

Determining the Size of the Florida Panther Population

The U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission estimate that there are 120 to 230 adult and subadult panthers within the habitat where panthers primarily breed. However, knowing the exact population size at any moment is impossible because of constant births, deaths, and limitations of survey methods.

Why Count Panthers? The public and managing agencies want to know how many panthers there are in order to track progress toward recovery. Population size and trend are frequently used to estimate the degree of imperilment of species and they are a good measure of the status of panthers. The Federal Recovery Plan for Florida panthers established numeric criteria to evaluate progress toward recovery. The plan specifies that two populations of 240 panthers should be established before considering moving from an Endangered to a Threatened classification.

Counting panthers is challenging. Estimation techniques that work on other species don't work well with panthers. Some of the challenges include: a lack of markings, like stripes or spots, making it difficult to recognize individual panthers; and the inability to reliably attract panthers to hair snares that would permit the collection of DNA samples. These issues have similarly affected how managers estimate puma population sizes in the western United States. Many of those states determine population sizes using a mix of educated guesses, hunter take, or in some cases, they are not counted at all.

What panthers are counted and where. The estimated population of 120-230 panthers includes only adults and subadults and not kittens that are still dependent on their mother. The Florida Panther Recovery Plan uses only the number of adults and subadults because they are most likely to survive across years and contribute to the breeding population. The population estimate is only for the areas south of the Caloosahatchee River identified as suitable breeding habitat based on a habitat analysis by Kautz et al. (2006). Although there are some panthers outside of this range, they are primarily dispersing males and do not contribute much to the breeding population.

History of estimating panther numbers. References to the panther population size have appeared in scientific literature, agency outreach materials, and popular media for years. Historically, most statements regarding panther numbers have resulted from expert opinion informed by field observations by those most closely engaged in panther research. Various figures have been used over the years including: 20-30 throughout the 1970s and early 1980s; 30-50 in the late 1980s through the mid-1990s; 50-70 for several years following genetic restoration in 1995; 90-120 in the early 2000s, 100-180 since 2014.

However, none of the aforementioned population ranges represent estimates that satisfy the rigors of science. A *scientific population estimate* incorporates measures of sampling effort, detectability, and precision. Measuring sampling effort assures consistency each time the population is counted so that estimates are comparable. Measuring detectability determines the chance of detecting a panther if it is present (via sign, trail camera photos, captures). The

precision of any estimate is affected by sample size. Small sample size typically results in an estimate with a wide margin of error (the “+ or –” often seen in polls). Techniques with wide margins of error are not very helpful when assessing the current status of a population.

In 2015, a peer reviewed paper described a technique for generating a scientific population estimate for panthers based on the proportion of the total number of panthers killed by vehicle collisions that were previously captured and radiocollared. Additional variables used in this technique include road density and traffic volume. This *roadkill technique* estimated a panther population size for 2012 at 269 adults and subadults (≥ 1 year old) with a margin of error between 143 and 509, meaning that the actual population size falls within this range with 95% certainty. This margin of error is too imprecise to use to inform conservation decisions. Scientists and managers that have studied panthers agree that the lower bound of this estimate is consistent with other indicators assessed via long-term monitoring and research. However, the upper bound of the range is not consistent with puma densities (the number of puma in an area of given size) reported by studies in other parts of their range. A population of 500 panthers would represent a panther density nearly 2 times higher than the average puma density reported throughout North and South America. As additional data are collected, the roadkill technique may become more precise with a tighter margin of error.

Annual counts of panther sign (photos, tracks, captures, mortalities, and radiocollar locations) also provide insight into panther abundance. Counts conducted primarily on public lands were informative in reaching the conclusion that the panther population is likely between 120 and 230. The lower bound is based on the number of adults and subadults documented during the most recent annual minimum count (2015). The upper bound of 230 is calculated using annual count data from core (very good) panther habitat to derive a density of panthers for that area. The density value is then multiplied by the total number of acres of habitat in the primary zone as identified by Kautz et al. (2006) to come up with an upper range of 230. Because this method does not account for sampling effort, imperfect detection of animals, or provide a margin of error, it can't be categorized as a scientific population estimate. Even with these shortcomings, this methodology has provided agencies with a reliable means of monitoring the population with the best data currently available.

Current research is focusing on better ways to estimate the population of panthers. Improvements to the roadkill technique and the potential use of camera trap grids both have potential to provide rigorous, precise scientific estimates of the population size of Florida panthers.