HABITAT SUITABILITY ANALYSIS OF THE CRITICALLY ENDANGERED FLORIDA PANTHER

Ian McCullough and Andrew Young
Colby College Department of Environmental Studies, ES 212, 2008

Abstract

The purpose of this study was to conduct a habitat suitability analysis of the critically endangered Florida panther (Felis concolor coryi) in Florida. We gathered land cover and road data from the Florida Geographic Data Library and performed map algebra using ESRI’s ArcGIS to compile a suitable habitat map. We found that there is 20381.7 km² of highly suitable habitat and 557124.4 km² of less desirable but usable habitat for the Florida panther. The highest concentration of highly suitable habitat is in Big Cypress National Preserve, with smaller patches in Tates Hell State Forest and along the southeast portion of the panhandle. Due to extensive fragmentation, however, and without establishment of habitat linkages to the existing southern population, there is little chance of survival of additional panther populations in much of northern Florida.

Introduction

The Florida panther (Felis concolor coryi) is a critically endangered subspecies of mountain lion with 80-100 remaining in the wild according to the U.S. Fish and Wildlife Service. As a large predator it requires large expanses of uninterrupted habitat. Females ideally inhabit home ranges of 100 km² and males 500 km². Panthers have shown preference for habitats consisting predominantly of hardwood hammock and hardwood or cypress swamp. Hardwood hammock supports the soil and vegetation best suited for white-tailed deer, a favorite panther prey (Maehr and Cox 1995). Urban, residential and agricultural growth are among the largest threats to the panther today and have limited the panther to 5% of its historic habitat range (Maehr 2002). Genetic isolation and lack of allelic diversity are other major concerns. In 1993, 18 captive and wild-born Texas cougars were introduced to the Okefenokee Swamp area of Florida and Georgia. Habitat availability and prey density were deemed suitable for panther persistence in North Florida (Belden and McCown 1996). We used a Geographic Information System (GIS) to identify remaining areas of suitable Florida panther habitat. The variables we took into consideration were land cover and roads. We hope our analysis will reveal the likelihood of panther persistence in its current range and if there is enough suitable habitat remaining for panther reintroduction and establishment of linkages in other parts of the state.

Methods

The GIS program used to conduct the analysis was ESRI’s ArcGIS. Data was downloaded from the Florida Geographic Data Library and the Florida Department of Environmental Protection. A state boundary shapefile was obtained from the Florida Coastal Everglades Long-term Ecological research website. We constructed several maps of Florida. The first was a map of protected lands in Florida (Fig.1). Figure 2 is a map of buffered roads (500 m) based on the parameters of Meegan and Maehr study (2002). We reclassified land coverages into six categories of decreasing panther suitability based on the findings of the Maehr and Cox study (1995) (Fig.3). We also made a map of patch sizes of most desirable panther habitat to quantify fragmentation and identify potential linkage areas. The final habitat suitability map (Fig. 5) is a single output map algebra sum of equally weighted road buffers and land cover with highly suitable habitat assigned a value of 2, less desirable a value of 1, and all other undesirable habitats, including open water assigned a value of 0.

Results and Conclusions

Florida panther habitat is heavily fragmented. Most suitable habitat is already under federal or state protection, but fragmentation places long-term persistence of the panther in jeopardy. We found that there are 20,381.7 km² of highly suitable habitat and 557,124.4 km² of less desirable but usable habitat for the Florida panther, though this habitat is heavily fragmented. Of 1,400,883 total highly suitable patches, just 1,678 of these are over 1 km², which constitute approximately 13,346 km², about 57% of the state’s total highly suitable habitat. There are just 15 patches greater than 100 km², making up 2,960 km² and 14.5% of the state’s total highly suitable habitat. The three largest patches occur in the Big Cypress-Everglades region which in total consist of 1,454 km² (7.1% of total). These three patches are connected by areas of marginal habitat, so dispersal among these areas is relatively likely. They are separated by I-75 and Route 29, both 2-lane rural roads that pose potential injury and/or mortality threats to panthers, but are crossable boundaries, so gene flow among patches is possible.

Suitable habitat does exist, however, in many parts of northern Florida, so theoretically panthers could survive in these areas. There are several patches greater than 50 km² (some over 100) along the western coast into the panhandle to Tates Hell State Forest that could eventually be connected into a dispersal network with the establishment of proper linkages. Waccassassa Bay and Crystal River Preserve State Parks would be the southwesternmost portion of this network and are already connected protected lands, though they are coastal areas where humans like to congregate. Perhaps road underpasses, which have been used in the past, can help facilitate dispersal and prevent panther-automobile collisions.

Even if this network were established, connection with the southern population would still be difficult but necessary to increase genetic diversity in what is essentially a genetic island in the southern population. Males occasionally disperse out of their known ranges, but no radio-collared cat has ventured north of Sarasota County (Maehr et al 2002), which is still nearly 200 km from the Crystal River Preserve. Translocation of panthers, females in particular, may be a solution if a second panther population is established to facilitate gene flow.

Acknowledgements

We would like to thank Geographic Information System & Quantitative Analysis Specialist Manny Simon for his extensive time and efforts spent assisting us with compiling our maps and performing our analysis. The authors would also like to thank Environmental Studies Professor Philip Nyhus for his tireless efforts in lab and lecture. Finally, we would also like to thank the Oak Foundation and Colby College for their extensive support in our research efforts.

Literature Cited


Figure 1. Protected Lands of Florida
Figure 2. Roads of Florida
Figure 3. Vegetation by Panther Suitability
Figure 4. Patch Size of Most Desirable Panther Habitat
Figure 5. Florida Panther Habitat Suitability

Projected Coordinate System: NAD 1983 Florida GDL Albers

Legend

Legend

Legend

Legend

Legend

Legend

Legend

Legend

Legend

Legend