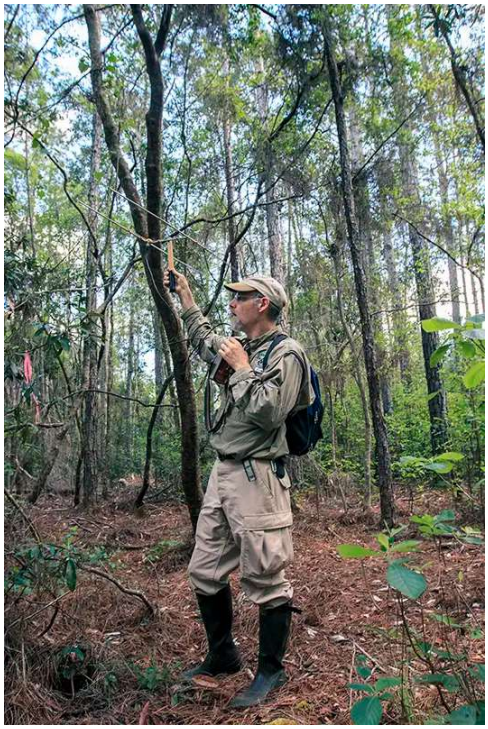
Tracking Bears

Tracking Collars



The FWC biologists have tracked individual bears using numerous methods across many projects. Among these methods are Global Positioning System (GPS) and Very High Frequency (VHF) collars. The FWC biologists equip black bears with collars to collect data on survival, reproduction, habitat, behavior, and movement. Researchers always prioritize bear safety. The FWC follows long-established institutional guidelines that collars cannot weigh more than 2-3% of a bear's total body weight. Collars are fit in such a way that the bear has room to grow but cannot easily pull the collar over their head.

GPS collars provide researchers with detailed data about bears. These collars regularly upload bear locations to a research database for approximately two years before falling off the bear, giving biologists a detailed look at many aspects of bear biology.

VHF collars send out a radio signal that researchers can listen to remotely with a signal receiver and an antenna. Depending on the terrain, researchers can hear the radio signals from VHF-collared bears from miles away. Although less precise and more time-intensive than GPS collars, VHF collars can last longer and weigh less.

Marking

The FWC uses three main methods to mark bears for research: ear tags, inner lip tattoos, and Passive Integrated Transponder (PIT) tags. Marking bears in several ways ensures that researchers can identify them again in the future. This way, if one marking method fails, there is always another way to identify the bear.

While a bear is immobilized during a capture, ear tags are inserted in each of the bear's ears. Unique color combinations of ear tags allow researchers to identify individual bears from photos or sightings. The bear is also given a tattoo on its inner lip of an assigned research name, such as B001. Tattoos allow for quick identification of the bear if it is handled again by researchers. Lastly, a PIT tag the size of a grain of rice is inserted under the skin, like the microchip that a domestic pet receives. A PIT tag will remain for the duration of a bear's life, allowing researchers to reliably identify bears with a handheld scanner if recaptured.

Survival

The FWC biologists use data from tracking collars on adult female bears and their cubs to estimate the probability of survival during different age classes. This is an important metric that impacts estimates of the population growth rate. When a collar stops moving for a period of time (8-24 hours), it emits a "mortality signal." The mortality signal may indicate that a bear is denning, has died, or the collar has fallen off the bear. If biologists suspect mortality, they follow the signal to document the date, location, and cause of death, if possible. At the conclusion of the study, biologists summarize the survival and mortality data for all bears in the study. Researchers use a statistical model called a "Known Fate" model to estimate the probability that an individual bear will survive any given year (an annual survival rate). For adult bears in Florida, this probability is generally high. For young bears, it can be much lower.

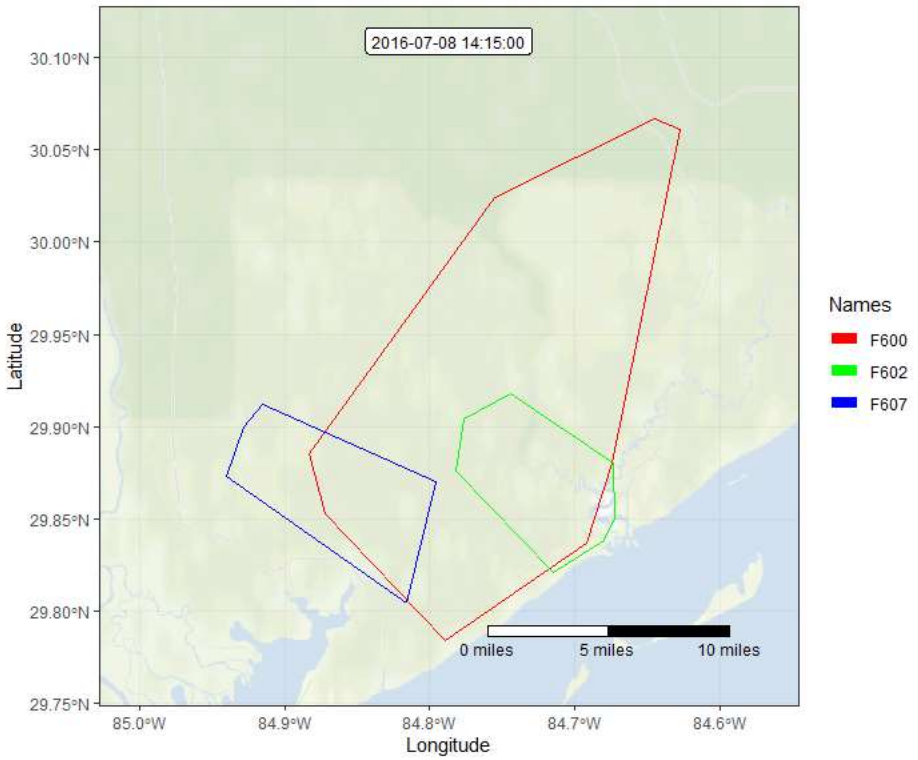
Fecundity

Fecundity is the measurement of reproductive output or success. For FWC bear biologists, it is estimated as the number of female cubs produced each year by the average female bear. Collecting the data necessary to estimate fecundity is a challenge. Biologists locate bear dens by female collar signals, then quietly approach the den location in early spring. The female flees from the den, giving researchers a short window of time to count her cubs and identify the sex of each cub. That information provides researchers with the number of female cubs per litter. Bears give birth sometimes in consecutive years, and sometimes rarely (> 4 years between litters), so researchers also track individual female bears to calculate the average "interlitter interval," or years between litter production. In Florida, this is typically a little over 2 years. These data together provide bear researchers with a reliable estimate of bear fecundity.

Home Range Estimates

A home range is the area in which an animal spends most of its time. This time period can be defined as a specific life stage, season, year, or as long as an individual was tracked. Biologists estimate home ranges of bears by using data from tracking collars to plot bear locations on a map. A common method that has been used for many decades is called a 95% Minimum Convex Polygon (MCP), used to find the area that encloses 95% of the animals known locations at any given time. Researchers may also use a "kernel density estimator" (KDE) or other range estimation method depending on the project. Applied across all individuals in a study, these methods enable researchers to estimate the average home range size in a region, habitat preferences, seasonal changes, and differences in home range size by sex, age, or other characteristic.

The animation below illustrates how bear movements lead to estimates of home ranges. In this example, three female bears with overlapping movements were tracked with GPS collars from July 2016 through July 2018 (date and time top center). As the bears move around their home range, you can see that most (95%) of their movements occur within the polygon (home range) of the matching color. See if you can notice when all three bears stop moving to den over winter.



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Office of Supplier Diversity

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Pursuant to section 120.74, Florida Statutes, the Fish and Wildlife Conservation Commission has published its **2022 Agency Regulatory Plan**.