Wisconsin Black Bear Management Plan, 2019 - 2029

Prepared by the

Wisconsin DNR Bear Advisory Committee

Committee members represent the following agencies and organizations:

- Great Lakes Indian Fish & Wildlife Commission
- Safari Club International
- United States Forest Service
- USDA-APHIS-Wildlife Services
- Wisconsin Bear Hunters' Association
- Wisconsin Bowhunters Association
- Wisconsin Conservation Congress
- Wisconsin County Forest Association
- Wisconsin Farm Bureau Federation
- Wisconsin Hunters Rights Coalition
- Wisconsin Wildlife Federation
- WDNR Bureau of Customer & Outreach Services
- WDNR Bureau of Law Enforcement
- WDNR Bureau of Wildlife Management
- WDNR Office of Applied Science

With Approvals by the

-WDNR Wildlife Leadership Team

-Wisconsin Natural Resources Board

Wisconsin DNR Mission Statement

To protect and enhance our natural resources: our air, land and water; our wildlife, fish and forests and the ecosystems that sustain all life.

To provide a healthy, sustainable environment and a full range of outdoor opportunities.

To ensure the right of all people to use and enjoy these resources in their work and leisure.

To work with people to understand each other's views and to carry out the public will.

And in this partnership consider the future and generations to follow.

Executive Summary

Black bears are perhaps the single wildlife species most emblematic of Wisconsin's north woods, and they have distinct cultural, social, and economic value. Bears are of high cultural significance to Wisconsin's Native American tribes, are an integral component of northern Wisconsin's ecosystems, support strong and vibrant hunting traditions, and are popular among wildlife photographers, tourists, and residents who enjoy viewing wildlife. Public surveys have revealed that the majority of state residents feel that bears "deserve our appreciation" and "keep nature in balance," are willing to live near bears, and believe that there should be as "as many bears as the habitat can support" on Wisconsin's landscape[60]. However, bears also cause damage to agricultural crops and property, and occasionally pose a threat to human health and safety. Indeed, concern about bears posing a threat to children and pets was expressed by the majority of residents surveyed, and about one-third of residents in bear range have had experience with some type of bear damage[60]. The complex relationship between people and bears in Wisconsin has fostered a diverse array of public values and opinions regarding black bears, and presents the Wisconsin DNR with significant challenges regarding their management.

The Wisconsin Black Bear Management Plan, 2019 – 2029, seeks to fully evaluate and address contemporary issues related to black bears and their management in the state. The state's bear population has increased in number and expanded in range in recent decades, and issues related to bear hunting, population and harvest management, human-bear conflicts, and the need for public education need to be evaluated and addressed. In line with the mission of the Wisconsin DNR, the plan strives to both ensure a healthy and sustainable black bear population and support the use and enjoyment of the black bear resource by all Wisconsin residents. While science remains the basis of effective bear population management, public input and communication with important stakeholder groups were instrumental in ensuring the plan reflects the spectrum of biological, social, and cultural issues surrounding bear management in Wisconsin.

The plan was developed by members of the Wisconsin DNR Bear Advisory Committee, which includes DNR staff with various areas of expertise and representatives from 11 relevant stakeholder groups, each of whom brings valuable experience and insight to the table. The philosophy behind the planning process emphasized:

- ***Collaboration.*** Input from all committee members, stakeholders, and the public was encouraged and considered.
- ***Evaluation.*** The planning process emphasized the comprehensive evaluation of all contemporary issues in light of existing information.
- ***Science-driven management.*** Goals and objectives defined in the plan will be supported by the best available ecological and social science.
- ***New opportunities***. The plan identifies new field, quantitative, ecological, or social science techniques that may improve bear population management, and new communication tools to better educate and engage the public regarding the value of our shared black bear resource.

While this document will serve to guide bear management decisions over the period 2019 – 2029, the information contained herein is also designed to provide the public a completely transparent view of black bear ecology and management in Wisconsin. The plan's first two sections include detailed summaries of black bear ecology and population dynamics and a historical account of black bears in Wisconsin. For interested citizens, the information contained in these sections should prove informative, enhance their appreciation for black bears, and better engage them as partners in our ongoing efforts to manage black bears in the state.

The third section, Black Bear Management in Wisconsin, 2019 – 2029: A Plan for the Future, identifies the overarching goal of the WDNR black bear program and provides a set of objectives,

strategies, and products designed to ensure the plan remains relevant and continues to direct and influence black bear management decisions over the next decade. The program goal for the bear management program is to:

Maintain a healthy and sustainable black bear population that fulfills the numerous ecological, social, and cultural benefits of bears while minimizing bear – human conflicts in order to promote and maintain a positive public image of black bears in Wisconsin.

Five specific objectives were developed to focus efforts toward achieving this goal; these are listed below with general summaries of strategies and products that will foster timely and efficient implementation:

Objective A: Ensure a Healthy and Sustainable Black Bear Population in Wisconsin (9 strategies and 22 products). Utilize population models to predict bear population trends and response to harvest and calibrate models with periodic population estimates. Maintain the mandatory registration and tooth submission requirements that provide important data for accurate population modeling. Eliminate numeric population goals and manage bear numbers at cultural carrying capacity in zones A-E. Develop thresholds for metrics related to hunter satisfaction, crowding, and interference, agricultural damage, bear nuisance levels, hunter success, and bear health threats to guide population management decisions toward cultural carrying capacity within each bear management zone. Maintain the use of current harvest methods to manage black bear abundance, in part by increasing public understanding of these methods. Implement a new bear management zone structure that better aligns population management decisions with spatial variation in habitat quality and negative human – bear interactions. Develop and implement protocols for monitoring bear health. Develop guidelines for black bear habitat management and communicate to land managers.

Objective B: Maintain high levels of hunter satisfaction (2 strategies and 3 products). Annual review of the Bear Hunter Survey, evaluating trends in hunter satisfaction, crowding, and interference. Monitor and report the number of preference points required to draw a harvest authorization within each bear management zone ("wait times"), and evaluate hunter understanding and acceptance of these wait times.

Objective C: Address human – bear conflict issues (6 strategies and 17 products). Collect annual summaries of bear conflict data by resource type, year, and bear management zone, and work with USDA-Wildlife Services staff to integrate bear conflict data for all agricultural damage, property damage, and nuisance complaints into the WDNR Wildlife Damage Abatement and Claims Program database. Appraise all crop damage caused by bears on farms enrolled in the WDACP. Emphasize current, and explore new, tools for addressing bear damage and nuisance issues. Assess effectiveness of current bear damage abatement tools and strive to address producer and public bear damage issues efficiently. Specific recommendations include allowing liquid scents to be utilized by hunters on bear agricultural damage shooting permits, expanding the use of trap monitors, proactive issuance of bear shooting permits, and development and implementation of bear conflict management plans for farms with chronic bear damage issues. Increase communication with the public and local law enforcement agencies regarding bear nuisance issues and the abatement options available. Emphasize the *Wisconsin Black Bear Response Guidelines for DNR Staff* (Appendix A) for addressing nuisance issues and incorporate a summary of the Grantsburg Project into the guidelines to inform approaches to community-wide bear conflict issues. Maintain the cooperative agreement between WDNR and USDA-WS.

Objective D: Identify appropriate communication strategies and outreach tools to increase public understanding of black bear ecology, the ecological, cultural, and economic benefits of black bears, and means of mitigating bear – human conflict (3 strategies and 9 products). Utilize public surveys and social science literature to address sensitive issues related to black bear management as necessary. Transparent and timely sharing of information related to black bears and bear hunting with the public. Work to enhance the transparency and accessibility of information on the WDNR black bear web pages. To proactively address issues related to range expansion, develop communication plan to inform southern Wisconsin residents and farmers about black bear ecology, values, and damage abatement options. Review existing programs designed to reduce bear damage and nuisance issues in municipalities and assess utility for implementation in Wisconsin.

Objective E: Identify important information needs and conduct research as necessary to address issues impacting black bears and hunting opportunity in Wisconsin (3 strategies and 11 products). Improve the ability to estimate black bear population size and response to harvest via implementation of periodic non-invasive genetic mark-recapture population estimators, exploration of independent data sources with which to calibrate current population models, assessment of the impacts of bait consumption on bear demographics and health, development of an index to natural food abundance, and the development of independent estimates of litter size and cub survival. Enhance the efficacy and efficiency of bear damage and nuisance management by evaluating the movements of translocated bears and utilizing current data to assess the effectiveness of current abatement techniques. Evaluate methods for reducing wolf depredation of hounds, identify a method for quantifying hunter satisfaction and identifying the factors responsible. Develop an economic assessment of black bears and bear hunting in Wisconsin.

Wisconsin's Black Bear Management Plan, 2019 – 2029 provides a comprehensive summary of black bear ecology and management in Wisconsin and is intended to both inform and engage the public and support science-based decision-making processes. The objectives, strategies, and products outlined herein define a focused and meaningful path toward a healthy, sustainable black bear population that maintains and enhances its value to the citizens of Wisconsin. While the plan effectively summarizes contemporary issues surrounding bear management, it is intended to be adaptive so as to embrace new challenges and opportunities as they arise.

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Section 1: Black Bear Ecology and Population Dynamics

Taxonomy

The term "bear" is derived from the Old English word "bera," which literally means "the brown one," perhaps suggesting the name was originally applied by Europeans to the brown bear (*Ursus arctos*). Regardless, "bear" now applies to members of the Family Ursidae, one of numerous mammalian Families within the Order Carnivora. The American black bear (*Ursus americanus;* hereafter, black bear) is one of eight species within the Family Ursidae. The black bear and 5 other species (the brown, Asiatic black, polar, sun, and sloth bears) belong to the genus *Ursus*; two other species, the giant panda and spectacled bear, diverged from this lineage early on and belong to different genera within the Family Ursidae.

Of the three bear species in North America (American black, brown, and polar), the black bear is the only one that occurs in the eastern United States. While definitive molecular taxonomy has yet to be performed, 16 subspecies of black bear are generally recognized based on size, color, skull structure, and other physical features[1]. Black bears in Wisconsin belong to the most common and widespread subspecies, *Ursus americanus americanus*, which ranges from eastern Alaska to the Atlantic, and south to Texas[1]. The black bear is the only living bear species thought to have evolved in North America[2]. Other North American bear species, including the Florida spectacled bear and the short-faced bears, went extinct around 11,000 years ago. It has been speculated that the arboreal habits and omnivorous diet of black bears evolved to avoid predation by or competition with these larger, carnivorous bears, and their more varied diet may have allowed them to survive periods of climate change that drove other North American bear species extinct[2,3].

Physical Characteristics

While black bears exhibit numerous color phases, including brown, blonde, and cinnamon, these colors are more common in Western populations while the black phase predominates in Wisconsin. In an Iron County study, 311 of 312 bears captured were black, the lone exception being a brown phase adult male[5]. Fur color is generally uniform on the body with the exception of brown fur on the muzzle and occasionally a spot or blaze of white fur on the chest. Twenty-three percent of the bears captured during the Iron County study had some white hair on the chest. The tail of black bears is short and often not apparent when viewed from a distance. The black bear skull is broad, with a rostrum ("muzzle") that slopes backward gradually toward the cranium. The resulting flat facial profile of black bears can often be distinguished from the dish-shaped (concave) profile of brown bears at a distance. Males tend to have a more pronounced sagittal crest on the skull than females, supporting more massive temporalis ("chewing") muscles and hence a stronger bite. The 42 teeth of black bears provide evidence of both their evolution as carnivores and their modern plant-based diet. The pronounced canines are a trait shared with other members of the Order Carnivora, such as the dog, cat, and weasel families, all of which eat primarily meat. On the other hand, the flattened molars of black bears contrast with the sharp shearing cheek teeth

Box 1: What We Learn From Teeth.
Wisconsin bear hunters are required to submit the first upper premolar from harvested bears. Examination of the cementum annuli visible in a stained cross-section of the tooth (photo on right) allows age to be determined, much like aging trees by their rings. This information is incorporated into population models and hence supports accurate monitoring of the state's black bear population.

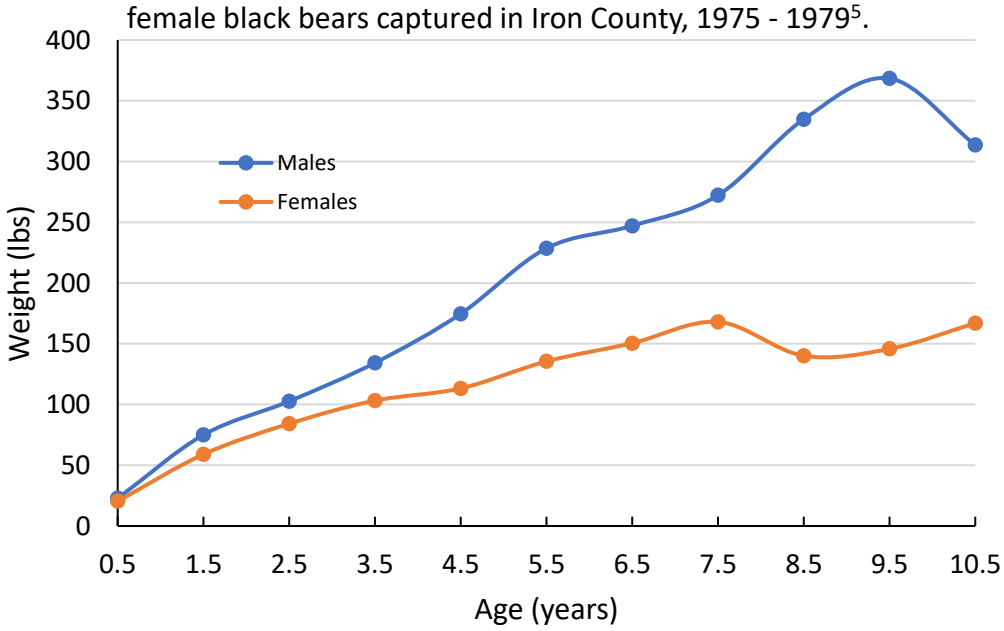
(carnassial pair) of other Carnivores, and this modification allows bears to effectively break down leafy plant matter. The sum of maximum skull length and width measurements is often used as a measure of "trophy" status for bears; the maximum recorded skull size for a Wisconsin black bear is 23 5/16" for a 2010 bear harvested in Monroe County[10].

Like raccoons, weasels, and their relatives, black bears exhibit plantigrade locomotion, meaning they walk directly on the soles of their feet. This is in opposition to the digitigrade locomotion of cats, dogs, and many other mammals that walk on their toes, and is the reason for the "shuffling" gait of walking bears. Black bear tracks will reveal 5 toes on both front and back feet, with marks from the non-retractable claws usually visible.

Body weight is highly variable among black bears, with differences attributable to sex, age, time of year, location, and food availability. Generally, adult boars weigh 125 – 550 pounds, with sows of similar age weighing 30 – 40% less (90 – 375 pounds)[4]. In Wisconsin, the average summer weights of 274 boars and 160 sows captured from 1975 – 1979 were 162 and 125 pounds, respectively[5]. A sample of Wisconsin bears captured and weighed from 1958 – 1962 revealed similar average weights for males (166 pounds) and females (118 pounds)[5]. All bears weighed during these studies were yearlings or older.

Both male and female cubs weigh 10-16 ounces at birth and grow rapidly throughout their first summer. Cubs in litters of 2 grow more quickly while in the den than cubs in litters of three or four, perhaps because they receive a greater proportion of the sow's milk[6]. Male cubs in Wisconsin gain slightly more weight (1.6 pounds/day) during the first summer than do females (1.3 pounds/day)[6]. Male bears grow consistently through the first 7-9 years of life in Wisconsin, adding at least 30% in body weight between springs; females grow at similar rates up to age 3-5[5,6] (Figure 1); slower female growth and smaller adult body size among females is likely influenced by the high energetic demands of gestation and

Figure 1. Average summer weights by age of 302 male and 168 female black bears captured in Iron County, 1975 - 1979[5].



lactation as females attain breeding age. Male black bears can reach weights of over 600 pounds in Wisconsin; a 780-pound bear, harvested in 2014 in Waupaca County, may be the heaviest bear recorded in the state. Reproductive females lose more weight while in the den (40%) than do males (25%)[6], likely due to the demands of cub production and lactation[6]. Subadult bears of both sexes gain

weight throughout the summer months[7]. The energetic demands of breeding lead to weight loss (or stable weights) for adult males during the breeding season in June and July; rate of weight gain by females depends on whether or not they are with cubs[7].

Most weight gain takes place during late summer and fall, when fruits and hard mast are most abundant. The high caloric value of these foods is essential for establishing fat reserves that sustain bears through the winter denning period[6,8,30].

Food Habits

Black bears are omnivores, and the majority of their annual diet consists of vegetation. Specific food items vary according to their availability throughout the year. In early spring, Wisconsin black bears feed primarily on grasses, forbs, and the catkins and emerging leaves of aspen and other woody plants[6], often focusing their foraging activities near wetlands or in riparian areas[8]. As summer progresses, berries increase in importance, and bears spend more time feeding on the nests of colonial insects (ants and bees). Bears in agricultural areas may begin to feed extensively on corn as it enters the "milk stage" in late July through August, and may cause significant local crop damage (see Human – Bear Conflict Management section, below). Bears will also prey on various small mammals and white-tailed deer fawns (see Ecosystem Role section, below), and feed on carrion and other available animal foods opportunistically. They readily utilize foods unintentionally provided by humans (e.g., apiaries, garbage, bird feeders), which can lead to conflicts and necessitate management intervention.

Recent research has indicated that supplemental food provided by bear and deer hunters ("bait") accounts for 40% or more of the black bear diet in northern Wisconsin[9]. As supplemental feeding of bears has been documented to alter bear activity patterns, movements[11,12], and reproduction, and may increase levels of human-bear conflict[14], further research on the impacts of baiting on black bears in Wisconsin is warranted.

Life Cycle

***Denning*.** The black bear's ability to survive in temperate ecosystems is partly a result of its ability to conserve energy by hibernating during the winter months, when food is scarce. Though body systems are not suppressed to the extent seen in other hibernating mammals (e.g., ground squirrels), bears do reduce their heart rate from a normal 40-50 beats to 8 beats per minute[15] and may take only one breath every 45 seconds, allowing them to reduce their metabolic rate by 75%. Body temperature does not drop significantly during hibernation, however, so bears remain somewhat alert and can be aroused fairly easily.

In Wisconsin, bears typically enter dens from late September through October[17,18]. Pregnant females enter dens first, followed sequentially by sows with cubs, yearlings, and adult males[18]. Kessler[18] noted a relationship between the date of den entrance and temperature, with pregnant females entering dens when mean weekly temperatures reach 51.4°F and other bears entering dens sequentially as temperatures continued to cool. The earliest date of den entrance in this study was by a female bear on 26 August; the latest was by two adult males on 1 November. Some bears may delay entering the den if supplemental food (e.g., standing corn) is available late in the fall or early winter. Conversely, eighteen female bears in Wisconsin entered dens on average 12 days earlier during a year when fall foods were in limited supply[18].

Den sites may be located in rock outcroppings, hollow logs, trees, or stumps, in excavated holes in the ground, or exposed "nests" on the surface of the ground. In northern Wisconsin, 62% of black bear dens were associated with windfalls, logging activities, and trees, 25% were excavated dens, and 8% of bears denned in nests on the ground[18]. Young are born during the Winter denning period, and the den provides a secure place for the cubs until spring.

Reproduction. Under ideal conditions female bears produce cubs every other year[19], although 39% of sows monitored from 1972 – 1979 in Iron County did not breed for 2+ consecutive years[5]. Breeding generally takes place from mid-June through mid-July[20,21]. In the Iron County study, no captured female black bears were in estrus prior to June 4 or later than July 22, whereas all females captured between June 19th and July 9th were in estrus[5].

Although breeding occurs in late spring and early summer, black bears exhibit delayed implantation and the fertilized egg does not implant in the uterus and begin development until the female enters the den for the winter. This strategy allows bears to expend energy on breeding activities during a time of the year when food is abundant, yet still have time to recover and gain weight during late summer and fall prior to entering the den. Cubs are born in mid-winter while the mother is in the den, though pregnant females who are unable to gain sufficient weight prior to denning may fail to successfully produce a litter[21]. Litter size in black bears ranges from 1 to 6 cubs[22]; in Wisconsin, average litter sizes between 2.4 and 3.0 have been reported[5,17,22]. Age and/or breeding experience may influence litter size, as sows breeding for the first time have smaller litters (average= 2.25) than do experienced breeders (average= 3.0)[24]. Observations of large litters (4-5 cubs) seem to be increasing in Wisconsin[69]. Given the importance of litter size to black bear population dynamics, methods for developing annual or periodic litter size estimates may be warranted. Neither litter size nor pregnancy rate appear to vary with winter severity, temperature, or precipitation[25].

Box 2: Bear Adaptations to Hibernation

While hibernation allows bears to conserve energy during winter, prolonged inactivity does impose several physiological challenges that bears are amazingly able to overcome. Many hibernators, like ground squirrels, avoid these problems by waking from hibernation every 4-10 days to urinate and defecate, and may also eat or drink. Bears, however, don't eat, drink, urinate, or defecate while hibernating, and are exceptional in the way they address these problems:

1) ***Dehydration***. Since they don't drink, but are metabolically active, bears risk dehydration while in the den. To avoid this, bears rely on water produced via the metabolism of fat to maintain water balance.

2) ***Muscle atrophy***. Inactivity causes muscles to atrophy. Bears avoid this by recycling the amino acids produced by metabolism into muscle protein, rather than excreting them in their urine. This also precludes the need to urinate and helps conserve water.

3) ***Osteoporosis***. Prolonged inactivity generally causes bone loss in animals. Bears recycle calcium while hibernating to ensure their bones remain strong.

Much research has been conducted on hibernating bears. Scientists believe understanding how bears address the challenges of hibernation may lead to improved treatments for diabetes, osteoporosis, certain cancers, and Alzheimer's disease, and may even help humans survive prolonged manned space flight!

Black bears are generally considered to be sexually mature at 3.5 years of age, although sows in Wisconsin often don't successfully produce a litter until 4.5 - 5.5 years of age[5] and undernourished sows may remain barren until beyond age seven[26]. As reproduction imposes significant energetic demands on animals, it is not surprising that food availability can impact many facets of black bear reproductive ecology. Age of first litter, the number of years between litters, and litter size have been closely tied to food supply (often the availability of acorns in the fall)[27]. Recent evidence that a high proportion of the black bear diet in northern Wisconsin is composed of supplemental food (i.e., bear and deer baits)[14] and the stability of this food source across years raises the possibility that supplemental food may be decoupling annual black bear reproductive measures from variation in the abundance of natural foods. Better understanding the demographic impacts of bait on Wisconsin's black bear population would be an important area for future research.

Habitat and Spatial Requirements

Black bears are often referred to as generalists due to their flexible, omnivorous diet and the observation that their geographic range spans multiple ecosystem types and vegetational communities. However, broad similarities in habitat use have been observed across the species' range. Generally, black

bears select areas that provide access to wetland or riparian habitats and particular forest types[28,29,30,31]; mast-producing trees (e.g., oaks) were found to be an important predictor of black bear habitat use in the upper Great Lakes region[30]. These common habitat characteristics across black bear range likely reflect the general need for protective and thermal cover, and the ability of forest and wetland habitats to produce a variety of seasonally-available foods. Recent work in Wisconsin has suggested that black bears are more likely to occupy deciduous forest habitat and less likely to be found in coniferous or mixed forest types[37]. The association with deciduous forests likely reflects the relative availability of hard mast, soft mast, and other preferred food items. The likelihood of bears occupying a forest patch is also positively related to forest patch size[37], suggesting that forest fragmentation reduces the ability of a landscape to support black bears.

Mature coniferous and deciduous forests provide thermal cover (e.g., shade), and mature deciduous trees provide energy-rich nuts, berries, and seeds during the hyperphagic period prior to den entrance. The catkins, buds, and emerging leaves of aspen are also known to comprise an important part of the black bear spring diet in Wisconsin[6,8]. Canopy gaps associated with waterways, wetlands, or disturbance (e.g., timber harvest) allow sunlight to reach the forest floor, which stimulates the development of herbaceous and shrub communities. Grasses, sedges, and other vegetation in these openings can provide important spring and early summer food, and dense young forest stands provide both escape cover and soft mast during the summer and early fall period[6,8,28]. Forest management activities that create canopy gaps, regenerate mast-producing deciduous species (e.g., oaks) and preserve existing forest openings hence contribute to the maintenance of quality bear habitat. Kohn[5] warned that "the loss of sodded openings and conversion of aspen and oak types to hardwoods and pine may reduce [northern Wisconsin's] carrying capacity for bears. Our current openings and aspen maintenance programs benefit many wildlife in addition to bears, and should be continued."

Patterns of human activity can also influence bear habitat use, with most studies suggesting avoidance of developed and agricultural areas. Numerous studies also suggest that black bears avoid areas with high road densities[32,33], though this relationship may vary by road type (primary vs secondary) and the juxtaposition of roads with other habitat components. For example, female bears in Wisconsin established home ranges in areas with relatively high road densities, but the majority of roads on the study area were gated forest or gravel roads with little/no vehicle access[34]. Similarly, Michigan bears travel extensively on logging roads, but avoid crossing major highways[35].

Habitat use by bears within their home ranges varies as bears respond to periods of growth and fruiting of various plant species. Bears in Minnesota have been documented undergoing seasonal migrations outside of their home range in early fall that allow them to take advantage of distant food sources[16]. Median distances moved by migrating bears was 6 miles and 16 miles for females and males, respectively, though one male moved 104 miles to take advantage of heavy acorn crops. Bears tended to migrate in August but returned to their home range prior to entering a den. In Wisconsin, baiting for deer and bear hunting provides high-calorie foods from mid-April up to the denning period, though the impact of this supplemental food on movements and habitat use has not been evaluated. It is also unclear how observed high levels of agricultural damage in certain areas (e.g., Rusk and Sawyer counties) might be influenced by bears emigrating from distant areas. Both these issues warrant future research.

MacFarland[37] used a number of habitat variables within an occupancy modeling framework to predict the results of black bear bait station surveys across Minnesota, Wisconsin, and Michigan. Habitat features important in predicting black bear visitation at bait sites were then evaluated across the three states using land cover data to develop a habitat suitability map. These results suggest that northern Wisconsin contains the majority of the state's contiguous quality black bear habitat, although areas of central and southwest Wisconsin also have a moderate-to-high probability of supporting bears (Figure 2). Small areas in the southeast portion of the state associated with the Kettle Moraine State Forest also contain suitable bear habitat.

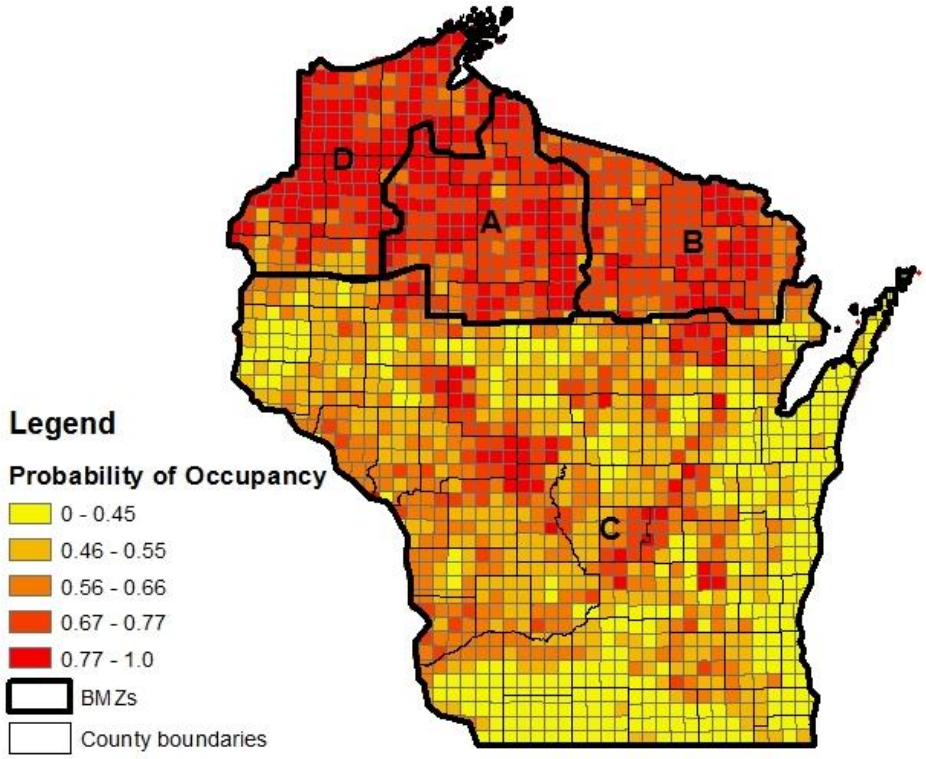


Figure 2. Probability of occupancy for black bears, by Wisconsin township[37].

With the exception of breeding pairs and sows with young, black bears are solitary animals[19] that occupy and defend discrete home ranges. Home range size and territorial defense vary widely across the species' range and are influenced by the distribution and abundance of food, age, sex, and time of year[21]. Adult male bears occupy much larger home ranges than do females, and male home ranges normally overlap those of several females. Rogers[43] found that male home ranges in Minnesota encompassed the territories of 7 – 15 females. In Wisconsin, average home range sizes for adult male bears has been estimated at 36 mi^2, while adult and subadult female home ranges averaged 7 mi^2 in size[17,18]. Sows with newborn cubs have relatively small home ranges, but their home range size increases as the cubs grow[45]. The home ranges of adult males and solitary females tend to be largest during the summer breeding season.

Kessler[18] found that most black bear family units in Wisconsin break up permanently in early June of their 2nd summer, after which yearling male and female bears exhibit distinctly different movement patterns. Young male bears may spend a few weeks near their mother's territory, but eventually disperse and may travel extensively to locate an area in which to establish their own home range[44]. In Minnesota, males dispersed an average of 38 miles before establishing a home range, with one individual moving 136 miles[43]. Sows are more tolerant of their female offspring, however, and most yearling females do not disperse. Upon leaving their littermates, young females simply establish a home range adjacent to or overlapping their mother's. While sows are tolerant of their female offspring, they actively defend their home range from incursion by unrelated females. In Minnesota, Rogers[43] noted sufficient overlap among male home ranges that all females were likely accessible to multiple males during the breeding season; both sexes are known to be promiscuous.

Ecological Role

Through their foraging activities, black bears influence various ecological processes and hence play an important role in ecosystems. For example, by tearing apart logs in search of insects and larvae, black bears help break down wood and hence aid in nutrient cycling.

Black bears are also known to be important agents of seed dispersal. As black bears tend to swallow soft fruits whole[38], seeds of many food items pass through the bear digestive system intact and bears therefore disperse seeds throughout their home range. The process of digestion and deposition in a nutrient-rich environment can also increase germination rates for seeds of a variety of mast-producing tree and shrub species[38,39]. The wide-ranging movements and high food intake of bears also contribute to their importance as seed dispersers. An individual black bear, for example, was recorded depositing over 60,000 Oregon grape (*Mahonia repens*) seeds in a single 24-hour period[39], and individuals can move up to 20 miles in that time[26]. Seed dispersal can be particularly important in areas impacted by recent disturbance, such as a fire or timber harvest.

Predation also has the potential to impact prey populations and impacts of bears on colony-nesting insects (e.g., ants, bees), small mammals, and ungulates have been postulated. Given the cultural and economic significance of deer hunting, potential impacts of predators on white-tailed deer populations have been extensively studied with some studies specifically assessing black bear impacts. From this research, we know that predation by bears on white-tailed deer occurs primarily during the neonatal period, when fawns are <45 days old and have not yet developed to the point where they can easily outrun bears[40,41,42]. For example, though black bears accounted for 49% of recorded fawn mortalities in northeastern Minnesota, no fawns were killed by bears after June[40]. Fawns killed by bears were also smaller at birth, and tended to be born later, than fawns that survived[40]. Since both fawn size at birth and relative birth date are influenced by doe age and condition, food availability or weather conditions during the fall and winter gestation period may in part determine the impact of bears on white-tailed deer fawn survival.

Black bears appear to be opportunistic predators of white-tailed deer fawns, consuming them only as they are encountered while foraging for other items. Mech and Kunkel[40] suggested that bears did not actively hunt fawns, but rather "detected bedded fawns up to 10m away incidentally while feeding upon insects and vegetation[40]." Scientists studying deer-predator interactions in the Upper Peninsula of Michigan similarly suggested that "black bears were not important predators of fawns, selecting areas with alternate foods (e.g., berries, ants, crops) due to presumed greater foraging efficiency[49]." While predation was the leading cause of fawn mortality on this study area[50], coyotes (47% of losses to predation) and bobcats (23% of losses) killed more fawns than did black bears (8% of losses) and, unlike bears, both former species altered their pattern of habitat use during spring and actively searched for fawns. These authors suggested that the larger body sizes of wolves and black bears may make actively searching for fawns too energetically costly, whereas it may be a profitable strategy for smaller predators such as bobcats and coyotes.

In northwest Wisconsin, where black bears are common, bears and bobcats have been documented as important predators of fawns (26% and 23% of fawn mortalities, respectively), although these estimates may be biased low as the predator species could not be identified in 37% of fawn predation events[51].

While such research helps illuminate the ecological role of black bears, estimates of bear predation on deer should not be interpreted as having a direct impact on deer population growth. There are many factors that influence deer population dynamics, including habitat composition, winter weather, human harvest, disease and accidents, and the suite of other predators (coyotes, wolves, bobcats) that prey on deer in Wisconsin. Understanding the direct impact of a single mortality factor on deer population growth is therefore extremely challenging. Given that black bears prey only on fawns during a brief period in spring, and only opportunistically while foraging for other foods, suggests that the proportion of the annual fawn crop depredated by bears is likely a function of bear and deer densities, and the dispersion of fawning sites in relation to habitats utilized by bears in the spring. The observed increase in deer populations and harvests across Wisconsin's northern forests since 2014[52] suggests that predation alone has not limited deer population growth. Current black bear densities therefore appear not to be regulating deer populations in Wisconsin.

Population Dynamics

One of the fundamental traits of wildlife populations, and one of keen interest to the public, is how the number of individuals changes through time. Concern about population declines can lead to efforts to identify and address the factors responsible, and population increases can lead to concerns about negative impacts on other species, natural communities, or human interests. The field of population dynamics seeks to understand the factors that influence changes in wildlife abundance, so that appropriate management strategies can be implemented where appropriate to achieve population goals. Similarly, understanding population dynamics can help predict a population's response to management actions under consideration.

At a very basic level, changes in abundance result from the difference between birth and death rates modified by net movement into and out of a population. The factors that influence birth rates, death rates, and movements, however, are numerous and interactions among them can be complex. For example, survival alone may be influenced by disease, starvation, predators, accidents, and human harvest, and the impact of each of these factors may differ through space and time. This complexity often makes it extremely challenging to clearly explain observed trends in wildlife populations. Decades of intensive research on black bears, however, has provided biologists with vital information regarding the species' ecology that provides a solid foundation for management decisions.

Since females in Wisconsin generally don't breed until they are 3-5 years old and produce relatively small litters only in alternate years, black bears have one of the lowest reproductive rates of any North American land mammal. However, this low reproductive potential is balanced by high cub and adult survival so that population growth rates of up to 25% per year are possible, although natural mortality and human harvest usually lead to slower (or negative) population growth.

Black bears are long-lived animals, and it is not uncommon for bears to survive for over 20 years in the wild. Cub survival is highly dependent on the age and physical condition of the female prior to denning ; condition is in turn dependent on the availability of fall foods[20,21]. Although cub mortality may be as high as 70% in years of poor food production[20], multiple studies suggest cub survival is generally high (three estimates between 70 – 94%) in Wisconsin[17,18,25]. Most black bear cub mortality is due to predators (including other bears), separation from or abandonment by the sow, and starvation. Generally, survival of adult bears with established home ranges is high[20]; in Wisconsin, reported estimates of adult survival have varied between 70 – 97%[5,25,57]. Kohn[5] found mortality of adult males was on average 7% higher than that of adult females in Iron County, and ascribed this to hunter selection for male bears. However, recent harvests in Wisconsin have revealed a declining male bias, suggesting overall harvest impacts are becoming more similar between the sexes. The survival of independent yearling bears has been less well-documented but is likely lower than for either cubs or adults as yearlings lack experience finding food independently, and may be naïve to risks associated with highways, human-dominated landscapes, or hunters.

Where hunted, human harvest is normally the leading cause of mortality for adult black bears. Human harvest is generally thought to be "additive" for black bears in that it adds to natural mortality and hence reduces survival. However, human harvest is not likely to be completely additive, and harvest mortality is probably compensated to some extent by a reduction in natural mortality. Such compensation would reduce the total impact of human harvest on overall survival.

Since bears (unlike white-tailed deer, coyotes, and many other species) do not seem to respond strongly to reduced density by increasing reproductive output, population growth rate itself declines as harvest increases. This makes harvest a powerful tool for biologists, who can vary harvest levels to bring about desired changes in black bear abundance. The increase and expansion of Wisconsin's black bear population itself over the last 30 years is likely due to harvest control via the current harvest quota system. Decisions about annual quotas are especially important for black bears, since recovery from overharvest would be slow due to the species' slow inherent population growth potential. Implementing scientifically-sound population monitoring and modeling

techniques is therefore critical to establishing appropriate harvest quotas each year and for maintaining the bear population at established population goals.

Biological carrying capacity (BCC) is a concept central to much of what we know about wildlife population dynamics. Generally, as populations increase toward BCC, mechanisms (e.g., competition for food) lead to declines in reproduction and/or survival such that further population growth is prevented. Though all wildlife populations certainly have an upper limit to density, identifying the factor or factors responsible for slowing population growth as density approaches BCC has proven to be extremely difficult. This is further complicated by the fact that BCC is related to other variables that change over time, such as weather and patterns of habitat dispersion. Early research in Alberta suggested that black bear BCC is determined by increasing predation on juveniles and cubs by adult males[54] as populations increase. Though this explanation has been much-debated[55,56], a study that compared the response of hunted and unhunted black bear populations to experimental manipulations strongly supported density-dependent variation in cub survival as the ultimate determinant of BCC[58]. In other words, when bear populations are allowed to increase, declines in cub survival may eventually lead to leveling off at BCC. It is still unclear, however, if adult males or females are primarily responsible for cub infanticide.

Difficulty in identifying the factors that regulate black bear populations may be due to the fact that most studied populations are exposed to human harvest, and hence are far enough below BCC that the factors don't exert a strong influence on population dynamics[58]. This is likely the case in Wisconsin, where currently no evidence exists that any survival or reproductive measure has declined over the past 30 years. This suggests that the current bear population is far enough below BCC that density-dependent population regulatory mechanisms are not limiting population growth, in turn suggesting that additional increases in bear numbers are possible. Liberal baiting regulations may also have led to an increase in BCC, if the availability of natural foods limits bear density in Wisconsin. Interestingly, research on the unhunted black bear population on Stockton Island (Lake Superior), where bear densities were 1.97/mi^2, revealed smaller litters, lighter body weights, smaller home ranges, and older age of first breeding for females, and more skipped breeding opportunities as compared to populations on the adjacent Wisconsin mainland where bear densities were much lower (0.93/mi^2)[23,57,59]. Although the insular nature of Stockton Island certainly has some influence on bear population dynamics, these density-dependent responses are similar to those noted for an unhunted black bear population in Alberta that was believed to be near BCC[58] and may indicate an upper threshold (BCC) for bears of approximately 2 bears/mi^2 in northern Wisconsin.

Regardless of the BCC for bears in Wisconsin, however, increasing bear numbers may lead to increasing human-bear conflict. Tolerance by people for these conflicts can define a cultural carrying capacity (CCC) for black bears. Because bears can be responsible for a range of conflicts, from damage to property or crops to threats to human safety, CCC is normally lower than BCC. Thirty-seven percent of Wisconsin residents have direct experience with at least one form of black bear damage, and this climbs to over 60% in areas of the state where bears are relatively abundant[60]. Still, over 80% of residents statewide feel that black bears "deserve our appreciation" and over 70% want their local bear population to either stay the same or increase[60]. However, relatively more residents (though still a minority) who live in areas with a high bear population would like to see the bear population decrease[60] than increase. This suggests that CCC is somewhat elastic in Wisconsin and responds to changes in black bear density and citizens' experience with bears as neighbors.

Effective management of Wisconsin's black bear population clearly requires managers to integrate sound biological information, data on negative bear impacts (agricultural damage, nuisance bear complaints), and levels of public appreciation and tolerance. Mandatory harvest registration and an adaptive, scientifically-sound population assessment process provide defensible annual estimates of bear population size and growth rate within each BMZ. Coupled with information on negative impacts compiled through the WDNR Wildlife Damage Abatement and Claims Program and periodic assessment of hunter and public sentiments through social surveys,

Wisconsin has effective tools in place to inform and support bear management decision-making processes.

Section 2: Black Bears in Wisconsin

Historical Overview

Prior to European settlement, black bears were present in all Wisconsin counties and considered abundant in the northern three-quarters of the state[46]. Native Americans and European settlers both utilized the bear as a source of clothing and food, and fat was rendered to provide oil for cooking. Bear oil was also in demand as a hair treatment, and Wisconsin hunters could receive a high price for oil rendered from harvested bears through the late 1800s[46]. A hunter received "$64.00 for eight gallons of pure, strained oil, and $6.00 for two gallons of crude oil" from a bear harvested near Algoma in 1867[46].

From early settler journals and newspaper articles, bears were apparently more abundant in the northern forests than in the oak woodlands, savannas, and prairies of the southern counties[46]. Periodic emigrations from the northern forests into southern Wisconsin, likely due to food shortage, were observed by early settlers; in these years, bears could be abundant as far south as Milwaukee and Prairie du Chien[46].

Events unfolding following settlement had significant impacts on Wisconsin's black bear population. Loss and fragmentation of forested habitat, unregulated harvest, market hunting, and negative public attitudes toward large predators led to black bear range contraction and population declines. Prior to the 1950's, Wisconsin' black bears were unprotected, considered "vermin" by many people, and could be shot or trapped in unlimited numbers at any time of year. As a result, bears were eliminated from southeast Wisconsin by the 1860s and from the central and southwestern parts of the state by the early 1900s[46]. Still, the black bear is the only native large carnivore to persist continuously in Wisconsin (wolves were declared extirpated by 1957, the last known cougar was shot in 1909), perhaps due to their omnivorous diet and relatively lesser impact on livestock. By 1950, bears were confined to the northern third of the state, in numbers likely significantly reduced from those present prior to settlement.

Wildlife population declines were one of many natural resource issues stemming from the unregulated harvest and rampant habitat loss that characterized the late 1800s and early 1900s. Eventually, public concern for our nation's natural resource base engendered a conservation ethic that continues to this day. In response to increasing public acceptance and regulated harvests, Wisconsin's black bear population has been increasing and expanding its range in recent decades. Harvest data can be used to suggest this range expansion. The 1977 black bear season included harvest in just 21 northern counties, but by 2017 bears had been registered in 46 of Wisconsin's 72 counties, with harvests occurring progressively further south over this time (Figure 3).

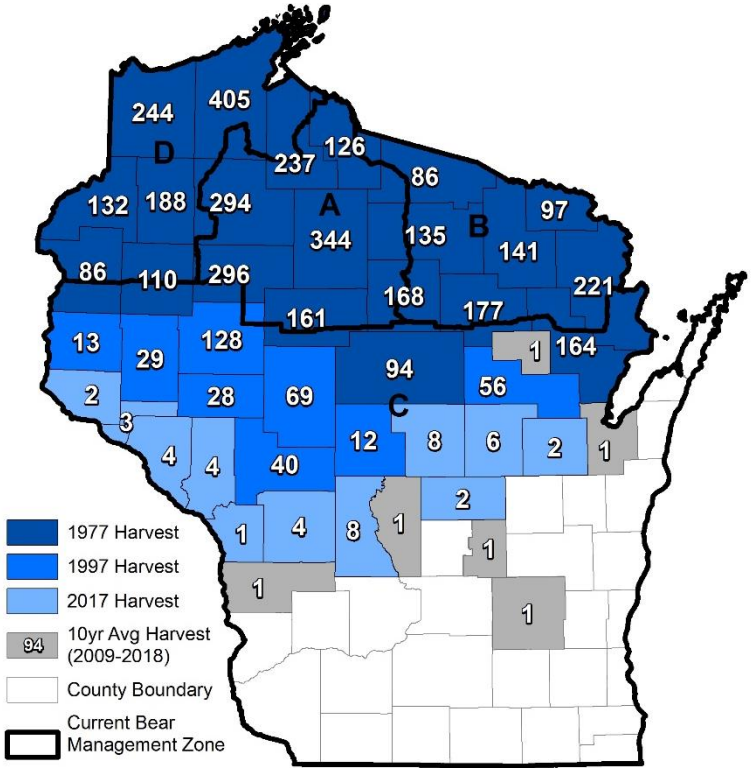


Figure 3. Increase and expansion of the black bear population in Wisconsin, 1977 – 2017, as indicated by harvest records.

The evolution of Wisconsin's black bear season structure reflects these changes in public acceptance and population growth and expansion, and our approach to black bear management continues to adapt to new scientific information and increased integration and understanding of public interests and values.

Black Bear Population Management

Prudent management of Wisconsin's black bear population serves to protect bears from overharvest- ensuring the long-term viability of the population while maximizing long-term opportunities for bear hunters, addresses issues related to nuisance bears and agricultural damage, and ensures that populations do not exceed cultural carrying capacity. Influencing the level of harvest within bear management zones is the primary tool used to manage bear abundance at the landscape scale, and more focused strategies are utilized to address local issues related to nuisance complaints and agricultural damage. As information is the foundation of effective decision-making, black bear population management decisions are supported by a variety of data sources regarding bear population status and trends, harvest levels, hunter effort, sex and age composition, hunter satisfaction, and trends in agricultural damage and nuisance complaints.

Bear Management Zones

There is significant variation in land cover, land use, and human density across Wisconsin, resulting in spatial variation in black bear habitat suitability. Access to public land for bear hunting also varies, with far more public land available in the northern portion of the state. Dividing the state into Bear Management Zones (BMZs) allows the establishment of zone-specific population goals and harvest quotas that reflect this underlying variation in habitat quality and public land access. This high-resolution approach to management also supports population management objectives that address spatial variation in levels of bear-human conflict, bear damage, and public acceptance of bears, and further allows increased hunter opportunity as permit levels can reflect the size and trend of the local bear population.

Bear Management Zones were first incorporated into Wisconsin's bear management framework

in 1987, when the state was divided into three zones (A, B, and C). In 1994, temporary subzone A1 was created from the western portion of zone A to address elevated nuisance and damage complaints in the far northwestern counties. The intent was to use increased harvest of bears in subzone A1 to reduce the population by 25% from 1994 levels. However, increased hunting pressure seems to have been focused in the northern portion of the subzone, where more forested public land exists, and not in the southern portion where the majority of agricultural damage occurs. This subzone was made permanent in 1996 and renamed zone D in 2007 (Figure 4).

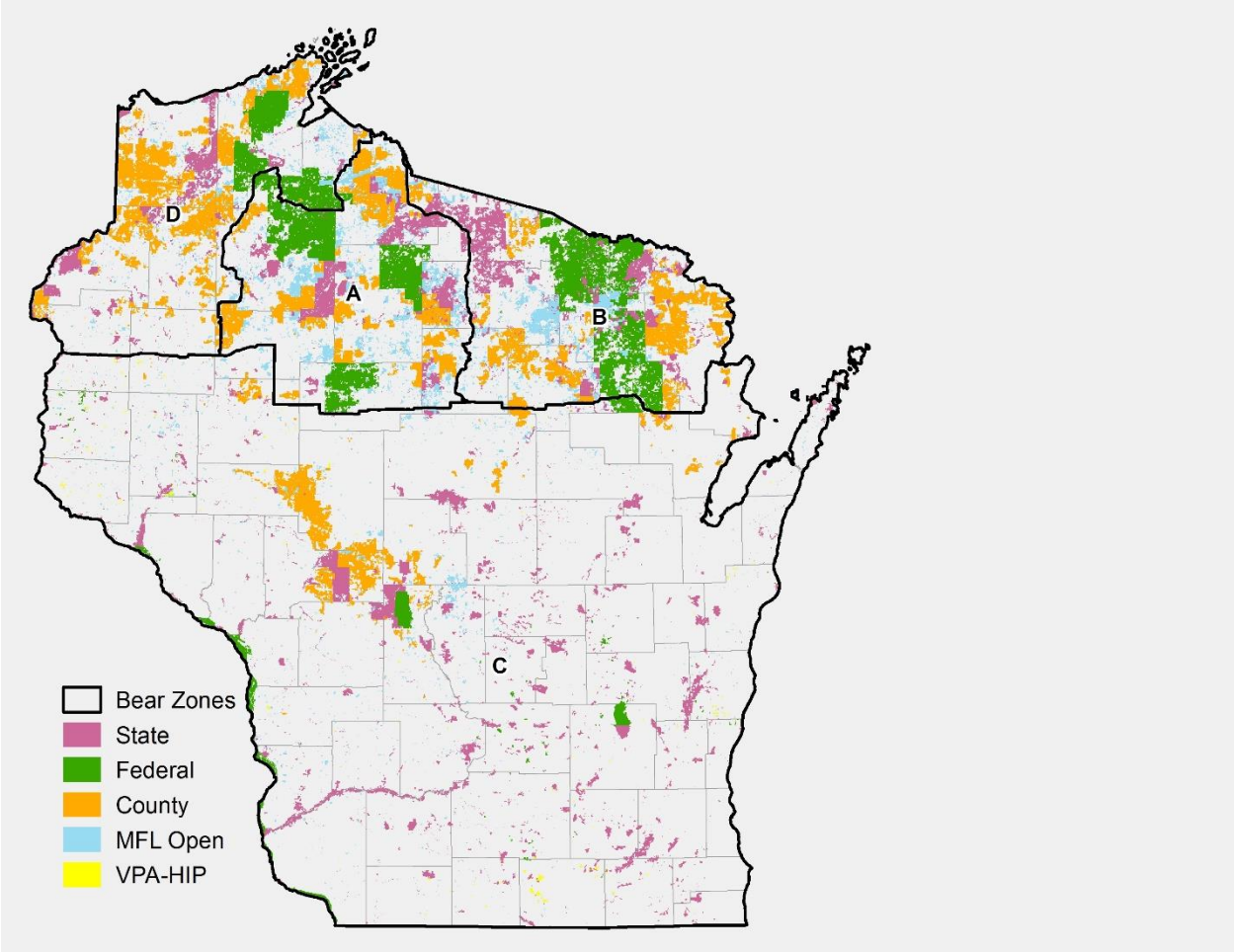


Fig. 4. Wisconsin black bear management zones, 2007 – present, with publicly-accessible lands shown.

In the past, zone-specific estimates of "bear range" have been used to express the area in each zone that provides suitable habitat and to calculate bear densities. These estimates were based on deer habitat maps, and utilized an arbitrary buffer around blocks of forest, wetland, and shrubland to define suitable bear habitat. While this approach may generally identify primary bear habitat, it is not robust to the level at which forests are fragmented or interwoven with other preferred (e.g., wetlands) or seasonally-utilized (e.g., agricultural crops) habitat types, selection by bears of forests of varying age or species composition, or seasonal shifts in habitat use. Hence, the total area within each BMZ is a more objective measure for deriving comparative metrics, recognizing that bear density within and among zones will vary according to the amount and dispersion of suitable habitat.

Currently, bear densities are highest across the northern zones A, B, and D, where both forest cover and public land availability are greatest (Table 1). Land use practices in this region are generally beneficial for black bears, although in some areas increasing human and agricultural development are reducing bear habitat and creating more conflicts between humans and bears. Historically, management

of the bear population within these zones has focused on sustaining healthy bear populations within

Table 1. Size, estimated bear density, % forest cover, and % public ownership of BMZs A-D.

BMZ	Size (mi^2)	Bears/mi^2, 2018	% Forest	% State	% County	% Federal	% MFL Open/VPA	Total % of BMZ with Public Access
A	6,146	0.86	72.3	9.4	14.9	13.9	10.7	48.9
B	5,735	1.00	77.9	12.7	14.7	17.2	9.4	54.0
C	37,837	0.57*	31.5	3.7	2.0	0.9	0.8	7.4
D	6,360	1.58	65.9	7.1	19.0	7.8	5.4	39.3

**Includes only zone C counties with a recent history of harvest.*

limits imposed by cultural carrying capacity. Generally, increases in nuisance complaints or agricultural damage have triggered attempts to reduce bear numbers; in the absence of such triggers population growth or stability has been the goal. For example, rising nuisance complaints in zone B during the late 2000s led to higher quotas and resultant harvests in an attempt to reduce bear numbers, and quotas in zone D have remained high to similarly address elevated levels of agricultural damage. Bear population management in these zones should continue to identify and address issues related to cultural carrying capacity, but might also incorporate information on hunter satisfaction, crowding, and general levels of public tolerance as measured by hunter and public surveys.

Range expansion into southern Wisconsin presents unique challenges for managers. Prior to 1985, it was believed that black bears could not coexist with people in this zone, and liberal harvests were utilized to limit population growth and expansion and therefore minimize the potential for conflict. The management philosophy has evolved since 1985, however, in recognition that many areas of southern Wisconsin contain suitable bear habitat, and coexistence with humans is possible. A public survey completed in 2018 revealed that the majority (54% - 56.5%) of southern Wisconsin residents are willing to reside near bears, whereas only 28% - 29% would not be so willing[60]. As well, more (24% - 30%) survey respondents would like to see their local bear population increase than decrease (11% - 15%), though the majority (44% - 48%) would like the population to remain similar to current levels of abundance.

Future management of bear populations in southern Wisconsin should also recognize that forest cover, land use, human density, and public land availability varies significantly across zone C, leading to spatial variation in habitat suitability. The central forest region includes a number of large blocks of public forest (e.g., Black River State Forest, Jackson and Clark County Forests) relative to the remainder of zone C. The southwestern portion of the zone also includes more forest cover and lower human densities than the southeastern portion of the state. Across the region, the need for public education about black bear behavior and habitat requirements is of highest priority as the bear population continues to expand into southern Wisconsin.

Reconfiguring the current BMZ structure may be a valid option for addressing local areas of elevated bear-human conflict and/or chronic agricultural damage issues (such as the area centered on Rusk-Taylor-Barron counties, where agricultural damage by bears has become a significant issue). However, such discussions should balance potential reductions in conflict or agricultural damage with impacts on harvest permit availability and hunters who have accumulated preference points for current zones that would be impacted by reconfiguration. Fortunately, empirical data exists that would allow both areas of chronic nuisance/damage issues to be identified and impacts on permit availability and hunters to be addressed. Zones should also be large enough that future bear harvests provide sufficient data to support population estimates and models with desired levels of precision; generally, zones >5,000 mi^2 are considered adequate.

Population Monitoring and Modeling

Maintaining bear populations at desired levels within each BMZ requires accurate and precise annual information on bear abundance, and the ability to predict the likely impacts of varying harvests. Because black bears primarily use forested habitats, it is not possible to count them directly. Other methods of determining abundance, such as mark-recapture techniques, are costly to apply over large areas on a repeated basis and so are not feasible tools for developing annual population estimates. Population indices, such as bait station surveys, provide information on trends in bear populations (increasing, decreasing, stable), but provide no information on the actual numbers of bears. Wisconsin has historically utilized a combination of population assessment tools to attain accurate estimates of population size and trajectory within BMZs.

Through 2017, an adaptation of a population model originally developed in Minnesota[63] was used in conjunction with an annual bait station survey to estimate bear population size. The model incorporated information about population parameters that affect population growth in known ways. These parameters include the sex and age composition of the population and age-specific reproductive and natural mortality rates. Mandatory registration and tooth submission provided annual information on the number of bears harvested and information on the sex and age composition of the population. Estimates of age-specific reproductive and natural mortality rates were based on bear research conducted in Wisconsin and neighboring states. Model output was then calibrated with results of the bait station survey and used to determine the harvest level (quota) most likely to achieve population goals. While this model has performed well over time, and certainly supported decisions leading to healthy and sustainable bear populations and harvests (Figure 8), advances in quantitative methods and computing hardware have made more effective tools available. Age-at-harvest models in particular have arisen as an improved option for Wisconsin. These models estimate population size each year by finding the population size most likely to have produced the observed total bear harvest and the age and sex ratios among harvested bears, and have numerous advantages over the previous model:

1) They are less sensitive to starting population size (though periodic calibration is still necessary).
2) Confidence intervals surrounding population estimates are generated, allowing management decisions to consider uncertainty in estimates.
3) Past model estimates are updated as new information is gleaned from harvest data each year.
4) The model can be refined by including multiple sources of bear population data.

Age-at-harvest models thus represent a more robust and defensible method for supporting harvest management decisions. The model currently being used in Wisconsin suggests that the bear population has increased in all zones over the last 30 years, with populations stabilizing in zones B and D in recent years (Figure 5). Bear numbers in zone C continue to increase (in part due to continued range expansion), whereas zone A has shown a marked population decline since 2010 (Figure 5). WDNR will continue to work with partners to explore and evaluate new population monitoring tools, to ensure black bear population management remains supported by the best available science.

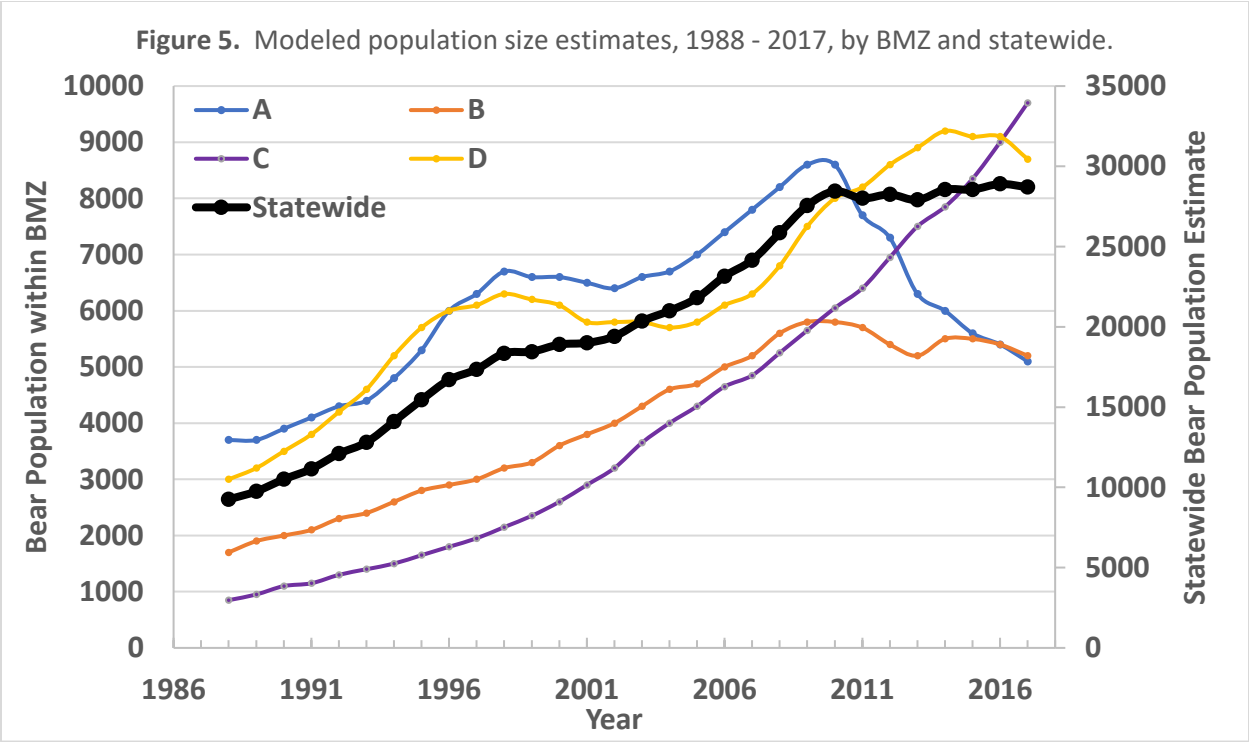


Figure 5. Modeled population size estimates, 1988 - 2017, by BMZ and statewide.

Numeric population goals for each BMZ have historically been used to drive management decisions, with annual quotas established to maintain the bear population near goal. Current zone-specific goals are contained in Administrative Code (NR 10.102[1][d]):

Zone	Population Goal
A	4,600
B	2,200
C	1,200
D	3,300
Statewide	11,300

This goal-driven approach guided population management decisions for many years. However, application of a mark-recapture population estimation technique in 2006 and 2007 revealed that Wisconsin's black bear population was approximately 2.6x higher than suggested by population models[37]. While this estimate allowed calibration of the population model so that it remained an effective tool to support subsequent management decisions, it also emphasized the need for periodic population estimates with which to calibrate the population model; in essence, periodic estimates are necessary to keep model predictions from "drifting" too far from actual bear population size over time. Regardless, current population goals are clearly no longer appropriate as targets for bear management decisions; thus, developing new black bear population objectives is a priority for this planning process.

Season Framework

The state of Wisconsin allows bear hunters to use 4 hunting techniques to fill the annual state bear harvest quota. These include; stalking and hunting without the aid of bait or dogs, utilizing bait to attract bears, the use of bait and dogs, and the use of dogs without baiting (a practice known as 'rigging' or 'free casting'). Baiting accounts for an average of 70.3% of bears harvested in Wisconsin, with the use of hounds accounting for 28.2% and all other legal means 1.5% (Figure 6).

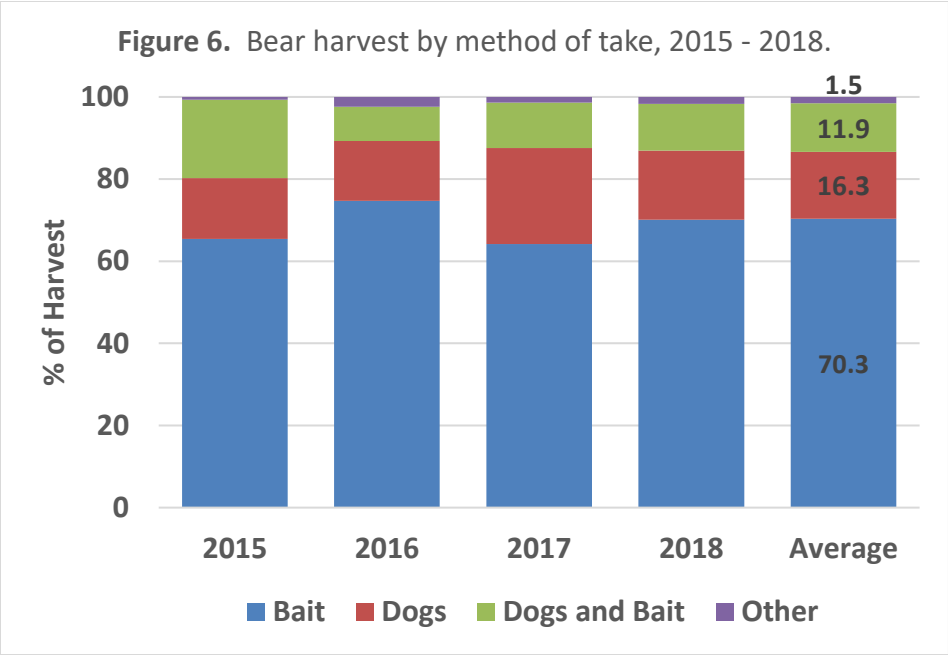


Figure 6. Bear harvest by method of take, 2015 - 2018.

Wisconsin has historically taken an extremely adaptive approach to harvest management, as reflected by major regulatory changes over the years (Table 2). Currently, black bears can be hunted beginning on the first Wednesday following Labor Day, with methods limited to either bait hunting or hound hunting during the initial week of the season in alternate years. The season for bait hunting opens on the first Wednesday following Labor Day in even-numbered years, and hound hunting opens on this date in odd-numbered years. Each activity is then permitted for 28 days, resulting in a total season length of 35 days. Of interest, this system of alternating among methods during the first 7 days of the season has a discernible difference on the total annual bear harvest. Examination of residuals from a linear trendline of total bear harvest during the period 1986 – 2018 reveals that, on average, 165 more bears are harvested during years when baiting is permitted first. A similar analysis with permit success rates reveals that annual permit success averages 1.52% higher in years when baiting is allowed first. While this amount of variation is small relative to the total variation in annual bear harvest, it does slightly confound efforts to achieve a harvest equal to the quota. Utilizing a 4-year mean, rather than a 3-year mean, permit success rate to determine permit levels would remove this effect. A portion of the allowable harvest is allocated to the Chippewa within the ceded territory of the state.

Table 2. Dates of important regulatory changes impacting Wisconsin's black bear season.

Year	***Change to black bear season implemented***
1956	Registration of harvested bears becomes mandatory.
1957	Black bear trapping prohibited.
1963	-Special September season implemented in 3 small northern areas -Wisconsin Conservation Department invites WI and MI hunters to demonstrate the use of hounds for hunting bear. -Use of hounds for bear hunting legalized.
1965	Harvest of cubs prohibited.
1966	Shooting bears in dens prohibited.
1974	-Black bear receives big game status, and big game license required to hunt them. -Bears could no longer be taken during the gun deer season; hunting restricted to people specifically hunting bear during their active period. -Baiting restricted to the use of liquid scents
1983	Fruits, pastries, liquid scents, vegetables, and grains allowed as bait.
1985	Black bear season closure to prevent overharvest and to allow WDNR time to develop a system for controlling hunter numbers and harvest.
1986	-Quota system and permit limits implemented as a means of controlling harvest. -Participant license (later referred to as the Class B license) required to participate in bear hunting activities. -Shooting of sows with cubs prohibited.
1987	-Three management zones established. -The number of permits issued in each zone based on previous 3-year average harvest and hunter success and allowable harvest (for first time, based on a population goal)
1994	Zone A split temporarily into Zone A and A1 to increase bear harvest and address damage complaints in the northwestern counties.
1997	Zone A1 becomes a permanent subzone, with continued goal of using harvest to address agricultural damage.
1999	Preference point system allows hunters to apply for either a preference point or harvest permit
2000	Bear hunting season to start on the first Wednesday after Labor Day.
2003	- "Youth Transfer" provision of Act 29 allows successful applicant to transfer license to a youth between the ages of 12 – 17. -Bait-only area in Zone B eliminated (opened to hound hunting).
2006	Bait only area in Zone A eliminated (opened to hound hunting).
2008	Subzone A1 renamed Zone D, creating four management zones. Hunters with Zone A permits no longer able to hunt in Zone D.
2016	Class B permit and back tag requirements eliminated. Transfer opportunities expanded to allow transfers to disabled individuals, Purple Heart recipients, and active-duty military.
2017	A person of any age may apply for a preference point. Youth transfer opportunities expanded to include youth under the age of 12.

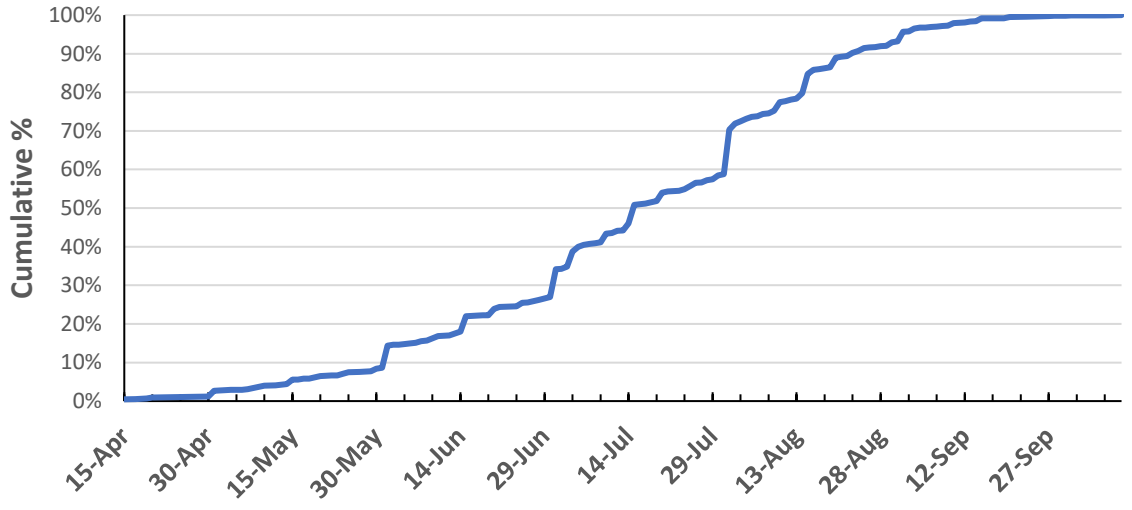
The harvest season is preceded by periods during which hunters are allowed to establish and maintain bait sites (beginning 15 April and running through the harvest season) and train hounds (July 1st – August 31st) each year. These periods are longer than similar baiting or dog training periods in other states where baiting and/or the use of hounds is legal, and the public has periodically expressed concern about the potential impacts of these activities. In addition, there is no limit on the number of bait sites hunters may maintain, though individual bait sites may contain no more than 10 gallons of bait.

While the impact of hound hunting on black bears has not been extensively studied, scientists at UW-Stevens Point recorded eight hound chases of 5 radio-collared bears[17], and documented an average chase distance of 6.9 miles (range 0.5 – 18.0 miles) over an average of 1.9 hours. Only one bear left its home range during the chase but returned the next day. All bears monitored showed normal weights and no signs of injury when checked in dens the following winter. While this suggests that hound training and hunting activities do not have significant impacts on bear health in Wisconsin, additional study is needed to verify these conclusions.

Public concern about Wisconsin's liberal baiting regulations focuses on 4 potential impacts: 1) the high availability of calorie-rich processed foods may have health impacts for bears and other wildlife species, 2) acclimation to supplemental foods provided by humans may increase nuisance issues, 3) theobromine contained in chocolate is known to be toxic to bears and other wildlife species, and 4) baiting may increase wolf depredation of hounds.

While the extended baiting season and unrestricted number of bait sites do allow significant bear bait to be placed on the landscape, most hunters do not start baiting until later in the season. A survey of bear hunters in 2014 suggested that 97.3%, 85.7%, and 65.8% of hunters had *not* yet initiated baiting activities by 1 May, 1 June, and 1 July, respectively (Figure 7). Only by August 9th (less than one month prior to the harvest season) had 75% of hunters that utilized bait begun baiting. The cost and effort associated with maintaining bait sites likely discourages most hunters from taking advantage of early baiting opportunities, which limits the amount of bait on the landscape until opening date draws near. Regardless, bait (both bear and deer bait) does constitute a high proportion of the black bear diet in Wisconsin (estimated at >40% for bears in northcentral Wisconsin[9]), and diets high in sugar and complex carbohydrates can lead to several health issues for other mammal species, including increased blood glucose, high blood pressure, heart

Figure 7. Date on which Wisconsin bear hunters initiated baiting activities in 2014 (n=1,962).



disease, altered function of the liver and pancreas, and altered composition of the gut microbial community (Lindsey Long, WDNR State Veterinarian, *personal communication*). Increased fat deposition may also impact survival or reproductive rates and hence influence demography and population dynamics. While no evidence exists that current baiting regulations are causing health issues for black bears, or influencing population dynamics, potential effects should be investigated to both protect bear health and provide accurate information (e.g., average litter size) for population models.

While baiting may alter the behavior and movement patterns of black bears, there is no consensus regarding how it may influence nuisance activity. While there have been suggestions that human-provisioned food can lead to habituation and hence elevated nuisance issues, it has also been suggested that supplemental feeding may instead act to reduce nuisance levels by keeping animals away from areas occupied by humans[64]. These contrasting hypotheses have not been evaluated for black bears in Wisconsin, and no obvious inferences can be made between current baiting practices and bear nuisance activity. Clarifying the potential impact of current baiting practices on nuisance bear activity is a potential area for further research.

Currently, it is legal to bait bears with chocolate in Wisconsin. Chocolate contains theobromine, a compound known to be toxic to a wide diversity of wildlife species, including black bears[65]. Chocolate consumed at bait sites has caused the deaths of one black bear cub in Michigan and 2 cubs, one subadult female, and one adult female in New Hampshire[65]. Theobromine toxicity was also the presumptive cause of death for one cub (Bayfield County), and the probable cause of death for 2 other cubs (Washburn County), submitted for necropsy in Wisconsin in 2011. In response to concerns about theobromine toxicity, Wisconsin has included a warning about the toxic effects of chocolate in the Bear Hunting Regulations since 2013, and no mortalities due to theobromine toxicosis have been verified since. However, undetected mortality may be occurring, theobromine can have sublethal impacts on bear health[65], and impacts on other species that may ingest chocolate at bear baits have not been examined in Wisconsin. Gathering data on the amount and type of chocolate in bear baits and documenting potential mortality and health impacts for black bears and other wildlife constitutes an important research objective.

Wolves may be attracted to bait sites, either by the bait itself or by prey species that are attracted to the bait. As many hunters use bait to locate bears for their hounds to pursue, this may increase encounter rates between wolves and hounds and the number of hounds killed by wolves. From 2008 – 2017, an average of 19 hounds were confirmed to have been killed by wolves in Wisconsin, and it has been suggested[66] that relatively high predation rates on hounds in Wisconsin as compared to the adjacent Upper Peninsula of Michigan is due to a longer baiting season in Wisconsin. However, as described in Figure 7, relatively little baiting occurs during the first ~1/2 of Wisconsin's baiting season, so this explanation needs better empirical support. As well, unlike Wisconsin, Michigan does not provide financial compensation for hounds depredated by wolves, which may contribute to higher reported rates of dog depredation in Wisconsin. While the link between baiting and wolf depredation on hounds therefore remains unclear, promoting current (e.g., depredation caution areas) and developing new (e.g., using trail cameras to monitor wolf activity near bait sites) tools to minimize hound-wolf contact will be beneficial.

Box 3. Wisconsin's Legacy of Bear Research.

Wisconsin has a long and active history of collaborative, management-oriented black bear research. While numerous individual bear research projects have been conducted over the years and all have provided useful information, a few deserve special mention given their significant contributions to our understanding of and ability to manage black bears in the state.

1) ***Early Wisconsin DNR work.*** Wisconsin DNR biologists provided the earliest data regarding black bear behavior, ecology, and demographics in the state. Dahlen[67] and colleagues defined statewide distribution in the 1950s and provided the first estimates of the size and characteristics of the annual bear harvest. Subsequent work by Bruce Kohn[5] (photo at right) and colleagues in Iron County provided additional insight into black bear movements and survival, and pioneered the use of bait station and hunter surveys in Wisconsin. The latter study also provided estimates of bear body mass and growth rate, and their life table analyses provide the first glimpse of age-specific survival and population growth in the state.

2) *UW-Madison research*. Under the supervision of Dr. Tim Van Deelen, the work of graduate students Dave MacFarland and Karl Malcolm (photo at right) has proven extremely influential in steering modern bear management efforts in Wisconsin. MacFarland[37] utilized mark-recapture methods to reveal that bears were over twice as abundant in the state as previously believed, supporting higher quotas and hunter participation and emphasizing the importance of periodic estimates to calibrate population models. His occupancy models also produced the best estimate of statewide bear habitat suitability currently available, informing decisions regarding spatial management goals. Malcolm[68] elucidated how the sex and age composition of the bear harvest is influenced by habitat and harvest methodology, informing management decisions related to season frameworks. Additional UW-Madison work by Dr. Jon Pauli and graduate student Rebecca Kirby revealed high consumption of bait by bears in northcentral Wisconsin and warned about possible impacts on bear health and demography.

3) ***UW-Stevens Point research.*** Faculty and graduate students from UWSP have been continuously engaged in black bear research for over 25 years, certainly the longest-running bear project in Wisconsin. Initiated by Dr. Ray Anderson and Dr. Neil Payne, the project has been supervised by Dr. Tim Ginnett (photo at right) since 2001. While the monitoring of sows at dens has been a mainstay of the project over the years and provided information on denning behavior and reproduction of Wisconsin bears, individual student work has also provided insight into bear habitat use, density-dependent population responses, parasite prevalence, impacts of hound hunting on bears, and predator- prey interactions. The project continues to this day.

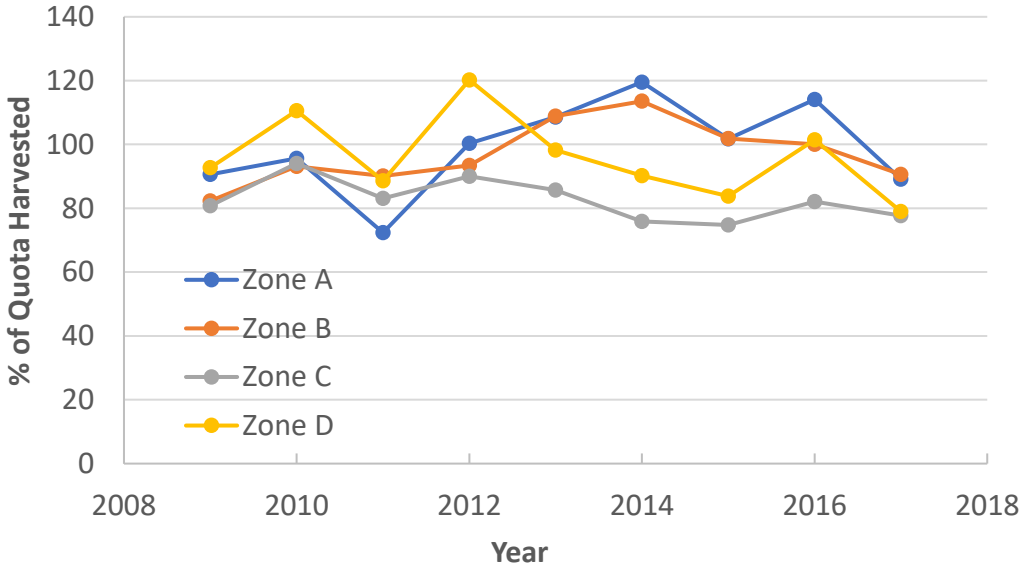
Harvest Management

Effective management of game species that are exposed to human harvest requires managers to carefully integrate biological and social information when making harvest management decisions. Accurate estimates of population size and growth rate allow sustainable harvest levels to be determined and harvest frameworks developed to achieve them. Regular communication with hunters also allows managers to develop frameworks that fairly allocate harvest opportunity and provide for a positive hunting experience. Wisconsin's bear management program has long relied on both biological and social (e.g., the Bear Hunter Survey) data to maximize hunter opportunity and satisfaction while ensuring healthy bear populations and sustainable harvests.

Harvest Quotas and Permit Allocation Process

To determine the number of permits that will be available within each BMZ, biologists first need to identify the number of bears to be harvested (the "harvest goal," "harvest quota" or "quota"). The quota is determined using population models that predict the likely population response within zones to varying harvest levels. One the quota is determined, it is divided by the average zone-specific permit success rate for the previous 3 years. For example, if the Zone B quota was 1,000, and the average success rate for the previous 3 seasons was 50%, 2,000 permits would be issued for the upcoming season. This technique has proven quite successful at achieving desired bear harvests in Wisconsin; between 2009 – 2017, harvests were on average 99.1%, 97.1%, and 96.1% of the quota for zones A, B, and D, respectively (Figure 8). Only in zone C have harvests been routinely below quota (average= 82.7%). Once quotas and permit levels are established for each zone, permits are allocated according to a preference point system.

Figure 8. Percent of Quota Harvested by BMZ, 2009 - 2017.



Given the high demand for black bear hunting opportunities in Wisconsin, the permit allocation process specified in state statute serves to distribute available permits to interested hunters in an equitable manner. Applicants receive a preference point each year that they apply but do not receive a permit. Prior to the drawing, all hunters applying for a harvest permit within a zone are sorted according to the number of preference points they have accumulated. The minimum number of preference points needed to draw a permit for that zone is then determined by allocating the available

permits to hunters, beginning with the group that has the most accumulated preference points and moving down to groups with progressively fewer preference points. All applicants with *more than the minimum* number of preference points needed are awarded a permit; remaining permits are allocated to applicants with *the minimum* number of preference points via a random drawing. Hence, only a portion of the hunters with the minimum number of preference points necessary will draw a permit each year. No hunters with fewer than the minimum number of preference points required for that zone receive a permit. Hunters lose all preference points if they fail to apply for either a harvest permit or preference point at least once every 3 years. If an applicant applies for a harvest permit and is a winner in the drawing, their preference point level returns to zero whether or not they purchase the harvest permit. Hunters can also choose to apply for a preference point only, in which case their application will not be included in that year's drawing.

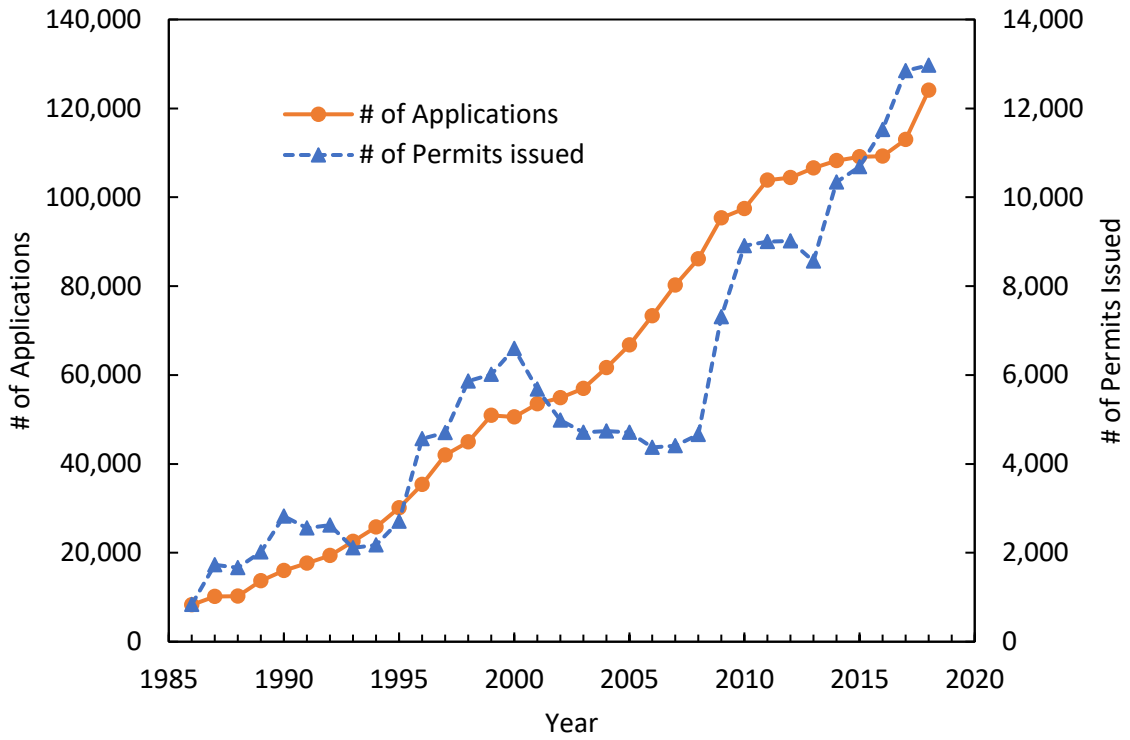
Box 4. Hypothetical bear permit drawing. In this example, 3,710 individuals applied for 2,200 available permits in a particular Bear Management Zone.

Preference Points	Number of Applicants	How the Drawing Would Work
12	205	All 2,082 of these hunters have more than the minimum number of preference points required and would receive a permit. 118 permits remain.
11	304	
10	415	
9	419	
8	382	
7	357	
6	342	➡ 118 permits allocated via random drawing.
5	301	No hunters with less than the minimum number points receive a permit, but all receive a preference point.
4	259	
3	283	
2	218	
1	138	
0	87	

Nonresidents accounted for an average of 5.5% of black bear harvest permit applications between 2009 – 2018, and 3.3% of the permits issued. Though the drawing process is not based on residency status, nonresidents were on average 14% less likely to draw a harvest permit than were residents during this period. The relative poor drawing success by nonresidents was likely due to their being relatively less familiar with the permit allocation process and hence more likely to apply with insufficient preference points to qualify for a permit.

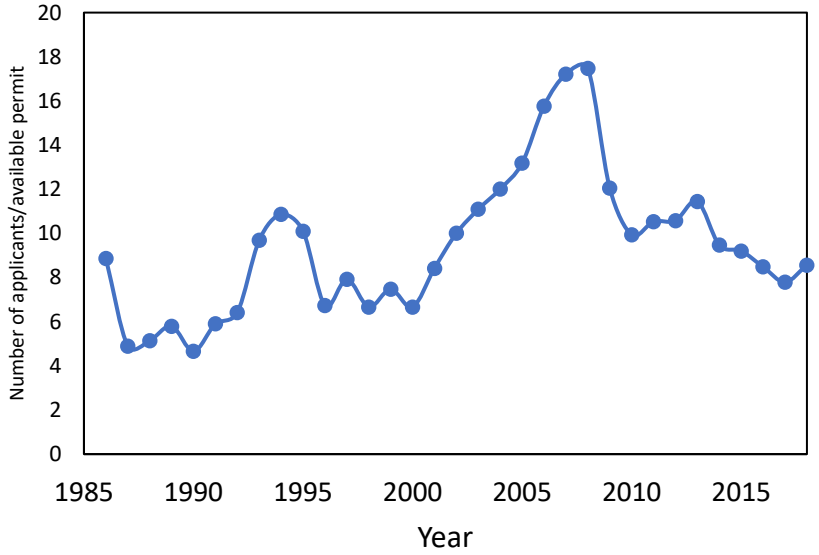
Interest in bear hunting has increased consistently since the current quota-based harvest management system was implemented in 1986 (Figure X), with a record 124,053 individuals applying for either a harvest permit or preference point for the 2018 bear season. An increasing bear population over this time has translated into an increasing trend in the number of permits available to hunters (Figure 9);

Figure 9. Number of applications for bear harvest permits and the number of permits issued, 1985 - 2018.



the average number of permits issued increased annually from an average of 1,816 between 1986 – 1990 to 11,674 between 2014 – 2018. With over 10x as many applicants as available permits in recent years, however, wait times for permits are substantial and to some extent continue to limit an individual hunter's lifetime opportunity to engage in bear hunting. Wait times have varied over time primarily due to variation in annual quotas as biologists strive to increase or decrease harvest to maintain the bear population at

Fig. 10. Number of applicants per available harvest permit, 1986 - 2018.



established goals. Statewide, the number of applicants per available permit increased substantially when quotas were reduced from 2000 – 2008, but declined thereafter as application of a new population estimate technique in 2009 showed bears to be more numerous than previously believed (Figure 10), which allowed higher quotas and permit levels in subsequent years.

There is also substantial variation in wait times among zones (Table 3), from 1 year in zone C to 11 years in zone B for the 2018 season. This variation results from differing bear population goals and resulting

Table 3. Results of 2018 Black Bear Permit Drawing.

Zone	Harvest Quota	# Permit Applicants	# Permit Winners	Minimum # Points Needed	% of Applicants with minimum points that drew a permit
A	1,250	9,135	2,130	8	88.7%
B	800	7,049	1,195	11	46.2%
C	1,200	10,327	7,330	1	31.9%
D	1,300	6,887	2,315	5	20.3%
**An additional 90,655 hunters applied for a preference point only*					

.

harvest quotas, as well as variation in the number of applicants, and is likely fixed through time in part by high hunter fidelity to particular bear management zones[47]. Bear hunters who have connections to a particular zone, such as a residence, second home, connections to friends/family- especially if those connections include access to private land- tend to apply for that zone regardless of potentially longer wait times[47]. Across zones, only 11 – 24% of hunters with experience hunting in a particular zone would consider hunting bear in a different zone in the future[47]. While this inflexibility is an understandable artifact of hunters' connections to particular lands, people, and traditions, it does serve to maintain zone-specific permit supply-demand relationships and relatively long wait times in some zones.

Box 5. Cultural significance and management of black bears by Wisconsin Ojibwe tribes.

Bears are prominent in tribal culture and beliefs. The following contribution was provided by Bad River tribal member Emily Nelis, Traditional Ecological Knowledge (TEK) Specialist, Great Lakes Indian Fish & Wildlife Commission:

For the Anishinaabe (also known as Ojibwe, or Chippewa), makwa (the Ojibwe word for "bear") is highly revered in traditional culture. As is true for other plants, animals, and beings, makwa has given the Anishinaabeg many gifts, which is explained through sacred stories passed down through generations. Makwa is also a member of the Ojibwe doodem (clan) system, which traditionally supported Anishinaabe governance, and continues to organize kinship ties and clan responsibilities. To the Anishinaabeg, makwa is a caretaker of medicines, and it is him who shows the Anishinaabeg where to find traditional medicines throughout Anishinaabe-aki (Ojibwe land). For this reason, makwa is regarded as a healer and

the Anishinaabeg rely on makwa for various healing purposes. Ojibwe bear clan members are also said to have the same qualities as makwa. They are traditionally considered healers with medicinal knowledge, as well as community protectors. Due to makwa's importance in traditional stories and teachings, makwa is treated respectfully by the Anishinaabeg to reciprocate the bear's respect for the Anishinaabeg.

In northern Wisconsin, *makwa* (bear) are also harvested by members of various Ojibwe tribes which reserved certain rights (including the right to harvest bear in accordance with tribal regulations) when they ceded their lands to the United States in treaties signed in 1837 and 1842. All of Bear Management Zone ("BMZ") A, and portions of BMZs B, C, and D consist of lands ceded in the treaties of 1837 and 1842 (Figure 5.1).

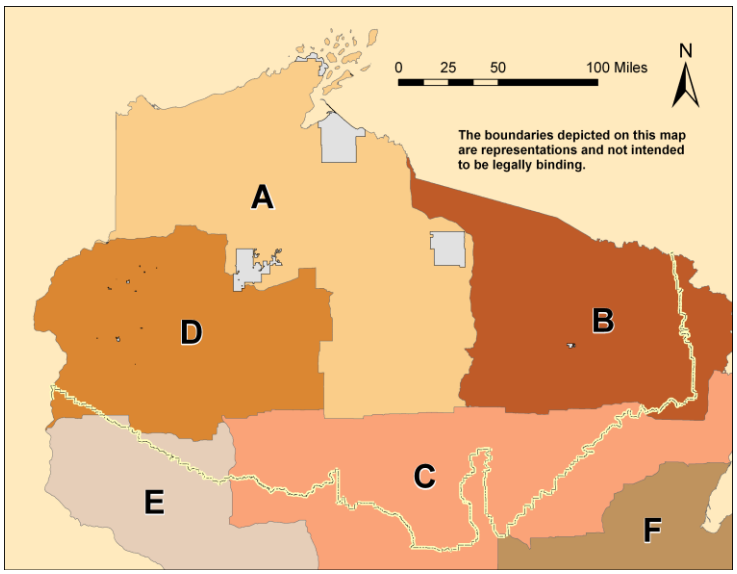


***Figure 5.1**. Tribal 0ff-reservation, ceded territory Bear Management Zones.*

Each tribe with off-reservation harvesting rights regulates the take of *makwa* by its members. As with other harvested species, the number of bears harvested is discussed and coordinated through intertribal processes and the State of Wisconsin to ensure that total harvest is limited to biologically appropriate levels. To date, harvest of *makwa* by tribal members has been minimal, remaining under 100 bear per year (annual average ~50), and the state has never needed to adjust its permit levels to accommodate tribal harvest.

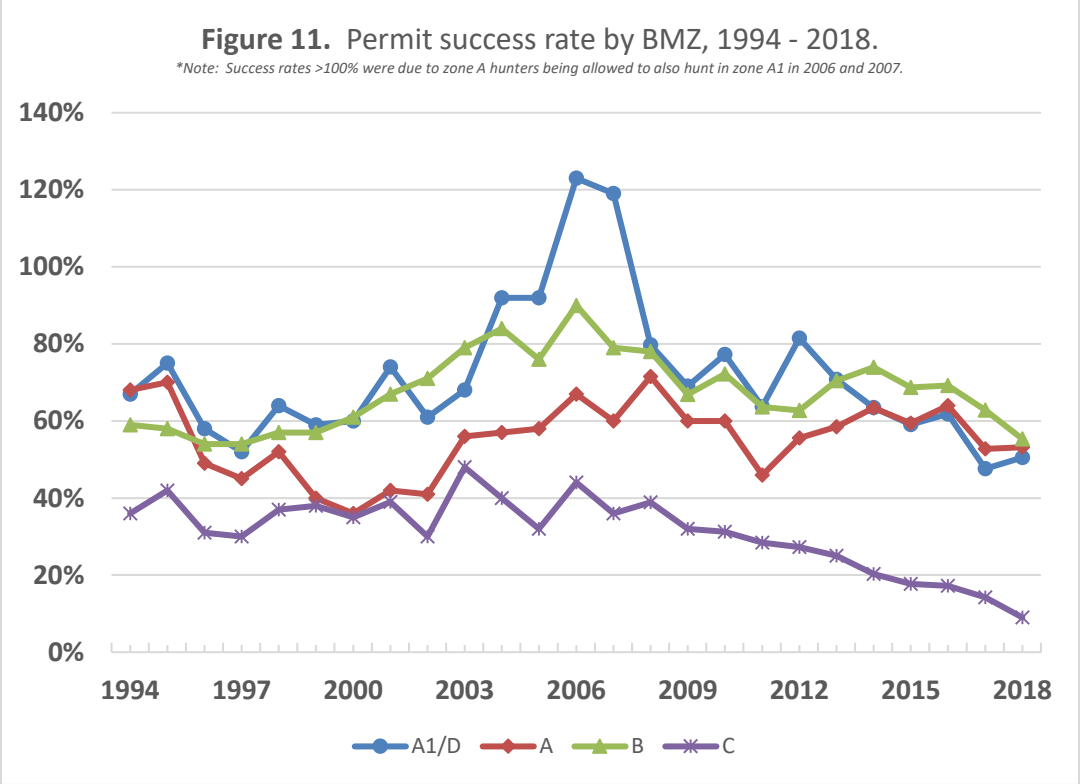
The Department recognizes the tribes' sovereign rights and authority in bear management and acknowledges that this plan, in no way intends or should be construed to modify, alter, abridge, or in any way affect, treaty-reserved rights as they have been established by the law, court decisions, and stipulations. The Department will implement its authority and jurisdiction claims consistent with this plan in a way that does not infringe upon the established rights and responsibilities of tribal entities.

Harvest

Mandatory registration has allowed biologists to closely monitor annual black bear harvest levels, both statewide and within each BMZ. Comparisons between Bear Hunter Survey responses to the question "did you harvest a bear…." and the registration database indicate that compliance with the

registration requirement is close to 100% for bear hunters in Wisconsin. Hunters also report the sex and method of harvest during the registration process, allowing biologists to track these metrics over time and across BMZs. Dividing the total number of bears harvested by the number of permits issued provides an estimate of permit success rate (Figure 11); although non-participation (i.e., hunters who draw a permit but do not purchase a license or participate in the hunt) introduces bias that leads to underestimation of true permit success rates, this estimate still allows permit success to be compared among BMZs and years as long as nonparticipation remains fairly constant.

While permit success rate is often viewed as a measure of bear abundance (e.g. low permit success rates suggest a low bear population and vice-versa), many other factors also influence permit success. Weather conditions (wet, cold, windy) during the season- especially on weekends- can limit both hunter effort and ability to locate or trail bears. As well, the availability of natural foods (nuts, berries) varies among years. In years with abundant natural food, bears may be less attracted to artificial baits, leading to lower encounter rates between bears and hunters. Annual hunter success and harvest rates in Minnesota, for example, correspond closely to an index of natural food abundance[53]. Development of a similar index to natural food abundance in Wisconsin would allow annual variation in permit success to be more clearly interpreted.



Fewer than 1,000 bears were harvested statewide in 1986 and 1987, but annual harvests increased over the subsequent decade before leveling off at an average of 2,912 bears from 1998 – 2008. A new bear population size estimation technique suggested the state's bear population was much higher than previously believed, resulting in higher quotas, increased permit availability, and higher harvests after 2008. Annual harvests since 2009 have been relatively stable, with an average of 4,396 bears being harvested each year (Figure 12).

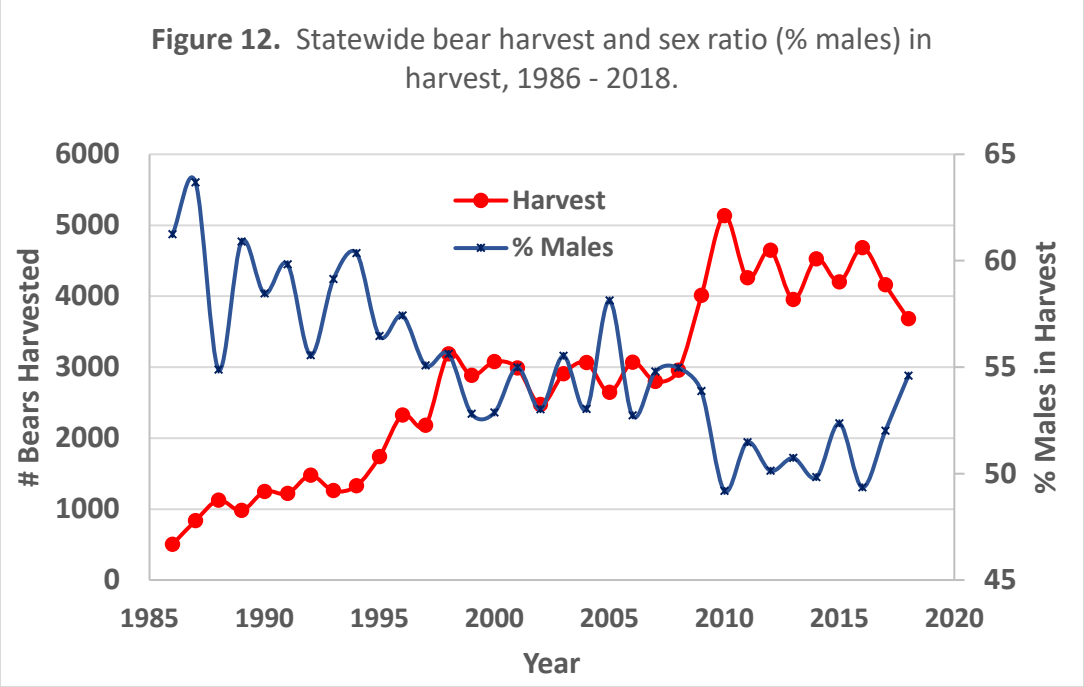
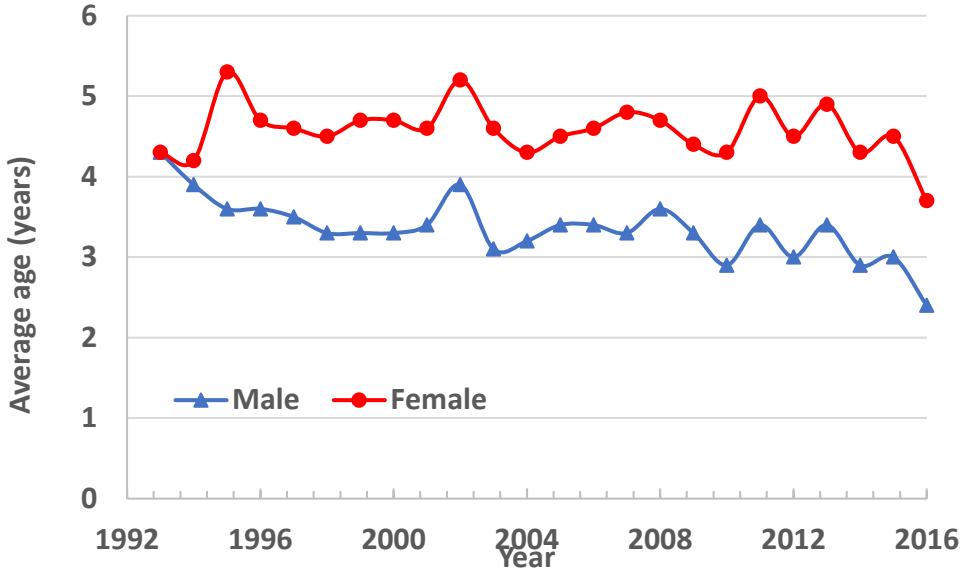


Figure 12. Statewide bear harvest and sex ratio (% males) in harvest, 1986 - 2018.

It is illegal to harvest sows with cubs in Wisconsin. Combined with hunter selection for larger bears, this has tended to produce harvests that are biased toward males (Figure 12). The magnitude of this bias, however, has declined over time. The percentage of male bears in the harvest declined from an average of 57.6% (1988 – 1998) to 54.3% (1999 – 2009) to 50.8% (2010 – 2017) over the past 30 years. Since black bears are promiscuous, individual males can breed with multiple females, and annual reproductive output is limited by (in part) the number of females present in a population. Increasing female harvest may therefore reduce population growth rate and restrict future harvest quotas. However, hunter selection for males complicates utilizing harvest-derived sex ratios to model future growth of Wisconsin's black bear population. Independent estimates of the sex ratio within each BMZ would allow harvest impacts on the female component to be better understood. Such estimates may be available as DNA, collected during noninvasive genetic sampling to estimate population size, can be used to determine the sex of a large sample of bears within each BMZ.

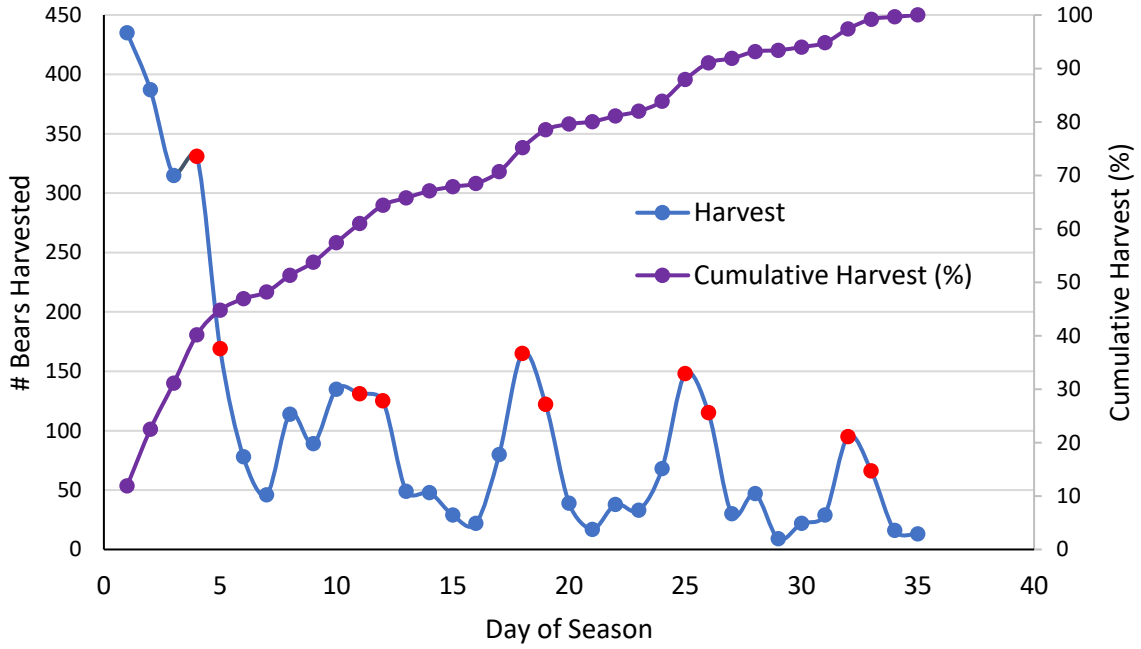
As a component of registration, hunters are required to submit a vestigial premolar. This small tooth provides a lot of information for biologists and scientists. Laboratory analysis of these teeth allow age to be determined (Box 1), and this data supports accurate population modeling. The average age of harvested male bears has declined significantly, by about 2 weeks/year, between 1993 and 2016; male bears in the harvest are now 11.3 months younger, on average, than in the early 1990s (Figure 13). There has been no detectable trend in the age of harvested females.

Figure 13. Average age of male and female bears in the harvest, 1993 - 2016.



The majority of bears are harvested early in the season. In 2018, 45% of bears were harvested during the first 5 days of the season, and 75% by day 18 (Figure 14). Following the high opening week harvest, most bears are harvested on weekend days through the remainder of the season.

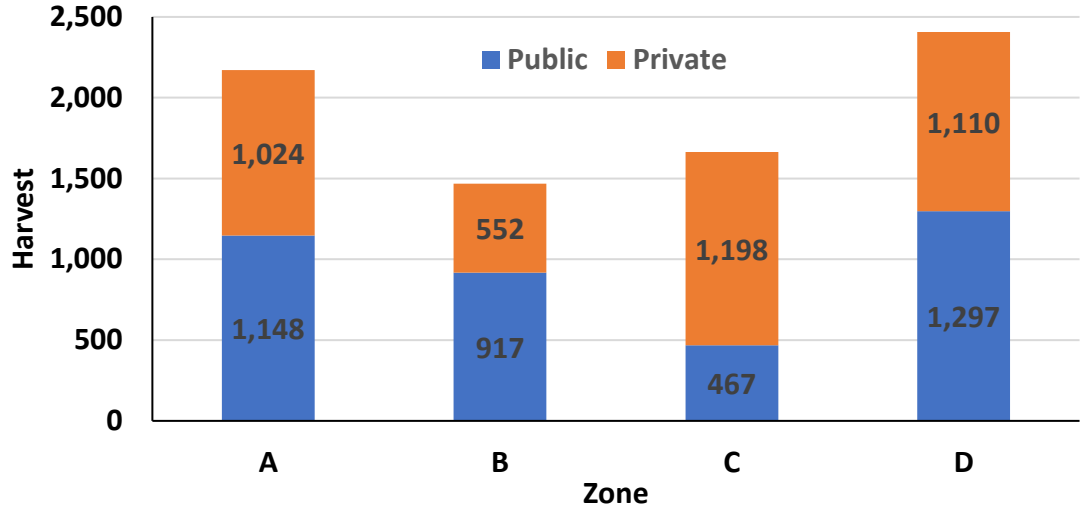
Figure 14. Number of bears harvested per day, and cumulative harvest, during the 2018 bear season. Weekend days denoted in red.



Public and Private Lands

Wisconsin is fortunate to have an abundance of public land accessible to bear hunters (Figure 4), and total bear harvest in the state is evenly distributed between public and private land. In 2017 and 2018, for example, 3,829 and 3,884 total bears were harvested on public and private land, respectively. Harvest is fairly evenly divided between these land types in zones A and D (Figure 15), whereas public land accounts for more harvested bears in zone B, and far fewer in zone C, than private land. This distribution of harvest generally reflects variation in public land availability among zones.

Figure 15. Black bear harvest, public vs. private land, 2017 - 2018.



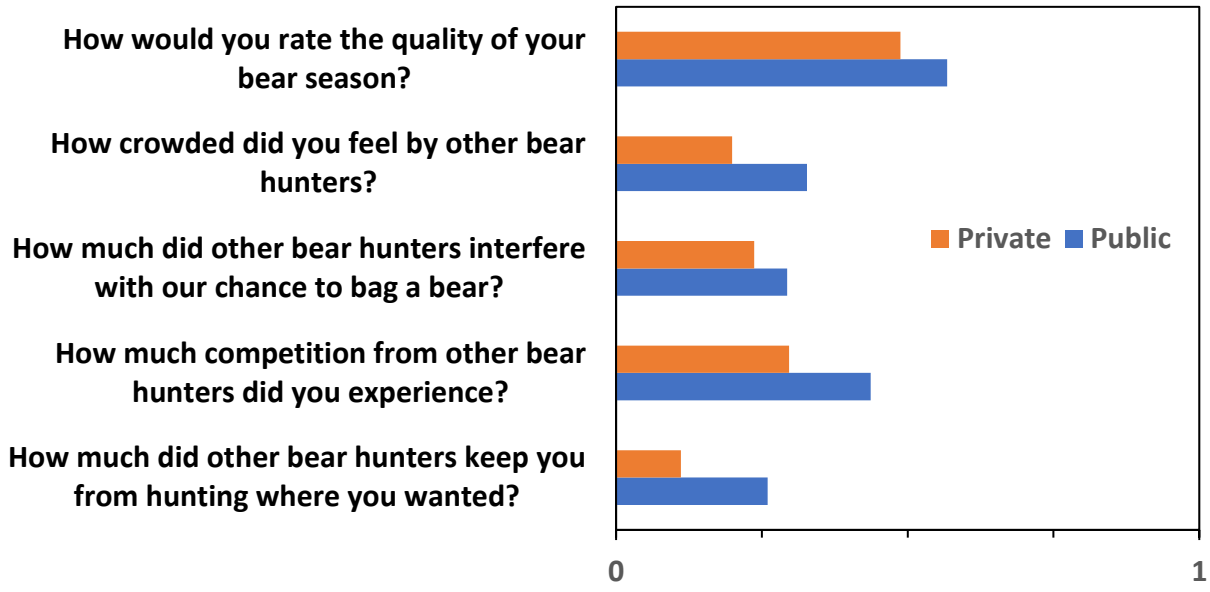
Hunters pursuing bears with hounds depend much more heavily on public land than do those hunting over bait. Across zones (A, B, and D) where hound hunting is legal, 79-89% of bears harvested using hounds were harvested on public land from 2017 – 2018 (Table 4). This reliance on public lands underscores the importance of large blocks of publicly-accessible land for hound hunters, as hounds may cover many miles while in pursuit of a bear. Hunters utilizing bait were much more reliant on private land, with only 28-46% of bears harvested over bait coming from public land over this time period.

Table 4. Percentage of bears harvested using either bait or hounds that were taken on public land, 2017 – 2018.

Zone	% of Bears Harvested over Bait Taken on Public Land	% of Bears Harvested with Hounds Taken on Public Land
A	31.8	80.6
B	45.8	89.2
C	28.4	N/A
D	35.9	79.1
Total	34.3	81.9

Although the number of licensed bear hunters is low (~12,000 statewide in recent years) relative to other forms of hunting (e.g., 600,000+ gun deer hunters), the ability to place and maintain an unlimited number of baits and the reliance of hound hunters on public land has occasionally led to concerns about crowding or interference on public land. Although 2017 Bear Hunter Survey data suggest that individuals who hunt on public land do perceive higher levels of crowding and interference than those who hunt on private land (Figure X), differences between groups are relatively small and in general hunters report only low levels of crowding or interference regardless of the land type hunted (Figure 16). As well, hunters on public land appear to be slightly more satisfied with their bear hunting experience than those who hunt private land (Figure X), suggesting that the slightly higher levels of crowding and interference on public land are tolerable and do not significantly impact the hunting experience.

Figure 16. Assessment of crowding, interference, and hunt quality by individuals who hunted public or private land (data standardized; 0=Least; 1=Most).



Implementing separate population management objectives for public and private land via the issuance of land type-specific harvest permits (i.e., public vs. private land permits) has occasionally been suggested as a means to 1) address perceived crowding issues on public land, 2) focus harvest on private lands prone to chronic agricultural damage, or 3) prevent overharvest on public lands. As described above, however, crowding and interference seem to be tolerable on public land and in general do not seem to be impacting hunter satisfaction. The WDNR Wildlife Damage Abatement and Claims Program provides proven and effective means of addressing crop damage issues on private land, and the proposed new zone structure (Figure 23) and ability to implement subzones already provide additional flexibility. As well, no evidence exists to support the idea that bear harvest on public land is unsustainable; Bear Hunter Survey data suggest that success rates are actually higher for hunters on public land. The development of land type-specific permits would complicate the permit issuance process, have unknown impacts on wait times, present law enforcement challenges, and limit hunter opportunity, and is not justified based on current information. However, Bear Hunter Survey data should continue to be evaluated relative to the experience and success of hunters on public and private land to inform future management decisions.

Economic Impacts

Hunters in the United States spend over $1.6 billion annually on hunting applications, licenses, stamps, and equipment- the single largest source of financial support for wildlife conservation and habitat management[61]. Similarly, expenditures by Wisconsin's bear hunters provide an important, and increasing, source of conservation funding here in Wisconsin. Revenue comes through the purchase of black bear permit applications and Class A hunting licenses. Gross revenue has more than doubled in the last decade, from $470,588 in 2007 to $1,055,553 in 2016 (Figure 15). This large increase in revenue reflects both increasing opportunities for (more licenses available) and interest in (more applications sold) bear hunting in the state. These funds (minus transaction and issuing fees) are deposited in the WDNR general Fish and Wildlife Account and help support bear management activities in Wisconsin.

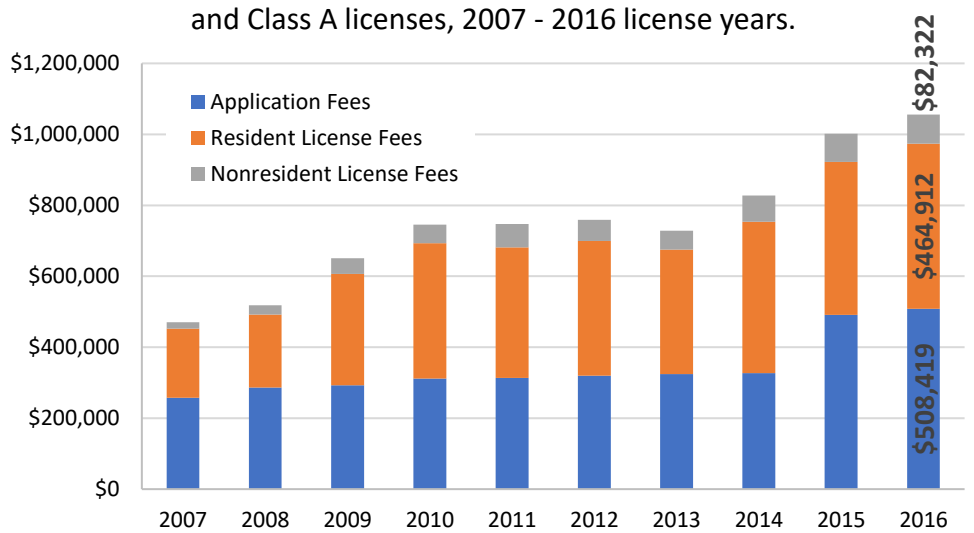


Figure 17. Gross revenue from the sale of bear applications and Class A licenses, 2007 - 2016 license years.

Note: Gross revenue only; costs associated with system, transaction, and other fees are not deducted.

Money spent by hunters on hotel rooms, gas, hunting equipment, and other items also provides a significant boost to local economies. In 2011, individual Wisconsin hunters spent an average of $1,846 in pursuit of big game[62]. Adjusting for inflation, the 10,355 active bear hunters in 2018 therefore would have invested an estimated $21,440,661.00 directly into Wisconsin's economy, mainly in rural areas of northern Wisconsin. This likely underestimates the total impact of bear hunters on Wisconsin's economy, as aspects of bear hunting in Wisconsin (purchase of bait, extensive travel prior to and during the season to maintain bait sites and train hounds) imply that, on average, bear hunters invest more in pursuit of their sport than other big game hunters. A survey designed to specifically quantify bear hunter expenditures would more clearly elucidate the economic impact of Wisconsin's bear hunters on local economies and provide another means of engendering public appreciation for Wisconsin's bear resource and the sport of bear hunting.

Bear Conflict Management

Conflict management is an important component of bear management in Wisconsin. While bear conflicts on a statewide level may not be significant, impacts to individuals can be significant and serious. Bear range expansion, human development, changes in agriculture production and crop prices, natural food availability, and other factors can greatly influence human tolerance toward bear and the number and severity of bear complaints wildlife professionals respond to each year. When responding to bear conflicts it is important to have an integrated conflict management program in place utilizing both non-lethal and lethal abatement options.

Beginning in 1990 the DNR began partnering with The U. S. Department of Agriculture, Animal Plant and Health Inspection Service-Wildlife Services (USDA-WS) for responding to bear complaints. In Wisconsin, bear conflicts are separated into two categories: Agriculture Damage and Nuisance/Property Damage. Many of the same abatement methods are used for both categories; however, management of conflicts is different between the categories. This section provides general information about recent trends in bear conflicts as well as general information on DNR and cooperator responses to complaints. More detailed information pertaining to the response and management of bear conflicts can be found in the *Wisconsin Black Bear Response Guidelines for DNR Staff* document (Appendix A).

Agriculture Damage Conflicts

Bear impacts to agricultural producers can result in significant losses for some producers, not only from damages caused by the bear but also in time and effort spent implementing abatement to minimize impacts. Bear damage to agricultural crops, damage to apiaries, stored livestock feed, and livestock depredations are eligible for assistance through Wisconsin's Wildlife Damage Abatement and Claims Program (WDACP). Bear depredation to livestock in WI is a rare event. The WDACP is administered by participating counties with oversight by the Wisconsin DNR. The WDACP provides support for abatement activities intended to reduce damage caused by designated wildlife species, including black bear, and provides partial compensation for damages by those species. This program is funded by a $2 surcharge on each hunting license and revenue generated from the sale of antlerless deer authorizations. Hunters, in exchange for funding the program, are provided access to enrolled properties for hunting the species causing damage. There are a few exemptions where public hunting access is not required, including an exemption for apiary (bee hive) owners who do not control access to lands where the apiary is located.

The number of producers enrolling in the WDACP fluctuates from year to year. Factors like crop prices, crop rotations, crop condition and yields, availability of hard and soft mast, bear densities, and landowner cooperation can greatly impact levels of bear damage and the number of program enrollees each year. In 2018, 249 agricultural producers enrolled in the WDACP for bear damage abatement assistance (Figure 16).

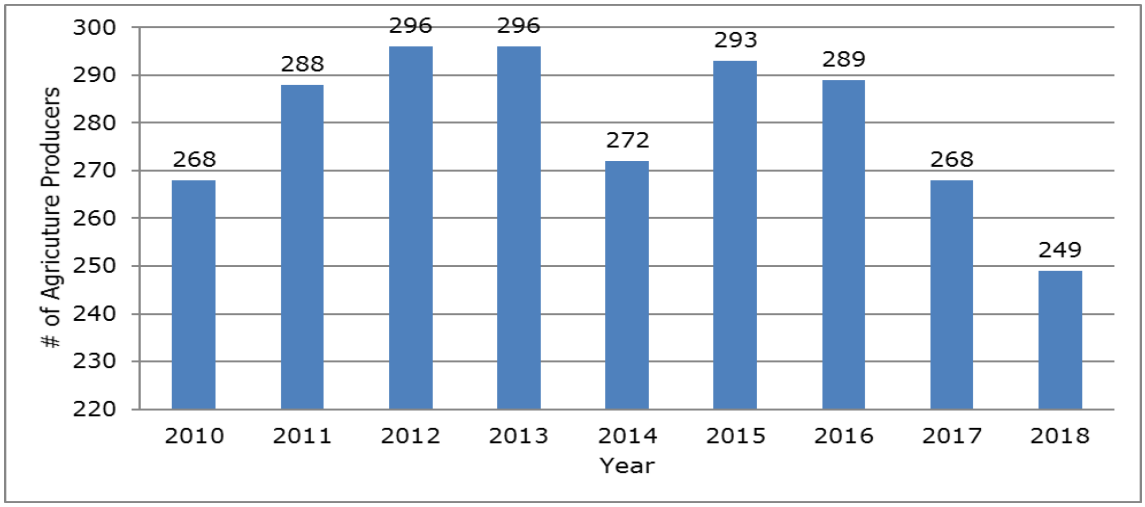


Figure 18. The number of agricultural producers enrolling in the Wildlife Damage Abatement and Claims Program for bear damage assistance, 2010-2018.

Trapping and translocation of bear is the primary abatement method used for protecting agricultural crops from damages caused by bear. Bear commonly damage corn, especially when corn is in the "milk" stage. Bear trapping and translocation services are conducted by USDA-WS staff through a cooperative agreement with the DNR using culvert-style live traps. Bear are moved a minimum of 20 miles from the trap site and released on large tracts of county, state, or federal land. Translocation distance depends on the age, sex, reproductive status, and time of year.

A number of factors influence the number of bear translocated annually, including the availability of natural food, the condition and location of corn crops, ability of producers to detect damage early, and access to locations of bear damage for trapping efforts. In 2018, 201 bears were trapped and translocated by USDA-WS in response to agriculture damage conflicts (Figure 20).

Translocation is a widely accepted abatement option. A public attitude survey conducted in Wisconsin[60] showed that 73% of survey respondents supporting trapping and translocation of bear to address crop damage issues. Trapping and translocation allows for bear to be removed from the site of damage but remain on the landscape. This non-lethal option is important to the public including bear hunters that are applying for and waiting years to receive a bear harvest authorization. For damage management purposes, trapping can be very effective at reducing bear damage if trapping efforts are initiated when damage first begins, and adequate access to locations of bear damage is provided by enrollees. Research conducted in Wisconsin looking at recapture rates of bear translocated from corn fields revealed that only 4% of 520 individually identified bear that were trapped and translocated from corn fields were recaptured[84]. Although this suggests that individual bears are not repeatedly involved in crop depredation events, further research is needed to determine if bears do return and cause additional damage but avoid traps; most of the bears that were recaptured had returned to within 3 miles of the capture site. Bear traps are also on the landscape 24 hours a day, so bear can be captured at any time, and in some cases multiple bear can be caught in the same day. This compares to bear shooting permits which may only be used during legal hunting hours and are only effective when hunters are present. On the negative side, trapping and translocation is costlier than some other abatement options and there are concerns from some agricultural producers about the time commitment required for checking traps and the damage to crops that may occur while accessing trap sites. To relieve this situation, DNR and USDA-WS are using electronic trap monitors which notify staff when trap doors close. Agricultural producers are not required to check traps that are equipped with electronic monitors. Other concerns with trapping are occasional problems with individuals tampering with traps, intentionally releasing bear, closing trap doors because they do not want bear moved from the area, or tampering with trap monitors. Cases of trap tampering may be refereed to DNR Law Enforcement staff for investigation.

Bear shooting permits provide another abatement option for agricultural conflicts. In general, bear shooting permits are issued as secondary abatement when trap sites are not accessible or when trapping is not effectively reducing bear damage. In most cases, permits are issued to producers who farm large acreages that are geographically spread out on the landscape. In 2018, 21 bear shooting permits were issued with 43 bear removed on those permits (Figure 17).

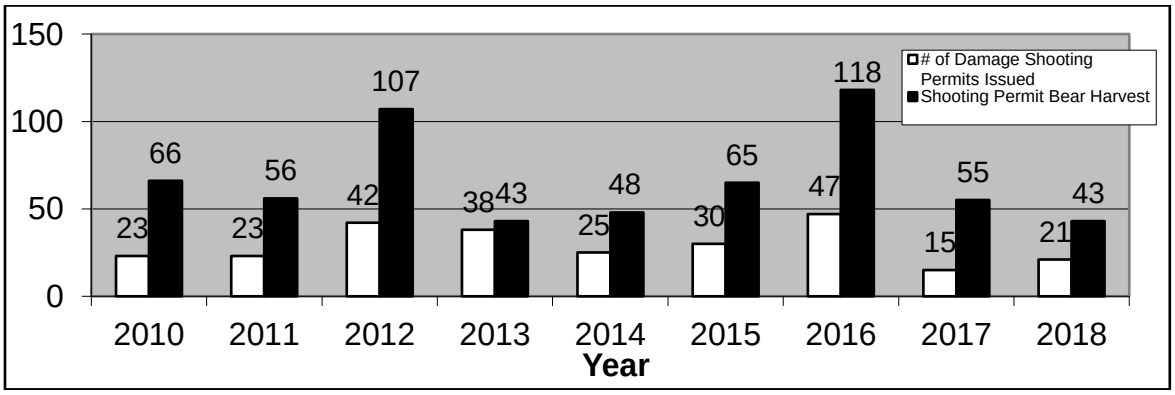


Figure 19. The number of agriculture damage bear shooting permits issued by the DNR and number of bear harvested, 2010-2018.

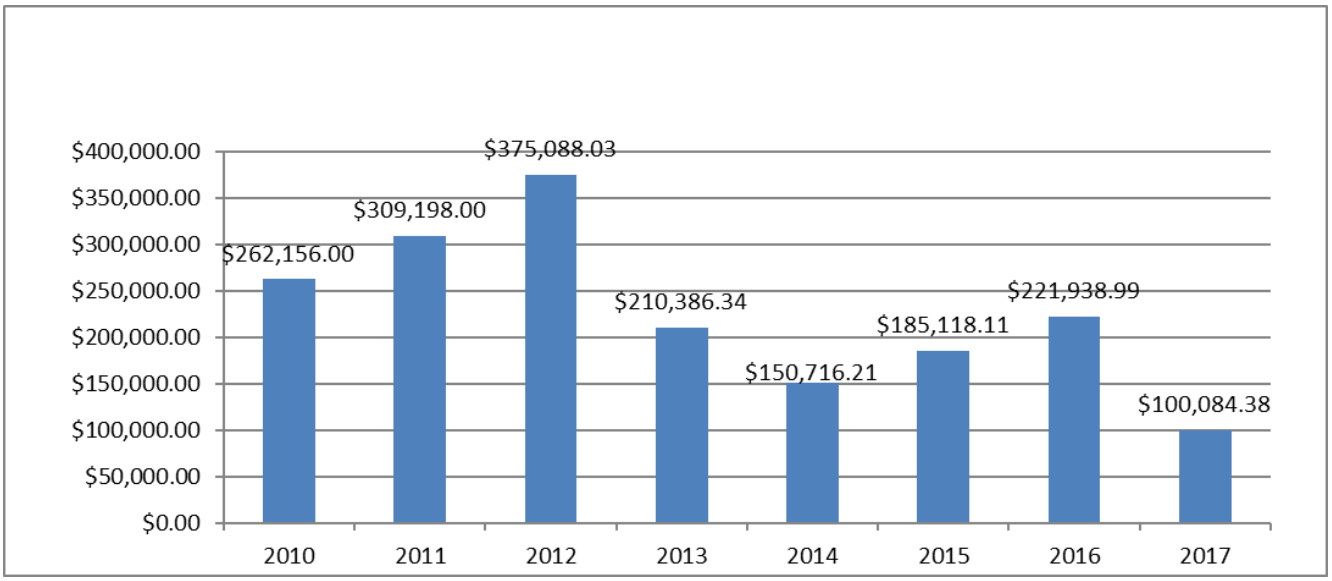
The use of shooting permits is a cost-effective option and removes bear from the landscape so there is no potential for the bear to return or cause damage in other locations. However, social factors must also be considered when issuing shooting permits. Historically, the issuance of bear

shooting permits has been met with caution from DNR wildlife biologists due to social concerns. Bear hunters may wait 2 to 10 years, depending on zone, for a bear harvest authorization whereas participants on bear shooting permits only need a license authorizing hunting with a firearm so there is no wait time involved. This can frustrate bear hunters and has also led to some agricultural producers enrolling in the WDACP for the sole purpose of receiving a bear shooting permit to avoid the harvest authorization application process. Some other concerns with the issuance of bear shooting permits include hunter selectivity for large bear and shooting permit holders releasing bear from traps, closing trap doors, tampering with trap monitors to prevent bears from being translocated and placement of bait to facilitate harvest may attract additional bear to crop fields. Another limitation is that bear shooting permits can only be used during normal shooting hours which provides little protection for crops if bears are coming to fields at night or hunters are not actively using permits when corn is in the milk stage and damage is most significant.

Temporary electric fencing is another abatement option commonly implemented, primarily for the protection of apiaries (bee hives). In 2018, there were 115 enrollments in the WDACP for the protection of apiaries. The majority of these apiaries were protected with temporary fencing. Temporary fencing is a cost effective, non-lethal option that works well when protecting smaller areas, usually a few acres or less is size. In 2018, the program provided electric fencing materials for the protection of almost 800 apiaries with an estimated value of $2.8 million dollars. This estimate is conservative. The value of an apiary can vary significantly depending on the number of colonies in the apiary, the purpose of the apiary; honey production or pollination, and whether the producer is local or migratory and moves bees. This estimate uses an average cost of $285 per colony and 10 colonies per apiary. Also, this estimate does not include the value of honey produced or increased crop yields because of pollination.

Compensation for agricultural damage caused by bear is also available through the WDACP. State Statue currently sets the maximum compensation limit at $10,000 per producer. Producers are required to contact the county at least 10 days prior to harvest so the amount of bear damage on the property can be appraised. The amount of bear damages appraised through the program can vary from year to year based on a variety of factors including the success of natural food production, location of fields containing corn, number of program enrollees, commodity prices, and yield production. In 2017, appraised losses from bear totaled more than $100,000 (Figure 18). Much of this damage is to corn. In 2017, more than 14,500 acres of corn were enrolled in the WDACP for protection from bear damage. Using the 2017 statewide average of 174 bushels per acre at a value of $3.25 per bushel, the corn resource protected by the program totals approximately $8.3 million.

Figure 20. Appraised agricultural damage by bear, 2010-2017.



It is important to note that these figures only represent bear damage on properties enrolled in the WDACP and for damages that were appraised. These figures do not reflect the total amount of agricultural damages being caused by bear throughout the state.

Nuisance/Property Damage Conflicts

The DNR maintains a cooperative agreement with USDA-WS for responding to all bear conflicts, including nuisance and property damage complaints. USDA-WS maintains two toll-free phone numbers that the public can use to report bear conflicts. These numbers are monitored during normal work hours, on weekends, and holidays to ensure a timely response. Directing complaints to one agency helps to insure consistency in response and allows for better tracking of bear complaints geographically as one bear can sometimes cause multiple complaints in the same general area. USDA-WS respond to complaints 7-days per week statewide and must be available on weekends and holidays when active bear traps are on the landscape.

Complaints about bears causing nuisance issues or property damage are separated into one of 5 conflict levels as outlined in the *Wisconsin Black Bear Response Guidelines for DNR Staff* (Appendix A). Conflict levels are based on the behavior of the bear, severity of the conflict, location, and impact to human health and safety. In 2018, USDA-WS responded to more than 500 complaints about bear causing nuisance or damaging property (Figure 19).

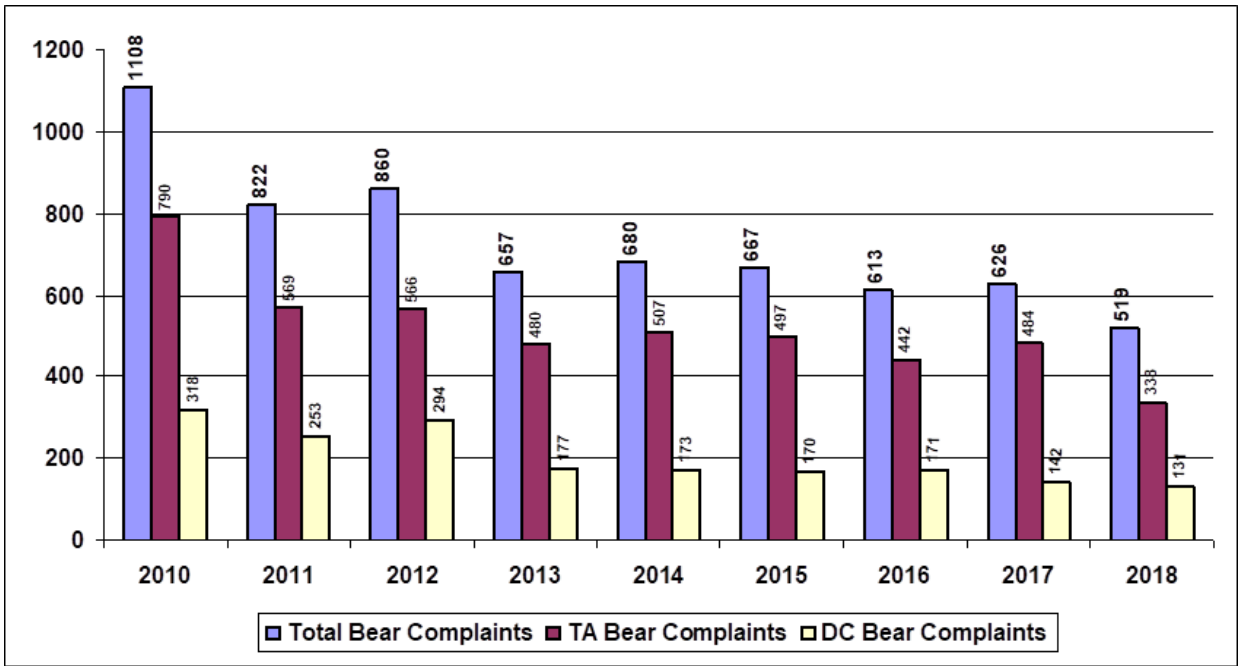


Figure 21. Total number of nuisance and property damage complaints, complaints handled with technical assistance and complaints handled with direct control received by USDA- Wildlife Services, 2010-2018

Bear complaints received by USDA-WS go through a screening process. Once a complaint is classified to a conflict level category, the most appropriate response is determined in accordance with the *Wisconsin Black Bear Response Guidelines for DNR Staff* document (Appendix A). The majority of complaints fall into a Level 3 or 4 category and are resolved by providing technical assistance to the complainant over the phone or by providing them educational materials. Approximately 60% of all reported conflicts are resolved through technical assistance. Education is the most critical component of conflict management, especially as bears expand their range in southern Wisconsin where the public is less accustomed to living with bear and as humans expand into bear habitat. Informational pamphlets, presentations, workshops,

Village of Grantsburg – Bear Removal Pilot Project

For several years the Village of Grantsburg experienced a high number of bear complaints from residents when compared to other municipalities. To address these complaints, a variety of non-lethal abatement options were implemented including educational efforts, altering trash pick-up schedules, trapping and translocation, and limited lethal control. Even with these efforts, however, complaints continued. In 2016, the Department implemented a 2-year pilot project to assess the effectiveness of a bear removal program for reducing complaints. Under this pilot project, landowners owning 5 or more acres within approximately 1.5 miles of the Village were eligible for a bear shooting permit. In 2016, 75 permits were available and in 2017, 100 permits were available. In 2016 and 2017, 14 and 9 bears were removed, respectively. After the implementation of the pilot project the number of complaints and management actions decreased from a high of 30 bear complaints, 5 bears translocated, and 5 bears euthanized in 2016 to 1 complaint and no bears translocated or euthanized in 2018. These results show that bear removal programs can effectively resolve chronic conflict issues in and around municipalities experiencing high levels of complaints. In the future, similar programs will be considered only after other conflict mitigation efforts have been unsuccessful.

community-based outreach programs, training programs for new DNR and USDA-WS staff, and annual press releases by the DNR and USDA-WS are used to inform residents of actions they can take to avoid conflicts with bear and who they should call if they need additional assistance. Education and outreach efforts also include communications with local law enforcement agencies as law enforcement staff are occasionally the first point of contact for complainants.

Nuisance and property damage complaints that are judged to be Level 2 or 1 and cannot be resolved through technical assistance, are then investigated by USDA-WS staff to determine the best course of action for conflict mitigation. If a determination is made that direct control is required, options include trapping and translocation, capture and on-site release, installation of electric fencing, shooting, trapping and euthanasia, or the issuance of bear shooting permits to landowners. Most often trapping and translocation is utilized. Bear are translocated a minimum distance of 20 miles to a release site on public lands where adequate habitat exists. In 2018, 108 bears were translocated in response to nuisance and property damage complaints. If a bear is deemed a continuing threat to human health and safety, human habituated, or food conditioned, DNR and USDA-WS will consult regarding euthanasia. In 2018, 6 bears were euthanized in response to high level nuisance, livestock depredation or property damage complaints.

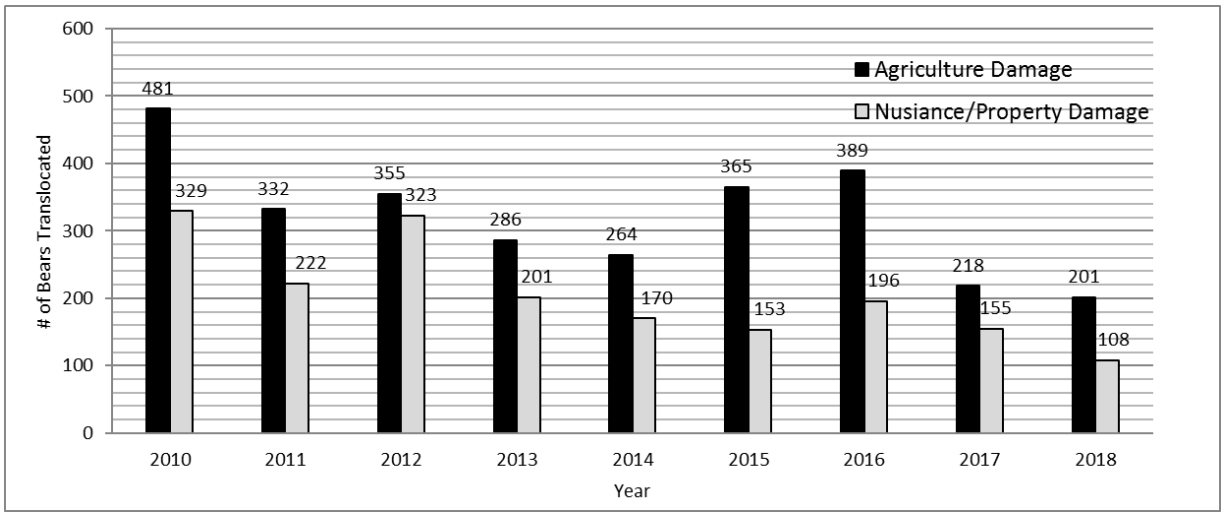


Figure 22. The number of bears translocated by USDA-Wildlife Services in response to Agriculture Damage and Nuisance/Property Damage complaints, 2010-2018

Complaints involving black bear attacking or injuring a person are classified as Level Critical complaints and require an immediate response. Level Critical complaints are coordinated by the WDNR Regional Biologist or Regional LE Supervisor. USDA/WS provides support to WDNR when responding to Level Critical complaints. Attacks by bears on humans do occur in Wisconsin but are very rare. Between 2013 and 2018, five Level Critical complaints were reported in Wisconsin. Four people were injured during these events. No human fatalities have resulted from encounters with wild black bears in recorded history in Wisconsin. The *Guidelines* (Appendix A) require that offending bears captured in response to Level Critical complaints be euthanized; four bears were euthanized in response to these five complaints.

Bear conflict management including translocation is costly and labor intensive. The effectiveness has been questioned as bears may return to the capture site and cause additional damage following translocation. In Wisconsin, of 176 ear tagged nuisance bears captured between 1995 – 2003 that were then recaptured or harvested, 28.4% were recaptured or harvested in the same square mile and an additional 26.7% within 6.2 miles of the original capture site[85]. Many of the bears in this study were not involved in additional bear conflicts after translocation, indicating that a tendency to return to the capture site does not necessarily result in recidivism. The authors of this study did not report how many of these bears were harvested by hunters.

From 2003 – 2018, 195 bears captured at nuisance/property damage complaints were ear tagged. Eighty-five (44%) of these bears were either recaptured after causing additional conflicts or harvested by hunters. Data for the distance between the recapture or harvest location from the original capture location were available for 40 bears. Translocation distance averaged 45.5 miles (range 17.4 – 148.1 miles). The distance between the recapture or harvest site from the original capture site averaged 15.3 miles (range 0.0 – 168.1 miles). Fifty-seven or 67% of the 85 bears were harvested by hunters. Twenty-three or 11.2% of the 195 bear that were tagged at nuisance or property conflict sites were subsequently recaptured at conflict sites. These data suggest that minimally 30% of the bears translocated for nuisance or property conflicts maybe subsequently harvested by hunters (WDNR/USDA-WS unpublished data). Translocation is an effective tool for helping bear and humans coexist, provides opportunities for hunters and is the most accepted method of bear conflict management supported by the public in Wisconsin[60].

The *Wisconsin Black Bear Response Guidelines for DNR Staff* (Appendix A) emphasize resolving bear complaints involving nuisance behavior or property damage through technical assistance and avoiding translocating bears or the use of lethal control options. If translocating a nuisance bear is necessary and subsequent complaints occur at the same location, the landowner is assessed a fee for additional services. This Landowner Cost Share Policy was implemented in 2009 to encourage citizens to proactively take steps themselves to avoid further conflicts. Very few home owners have been charged this fee and the trend in the number of complaints received by USDA-Wildlife Services has declined since 2009 (Figure 19). This suggests that technical assistance provided by USDA-WS staff, along with the Landowner Cost Share Policy may be promoting more bear-friendly behavior among Wisconsin residents and supporting the coexistence of bears and humans on the landscape.

Bear Health

Bears are extremely unique in that their annual cycle includes a state of winter torpor. This state has many of the characteristics of small animal hibernation, but some differences include that bears tend to maintain an only slightly reduced body temperature, drastically reduce their metabolic rate (~25%), completely conserve nitrogen (important for muscle maintenance), and maintain the ability for wounds to heal[78]. Current research also provides some evidence that a bear's immune system remains active and may enhance processes that minimize the effects of infectious organisms[78]. These physiologic adaptations may play a key role in how black bears respond to and fight off infectious organisms. As such, changes to this torpor state may impact disease susceptibility and should be evaluated as one component of population assessment.

While there have been no documented black bear declines in Wisconsin associated with disease-causing organisms, there is the potential for black bear to be exposed to several pathogens (bacterial, viral, and fungal) as well as parasitic diseases and toxins.

The following section provides an overview of the disease agents that black bear may be exposed to in Wisconsin, as well as agents that have had more significant impacts on black bears in other states. Biologists and hunters alike should be alert for the presence of sick or dead black bears on the landscape so that disease occurrence can be identified and appropriate response measures taken if warranted. While very few disease agents have been identified as causing actual clinical disease in black bear, monitoring mortalities within our wild black bear population can help provide information on the impacts of disease. This in turn leads to better management of these populations through both increased knowledge of possible health implications and identification of areas where knowledge needs to be expanded through research.

Black bears have been evaluated for their exposure to pathogens in multiple states, including Wisconsin. Seldom is clinical disease identified although exposure to numerous disease agents has been recorded. There have been case reports of individual animals that have died due to

disease caused by Canine Distemper Virus, Canine Adenovirus (Infectious canine hepatitis), the fungus Blastomyces, and the parasites Cryptosporidium sp. and Sarcocystis sp.[70,72,73,80,82]; however, these seem to represent rare occurrences. Bear populations across the United States have demonstrated antibody responses to multiple disease agents including Canine Distemper Virus, Canine Parvovirus, West Nile Virus, *Toxoplasma gondii* (a protozoan parasite often found in muscle), Tularemia, and various tick-born pathogens including *Borrelia burgdorferi* (the agent responsible for Lyme disease), *Rickettsia* sp., *Anaplasma* sp., *Ehrlichia* sp., and *Babesia* sp. with little or no clinical disease noted[72,72,]77. However, not all black bear populations have been exposed to each of these organisms and naïve populations may respond with clinical disease if a disease agent were introduced to a new area. Sick animal reports and mortality investigations are important tools that should be maintained to monitor for expression of disease in the Wisconsin black bear population.

Parasites of potential concern to humans

Internal parasites that black bears may carry include, but are not limited to, the roundworms *Trichonella spiralis* and *Baylisascaris transfuga.* There is no evidence these organisms are a significant cause of mortality or even clinical disease in the black bear population of Wisconsin, but they have potential to be a health risk for humans.

Trichinella spiralis is responsible for the disease Trichinosis. The adult worms of these species live in the small intestine of their host but the larvae encyst in the muscle tissue. Mammals, including humans, become infected when they consume meat that contains these cysts. *Trichinella* larvae can survive freezing when encysted in muscle tissue. Cooking meat thoroughly will kill the larvae and render them uninfectious. Black bears likely become infected via scavenging animal carcasses. All wild carnivores and omnivores should be considered as potentially infected with *Trichinella* cysts.

Baylisascaris transfuga is another roundworm carried by bears that can pose a human health risk. The adult worms are found in the intestine. Eggs are spread in feces and, similar to the more common species carried by raccoons, when the egg is ingested larvae can migrate to the brain and can cause neurologic changes such as a loss of balance, abnormal stance, or even blindness[83]. *B. transfuga* has not been reported in humans, but care should be taken to wear gloves or wash hands thoroughly following any interactions with live bears or bear carcasses.

Sarcoptic Mange in Eastern Bear Populations

Sarcoptic mange is a contagious skin disease that is caused by a mite. Sarcoptic mange mites are external parasites that are adapted to individual host species. Mites infect the skin causing itchiness, hair loss, and scabbing, and make the skin prone to secondary infections from bacteria and yeast. Depending on the host's response to these mites, the infection may be mild or severe.

Prior to the 1990s it was uncommon for black bears to be seen with clinical signs suggestive of sarcoptic mange, and bears were even less commonly diagnosed with mange. However, over the course of the last few decades both Pennsylvania and Virginia have seen an increased number of bears exhibiting signs of and diagnosed with severe infection of a specialized sarcoptic mite. It is now considered a common cause of black bear mortality in these states although it is not believed to limit population growth.

Wisconsin has not yet identified this mite in the state and efforts to minimize its introduction should be considered. Research efforts are ongoing to better understand how this mite is being transmitted between bears. Known methods of transmission are by direct contact or contamination of a hosts' environment. Other species could transmit the mite unknowingly as it can survive on a host it is not adapted to for a duration of up to 14 days; hunting dogs brought into

Wisconsin from areas where the mite is present thus are a potential source of introduction of mites to Wisconsin.

Toxins

In addition to pathogenic agents that black bears may be exposed to in Wisconsin, the possibility of unintentional exposure to toxins can occur. Hunting regulations allow for the baiting of black bears. Unfortunately, much of what we know about the health effects of food items utilized as bait is based on simple observation or research studies on domestic animals. Research on the specific effects of items normally used as bait on wildlife species, including black bears, is generally lacking. However, there is ample evidence to suggest that bears are susceptible to the toxic effects of chemicals found in chocolate. Michigan, Wisconsin, and New Hampshire have all identified theobromine in dead bear cubs at levels consistent with those known to be toxic to dogs. Work from New Hampshire has suggested that toxic levels of theobromine for bear are in the range of 21.8 – 110. 0 ppm, and for caffeine 4.0 – 5.1 pppm[65].

Rehabilitation

In Wisconsin, orphaned bear cubs can be rehabilitated by wildlife rehabilitation licensees who are specifically authorized to do so by the Department. Bear rehabilitation requires profound knowledge and experience, and the authorized licensees demonstrate skilled care in order to achieve successful rehabilitation and release bears with minimal potential for future human conflicts. A policy on 'dealing with reported orphaned black bear cubs' also provides guidance to the Department, and partners such as USDA Wildlife Services, to evaluate orphaned or potentially orphaned bear situations and respond accordingly.

Hunter Surveys

Managing bear hunters and their experiences are an important part of bear management in Wisconsin. Getting information directly from bear hunters allows for monitoring of participation, effort, interference, success, and measure hunter attitudes and satisfaction. Since 1998, bear harvest permit holders have been sent a hunter survey (about every 3 years) to glean insight and information on these topics and gather additional information on potential season frame works and management issues. Information provided by hunters affords insight and information critical to bear management and ensures hunter involvement into management decisions.

Below is a snapshot of some of this vital bear hunter information. Data assembled from Class A permit holder responses to frequent questions from 1998-2017; 7 survey years.

- 11.2% of permit holder participate in the dog training season (4.4-18.3%)
- 92.5% of permit holder participate in the hunt (78.2-97.6%)
- Active permit holders average 7.3 days afield
- Hunters hunt on public lands 43.7% of the time.
- 12.5% of bear hunters hunt an area because of known bear damage.
- Bait is the most commonly used method of hunting, 80.8%
- Dogs are used to pursue bears by 18.4% of hunters
- Guns are used by approximately 75% of bear hunters, the rest use bows and/or crossbows
- 24.8% of bear hunters said that "other hunters" interfered with their bear hunt
    - The most commonly stated "other hunters" were fellow bear hunters
- Active permit bear permit holders harvest a bear 57.7% of the time

- Bear harvest permit holder are generally happy with their bear season as on average 48% rate their hunt as “High” or “Very high”.

Registration

Mandatory registration of bears harvested by hunters is the single most important survey that is conducted on bears in the state. Information collected at registration provides managers with many biological and social parameters of bear harvest for each Bear Management Zone (BMZ):

- Total harvest
- Sex ratio of the harvest
- Access to teeth for aging purposes
- Method of take (dog or bait)
- Hunter permit success rates

While bear harvest rates are affected by many factors (weather, natural food sources, hunter behavior) they are also influenced by bear population size. There is likely a positive relationship to bear population and hunter harvest rates. Biologist monitor the hunter success rates in each BMZ closely at the end of every bear season to see if harvest meets with expected harvest and if adjustments need to be made in bear management.

Information collected on the sex and age at harvest are great sources of information about the status of the bear population. The teeth collected not only provide information on the age of the bear harvested but can also show the number of pregnancies a female bear has had prior to harvest. These data, along with the harvest data, are used in modeling the bear population.

Starting in the fall of 2015 hunters were no longer required to physically bring bears to a registration station to register their harvest but could either register it over the phone or online. These systems provide increased convenience for hunters and reduced cost and DNR staff time associated with bear registration. Some in-person registration stations continue to offer registration services by providing a phone or computer for hunters to complete their bear harvest registration electronically. Hunters are provided an envelope with instructions on how to extract and submit a tooth themselves. Hunter compliance with mandatory registration was monitored after switching to this electronic system in the fall of 2017. Hunters were sent surveys after the season, and by using an unmatched group technique, a hunter compliance rate was derived. While the compliance rate was very nearly 100%, the lower confidence limit on the estimate was 89.7%. Since many hunters wait 5 or more years for a bear and are likely hunting bears as a life time achievement it appears that complying with mandatory registration, even if not in person, is a high priority for the hunting public.

Section 3: Black Bear Management in Wisconsin, 2019 – 2029: A Plan for the Future

PROGRAM GOAL

Since the previous management plan was drafted in the early 1980s, black bear population size and distribution have both increased significantly in Wisconsin. As well, harvest management has evolved to include bear management zones and annual harvest quotas, new population monitoring and modeling tools have become available, bear hunter surveys have provided regular information on hunter satisfaction and perceptions, and the Wildlife Damage Abatement and Claims Program has been established to formalize approaches to addressing bear agricultural damage and nuisance issues. While the previous management plan is therefore outdated, bear management has remained an adaptive process, embracing these developments as they occurred such that decisions have continuously relied on the best information and tools available. This plan strives to define the current ecological and social status of Wisconsin’s bear management program, formalize information needs, and define a path forward that supports healthy bear populations while

minimizing negative bear – human interactions. The plan is intended to be adaptive, in the sense that defined objectives and strategies can be modified as appropriate given new information and/or management tools.

The goal of Wisconsin's bear management program is to:

Maintain a healthy and sustainable black bear population that fulfills the numerous ecological, social, and cultural benefits of bears while minimizing bear – human conflicts in order to promote and maintain a positive public image of black bears in Wisconsin.

To ensure this very broad program goal remains relevant to the WDNR and its conservation partners and is linked to on-the-ground management actions, this plan defines realistic and appropriate ***objectives*** for each of the varied components of Wisconsin's bear management program. ***Strategies*** are also defined that will provide decision-makers direction when striving to achieve plan objectives. Finally, to ensure the plan continues to focus and direct management actions over the next decade, ***products*** are defined for each strategy. These products identify specific information or processes necessary to implement a strategy. In essence, objectives define *what* needs to be done to achieve the program goal, strategies describe *how* to achieve the objectives, and products define tangible *action items* measuring progress toward implementation of strategies.

Objectives, Strategies, and Products
Objective A: Ensure a healthy and sustainable black bear population in Wisconsin.

Strategy A1: Continue mandatory registration and utilize registration data to inform population modeling efforts and support management decisions. Data provided via bear registration (including submission of a tooth sample) is critical to the development of accurate predictions of population size and trend. The age-at-harvest models currently used to estimate population size and determine appropriate harvest quotas rely on information regarding the age and sex composition of the bear population within each bear management zone. Registration of harvested bears is therefore critical to effective harvest management and in ensuring the ability to maintain bear populations at desired levels.

Product A1a: Maintain mandatory registration processes that are user-friendly and provide relevant bear population data. Registration systems and software are developed and maintained by contractors in communication with WDNR Bureau of Customer and Outreach Services staff. WDNR Large Carnivore Program staff will communicate regularly with Bureau of Customer and Outreach Services staff to ensure that the registration system continues to meet the needs of bear hunters and provide information important to bear management decision-making processes.

Product A1b: Maintain carcass tag requirements. Currently, hunters must possess a carcass tag while hunting, validate the tag immediately upon killing a bear, and affix the tag to the carcass if they leave it. These requirements assist law enforcement staff during routine patrol and investigation activities and should be maintained.

Product A1c: Periodically assess hunter compliance with registration requirement. Given the importance of data derived from annual harvests, and the role hunter success rates currently play in calculating permit levels, it is important that hunter compliance be high and stable. Periodic estimation of compliance rates (every 3-5 years) will ensure that managers have complete and consistent harvest data when making management decisions.

Product A1d: Annual summaries of harvest data, including total harvest, age ratios, and sex ratios, by bear management zone. WDNR staff will compile data relevant to quota-setting discussions and provide this information to WDNR Bear Advisory Committee members following completion of the harvest season each year, and as age data from the previous year's tooth sample becomes available.

Strategy A2: Manage bear populations at cultural carrying capacity within each bear management zone. Historically, zone-specific numeric population goals have been used as a target for bear population management decisions, and these goals are established in Administrative Code (NR 10.102[1][d]). However, establishing numeric goals that accurately reflect habitat suitability and biological carrying capacity is exceedingly difficult. As well, social constraints to bear population growth (e.g., agricultural damage, public intolerance, nuisance issues) vary through space and time, and it is difficult to respond to this variation yet maintain populations at or near established goals. Managing toward goals also may sacrifice long-term hunter opportunity, as it may lead to decisions to reduce or stabilize bear populations when further growth would be socially acceptable. Numeric population goals (or target ranges) may unnecessarily restrict decisions in a management arena where flexibility in annual quota-setting discussions would allow managers to maximize hunter opportunity and satisfaction while responding to social concerns.

Product A2a: Eliminate numeric population goals, and base annual harvest management decisions on data reflecting zone-specific cultural carrying capacity. It is recommended that WDNR eliminate bear population goals, and instead base zone-specific bear population management decisions (i.e., use quotas to increase, stabilize, or decrease the population) on annual data regarding (in no particular order of importance): 1) agricultural damage, 2) nuisance complaints, 3) hunter crowding or conflict, 4) hunter success, 5) hunter satisfaction, and 6) bear disease/health issues. Data regarding 1-5 are already compiled by WDNR and USDA-WS staff. The WDNR Bear Advisory Committee will be responsible for defining a threshold for each metric, beyond which constitute "unacceptable" levels that would indicate a management response is warranted. While each metric would be evaluated independently, decisions would be based on examination of data pertaining to all metrics. Research to better understand the factors contributing to bear hunter satisfaction will enhance the ability to incorporate this metric into management decisions, and such research is listed as a priority need below. While no annual monitoring data currently exist to allow disease or health issues to inform population management decisions, population density is known to influence disease transmission rates. Hence, inclusion of this metric provides managers the flexibility to respond should new disease threats (e.g., the scabies mite currently pervasive among black bears in Pennsylvania) suggest a population response is appropriate. Similarly, while it is difficult to define the "ecological role" of black bears, they are certainly an important component of healthy, diverse ecosystems and some level of abundance is necessary to allow their ecological role to be filled.

Product A2b: Definition of acceptable thresholds for agricultural damage, nuisance complaints, hunter crowding or conflict, hunter success, and hunter satisfaction. The WDNR Bear Advisory Committee should review all relevant data sources and define specific thresholds for each metric.

Product A2c: Annual summaries of nuisance/ag damage. WDNR and USDA-APHIS-Wildlife Services staff should consult and provide concise summaries of bear nuisance and agricultural damage each year prior to quota-setting discussions.

Product A2d: Annual bear hunter survey. Bear hunter surveys are currently administered to a random sample of bear hunters every third year. As data regarding hunter crowding and satisfaction will inform annual quota-setting discussions under the new population management framework, annual bear hunter surveys will be required and are recommended.

Strategy A3: Utilize hunting as the primary tool to manage black bear abundance and maintain the use of current tools as legitimate harvest methods. Effective harvest is central to achieving prescribed harvest levels (quotas) within zones, and hunter expenditures serve to both support conservation efforts (Figure 15) and stimulate local economies. Current harvest methods, including baiting and trailing with dogs, allow both high hunter selectivity and success (Figure 11), and have allowed quotas to be regularly achieved in most zones (Figure 8). Hunting, inclusive of bait and dogs, should be maintained both for the population management capabilities and nature-based recreational opportunity it provides.

Product A3a: Support development of ethical guidelines for hound hunting and develop outreach tools to increase the public's understanding of current harvest methods. Public antipathy toward hound hunting may engender campaigns or legislative efforts to curtail or eliminate the activity; this antipathy often arises in response to illegal or unethical behavior by a minority of hound hunters- especially if this behavior is communicated on social media. WDNR staff should support current partner-driven efforts to develop and promote guidelines for the safe and ethical use of hounds to pursue black bears. These guidelines will both promote responsible behavior on the part of current and new hunters and provide an effective tool to educate the public about hound hunting. Additional outreach tools should be considered that provide an honest and factual depiction of bear hunting and highlight its numerous social, economic, and management benefits.

Product A3b: Develop a repository for verified incidents related to bear hunting, baiting, and hound training. Currently, an effective response to public concerns about bear hunting is constrained by the lack of complete and timely data on the type, number, severity, and location of complaints that arise. Often, stories are related verbally, with no organized means to compile data. The WDNR Bear Management Committee should develop a simple, user-friendly, online tool for WDNR staff to document all verified incidents related to bear hunting, including poor hunter behavior, sick or injured bears, and trespass events. The database thus created will assist with the identification of problem areas or issues and allow appropriate responses (including outreach and/or increased patrol by law enforcement staff) to be developed and implemented.

Product A3c: Support collaboration between agency staff, land managers, and constituent groups to identify illegal and unethical behavior and develop means to address it. The majority of bear hunters are ethical practitioners of a legal activity and are very passionate about bear hunting and its future. However, the minority of hunters who fail to act responsibly in pursuit of bears can garner negative public attention, color the non-hunting public's perception of bear hunting, detract from the many social, economic, and population management benefits of current bear season frameworks, and conflicts with other users can confound land manager or agency attempts to achieve multiple-use land management goals. As conflicts arise, the WDNR Bear Advisory Committee should work to foster discussions among relevant member groups to identify specific issues and pool resources to address them through focused outreach, policy, or law enforcement efforts. As the Committee includes staff and volunteers from multiple organizations and agencies, it is well-

suited to identify and address issues as they arise and develop collaborative solutions to address them.

Strategy A4: Utilize population models to predict bear population trends and responses to harvest and other management actions.
Population assessment that produces data relevant to management decisions is foundational to the effective management of Wisconsin's bear population, and Wisconsin invests significant resources to ensure decisions are based on sound scientific data. Mathematical models utilize population data to effectively estimate population status and trajectory, and the response to varying harvest levels. As there are numerous population models available, and as new analytical techniques are developed, it is important that WDNR scientists periodically assess model performance, explore the utility of new approaches as they are developed, and define data needed to support accurate and precise model output.

Product A4a: Annual prediction of zone-specific population size, trend, and impacts of varying harvest levels during the quota-setting process. Given the low population growth potential of black bears, the high demand for bear hunting opportunity, and the potential for negative human-bear interactions, sound population management decisions are critical. As regulating harvest levels within BMZs is the primary means of managing bear abundance, annual zone-specific quota determinations need to be made with diligence. WDNR staff should therefore continue to summarize and present information on population size, trend, and the likely impacts of varying harvest levels to WDNR Bear Advisory Committee members during the quota-setting process. This will ensure that bear management decisions continue to be based on the best available science.

Product A4b: Annual scientific review of model performance, information needs, and new quantitative tools. The current age-at-harvest models rely on data regarding the total harvest and age/sex composition derived from the sample of bears harvested during the annual hunting season. Just as these models provide significant advantages over models previously used in Wisconsin, new population models or other assessment tools may become available in the future. Scientists with the WDNR Office of Applied Science should continue to evaluate both the performance of current models and the utility of new models and other population assessment tools as they are presented in the scientific literature. Scientists should also identify data and/or refinements to the data collection process, needed to support or improve the performance of current or new models so that bear registration, tooth aging, or other data-collection processes can be refined as necessary.

Strategy A5: Validate and calibrate bear population model via periodic estimation of bear population size. MacFarland's work[37] revealed the risks associated with harvest management decisions that are based solely on model projections and population indices. While models importantly provide the ability to predict future population size and estimate responses to harvest, they are estimates only and will always be prone to some level of uncertainty. Inherently, the precision of predictions decreases the further out you move from a known value. Decreased precision results in lower certainty which, in turn, translates into riskier decisions. These risks obviously become more pronounced the longer decisions remain based on model output and are not linked to an accurate population estimate.

Product A5a: Development of protocol and implementation of periodic population estimate (see research product E1a, below, for description).

Strategy A6: Evaluate current Bear Management Zones and alternatives to balance bear population goals with hunter opportunity and human – conflict issues. Since bear management zones were first utilized in 1987, they have provided managers the ability to establish population goals and harvest quotas that address variation in habitat quality, levels of agricultural damage and nuisance issues, and public tolerance. While zone structure has remained fairly stable since that time (Figure 4), one major change did occur in 1997 when zone D (originally named zone A1) was created from the western portion of zone A, in an attempt to focus harvest in the new zone to address high levels of agricultural damage and nuisance issues. However, increasing harvest permits in this zone led to increased hunter effort in the norther portion of this zone, which has more forest cover and greater availability of public land whereas most of the damage and nuisance issues were in the southern portion, where there is more agriculture. As well, the current zone structure may not support adequate discussions of bear management in southern Wisconsin, given spatial variation in habitat quality across this zone. Reviewing the effectiveness of the current zone structure in achieving the program goal was an important component of the bear plan revision process.

Product A6a: Revise Bear Management Zone structure to align population management decisions with spatial variation in habitat quality and negative human-bear interactions. This plan recommends adjusting zone boundaries to address difficulties in addressing agricultural damage and nuisance issues in zone D. Given similarities in forest cover and public land availability, the northern portion of zone D should be attached to zone A (Figure 21). The remaining portion of zone D would therefore be more homogenous with respect to land use and allow greater precision when attempting to manage bear populations to address human-bear conflict issues.

Occupancy modeling by MacFarland[37] also revealed significant variation in bear habitat suitability across zone C (Figure 2). The northcentral portion includes relatively more forest cover and public land than the remainder of zone C. The southwest portion of the zone contains little public land, but relatively more forest cover than the southeast. Human densities also increase substantially in the southcentral and southeastern portions of the zone. Therefore, the opportunity exists to consider varying approaches to bear management across zone C, and to proactively manage observed range expansion (Figure 3) into the southern part of Wisconsin.

This plan recommends zone C be divided into three zones (Figure 21), to achieve a higher-resolution approach to bear management that embraces variation in habitat suitability, land use, and human density. Decisions regarding bear abundance in zones C and E would be made in accordance with Strategy A2, above, so that "acceptable" levels of bear density in accordance with the idea of cultural carrying capacity might be identified over time. As mentioned, a 2018 public survey[60] has indicated that the majority of Wisconsin residents are willing to live near bears, and more would like to see local bear numbers increase than decrease (although the majority support maintaining present levels of abundance). Given that most southern Wisconsin residents lack experience living with bears, however, proactive educational and outreach efforts will be important; such efforts are discussed below. With relatively little suitable habitat and high human densities in the proposed zone F, management will emphasize allowing local control over bear range expansion by ensuring ready availability of harvest permits.

The new zone structure and approach to bear population management provides exciting new opportunities to specifically address long-standing recognition of bear range expansion in Wisconsin. The goal of allowing bears to achieve cultural carrying capacity in zones C and

E, and the metrics that will be utilized to define this point (Strategy A2)- including monitoring agricultural damage and nuisance levels- will ensure future management decisions in these areas are informed by impacts on residents. As bears are still relatively rare in zone E, it will likely be many years or decades before populations build to the point where viable assessments of cultural carrying capacity would be possible. This affords managers time to support potential long-term bear population growth in zone E with proactive outreach efforts to educate citizens about black bears and how to live with them. It will also allow time for the WDNR Bear Advisory Committee to develop new tools as needed to address agricultural damage and nuisance complaints in the region (e.g., large parcels of public land on which to release translocated bears are generally not available).

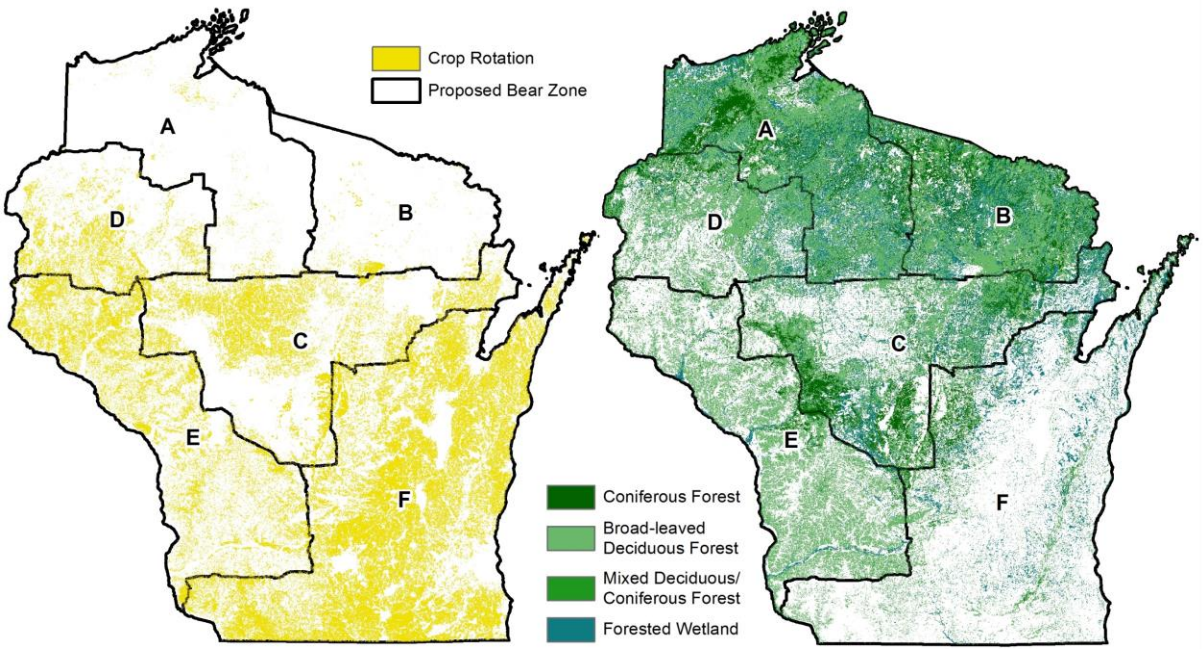


Figure 23. Recommended bear management zones A – F, in relation to Cropland (yellow) and forest cover (green).

Table 5. Size, % forest cover, and % public ownership of recommended BMZs A-F.

BMZ	Size (mi^2)	% Forest	% State	% County	% Federal	% MFL Open/VPA	Total % of BMZ with Public Access
A	9,363	74.7	9.3	17.9	14.4	9.7	51.2
B	5,948	77.8	12.4	14.3	17.4	9.2	53.3
C	9,490	46.3	4.5	7.0	0.7	1.7	13.9
D	4,873	50.7	4.3	10.2	0.2	2.5	17.1
E	9,497	37.9	3.2	0.2	1.3	0.7	5.3
F	16,908	18.7	3.8	0.1	0.5	0.3	4.6

Product A6b: Maintain current season frameworks in new zones (C, E, F), with the addition of hound hunting in zone C. While the new zone structure in southern Wisconsin allows finer-scale population management that better reflects spatial variation in suitable habitat, public land access, and human densities, it also provides the opportunity to review season frameworks within new zones.

Strategy A7: Protect and monitor bear health.

Product A7a: Work with WDNR Wildlife Health staff to identify current threats to bear health and develop monitoring protocol. Maintaining a healthy bear population extends beyond addressing factors that have demographic impacts on survival and/or reproduction. Factors may have sublethal effects on bear health that should be identified and addressed. Currently, issues have been raised regarding the potential health impacts of the documented high consumption of calorie-rich baits and the potential presence of theobromine, a substance found in chocolate, at bait sites. Toxic effects of chocolate may also extend to other wildlife species. As well, while no current diseases appear to be impairing black bear population growth in Wisconsin, endemic diseases may increase in virulence, or new diseases (e.g., via introduction of the mite currently causing scabies in Pennsylvania bears) may be introduced. Monitoring protocol should be developed and implemented in consultation with WDNR Wildlife Health staff that would provide data regarding the presence and impact of potential threats to bear health in Wisconsin.

Product A2b: Develop outreach documents for hunters, to educate them about existing or potential health threats. Bear hunters are particularly well positioned to provide information on the presence of disease or other health risks in Wisconsin's black bear population. Outreach material should be developed and distributed that describes current threats, including symptoms to look for in the field. Material should include a warning to hound hunters that hunt in other states (e.g., Pennsylvania or West Virginia) that the mite causing scabies-associated bear mortality in Pennsylvania can survive and be introduced to Wisconsin on hunting dogs.

Product A2c: Identify prevalence of shot pellets or other projectiles in bear carcasses. Informal reports from several meat processors suggest that butchering occasionally reveals the presence of shot pellets or other projectiles in harvested bears. Assumedly, this material comes from citizens shooting at bears to address nuisance situations. Understanding the prevalence and distribution of shot pellets or other projectiles in harvested bears would support more effective and targeted education and outreach to citizens to reduce the occurrence of this activity.

Strategy A8: Communicate bear habitat management guidelines to land managers. Though black bears are considered habitat generalists, specific habitat types and attributes are important during their life cycle, and bear populations are known to be impacted by human development and forest fragmentation. These habitat elements and considerations should be enumerated and communicated to public land managers and private landowners, so that black bear habitat needs can be considered during land management planning processes.

Product A8a. Development of black bear habitat management guidelines for Wisconsin. The WDNR Bear Advisory Committee should develop a guide, or similar document, that summarizes key habitat features of important to black bears (as identified under Habitat and Spatial Requirements, above) and impacts of forest management, as well as address the impacts of forest maturation, human development, and forest fragmentation on habitat suitability.

Strategy A9: Ensure communication with and among WDNR Bear Advisory Committee members is timely and sufficient to support representative input and effective bear management decision-making processes. The WDNR Bear Advisory Committee is responsible for developing recommendations regarding bear management in the state. Members include

WDNR staff and representatives from relevant constituent groups. Members need to be provided data and information in a timely fashion so that they can confer with their organization's leadership and/or members and ensure their interests are represented, and be kept apprised of policy or issues of relevance to bear management in the state.

Product A9a: Biennial meetings of WDNR Bear Advisory Committee. The Committee should meet at least 2 times per year. One meeting should be scheduled for November/December and should include development of zone-specific harvest quotas for the following bear season. Another meeting should be held to allow members to continue addressing the objectives, strategies, and products contained in this management plan, as well as discuss new bear research or issues relevant to black bears and bear hunting in Wisconsin. Additional meetings may be schedules as needed, and meeting format (in-person, phone, video conference) should respect the time/travel demands on committee members.

Product A9b: Transparent and timely sharing of data from annual harvest summaries, population models, permit drawing processes, and hunter surveys. To ensure Bear Advisory Committee members can adequately review, consider, and share information with their organizations, WDNR staff should strive to provide information as far ahead of time (ideally, >1 week) as possible.

Objective B: Maintain high levels of hunter satisfaction. Bear hunting has become very popular in Wisconsin with high demand for permits, and population management efforts rely heavily on hunter harvest. Decisions regarding population management, season frameworks, and regulations therefore should consider impacts on hunter satisfaction. Bear hunter survey information from the 2014 and 2017 Bear Hunter Surveys suggest nearly as many hunters reported their overall hunt quality as "fairly low" or "very low" (2014: 31.4%; 2017: 33.3%) as did the number reporting hunt quality as "high" or "very high" (2014: 32.1%; 2017: 35.0%). This suggests that the factors responsible for creating a satisfying, quality hunting experience deserve greater attention by managers so that potential season framework adjustments might be made to enhance the experience for bear hunters in Wisconsin.

Strategy B1: Evaluate hunter satisfaction and crowding using Bear Hunter Survey data and recommend modifications to season structure or permit levels as appropriate. The Bear Hunter Survey provides significant information regarding hunter perceptions of regulatory frameworks and bear hunting opportunities in Wisconsin. In particular, this survey allows hunter satisfaction and perception of crowding to be quantified. Further, other information contained in this survey (hunting method, land type hunted, etc.) allows covariates of potential importance to hunter satisfaction and crowding to be evaluated. This information provides managers the opportunity to explore opportunities to adjust season frameworks or permit levels to sustain a quality experience for bear hunters in Wisconsin.

Product B1a: Annual review of Bear Hunter Survey results related to hunter satisfaction and crowding. WDNR staff should compile Bear Hunter Survey data regarding hunter satisfaction and crowding annually (see Product A2c, above), and present it to WDNR Bear Advisory Committee members for consideration. Interpretation of survey data will be enhanced by increased understanding of the link between management actions and hunter satisfaction, as emphasized by Product E2, below.

Product B1b: Explore means of enhancing communication with bear hunters and other citizens interested in black bears. Increased communication would lead to management decisions regarding season frameworks that are more responsive to hunter and public

sentiment. Attendance by WDNR staff at relevant partner organization (e.g. the Wisconsin Bear Hunters' Association) meetings, or development of annual "Town Hall"-style meetings would provide opportunities to both update interested citizens on contemporary black bear issues and identify specific areas of public concern.

Strategy B2: Monitor and report wait times, and monitor hunter acceptance of wait times. Most respondents to a 2018 survey[47] of bear hunters felt that 3-5 years is an appropriate time to wait for a bear harvest permit. Not surprisingly, those who prefer to hunt in zones A, B, and D (where hunters can expect a permit every 8, 11, and 5 years, respectively) therefore feel that current wait times are too long. However, respondents did not support regulatory changes that would reduce wait times if they also reduced hunter success[47]. Reducing wait times would require either 1) reduced demand (applicants) for permits or 2) higher permit availability driven by either higher quotas or lower hunter success rates. As hunters have expressed satisfaction with the tradeoff between long wait times and success, quotas are set based on population management objectives, and demand is driven by hunter interest, there seems little ability to reduce wait times through regulatory changes. As hunters are also strongly tied to particular zones due to land access or social connections[47], attempts to shift demand spatially (e.g., encouraging hunters to apply for a zone with a shorter wait time) would also likely not prove fruitful.

Product B2a: WDNR staff should continue to determine wait times (minimum preference points needed) in each BMZ annually and share this information with bear hunters and the WDNR Bear Advisory Committee. Although reducing wait times is challenging, monitoring wait times following the annual permit drawing process will be important. Ensuring bear hunters are aware of zone-specific wait times via dissemination of this data in reports and media releases will ensure hunters are able to adequately evaluate their bear hunting opportunities in Wisconsin. The WDNR Bear Advisory Committee should also identify zone-specific wait times annually and revisit regulatory options to reduce wait times should hunter concerns or frustrations increase.

Objective C: Address human – bear conflict issues.

Strategy C1: Collect annual summaries of bear conflict data by resource type, year and by bear management zone.

Product C1a: Summary of Agriculture and Nuisance bear. USDA-WS and county WDACP staff will continue to collect bear conflict data . Data management systems will be updated to reflect potential new bear management zones. These data will be provided to the WDNR Bear Advisory Committee annually and others as requested.

Product C1b: Incorporate USDA-WS data into WDNR WDACP wildlife damage database. USDA-WS and WDNR will work towards integrating bear conflict data for both agriculture damage (already occurring to some extent) and nuisance and property conflict data into the database to increase the efficiency of data acquisition and accuracy pertaining to bear conflict management. Data will include finer scale spatial locations of bear conflict management.

Product C1c: Appraise all bear damage. USDA-WS and county WDACP staff will appraise all bear damage to agriculture crops that are enrolled and eligible for compensation in the WDACP. Appraising will not cease after the compensation cap has been reached.

Strategy C2: Emphasize current tools and the Wisconsin Black Bear Response Guidelines for DNR staff document for addressing issues.

Product C2a: Incorporate the Grantsburg, WI pilot project nuisance bear management program into Wisconsin Black Bear Response Guidelines for DNR staff document. When appropriate a summary of the Grantsburg, WI pilot project for nuisance bear management will be added to the Response guidelines (Appendix A) as a tool for managing community-wide bear conflict issues.

Product C2b: Maintain a fully integrated bear conflict management program that emphasizes technical assistance while allowing for translocation and lethal control of bear when needed. The current bear conflict program will continue to function in the same capacity as it is currently operating under.

Product C2c: Allow liquid scents to be used on agriculture damage bear shooting permits. It was the consensus of the BAC that permittees should be allowed to use liquid scents under the authority of shooting permits for agriculture bear damage. Scents need to be removed at the end of shooting hours each day as to not attract additional bear to damage locations. Food based attractants, baiting of bear, should not be authorized on agriculture damage permits.

Product C2d: Continue to use trap monitors and expand their use. The use of trap monitors will continue to be used for agriculture conflicts. The use of trap monitors will continue to expand as funds allow for acquisition of additional monitors. Bear conflict staff will continue to research the use of this technique and adopt more affordable units into the program if they become available to increase the efficiency of this program and reduce requirements of producers checking bear traps.

Product C2e: Proactive bear shooting permit for agriculture bear damage. WDNR staff are analyzing data to determine what level of damage would warrant the issuance of proactive bear shooting permits to agriculture producers experiencing chronic bear damage.

Product C2f: Incorporate new technology into bear conflict management. WDNR and USDA-WS will continue to remain engaged in searching for new techniques, tools, and technology that will increase the efficiency of bear conflict management, service delivery, and ways of reducing the need to translocate bear.

Strategy C3: Increase public and agency awareness of potential bear – human conflicts and safety issues, and provide information on abatement techniques.

Product C3a: Issue press releases and utilize social media to inform and educate the public regarding bear conflict management. The WDNR will continue to issue press releases to the public regarding bear conflicts, techniques to reduce conflicts, and contact information for USDA-WS for assistance with bear conflicts. Outreach efforts should also explore educational opportunities through social media.

Product C3b: Continue to print, and update as needed, the "Living with Black Bear In Wisconsin" pamphlet. The WDNR will continue to make this pamphlet available online and

at DNR Service Centers, at State Parks, and upon request to individuals looking information on coexisting with black bear.

Product C3c: Provide training to DNR staff regarding bear conflict management. Bear damage and nuisance conflict management topics should be included in the training curriculum for new Wildlife Biologist and Warden. This important for providing a consistent response to bear complaints.

Strategy C4: Ensure timely and effective response to safety threats and reports of bear damage.

Product C4a: Develop bear conflict management plans for farms with a chronic history of bear damage. The WDNR and USDA-WS along with the county WDACP technician and producer will develop an annual plan for chronic farms that will outline abatement techniques on a per field basis based on field access, history of bear damage, the distance between the field and farm, and other issues affecting the efficiency and efficacy of abatement techniques.

Product C4b: Maintain toll-free bear complaint reporting hotlines. Each USDA-WS office will continue to maintain toll-free hotline numbers for citizens to report bear complaints. These lines will be monitored 7-days per week to insure quick and efficient response to bear conflicts.

Product C4c: USDA-WS will maintain staffing state-wide to respond to bear conflicts. USDA-WS will maintain staff that are trained and equipped with the necessary tools to respond to bear complaints throughout Wisconsin.

Strategy C5: Maintain WDACP and nuisance bear conflict services, and update agreements with USDA-APHIS-Wildlife Services and Counties participating in the WDACP as necessary.

Product C5a: Maintain cooperative agreement between WDNR and USDA-WS. The WDNR and USDA-WS will continue to work cooperatively to fulfill bear conflict management in Wisconsin. USDA-WS will provide services for bear conflict as directed by the WDNR and as detailed in the *Black Bear Response Guidelines for DNR Staff* (Appendix A). Agreement will be reviewed annually by both parties.

Strategy C6: Address nuisance issues in accordance with DNR policy.

Product C6a: Emphasize Black Bear Nuisance Guidelines document. Bear conflict management will follow procedures outlined in the *Black Bear Response Guidelines for DNR Staff* (Appendix A). If situations develop that are not covered in this document, USDA-WS will consult with the WDNR regarding response options. Guidelines should be reviewed periodically and reflect the most current management options and processes for staff responding to complaints about black bear.

Objective D: Identify appropriate communication strategies and outreach tools to increase public understanding of black bear ecology, the ecological, cultural, and economic benefits of black bears, and means of mitigating bear – human conflict.

Strategy D1: Utilize public surveys and social science literature to identify and address sensitive issues surrounding bear management. The 2018 public survey provided significant

information regarding the public's appreciation for, tolerance of, and management preferences for black bears. Such information importantly helps direct and/or support management decisions regarding bear densities, range expansion, and nuisance/damage issues.

Product D1a: Implement public surveys or other tools to evaluate public opinion, as the need for such information arises. WDNR social scientists should be consulted regarding the utility of similar work in the future, especially as bear population increase in new areas of the state. Future surveys should be designed to identify public preferences for various management actions (lethal control of nuisance bears, translocation, etc.) and also assess the impact of local bear population trends and personal experience with bears/bear damage on tolerance.

Product D1b: Transparent and timely sharing of data related to the annual permit drawing, harvest, population models, and hunter surveys with hunters and the general public. Given the high level of public interest in black bears, information related to important aspects of black bear management should be disseminated in a timely fashion. Method of delivery (e.g., news release vs social media) should be appropriate and ensure high exposure to interested citizens.

Product D1c: Continue to compile harvest, hunter survey, and population modeling information. Reports summarizing this information should continue to be prepared and made available to the general public via the WDNR Wildlife Surveys Report web page.

Product D1d: Enhance transparency and accessibility of information on the WDNR black bear web pages. The abundance of information regarding black bear ecology and management has increased the complexity of the WDNR bear-related web pages. These pages should be reviewed and updated as appropriate to ensure that information of relevance to hunters and the general public is easy to locate and clearly summarized/presented.

Product D1e: Ensure the Wisconsin Black Bear Management Plan, 2019 – 2029, is widely available to the public. This document provides a comprehensive overview of black bear ecology and management in Wisconsin and summarizes objectives that will guide decision-making processes regarding black bears in the coming years. It therefore provides an effective outreach tool to increase public understanding of and appreciation for black bears, and will hence empower citizens to make informed decisions regarding bears locally and through public input processes (e.g., the Wisconsin Conservation Congress,). The plan should be posted on the Wisconsin DNR website, and hard copies should be made available at local WDNR offices and service centers.

Strategy D2: Inform southern Wisconsin residents about the ecology of black bears, benefits of the bear resource, and how to coexist with bears on the landscape, targeting areas where bear populations may increase in the coming years. Further black bear range expansion and population increase in Wisconsin is likely. Citizens with little or no experience living near bears may not be aware of damage abatement techniques, be unaware of the benefits of the black bear resource, or express naive fears or concerns about bears. Negative public reaction may reduce cultural carrying capacity, hinder range expansion, and reduce hunting opportunities associated with bears.

Product D2a: Communications plan designed to educate southern Wisconsin residents about black bears. WDNR Office of Communications staff should be consulted regarding

the development of a communications plan that will establish a timeline and process for disseminating information to the public. The plan should target areas of southern Wisconsin where increases in bear numbers are likely, and present information designed to familiarize residents with black bears and means to coexist with them.

Product D2b: Inform southern Wisconsin farmers about black bears, and increase awareness of the abatement and control options that are available. As black bears increase in southern Wisconsin, crop and livestock depredations will occur. While crop damage is expected to be more diffuse on the landscape given the availability of corn, WDNR staff should develop outreach efforts aimed at ensuring farmers are able to identify bear damage and are aware of the abatement and control options that are available through the WDACP.

Strategy D3: Review existing programs for minimizing bear nuisance and damage issues in municipalities. Black bears can be attracted to towns and villages by the scent and availability of food, occasionally leading to nuisance, damage, or human health and safety issues. These concerns can lead to costly interventions that may lead to lethal control of the offending bears and/or engender negative public views of bears. Campaigns to educate residents about bears and implementing practices to reduce human – bear conflict have been successful; notably, the "Bear Smart" campaign (www.bearsmart.com). Such campaigns might inform proactive means of similarly addressing issues within Wisconsin's bear range, potentially reducing costs associated with bear management and maintaining the high public acceptance of black bears[60].

Product D3a: Review of existing efforts to minimize bear conflicts in municipalities. WDNR staff should review current campaigns to create "bear safe" communities and present the WDNR Bear Advisory Committee with a summary and options for implementing similar efforts in Wisconsin.

Product D3b: Increase communication with local law enforcement agencies regarding nuisance bear issues. Local law enforcement staff are often the first point of contact for citizens with a nuisance bear complaint, but these staff may not have the training or experience necessary to identify appropriate response actions. Outreach to local law enforcement agencies that increases staff understanding of nuisance bear issues would be beneficial. Local agencies should be instructed to contact USDA-WS staff to resolve bear nuisance issues.

Objective E: Identify important information needs and conduct research as necessary to address issues impacting black bears and hunting opportunity in Wisconsin.

Effective management of any wildlife population requires a solid understanding of the species' ecology, population dynamics, response to population stressors (e.g., harvest), interactions with other species, and impacts on human interests. Wisconsin has a rich history of using wildlife research to support effective black bear management (see Box 3). However, management must continually adapt to shifting biological realities and social constraints, and new information is needed to inform management decisions. Below, a number of relevant research projects are outlined that will allow managers to address contemporary black bear management issues.

Strategy E1: Improve the ability to estimate black bear populations and their response to management actions.

Product E1a: Periodic noninvasive genetic mark-recapture estimation of bear population size. While population models allow annual prediction of population size and response to

harvest within bear management zones, these models must be calibrated periodically to ensure that modeled starting population size approximates the actual number of bears on the landscape. Wisconsin has successfully utilized mark-recapture population estimation procedures to calibrate population models, and such estimates will continue to be necessary to ensure management decisions are based on sound population data. Recommended frequency of these estimates (annual estimates are cost-prohibitive and may be unnecessary) will be determined by WDNR Office of Applied Science staff in consultation with members of the WDNR Bear Advisory Committee.

Product E1b: Explore independent data sources to calibrate current bear population models. The current population model might be refined via inclusion of additional sources of population and demographic data. WDNR Office of Applied Science staff should identify potential data sources and evaluate their ability to calibrate models.

Product E1c: Develop independent estimates of fecundity and cub survival to support bear population models. Population size estimates derived from current models are sensitive to estimates of litter size and cub survival. However, current estimates are based on historic studies in Wisconsin and/or research conducted elsewhere, and there are indications that litter size may be increasing in Wisconsin[69]. Direct estimation of litter size and cub survival would increase the accuracy of model predictions and lead to greater confidence in harvest management decisions. To foster broader understanding of the factors influencing cub survival, future studies should include cause- specific estimates of both natural (e.g., predation by wolves) and human-caused (e.g., roadkill) mortality.

Product E1d: Effects of baiting/bait consumption on bear demographics and health. Baiting of bears is legal in Wisconsin from April 15th – August 31st, with no limits on the number of bait sites individual hunters can establish. Recent research conducted in northcentral Wisconsin suggests that >40% of the black bear diet may be composed of bait, and concerns exist that this may have demographic (e.g., increased litter size/survival) or health (see Season Frameworks section, above) consequences for bears in Wisconsin. Better understanding the potential impacts of bait consumption on bears will support science-based decisions regarding current season frameworks.

Product E1e: Develop a means of assessing spatial and temporal variation in natural food abundance. Annual variation in the availability of hard (e.g, nuts) and soft (e.g., berries) mast has demographic impacts on a wide array of wildlife species. Acorn production in particular has been documented to influence black bear movements[21,22], cub and yearling survival[86], and reproduction[87], although dietary plasticity may mitigate these effects if alternate foods (e.g., bait, garbage) are available[21]. Altered movement patterns by bears in response to natural food availability can also influence hunter success and harvest[53]. Regional indices to mast abundance have become useful tools to explain variation in wildlife demographic and harvest parameters[53,88], and would similarly enhance our ability to understand black bear habitat use, demography, and harvest characteristics in Wisconsin.

Strategy E2: Improve the efficacy and efficiency of bear damage and nuisance management.

Product E2a: Define the movement and behavior of translocated bears. Translocation is a critical component of Wisconsin's response to black bear agricultural damage and nuisance issues. Though recent research has suggested that only 4% of bears translocated from agricultural fields in Wisconsin are subsequently recaptured near those fields, it is unknown whether this indicates they are not returning to the area or are simply less likely to be

recaptured following translocation. Evaluating the movements and behavior of translocated bears will allow evaluation of this important abatement tool, and enhance our ability to directly address bear nuisance and damage issues.

Product E2b: Evaluate the effectiveness of current abatement measures on long-term ag damage issues. Wisconsin has many years' worth of information regarding bear agricultural damage, and abatement responses to that damage, for individual farms. Hence, data is available to analyze the impacts of various abatement strategies (translocation, shooting permits) on subsequent damage levels. This information would enhance the effectiveness and efficiency of the bear damage program.

Product E2c: Evaluate the distribution of WDACP program expenditures among enrollees. Agricultural damage caused by bears is not uniformly dispersed throughout bear range; particular areas (e.g., Sawyer and Rusk counties) tend to have higher levels of damage and hence require greater program investment in abatement measures and compensation payments. Evaluating the distribution of expenditures among bear damage enrollees may both improve our understanding of the landscape factors contributing to high levels of bear damage and support refined means of addressing chronic bear agricultural damage issues.

Strategy E3: Evaluate social and economic issues related to black bears and black bear hunting in Wisconsin.

Product E3a: Evaluate methods for reducing hound depredations by wolves and educate hunters about means to minimize wolf – hound encounters. Wolves were responsible for the deaths of 19 hounds per year, on average, from 2008 – 2017, with a high of 41 hounds killed in 2017. Evaluating current (e.g., wolf caution areas) and new means of reducing wolf – hound encounters would be beneficial. Educating hunters about means of identifying wolf use in their hunting area (e.g., trail cameras on bait sites), as well as continuing to promote wolf caution area maps likely provide the best opportunities to minimize encounters and protect hounds.

Product E3b: Develop a method for quantifying hunter satisfaction and assessing how it is influenced by management actions. Ensuring a quality experience for bear hunters is an important consideration as season frameworks are established, and is especially important given that some hunters wait >10 years to receive a harvest permit to hunt in Wisconsin. Annual bear hunter surveys (see product A2d) will provide significant information about the motivations, behavior, and experience of bear hunters in Wisconsin. Identifying factors important in determining hunter satisfaction will allow season frameworks to be modified to enhance the bear hunting experience in Wisconsin.

Product E3c: Develop an economic assessment of black bears and black bear hunting in Wisconsin. Black bears are emblematic of the Northwoods of Wisconsin and are part of the natural resource base that attracts tourism dollars to the area. Expenditures by bear hunters (e.g., lodging, food, gas) also help support local economies. Estimation of the direct and indirect economic impact of black bears on Wisconsin's economy would inform future policy, budget, land management, and regulatory decisions of relevance to black bears and the tradition of black bear hunting.

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Wisconsin Black Bear Response Guidelines for DNR Staff

This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

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Introduction:

Wisconsin has a thriving black bear population. The primary range is in the northern 1/3 of the state but bears are expanding their range into the central and southern counties. Human-bear conflicts have increased with this expanding population. Bears have potential to threaten crops, apiaries, fruit trees, campgrounds, livestock, buildings, and other property. The Wisconsin Department of Natural Resources and partners receive hundreds of complaints annually about black bears. The Department attempts to minimize human/bear conflicts by explaining ways to coexist with black bears, controlling bear populations through hunter harvest, and providing direct assistance for some bear complaints. These guidelines assure that the Department's response to black bear damage and nuisance situations is fair and consistent, yet allow discretion for local circumstances.

Bear Management Responsibilities:

The Wisconsin DNR – Bureau of Wildlife Management has primary responsibility for the management of black bears in Wisconsin. The Wisconsin DNR has entered into a cooperative services agreement with USDA- Wildlife Services (USDA-WS) to assist with bear complaints. The Wisconsin DNR – Bureau of Law Enforcement may also respond to nuisance bear complaints when DNR-Wildlife Management or USDA-WS are unable to respond. Most routine complaints are handled by providing technical advice or through live trapping and relocation. More complex or serious incidents are best solved with coordination among DNR wildlife managers, conservation wardens, USDA-WS staff and local law enforcement officials.

The appropriate Tribal entity has responsibility over all bear management activities on lands owned or managed by the tribal entity within Indian Reservation boundaries. Bear conflicts occurring on properties that are within reservation boundaries but owned by non-trial entities will be managed by the Department.

Bear Incident Response Ratings:

The following rating system has been created so that bear complaints can be placed in a general category based upon an assessment of the complaint. This system will help the DNR to be to consistent in the application of management actions throughout the state. It is understood that not all bear complaints will fit neatly into a single category. These situations call for judgment on the part of DNR staff and USDA-WS. Upon receiving a report of a bear incident, DNR and USDA-WS should classify the situation into one of the following categories.

Level Critical – *Bear has attacked or injured a person. An immediate response and site visit is required. Response at this level may require implementation of the Incident Command System (ICS).*

Level 1– *The bear is an immediate threat to human health and safety. These incidents require an immediate site visit and the bear may need to be euthanized. Examples of these situations include:*

- *Bear has entered a human occupied dwelling and may or may not remain on site*

- *Bear is sick or injured and unable to leave the area and poses an immediate threat to human health and safety*
- *Bear is in an urban area and has no feasible way of escaping*
- *Bear is displaying aggressive behavior towards people (beyond simply bluff charges or jaw popping); bear is unafraid of people*
- *Bear is at a camp-ground or resort and has entered tents; bear is being bold and persistent and difficult to haze.*

Level 2 – *Level 2 incidents have the potential to escalate into a human health and safety concern. These incidents typically do not require an immediate site visit. Non-lethal or lethal control may be implemented based on the situation. Examples of Level 2 Incidents include:*

- *Bear has caused major property damage by damaging a home and or damaged or entered other un-occupied structures (barn, sheds, etc), but is no longer on-site*
- *Bear is observed frequently entering a campground during the day and/or bear is raiding camp sites*
- *Bear is habituated to people and observed during the day; bear is reluctant to leave location but is not aggressive (complainant has complied with removing possible attractants).*
- *Bear is sick or injured but is not posing a human health and safety threat (is able to move, escape into woods, etc.)*
- *Bear is in an urban area where other residents continue feeding birds and subsequently attracting bear*
- *Bear has injured or killed a pet/companion animal*

Level 3 – *Bear has caused minor property damage. These incidents generally do not require a site visit and can often be handled by providing technical advice/guidance over the phone. Examples of Level 3 Incidents include:*

- *Bear has damaged bird feeders*
- *Bear have knocked over garbage cans or are feeding in dumpsters*
- *Bear are present in captive deer farms utilizing deer feed (no verified depredations)*

Level 4 –*Bear is reported exhibiting normal behavior and is not considered a threat to public safety or personal property. A site visit is not needed and these incidents should be handled by providing technical advice/guidance over the phone. Examples of Level 4 Incidents include:*

- *A bear observed walking through a back yard*
- *A bear is reported crossing a road*

Response to Nuisance Bears:

The DNR will take the lead on all "Level Critical" conflict management responses. Whenever possible, all other bear complaints (level 1 - 4) should be directed to the appropriate USDA-WS office for screening and determination of response level rating. Directing all calls to one location assures consistency and efficiency in responding to nuisance bear conflicts. Each USDA-WS District Office maintains a toll-free line specifically for this purpose (see Appendix 2 for USDA-WS contact numbers). During periods of high bear complaints, including weekends and holidays, USDA-WS voice mail is checked frequently. Routine complaints will be handled during the work week and urgent complaints will be responded to immediately.

For Level 1 complaints received by DNR staff, DNR staff should contact USDA-WS directly to assure immediate assistance is provided. In the event USDA-WS personnel are not immediately available to respond to a Level 1 complaint, DNR staff should respond. USDA-WS should immediately be provided with a summary of the conflict, including the contact information for the responding DNR employee.

DNR staff who receive an initial level 2, 3, or 4 complaint should either provide the complainant with the appropriate USDA-WS District Office's toll free number for assistance or report the conflict to USDA-WS staff directly.

The following are general guidelines for responding to bear incidents:

Level "Critical": Immediate site visit required.

- DNR will take the lead on "Critical" level complaints. If USDA-WS receives the initial call they will notify DNR in the following progression until someone is contacted; 1) District Wildlife Supervisor 2) Area Wildlife Supervisor, 3) District Warden Supervisor, 4) County Wildlife Biologist, 5) County Warden, 6) Area Warden Supervisor. It is strongly recommended that each DNR district annually provide USDA-WS with an emergency contact list for these individuals.
- A WM or LE Supervisor shall be designated as the incident commander with responsibility for incident management. Implement a Level "critical" Black Bear Incident Action Plan. This plan includes:
    - Work to ensure compliance with state regulations;
    - Be cognizant of public perception, handle situation as quickly and sensitively as possible;
    - Maintain communications between conservation wardens and wildlife staff to ensure that any issues, concerns and decisions are addressed in an integrated and timely manner. Brief Administration immediately; and
    - Develop a communication plan for the public and all involved staff.

Level 1 Incidents: Site visit is required.

- USDA-WS should take the lead on all non- "Critical" level complaints. If the initial complaint is received by the DNR then DNR staff will attempt to contact USDA-WS for management of the incident. A notification message should be left on the USDA-WS voice mail if USDA-WS staff are not immediately available.
    - If a DNR wildlife biologist received the initial complaint, and USDA-WS is not immediately available, the DNR biologist shall respond to the incident and conduct a site visit. The DNR wildlife biologist shall notify their immediate supervisor and local DNR Warden so they are aware of the situation.
    - If a DNR warden received the initial complaint and USDA-WS is not immediately available, the DNR warden shall respond to the incident and conduct a site visit. The DNR warden shall notify their immediate supervisor and the local DNR wildlife biologist so they are aware of the situation and to discuss the response.
- If the initial complaint is received by USDA-WS they will respond to the incident and contact the appropriate DNR wildlife biologist to discuss the response.
- Once a USDA-WS staff, a DNR wildlife biologist, or a DNR warden has responded to the incident, other USDA-WS or DNR staff do not need to respond to the site unless

assistance is requested by the responding individual. However, DNR and USDA-WS should remain in close communication until the incident is resolved.

- In situations where multiple individuals respond to the Level 1 incident, USDA-WS generally has primary management responsibility, followed by the DNR wildlife biologists, and then DNR wardens. All responders shall work cooperatively to resolve the conflict.
- DNR staff and USDA-WS shall be cognizant of public safety and public opinion when determining method of euthanasia, if required.
- If the bear remains on-site and it is determined the bear must be euthanized, the bear shall be euthanized by chemical immobilization and lethal injection, chemical immobilization and shooting, or free-range shooting if necessary.
- Responding individuals who are not trained or properly equipped to euthanize or immobilize the bear shall request assistance from trained individuals.
- Crowd control is often essential in many of these situations. Efforts should be made to diffuse any crowd that may have formed. Crowd control is primarily the responsibility of the local police or sheriffs department. They should be contacted immediately for assistance.
- If the bear is no longer at the site, then DNR staff will consult with USDA-WS to determine the appropriate response.
- Local DNR staff in consultation with the Wildlife Damage Specialist, Area Wildlife Supervisor and Communications Staff will develop a communication plan for the public and all involved staff based on level of public attention.

Level 2, 3, or 4 Incidents: All calls that are determined not to be Level 1 situations (requiring an immediate site visit) should be directed to the appropriate USDA-WS District Office for appropriate assistance. The majority of nuisance complaints can be handled through technical advice and recommendations.

Response to Reports of Bear Damage to Agricultural Crops:

Complaints regarding bear damage to agricultural crops should be directed to the appropriate county Wildlife Damage Abatement and Claims Program (WDACP) technician for response (see Appendix 3 for contact information). Bear damage to agricultural crops are eligible for abatement assistance and compensation through the WDACP. The crop owner must enroll in the WDACP to receive any damage abatement assistance and to remain eligible for bear damage compensation. If the WDACP technician recommends trapping as abatement, the WDACP technician is responsible for contacting USDA-WS to initiate trapping efforts.

If trapping efforts are determined to be unsuccessful and damage continues, the WDACP technician may recommend to the DNR wildlife biologist the issuance of a bear shooting permit.

Response to Reports of Bear Depredating Livestock:

Livestock depredation complaints must be immediately directed to USDA-WS for verification (see Appendix 2 for contact information). If verified as bear depredation, USDA-WS is responsible for notifying the county WDACP technician to enroll the producer in the WDACP. The producer must enroll in the WDACP to receive any damage abatement

assistance and remain eligible for bear damage compensation. The DNR wildlife biologists may immediately issue a shooting permit if conditions warrant.

Bear Damage/Nuisance Abatement Options:

Technical Assistance/Education **–** Technical assistance includes assessing the damage situation and providing advice and recommendations over the telephone or during brief personal consultations. It may also include inspection of the damage site. Every effort should be made to resolve black bear complaints through technical assistance. All recommended abatement methods and procedures shall be safe, effective and in compliance with all state federal laws and local ordinances.

When the bear problem involves a food attractant, attractant/food removal will be recommended. Bears will not be trapped and relocated where an attractant is present, unless other circumstances would warrant such action.

If problems continue after the recommended abatement has been implemented, direct control may be pursued.

Two DNR publications provide information about bear biology and living with bears. These publications can be found on the DNR website.

1. The Black Bear (*Ursus americanus*) PUBL-WM015 85
2. Living with Bears in Wisconsin PUB-WM-532-2016

Trap/Relocate- The DNR has a cooperative services agreement with USDA-WS to trap and relocate black bears in Wisconsin. Trapping practices are separated into two categories; nuisance trapping and agriculture damage (WDACP) trapping. Bears are primarily captured in culvert traps.

Nuisance trapping-

- Trapping nuisance bears shall primarily be done by trained USDA-WS staff.
- DNR staff will only be involved in trapping nuisance bears if collectively decided by USDA-WS and DNR. Immediate supervisor approval is needed before trapping is initiated by DNR staff. There should be a valid reason why trapping efforts are not being carried out by USDA-WS in accordance with the cooperative services agreement.
- Set traps must be checked daily by the property owner. The owner must notify USDA-WS if any bears have been caught. Traps monitored electronically by USDA-WS do not need daily inspection by the property owner.
- All traps must be safe and in proper working order. Traps shall be set to minimize hazards to the public and the trapped animal. Traps should be set out of sight of the public whenever possible. All sets must be clearly marked with approved warning signs fastened to the trap.
- Bears trapped in response to Critical Level and Level 1 situations shall be euthanized. The final disposition of the bear carcass shall determine the method of euthanasia. The carcass of any euthanized bears shall be salvaged whenever possible. Carcasses of bears chemically immobilized and euthanatized can not be salvaged for human consumption. The carcasses of bears euthanized via chemical immobilization and euthanasia must be incinerated or buried to a depth that it is unlikely to be excavated by scavengers.

- Methods of euthanasia include: injectable barbiturate euthanasia solution (Euthanasia B), tranquilizing and shooting outside the trap, or shooting the bear in the trap. USDA-Wildlife Services employees are not authorized to shoot bears inside culvert traps. DNR staff (WM and LE) may shoot bears inside culvert traps.
- Bears trapped in response to Level 2, 3, and 4 situations and which are not recommended for euthanasia by the DNR wildlife biologist shall be relocated by USDA-WS a minimum of 20 miles from the capture site.

Agriculture Damage Trapping-

- Trapping shall only be conducted by USDA-WS.
- The county WDACP technician is responsible for requesting bear trapping services from USDA-WS and enrolling the landowner in the WDACP before trapping efforts are initiated.
- The WDACP enrollee shall be responsible for checking traps and notifying the USDA-WS technician when a bear has been trapped. Traps monitored electronically by USDA-WS do not need daily inspection by the enrollee.
- In most cases bears trapped under agriculture damage complaints will be relocated a minimum of 20 miles from the capture site.
- Bears trapped in response to a verified livestock depredation and bears that repeatedly cross fences constructed to protect apiaries should be euthanized. Method of euthanasia shall be determined by the final disposition of the bear carcass. The carcass of any euthanized bears shall be salvaged whenever possible. Carcasses of bears chemically immobilized and euthanatized can not be salvaged for human consumption. The carcasses of bears euthanized via chemical immobilization and euthanasia must be incinerated or buried to a depth that it is unlikely to be excavated by scavengers.
- Methods of euthanasia include; shooting in the trap (see Appendix 5: Precautions for Euthanizing a Black Bear in a Live Trap Using a Firearm), Euthanasia B, tranquilizing and shooting outside the trap. USDA-Wildlife Services employees are not authorized to shoot bears inside culvert traps. DNR staff (WM and LE) may shoot bears inside culvert traps.

Shooting Permits- Shooting permits may be issued for both nuisance and agriculture damage situations. Bear shooting permits are issued by the local DNR wildlife biologist to complement live trapping efforts or in situations where live-trapping and/or other abatement is not feasible. The DNR Wildlife Biologist or USDA-WS may give verbal authorization to shoot a bear in situation where there is an immediate need to authorize the removal of a bear after joint discussion with USDA-WS and DNR. If this occurs the DNR wildlife biologist will then issue a shooting permit as soon as practical.

Nuisance Shooting Permits –

- Nuisance bear shooting permits may be issued in extraordinary situations where trapping efforts or non-lethal abatement has proven to be ineffective. Nuisance Bear Shooting Permits must be issued using form number 2300-109, "Landowner/Lessee Authorization to Remove or Destroy Animals Causing Damage or Nuisance Application and Permit." Unlike Agriculture Damage Bear Shooting Permits, the $1,000 damage threshold does not apply to Nuisance Permits.
- Public hunting access should be a condition of the permit whenever feasible.
- Along with the issuance of the shooting permit permittees should be issued Bear Damage/Nuisance carcass tags through the GoWild licensing system and provided with

the corresponding number of form 2300-220 "Authorization to Shoot Bear Causing Agricultural Damage." The number of bears authorized for removal shall be at the discretion of the DNR wildlife biologist.

- Bear carcass disposition is at the discretion of the local DNR wildlife biologist and should be stipulated in the Conditions Section of the Bear Shooting Permit (form 2300-109). It is recommended that permittees and participants be authorized to keep carcass.
- The use of bait is prohibited unless otherwise authorized by the DNR Biologist and written in the conditions of the permit. If allowed, it is recommended that baiting be restricted to a distance of within 50 yards from the conflict site.

Agriculture Damage Shooting Permits-
Trapping and relocating damage-causing bears will usually abate crop damage. However, in certain cases, trapping may be insufficient. Shooting permits may be issued by a DNR wildlife biologist when USDA-WS or the county wildlife damage technician determines that abatement measures beyond trap/relocation are justified. Shooting permits will be used to complement trapping and not as replacement for trapping.
The decision to issue shooting permits will be based on current or ongoing damage along with the history of bear damage on the property. Shooting permits should not be issued on DNR owned or managed lands that are leased for share cropping.

- Anyone receiving a bear shooting permit for agriculture damage shall be enrolled in the WDACP. It must first be determined by the WDACP technician, that $1,000 or more in bear damage is likely to occur before a shooting permit can be issued.
- Only DNR wildlife biologists can issue bear shooting permits.
- Bear Shooting Permits for agriculture damages are issued using DNR form 2300-219 "Landowner/Authorization to Shoot Bear Causing Agriculture Damage Application & Permit." This form shall be completed in the Wildlife Damage Database.
- The number of bears authorized for removal will be determined by the DNR wildlife biologist in consultation with the WDACP technician.
- Bear carcass disposition is at the discretion of the local DNR wildlife biologist and should be stipulated in the Conditions Section of the Bear Shooting Permit (form 2300-219). It is recommended that permittees and participants be authorized to keep the carcass.
- Along with the issuance of the shooting permit permittees should be issued Bear Damage/Nuisance carcass tags through the GoWild licensing system and provided with the corresponding number of form 2300-220 "Authorization to Shoot Bear Causing Agricultural Damage," and bear tooth collection materials.
- The use of bait is prohibited unless otherwise authorized by the DNR Biologist and written in the conditions of the permit. It is recommended that baiting be restricted to a distance of within 50 yards of the field edge or conflict site in cases where baiting is authorized.

Use of Dogs on Shooting Permits
Under NR 12.15, WI Administrative Code, pursuing bear with the aid of dogs under the authority of a bear shooting permit is prohibited unless the department determines there are extraordinary conditions which warrant an exemption.

Criteria for permitting the use of dogs on bear shooting permits include the following:

- Other abatement methods are not feasible or are ineffective in preventing damage or reducing conflict.

- Bears are entering fields from multiple locations, making it difficult to shoot them cleanly and safely.
- Multiple bears are damaging fields at the same time, overwhelming traps or bait sites.
- Crop losses are high and increasing rapidly.

The use of dogs may only be permitted on shooting permits issued for conflicts in Bear Management Zones A, B, and D. The use of dogs is not allowed on bear shooting permits issued for conflicts in Bear Management Zone C. Section 6 on forms 2300-219 "Authorization to Shoot Bear Causing Agricultural Damage" and form 2300-109 "Authorization to Remove or Destroy Animals Causing Damage or Nuisance" is the proper location to establish the special conditions that allows the use of dogs on the shooting permit. Under NR 12 WI Administrative Code, permittees may restrict the use of dogs if trespass problems on adjoining properties are likely to occur.

All standard hunting rules and regulations apply when authorizing the use of dogs on shooting permits including hunting license requirements and limits on the number of dogs that can be used to pursue bear at any given time. Bear may be shot on all lands included under the shooting permit and within 1/4 mile on adjoining properties with landowner permission. Permits are not valid on adjacent lands if those lands are owned or managed by the DNR. Additional constraints may be placed on the use of dogs per the discretion of the DNR wildlife biologist.

Suggested constraints on using dogs for bear damage permits:

- Dogs must be started on the damaged field.
- The number of dogs used may not exceed 6 and may be limited further.
- Damaged field should be part of large parcel (>80ac).
- Adjacent landowners should not be residential parcels.
- Size of the hunt party may be restricted by the local biologist.
- Multiple bears may be shot if the permittee and/or participant have multiple carcass tags.
- Family groups should be removed instead of taking individual bears from multiple groups.

Chemical Immobilization-

Every attempt should be made to resolve conflicts without using immobilizing drugs. However, in some situations the use of immobilization drugs may be necessary and useful for removing nuisance bears. ***Immobilizing drugs must be used with extreme caution***. *(See appendix 4 for "The complexities and limitations of tranquilizing bears"*)

Only trained USDA-WS staff and DNR employees registered on the DNR Wildlife Health Team's approved list may use immobilization drugs. All bear chemically immobilized and relocated must be ear tagged which allows the bear to be identified and prevents any potential human consumption of the bear within 30 days of being immobilized. One ear tag shall be placed in each ear with one tag forward facing and the other tag rear facing. Bears immobilized within 30 days of the bear harvest season must be euthanized and disposed of by deep burial or incineration. The local DNR wildlife biologist shall be responsible for carcass disposal.

Euthanizing Bears-

In general bears should be considered for euthanasia when they pose an immediate threat to human health and safety, have depredated livestock, have become habituated to humans, or shows signs of significant illness. Bears can be euthanized either through shooting by DNR Staff (WM or LE) or by the use of an injectable barbiturate euthanasia solution (Euthanasia

B) by Wildlife Services. Euthanasia method is at the discretion of the local DNR wildlife biologist.

Whenever possible DNR wildlife biologists should dispatch bears by shooting in order to salvage the meat and hide. When DNR chooses to dispatch a bear, the local DNR wildlife biologist will coordinate the dispatching of the bear and the disposition of the carcass. DNR staff may shoot bear in culvert traps.

USDA-WS staff are not authorized to shoot bears inside culvert traps. Bears will only be dispatched by USDA-WS using an injectable barbiturate euthanasia solution (Euthanasia B) in accordance with all applicable WS I&E policies. Bears euthanized using an injectable barbiturate euthanasia solution (Euthanasia B) must be buried or incinerated. If burial is chosen, the local DNR wildlife biologist will arrange burial of the bear and record location where the bear has been buried.

Nuisance Bear Landowner Cost Share Program:

- Private individuals/landowners as well as public property managers (except WDNR properties/parks) with multiple bear conflicts, must share abatement expenses for trapping and relocating problem nuisance bears.
- The initial bear trapping efforts during a calendar year will be conducted at no charge to the landowner/property manager.
- Subsequent bear conflicts will cost $175 for each complaint, regardless of whether a bear is captured. Note: The fee is $175 per complaint, not per bear trapped. Properties owned or managed by WDNR are not subject to this fee.
- A subsequent conflict is defined as a request for additional assistance 7 days or longer after completion of the initial trapping effort.
- The fee will be collected by USDA-Wildlife Services.
- The fee is waived for complaints that are determined to be a Level 1 incident and an immediate human health and safety concern. It will be the discretion of USDA-WS and the WDNR if a complaint is an immediate threat to human health and safety.

Bear Management on Captive Cervid Farms:

Bear management on captive cervid farms can be split into two categories: nuisance or depredations. Each category is handled differently.

Nuisance situations (i.e. damage to fences, deer feeders, etc.) will be handled by USDA-WS in consultation with the local DNR wildlife biologist. In order to be categorized as a nuisance situation, livestock must not have been injured or killed.

For nuisance situations:

1. USDA-WS shall assess the situation and determine if non-lethal abatement, which shall include but not be limited to modifications to feeding operations, and/or abatement fencing around feeding sites, is reasonable.
2. If non-lethal abatement fails or is not an option, then USDA-WS will initiate trapping and relocation efforts.
3. A maximum of 3 bears will be trapped. The landowner may enter into a cooperative service agreement with USDA-WS to have additional bears trapped

and relocated. The landowner is responsible for the full cost of trapping and relocation.

4. If trapping is deemed unsuccessful by USDA-WS the DNR wildlife biologist may subsequently issue a bear shooting permit to the cervid farmer. The number of tags issued will be at the discretion of the DNR wildlife biologist. Normal bear shooting permit conditions apply. Disposition of bears harvested under a shooting permit is at the DNR wildlife biologist's discretion.

Captive or farm raised deer are classified as "livestock" and subsequently depredation or injury to captive deer by bear is eligible for damage abatement assistance and compensation through the WDACP.
In these situations:

1. The cervid farmer must enroll in the WDACP in order to receive abatement assistance and to be eligible for depredation compensation. Farmers who refuse to participate in the program will not be provided any damage abatement assistance or compensation.
2. The WDACP technician will recommend reasonable abatement, which shall include but not be limited to modifications to feeding operations, and/or abatement fencing around feeding sites.
3. Open bear hunting will also be required. The use of dogs will not be permitted on the property. Baiting for bears will be allowed.
4. The WDACP technician shall request trapping and relocation assistance from USDA-WS if other reasonable non-lethal abatement fails.
5. If trapping is unsuccessful the DNR wildlife biologist may subsequently issue a bear shooting permit to the cervid farmer. The number of tags issued will be at the discretion of the DNR wildlife biologist. Normal bear shooting permit conditions apply. Disposition of bears harvested under a shooting permit is at the DNR wildlife biologist's discretion.

Sows with Cubs:

If USDA-WS determines that a sow with cubs should be trapped and relocated, a reasonable effort should be made to relocate the entire group. This may not be possible, and the landowner should be informed that cubs may be left behind. After mid-summer, July, cubs are more independent and may be relocated separately from the sow. Cubs should not be transported in the same trap as the sow. Cage traps can be used to catch and move cubs.

Dealing with Reported Orphaned Black Bear

Orphaned and presumed orphan black bear cubs are an annual issue for wildlife managers and our partners (Wildlife Services, etc.). The profile of this issue can be quite high due to the strong anthropomorphic attraction of bears and it is important to have a strong clear policy to proactively handle these situations.

In 2011, the DNR Bear Advisory Committee assisted with establishing the following steps (in order) that should be implemented in dealing with orphan bear reports:
1) Prior to July 15th, DNR will determine whether the cub is an orphan. If the sow cannot be confirmed dead, the cub(s) should be left where they are for at least 24 hours to allow them to reunite with the sow. During this time, DNR will take steps to inform the public they

should not feed the cub(s) and advise that any activity in the surrounding areas should be minimized to help encourage the reuniting of the cub(s) with the sow. In most cases, these are not orphaned cubs.

2) If the sow is confirmed dead and it is prior to mid-March, DNR may evaluate options to place orphaned cub(s) in a surrogate den; however, radio collars are no longer being placed on bears. DNR staff are encouraged to take note of any dens with a sow and cubs they become aware of, as these may be used for future placement of orphaned cubs. If possible, DNR will not place orphaned cubs in dens with only 1 existing cub, as sows producing litters of only 1 cub usually are first-time, inexperienced mothers. Cub survival is reduced for these inexperienced sows, and they are more likely than experienced sows to reject an introduced cub. In situations where it is possible to place cubs in a surrogate den, the cubs can receive temporary rehabilitation care in a licensed bear facility until the placement can be made.

3) If the sow is confirmed dead and it is between mid-March to July 15th, DNR will evaluate each cub on a case-by-case basis to determine if the cub(s) could be placed with a surrogate den and/or rehabilitation facility that is licensed for bears.

4) If a surrogate sow in a den cannot be located or it is post den emergence, the second option is to place orphaned cub(s) in a bear-licensed rehabilitation facility where the cub(s) can be held until released. Cubs requiring transport to a rehabilitation facility should be placed in a pet-carrier-type container that is secure, closed completely and covered with a blanket or similar material. The cub(s) should be kept in a warm, dark, quiet environment until they are admitted to a rehabilitation facility.

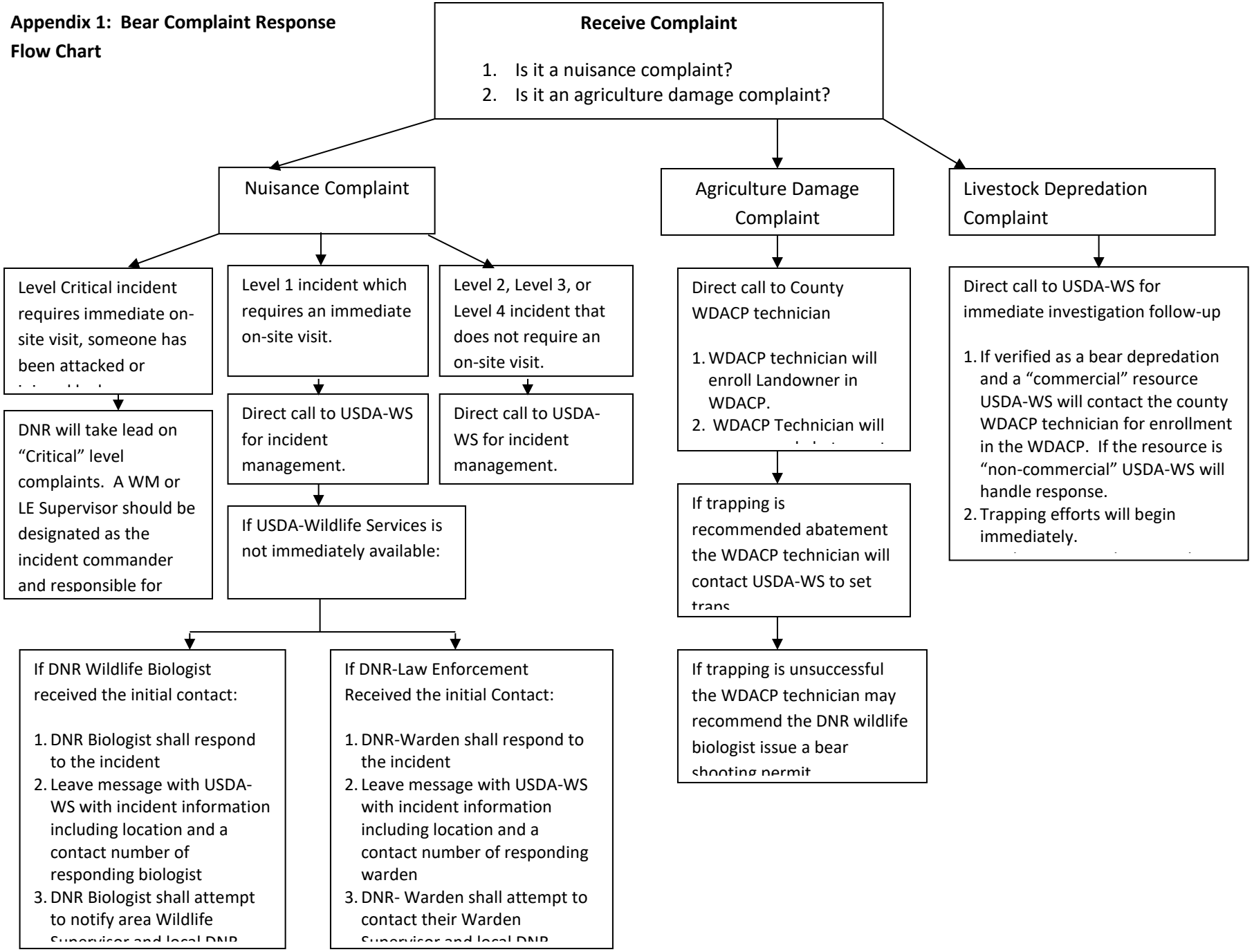
Cages for young cubs are typically a pet kennel or similar small cage with soft material, such as blankets or towels for the bottom substrate, and have some sort of visual barrier or are kept in a separate area to minimize human exposure. Even though licensed rehabilitators are well qualified for bear rehabilitation, individuals transporting a cub(s) to a rehabilitation facility should observe the facility and the surroundings and make note of anything suggesting that habituation could occur. Observations like this could include where the cubs are housed. Transporting individuals should also make note of whether this area is isolated from both human and domestic animal disturbance and exposure and observe whether the cub(s) react to human voices and/or act as if they want to be near people. Any observations of habituation or conditions that may encourage habituation should be reported to the Wildlife Health/Wildlife Rehabilitation program manager.

There are licensed wildlife rehabilitation centers which can provide temporary care for orphaned bear cubs that are intended for placement with a surrogate sow, and for cubs that will need extended rehabilitation care. Please reference the wildlife rehabilitator directory found on the WM intranet or contact Wildlife Health/Rehabilitation program manager.

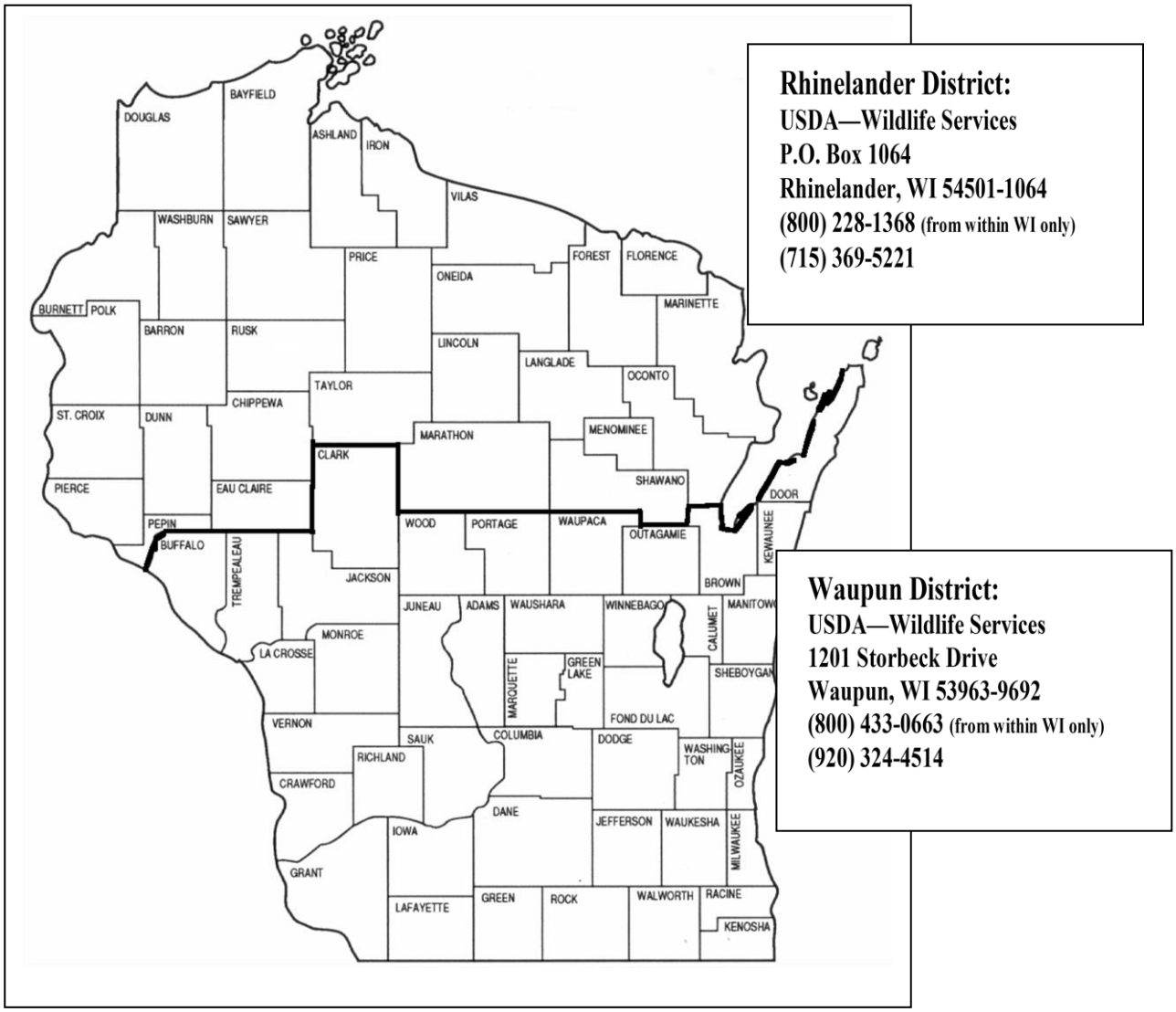
5) Bears that cannot be placed immediately will be euthanized using techniques from the American Veterinary Medical Association (AVMA) Guidelines for Euthanasia found on the WM intranet: http://intranet.dnr.state.wi.us/int/land/wildlife/document/WH/euthanasia.pdf

6) On or after July 15th, the DNR will provide technical assistance to the person reporting the orphaned cub(s). The appropriate DNR staff person will inform the person that cubs left on their own at this time of year likely have a better chance of survival than they do if we take them out of the wild. Staff should not pick up cubs after July 15th. If a cub is brought in after this time, it should be released back to the area it was found as soon as possible.

Appendix 1: Bear Complaint Response Flow Chart



Appendix 2. USDA –WS Districts and Contact Information



Rhinelander District:
USDA—Wildlife Services
P.O. Box 1064
Rhinelander, WI 54501-1064
(800) 228-1368 (from within WI only)
(715) 369-5221

Waupun District:
USDA—Wildlife Services
1201 Storbeck Drive
Waupun, WI 53963-9692
(800) 433-0663 (from within WI only)
(920) 324-4514

Appendix 3. Wildlife Damage Abatement and Claims Program County Contacts

County	County Contact	Phone Number		County	County Contact	Phone Number
Adams	USDA-Waupun			Marathon	USDA- Rhinelander	
Ashland	Dave Schultz	715-682-7187		Marinette	USDA-Rhinelander	
Barron	USDA- Rhinelander			Marquette	USDA-Waupun	
Bayfield	Dave Schultz	715-682-7187		Menominee	Not in Program	
Brown	Jon Bechle	920-391-4620		Milwaukee	USDA-Waupun	
Buffalo	USDA-Waupun			Monroe	USDA-Waupun	
Burnett	Cindy Blonk	715-349-2186		Oconto	Chad Trudell	920-834-5688 x8
Calumet	USDA-Waupun			Oneida	USDA- Rhinelander	
Chippewa	USDA- Rhinelander			Outagamie	USDA-Waupun	
Clark	USDA-Waupun			Ozaukee	Jeff Bell	262-284-8274
Columbia	USDA-Waupun			Pepin	USDA- Rhinelander	
Crawford	Greg Cervin	608-875-5813		Pierce	USDA- Rhinelander	
Dane	USDA-Waupun			Polk	USDA-Rhinelander	
Dodge	USDA-Waupun			Portage	USDA-Waupun	
Door	Greg Coulthurst	920-746-2214		Price	USDA- Rhinelander	
Douglas	Dave Schultz	715-682-7187		Racine	USDA-Waupun	
Dunn	USDA- Rhinelander			Richland	Greg Cervin	608-875-5813
Eau Claire	Chad Berge	715-839-6206		Rock	USDA-Waupun	
Florence	USDA- Rhinelander			Rusk	USDA- Rhinelander	
Fond du Lac	USDA-Waupun			St. Croix	Cindy Blonk	715-349-2186
Forest	USDA- Rhinelander			Sauk	USDA-Waupun	
Grant	Greg Cervin	608-875-5813		Sawyer	Tim Seidel	715-634-6463
Green	USDA-Waupun			Shawano	Blake Schuebel	715-526-4633
Green Lake	USDA-Waupun			Sheboygan	USDA-Waupun	
Iowa	USDA-Waupun			Taylor	USDA- Rhinelander	
Iron	Dave Schultz	715-682-7187		Trempealeau	USDA-Waupun	
Jackson	USDA-Waupun			Vernon	USDA-Waupun	
Jefferson	USDA-Waupun			Vilas	USDA- Rhinelander	
Juneau	USDA-Waupun			Walworth	USDA-Waupun	
Kenosha	Not In Program			Washburn	USDA- Rhinelander	
Kewaunee	USDA-Waupun			Washington	USDA-Waupun	
La Crosse	USDA-Waupun			Waukesha	USDA-Waupun	
Lafayette	USDA-Waupun			Waupaca	Greg Peterson	715-258-6245
Langlade	USDA- Rhinelander			Waushara	USDA-Waupun	
Lincoln	USDA- Rhinelander			Winnebago	USDA-Waupun	
Manitowoc	USDA-Waupun			Wood	Tracy Arnold	715-421-8475

USDA-Rhinelander District – 715-369-5221
Toll Free – 1-800-228-1368

USDA-Waupun District – 920-324-4514
Toll free – 1-800-433-0663

Appendix 4. The complexities and limitations of tranquilizing bears.

1. Immobilization is not a simple solution.
    a. Immobilizing wildlife is complicated and unpredictable under any circumstances.
    b. With such public attention and, noise and stress the complications are multiplied.

2. Chemical immobilization is <u>not</u> the same as tranquilizing. Immobilizing the animal will not put it to sleep; it will remain aware but unable to move. This can be very traumatic for the animal.

3. Dosing concerns:
    a. Dosing an animal of unknown weight makes dosing a guess
    b. It takes longer for drugs to take effect in an agitated animal.

4. Darting concerns:
    a. Need to be accurate with the dart...intramuscular is essential...difficult with a bear
    b. Many reasons darting doesn't work...darted into the fat, or just under the skin, dart doesn't inject, dart bounces
    c. If the dart doesn’t end up in the bear, there is now a restricted drug that the public could be exposed to
    d. The drug will take about 4 weeks to metabolize through the animal; if it is possible that the animal will be consumed prior to this time, immobilizing drugs should not be used. If this is a hunted species you will want to avoid administering drugs within a month of a hunting season

5. Animal’s response after darting:
    a. Prolonged induction in bears...can be 20 minutes or more before drug takes effect...this will be affected by the degree of stress the animal is under (noise in particular)
    b. Animal's reaction to darting – could bolt away which becomes a public safety issue (people, cars) and the bear could end up dead anyway
    c. Or if animal remains in tree, it’s a safety issue for the animal (injury if it falls); if it doesn’t fall out, we need a way to get it down.
    d. Can't assess the physical status of the animal while the drug is taking effect... drug inhibits animal's ability to thermoregulate so overheating is an issue particularly in bears (thick insulation) in summer

6. Even if all goes well:
    a. If the drug is effective, is brought down w/o injury, now needs to be transported, monitored and released
    b. Bears under Telazol often take hours to recover
    c. Will the bear come back to same location – or become someone else’s problem somewhere else?

7. Equipment and personnel:
    a. Proper equipment (cost of suitable dart rifle is ~$2000 (Dan-inject...type used in most zoos) (can get guns for less than $1000) ...drug and dart costs are not huge issues

b. Personnel need specific training and need to practice with the specific gun (different models work differently and individual guns can shoot differently. There was a recent situation where a gun was borrowed and ended up shooting high, resulting in a dart that missed the bear and needed to be found, and the need to then get more chemical and take a second shot – which is an opportunity that will not always be there.)
c. Federal requirements about use and monitoring of immobilization chemicals (drugs used are USDA controlled substances)

Appendix B. Wisconsin DNR orphaned black bear cub protocols.

DEALING WITH REPORTED ORPHANED BLACK BEAR CUBS (rev. April 2014)

Orphaned and presumed orphan black bear cubs are an annual issue for wildlife managers and our partners (Wildlife Services, etc). The profile of this issue can be quite high due to the strong anthropomorphic attraction of bears and it is important to have a strong clear policy to proactively handle these situations.

In 2011 the Bear Committee assisted with establishing the following steps (in order) that should be implemented in dealing with orphan bear reports:

1) Prior to July 15th, determine whether the cub is definitely an orphan. If the sow cannot be confirmed dead, leave the cub(s) where they are for at least 24 hours to allow them to reunite with the sow. During this time, inform the public they should not feed the cub(s), and that any activity in the surrounding areas should be minimized to help encourage the reuniting of the cub(s) with the sow. In most cases, these are not orphaned cubs.
2) If the sow is confirmed dead and it is prior to mid-March, we might be able to place orphaned cub(s) in a surrogate den however; radio collars are no longer being placed on bears. If at any time you become aware of a den with a sow and cubs, please take note of it as it may be used for future placement of orphaned cubs. If possible, do not place orphaned cubs in dens with only 1 existing cub. Sows producing litters of only 1 cub usually are first-time, inexperienced mothers. Cub survival is reduced for these inexperienced sows, and they are more likely than experienced sows to reject an introduced cub. In situations where it is possible to place cubs in a surrogate den, the cubs can receive temporary rehabilitation care in a licensed bear facility until the placement can be made.
3) If the sow is confirmed dead and it is between mid-March to July 15th, we need to evaluate each cub on a case-by-case basis to determine if the cub(s) could be placed with a surrogate den and/or rehabilitation facility that is licensed for bears.
4) If a surrogate sow in a den cannot be located, or it is post den emergence, the second option is to place orphaned cub(s) in a licensed rehabilitation facility where they can be held until released. If you need to transport cubs to a rehabilitation facility, place the cubs in a pet carrier type container that is secure, closed completely, and covered with a blanket or similar material. Keep the cub(s) in a warm, dark, quiet environment until they are admitted to a rehabilitation facility.

   Cages for young cubs are typically a pet kennel or similar small cage with soft material, such as blankets or towels for the bottom substrate, and have some sort of visual barrier or are kept in a separate area to minimize human exposure. Even though licensed rehabilitators are well qualified for bear rehabilitation, when you bring a cub(s) to a rehabilitation facility, please observe the facility and the surroundings and make note of anything suggesting that habituation could occur[1]. Observations like this could include where the cubs are housed. Make sure this area is isolated from both human and domestic animal disturbance and exposure. Cubs should also not react to human voices and act as if they want to be near people. As you transfer the cub(s) and you notice anything that may encourage habituation, please contact Mandy Kamps immediately at (715) 359-5508 or amanda.kamps@wisconsin.gov.

   As of May 2013, there are currently two wildlife rehabilitation centers[2] who can provide temporary care for orphaned bear cubs that are intended for placement with a surrogate sow, and for cubs that will need extended rehabilitation care – 1) Wild Instincts, Rhinelander, (715) 362-9453 and 2) Lynn Seeger (715) 234-3306 and her volunteer Tamara Larson, Frederic, (715) 491-2352, per temporary agreement. (Check with Mandy Kamps on status of temporary agreement)

5) Bears that cannot be placed immediately will be euthanized using techniques from the American Veterinary Medical Association (AVMA) Guidelines for Euthanasia found on the WM intranet: http://intranet.dnr.state.wi.us/int/land/wildlife/protocol.htm, for example: chemically euthanized by Wildlife Services personnel or a licensed veterinarian (local vet clinic or the DNR wildlife veterinarian) or gunshot to the head.
6) On or after July 15th, provide technical assistance to the person reporting the orphaned cub(s). Inform the person that cubs left on their own at this time of year likely have a better chance of survival than they do if we take them out of the wild. Do not pick up cubs after July 15th. If a cub is brought in, it should be released back to the area it was found as soon as possible.
7) If the cubs are reported after July 15th and the sow is dead, remove the carcass from the vicinity so the

cubs won't stay in the area. Try to convince the local residents not to feed the cubs. Inform them that cubs are born during the first half of January so they are already 6 months old. They might stay in the vicinity for a week or so before leaving but are able to find the food they need to survive. Call the person who reported the orphaned cubs about a week later to see what has developed. Euthanasia or placement in a rehabilitation facility may be necessary if the physical condition of the cubs appears to be deteriorating.

8) If orphaned cubs cannot be deterred from an area, and they are causing agricultural damage or becoming a nuisance to the public, USDA-APHIS Wildlife Services can trap and relocate the cubs to a different area in their natural environment. If orphaned bear cub trapping is required, USDA-Wildlife Services can be contacted in the Rhinelander District at (715) 369 – 5221 or 1-800-228-1368, or in the Waupun District at 1-800-433-0663.
9) Any bear cub showing signs of being significantly ill (even if it is after July 15th) should be euthanized and sent to DNR Wildlife Health for necropsy.

Additional Information

1. Bear cub habituation can be prevented by:
   Minimizing human exposure during rehabilitation care*
   Minimizing the number of caretakers permitted to assist in feeding and care interactions
   Housing multiple cubs together to encourage socialization with conspecifics

*Very young or bottle-fed cubs can become habituated to humans because they are fed multiple times per day and they are handled at each feeding. Moreover, even if the cub is intended to be placed with a surrogate, placement is not guaranteed until it actually occurs. As a result, licensed rehabilitators begin limiting human exposure as soon as the cub(s) are admitted to only what is necessary during feeding times. Because rehabilitators limit exposure time right away, they are already taking measures to prevent habituation in the event that the cub will need extended rehabilitation care.

2. Be assured that only those who are well qualified for bear rehabilitation will be licensed to do so. Bear rehabilitation requires great knowledge and experience. Individuals who are licensed for bear rehabilitation have demonstrated skilled animal care techniques and extensive species knowledge, and have contributed substantial time and money toward successful bear rehabilitation. In addition to preventing habituation of bears, successful rehabilitation includes releasing bear in areas with minimal potential for future human conflicts.