Protect** people and property by promoting safe outdoor experiences and managing human-wildlife conflicts.
  - DWR Goal 5: Minimize wildlife-related conflicts while balancing conservation goals and human benefits.
  - DWR Goal 6: Promote public safety for all people enjoying Virginia's wildlife and waterways.

The Citizens Advisory Committee (CAC, Appendix 1) and Interagency Advisory Committee (IAC) worked with DWR staff to revise goals from the 2012-2021 Bear Management Plan related to bear populations, habitat, bear-related recreation, and human-bear conflicts and to develop a new goal addressing bear health and welfare. These goals reflect the values of a diverse public and are broad statements of principles and ideals about what should be accomplished with bear management in Virginia. The goals articulate fundamental outcomes as well as important process guidance from the public on preferred approaches to achieve these stated outcomes. Simultaneously, overarching values and principles were identified as a mission for bear management, which describes why and how bears should be managed in Virginia.

Based on these goals, the Bear Plan Technical Committee (BPTC, Appendix 1), in consultation with the CAC and IAC, developed specific objectives to help guide the successful attainment of each goal. Objectives are the technical expression of the public vision, expressed as goals. Some objectives used in this plan are intended to be quantifiable and/or have milestones for achievement; however, the entire set of objectives ultimately functions more as a "checklist" for achieving goals.

Potential strategies, which clarify how each objective should be met, were developed by BPTC and reviewed by CAC and IAC. While this is not an operational plan detailing all specific steps or actions to achieve objectives, these strategies represent some approaches, techniques, and programs that will be considered to accomplish objectives. As with objectives, decisions about what strategies to use are largely the technical realm of wildlife professionals, but still with input and considerations about what techniques are most acceptable to the public. This revised plan includes several new strategies highlighting the need for improved metrics to better track important trends (e.g., bear populations, human-bear conflicts). Staff will need to continue to develop improved metrics across all goal areas of the plan.

The broad mission and goal statements are much less likely to need amending before the next major plan revision than objectives and strategies. While goals should remain relatively constant over time, specific objectives and strategies will need flexibility to respond to changing social, environmental, technical, and administrative conditions. Objectives and/or strategies may be added, deleted, or amended by DWR as new information or circumstances demand. DWR staff will submit any interim updates to the

CAC and IAC for review. Updated objectives will be provided as addenda to the Plan on the agency website.

It is important to emphasize that this bear management plan, like other species management plans developed by DWR (e.g., deer, wild turkey, elk), is more aspirational than operational. These plans intentionally include more than can be accomplished with finite resources.

Mission: ***Sustainably manage black bears as a wild, free-roaming public trust resource in a manner that serves the needs and interests of the citizens of the Commonwealth.***

Manage black bear populations, bear habitat, bear-related recreation, human-bear conflicts, and bear health and welfare using sound, applied science-based approaches that:

- ***are flexible;***
- ***are proactive;***
- ***are ecologically responsible;***
- ***are ethical;***
- ***have impacts at relevant scales (local, regional);***
- ***are applied consistently;***
- ***are accountable and transparent;***
- ***are collaborative with other agencies, partners, and the public;***
- ***are holistic, considering consequences on other species, neighbors, and stakeholders; and,***
- ***Foster public awareness, understanding, and engagement through accurate and objective bear-related information and education.***

These overarching values and principles establish, at the most basic level, why and how black bears should be managed in Virginia. DWR has a legislative mandate (§29.1-103) to manage black bears and other native wildlife in Virginia as a public trust for all citizens. Successful bear management depends not only on the best scientific information and techniques, but also the support and engagement of a diverse public. Bear management is the shared responsibility of DWR, other agencies, partners, and the public.

Eleven (11) fundamental outcomes were identified within the six goals that follow (Table 3). Guided by overall statewide priorities for these fundamental outcomes as provided by the Citizen's Advisory Committee and the Bear Plan Technical Committee, DWR Wildlife Division management staff adopted priorities for zone outcomes that reflected differences in local land use, bear populations, and human densities. These weightings will help direct limited bear program resources toward the most important areas of work (Appendix 4).

Table 3. Fundamental outcomes, by goal, for bear management in Virginia.

Goal 1 - Population Viability	
1. Population Viability	
Goal 2 - Population and Cultural Carrying Capacity (CCC)	
2. CCC Population Level	
Goal 3 - Habitat Conservation and Management	
3. Habitat Management	
Goal 4 – Bear-related Recreation	
4. Hunting Recreation	5. Non-hunting Recreation
Goal 5 - Human-Bear Conflicts	
6. Agricultural Conflicts	9. Vehicular Conflicts
7. Residential Conflicts	10. Human Health & Safety Conflicts
8. Recreational-Bear Conflicts	
Goal 6 – Bear Health and Welfare	
11. Bear Health & Welfare	

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Goal 1 - Population Viability

Ensure the long-term viability of bear populations in each of the eight Viability Regions in Virginia (Figure 24).

This goal primarily addresses the "conserve" tenet in the agency mission (DWR Goal 1). Although bear populations have been expanding across the Commonwealth, the long-term population viability of bears in Virginia should continue to be guaranteed. In simple terms, a minimum viable population is the smallest isolated number of individuals that are able to reproduce and maintain the population from one generation to another. Approximating general physiographic province boundaries (or portions thereof), eight broad Viability Regions were considered for population viability objectives (Figure 25). Minimum viability standards will be established to maintain a viable black bear population somewhere in each of the eight Viability Regions of Virginia. Biologically sound ecosystem management approaches should be the basis of maintaining viable bear populations. Because ecosystems (and bears) do not recognize artificial administrative boundaries, coordinated monitoring and management approaches among Virginia's Viability Regions and neighboring states will be necessary.

<u>Objective 1.</u> Maintain minimum population and habitat criteria required for achievement of long-term viability in each Viability Region.

Habitat and population requirements need to be established, maintained, and updated to ensure long-term population viability for black bears in Virginia. These area-specific thresholds should be based on the best information that is cost-effectively obtainable. Because accurate estimates of population size and characteristics are difficult and expensive to obtain across all areas, these minimum criteria will be based heavily on indices of bear habitat and populations.

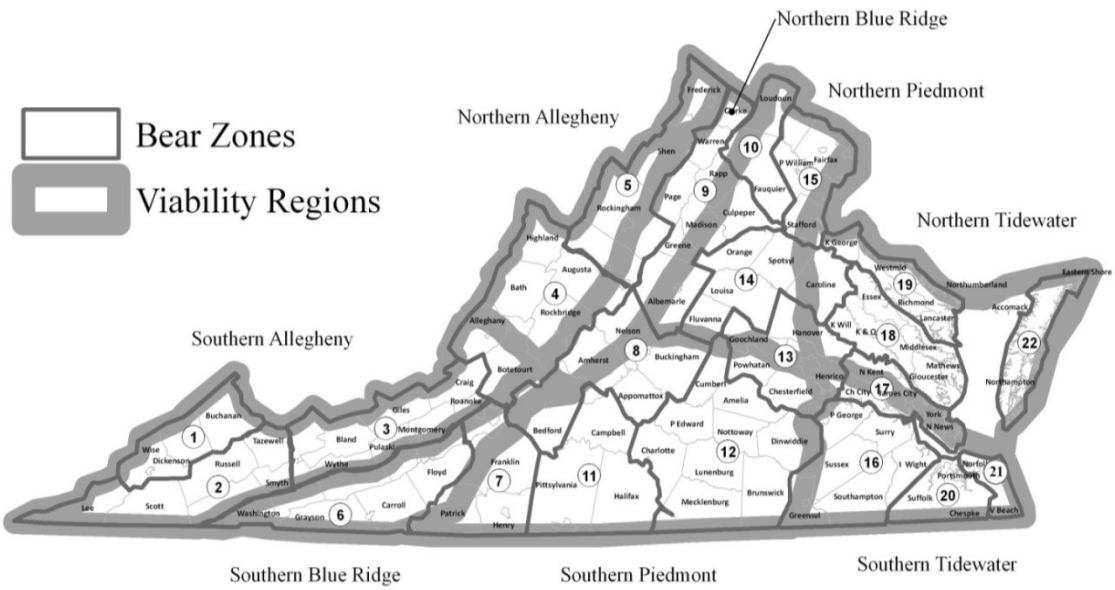

Figure 25. Population viability regions for black bears in Virginia.

<u>Potential Strategies</u>

a. Use a combination of approaches (including literature review, expert opinion, site-specific information, and population/habitat modeling) to establish minimum viability criteria for black bear populations.

b. Conduct site-specific research to improve the assessments of minimum viability criteria for black bear populations.

c. Evaluate the relationship between the population monitoring indices and minimum viability criteria for black bear populations.

<u>Objective 2.</u> To determine the most important risk factors that may prevent attainment and/or maintenance of the long-term population viability in each Viability Region.

Although bear populations have been growing across Virginia in recent decades, these populations are still exposed to factors that could negatively affect population viability over the long term. These potentially limiting risk factors could include changes in population demographics, genetics, environmental influences, diseases, human impacts, and habitat concerns. Describing,

evaluating, and prioritizing these area-specific risks will be essential to maintaining management programs that address population viability goals.

Potential Strategies

a. For black bear populations in each Viability Region, evaluate risk factors that might prevent the attainment and/or maintenance of population viability. Potential risk factors should consider population demographics (e.g., changes in births, deaths, and population growth), genetics (e.g., inbreeding concerns), environmental influences (e.g., disease, competitors, pollutants, natural catastrophes), human impacts (e.g., roads, urbanization, poaching, illegal trade), and habitat concerns (e.g., corridors, forest composition).
b. Continue efforts to work and collaborate on the Virginia Wildlife Corridor Action Plan to reduce vehicle-wildlife conflicts (e.g., pursue federal funding for and establish bear crash countermeasures such as wildlife crossings).

Objective 3. ***To implement management programs that achieve or maintain the long-term population viability in each Viability Region.***

Population status, viability requirements, and risk assessments should determine the design and implementation of management programs for long-term bear population viability. Implementation might focus on educating and enlisting the help of stakeholders, coordination among management and resource organizations, habitat connectivity, and other identified limiting factors. Management program effects should be monitored and modified as necessary.

Potential Strategies

a. Programs should have an educational component that informs the public about population viability objectives and management approaches.

b. Programs should place priority on addressing the most important risk factors for the geographic bear populations that fail to meet minimum viability criteria.

c. Addressing the specific limiting factors in each Viability Region, use a combination of appropriate approaches (e.g., interagency coordination, regulations, education, habitat management, establishment of sanctuaries) to implement management programs.

d. Monitor changes in population and age structure and assess annual variation in reproduction and mortality, using multiple population assessment and modeling tools (e.g., non-harvest data, Bayesian statistics, Monte Carlo simulations, hierarchical modeling).

e. Through research and monitoring activities, determine the efficacy of implemented management programs to achieve or maintain the long-term viability of black bear populations in each Viability Region.

f. Modify programs to improve efficacy in achieving and/or maintaining the long-term viability of black bear populations in each Viability Region.

g. Promote a positive image of bears through education, transparency, and outreach.

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Goal 2 - Population and Cultural Carrying Capacity (CCC)

Manage current and projected bear populations at levels adaptable to a changing CCC (e.g. land use, property concerns, economics, and recreational opportunities).

- ***The goal of maintaining or achieving long-term population viability (per Goal 1) is of higher priority, even when CCC is exceeded.***
- ***Both public attitudes and bear population size should be managed to meet current and projected bear CCC objectives.***
- ***Maintain black bear populations while recognizing ecological considerations and balancing the needs of other species.***
- ***Regulated hunting is the preferred method of direct population management, where appropriate and feasible.***

This goal primarily addresses the tenet of the agency mission to "conserve and manage wildlife populations and habitat for the benefit of present and future generations." Implicit in this statement is the need to balance the human benefits and costs associated with bear populations (DWR Goal 2); therefore, both the "connect" (e.g., recreation; DWR Goal 3) and "protect" (e.g., human-wildlife conflicts; DWR Goal 5) tenets of the agency mission are implicated in this goal, as well.

Cultural carrying capacity (CCC) is defined as the number of bears that can coexist compatibly with humans. At CCC, the bear population is in balance with positive demands for bear (i.e., recreation) and the negative demands (i.e., damage). CCC is a function of the tolerance levels of human populations to bears and the effects of bears, including perceived impacts on other species of interest (e.g., white-tailed deer). CCC can vary widely within and among communities. The CCC level for bears generally occurs well below the biological carrying capacity (BCC); BCC is the maximum number of bears that a habitat can sustain over time.

Bear populations should be managed to meet both population viability and CCC goals. While traditionally bear populations have been manipulated to meet CCC objectives, public attitudes (i.e., CCC desires) can also be addressed to meet bear population levels. Public tolerance (CCC) of bears can often be increased with additional information and resources on how to coexist with bears.

Although there are several techniques for managing bear populations in different circumstances, tradition, management efficiency, and cost effectiveness necessitate the use of hunting as the primary bear population management strategy for free-ranging bears across most of Virginia. For the purposes of this plan, hunting refers to the legal pursuit and/or taking of wild animals under fair chase conditions for recreational and/or management purposes.

Objective 1. ***Assess, and update as necessary, bear population objectives in each Bear Management Zone biennially beginning in 2024 (Figure 26).***

As bear populations, land use, human populations, and recreational values change, so will the public acceptance of bears. The CCC can constantly change over time within any management Zone. Therefore, the CCC objectives need to be updated periodically to ensure that population management programs respond to changes in public demands for bears.

Black bear populations should be managed to achieve current or potential CCC over the smallest area that is practical. In Virginia, 22 Bear Management Zones represent practical management units based on physiography, black bear populations, land use patterns, human population densities, land ownership, black bear biology, and resources available to manage bears.

Public values provide the foundation for determining CCC and the resulting proposed population objectives in each Zone. Bear population management objectives to meet the CCC are based on the balanced, albeit somewhat subjective, combination of public values expressed for bear-related recreation, human-bear interaction concerns, and their role in the ecosystem.

CCC objectives in each Bear Management Zone meet one of three practical population targets. These population targets are to (1) increase the current bear population, (2) stabilize the bear population at the current level, or (3) decrease the current bear population. CCC population objectives are not necessarily related to the current population trends or even the relative population size. Instead, they are intended to simply reflect a balanced assessment of the Zone-wide public values. These public values (e.g., public population preferences, hunter population preferences, agricultural producer tolerance for bears) and other available technical information that may influence public values (e.g., bear density indices and trends, current and projected nuisance problems, human population densities, future development potential) were considered via a structured decision-making process to model CCC for each Zone (Appendix 5). The resulting CCC population objectives for each Zone in are shown in Figure 26.

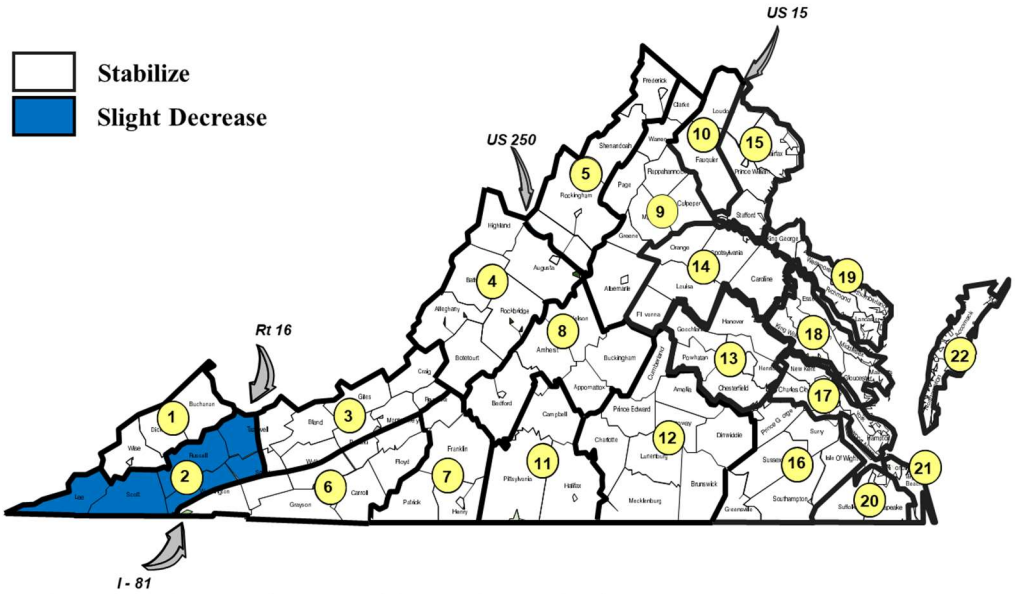

Figure 26. Bear population objectives for each Zone, 2023-2032, relative to 2020 bear population levels (the year public survey data was obtained).

Potential Strategies

a. Based on social, economic, political, and biological perspectives develop methods to determine and update CCC in all Zones. Use a variety of public involvement techniques (e.g., focus groups, surveys, public meetings, local government coordination) to include input from all segments of Virginia's population.

b. Continue to refine and develop more objective techniques to determine CCC objectives and anticipated future changes (e.g., structure decision making).

c. Continually acquire improved data that is more sensitive to bear populations and public desires related to bears. Where appropriate, use multiple population assessment and modeling tools (e.g., non-harvest data, Bayesian statistics, Monte Carlo simulations, hierarchical modeling).

Objective 2. To meet and maintain bear population objectives in each Zone.

Appropriate options to manage populations will be selected based on CCC objectives, viability status, and current population trends. Due to its efficacy, cost- effectiveness, tradition, and recreational value, regulated hunting will be a primary bear population management option. While regulated hunting is highly effective for controlling and managing bear populations (e.g., stabilizing or decreasing), conservative hunting seasons also are compatible with objectives to increase bear populations. Slow growth through natural increases will be the preferred option to increase bear populations. Education and cooperation with large public landowners will remain important strategies toward meeting CCC population management objectives. Although site-specific needs may require morel localized actions within a zone (see objective 4 below), attainment of the Zone-wide CCC objective will be based on population indices from across the entire Zone and will determine the general population management program and hunting seasons.

Potential Strategies

a. Where it is necessary to control or reduce bear population numbers in order to stabilize the local population, regulated hunting will be the primary population management option.

b. Where hunting is inappropriate, other management options will be used to control bear populations to reach the objective (e.g., trapping and removal)

c. Population growth objectives (increases) will be attained through a natural increase in bear populations; only in rare cases would bears be moved from one Zone to another for the purpose of increasing a population.

d. Cooperate with public entities (National Park Service, USFW, USFS, etc.) to meet the objectives of adjacent land ownerships through implementation of appropriate population management programs (e.g., habitat management, hunting, other options).

e. Collaborate with local governments and planning organizations regarding human population and land use impacts on bear populations.

f. Through research and monitoring activities, determine the efficacy of implemented management programs to achieve objectives.

g. Identify limiting factors to meeting population objectives (hunting seasons, habitat, agriculture, disease, etc.).

Objective 3. Increase public tolerance for bear populations, especially in areas where there is potential conflict with a zone objective or where population viability may be at risk.

Population CCC objectives may create local issues for some stakeholders in certain zones. In areas where bear population objectives may exceed current levels of CCC, attainment of bear population objectives may depend on raising the CCC. Increased knowledge and better understanding of black bears could lead to increased public tolerance of bears and raise CCC to match the population objective.

Potential Strategies:

a. Foster an understanding of how to coexist with bears and increase acceptance of bear populations through public education. Public education should accompany/precede attainment of population objectives.

b. Identify-and target appropriate stakeholders and organizations.

c. Monitor attitude changes over time through surveys that target the public, hunters, public officials, etc.

d. Conduct research that identifies how public tolerance (CCC) interacts with bear population viability criteria. Research considerations should include land use, human density, distribution, and income levels, bear density and distribution, conflict management responses, and level of public education.

e. Research may involve field components to understand bear behavior in proximity to humans, assessment of public demands and satisfactions, and surveys of areas with frequent bear/human interactions.

Objective 4. To develop or continue management programs for local bear management areas within the larger management Zones.

While CCC provides Zone-wide population objective targets, the Zone objective will not always be uniformly attained across the entire Zone. Regulations on bear hunting are designed purposefully to apply to large areas with similar population characteristics (i.e., Zones), be as simple and uniform as possible, and avoid confusion. Because habitats, densities, hunter pressures, human-bear problems, and public demands (CCC) are not exactly the same over entire Management Zones, regulations encompassing these broad areas may be either too conservative or too liberal at specific sites within Zones.

To meet the unique management needs and challenges in such areas, alternative site-specific management regulations (e.g., urban vs. rural areas, high human population) and programs must be developed and implemented. Local bear management areas may include refuges; state parks and forests; cities, towns, and developed sections of counties; resorts and planned communities; industrial or utility developments; military installations; government research facilities; airports; agricultural areas; and any other areas that merit bear population management assistance beyond that provided on a Zone-wide basis (e.g., hunting regulations).

Potential Strategies

a. Educate the public about the need for local bear population management.

b. Consider smaller units of management for site-specific management of bear populations through regulated hunting seasons or targeted non-lethal management programs.

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c. Encourage the management of and reduce bear-related attractants that unnaturally draw bears into high human density areas by providing technical assistance to communities and through promoting our BearWise® cost share program.

d. Develop and maintain programs for site-specific management of bears.

Objective 5. ***Continue to evaluate/monitor the relationship between bears and other wildlife species.***

While bears generally do not have significant impacts on other species of flora and fauna, there are some situations where impacts may occur. As an omnivore that consumes plant and animal matter, black bears may impact other wildlife species through competition for food or through direct predation. Although some studies have shown that bears can be a primary predator of deer fawns, whether that predation actually limits deer population growth is a critical question that remains open and is highly complex. Recent concerns about deer population levels in National Forest areas of Virginia have implicated several potential factors including habitat issues (e.g., lack of timber management) and predator impacts (e.g., coyote, bears). A recent study (2019-20) in Bath County, Virginia concluded that fawn mortality due to bears, coyotes, and bobcats was not preventing the deer population from sustaining or perhaps even growing slowly. The nature of fawn predation is site specific and could be dependent upon a number of factors, including habitat types, habitat quality, the predator community in an area, underlying densities of each fawn predator, and local deer densities. In addition, impacts from predation may change through time depending upon how close the deer population is to BCC.

Potential Strategies

a. Continue to evaluate/monitor the impacts of bears on deer populations.

b. Develop an understanding of potential bear impacts on other wildlife species through predation, habitat selection, and foraging behavior studies, especially in areas of public concern.

Goal 3 - Habitat Conservation and Management

Manage and conserve black bear habitat in Virginia consistent with long-term bear population objectives, with emphasis on areas of special significance (e.g., areas with source populations and habitat linkages) considering potential habitat changes, and potential human-bear interactions. Conservation may consist of habitat management or protection that benefits multiple species.

This goal primarily addresses the "conserve" tenet in the agency mission (DWR Goals 1 and 2). The availability of suitable bear habitat is key to managing black bears to meet specific population viability and CCC goals. Habitat management practices that affect habitat diversity, forest succession, land use, and habitat connectivity will have major implications for bear population management and human-bear conflict concerns. Habitat management practices which promote a diversity of habitat types and productivity (natural food sources), will likely benefit bears. Conversely, habitat management practices (or the lack thereof) which decrease habitat diversity or productivity will likely be detrimental to bear populations. Continued education and outreach on the benefits of active forest management, particularly on large contiguously forested landscapes (primarily west of the Blue Ridge) are necessary to accomplish habitat goals for bears and potentially reduce human-bear conflicts due to providing a greater abundance of natural food sources. As climax forests (composed of species such as American beech, tulip poplar, sugar maple) replace forests historically dominated by oaks and hickories, the loss of hard mast

crops, such as white oak and red oak acorns, will have potential negative impacts on bear populations and human-bear interactions.

Increasing urbanization and human population growth across portions of Virginia will have direct impacts to bear habitat and thus bear population viability and CCC. The human population in Virginia grew by nearly 7.4% from the 2010 to the 2020 census, an addition of more than 600,000 people. While much of this growth centered along the Interstate 95 corridor (from Loudoun County south to Virginia Beach), pockets of growth also occurred along the Interstate 81 corridor, particularly the Roanoke/Montgomery County area and from Rockingham County east to Charlottesville (US Census, 2020). These western localities have been bear strongholds for many decades, but increasing concerns about habitat connectivity and instances of bear-vehicle collisions in these areas warrant additional monitoring and evaluation for mitigation. Habitat fragmentation and corridor connectivity will likely become increasingly important issues for bear habitat management through the duration of this bear plan.

Objective 1. ***To refine specific bear habitat quality and associated habitat needs (e.g., amount, composition, linkages, diversity) to meet population viability and achieve population objectives.***

The estimated minimum area needed to support a viable bear population (approximately 80,000 acres for forested wetlands or 200,000 acres for forested uplands) are broad generalizations for the southeast region and are only based on observational data. These estimates may not be representative of habitat conditions across Virginia's diverse physiographic provinces. Thus, regional physiographic differences in habitat quality need to be accounted for when determining habitat requirements to achieve minimum population viability and CCC goals. Improved technologies in bear research and monitoring (GPS enabled collars, satellite linkages for data transmission, aerial photography/drone usage for habitat assessments, etc) should allow for improved estimation of the habitat quality and habitat needs to meet population viability and CCC goals across the varied landscapes of Virginia.

Potential Strategies

a. Determine geographic differences in habitat quality and quantity across Virginia (related to BCC and minimum population size).

b. Determine when habitat becomes a limiting factor to meet bear population objectives due to quality (e.g. forest composition), quantity (e.g., suburban areas) and/or linkages (e.g. travel corridors) between seasonal habitat types.

c. Determine impact of habitat changes (e.g., loss of corridors, expanding human populations, aging forests) on bear populations.

Objective 2. ***To ensure habitat requirements are appropriate to meet population viability and achieve population objectives.***

Minimum bear habitat requirements consist of adequate natural food supplies that are available throughout the year, forested landscapes that meet minimum home range needs, and connectivity to large blocks of forestland to serve as population sources or linkages. Optimal bear habitat in the southeast generally contains managed forested landscapes in a diverse array of successional stages, hardwood stands with mast producing species such as red and white oaks, and early successional vegetative communities with a high diversity of soft mast producing plants. Interspersed within these landscapes are extensive expanses of rugged terrain such as dense thickets, swamps, bays, rock outcrops, or other habitat features that provide sufficient escape cover and reduced interaction with humans. These cover types are critical for protection from human disturbance, including dogs, and often provide areas for denning in which females will give birth to young of the year. Conservation of

corridors and habitat linkages are increasingly important, especially for bear populations where habitat fragmentation is a concern (e.g., Great Dismal Swamp). Improving metrics of categorizing and monitoring bear habitat usage and availability while also working with a diverse suite of land managers to improve habitat practices for bears (which will in turn benefit numerous additional wildlife species) and educating the public about the importance of these habitat types and active habitat management will be important for meeting population objectives throughout Virginia.

Potential Strategies

a. Modify minimum viability criteria, as minimum habitat needs are refined.

b. Determine where habitats fail to meet minimum population viability criteria or achieve population objectives.

c. Monitor changes in bear habitats (size and quality) at multiple scales (e.g., Viability Regions, zones). Monitoring habitat changes may include use of Landsat Imagery, aerial photography, existing GIS information, Continuous Forest Inventory data, forest stand information, and specific field data.

d. Consistent with population viability priorities and to meet population objectives, maintain and/or establish connectivity and corridors among forested habitats in all areas of Virginia, through acquisitions, easements, municipal planning coordination, etc.

e. Actively promote and implement habitat management practices on all lands (public & private) that are consistent with population viability and population objectives. Include public education about habitat management that is beneficial for bears and other wildlife.

f. Support public land habitat management that manipulates vegetation to meet bear management objectives. These lands include U.S. Forest Service, Virginia Department of Wildlife Resources, State Parks, State Forests, Shenandoah National Park, USFWS National Wildlife Refuges, and military installations.

g. Work with governmental (e.g., county, state, federal) and non-governmental (e.g., The Nature Conservancy, National Wild Turkey Federation, American Chestnut Foundation, American Chestnut Cooperator's Foundation, Appalachian Habitat Association) organizations to preserve/promote forest habitat integrity in areas associated with human population growth/development and in other areas where habitat requirements are not met.

Goal 4 –Bear Related Recreation

Provide and promote a diversity of bear-related recreational opportunities (e.g., hunting, non-hunting) for a diverse public that minimize human-bear conflicts, encourage responsible and rewarding outdoor experiences, and promote keeping bears wild. Recreational opportunities should not support activities that prevent attainment of black bear population objectives. Recreational methods should be consistent with and respect the rights of landowners and others. Harvested bears should be utilized.

This goal primarily addresses the "connect" tenet of the agency mission (DWR Goals 3 and 4), but also implicated in this goal are the "conserve" (e.g., manage populations; DWR Goal 2) and "protect"

(e.g., promote safe outdoor experiences, manage human-wildlife conflicts; DWR Goals 5 and 6) tenets of the agency mission.

Black bears provide valuable recreational opportunities for a diverse suite of users across the Commonwealth including hikers, hunters, wildlife watchers, photographers, and the general public. Regulated hunting through the allocation of season lengths, season timing, and hunting methods (weapon, hound use), is the preferred management tool for meeting population objectives. Regulated hunting can provide recreational benefits while also attaining population objectives of increase, stabilize, and/or decrease depending on the parameters placed on the hunting seasons and/or methods. The array of bear hunting opportunities in Virginia through archery, muzzleloader, firearms with dogs, and firearms without dogs, along with bear-dog training, provide distinct experiences and satisfactions for the recreational users. The need to emphasize the role of regulated bear hunting as a population management tool to both hunters and the general public will likely continue to increase.

Based on a 2016 survey, approximately 35% of Virginia's population viewed wildlife, equating to nearly 2.1 million wildlife viewers in the state and equating to nearly $32 billion dollars in wildlife viewing expenditures. Black bears continue to rank highly as a species valued for viewing opportunities in Virginia. While the number of licensed hunters in Virginia has declined over the past thirty years, wildlife viewing has seen a slight increase in participation. In 2021, DWR completed its first Virginia Wildlife Viewing Plan outlining four key goal areas to continue to engage and support wildlife viewing across the Commonwealth. Non-hunting recreational opportunities to enjoy bears in their natural habitats, and under conditions that foster education about bears, should be available to all Virginia citizens.

Bear related recreational opportunities should not foster opportunities for negative human-bear interactions or promote artificial encounters (e.g., high numbers of bears due to an illegal feeding site, unpermitted captive bear exhibits). Bear-related recreational experiences should occur outdoors in natural habitats and environments to promote an accurate understanding of bears and their utilization of space across a landscape.

Objective 1. ***To determine non-hunting demands/desires and satisfactions for bear recreation.***

Non-hunting recreational demands for bears are poorly understood. While the demand to view bears is high among some members of the public, satisfactory approaches to developing these viewing opportunities are unknown. A better understanding of non-hunting recreational desires for black bears and how these opportunities can be used to provide education and outreach while preventing unnatural situations (and possible negative human-bear interactions) is needed.

Potential Strategies

a. Survey Virginia citizens regarding non-hunting recreational satisfactions and demands. Considered recreational demands should include viewing opportunities, access to information and education, existence values, and photography. Obtain further details about results from existing surveys and plans (e.g. Watchable Wildlife Plan). For example, determine the type of bear viewing opportunities that are preferred by the public.

b. Evaluate constraints to participation in non-hunting recreation.

Objective 2. ***Inform the public about non-hunting recreational opportunities.***

Goals of the DWR Wildlife Viewing Plan include continued information sharing for non-hunting recreational opportunities for all species, utilizing the DWR Watchable Wildlife webpages, social media, and additional outreach opportunities. Collaboration within the agency for enhancing outreach on non-hunting bear related recreation along with partners (state parks, national parks, etc.) will be

critical to reaching a diverse public and informing them of available opportunities which meet their demands. Non-hunting bear related recreational messaging should focus on opportunities in natural habitats and educational messages which aim to increase appreciation for bears as a part of a functioning ecosystem, increase tolerance for bears, and limit negative human-bear interactions.

Potential Strategies

a. Prioritize programs based on demands expressed by Virginia citizens.

b. Develop and/or promote educational programs on black bear biology, management, and human-bear interactions in Virginia. Educational approaches may involve collaboration with DWR watchable wildlife biologists, coordination with other organizations, public dissemination of information through print media, digital media, social media, in-person and virtual programs, and school programs consistent with the Standards of Learning.

c. Educate public about non-hunting bear-related recreational opportunities by identifying areas for photographic and bear viewing opportunities where people can enjoy bears in their natural habitats. These opportunities should focus on safety and maintaining wild bear behaviors. Programs might focus on information about where to find bears, identification of bear sign, and bear behavior.

d. Utilize surveys to monitor changing levels of non-hunting recreation satisfactions, awareness about black bears, and impact of non-hunting recreational programs.

e. Ensure that bear viewing, and photography activities do not facilitate human-bear conflicts.

f. Enhance the public enjoyment/appreciation of forests and habitats that benefit bears.

Objective 3. ***To determine black bear hunter satisfactions (distinct qualities associated with hunting methods) and constraints to hunting participation in Virginia.***

Individuals hunt for many reasons, which provide a distinct set of satisfactions (e.g., for meat, for companionship, seeing bears, being close to nature, working with dogs, testing their skills, for the challenge), but specific information on bear hunter satisfactions, especially in Virginia, is limited. Understanding hunter satisfactions and intrinsic motivations for bear hunting would allow recreational opportunities to be tailored to better meet these satisfactions. Understanding constraints to participation in bear hunting (e.g., free time, cost, access) would also be beneficial in evaluating hunter effort and developing recreational programs that maximize hunter satisfactions while minimizing constraints, and still meeting programmatic goals.

Potential Strategies

a. Determine desirable attributes of quality bear hunting experiences (e.g., hunter density, specific characteristics of and demand for quality bears, access needs, etc.), and the relative importance and sensitivity of bear hunting satisfactions as they relate to the overall recreational experience.

b. Determine constraints to bear hunting participation and enjoyment. Potential constraints should include considerations for access on public and private land, season frameworks, interference with other hunters, and other sociological and economic factors.

c. Evaluate landowner (public and private) constraints to allowing access to bear hunters on their properties.

d. Implement programs that maximize recreational satisfactions, minimize constraints to hunting participation, and achieve participation objectives by providing diverse bear hunting experiences and opportunities to satisfy varied demands by bear hunters while meeting bear population objectives.

e. Educate public about different hunting opportunities that satisfy different recreational satisfactions.

f. If hunting access is a limiting factor, foster cooperation between hunters and landowners.

Objective 4. ***Consistent with black bear population objectives, to maintain diverse recreational bear hunting satisfactions from archery, muzzleloader, firearms without the use of dogs, firearms with the use of dogs, and bear-dog training seasons.***

Since the 2010-2021 black bear management plan, bear populations have expanded across Virginia into areas that were not traditionally hunted for bears. Diverse recreational hunting opportunities have been added throughout this past decade while still meeting population objectives (including increase objectives) throughout many zones. These recreational hunting opportunities in non-traditional bear hunting areas have not yet been evaluated to determine hunter satisfactions, changes in effort related to bear hunting, and future desires of hunting recreationists throughout the state. Utilizing regulated hunting as both a recreational opportunity and population management tool allows flexibility in the methods employed which can result in satisfaction from multiple user groups. Continued evaluation of hunter satisfactions and bear related hunting effort data are needed to accurately evaluate the current recreational opportunities afforded bear hunters as well as develop future opportunities as needed.

Potential Strategies

a. Monitor hunting effort in Virginia by developing and implementing accurate measures of effort by different black bear hunting methods.

b. Maintain hunting recreation quality by preserving diverse types of hunting opportunities.

c. Establish population criteria (based on indices of population size, distribution, population trends, and demographic characteristics) for managing (e.g., initiating, expanding, and shortening) bear hunting seasons to meet black bear population objectives.

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d. Ensure that hunting is not affecting the attainment of population objectives by monitoring the harvest and status of black bear populations (e.g., population size, distribution, population trends, demographic characteristics).

e. Consistent with population management objectives, propose to open new bear hunting opportunities in eligible counties based on established population criteria.

f. Consistent with population management objectives, propose to reduce bear hunting opportunities, when necessary, due to attainment of population objectives, disease outbreaks, and/or other factors affecting population viability.

Objective 5. ***Identify and manage for appropriate allocation of hunting opportunities among hunting methods.***

Allocation of hunting opportunities and harvest is an ongoing issue that impacts multiple constituent groups including bear hunters, other hunters (e.g., deer, turkey, small game), landowners (private and public), and other outdoor enthusiasts. There are diverse, and sometimes conflicting interests in values, satisfactions, and seasons associated with different hunting methods. Continual evaluation of current harvest season structures with diverse public input is necessary to optimize hunter satisfactions while limiting conflict both between hunters of varying methods or species, and between hunters and the public. A diverse mix of recreational hunting opportunities that provide an equitable allocation amongst user groups and participants based on their unique harvest rates, efficiency, and methodology will continually be adapted based on hunter desires and meeting population objectives.

Potential Strategies:

a. Identify stakeholders representing diverse interests in different forms of bear hunting (e.g., archery hunters, hound hunters) and those stakeholders impacted by bear hunting (e.g., landowners).

b. Determine stakeholder issues through surveys, meetings, etc.

c. Allocate hunting seasons based on stakeholder involvement and collaboration.

d. Establish hunting regulations to meet allocation goals.

Objective 6. ***To develop and promote recreational programs and regulations that keep bears from being habituated to humans or human related food sources.***

Bear related recreation can come in many forms and cross a broad spectrum from hunting bears in a remote wilderness to viewing bears in a captive setting. Promoting bear related recreation which encourages viewing bears in their natural habitat and without the use of unnatural congregation or feeding is highly desirable. This will continue to highlight the value of bears as wild, free-range animals and the role they play in a naturally functioning ecosystem. Food-rewarded interactions (whether intentional or inadvertent feeding) are a primary component of negatively changing bear behavior to become food conditioned and habituated, leading to negative human-bear interactions. Continual outreach and education, along with enforcement of feeding regulations, will be critical in keeping bears wild while promoting a diverse mix of bear related recreational opportunities.

Potential Strategies

a. Foster a better understanding of black bear behaviors through education and outreach by providing directed education and technical assistance about techniques for bear-related recreation in natural environments that reduce negative human bear interactions. Educational programs should include information about avoiding interactions that lead to habituation of bears to people and how to interpret bear behavior.

b. Maintain and enforce current regulations that prohibit the intentional or inadvertent feeding of bears.

c. Regulate the feeding of other wildlife food substances that attract bears.

d. Maintain and enforce current laws prohibiting the private ownership of bears in Virginia.

e. Promote the use of approved bear attractant storage by recreational users (e.g., bear canisters, personal food storage devices)

Objective 7. ***To identify, describe, and document bear hunting activities that result in conflicts with landowners and other Virginia citizens.***

As landscapes change in conjunction with increasing human populations and bear range expansion, conflicts between user groups (e.g., hunting recreationists, non-hunting recreationists, private and public landowners) are likely to continue. Ongoing evaluation of bear hunting practices that may infringe upon others, including seasonality, location, and types of impact, are critical to determine the best steps forward for resolving and minimizing future conflicts. Productive communication between hunters and landowners to determine current issues and potential solutions or mitigation techniques will be necessary for ongoing conflict resolution.

Potential Strategies

a. Use existing hunter and public surveys in addition to new survey instruments to question landowners, outdoor recreationists, resource professionals (e.g., law enforcement officers, biologists), and other potentially affected citizens about negative aspects of bear hunting and bear hunter behaviors.

b. Identify the bear hunting practices that create the greatest infringement on the rights of others. The determination of negative bear hunting practices should be based on the impact to landowners, outdoor recreationists, and other citizens.

c. Identify potential solutions to areas of greatest conflict.

d. Increase awareness of bear hunting seasons and communication between other outdoor users and bear hunters.

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Objective 8. ***Implement programs to reduce conflicts between bear hunting activities and other Virginia citizens (especially landowners) by at least 25%.***

While all forms of bear related recreation may create conflict between user groups, most reported incidents occur between bear hunters and landowners. Issues such as trespass (by both hunting dogs and hunters), disturbance to property, and roadway issues are commonly cited complaints by landowners throughout the bear hunting seasons. The success of any mediation program between landowners and bear hunters will require productive communication on both sides and understanding of the issues as well as the satisfactions of both user groups. Programs which involve local stakeholders in internal monitoring and ongoing discussion will likely be the most productive in the long term.

Potential Strategies

a. Using a variety of techniques (e.g., workshops, brochures, popular articles, videos) inform and educate bear hunters, landowners, and other affected citizens about solutions to the most significant conflicts (e.g., what causes conflicts, where they occur, how to avoid them).

b. Foster communication about concerns and solutions between bear hunters, landowners, and other affected citizens through conflict resolution strategies (e.g., workshops, focus groups). These strategies could be implemented at local, regional, and statewide levels.

c. As necessary and feasible, make regulation changes and enforce laws to ensure bear hunting does not infringe on the rights of landowners, and other affected citizens.

d. Improve capacity (e.g., personnel, equipment) of DWR and other agencies to enforce laws.

e. Implement a system to monitor changes in bear hunter conflicts with landowners and other affected citizens (possibly through landowner/citizen surveys).

f. Assess the utility of currently acquired data as a metric for conflicts and develop an improved metric(s), as necessary.

Objective 9. ***To describe fair, sportsmanlike, humane, and ethical bear hunting methods (including utilization) and implement programs that ensure compliance with these methods.***

The future of bear hunting will be affected significantly by public perception of bear hunters and bear hunting activities. Guidelines, regulations, and education related to bear hunting should address concerns for ethics and fair chase. All bear hunting recreationists will need to work together to clearly describe fair and sportsmanlike bear hunting methods, which can encompass different techniques and preferences, while still adhering to an ethical standard. Education and outreach should be targeted to both hunting and non-hunting recreationists and general citizens to promote the fair and sportsmanlike hunting methods which follow stated bear hunting regulations. Efforts by bear hunting groups to promote these standards and hold bear hunters accountable for following ethical, fair, and sportsmanlike hunting practices will go a long way to ensuring these practices remain viable options for the future of bear management in Virginia. Utilization of the meat of a harvested animal is a fundamental component of ethical hunting practices. While the percentage of bear hunters who do not utilize some portion of their harvested bear is unknown, survey responses show that bear hunters rank

meat consumption, utilizing the animal for taxidermy, and donating the meat, respectively, as the top three reasons they hunt. A current regulation addresses the wanton waste of game animals (4VAC15-40-250).

Potential Strategies

a. Consider a variety of sources to describe fair, sportsmanlike, humane, ethical black bear hunting methods.

b. Develop standards that define specific criteria and guidelines for fair, sportsmanlike, humane, and ethical bear hunting.

c. Evaluate sociological implications of hunting regulations to avoid strategies that generate negative public perceptions jeopardizing the future of bear hunting and/or bear hunters.

d. Using a variety of techniques (e.g., workshops, brochures, popular articles, videos) inform and educate bear hunters, other hunters, and the general public about fair, sportsmanlike, humane, ethical bear hunting standards that ensure bear hunter compliance with behavior criteria and protect hunting activities that conform to these standards.

e. Use a variety of techniques (e.g. focus groups, surveys, task forces, public meetings) to balance fair, sportsmanlike, humane, and ethical values with the population management values associated with bear hunting.

f. Enforce laws that govern bear hunting activities (e.g., trespass, bag limits, methods) and maintain prohibition on the use of bait to hunt bears.

g. As necessary, make regulation and law changes to ensure the future of bear hunting in Virginia that follows fair, sportsmanlike, humane, and ethical methods.

h. Monitor hunter compliance with fair, sportsmanlike, humane, and ethical bear hunting standards using surveys and the incidence of law enforcement citations.

i. Ensure through regulation that weapon types used in bear hunting methods are adequate for dispatching an animal quickly with minimal chance of wounding an animal that can escape without being retrieved (minimize unrecovered crippling loss). Encourage local governments to enact ordinances ensuring same.

j. Promote the ecological and personal benefits of eating wild game along with the proper handling, and cooking through directed education campaigns.

Objective 10. ***To identify and manage non-hunting bear-related recreational activities that result in conflict with Virginia citizens.***

While nearly 2.1 million Virginia citizens participate in some form of wildlife viewing related recreation, it is unknown to what extent those activities result in conflict with other Virginia citizens. Feeding (intentional or inadvertent) likely poses one of the highest potential conflicts due unnatural congregation of bears and the potential for food conditioning and habituation to exacerbate to unacceptable levels. Other issues including trespass, impeding hunting, or roadway blockages (e.g.,

stopping a vehicle within a roadway to photograph or view a bear) are not well documented but likely occur. Determining the types of non-hunting related recreational conflicts across the Virginia landscape and their causes and extent will be the first step in working towards resolutions to minimize these issues.

Potential Strategies

a. Use existing and new survey data to determine the type and extent of conflicts resulting from wildlife viewing activities.

b. Educate non-hunting bear recreationists about trespassing, feeding of wildlife, and other potential conflicts with landowners and other citizens.

c. Maintain and enforce laws that prohibit feeding of bears and other wildlife that attract bears.

Goal 5 - Human-Bear Conflict

Foster coexistence with bears by preventing and reducing human-bear conflicts (e.g., agricultural, residential, recreational, vehicular, human health and safety) while:

- ***Attaining bear population and recreation objectives;***
- ***Minimizing loss of property and income;***
- ***Fostering practices that keep bears wild;***
- ***Promoting shared responsibility (personal, community, agency) for human-bear conflicts;***
- ***Prioritizing use of nonlethal methods to resolve conflicts;***
- ***Using hunting as the preferred method when lethal alternatives are required to manage conflicts;***
- ***Increasing tolerance and appreciation of bears;***
- ***Encouraging utilization of bears that are killed, where appropriate and feasible.***

This goal primarily addresses the tenet in the agency mission to "protect people and property by promoting safe outdoor experience and managing human-wildlife conflicts" (DWR Goal 5 and 6), but also implicated in this goal are the "conserve" (e.g., manage populations and coexistence; DWR Goal 2) and "connect" (e.g., appreciation, DWR Goal 4) tenets of the agency mission.

Bear management goals are not limited to achieving population objectives or providing recreation for Virginia's citizens. Fostering coexistence with bears while also preventing and mitigating human-bear conflicts is a high priority. Damage caused by black bears is diverse and can cause significant financial losses, property damage, and can lead to food conditioned and/or habituated bears which may pose a risk to public safety. In residential areas, human-bear conflicts are primarily driven by unsecured attractants (e.g., bird or other wildlife feeders, residential trash, pet food), vehicular damage (e.g., entering vehicles), or concerns over public sightings. Across the rural landscapes of Virginia, agricultural damage by black bears includes consumption of crops (e.g., corn, peanuts, fruit, berries), damage to fruit tree limbs, predation of livestock, property damage (e.g., chicken coops, feed storage areas), and destruction of beehives. Human-bear conflict reports have increased over the past decade as human population increases (particularly in more urban areas) have occurred simultaneously with black bear range expansion across eastern Virginia.

Citizens, communities, local governments, VDWR, and other state and federal agencies share responsibility in managing human-bear conflicts. While VDWR has primary responsibility for managing bear populations, the decisions and actions of landowners, local governments, and all citizens directly

influence the type of interactions people have with bears and the effectiveness of programs designed to mitigate and prevent human-bear conflicts. Recognizing that all Virginia citizens live in black bear country, it is critical that every person understands the impacts their decisions have on black bear movements and behaviors and the consequences those decisions have for themselves and their community. Community leaders can promote positive human-bear interactions by proactively making policy decisions which minimize the potential for human-bear conflicts, such as wildlife feeding and residential trash storage ordinances.

Education and outreach are critical components of the human-bear conflict goal area. Effective public information campaigns and consistent messaging across all jurisdictions and by all stakeholders is necessary to foster greater understanding of black bear biology and conflict prevention tools. Collaborative efforts between VDWR and impacted stakeholders (e.g., agricultural producers, residential neighborhoods, apiarists) are also vital to further the science in conflict prevention and mitigation strategies.

Objective 1. ***To implement and review explicit and cost-effective (for the public and agency) response policies/guidelines that utilize both non-lethal and lethal options for managing bear conflicts.***

Guidance documents and policies are necessary to clarify roles and responsibilities and ensure consistency in delivery of human-bear conflict mitigation. These documents must be adaptable as situations evolve and as site-specific situations dictate. Non-lethal conflict mitigation strategies are primarily favored by the general public and are encouraged as a first step before using lethal control. Guidance documents should be reviewed and updated periodically to incorporate emerging technologies and innovative strategies. VDWR has several guidance documents (Black Bear Capture & Handling BMPs, Bear Response Guidelines, Wildlife Response Scenarios, Use of Chemical Immobilization on Wildlife) that are used by staff (and some partners) for responding to human-bear conflict situations. Ongoing training and review is a critical element of all of these documents.

Potential Strategies

a. Maintain and revise, when necessary, cost-effective response policies/guidelines to address human-bear conflicts. Policies/guidelines should address:
    - A consistent, shared public/agency responsibility.
    - Keeping bears wild.
    - Input from affected individuals, municipalities, and government organizations.
    - Circumstances for lethal and non-lethal management applications.
    - The use of hunting as the preferred lethal management tool.

b. Determine how policies/guidelines apply to unusual/complicated situations like orphan cubs, bears in foxhound training preserves, etc.

c. Bears should be managed at the site where the conflict is occurring. Relocation of bears generally should not be used to manage conflicts except for certain extenuating circumstances (e.g., some urban entrapments).

d. While non-lethal approaches are preferred (e.g., aversive conditioning, electric fencing, garbage management), both lethal and non-lethal options should be available for managing bear conflicts. Non-lethal options should be considered first; however,

lethal options may be necessary when non-lethal options are ineffective or impractical.

e. Policies/guidelines should be flexible to allow affected individuals, landowners, and municipalities a range of choices in resolving conflict situations.

f. Policies/guidelines should provide explicit capture, treatment, and disposition guidelines for black bears that need to be handled.

g. Communicate and educate the public, municipalities, and state agencies about these policies/guidelines.

h. Policies/guidelines should identify and correct citizen actions that encourage bear conflicts (e.g., intentional feeding that habituates bears to people, poor garbage management).

Objective 2. ***Encourage and support effective bear management options to reduce negative human bear interactions.***

The options available to manage human-bear conflicts are often poorly understood by the public. Options such as "trap and transfer" are often the preferred option expressed by a constituent dealing with a negative bear interaction; however, relocation is rarely a viable option to mitigate the current situation or prevent future conflicts. Preventing and reducing human-bear conflicts is a shared responsibility of the public and VDWR; thus, individuals experiencing damage will often need to implement mitigation or prevention techniques as part of their responsibility. Education and outreach are the primary tools for reducing negative human bear interactions by increasing understanding of bear behavior, increasing tolerance for bears, and providing techniques and resources for prevention and mitigation of conflict situations. Continuing to provide regulated recreational hunting opportunities to meet population objectives is also an important tool in reducing negative human-bear interactions over time.

Potential Strategies

a. Provide directed education and technical assistance about techniques for preventing negative human-bear interactions, including in agricultural, residential, and outdoor recreational settings.

b. Provide directed training to local law enforcement field staff (e.g., Animal Control Officers) on interpreting bear behavior, employing non-lethal techniques, and messaging to reduce negative human-bear interactions.

c. Via surveys, monitor satisfactions and changes in satisfactions with protocol outcomes by affected individuals, landowners, and municipalities.

d. Keep records on bear complaints, recommendations, and outcomes for analyses of methods. Records should be geo-referenced and should include the location of the attractant as well as the bear.

e. Communicate with other states, agencies, stakeholders, and partners for information about successful bear management procedures.

f. Determine public satisfactions with methods used to manage conflict concerns.

g. Promote partnerships through programs such as grant funding and principles of the BearWise® program.

h. Monitor and evaluate trends in annual bear conflicts by type.

i. To prevent potential negative human-bear interactions from occurring, develop updated educational materials and outreach programs designed to inform the general public, landowners, waste management companies, homeowners associations, and local governments about how to prevent and minimize conflicts.

j. Utilize BearWise® messaging to promote human-bear conflict prevention and mitigation strategies.

k. Use recreational hunting to reduce human-bear problems.

l. Maintain and enforce current regulations that prohibit the intentional or inadvertent feeding of bears including the feeding of other wildlife food substances that attract bears.

m. Enforce current regulations (4VAC15-40-282) by requiring any entity with open dumpsters/ free access to garbage by bears to secure the trash attractant.

n. Regulate the feeding of other wildlife food substances that attract bears.

o. Maintain and enforce current laws prohibiting the private ownership of bears in Virginia.

p. Promote the use of approved bear attractant storage by recreational users (e.g., bear canisters, personal food storage devices)

Objective 3. ***To identify, develop, and implement site-specific management options for unique bear management situations.***

To provide simplicity and consistency, bear hunting regulations are uniformly established over large areas (bear zones). While this is often sufficient to meet population objectives at a zone scale, it may be ineffective at addressing localized areas with unique situations. The area wide regulations may be too liberal, too conservative, or ineffective based on unique local site characteristics. These situations could include human-bear conflicts in highly urbanized areas or extensive agricultural damage associated with large refuges or unhunted landscapes. Additional site-specific management strategies could include special hunting opportunities, kill permits, and educational programs. Education and outreach will be necessary to ensure success of unique management approaches and to mitigate additional public concerns.

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Potential Strategies

a. Actively support site-specific bear management options through educational programs, conflict resolution techniques, and coordination among affected parties (e.g., neighboring landowners, recreational users).

b. Develop special hunting regulations or programs to address site specific damage concerns for specific bear management conflicts.

c. Evaluate the feasibility and desirability of special options that might be utilized for site-specific concerns.

Objective 4. ***Promote citizen and community initiatives that prevent negative human-bear interactions.***

In conjunction with VDWR-led educational programs and regulations that reinforce keeping bears wild, citizen and community initiatives are a key piece of the shared responsibility for reducing human-bear conflicts. In a 2020 Responsive Management survey, 76% of general population respondents agreed with the statement that, "residents who live in areas with bears should be responsible for reducing conflicts with bears." Initiatives such as BearWise® ® community recognition programs, Virginia Master Naturalist BearWise® ® outreach, and the BearWise® ® cost share program for localities are all designed to meet localized needs with implementation by local citizens and communities. These programs instill ownership of the issues with local citizens and communities and allow them to provide outreach and education on human-bear conflict prevention and mitigation specific to their area while expanding the reach that VDWR alone could provide.

Potential Strategies:

a. Attract and support (through education, supplies, guidelines, etc) communities that would like to start programs for the benefit of coexisting with bears/preventing negative interactions.

b. Survey communities in high bear density areas about the willingness to begin BearWise® communities.

c. Create model ordinances for communities to use as guidelines for reducing human-bear conflicts (e.g., trash, bird feeding).

d. Promote bear specific ordinances among municipalities.

e. Promote partnerships with communities through our BearWise® cost share and educational programs.

Objective 5. ***To reduce the requests for out-of-season bear kill permits for agricultural bear damage by at least 30%.***

As mandated by Code of Virginia §29.1-529, *Killing of deer or bear damaging fruit trees, crops, livestock, or personal property or creating a hazard to aircraft,* VDWR is authorized to permit owners or lessees of land where bears are causing commercial agricultural damage or damage to

personal property used for agricultural production to kill bears outside of general bear hunting seasons. Permits are issued based upon a site assessment by a VDWR representative and include limits on the number of bears that may be harvested, time frame the permit is active, and the area where the permit may be used. While kill permits can be a useful tool for agricultural producers to reduce crop damage as it is occurring, they are often time and labor intensive for the producer and do not generally provide a long-term solution to the issue. Fifty-one (51%) percent of agricultural producers surveyed in 2020 agreed with the statement that, "farmers and agricultural producers should be responsible for reducing damage to their crops or livestock caused by bears, but 69% also agreed with the statement that VDWR (VDGIF at the time of the survey) "should be responsible for reducing damage caused by bears to crops or livestock (Responsive Management, 2020)." Thus, creating more effective long-term solutions with shared responsibility between VDWR and agricultural producers and creating partnerships with these groups and recreational bear hunters are strategies to help meet this objective.

Potential Strategies

a. Use regulated hunting as the primary bear population damage management strategy.

b. Provide resources on and support the use of non-lethal alternatives for managing agricultural bear damage such as exclusionary devices (e.g., fencing), aversive conditioning, and or bear dogs.

c. Foster cooperation between hunters and landowners who experience bear damage, e.g., matching willing hunters and landowners with conflicts.

d. Provide technical assistance to communities and landowners implementing bear management programs, recognizing that to be effective, solutions will need to address bear damage at the time it is occurring.

e. Develop educational materials for agricultural producers regarding bear damage abatement programs and techniques.

f. Continue to engage U.S. Department of Agriculture -Wildlife Services (USDA-WS), when applicable. Explore opportunities for expanding assistance from USDA-WS personnel and Commercial Nuisance Animal Permit holders.

g. Assess the utility of kill permits as a metric for agricultural bear damage and develop an improved metric(s), as necessary.

Goal 6 – Bear Health and Welfare

Promote the health and welfare of wild black bears while attaining other bear plan goals. Foster respect for wild bears both as individual animals and as members of a naturally functioning population.

While this goal is oriented more toward individual bears than bear populations, all three tenets of the agency mission are implicated by this goal addressing balanced public desires and appreciation for bears: "conserve" (e.g., welfare as a public need in population management; DWR Goal 2), "connect" (e.g., appreciation and concern for bears; DWR Goal 4), and "protect" (e.g., bear diseases that could impact humans and domestic animals; DWR Goal 5).

Since the writing of the 2012-2021 Bear Management Plan, bear health and welfare have become increasingly important aspects of bear management in Virginia. Sarcoptic mange and its implications on individual bear health as well as potential population level effects, orphan bear cub health and welfare, and other new and emerging issues have all elevated the importance of dealing with individual bears. Prior to 2012, concerns for black bear health were relatively minor and infrequent. With the emergence of sarcoptic mange within Virginia borders by 2014, individual bear health and welfare became a much larger focus. Bears exhibiting symptoms of sarcoptic mange (particularly latter stages) are often highly visible to the public and demand response actions to provide the public with accurate information as well as minimize individual bear suffering. The response to and handling of orphan bear cubs has steadily increased since 2013. With increasing human densities and expanding bear populations, it is inevitable that bear cubs may become orphaned due to human disturbance (burning brush piles, recreating near den sites, etc.), unintentional "poaching" (picking up a cub when seen alone), and/or death of the female (vehicle collisions). Responding to these instances and providing an opportunity for these cubs to return to the wild while minimizing human habituation is valued highly by the public and often generates local and national media attention.

Keeping bears wild has been a mission statement and tagline of the Virginia black bear management program for many years. Education and outreach to foster respect for bears as a species and the importance they play in a fully functioning healthy ecosystem are important as urbanization continues across Virginia. While zoological exhibits have a place in educating and providing viewing opportunities for citizens, it is important that the value of wild black bears across the state is continually emphasized.

Objective 1. **Ensure the health and welfare of bears restrained or held for research, rehabilitation, management, or other purposes.**

The safe, humane, and respectful handling of bears, whether for research, conflict mitigation, humane dispatch, or otherwise is a tenet of this bear management plan along with specific policies and guidelines developed by DWR and partners. The handling of a bear (for any purpose) is thoroughly reviewed, and the minimization of handling is the ultimate goal. DWR works with a limited number of permitted facilities when the need arises for a bear to be held in captivity for rehabilitation purposes. These facilities work closely with DWR to ensure the health and welfare of the bear(s) in their care with the goal of timely releases back to the wild as soon as appropriate. Exhibitors holding black bears for zoological collections also must meet strict health and welfare standards, such as being accredited by the Association of Zoos and Aquariums (AZA) or the Global Federation of Animal Sanctuaries (GFAs).

Potential Strategies

a. Conduct periodic inspections of permitted rehabilitators and exhibitors holding bears.

b. Capture and handling of bears for any purpose will follow veterinarian approved policies/guidelines on animal use, care, and disposition.

c. Continually assess policies/guidelines on bear capture and handling and provide consistent training of staff involved in capturing and handling bears on a routine basis.

d. In compliance with policies/guidelines, respond to any individual bear suffering from severe disease or injury in a timely manner.

Objective 2. **Evaluate and monitor diseases in black bears to determine impacts on the health and welfare of individual bears and on bear populations.**

Until recently, black bears have rarely been the subject of wildlife health and disease research as they were not known to be susceptible or succumb to many wildlife health issues. But, in recent years the emergence of sarcoptic mange in numerous eastern states with black bear populations, along with newly emerging issues such as highly pathogenic avian influenza, have prompted increased research into bear health. Virginia is a collaborative member of the Southeastern Cooperative Wildlife Disease Study (University of Georgia) for evaluating wildlife health issues through sample analysis, consultation, and participation in multi-state research efforts. Virginia also works extensively with other state agency bear managers and university partners to discuss and share information and research on bear health issues.

Potential Strategies

a. Identify diseases impacting bears in Virginia, monitor their spread and/or prevalence over the landscape, and develop guidelines on identification, response, and handling protocols.

b. Continue to acquire and develop knowledge of diseases in bears (e.g., sarcoptic mange) and the resulting effects on reproduction, habitat selection, home range size and resource utilization.

c. Conduct research to determine disease impacts at the population level versus localized areas of impact.

d. Develop an improved understanding of sarcoptic mange mite ecology, especially the relationship between landscape level mite prevalence and environmental variables.

e. Maintain working relationships and collaboration with other agencies, organizations, and partners on bear diseases through the sharing of research, protocols, and information.

f. In conjunction with DWR Wildlife Health staff, monitor wildlife disease-related research, and update protocols and handling guidance documents for bears accordingly.

Objective 3. **Implement management actions, if applicable, to reduce impacts of disease on bear health and populations.**

As stated previously in this plan, regulated bear hunting is the primary and preferred tool for managing bear populations. DWR sets bear hunting regulations on a bi-annual cycle. These regulation proposals are developed with the goal of addressing bear population objectives throughout the stated bear management zones by either increasing, decreasing, or stabilizing the population. Regulation proposals will thus allow for increased harvest opportunities (additional hunting days, additional weapon types) or decreased harvest opportunities (reduce available hunting days or methods) depending on the stated population objective. Disease monitoring and the analysis of disease impacts to local or widespread areas will continue to be a vital component of data analysis when determining harvest regimes for black bears.

For numerous wildlife diseases that are transmissible through direct contact (e.g., mange, chronic wasting disease in deer), limiting the congregation of these animals is a high priority to reduce transmission. The unnatural congregation of bears at wildlife feeding sites (for deer, birds, squirrels), municipal trash sites (e.g., open dumpsters or landfills), and around unsecured attractants in

residential areas (e.g., pet or livestock feed, birdseed, trash) can be addressed through multiple modes of education and outreach, technical assistance, and enforcement of current or future feeding laws and ordinances.

Potential Strategies

a. Enforce bear feeding laws to reduce the spread of contagious diseases in bear populations through congregated feeding sites.

b. Provide education, guidance, and technical assistance enabling constituents to secure and/or remove bear attractants that would congregate bears.

c. Work with localities to develop bear related local ordinances and provide assistance associated with BearWise® program goals to remove attractants.

d. Modify hunting season regulations and site-specific programs to address aggregate mortality in areas where disease is known or suspected to impact bear populations.

e. Regulate bears held in captivity to minimize risk for disease transmission to wild bear populations.

Objective 4. **Increase public awareness regarding bear diseases that may impact health of bears, humans, and/or other wild or domestic animals.**

Diseases of wildlife can often incite questions and fear from the public due to concerns for their health (whether through consumption or handling of a game animal), and that of their pets and livestock (through contact with a sick wild animal). Education and outreach is a key component of increasing awareness and reporting of diseases of black bears while providing accurate, science based information to address the concerns of the public. For many diseases of wildlife, reporting of the sick animal often comes from a member of the public. Thus, ensuring the public is aware of reporting mechanisms and ensuring those mechanisms are available, easy to use, and provide assistance back to the person making the report are essential. The data collected from the public reporting of sarcoptic mange in Virginia since 2014 has been critical in determining management strategies and response protocols. Continuing and/or improving this data collection will be important, particularly as more research is done on sarcoptic mange. Having a central mechanism for reporting and information sharing is beneficial should additional diseases or health issues impacting black bears arise in the future.

Potential Strategies

a. Provide educational outreach through various channels (e.g., print, digital, social media, in-person programming, etc) about diseases affecting black bears.

b. Collaborate with other agencies, partners, and public health officials to develop messaging related to potential public health and safety impacts of bear diseases.

c. Continue utilization of the Virginia Wildlife Conflict Helpline for public disease reporting. Explore additional reporting mechanisms for convenience of the public.

d. Create and maintain online or mobile application-based reporting tools for staff and the public.

Objective 5. **Continually evaluate and update response polices/guidelines for sick, orphaned, and injured bears.**

Sick, orphaned, and/or injured black bears often draw public attention and scrutiny of response actions. Thus, ensuring that DWR policies and guidelines are up to date with the latest science and account for staff flexibility are imperative. Ongoing training and education within DWR is also necessary to ensure that all staff members who may handle a sick, orphaned, or injured black bears are knowledgeable about proper procedures. Partnerships with permitted rehabilitation facilities are critical to ensure that proper veterinary care is provided when deemed necessary and that protocols are followed to allow re-homing or release back to the wild for bears held in captivity for rehabilitation. In some instances, humane dispatch or euthanasia is the most appropriate action for a sick, orphaned, or injured bear. In these instances, it is imperative that established policies and guidelines are utilized for a consistent response and messaging as to the reasons this option was chosen.

The holding in captivity of bears (particularly bear cubs) by non-permitted individuals is an ongoing problem and one that needs to continually be addressed through education, outreach, and enforcement of current laws that prohibit the possession, handling, or providing of treatment to bears. These activities not only put the person at risk due to potential zoonotic disease transmission or injury caused by the bear, but also reduce the likelihood that the bear will ever be releasable to the wild. Education on this topic is complex due to the need to encourage citizens to not handle bears or intervene while still acknowledging the utility of permitted rehabilitation facilities that provide quality care in the appropriate situations.

Potential Strategies

a. Collaborate with relevant partners on protocols for handling and rehabilitating orphan cubs and sick/injured bears.

b. Continually evaluate the humaneness and effectiveness of rehabilitating orphan and/or injured bears and releasing them to the wild.

c. Rehome orphan black bear cubs to the wild with surrogate females as the preferred management option when feasible to utilize.

d. Utilize best management practices when rehoming orphan bear cubs in the wild to surrogate females.

e. Continue to permit only specific wildlife rehabilitation centers in Virginia to house, care for, and rehabilitate injured, sick, and/or orphaned black bears following protocols developed in collaboration with DWR.

f. When deemed the most humane management option, dispatch injured, sick, and/or orphan bears according to veterinarian-approved provisions of guidelines and protocols.

e. Inform the public about laws that prohibit possessing, handling, or providing treatment to bears, and the risk associated with such activities, unless authorized and directed by professionals.

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Appendix 1. Members of the three (3) committees engaged in revision of the 2023-2032 Bear Management Plan.

Members of the Citizens Advisory Committee

Name	Organization
Nolan Nicely	Appalachian Habitat Association
Kathryn Herndon-Powell*	Appalachian Trail Conservancy
Wade Truong	Backcountry Hunters and Anglers
Katherine Diersen**	Defenders of Wildlife
Randy Ughetta	Hidden Falls Subdivision, Roanoke Co.
Blair Smyth	The Nature Conservancy
Josh Palumbo	The Nature Foundation at Wintergreen
Marshall Saunders	Virginia Apple Grower's Association
David Steger	Virginia Bear Hunters Association
Lowell Hertzler	Virginia Bowhunters Association
Mack Smith	Virginia Cattlemen's Association
Stefanie Taillon	Virginia Farm Bureau
Kirby Burch	Virginia Hunting Dog Alliance
Ben Fulton	Virginia Property Rights Alliance
Bruce Hamon	Virginia State Beekeeper's Association
Ward Burton	Ward Burton Wildlife Foundation
Ed Clark	Wildlife Center of Virginia

*Alternate: Conner McBane
**Alternate: Ben Prater

Members of the Interagency Advisory Committee

Name	Agency/Jurisdiction
Tom Davis	Blue Ridge Parkway
Fred Ramey	City of Norton
Katherine Edwards	Fairfax County Police Department
Linda Milsaps	Floyd County
Chris Lowie	Great Dismal Swamp NWR
Brian Stump*	Salem City Police Department
Rolf Gubler	Shenandoah National Park
Shannon Bowling	US Dept of Defense
Carol Croy**	US Forest Service
Chad Fox	USDA- Wildlife Services
Jason Fisher	VA Cooperative Extension

Jonah Fielding	VA Department of Forestry
Forrest Atwood	VA State Parks (VDCR)
Bridget Donaldson	VA Transportation Research Council

*Alternate: Capt. Todd Clayton
**Alternate: Kit MacDonald

Members of the Bear Plan Technical Committee

Name	Position
Pete Acker	Region 1 (R1, Tidewater) Wildlife Division (WD) District Biologist
David Garst	R1 WD District Biologist
Chris Smith	R1 Law Conservation Police Officer (CPO)
Sarah Peltier	Region 2 (R2, Piedmont) WD District Biologist
Dan Lovelace*	R2 WD District Biologist
Matthew Overstreet	R2 WD Manager
Sonny Nipper	R2 Law Sgt.
Betsy Stinson	Region 3 (R3, Southwest) WD District Biologist
Seth Thompson	R3 WD District Biologist
Mark Shaw	R3 Law CPO
David Kocka	Region 3 (R4, Northern/Northwest) WD District Biologist
Jordan Green	R4 WD District Biologist
Jaime Sajecki	R4 WD Manager
Kenneth Williams	R4 Law Sgt.
Megan Kirchgessner**	WD Veterinarian
Jay Howell	WD Small Game/Data Biologist
Katie Martin	WD Deer, Bear, Turkey Biologist
Carl Tugend	WD Bear Project Leader
Nelson Lafon	WD Forest Wildlife Program Manager
Cale Godfrey	WD Assistant Chief

*Alternate: Ali Davis
** Alternate: John Tracey

Appendix 2. Summary of comments received by Plan previewers and how the Plan was revised based on those comments.
The following table summarizes only substantive suggestions offered by those individuals who previewed the first full draft of the 2023-2032 Virginia Bear Management Plan during June 27 – July 21, 2023. It does not include editorial suggestions, which were addressed as appropriate, or comments that did not indicate an actual change. Page numbers shown are approximate. Full comments are available upon request.

Summary of Substantive Comment	**Plan Changed?**	**Change Made or Rationale for No Change**
Black bears interact regularly, especially within female social groups	Yes	Text (p.14) and citation added.
Include law requiring motorists to report bears killed by vehicle	Yes	Text (p. 48) and code reference added.
Expand on description of illegal sale of bear parts and include past enforcement operations	Yes	Text (p. 52) and multiple citations added.
The plan suggests that DWR does not use capture-recapture or other intensive methods for population estimation	Yes	Text (p. 36) and citation added to clarify that such techniques are being used and have been used for research but are not currently feasible for long-term monitoring at a statewide scale.
Non-harvest related methods for population monitoring need to be used	Yes	Text (p. 36) added to clarify that some non-harvest metrics are currently considered. Strategies under Goals 1 and 2 call for continued improvement in practical, at-scale bear population monitoring methods.
Hunting bears with hounds and archery equipment is inhumane and/or not fair chase	No	The section "Concerns about bear hunting" (pp. 45-46) addresses issues and public opinions related to different methods of bear hunting.
Plan should be operational, not just aspirational	No	DWR statewide species management plans are designed to be strategic and not operational. They provide overarching direction to guide more detailed operational work plans developed and implemented by DWR staff working with partner agencies and organizations.
Need better metrics or targets to know when management objectives are achieved	Yes	Bear plan strategies call for development and use of improved metrics (e.g., populations, conflicts). Text (p. 72) added to emphasize that this is a task to be addressed during the life of this revised plan.
The public review and Board endorsement timeline gives the appearance of a predetermined outcome	No	The October date for likely Board endorsement was included as a placeholder based on past experiences with public reviews of draft plans. It is noted that this is an "anticipated" date, and it can be changed, if needed.
There needs to be a plan amendment period after public review	No	DWR staff and both external committees will review revisions made based on the preview and public reviews before the plan is sent to the Board
There is over-reliance on surveys and public opinion in the plan. Surveys are a human management tool, not a biological management tool for wildlife. Reliance on public opinion	No	Surveys and other social science techniques used to gather public opinions are integral to modern wildlife management. Many state wildlife agencies, like DWR, have human dimensions specialists. Many practical dimensions of bear management cannot be informed by biological information alone and

can result in poor outcomes for bear management.		often require sociological data. Bear management decisions (e.g., setting bear seasons) need to integrate best biological science and balanced stakeholder needs (e.g., hunter desires and citizen conflicts).
Plan needs to focus more on biological carrying capacity than cultural carrying capacity.	No	Managing for the desired populations of bears for all Virginians (the owners of the resource) is one of the most fundamental concerns for bear management. As long as viable bear populations are achieved, there is no biologically "correct" number of bears on the landscape.
There is no firm population estimate statewide or by zone in the plan, although there were previous estimates provided to the public.	No	The plan provides a population reconstruction index statewide (p. 39) and by zone (see Appendix 2). Reliable indices of relative bear population size and trends are more important than absolute population numbers for managing bears at zone and statewide scales. Absolute population estimates are more useful for research or for management of small or isolated populations, often unexploited, when other indices are not available. Population estimates were provided previously to meet inquiries of the public or media, not because they were relevant for management.
Plan relies on one statistical model for population estimates vs. use of several and of more modern models (Bayesian).	Yes	Existing strategies under Goals 1 and 2 call for continued improvement in practical, at-scale bear population monitoring methods. Added text to strategy d. under Population Viability Objective 2 and strategy c. under Population and CCC objective 1 that references the use of multiple population assessment and modeling tools (e.g., non-harvest indices, Bayesian statistics, Monte Carlo simulations, hierarchical modeling). Text (p. 36) added regarding published evaluation demonstrating that population reconstruction (which Virginia has been using) is robust for reconstructed population estimates and trends. Researchers participating in a symposium at the Eastern Black Bear Workshop in WI in April 2023 noted that Downing reconstruction alone provides information just as useful for making bear management decisions as results of models needing more types of data.
Should establish baseline current bear population for a zone and establish a target population objective prior to adopting measures to change bear populations.	No	As written, the plan provides a population index and trend for each zone (Appendix 2) as well as an objective for those zones (Figure 26). The draft objectives were provided for public review during January 2023 (Appendix 6) because regulation season proposals made during spring 2023 were based on these new objectives. As noted above, an exact population estimate is not needed as long as a reliable index is used.
How does DWR plan to, or does DWR plan to, leverage citizen science programs such as Virginia Master Naturalists?	No	The bear program is currently working with Master Naturalists to assist in educational efforts about being BearWise®. The bear program welcomes opportunities to work with citizens and organizations; exactly how is an operational decision that would not be outlined in a strategic plan.

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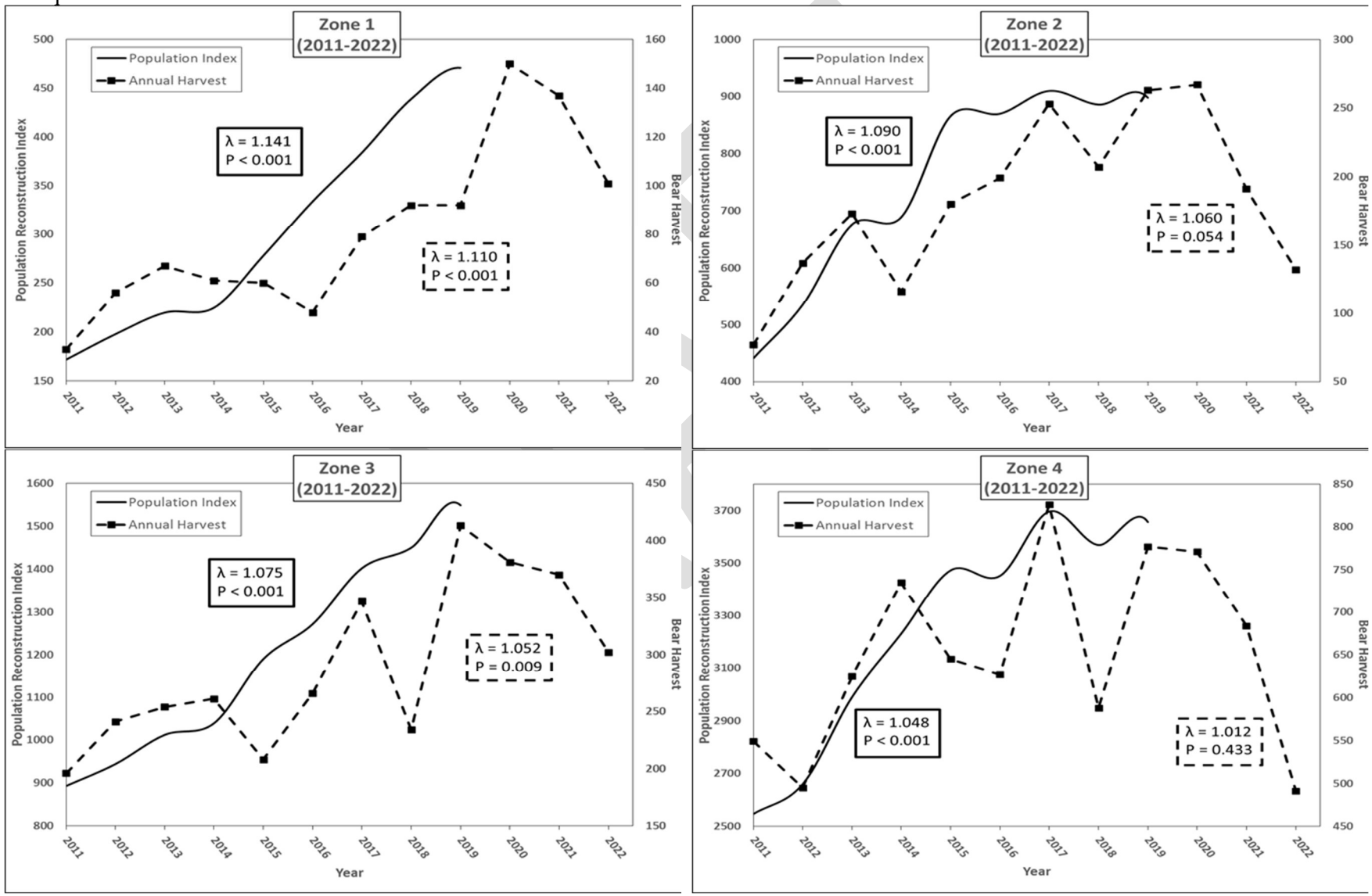
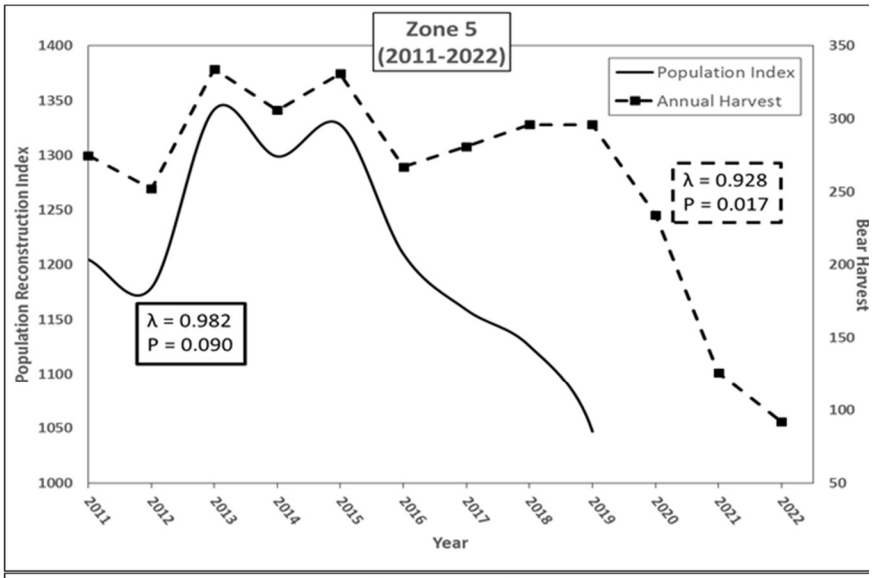
No overlay of human population centers or growth across Virginia (cultural carrying capacity and conflict mitigation issues)	Yes	Maps depicting human population characteristics, complaints related to bears, etc. that staff referenced when establishing draft bear population objectives have been added to the end of Appendix 4.
What studies, specifically, are being done on sarcoptic mange, why, and what objectives are sought and why?	No	The new mange research project is listed among important bear research projects (p. 30). More details of this research will be shared publicly as it becomes available. Mange transmission, mite characteristics, environmental and genetic factors, rates of recovery and mortality, and geographic spread of mange have and are being investigated by multiple states. Virginia hosted the first interstate mange meeting among 23 states in 2022.
How does DWR plan to achieve the objective related to kill permits?	No	Strategies listed under Objective 5 of the Human-Bear Conflicts goal outline basic approaches; exact methods/tools will be site-specific and operational.
There is a lack of focus on non-lethal intervention means (such as hounds)	No	Strategy b. under Objective 5 of the Human-Bear Conflicts goal references non-lethal resources and methods, such as fencing and use of bear dogs. DWR welcomes opportunities to work with partners in conflict mitigation, but exactly how such partnerships develop and evolve are operational decisions that would not be outlined in a strategic plan. DWR frequently provides guidance around such techniques, listed in An Evaluation of Bear Management Options (see Supporting Documents, p. 64).
Expenditures on conflict mitigation appear low	No	Preventative conflict management is a primary focus of bear program staff, but more funding could help increase outreach. DWR welcomes the opportunity to work with partners to increase or leverage funds.
There is a lack of focus on BearWise® and Bear Smart.	No	DWR has been an active participant in BearWise® from the beginning, helping to develop the program. Extensive public outreach by DWR centers around BearWise®. More funds are sought for BearWise® cost share projects with localities annually. Moreover, BearWise®, which focuses on outreach and prevention of human-bear conflicts, does not address all aspects of a comprehensive statewide bear management program (e.g., population and habitat management, hunting, diseases, research).
Hunter participation and hunter interest information is incomplete (e.g., why more hunters don't pursue bears)	Yes	Text (p. 41) added regarding survey data on reasons why many Virginia hunters do not pursue bears. There are many ways to analyze and present hunter survey data, which DWR regularly does; however, we chose what we thought were reasonable summary statistics for this background information in the bear plan. Due to human dimensions staff changes, several years passed without hunter surveys but a regular schedule has been developed and future surveys will provide opportunities to ask more questions related to bear hunter participation, interest, motivations, etc.

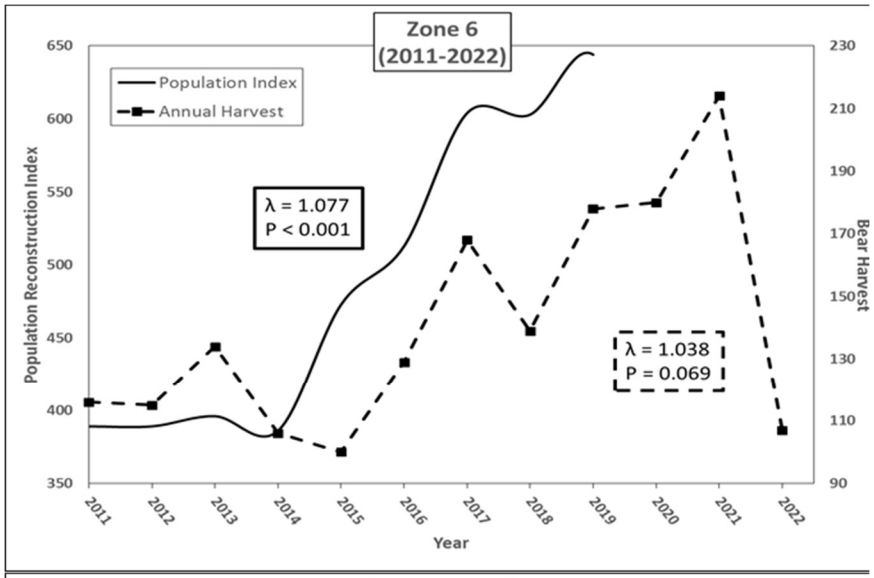
Appendix 3. Zone-specific population trends and estimates of the finite rate of population change (λ, lambda) based on bear population reconstruction and total harvest in Virginia for the time periods of 2011-2022.

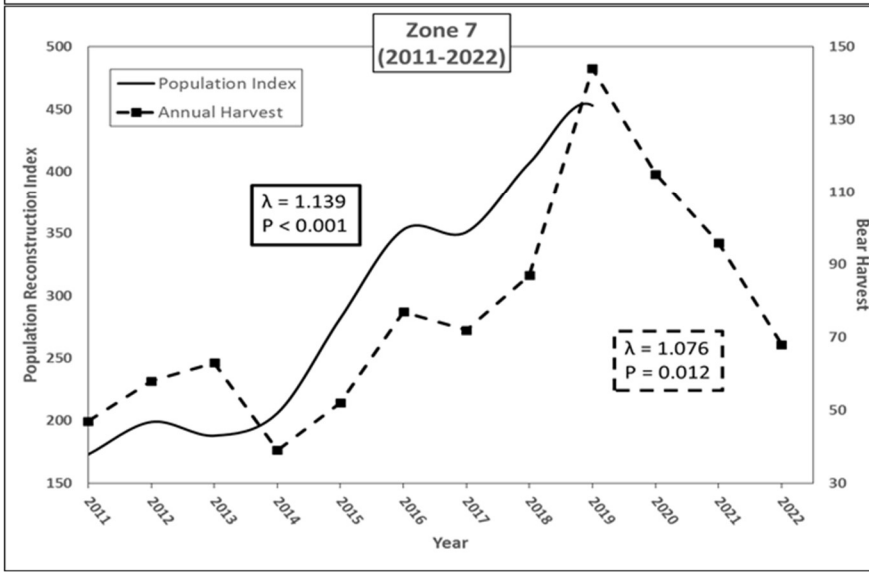
Significant trends (P < 0.05) are indicated by bold values of λ. Zones 15, 17-19, and 21 are not included due to sparse bear populations and infrequent harvests.

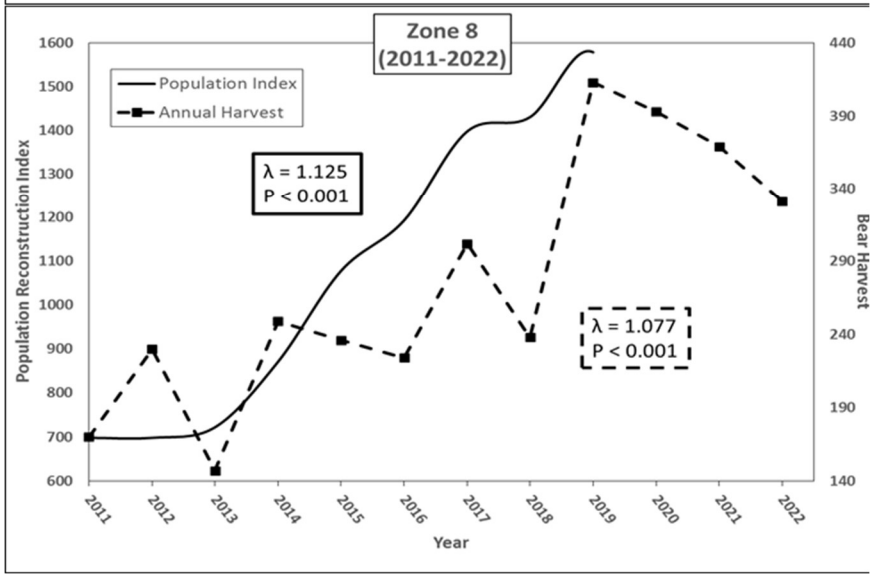


Appendix 3. (continued).

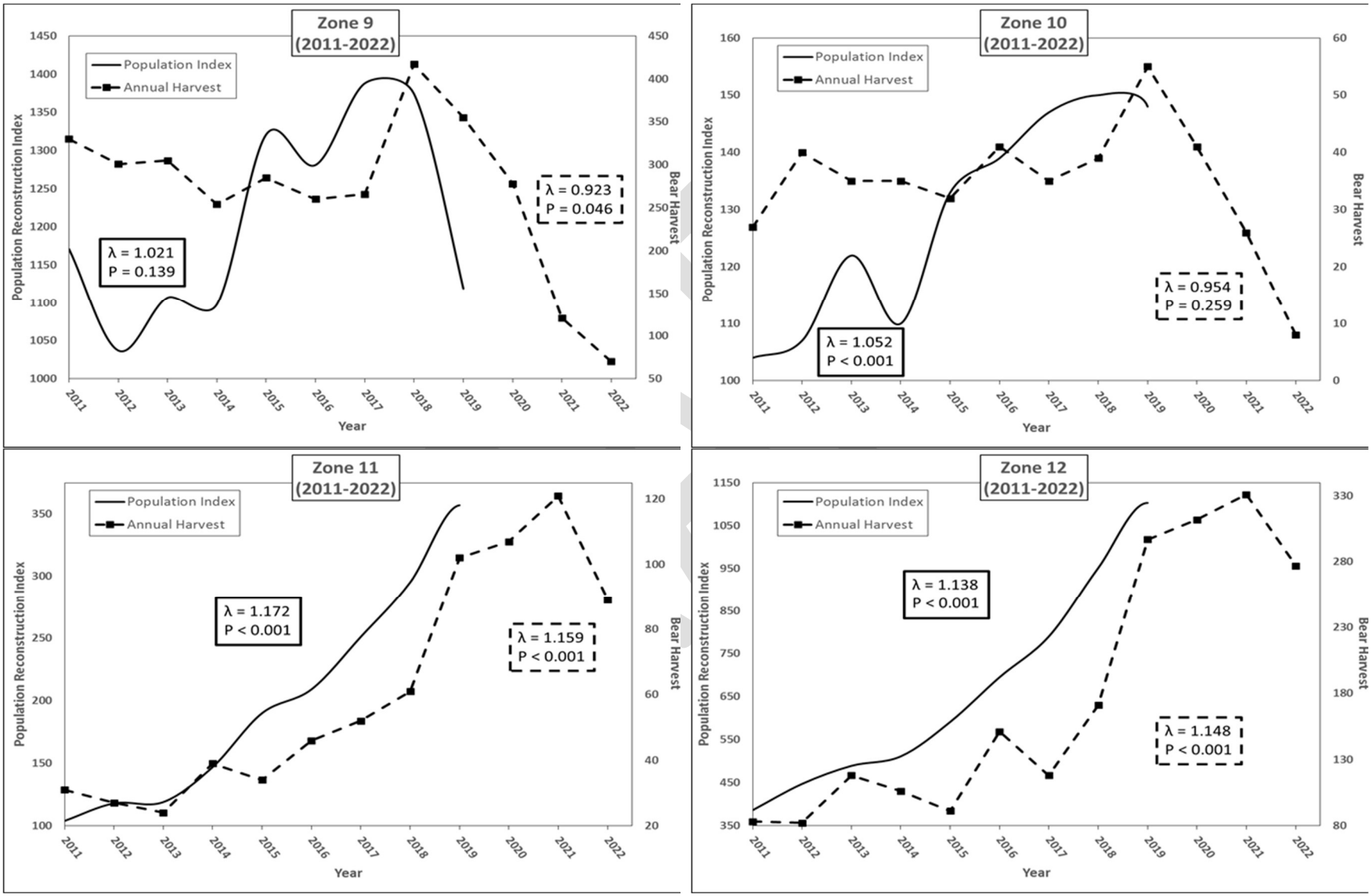




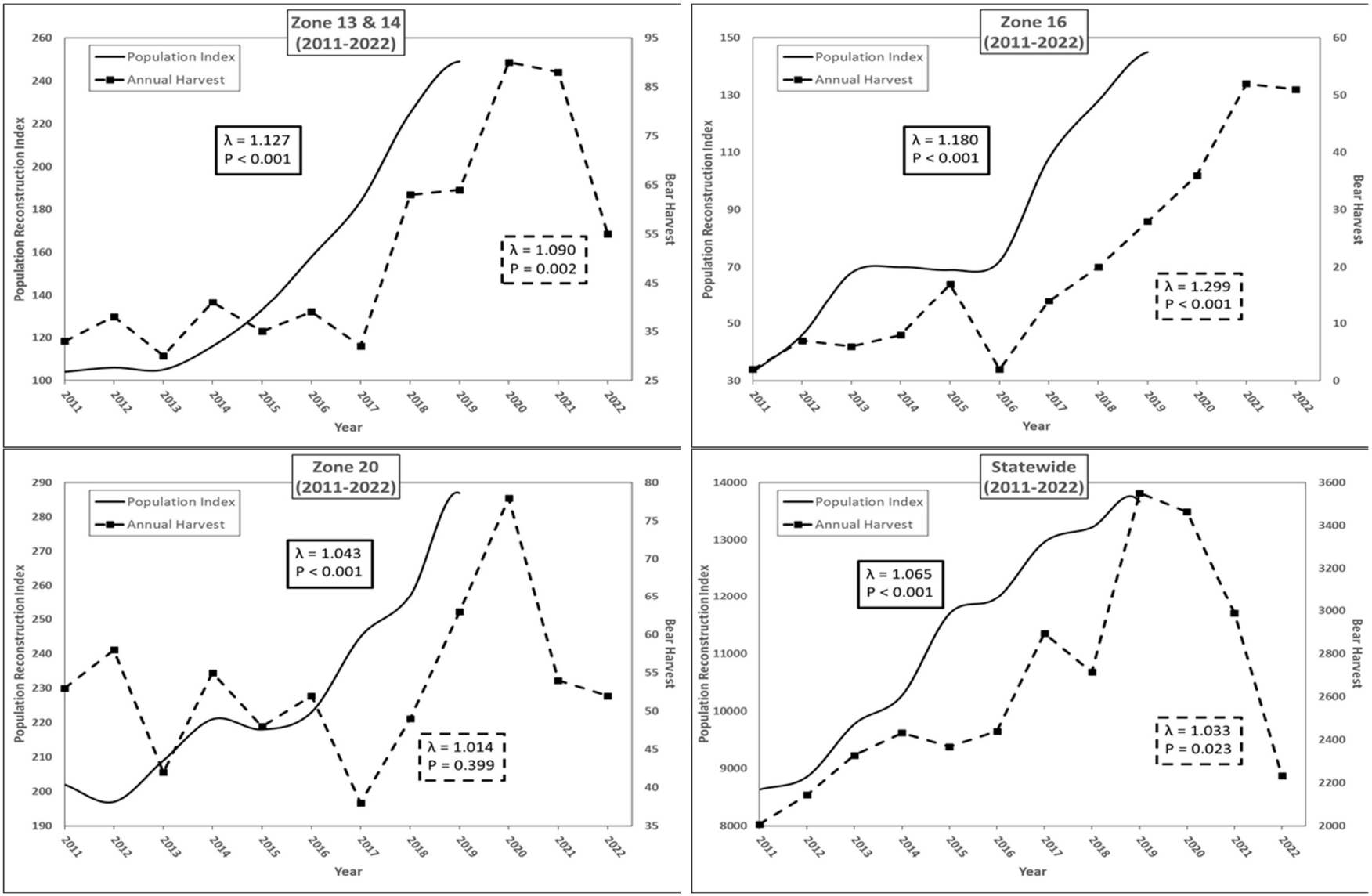




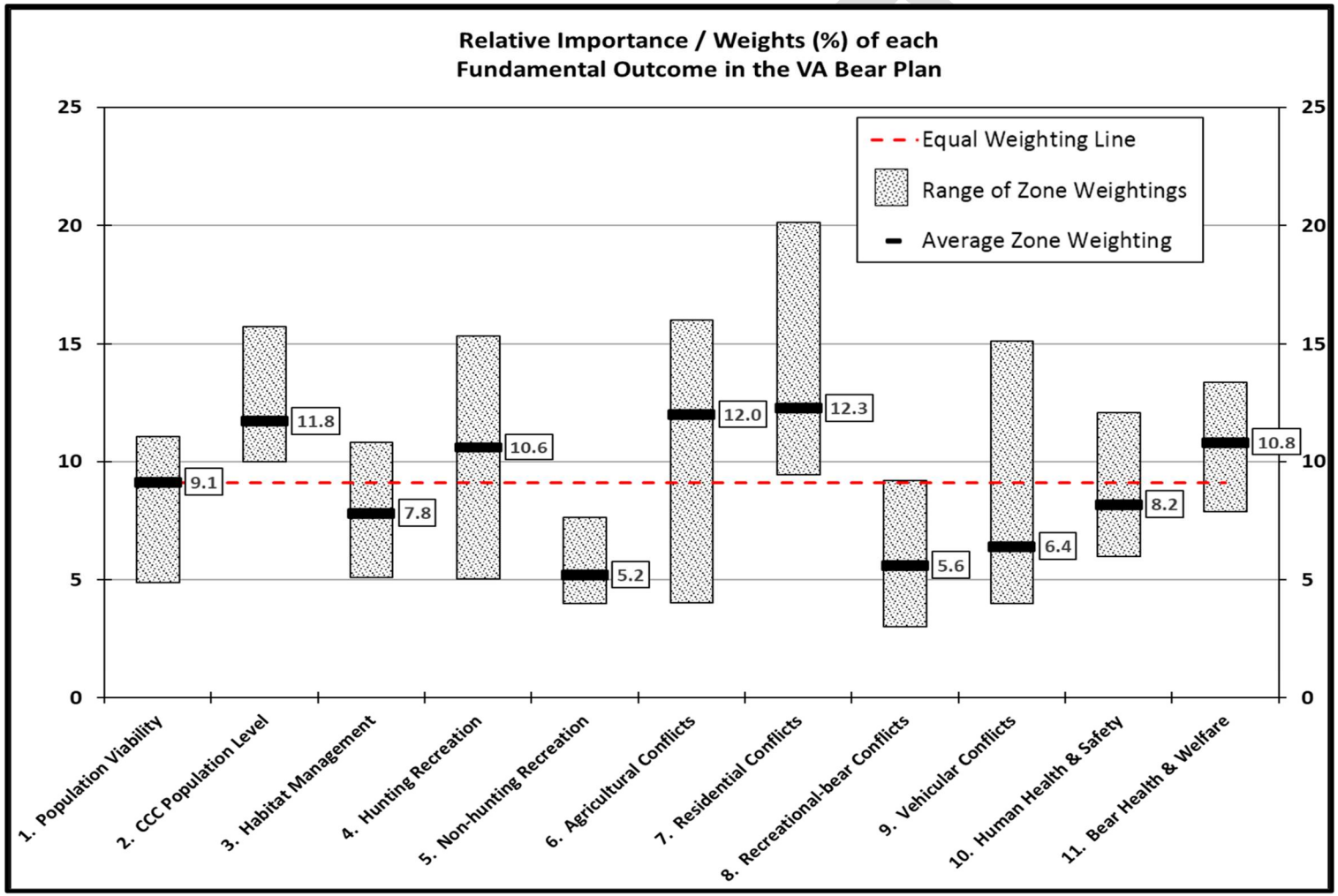
Appendix 3. (continued).



Appendix 3. (continued).



Appendix 4. Relative importance of fundamental outcomes in the Bear Plan.
Bear management decisions involve trade-offs among the 11 fundamental outcomes identified within Bear Management Plan goal statements. Zone-specific relative weightings (%) among these outcomes were provided by DWR Wildlife Division management staff and reflect the relative values decision makers place on the different outcomes at local scales. Guided by overall statewide weightings of outcomes provided by the Citizen's Advisory Committee and the Bear Plan Technical Committee, priorities for local outcomes reflect differences in land use, bear populations, and human densities. Relative weightings within each Zone sum to 100%, where 9.1% (=100%/11) represents the average weighting.



Appendix 4. Continued.

Bear Zone #	Relative Weighting (%) by Fundamental Outcome										
	1. Population Viability	2. CCC Population Level	3. Habitat Management	4. Hunting Recreation	5. Non-hunting Recreation	6. Agricultural Conflicts	7. Residential Conflicts	8. Recreational-bear Conflicts	9. Vehicular Conflicts	10. Human Health & Safety	11. Bear Health & Welfare
1	10.8	11.9	9.7	10.8	5.4	6.6	12.2	6.5	6.5	8.7	10.8
2	10.5	11.5	9.4	10.5	5.2	11.8	9.4	6.3	6.3	8.4	10.5
3	9.9	10.9	8.9	11.2	5.0	9.9	11.2	7.5	7.5	8.0	9.9
4	5.1	12.0	5.1	15.3	5.4	8.2	12.3	9.2	6.5	8.7	12.3
5	5.1	12.0	5.1	10.0	5.5	15.4	12.3	7.0	6.5	8.7	12.3
6	10.6	11.7	9.6	10.6	5.3	10.6	9.6	6.4	6.4	8.5	10.6
7	10.6	11.7	5.1	10.6	5.3	16.0	15.5	4.0	4.0	8.0	9.1
8	5.0	11.7	5.5	14.0	5.3	15.0	15.5	6.0	4.0	6.0	12.0
9	4.9	11.2	9.1	11.5	7.6	11.5	10.5	6.1	6.1	8.1	13.4
10	9.5	10.4	9.8	10.7	4.7	9.8	11.1	5.7	7.1	8.0	13.3
11	10.6	11.7	5.1	12.6	4.0	16.0	15.0	4.0	5.0	6.9	9.1
12	10.6	11.7	9.6	13.0	4.0	13.0	9.6	4.6	5.0	6.9	12.0
13	11.1	15.6	5.2	5.2	5.5	12.5	13.6	3.1	6.7	8.9	12.5
14	10.5	11.5	10.8	10.5	5.2	11.8	10.8	6.3	6.3	8.4	7.9
15	5.0	11.8	7.0	5.0	6.0	4.0	20.1	3.0	15.1	12.1	10.7
16	9.6	10.5	8.6	12.6	4.8	14.4	10.8	5.7	5.7	7.7	9.6
17	10.7	15.7	5.2	5.2	5.6	12.6	13.6	3.1	6.7	8.9	12.6
18	11.0	10.7	8.8	9.7	4.9	14.7	11.0	5.8	5.8	7.8	9.7
19	11.0	10.7	8.8	9.7	4.9	14.7	11.0	5.8	5.8	7.8	9.7
20	9.1	10.0	8.2	13.7	4.5	13.7	13.7	5.4	5.4	7.3	9.1
21	10.6	11.7	9.6	10.6	5.3	10.6	9.6	6.4	6.4	8.5	10.6
AVG	9.1	11.8	7.8	10.6	5.2	12.0	12.3	5.6	6.4	8.2	10.8
Max	11.1	15.7	10.8	15.3	7.6	16.0	20.1	9.2	15.1	12.1	13.4
Min	4.9	10.0	5.1	5.0	4.0	4.0	9.4	3.0	4.0	6.0	7.9

Appendix 5. Explanation of the structured decision-making process for determining bear population objectives.

A requisite step toward achieving the fundamental outcome of Goal 2 to "manage current and projected bear populations at levels adaptable to a changing CCC" is updating the bear population objectives in each zone (Objective 1). The number of bears in an area that is acceptable to the human population (i.e., the cultural carrying capacity) depends on the human tolerance for bears and the public benefits derived from bears. CCC is a function of both the desired population size based on perceived benefits (i.e., what people want) and the realized benefits from bear population changes (i.e., what people really get).

Determining CCC for bears is often contentious among stakeholders and involves the joint consideration of a combination of social, economic, political, and biological perspectives. With varying bear population sizes, land uses (e.g., urban vs. rural), human population densities, and public attitudes, CCC differs among stakeholder groups and among the 22 bear management zones in Virginia. For example, hunters and wildlife watchers may desire higher bear populations than farmers who have concerns about bear damage to crops. Because desired changes in bear CCC (e.g., increase, stabilize, or decrease population size) have typically been more subjective than quantitative, a potential strategy for Objective 1 was to "develop more objective techniques to determine CCC objectives and anticipated future changes (e.g., structure decision making)." Therefore, DWR staff implemented a structured decision-making (SDM) process to recommend CCC population objectives in each Bear Management Zone. SDM is an organized approach for selecting a management action (e.g., a CCC bear population objective) that optimizes competing public desires and outcomes (e.g., what stakeholders want, what people really get) (Runge et al. 2013).

The SDM Approach

Using the PrOACT decision-making model, SDM is a formal framework for breaking complex and difficult decisions into component parts. The structured decision-making process incorporates both stakeholder values and technical evaluations. As the result of work from the Citizens Advisory Committee (CAC) and other public input, Bear Plan goals (especially the fundamental outcomes) identified key stakeholder values for determining CCC population objectives. Technical considerations came from empirical data and expert elicitations from multiple sources including the Bear Plan Technical Committee (BPTC), other DWR management staff, public surveys, and other research. The PrOACT steps include:

Defining the Problem
Objectives
Actions / Alternatives
Consequences
Trade-offs & Optimization

Defining the Problem

Developed by the BPTC, the problem that required decisions was defined as:

"Determine the 2022 bear population management objective (direction and extent) in each management zone as a basic factor toward achieving the current and future CCC."
Objectives

As one of the 11 value-driven fundamental outcomes that matter most to the public (Table 3), achieving CCC will need to address multiple, and often competing, objectives. By our definition, bear population

size at CCC will need to balance the realized human benefits (i.e., how well the other 10 fundamental outcomes are achieved) with what stakeholders would accept (i.e., what people want).

The BPTC believed that six of these fundamental outcomes (involving "what people want" and/or "what people get") could be especially influenced by changes in population size. These outcomes include maintaining population viability (from Goal 1), providing recreation benefits (hunting and non-hunting) (from Goal 4), and resolving conflicts (agricultural, residential, and recreational) (from Goal 5). As well, the most significant public interest in these fundamental outcomes comes from citizens with specific stakes in each of the outcomes and not necessarily from the general public. Stakeholders are those citizens who are affected by decisions that lead to actions.

To determine CCC, two factors were considered for each fundamental outcome: (1) meeting stakeholder desires and perceptions (i.e., "what people want") and/or (2) the actual benefits that might be realized (i.e., "what people really get"). While the dual CCC factors would be important for most outcomes, population viability and non-hunting recreation benefit outcomes had singular factors. Although there may be significant concerns from some people about population viability (i.e., "what people want"), the BPTC did not also include "what people really get" as a discriminating objective because viability would likely be achieved with all population alternatives. Conversely, non-hunting recreation benefits might be influenced by population changes, but the absence of demands by non-hunting recreationists suggest little benefit for including this as a discriminating factor.

While bear population size may influence conflicts for many outdoor recreationists (e.g., campers, hikers), the BPTC restricted the outcome focus of recreational conflicts to deer hunter concerns west of the Blue Ridge (WBR). The potential impact of bears on relatively low deer populations WBR (especially on public lands) has been a concern for deer hunter recreationists.

Therefore the 10 most meaningful objectives considered in determining bear population CCC were:

Fundamental Outcome	Stakeholder Group	CCC Factor	CCC Objective[1]
Population Viability	Ecologistic-minded Residents	What stakeholders want	1
Hunting Recreation Benefits	Licensed Bear Hunters	What stakeholders want	2
		What stakeholders get	3
Non-hunting Recreation Benefits	Non-consumptive Users	What stakeholders get	4
Agricultural Conflicts	Vulnerable Agricultural Producers	What stakeholders want	5
		What stakeholders get	6
Residential Conflicts	Residents Concerned about Bear Conflicts	What stakeholders want	7
		What stakeholders get	8
Recreational Conflicts	Deer Hunters West of the Blue Ridge	What stakeholders want	9
		What stakeholders get	10

[1] Consequences for objectives 1, 2, 5, and 7 evaluated empirically with public surveys. Consequences for objectives 3, 4, 6, 8, 9, and 10 predicted with expert elicitation.

Actions / Alternatives

Population management alternatives represent the available population choices for achieving CCC objectives. Rather than targeting absolute densities of bears, the Virginia DWR has traditionally set more

practical population objectives that reflect the relative change in the number of animals on the landscape (e.g., great increase, slight increase, stabilize, slight decrease, great decrease). Population objectives in terms of relative change provide the basis for hunting regulations and other specific population management methods.

Relative Population Management Action	Practical Outcome (example trend)
Great Increase	75% increase - (e.g., $\lambda = 1.0576$ over 10 years)
Slight Increase	25% increase - (e.g., $\lambda = 1.0226$ over 10 years)
No Change / Stabilize	No change - (e.g., $\lambda = 1.0$)
Slight Decrease	25% decrease - (e.g., $\lambda = 0.9716$ over 10 years)
Great Decrease	75% decrease - (e.g., $\lambda = 0.8706$ over 10 years)

Consequences

To compare alternatives within each Bear Management Zone, DWR staff evaluated and predicted the consequences of the five population management actions (great increase, slight increase, stabilize, slight decrease, or great decrease) on each of the 10 CCC objectives. Likert-scale performance measures of stakeholder satisfaction were used to describe the consequences of the different population alternatives on achieving each CCC objective, where:

Performance Measure	Score
Completely Dissatisfied	1
Mostly Dissatisfied	2
Slightly Dissatisfied	3
Neither Satisfied/Dissatisfied	4
Slightly Satisfied	5
Mostly Satisfied	6
Completely Satisfied	7

Relative to "what stakeholders want" for objectives 1, 2, 5, and 7, estimates of zone-specific satisfactions with each combination of CCC objective and population alternative were based on surveys conducted during 2020 of the general public (n=844 responses), agricultural producers (n=1,162 responses), and licensed bear hunters (n=911 responses) (Responsive Management 2020). Selected survey questions targeted specific objectives and were analyzed for the stakeholder group of interest.

Objective 1 – Population viability (what ecologistic-minded residents want): Four screening questions (Q70, Q71, Q72, Q73) were used to identify the most ecologistic-minded members of the general public. It was assumed that the upper quartile of scores represented the most ecologistic-minded residents (n=133) among the respondents. For each *population alternative*, the statewide results of the following

question*(s)* were used to represent concerns for bear population viability among citizens with the keenest interest in ecological systems.

How satisfied or dissatisfied would you be if the Department's management actions *(greatly increased, slightly increased, maintained, slightly decreased, greatly decreased)* the bear population throughout the state?

Objective 2 – Hunting recreation benefits (what licensed bear hunters want): Screening questions were used to identify resident bear hunters (n=893) from bear hunting license buyers (e.g., Resident Bear License, Sportsman's License). Zone-specific results of the following question*(s)* predicted the satisfaction that bear hunters would have with each of the *population alternatives*.

How satisfied or dissatisfied would you be if the Department's management actions *(greatly increased, slightly increased, maintained, slightly decreased, greatly decreased)* the bear population in the county where you hunt most often?

Objective 5 – Agricultural conflicts (what vulnerable agricultural producers want): All members of the Virginia Farm Bureau were surveyed about their attitudes toward bears and bear population management. Because not all VFB members produce commodities normally vulnerable to bear damage (e.g., cotton), screening questions identified a subset of stakeholders with documented commodity vulnerabilities and concerns. VFB members who raised either (1) bees or (2) cattle plus corn/grain had heightened concerns about bears and represented vulnerable agricultural producers (n=290). Zone-specific results of the following question*(s)* predicted the satisfaction that vulnerable agricultural producers would have with each of the bear *population alternatives*.

How satisfied or dissatisfied would you be if the Department's management actions *(greatly increased, slightly increased, maintained, slightly decreased, greatly decreased)* the bear population in the county where you farm?

Objective 7 – Residential conflicts (what residents concerned about bear conflicts want): The stakeholder group especially concerned about residential bear conflicts was composed of general public respondents who considered problems for homeowners among the more important factors in making bear management decisions (n=246). Out of eight factors considered (Q58-Q65), residents who ranked "problems for homeowners" among their top four factors for managing bears were chosen as the group of most concerned residents. Zone-specific results of the following question*(s)* predicted the satisfaction that concerned residents would have with each of the bear *population alternatives*.

How satisfied or dissatisfied would you be if the Department's management actions *(greatly increased, slightly increased, maintained, slightly decreased, greatly decreased)* the bear population in your neighborhood?

When specific empirical data were lacking to estimate the satisfaction consequences of different population actions on CCC objectives (objectives 3, 4, 6, 8, 9, and 10), expert elicitations were provided by the BPTC using a modified Delta method. These expert opinions were based on staff experience, related research, and local knowledge.

Objective 3 – Hunting recreation benefits (what licensed bear hunters get):
Objective 6 – Agricultural conflicts (what vulnerable agricultural producers get):
Objective 8 – Residential conflicts (what residents concerned about bear conflicts get):

While stakeholders often have strong opinions and perceptions about how population changes would affect their recreational or conflict interests (i.e., what they want), the actual outcomes (i.e., what they get) might differ from their expectations. Using stakeholder satisfactions with the current population (from objectives 2, 5, & 7) as starting points (Q11, Q48, Q54), the BPTC created three hypothetical response curves reflecting expectations for the actual satisfactions that might result from each alternative population level (i.e., what they get). The three response curves predicted realized satisfactions for: (1) the average zone, (2) the zone with the lowest current population satisfaction, and (3) the zone with the highest current population satisfaction. Interpolations relative to these curves (based on satisfactions with current populations) provided the expected satisfactions for each population alternative in every Zone.

Objective 4 – Non-hunting recreation benefits (what non-consumptive users get):
Objective 9 – Recreational conflicts (what deer hunters WBR want):
Objective 10 – Recreational conflicts (what deer hunters WBR get):

Although no experimental data were available for these CCC objectives, we assumed that stakeholder satisfactions with the current population size was 4.0 (neither satisfied nor dissatisfied). Relative to 4.0 for the current population size, expert elicitations from the BPTC about each population alternative were used to predict the expected change in stakeholder satisfactions. SDM selection of optimum population management alternatives depends on the relative satisfaction differences among the population alternatives and not on the absolute level of satisfaction, so the starting point is generally not an important consideration. These expert opinion results were uniformly applied in all zones.

Predictions of stakeholder satisfactions with population alternatives for each CCC objective were organized into consequence tables for each zone. As an example, see the expected satisfaction results summarized in the consequence table for Zone 2 below. All the satisfaction results were used to populate consequence tables for each zone (Appendix 6).

Trade-offs & Optimization

The best population alternative(s) for jointly achieving multiple CCC objectives in each zone were based on optimum tradeoffs among the stakeholder satisfactions. A weighted additive model quantified the overall value of each population alternative based on the predicted satisfactions and the relative importance of each CCC objective.

The relative importance (%) among the CCC objectives in each zone were based on a reallocation the zone-specific weightings for all the fundamental outcomes provided by DWR Wildlife Division management staff (Appendix 4). And for each fundamental outcome, the BPTC judged that the realized satisfactions for stakeholders (what they get) should be twice as important for making management decisions as the stakeholder perceptions (what they want).

Trade-off tables for each zone guided the weighted additive analyses of zone consequence satisfactions to identify the most optimal population alternative (i.e., the alternative with the greatest sum of weighted scores) and other closely competing options. Different performance measures for multiple objectives are often normalized in SDM analyses. But because all our CCC objectives were measured on the same 7-point satisfaction scale, normalizing variables was not necessary. As an example, see the tradeoff table for Zone 2 below where the sum of weighted scores suggest that the “current size” population was the most optimal solution, with a “slight decrease” as a close competitor.

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CONSEQUENCE TABLE - Zone 2

CCC Objectives (w/in Fundamental Outcomes)	Satisfactions with Population Alternatives [1, 2]				
	Great Increase	Slight Increase	Current Size	Slight Decrease	Great Decrease
Population Viability - Ecologistic-minded resident satisfaction with the:					
1. Population alternative (what they want) (statewide)	**4.37**	**5.32**	**5.74**	**3.28**	**1.99**
Hunting Recreation Benefits - Bear hunter satisfaction with the:					
2. Population alternative (what they want)	**3.37**	**4.15**	**5.04**	**4.19**	**3.26**
3. Resulting improvement in bear hunting recreation (what they get)	*4.99*	*5.20*	**5.04**	*4.39*	*2.77*
Non-hunting Recreation - Non-consumptive user satisfaction with the:					
4. Resulting improvement in non-hunting recreation opportunities (what they get)	*3.95*	*4.02*	*4.00*	*4.02*	*3.45*
Agricultural Conflicts - Vulnerable agricultural producer satisfaction with the:					
5. Population alternative (what they want)	**1.52**	**1.61**	**2.48**	**5.05**	**6.05**
6. Resulting mitigation of agricultural losses (what they get)	*1.69*	*1.98*	**2.48**	*2.81*	*3.40*
Residential Conflicts - Concerned resident satisfaction with the:					
7. Population alternative (what they want)	**2.05**	**2.79**	**5.05**	**4.95**	**4.16**
8. Resulting reduction of homeowner conflicts (what they get)	*3.46*	*4.34*	**5.05**	*4.96*	*4.81*
Recreational-bear Conflicts - WBR Deer hunter satisfaction with the:					
9. Population alternative (what they want)	*2.37*	*3.16*	*4.00*	*4.73*	*5.10*
10. Resulting increase in deer populations & hunter recreation (what they get)	*3.46*	*3.80*	*4.00*	*4.23*	*4.42*

[1] 1 = Completely dissatisfied
2 = Mostly dissatisfied
3 = Slightly dissatisfied
4 = Neither
5 = Slightly satisfied
6 = Mostly satisfied
7 = Completely satisfied

[2] **Bold cells** are empirical results from 2020 survey data (Responsive Management 2020). *Italic cells* are data based on BPTC expert opinions and/or modifications by regional DWR staff.

TRADEOFF TABLE - Zone 2

CCC Objectives (w/in Fundamental Outcomes)	Weights reallocated to 100%	Weighted Satisfactions w/ Population Alternatives				
		Great Increase	Slight Increase	Current Size	Slight Decrease	Great Decrease
Population Viability - Ecologistic-minded resident satisfaction with the:						
1. Population alternative (what they want) (statewide)	7.76	0.34	0.41	0.45	0.25	0.15
Hunting Recreation Benefits - Bear hunter satisfaction with the:						
2. Population alternative (what they want)	7.76	0.26	0.32	0.39	0.32	0.25
3. Resulting improvement in bear hunting recreation (what they get)	15.52	0.77	0.81	0.78	0.68	0.43
Non-hunting Recreation - Non-consumptive user satisfaction with the:						
4. Resulting improvement in non-hunting recreation opportunities (what they get)	7.76	0.31	0.31	0.31	0.31	0.27
Agricultural Conflicts - Vulnerable agricultural producer satisfaction with the:						
5. Population alternative (what they want)	8.76	0.13	0.14	0.22	0.44	0.53
6. Resulting mitigation of agricultural losses (what they get)	17.51	0.30	0.35	0.43	0.49	0.59
Residential Conflicts - Concerned resident satisfaction with the:						
7. Population alternative (what they want)	6.99	0.14	0.19	0.35	0.35	0.29
8. Resulting reduction of homeowner conflicts (what they get)	13.97	0.48	0.61	0.71	0.69	0.67
Recreational-bear Conflicts - WBR Deer hunter satisfaction with the:						
9. Population alternative (what they want)	4.66	0.11	0.15	0.19	0.22	0.24
10. Resulting increase in deer populations & hunter recreation (what they get)	9.31	0.32	0.35	0.37	0.39	0.41
Sum of weighted scores (for each alternative)	**100.00**	**3.17**	**3.64**	**4.20**	**4.16**	**3.84**

Based on the sum of weighted scores, maintaining the "current size" of the bear population was the alternative that made the most optimal tradeoffs among all 10 CCC objectives in every zone. Depending on the zone, either a "slight increase" or a "slight decrease" was next best. In all zones, "great increase" and "great decrease" in bear populations were the least optimum alternatives.

Sum of Weighted Scores by Bear Management Zone

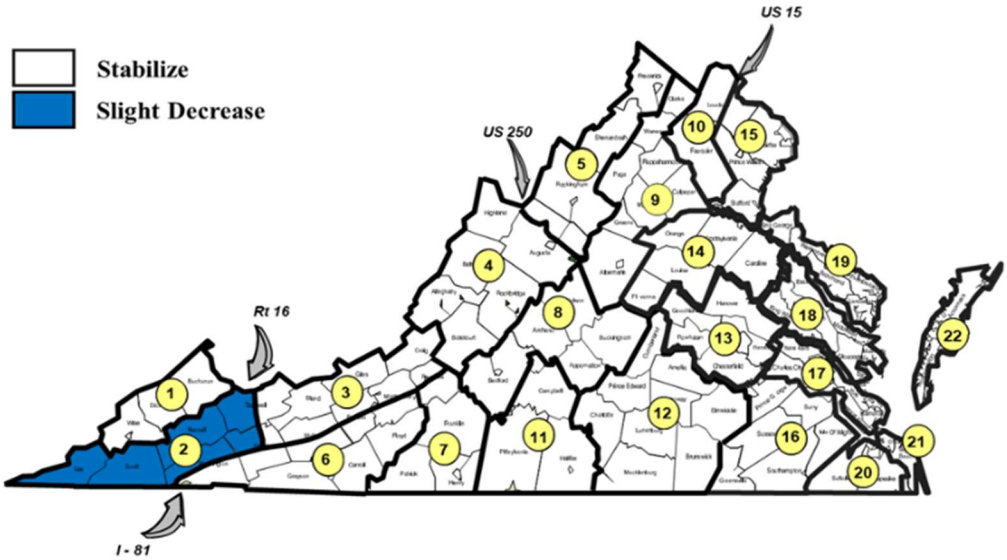
Zone	Population Alternative				
	Great Increase	Slight Increase	Current Size	Slight Decrease	Great Decrease
1	3.35	3.75	4.26	4.13	3.84
2	3.17	3.64	4.20	4.16	3.84
3	3.41	3.95	4.49	4.23	3.85
4	3.52	4.02	4.55	4.19	3.74
5	3.23	3.82	4.38	4.06	3.84
6	3.48	4.06	4.71	4.27	3.80
7	3.33	3.90	4.64	4.28	3.88
8	3.62	4.30	5.00	4.47	3.70
9	3.45	3.97	4.31	3.98	3.53
10	3.58	4.07	4.54	4.07	3.48
11	3.55	4.13	5.00	4.34	3.86
12	3.66	4.14	4.70	4.18	3.66
13	3.38	4.07	4.96	4.34	3.74
14	3.90	4.51	5.18	4.42	3.74
15	3.85	4.62	5.73	4.90	4.09
16	3.74	4.31	4.91	4.28	3.79
17	3.43	4.10	5.02	4.35	3.79
18-19	3.58	4.20	4.95	4.26	3.63
20	3.95	4.58	5.44	4.49	3.66
21	3.96	4.62	5.42	4.33	3.49

Conclusions

Structured decision making helped to identify the CCC population objective (i.e., the bear population alternative) that might produce the greatest overall public acceptance and benefit in each Bear Management Zone across Virginia. With impartial and evidence-based results for each zone, the SDM approach helped to clarify decisions about prospective CCC bear population objectives and provided a meaningful basis for subsequent DWR staff discussions. DWR staff working within each administrative region used these SDM results along with data on bear densities, incidences of sarcoptic mange in bears, human populations, complaints received, and vulnerable crops (see maps at the end of this appendix) to inform decisions about appropriate objectives by zone. Largely agreeing with the SDM results, these staff discussions resulted in a proposal to manage bear populations at the "current size" in every zone. After reflection by DWR management staff, only Zone 2 with a comparable sum of weighted scores to "current size" was changed to a "slight decrease" recommendation. The general public had the opportunity to review draft bear population objectives online during January 2023 (Appendix 7). These objectives served as the basis for DWR staff hunting season recommendations that were advertised and

approved by the DWR Board at their meetings in March and May 2023, respectively.

Draft Bear Population Objectives (2023-2032) *



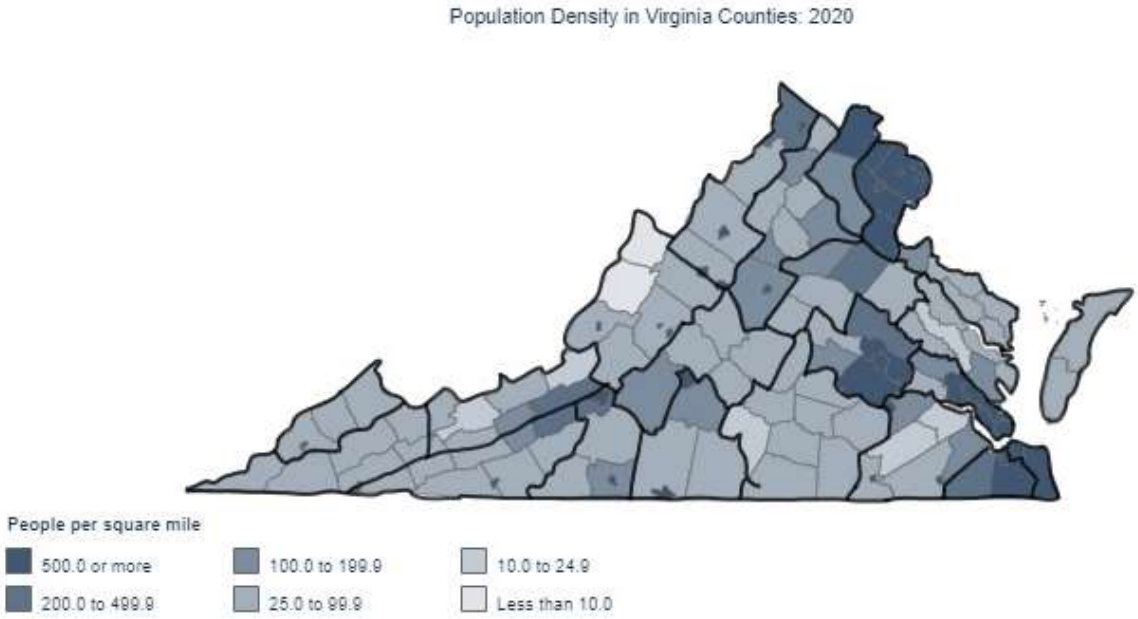
*** New objectives relative to 2020 bear population levels (the year public survey data was obtained)**

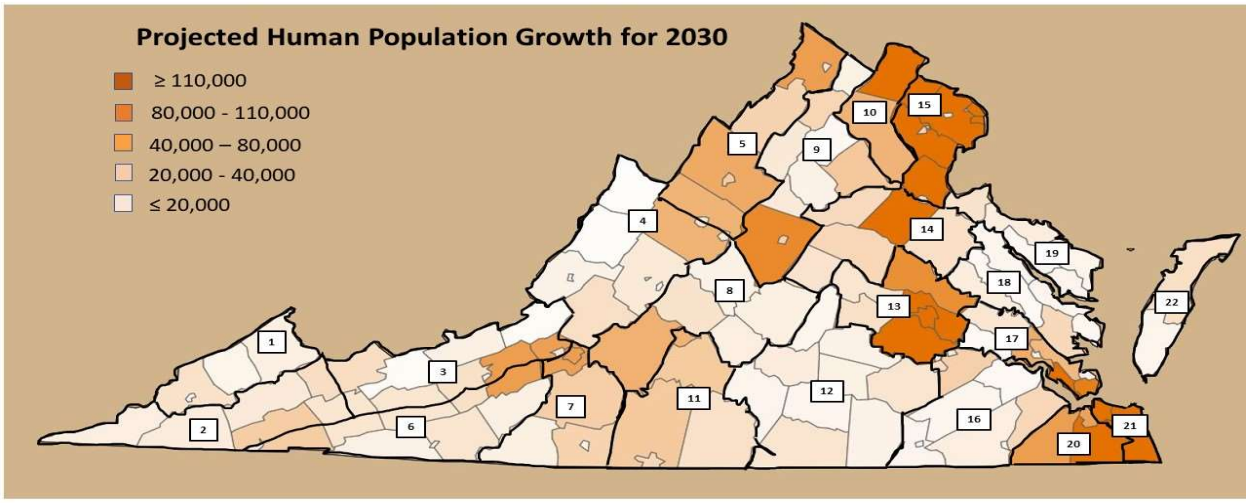
Literature Cited

Responsive Management. 2020. The attitudes of Virginia residents, bear hunters, and agricultural producers toward black bears and black bear management. Responsive Management, Harrisonburg, Virginia.

Runge, M. C., J. B. Grand, and M. S. Mitchell. 2013. Structured decision making. Pages 51–72 in P. R. Krausman and J. W. Cain III, editors. Wildlife management and conservation: contemporary principles and practices. Johns Hopkins University Press, Baltimore, Maryland, USA.

Examples of other data used by staff when proposing draft zone objectives are shown on the maps below. Sources include U.S. Census Bureau, Weldon Cooper Center for Public Service, USDA Wildlife Services, USDA Census of Agriculture.


Population Density in Virginia Counties: 2020
People per square mile
500.0 or more
200.0 to 499.9
100.0 to 199.9
25.0 to 99.9
10.0 to 24.9
Less than 10.0


Projected Human Population Growth for 2030
≥ 110,000
80,000 - 110,000
40,000 – 80,000
20,000 - 40,000
≤ 20,000
1
2
3
4
5
6
7
8
9
10
11
12
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17
18
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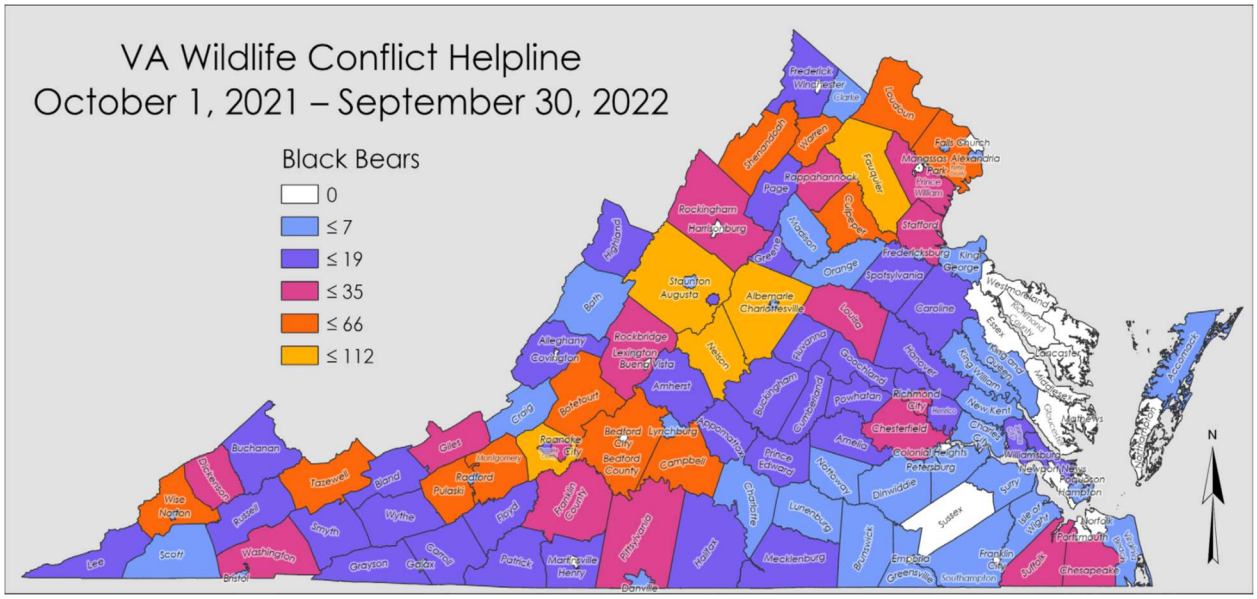
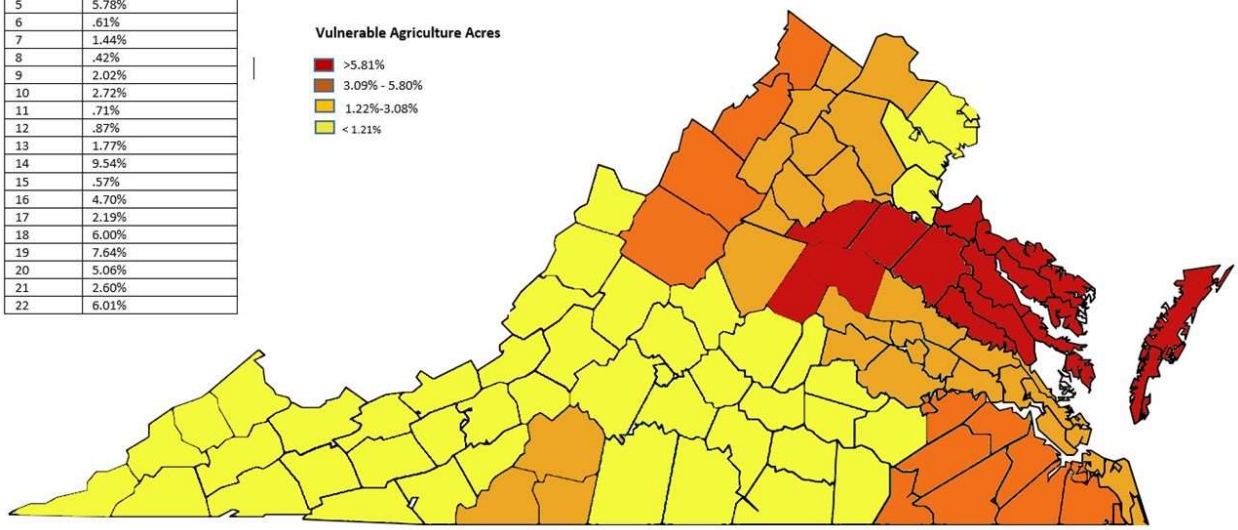
21
22



Percent of Landscape in Vulnerable Agricultural Crop Acres
(Corn Acres + Peanut Acres + Orchard Acres/Total Zone Acres)
Crop Acres From USDA Census Of Agriculture 2017

Bear Zone	% Vulnerable Ag Acres
1	.02%
2	.34%
3	.17%
4	.44%
5	5.78%
6	.61%
7	1.44%
8	.42%
9	2.02%
10	2.72%
11	.71%
12	.87%
13	1.77%
14	9.54%
15	.57%
16	4.70%
17	2.19%
18	6.00%
19	7.64%
20	5.06%
21	2.60%
22	6.01%



Appendix 6. Zone predictions of stakeholder satisfactions with population alternatives for each CCC objective.

Zone	Population Alternative	CCC Objective [2]									
		1	2	3	4	5	6	7	8	9	10
1	Great Increase	4.37	3.61	4.99	3.95	1.54	1.68	1.83	3.40	2.37	3.46
1	Slight Increase	5.32	4.00	4.74	4.02	1.67	1.96	2.46	4.27	3.16	3.80
1	Current Size	5.74	4.35	4.35	4.00	2.46	2.46	4.92	4.92	4.00	4.00
1	Slight Decrease	3.28	4.17	3.60	4.02	5.13	2.79	4.96	4.86	4.73	4.23
1	Great Decrease	1.99	3.43	2.64	3.45	6.09	3.38	4.46	4.75	5.10	4.42
2	Great Increase	4.37	3.37	4.99	3.95	1.52	1.69	2.05	3.46	2.37	3.46
2	Slight Increase	5.32	4.15	5.20	4.02	1.61	1.98	2.79	4.34	3.16	3.80
2	Current Size	5.74	5.04	5.04	4.00	2.48	2.48	5.05	5.05	4.00	4.00
2	Slight Decrease	3.28	4.19	4.39	4.02	5.05	2.81	4.95	4.96	4.73	4.23
2	Great Decrease	1.99	3.26	2.77	3.45	6.05	3.40	4.16	4.81	5.10	4.42
3	Great Increase	4.37	3.72	4.99	3.95	1.89	2.36	2.08	3.58	2.37	3.46
3	Slight Increase	5.32	4.27	5.03	4.02	2.46	2.82	3.17	4.49	3.16	3.80
3	Current Size	5.74	4.78	4.78	4.00	3.34	3.34	5.33	5.33	4.00	4.00
3	Slight Decrease	3.28	3.58	4.10	4.02	4.38	3.56	5.08	5.16	4.73	4.23
3	Great Decrease	1.99	2.89	2.72	3.45	4.93	3.99	4.08	4.92	5.10	4.42
4	Great Increase	4.37	3.76	4.99	3.95	1.82	2.18	2.50	3.58	2.37	3.46
4	Slight Increase	5.32	4.38	5.18	4.02	2.21	2.60	3.25	4.49	3.16	3.80
4	Current Size	5.74	5.01	5.01	4.00	3.12	3.12	5.33	5.33	4.00	4.00
4	Slight Decrease	3.28	3.51	4.36	4.02	4.03	3.36	4.00	5.16	4.73	4.23
4	Great Decrease	1.99	3.00	2.76	3.45	4.77	3.84	2.83	4.92	5.10	4.42
5	Great Increase	4.37	3.56	4.99	3.95	2.06	2.45	2.00	3.55	2.37	3.46
5	Slight Increase	5.32	3.92	5.07	4.02	2.71	2.94	3.67	4.45	3.16	3.80
5	Current Size	5.74	4.84	4.84	4.00	3.47	3.47	5.27	5.27	4.00	4.00
5	Slight Decrease	3.28	3.47	4.17	4.02	3.41	3.67	3.80	5.11	4.73	4.23
5	Great Decrease	1.99	2.85	2.73	3.45	4.47	4.08	2.67	4.90	5.10	4.42
6	Great Increase	4.37	3.68	5.01	3.95	2.12	2.76	1.88	3.64	2.37	3.46
6	Slight Increase	5.32	4.20	5.27	4.02	2.96	3.34	2.59	4.56	3.16	3.80
6	Current Size	5.74	5.15	5.15	4.00	3.88	3.88	5.47	5.47	4.00	4.00
6	Slight Decrease	3.28	3.36	4.51	4.02	4.44	4.02	4.24	5.26	4.73	4.23
6	Great Decrease	1.99	3.05	2.78	3.45	4.08	4.36	3.71	4.98	5.10	4.42
7	Great Increase	4.37	4.14	4.99	3.95	2.09	2.88	1.35	3.43		
7	Slight Increase	5.32	4.56	5.03	4.02	2.89	3.47	2.00	4.31		

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7	Current Size	5.74	4.78	4.78	4.00	4.09	4.09	5.00	5.00		
7	Slight Decrease	3.28	3.67	4.10	4.02	4.29	4.20	4.70	4.92		
7	Great Decrease	1.99	2.87	2.72	3.45	3.97	4.47	4.65	4.79		
8	Great Increase	4.37	4.60	5.14	3.95	2.38	2.90	1.94	3.68		
8	Slight Increase	5.32	5.11	5.44	4.02	3.36	3.50	3.25	4.61		
8	Current Size	5.74	5.46	5.46	4.00	4.14	4.14	5.56	5.56		
8	Slight Decrease	3.28	3.27	4.76	4.02	4.48	4.24	4.44	5.33		
8	Great Decrease	1.99	2.43	2.78	3.45	4.05	4.49	2.71	5.02		
9	Great Increase	4.37	4.09	4.99	3.95	2.21	2.30	2.60	3.20		
9	Slight Increase	5.32	4.71	5.25	4.02	2.58	2.76	3.73	4.02		
9	Current Size	5.74	5.13	5.13	4.00	3.28	3.28	4.47	4.47		
9	Slight Decrease	3.28	3.45	4.49	4.02	3.78	3.50	3.93	4.53		
9	Great Decrease	1.99	2.47	2.78	3.45	4.57	3.95	3.07	4.57		
10	Great Increase	4.37	4.96	4.99	3.95	2.15	2.21	2.48	3.43		
10	Slight Increase	5.32	4.84	5.25	4.02	2.50	2.64	3.48	4.31		
10	Current Size	5.74	5.11	5.11	4.00	3.16	3.16	5.00	5.00		
10	Slight Decrease	3.28	3.68	4.48	4.02	3.80	3.40	4.10	4.92		
10	Great Decrease	1.99	2.65	2.78	3.45	4.36	3.87	2.86	4.79		
11	Great Increase	4.37	4.35	5.09	3.95	2.00	2.69	2.05	4.02		
11	Slight Increase	5.32	4.69	5.37	4.02	2.50	3.25	2.60	5.04		
11	Current Size	5.74	5.35	5.35	4.00	3.79	3.79	6.00	6.00		
11	Slight Decrease	3.28	3.30	4.67	4.02	3.79	3.94	4.40	5.63		
11	Great Decrease	1.99	2.28	2.78	3.45	4.71	4.29	4.15	5.12		
12	Great Increase	4.37	4.17	4.99	3.95	2.29	2.87	2.50	3.56		
12	Slight Increase	5.32	4.61	5.03	4.02	2.86	3.46	2.83	4.46		
12	Current Size	5.74	4.78	4.78	4.00	4.07	4.07	5.28	5.28		
12	Slight Decrease	3.28	3.68	4.09	4.02	3.75	4.18	4.89	5.12		
12	Great Decrease	1.99	3.05	2.72	3.45	4.18	4.46	3.78	4.90		
13	Great Increase	4.37	4.79	5.31	3.95	1.83	2.73	1.90	3.78		
13	Slight Increase	5.32	5.51	5.65	4.02	2.67	3.30	2.70	4.74		
13	Current Size	5.74	5.84	5.84	4.00	3.83	3.83	5.70	5.70		
13	Slight Decrease	3.28	3.94	5.09	4.02	3.77	3.98	4.10	5.42		
13	Great Decrease	1.99	2.61	2.78	3.45	2.92	4.33	3.63	5.06		
14	Great Increase	4.37	5.44	4.99	3.95	2.63	3.19	2.22	4.16		
14	Slight Increase	5.32	5.28	5.15	4.02	3.47	3.83	3.44	5.21		
14	Current Size	5.74	4.97	4.97	4.00	4.65	4.65	6.17	6.17		
14	Slight Decrease	3.28	3.13	4.32	4.02	4.00	4.67	4.61	5.74		

14	Great Decrease	1.99	2.35	2.76	3.45	3.84	4.77	3.78	5.16		
15	Great Increase	4.37	5.35	5.12	3.95	2.65	3.18	2.19	4.33		
15	Slight Increase	5.32	5.56	5.41	4.02	3.52	3.81	3.13	5.43		
15	Current Size	5.74	5.41	5.41	4.00	4.63	4.63	6.38	6.38		
15	Slight Decrease	3.28	2.95	4.73	4.02	4.04	4.65	4.69	5.89		
15	Great Decrease	1.99	1.96	2.78	3.45	3.70	4.75	3.75	5.21		
16	Great Increase	4.37	4.40	4.99	3.95	2.91	3.23	2.09	3.60		
16	Slight Increase	5.32	5.01	5.01	4.02	3.55	3.88	3.00	4.51		
16	Current Size	5.74	4.76	4.76	4.00	4.73	4.73	5.36	5.36		
16	Slight Decrease	3.28	3.37	4.07	4.02	3.91	4.74	4.36	5.18		
16	Great Decrease	1.99	3.16	2.72	3.45	3.73	4.81	4.00	4.94		
17	Great Increase	4.37	5.07	5.05	3.95	1.77	2.83	1.87	4.00		
17	Slight Increase	5.32	5.39	5.32	4.02	2.62	3.41	2.63	5.01		
17	Current Size	5.74	5.25	5.25	4.00	4.00	4.00	5.97	5.97		
17	Slight Decrease	3.28	2.95	4.60	4.02	4.13	4.12	3.90	5.61		
17	Great Decrease	1.99	2.32	2.78	3.45	3.14	4.42	3.59	5.11		
18 &19	Great Increase	4.37	5.07	5.05	3.95	1.93	2.83	1.87	4.00		
18 &19	Slight Increase	5.32	5.39	5.32	4.02	2.72	3.41	2.63	5.01		
18 &19	Current Size	5.74	5.25	5.25	4.00	4.00	4.00	5.97	5.97		
18 &19	Slight Decrease	3.28	2.95	4.60	4.02	4.13	4.12	3.90	5.61		
18 &19	Great Decrease	1.99	2.32	2.78	3.45	3.20	4.42	3.59	5.11		
20	Great Increase	4.37	4.81	5.07	3.95	2.63	3.21	2.30	4.51		
20	Slight Increase	5.32	5.20	5.35	4.02	3.31	3.85	2.90	5.66		
20	Current Size	5.74	5.29	5.29	4.00	4.69	4.69	6.60	6.60		
20	Slight Decrease	3.28	3.17	4.63	4.02	3.81	4.71	3.78	6.04		
20	Great Decrease	1.99	2.52	2.78	3.45	3.56	4.79	2.44	5.26		
21	Great Increase	4.37	4.54	5.14	3.95	2.63	3.21	2.30	4.51		
21	Slight Increase	5.32	5.39	5.43	4.02	3.31	3.85	2.90	5.66		
21	Current Size	5.74	5.45	5.45	4.00	4.69	4.69	6.60	6.60		
21	Slight Decrease	3.28	2.07	4.76	4.02	3.81	4.71	3.78	6.04		
21	Great Decrease	1.99	1.50	2.78	3.45	3.56	4.79	2.44	5.26		

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[1] 1 = Completely dissatisfied 2 = Mostly dissatisfied 3 = Slightly dissatisfied 4 = Neither 5 = Slightly satisfied 6 = Mostly satisfied 7 = Completely satisfied
[2] Numbers denote the specific CCC objective where, 1 = Population viability (what ecologistic-minded residents want) (statewide) 2 = Hunting recreation benefits (what licensed bear hunters want) 3 = Hunting recreation benefits (what licensed bear hunters get) 4 = Non-hunting recreation benefits (what non-consumptive users get) 5 = Agricultural conflicts (what vulnerable agricultural producers want) 6 = Agricultural conflicts (what vulnerable agricultural producers get) 7 = Residential conflicts (what residents concerned about bear conflicts want) 8 = Residential conflicts (what residents concerned about bear conflicts get) 9 = Recreational-bear conflicts (what deer hunters WBR want) 10 = Recreational-bear conflicts (what deer hunters WBR get)

Appendix 7. Draft bear population objectives public comments summary (2023)

The Department of Wildlife Resources (DWR) released draft black bear population objectives for public review during January 11 – February 23, 2023. This opportunity was designed to determine if any important considerations were overlooked as objectives were developed and to gather general impressions about the draft objectives before DWR staff recommended amendments for 2023 bear hunting seasons. The volume and nature of feedback received suggested that many respondents were expecting more information and opportunity for engagement than was intended for this particular review; in retrospect, it was challenging to balance the immediate need for feedback on draft population objectives alone with the desire for many respondents to understand details of the complex process used to develop the objectives. Although the results provide insight into the perspectives of multiple stakeholders, they should not be regarded as a referendum on the perspectives of all Virginians, which could only be determined through a survey of randomly selected individuals.

Comments were received from 1,257 individuals in response to two open-ended questions that were provided on the agency's website along with a description of the process and the map of the draft objectives (see below).

The first question, "*Do you believe we missed any important considerations in developing these draft population objectives?*" yielded 1,036 measurable answers; 548 (53%) indicated that important considerations were missed, while 488 (47%) of the responses indicated that no important considerations were missed. The first table below shows the topics that respondents indicated were missed, ranked by frequency, and a brief assessment of how that topic has already been addressed while developing these objectives or how it will be addressed in the draft plan.

Most of the topics listed in the first table below refer to strategies or means to accomplish population objectives (e.g., hunting, type of season structure, non-lethal). Although the specific actions that might be taken are related to the population objectives, the current focus was on input regarding the population objectives themselves. The public will have an opportunity to comment on goals, objectives, and strategies that comprise the draft Black Bear Management Plan, in its entirety, later this year.

Many other categories in the first table below were considered via the 2020 public survey and incorporated into the Structured Decision-Making (SDM) model used to develop these draft population objectives. For example, concerns about overpopulation or underpopulation were key components investigated with the earlier survey and they have already been incorporated as a desired outcome in the SDM model. Impacts to deer, bear disease issues (e.g., mange), and damage caused by bears were represented in the consequences table of the SDM model.

Several topics identified as missing in the first table below merit further discussion. That cultural carrying capacity (CCC), rather than biological carrying capacity (BCC), should provide the basis for setting bear populations is a tenet of DWR's management planning framework for all big game species that provide both benefits and costs to Virginia citizens (i.e., deer, bear, turkeys, elk). That this should remain a key consideration for game species population management has been reaffirmed by stakeholder advisory committees and during public review for all of these plans. With regards to the conflict between urban and rural zones, the issues of scale and variability remain a challenge in bear (and other species) management. Bear zones are constituted to provide as much management consistency as possible over meaningful geographic scales; however, it is recognized that objectives and bear seasons set at the zone level may not, in themselves, address all constituent needs at the local level. Previous versions of the bear plan have provided for more site-specific bear management options when local needs dictate, and presumably the revision underway will, as well. Lastly, while larger survey sample sizes may have been helpful in some zones, low sample sizes were not a limiting factor in the modeling exercise used to develop these draft bear population objectives. Besides this latter issue of sample size, the other issues identified can still be addressed during ongoing development of the draft plan.

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Topic	Count	How Addressed in Process or Draft Plan
Overpopulation	72	Primary consideration of 2020 public survey and SDM process
Underpopulation	60	Primary consideration of 2020 public survey and SDM process
Fawn predation/Deer population	58	Included in SDM process
Use BCC not CCC	56	Managing populations for CCC is a key concept in draft plan goals
Mange/disease	53	Included in SDM process
Bigger sample size	39	Survey sampling was a balance between cost and SDM modeling needs
Season changes	37	A potential strategy for meeting, not setting, population objectives
Population estimates per zone	30	Objective is for a relative population change/size, not actual number
Public education	29	A potential strategy for meeting, not setting, population objectives
Crop/livestock/property damage	25	Included in SDM process
Non-lethal management/relocation	17	A potential strategy for reducing conflicts, not setting population objectives
Concerns with dog hunting	14	A recreational issue, unrelated to setting population objectives
Conflict with urban vs. rural zones	12	Previous and draft plan contain provisions for site-specific options
Putting bear tag back on big game license	10	A potential strategy for meeting population and recreational objectives, but not for setting population objectives
Bear check stations needed	9	A potential strategy for acquiring data, not setting population objectives
Trespassing hunting dogs	8	A recreational issue, unrelated to setting population objectives
Bear vehicle collisions	8	Considered in SDM process; negligible overall population impacts
Opposition to hunting	6	A value/position independent of population size
Bear poaching	5	A potential strategy for meeting, not setting, population objectives

The second question, "*Share any general impressions you have about these draft bear populations*," yielded 1,119 measurable responses. These comments were separated by bear management zone (if given) and whether the respondent believed the draft objectives were correct or incorrect. Of these responses, 371 (33%) indicated that the objectives were correct (80 of these specified a zone); 748 (67%) indicated that the objectives were incorrect (341 of these specified a zone). Below the map is a summary of additional comments provided by respondents to explain why they thought the draft objective was correct or incorrect for specific zones.

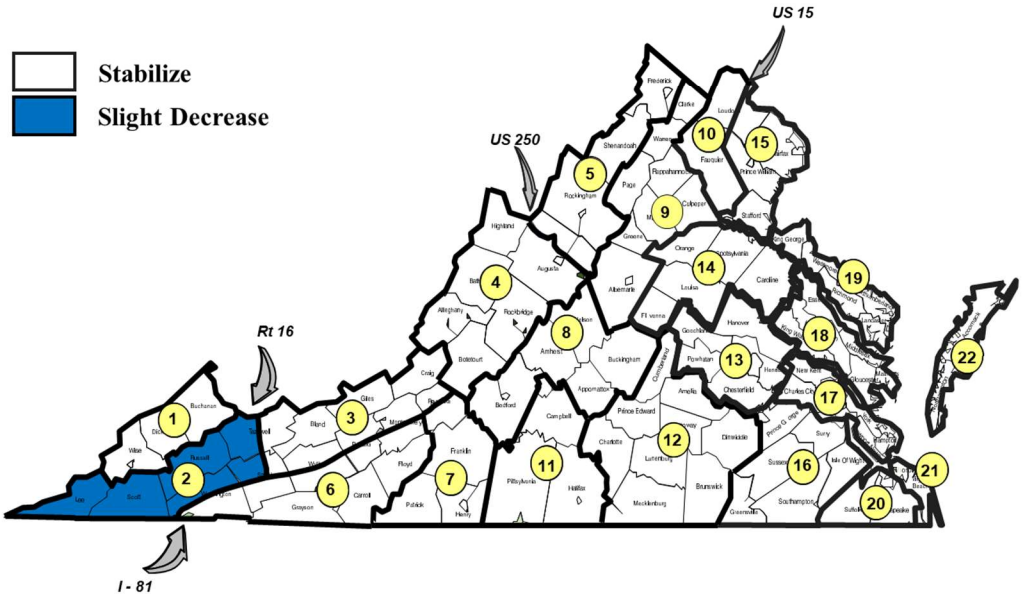
As noted in the introduction, responses received during an open public review opportunity provide useful insights - often into *why* respondents hold certain opinions - but are limited in their utility as a referendum or "vote" on a particular issue. As opposed to a scientific survey where respondents are

selected at random from a representative sample of all groups and regions of interest, those who choose to participate in public review opportunities may be motivated due to certain concerns and/or may be concentrated in a particular region. As shown in the table below, the public input regarding whether draft bear population objectives are correct – mostly disagreeing with stabilizing bear populations at 2020 levels - contrasts with input received from the 2020 Responsive Management survey (based on a random sample of respondents) during which respondents largely supported maintaining bear populations at then-current levels. Even agricultural producers, who stood to experience the most negative impacts from bears, expressed more support for stabilizing bear populations when surveyed in 2020 than *all* respondents did during the recent open public review period. In addition, the zone-by-zone comments indicate that opposing viewpoints compensated each other, to some extent, which leads back to the concept of CCC as a balance between those who desire more or fewer bears.

Group	Maintain at Same Level (AGREE with stable)	Increase or Decrease (DISAGREE with stable)	Increase (disagree)	Decrease (disagree)	Don't Know
Public pop obj review (Jan 2023)	33%	67%			
Surveyed residents (in neighborhoods)	75%	22%	13%	9%	3%
Surveyed hunters (where they hunt)	46%	52%	28%	24%	2%
Surveyed agricultural producers (where they farm)	39%	49%	15%	34%	12%

The public review period gave interested members of the public an opportunity to identify any important considerations that may have been overlooked as draft bear population objectives were developed and to provide general impressions about the draft objectives. Results from the 2020 Responsive Management survey indicate that the input received during the recent public review period is probably more useful for examining *why* respondents felt populations were incorrect than the fact that most respondents felt that way. In many zones, opposing viewpoints compensated each other, reflecting CCC as a balance between those who desire more or fewer bears. Although this review did not uncover any key considerations that had been missed during the process to develop draft bear population objectives, several issues were identified (e.g., appropriateness of CCC as basic tenet, localized bear management) that DWR staff and stakeholder committees should continue to consider as they complete the draft of the full black bear management plan.

Draft Bear Population Objectives (2023-2032) *



*** New objectives relative to 2020 bear population levels (the year public survey data was obtained)**

Public comments about specific zone objectives

Zone 1 -Out of the 14 comments specifically about zone 1, 12 indicated this zone was overpopulated and needed to see a slight to moderate decrease in the bear population;1 indicated the season should be extended to help manage the bear population;1 indicated they had seen a decrease in bears in this zone since the 2020 population estimate.

Zone 2 - Out of the 14 comments specifically about zone 2, 7 indicated this zone was overpopulated and needed to see more than a slight decrease in the bear population; 2 indicated the use of legal baiting would help decrease the bear population; 2 indicated they had seen a decrease in bears in this zone since the 2020 population estimate; 1 indicated the season should be extended in order to help manage the bear population; 2 indicated the draft bear populations were correct.

Zone 3 - Out of the 29 comments specifically about zone 3, 15 indicated this zone was overpopulated and needed to see a decrease in the bear population; 6 indicated they had seen a decrease in bears in this zone since the 2020 population estimate; 3 indicated the overpopulation of bears in this zone was harmful to the deer population; 2 indicated the season should be extended in order to help manage the bear population; 1 indicated that public education and outreach would help people learn to live with the bears in this zone; 2 indicated the draft bear populations were correct.

Zone 4 - Out of the 44 comments specifically about zone 4, 18 indicated this zone was underpopulated and needed to see a decrease in hunting pressure; 14 indicated they had seen an increase in bears in this zone since the 2020 population estimate; 2 indicated the season should be extended to help manage the bear population; 1 indicated that mandatory check-ins should start again; 9 indicated the draft bear populations were correct.

Zone 5 - Out of the 55 comments specifically about zone 5; 26 indicated this zone was underpopulated and needed to see a decrease in hunting pressure; 8 indicated they had seen an increase in bears in this zone since the 2020 population estimate; 4 indicated that management of mange was needed to help the bear population; 2 indicated that mandatory check-ins should start again; 1 indicated that damage to bees needed to be considered; 1 indicated that relocating bears needed to be considered going forward; 13 indicated the draft bear populations were correct.

Zone 6 - Out of the 29 comments specifically about zone 6, 16 indicated this zone was overpopulated and needed to see a decrease in the bear population; 6 indicated the season should be extended in order to help manage the bear population; 5 indicated they had seen a decrease in bears in this zone since the 2020 population estimate; 2 indicated the draft bear populations were correct.

Zone 7 - Out of the 6 comments specifically about zone 7, 4 indicated this zone was overpopulated and needed to see a decrease in the bear population; 1 indicated the season should be extended in order to help manage the bear population; 1 indicated the draft bear populations were correct.

Zone 8 - Out of the 34 comments specifically about zone 8, 12 indicated this zone was overpopulated and needed to see a decrease in the bear population; 8 indicated the season should be extended in order to help manage the bear population; 7 indicated they had seen a decrease in bears in this zone since the 2020 population estimate; 1 indicated that public education and outreach would help people learn to live with the bears in this zone; 6 indicated the draft bear populations were correct.

Zone 9 - Out of the 49 comments specifically about zone 9, 28 indicated this zone was underpopulated and needed to see a decrease in hunting pressure; 4 indicated they had seen an increase in bears in this zone since the 2020 population estimate; 2 indicated that management of mange was needed to help the bear population; 1 indicated the seasons should be paused in order to help manage the bear population; 1 indicated that public education and outreach would help people learn to live with the bears in this zone; 1 indicated that trespassing while chasing with dogs needed to be addressed; 12 indicated the draft bear populations were correct.

Zone 10 - Out of the 10 comments specifically about zone 10, 6 indicated this zone was underpopulated and needed to see a decrease in hunting pressure; 2 indicated they had seen an increase in bears in this zone since the 2020 population estimate; 2 indicated the draft bear populations were correct.

Zone 11 -Out of the 15 comments specifically about zone 11, 7 indicated this zone was overpopulated and needed to see a slight to moderate decrease in the bear population; 4 indicated the season should be extended in order to help manage the bear population; 2 indicated they had seen a decrease in bears in this zone since the 2020 population estimate; 2 indicated that relocating bears needed to be considered going forward.

Zone 12 -Out of the 59 comments specifically about zone 12, 17 indicated this zone was overpopulated and needed to see a slight to moderate decrease in the bear population; 13 indicated the season should be extended in order to help manage the bear population; 6 indicated they had seen a decrease in bears in this zone since the 2020 population estimate; 3 indicated that relocating bears needed to be considered going forward; 2 indicated that the amount of out of state hunters may affect population numbers; 18 indicated the draft bear populations were correct.

Zone 13 -Out of the 8 comments specifically about zone 13; 3 indicated this zone was overpopulated and needed to see a slight to moderate decrease in the bear population; 1 indicated they had seen a decrease in bears in this zone since the 2020 population estimate; 2 indicated that relocating bears needed to be

considered going forward; 1 indicated the overpopulation of bears in this zone was harmful to the deer population; 1 indicated that damage to personal property needed to be considered; 2 indicated the draft bear populations were correct.

Zone 14 -Out of the 8 comments specifically about zone 14, 3 indicated this zone was underpopulated and needed to see a decrease in hunting pressure; 1 indicated they had seen an increase in bears in this zone since the 2020 population estimate; 1 indicated the season should be extended in order to help manage the bear population; 1 indicated that damage to personal property needed to be considered; 2 indicated the draft bear populations were correct.

Zone 15 -Out of the 9 comments specifically about zone 15, 3 indicated they had seen a decrease in bears in this zone since the 2020 population estimate; 2 indicated that population estimates should be based on biological carrying capacity and that the bears' environment was protected; 4 indicated the draft bear populations were correct.

Zone 16 -Out of the 25 comments specifically about zone 16, 7 indicated this zone was underpopulated and needed to see a decrease in hunting pressure; 6 indicated the season should be extended in order to help manage the bear population; 5 indicated they had seen an increase in bears in this zone since the 2020 population estimate; 3 indicated that relocating bears needed to be considered going forward; 1 indicated that legal baiting should be allowed to help manage the bear population; 3 indicated the draft bear populations were correct.

Zone 17 -Out of the 3 comments specifically about zone 17, 2 indicated this zone was underpopulated and needed to see a decrease in hunting pressure; 1 indicated that bears needed to be reintroduced/relocated to this zone.

Zone 18 -Out of the 3 comments specifically about zone 18, 2 indicated this zone was underpopulated and needed to see a decrease in hunting pressure; 1 indicated the draft bear populations were correct.

Zone 19 -The comment specifically about zone 19 indicated that this zone was underpopulated and needed to see a decrease in hunting pressure.

Zone 20 -Out of the 5 comments specifically about zone 20, 4 indicated this zone was overpopulated and needed to see a slight to moderate decrease in the bear population; 1 indicated the draft bear populations were correct.

Zone 21 -The comment specifically about zone 21 indicated this zone was underpopulated and needed to see a decrease in hunting pressure.

Zone 22 - No comments were received specifically about zone 22.