

## HISTORICAL TRENDS WITHIN THE RANGE OF THE FLORIDA PANTHER

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### **Florida Panther Habitat Defined**

In order to discuss trends in Florida panther habitat, it is first necessary to define panther habitat. For the purposes of this paper, panther habitat as defined below is based on a Geographic Information System (GIS) analysis of panther habitat by Maehr and Cox (in press).

Maehr and Cox (in press) plotted over 14,000 geographically referenced radio telemetry records of panther locations in southwest Florida on a vegetation map of the region created from Landsat Thematic Mapper satellite imagery (Kautz et al. 1993). The vegetation type in which each location occurred was noted. Maehr and Cox (in press) then generated a set of over 7,000 randomly selected points, overlaid them on the vegetation map, and determined the vegetation type under each randomly selected point. This step provided an indication of the availability of the different vegetation types.

Vegetation types actually used by panthers were compared to random availability of habitats. As shown in Figure 1, 80 percent of all radio telemetry locations occurred in four vegetation types: cypress swamp (32 percent), hardwood hammock (23 percent), hardwood swamp (17 percent), and pinelands (7 percent). However, these types accounted for only 22 percent of the available habitat in the region. These results reinforce the findings of others

that Florida panthers prefer forest habitats.

Florida panthers used freshwater marsh (6 percent) and agriculture and pasture (5 percent) habitats sparingly, even though these two habitats together comprised 50 percent of the available habitat in the region. Due to the extensive occurrence of these vegetation types within the current range of the Florida panther, occasional use of these habitats by panthers probably is unavoidable.

The following sections will look at trends and status of panther habitat, particularly forest habitats, by first reviewing habitat trends statewide, then in south Florida, and finally in southwest Florida, the current stronghold of the Florida panther.

### **Statewide Land Use Trends in Florida, 1936-1987**

Statewide trends in wildlife habitat between 1936 and 1987 provide an indication of the extent of loss of panther habitat in recent times (Figure 2). During this 51-year period, Florida forests declined 4.30 million acres, a loss of 21 percent (Kautz 1993). Assuming that all of the forest lost was good panther habitat, assuming no overlap of home ranges within each sex, and assuming male and female home range sizes vary between 100-200 mi<sup>2</sup> and 38-75 mi<sup>2</sup>, respectively, the loss of 4.30 million acres of forest is the equivalent of 35-70

male panther home ranges and 100-200 female panther home ranges.

During this same period, herbaceous wetlands declined 3.88 million acres, a loss of 56 percent. At the same time, cropland and rangeland increased 4.25 million acres, a gain of 30 percent. Urban areas increased 3.95 million acres, a gain of 538 percent. Clearly, during this 51 years, the Florida landscape became increasingly agricultural and urbanized at the expense of native wildlife habitats.

### **Land Use Trends in South Florida, 1936-1987**

A series of U.S. Forest Service (USFS) technical reports contain data on trends in land use by county (Eldridge 1938a, Eldridge 1938b, Ineson and Eldridge 1938, McCormack 1950, Larson and Goforth 1961, Knight and McClure 1971, Bechtold and Knight 1982, Brown and Thompson 1988). To quantify trends in land use within a 10-county area of south Florida, the primary range of the panther, land use data for Charlotte, Glades, Lee, Hendry, Collier, Martin, Palm Beach, Broward, Dade, and Monroe counties were obtained from these reports.

As shown in Figure 3a, forest land in south Florida declined 33 percent between 1936 and 1987, a loss of 0.98 million acres of habitat. Up through 1970, forest land was tallied in all 10 south Florida counties. However, the 1980 and 1987 reports show zero forest land in Broward, Dade, and Monroe counties. This is because, by 1980, urban development had proceeded to the point that USFS staff felt that there were no commercial timber resources remaining in these three counties. As a consequence, forest inventories were not

conducted in Broward, Dade, and Monroe counties in 1980 and 1987 (Ray Sheffield, pers. comm.).

USFS classifies forest lands into two major types, commercial and non-commercial forests. Commercial forest land is defined as any land with  $\geq 16.7$  percent stocking of trees, or formerly having had trees, capable of producing 20 ft<sup>3</sup> of wood per acre per year, and not reserved for other use. Non-commercial forest land includes land incapable of producing 20 ft<sup>3</sup> of wood per acre per year due to adverse site conditions and forest land withdrawn from timber use by statute or administrative designation. Mangrove swamps, hat-rack cypress, shrub swamps, and forests in state parks are examples of non-commercial forest lands.

As shown in Figure 4, commercial forests accounted for 1.66 million acres, or 55 percent, of all forest land in south Florida in 1936. Between 1936 and 1987, commercial forest land had declined to 0.66 million acres, a 60 percent reduction over this 51-year period. In 1987, commercial forests accounted for 33 percent of all forest land in the region. Clearly, the forest lands converted to human uses in south Florida were the most productive of the forest lands in the region.

Also shown in Figure 4 is that non-commercial forests accounted for 1.35 million acres, or 45 percent, of all forest land in south Florida in 1936. From 1936 to 1987, the area of non-commercial forest land ranged between 1.20 million acres and 1.59 million acres. The fluctuations in non-commercial forests during this period are largely attributable to sampling error and to changes in USFS definitions of forest types over time. In 1987, USFS again reported a total of 1.35 million acres of non-

commercial forests in south Florida. At that time, non-commercial forests covered 67 percent of all forest land in the region. These results suggest that the area of non-commercial forest land in south Florida has remained relatively constant over time.

The USFS reports contain information on the area of marsh land in south Florida only for 1949-1987. As shown in Figure 3b, marsh land in the 10-county south Florida region declined 1.39 million acres, or 40 percent. Much of this loss was due to the conversion of Everglades and wet prairies to agricultural and rangeland uses.

Data on trends in cropland, pasture, and urban land in south Florida are only available from USFS reports for 1959-1987. As shown in Figure 3c, cropland increased 0.65 million acres, a 141 percent gain, during this 28-year period. At the same time, pasture increased 0.53 million acres, a gain of 52 percent (Figure 3d), and urban land increased 0.71 million acres, a gain of 170 percent (Figure 3e).

Overall land use trends in the 10-county south Florida region for the period 1959-1987 are summarized in Figure 3f.

### **Strategic Habitat Conservation Areas for Florida Panther**

Cox et al. (1994) published a map of private lands recommended for inclusion in a Strategic Habitat Conservation Area for the Florida panther (Figure 5). The map shows that almost all of the land that would be necessary to meet the long-term conservation needs of panthers occur in the five southwest Florida counties of Collier, Hendry, Lee, Glades, and Charlotte. The remainder of this discussion will pertain to trends and

status of panther habitat in these five counties.

### **Ownership of Panther Habitat in Southwest Florida**

Trends and status of ownership of panther habitat in southwest Florida was determined in two different ways. One involved USFS data, and the other was based on a Geographic Information System (GIS) analysis contained in Cox et al. (1994).

The only USFS reports containing ownership information were the 1970, 1980, and 1987 inventories. During those surveys, USFS collected ownership information only on commercial forest lands. No ownership information is available for non-commercial forest lands.

As shown in Figure 6, the acreage of commercial forest land (i.e., the most productive forests from a timber standpoint) in private ownership declined from 97 percent to 92 percent in the five counties of southwest Florida. The fluctuations in total acreage of commercial forest in the region are most likely attributable to sampling error and difficulties in differentiation of commercial and non-commercial forests. These results indicate a slight increase in the amount of panther habitat in public ownership over this period. Nevertheless, the vast majority of the most productive forest land (and presumably the best panther habitat) in the region is in private ownership.

Data available in Cox et al. (1994) provide a more complete assessment of the ownership of panther habitat (Figure 7). A GIS overlay of public land boundaries on a vegetation map of the region reveals that 67 percent of the four preferred panther habitats (i.e., cypress

swamp, hardwood hammock, hardwood swamp, and pineland) was in private ownership in 1994. This figure differs from the USFS figure because the GIS overlay includes forest lands that USFS considers non-commercial forests.

### **Commercial Forest Types in Southwest Florida, 1987**

Another assessment of the status of Florida panther habitats in southwest Florida can be obtained by determining the types of forest that occur on commercial forest land. As shown in Figure 8, cypress-gum forests accounted for 59 percent of all commercial forest land in the region in 1987. Pine forests accounted for 32 percent, and hardwood forests accounted for only 9 percent of the commercial forest land. Belden et al. (1988) and Maehr et al. (1991) identified hardwood hammock as the most important community type for Florida panthers. The importance of conserving these types for panthers cannot be emphasized enough. Given the low occurrence of hardwood forests in the region, and given that 92 percent of the commercial forests in the region are in private ownership, conservation of hardwood forests may prove difficult.

### **Size Classes of Commercial Forest Trees in Southwest Florida, 1987**

Finally, commercial forest lands in southwest Florida can be characterized on the basis of tree size classes. Brown and Thompson (1988) provide the following definitions for tree size classes.

Saw-timber size trees: softwoods  $\geq 9.0$  inches diameter at breast height (dbh) and hardwoods  $\geq 11.0$  inches dbh.

Poletimber-size trees: live trees  $\geq 5.0$  inches dbh but smaller than saw timber size.

Saplings: live trees 1.0-5.0 inches dbh

Seedlings: live trees of commercial species  $\leq 1.0$  inches dbh that are expected to survive and develop.

Nonstocked: commercial forest land stocked with  $\leq 16.7$  percent growing stock trees.

In 1987, 36 percent of commercial forest lands supported stands of sawtimber, 32 percent supported poletimber stands, 12 percent supported saplings and seedlings, and 19 percent were nonstocked. By way of comparison, 33 percent of commercial forest lands statewide supported sawtimber stands, 26 percent supported poletimber stands, 29 percent supported saplings and seedlings, and 12 percent were nonstocked in 1987. These figures indicate that commercial forest lands in southwest Florida tend to support older growth forests than the rest of the state. They also indicate that, once forests are cut, there is less of a tendency to replant forests in southwest Florida.

### **Summary**

Based on a GIS analysis of habitat use, Florida panthers prefer forest habitats, particularly cypress swamp, hardwood hammock, hardwood swamp, and pinelands. Statewide, forest habitats declined 4.30 million acres, or 21 percent, in the 51-year period from 1936 to 1987. This may have been enough habitat to support 35-70 male and 100-

200 female Florida panthers. In a 10-county region of south Florida, forest lands declined 0.98 million acres between 1936 and 1987. All of the forest land converted to other uses came from the lands classified as commercial forest land, whereas lands classified as non-commercial forest land showed no decrease over time. Between 1949 and 1987, marsh land in south Florida decreased by 1.39 million acres. Between 1959 and 1987, cropland increased by 0.65 million acres, pasture increased by 0.53 million acres, and urban area increased by 0.71 million acres. Within a five-county area of southwest Florida that includes the current range of the panther, 92 percent of commercial forest land, which comprises important habitat for the panther, was in private ownership in 1987. A GIS analysis of ownership patterns revealed that 67 percent of the four vegetation types most preferred by the Florida panther were in private ownership in 1994. Cypress-gum forests accounted for 59 percent of the forests on commercial forest lands in southwest Florida, pine forests accounted for 32 percent, and hardwood forests accounted for 9 percent in 1987. Hardwood forests, which are the most important habitat types for panthers, are also the most rare forest type and are more likely to occur on private land. Sawtimber- and poletimber-size stands comprised 68 percent of commercial forest lands in southwest Florida whereas sapling, seedling, and nonstocked sites comprised 31 percent in 1987.

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