



An Education in **Black Bears**

The Urban/Suburban Black Bear Study is researching how management plans impact human-bear interactions

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photographed by Melissa McGaw



Tunnel Road south of downtown Asheville is nobody's idea of a quiet thoroughfare. Fronted by hotels and restaurants, vehicle activity on the five lanes is brisk, both day and night. That a female black bear, ear-tagged and GPS radio-collared, had given birth to two cubs in a den just a few steps away from the paved parking lot of one of Tunnel Road's many retail establishments would seem the stuff of urban legend. Yet, here we were, on a cold February day, taking in exhaust-tinged air under billboards amidst the din of traffic as we recaptured the denning bear to change her radio-collar and weigh and sex her cubs.



MIKE CARRAWAY

Top: A culvert trap in transit attracts the attention of a yearling bear. Above: Bear N190 is released by N.C. State Ph.D. student Jennifer Strules. Bears are released from traps once they have recovered from anesthesia.

We are the Urban/Suburban Black Bear Study, a collaborative research project between N.C. State University and the N.C. Wildlife Resources Commission. Since 2014, our team has been live-trapping and GPS-radio-collaring black bears in Asheville to learn about urban black bear ecology. Our research provides science-based information to the Commission to inform effective management plans and outreach efforts for black bears in North Carolina.

Why do we study bears in Asheville? Located in Buncombe County, Asheville is a medium-sized city of about 90,000 citizens with a resident black bear population. Data from the Commission in 2018 showed that the rate of human-black bear interactions

in Buncombe County disproportionately accounted for 44% of all human-bear interactions in the state.

Throughout their range in North America, and in Asheville, black bears are readily adapting to living near people. Black bears are food-driven, and customarily subsist on natural foods, such as acorns and berries that can widely fluctuate in availability. Thus, areas of high human populations, with relatively stable provisions of trash and birdseed, have the potential to attract bears. When that happens, human-bear interactions, and changes in bear behavior, are likely to follow. Bears conditioned to human foods can eventually become aggressive and frequently damage property or become threats to human safety in the process.

How can wildlife managers create management and education plans that reduce these interactions? Conventional management methods such as hazing may be ineffective and impractical within some municipal boundaries, relocating bears simply makes the bear a problem for someone else and could put the bear in jeopardy if it were to try to cross roads or highways to return to where it was originally captured, and lethal control is rarely supported by the public nor desired by wildlife managers. Most significantly, these methods do not address the root of the problem: easy access to unsecured garbage and birdseed by bears in residential areas. So, where do we go from here?

BearWise, a regional bear education program that promotes responsible science-based solutions for living with black bears, holds much promise to proactively address human-bear interactions and keep bears wild. By following the program tenet, “The Six BearWise Basics,” residents, businesses or communities learn how to identify and secure the attractants that unintentionally bring bears into their yards and neighborhoods. Simply put, if attractants are present, chances are good that bears will find them. Remove or secure attractants, and you remove the reason for bears to come to your yard or neighborhood while also helping keep bears wary of humans.

While bear education can decrease attractants and human-bear interactions, there has not been an opportunity to research the spatial response by black bears when it occurs, or to examine the concurrent perceptions and experiences of residents exposed to a bear education program. Thus, in our current research phase (2019–2023) we are attempting to quantify the before-and-after impacts of bear education in Asheville on

urban black bear movements and human-bear interactions.

Spatial data from radio-collared bears will allow comparisons of seasonal and annual home ranges before and after bear education occurs. Will bears that are accustomed to accessing human-provided

attractants alter their movements in response to a reduction in these resources? Will residents that receive bear education change their behavior by eliminating attractants, and

how will they evaluate the effectiveness of these measures in reducing bear activity close to their homes?

Finally, we are investigating urban bear resource selection in terms of diet, and how diet, in turn, affects reproduction. What portion of the urban bear diet is human-sourced foods, and are there discernable patterns of use? Does consumption of human-sourced foods disrupt natural processes of bears, such as movements, den chronology or litter size?

BEAR WITH US

The homeowner’s call came at 2:05 a.m. “I just heard the trap door shut. It sounds like there’s something big inside!” We arrived at the residence within 30 minutes. Headlamps illuminated our way across the stone patio as we gently placed the anesthetized bear on a tarp at 3:11 a.m.

After checking the bear’s heart rate and temperature (a procedure we repeat every 10 minutes to ensure the animal’s vital rates are within safe limits), we encouraged the homeowners and their two school-age children (all in pajamas) to come closer for a better look. For all, this is an unparalleled experience. For us, as wild-

life scientists, it is a chance to demonstrate and explain standard research techniques used on bear captures. For residents, it’s



a once-in-a-lifetime opportunity to observe a bear up-close.

In April 2019, we began live-trapping bears in northeast Asheville for the current study. Most of our trap sites (93%) are located on private property in suburban neighborhoods. We contacted homeowners or businesses experiencing bear activity and obtained written permission to place culvert-style traps for bears on their property. Thanks to the enthusiastic cooperation of 64 homeowners, American Legion Post 70, Bell Elementary School, Highland Brewing Company and Trinity Presbyterian Church, we captured a total of 155 bears and radio-collared 46 bears.

Once a bear is captured, we anesthetize the animal with immobilizing chemicals and affix ear tags, apply a lip tattoo, obtain blood, tissue and hair samples, and extract a premolar tooth for age estimation. Due to current research objectives concerning reproduction and denning, we fit only female bears with Global Positioning System (GPS) radio-collars for our study; we do not collar male bears. Under optimal conditions, the GPS collars record the bear’s location every 30 minutes. With this information, we can estimate the total area traversed by each bear on a seasonal or annual basis, or “home range.”



Collar fitting is one of the most important and sensitive procedures we perform on a bear capture. We take every precaution to ensure the collar is properly fitted to allow for future growth and seasonal weight gain. Also, we follow professional guidelines of wildlife research where collars cannot weigh more than 2 to 3% of the captured animal’s body weight. The collars weigh around 2 ½ pounds, thus, we generally do not collar bears that weigh less than 100 pounds. Concern for the well-being of captured bears figured prominently in our selection of the radio-collars we use on our project. Should the removal of a collar become necessary (i.e., if it malfunctions), the collars have several features that allow for remote removal.

First, collars are equipped with a manual drop-off. We can get within a specified range of a collared bear and use an electronic device that issues a signal to the collar. Upon receiving the signal, two pins are triggered, allowing the collar to drop off the bear. Second, a cotton spacer is attached to the collar belting. The spacer is designed to naturally deteriorate over time, ensuring that the collar will drop off post-capture, usually within two to three years. Finally, the collar is also built with a programmed drop-off. After three years of deployment, the mechanism used to manually remove the collars is automatically triggered, and the collar drops off.

The live-capture of wildlife (specifically vertebrates) for research purposes is a highly regulated activity, and our project is no exception. Because our project is administered through N.C. State, our research proposal and methodology (including our anesthetic and live-capture procedures) are subject to and have received approval through a rigorous review process by the Institutional Animal Care and Use Committee (IACUC) at the university. IACUCs are required by federal law at institutions that conduct animal research, including wildlife species.

Each IACUC must be staffed by at least one veterinarian and must include at least two members (usually laypeople) with non-research interests (i.e. ethicists, clergy). The primary role of the IACUC is that of stringent review and oversight for the humane care of animals in research, from inception to completion of each project. Simply put, without IACUC approval, no research involving animals can occur.

In addition to mandatory IACUC scrutiny, our project must meet annual permitting requirements of the Commission, the state agency and legal authority responsible for managing wildlife, including black bears. The Commission thoroughly reviews our animal capture and handling procedures to assure animal welfare. Finally, to conform to



Opposite: The study uses culvert-style traps to capture bears. When a bear enters the trap and pulls on a baited trigger, the door shuts and traps the bear inside. Top: Jennifer Strules uses a CO2-powered pistol to anesthetize a yearling bear captured in a culvert trap, with assistance from crew members Shelby Shiver and Commission retired District Supervisor Mike Carraway. Above: Crew members carry the immobilized yearling to a shady and cool processing area.



N.C. State Research Technician Shelby Shiver invites homeowners to observe the crew processing a bear family captured on their Asheville property.



expected professional standards of ethical conduct, we voluntarily follow the American Society of Mammalogists' guidelines for the use of wild mammals in research, which codifies best practices for live-capture, chemical immobilization and radio-collaring. In no way do we view these strict measures of oversight as burdensome. Rather, we welcome the opportunity for our research and capturing procedures to be held to the very highest standards of humane care.

Post-processing, we administer a reversal agent and return the bear to the trap so it can safely recover from being anesthetized. In addition, staff remain on hand to monitor the bear until facultative movement is fully regained and the bear is fully alert. Then the bear is released from the trap at the location of capture.

One of the most rewarding aspects of our work is hosting homeowners on captures, who have a standing invitation to observe our crew in action once a bear is safely immobilized and removed from the trap. We have accommodated 294 guests, ranging from toddlers to senior citizens. It is a very special privilege to personally connect Asheville residents to the bears they so often observe, and whose health, safety and well-being often figure prominently in their thoughts.

STARTING WITH PEOPLE

We drove slowly through today's survey block, a quiet community of ranch-style homes, tallying items on each street that

Crew members Jennifer Strules, Shelby Shiver and Kailey Anderson (left to right) take great care handling an anesthetized black bear, including frequently monitoring its heart rate and rectal temperature, properly fitting GPS radio-collars to account for growth, collecting a suite of body measurements, identifying the bear with ear tags and a lip tattoo, collecting hair samples, examining the mouth and teeth to determine if urban bears show higher-than-expected rates of gum disease and tooth decay, and obtaining blood samples for testing.

escape our everyday attention but rarely go unnoticed as potential food sources by bears.

"Bird feeder. Unsecured trash container. Oh, wait. Unsecured barbecue grill, too."

Surveying for these attractants provides us with baseline data about the occurrence of human-sourced foods in Asheville neighborhoods and will help us understand if bear education motivates residents to alter their availability.

At its core, bear education instructs residents to secure attractants: to keep waste inside until collected (or use a bear-resistant container), store grills, eliminate outdoor pet feeding and remove bird feeders when bears are active.

Starting in 2021 and continuing through 2022, we will provide bear education to Asheville residents through social media posts and distribution of printed materials through mailings and door-to-door canvassing. Because bear education will instruct residents to remove attractants, we conduct vehicular surveys to evaluate the frequency of attractants in neighborhoods, pre- and post-education.

For trash and recycling, residents will be advised to either use a bear-resistant container or not put containers curbside until the morning of trash collection. To quantify other attractants, we randomly select two to three neighborhoods per week to visually detect bird feeders and barbecue grills. Changes in curbside trash habits and a reduction in attractant availability pre- to post-treatment per neighborhood could signal that bear education was effective.

Additionally, we want to compare resident perspectives before and after bear education occurs. In 2021, we invited randomly-selected Asheville residents to complete "Black Bears in Your Community: A Survey of Your Experiences" to gauge attitudes toward bears and human-bear interactions. Upon completion of the bear education campaign in 2022, we will re-survey residents. Through these results, we will understand if education was valuable to residents, motivated them to reduce attractants and if they experienced a decline in unwanted bear interactions.



MIKE CARRAWAY/NCWRC

FOOD ATTRACTIONS

The muddy paw prints showed on the vehicle's exterior where the GPS-collared bear had investigated. A residual sweet odor from the empty soda can in the cup holder had likely attracted the bear's attention as a potential food source. By investigating locations of collared bears and obtaining visual evidence of food-searching or consumption, we gain insight into how these animals, adapted to efficiently finding and consuming native foods like acorns and insects but now living (and eating) in suburban areas, make choices about food selection.

In western North Carolina, bears use a variety of natural food crops. When human development extends into their habitat, bears can gain access to human-sourced foods, such as garbage and birdseed. How do bears choose what to eat when all of these resources are present? We visit collared bear locations and search a 20-meter radius for visual evidence of consumption of native and anthropogenic foods by bears.

If consumption is detected on these searches, we collect additional attribute data at the "use" site and at paired random points to model factors that might explain

Unsecured bird feeders provide an easy and high-calorie meal for a collared female bear and her yearlings.

foraging, i.e. distance to cover. Each winter, we recapture collared female bears in their dens and record litter size to assess the role of diet in reproduction. Using a laboratory technique termed stable isotope analysis, hair samples will be tested to determine the proportion of human-sourced foods consumed by individual bears, and if that proportion affects litter size (fecundity).

Our project will conclude in 2023 and will make a significant contribution to the scientific understanding of urban bear ecology, help inform effective education and outreach efforts of living with bears and be in the vanguard of a progressive approach to keeping bears wild and people safe. ♦

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