Florida Key deer
Odocoileus virginianus clavium

This profile is a short summary of information to introduce the species and does not summarize all available information on the species.

Listing status: USFWS = Endangered
FWC = Endangered

Trend: The Florida Key deer (Odocoileus virginianus clavium) is endemic to the Florida Keys and is restricted to roughly 11 island complexes in the lower Florida Keys (USFWS 2007), with approximately 75% of the population existing on Big Pine Key and No Name Key (Lopez 2001). Once abundant and ranging from Key West to Key Vaca, habitat destruction and intense hunting pressure reduced populations to less than 50 individuals by the 1940’s (USFWS 1999; Lopez et al. 2004a). The Florida Key deer was officially listed as federally endangered in 1967.

As a result of reduced hunting (banned in 1939 by the Florida legislature) and the conservation of Florida Key deer habitat through the establishment of the National Key Deer Refuge (NKDR) in 1957, Florida Key deer numbers have increased. Current populations are considered stable, and population estimates total approximately 800 individuals, with roughly 600 located on Big Pine and No Name Keys (NatureServe; Lopez 2001). Researchers estimate an increase of 5% annually since 1971 (Lopez et al. 2004a), despite increasing mortality from deer-vehicle collisions (FNAI 2001; Parker et al. 2007). This increase, however, is highly localized. Florida Key deer have become increasingly abundant on Big Pine Key and adjacent islands, but have decreased to near zero on the more distant southwestern islands such as Cudjoe and Sugarloaf Keys (USFWS 2003; Lopez et al. 2001).

Threats: The greatest threat for this species is urban development in the Florida Keys and its associated risks. These risks include habitat loss and fragmentation, deer domestication, and deer-vehicle collisions (Lopez et al. 2004; Harveson et al. 2004). Deer-vehicle collisions are the largest direct causes of mortality, accounting for up to 50% of annual losses. Approximately 26% of annual Florida Key deer mortality occurs as deer-vehicle collisions (DVCs) on the 5.6-km section of US 1 on Big Pine Key (Parker et al. 2007). Of particular concern is South Big Pine Key, which has a much higher rate of development and fragmentation in Florida Key deer habitat than North Big Pine Key (Harveson et al. 2004). Florida Key deer will aggregate in urban areas, making surrounding natural areas (such as the NKDR) more susceptible to overbrowsing, a decrease in preferred plant density, and an increase in non-preferred species (Barrett and Stiling 2006). The availability of fresh water is also affected by urbanization activities, such as dumping, draining, pumping, etc. Additional threats include fencing, which has resulted in a loss of habitat and interference with migration.
routes, poaching, drowning in mosquito impoundments, and predation by dogs (NatureServe; USFWS 2003).

Notes: The USFWS has drafted a management plan for Florida Key deer that is not yet finalized. Literature suggests that Florida Key deer respond to urbanization in a bell-curve fashion. Populations respond positively up to a certain threshold of urbanization, after which point the effects of urbanization appear to be detrimental (USFWS 2004).

Prioritization information:
- PLCP PVA proportion of pops modeled to persist on public lands = 0.38
- PLCP PVA probability of a 50% decline on public lands = 0.11
- Millsap updated biological score = 43.3
- Millsap updated supplemental score = 16
- Legacy population trend = Stable
- Legacy population status = Medium

Summary: This species triggers 4 of the 6 parameters, making it a moderate to high priority. USFWS plan places a high emphasis on decreasing habitat fragmentation and road mortality resulting from increased urbanization of high-density areas, as well as protecting uplands with permanent freshwater sources.

Life History: The endangered Florida Key deer is the smallest subspecies of white-tailed deer in the United States. In addition to their size, a number of characteristics distinguish Florida Key deer from other white-tailed deer. These include high saltwater tolerance, low birth rates, and weak family bonds (USFWS 2004). Their behavior is also more solitary than northern white-tailed deer, although feeding by people has resulted in aggregations on the human-inhabited islands. According to Ellsworth et al. (1994), the Florida Key deer population is the most genetically divergent deer population in the southeastern United States. The Florida Key deer is more susceptible to a loss of genetic diversity because of its island environment and the population bottlenecks it has already experienced (USFWS 2004).

Florida Key deer utilize all habitat types within their range, including pine flatwoods, pine rocklands, hardwood hammocks, buttonwood wetlands, mangrove wetlands, and freshwater wetlands. Uplands (pine rocklands in particular) are critical to Florida Key deer because they contain permanent freshwater sources. The principal factor influencing the distribution and movement of Florida Key deer is the location and availability of fresh surface water. Approximately 85% of fawning occurred in pinelands and hammocks, which may also function as important bedding and loafing areas (USFWS 2004; Lopez 2004b). The presence of food, freshwater, and cover collectively support the importance of uplands for Florida Key deer.

Florida Key deer forage on over 160 species, and their diet varies seasonally. Preferred forage includes red mangroves, gumbo limbo, blacktorch, saffron-plum, blolly, indigoberry, blackbead, grasses, acacia, Indian mulberry,
and pencil flower. Red and black mangroves constitute 24% by volume of the Florida Key deer’s diet. Seasonal availability of special foods such as black mangrove, palm, and dilly fruits influences Florida Key deer movements. Many of the important food plants occur in pine rocklands and are stimulated by fire. Florida Key deer use and congregate in urban areas to feed on ornamental plants and grasses and seek refuge from biting insects (USFWS 2003; Barrett and Stiling 2006).

Florida Key deer have well-defined patterns of activity and habitat use. Established trails are visible in many of the Florida Key deer movement corridors. Bedding and feeding areas are used regularly by individuals. “Hot spot” road crossings are clearly apparent from roadkill data, however road characteristics may complicate to this analysis. Florida Key deer swim easily between keys and use all islands during the wet season, but during the dry season, suitable water is available on only 13 islands. Big Pine Key and No Name Key provide the most fresh water. Home ranges vary seasonally and with age and may be affected by the degree of urbanization. Average monthly home range size for adult males is about 120 ha and for adult females is about 52 ha, while yearly ranges are larger with an average of 320 ha for males and 175 ha for females. Adult males range over much larger areas during the breeding season and may shift to an entirely new area (USFWS 2004).

On average, Florida Key deer produce fewer young than other free ranging white-tailed deer populations. Fecundity and rate of reproductive activity are low, and mean age of first breeding is high, resulting in reproductive potential that is lower than any other North American deer population. The sex ratio is skewed towards male offspring.

Deer, marsh rabbits, and silver rice rats use similar vegetation in salt marshes, transitional areas, and freshwater marshes. Deer and silver rice rats both rely on mangrove swamps, although mangroves seem to be the least important of the used habitats (Lopet et al 2004). Coastal berm areas on Long Beach and Sugarloaf Beach on Big Pine Key are used by marsh rabbits, as well as by Florida Key deer that use these same areas for bedding and fawning (USFWS 2004).

Preferred habitat Parameters for Florida Key deer:
- Islands with permanent freshwater sources
- Pine rockland with frequent (3-8 year) fire cycles

Minimum Habitat Requirement:
- From PVA: Populations with at least 30 females (or approx 75 ha)
- From Literature: N/A

Best Management Practices:
- Prioritize land acquisition efforts toward upland habitats with permanent fresh water sources
- Protect additional habitat designed to minimize fragmentation of the Florida Key deer population and reduce chances of collisions with vehicles
- Maintain low speed limits and deer crossing signs on roads that pass through occupied islands
- Establish fencing and underpasses in hot spot crossing areas
- Protect or establish corridors that will allow movement of deer between various habitat patches
- Burn pine rockland community regularly (3-8 years) to maintain high-quality forage
- Protect freshwater areas within occupied islands
- Enforce leash laws to minimize encounters between dogs and deer.
- Educate public regarding threats, including problems associated with feeding and domestication
- Eliminate the accidental drowning of fawns by filling mosquito ditches on public lands
- Evaluate population control measures and browsing impact in high-density areas
- For additional information on best management practices, see USFWS South Florida Multi-Species Recovery Plan

Survey Methods and Monitoring Protocols: Traditional survey techniques used for Florida Key deer on Big Pine and No Name Keys include road-counts, strip-counts, and mark–recapture methods. Due to practical limitations and financial considerations these survey techniques may be impractical for application on outer islands. Camera-based surveys have been successfully used to survey deer populations on outer islands.
For additional information on monitoring, see Lopez et al. 2004a and Watts et al 2008.

PVA Summary: The Wildlife Habitat Conservation Needs in Florida project created a PVA (http://research.myfwc.com/features/view_article.asp?id=29815) for the Florida Key deer using parameters values based on data from Big Pine Key and No Name Key. Growth rate was estimated at 1.0067. In this analysis, 47% of fawns survived to become yearlings and 83.4% of yearlings were modeled to survive to become adults. To delineate distinct populations, dispersal was estimated at 0.5 km. Data from BPK and NNK were used to estimate initial abundance of 0.32 females/ha (0.4 females/ha carrying capacity) for the entire population. For all potential habitat, the metapopulation contained 17 populations of deer, which was increased to 26 populations when considering the more fragmented potential habitat occurring in currently managed areas.

Both populations had zero risk of extinction when modeled over a 100-year period, however the populations on only managed lands had a 11-19% chance of a 50% decline. Adult survival was found to be the most important parameter in persistence; reducing survival by 10% increased the risk of extinction from 0% to 83% for the populations on all potential habitat. Populations that had at least 30 females were most likely to remain occupied throughout the entire 100 year simulation, which suggests that the smaller populations are not likely to persist long term without occasional dispersal. All of
these models assume that there are no catastrophes and no changes in habitat, which further emphasizes the critical importance of the larger populations and dispersal among the populations.

2003 Landcover used for model:
- Pinelands
- Tropical Hardwood Hammock
- Freshwater Marsh and Wet Prairie
- Mangrove Swamp
- Scrub Mangrove

FNAI Natural Communities Utilized by Florida Key deer:
- Pine Flatwoods
- Pine Rocklands
- Rockland Hammocks
- Tidal Swamps
- Wet Prairie

FNAI field guide description of habitat:
A variety of habitats in close proximity to fresh water. Pine/palm community (pine rockland) and tropical hardwood forests are used most frequently. Buttonwood and mangrove swamps provide a small but essential portion of the Florida Key deer’s annual habitat needs. Recently burned areas provide nutrient-rich forage.

Important Links:

FNAI Florida Key deer profile


USFWS. 2004. South Florida Multi-Species Recovery Plan – Florida Key deer

Pertinent Documents/Literature:


USFWS. 2007. Key deer (Odocoileus virginianus clavium) 5-year review: summary and evaluation DRAFT. South Florida Ecological Services Office.