Standard Local Operating Procedures for Endangered Species
South Florida

Southeastern Beach Mouse

I. Explanation of SLOPES

The Standard Local Operating Procedures for Endangered Species (SLOPES) for the federally threatened southeastern beach mouse (*Peromyscus polionotus niveiventris*) (beach mouse) provides a tool to assist the user in determining if an action, i.e., a Federal permit, a Federal construction project, or other such action, may adversely affect the southeastern beach mouse. These procedures provide the user with a stepwise process to determine what effects the action will have on sea turtles and options available that may avoid or minimize these effects. A summary of the ecology of the southeastern beach mouse can be found in *South Florida Multi-Species Recovery Plan* (Service 1999).

During the review of a project effects to the southeastern beach mouse, the Service evaluates the possible adverse affects of actions proposed within the coastal strand of Indian River County and northern St. Lucie County. If suitable habitat is present within the project area, the Service presumes that the beach mouse is present. However, the SLOPES protocol provides an option conduct surveys to determine presence or absence of the beach mouse.

To assist with the determination of the affects of an action on the beach mouse, additional biological information is provided below.

II. Biological Information (and Where to Find It)

What it is, where it occurs, and where it occurred historically

The southeastern beach mouse was listed as a federally threatened species in 1989. It is one of 16 recognized subspecies of oldfield mice (Peromyscus polionoits), as well as, one of seven subspecies identified as "beach mice"(Hall 1991). Historically, the southeastern beach mouse occurred along approximately 174 miles of Florida's east coast barrier islands, from Ponce Inlet, Volusia County to Hollywood, Broward County (Stout 1992) (add map of historic range). However, according to the most recent published literature, this subspecies is currently limited to approximately 50 miles of dune habitat in Volusia County, Brevard County, and within pockets of suitable habitat in Indian River and St. Lucie counties. The southeastern beach mouse is geographically isolated from all other subspecies of beach mice.

The distribution of the southeastern beach mouse is severely limited and fragmented and has

declined significantly due to modification and destruction of its coastal habitats. As a result, the beach mouse has been extirpated from Fort Pierce Inlet, St. Lucie County south through Broward County. Population data is limited in South Florida, therefore, population trends are difficult to determine for the southeastern beach mouse; however, recent surveys reveal that where it currently persists, its population is small (Service 1999). Though the southeastern beach mouse occurs in Brevard and Volusia counties, these SLOPES pertain to the population of southeastern beach mice that exist in Indian River and St. Lucie counties.

Critical habitat as defined under the ESA has not been designated for the southeastern beach mouse.

III Suitable habitat

Dune vegetation, particularly sea oats *(Uniola paniculata)* within the primary coastal dunes is considered essential habitat of the southeastern beach mouse (Humphrey and Barbour 1981, Humphrey *et al.* 1987, Stout 1992). However, this subspecies has also been reported from sandy areas of adjoining coastal strand vegetation (Extine 1980, Extine and Stout 1987, Rich *et al.* 1993), which refers to a transition zone between the foredune and the inland plant community (Johnson and Barbour 1990). Although individuals can occur and reproduce in the ecotone between the former sea oats zone and the shrub zone, they will not survive as a population there (L. Ehrhart, University of Central Florida, personal communication 1998). Beach mouse habitat is heterogeneous, and distributed in patches that occur both parallel and perpendicular to the shoreline (Extine and Stout 1987). Because this habitat occurs in a narrow band along Florida's coast, structure and composition of the vegetative communities that form the habitat can change dramatically over distances of only a few meters. (Should we convert to feet or yards?)

Primary dune vegetation described from southeastern beach mouse habitat includes sea oats, dune panic grass (*Panicum amarum*), railroad vine (*Ipomaea pes-caprae*), beach morning glory (*Ipomaea stolonifera*), salt meadow cordgrass (*Spartina patens*), lambís quarters (*Chenopodium album*), saltgrass (*Distichlis spicata*), and camphor weed (*Heterotheca subaxillaris*) (Extine 1980). Coastal strand and inland vegetation is more diverse, and can include beach tea (*Croton punctatus*), prickly pear cactus (*Opuntia humifusa*), saw palmetto (*Serenoa repens*), wax myrtle (*Myrica cerifera*), rosemary (*Ceratiola ericoides*), sea grape (*Coccoloba uvifera*), oaks (*Quercus sp*.) and sand pine (*Pinus clausa*) (Extine and Stout 1987). Although Extine (1980) observed this subspecies as far as 1 km inland on Merritt Island, he concluded that the dune scrub communities he found them in represent only marginal habitat for the southeastern beach mouse; highest densities and greater survival of mice were observed in beach habitat. In the same study site, Extine (1980) and Extine and Stout (1987) reported that the southeastern beach mouse showed a preference for areas with clumps of palmetto, sea grape, and expanses of open sand. In Indian River County, southeastern beach mice inhabit dunes that are only 1 to 3 m wide and dominated

by sea oats and dune panic grass (Humphrey and Frank 1992). According to Stout (1992), southeastern beach mice do not occur in areas where woody vegetation is greater than 2 m in height. Within their dune habitat, beach mice construct burrows to use as refuges, nesting sites, and food storage areas. Burrows of *P. polionotus*, in general, consist of an entrance tunnel, nest chamber, and escape tunnel. Burrow entrances are usually placed on the sloping side of a dune at the base of a shrub or clump of grass. The nest chamber is formed at the end of the level portion of the entrance tunnel at a depth of 0.6 to 0.9 m, and the escape tunnel rises from the nest chamber to within 2.5 cm of the surface (Blair 1951). A beach mouse may have as many as 20 burrows within its home range. They are also known to use old burrows constructed by ghost crabs (*Ocypode quadrata*).

Behavior

Not much is known about the life history and ecology of the southeastern beach mouse. Therefore, this section makes inferences about their biology using data from studies of other beach mice. *P. polionotus* is the only member of the genus that digs an extensive burrow for refuge, nesting, and food storage (Ehrhart 1978). To dig the burrow, the mouse assumes a straddling position and throws sand back between the hind legs with the forefeet. The hind feet are then used to kick sand back while the mouse backs slowly up and out of the burrow (Ivey 1949). Burrows usually contain multiple entrances, some of which are used as escape tunnels. When mice are disturbed in their burrows, they open escape tunnels and quickly flee to another burrow or to other cover (Ehrhart 1978). Beach mice, in general, are nocturnal. They are more active under stormy conditions or moonless nights and less active on moonlit nights. Movements are primarily for foraging, breeding, and burrow maintenance. Extine and Stout (1987) reported movements of the southeastern beach mouse between primary dune and interior scrub on Merritt Island, and concluded that their home ranges overlap and can reach high densities in their preferred habitats.

Reproduction and Demography

Studies on *Peromyscus* species in peninsular Florida suggest that these species may achieve greater densities and undergo more significant population fluctuations than their temperate relatives, partially because of their extended reproductive season (Bigler and Jenkins 1975, Smith and Vrieze 1979). Subtropical beach mice can reproduce throughout the year; however their peak reproductive activity is generally during late summer, fall, and early winter. Extine (1980) reported peak reproductive activity for *P. p. niveiventris* on Merritt Island during August and September, based on external characteristics of the adults. This peak in the timing and intensity of reproductive activity was also correlated to the subsequent peak in the proportion of juveniles in the population in early winter (Extine 1980). This pattern is typical of other beach mice as well (Rave and Holler 1992). Sex ratios in beach mouse populations are generally 1:1

(Extine 1980, Rave and Holler 1992). Blair (1951) indicated that beach mice are monogamous; once a pair is mated they tend to remain together until death. He also found, however, that some adult mice of each sex show no desire to pair. Nests of beach mice are constructed in the nest chamber of their burrows a spherical cavity about 4 to 6 cm in diameter. The nest comprises about one-fourth of the size of the cavity and is composed of sea oat roots, stems, leaves and the chaffy parts of the panicles (Ivey 1949). The reproductive potential of beach mice is generally high (Ehrhardt 1978). In captivity, beach mice are capable of producing 80 or more young in their lifetime, and producing litters regularly at 26-day intervals (Bowen 1968). Litter size of beach mice, in general, ranges from two to seven, with an average of four. Beach mice reach reproductive maturity as early as 6 weeks of age (Ehrhart 1978).

Dispersal of young mice and the disappearance of adults may be the primary reasons for population fluctuations in certain areas (Blair 1951). Young beach mice move an average of 432 m before establishing residence in a new area. Although reproductive potential is high, mortality of adult beach mice is also quite high. Only 19.5 percent of the beach mice present in this study in January survived to May of that same year.

Foraging

Beach mice typically feed on seeds of sea oats and dune panic grass (Blair 1951). The southeastern beach mouse probably also eats the seeds of other dune grasses, railroad vine, and prickly pear cactus. Although beach mice prefer the seeds of sea oats, these seeds are only available as food after they have been dispersed by the wind. Beach mice also eat small invertebrates, especially during late spring and early summer when seeds are scarce (Ehrhardt 1978). Beach mice will store food in their burrows.

Status and Trends

The distribution of the southeastern beach mouse has declined significantly due to modification and loss of its coastal habitats, particularly in the southern part of its range. Historically, it was reported to occur from Ponce (Mosquito) Inlet, Volusia County, to Hollywood Beach, Broward County (Hall 1981). Bangs (1898) reported it as extremely abundant on all the beaches of the east peninsula from Palm Beach at least to Mosquito (Ponce) Inlet. More recently, the southeastern beach mouse has been reported only from Volusia County (Canaveral National Seashore to about 11 km north of the Volusia-Brevard County line), Federal lands in Brevard County (Canaveral National Seashore, Merritt Island NWR, and Cape Canaveral Air Force Station), a few localities in Indian River County (Sebastian Inlet SRA, Treasure Shores Park, and several private properties), and St. Lucie County (Pepper Beach County Park and Fort Pierce Inlet SRA) (Humphrey *et al*. 1987, Robson 1989, Land Planning Group, Inc. 1991, Humphrey and Frank 1992, Service 1993).

Large, healthy populations of the southeastern beach mouse are still found on the beaches of Canaveral National Seashore, Merritt Island NWR, and Cape Canaveral Air Force Station in Brevard County-all federally protected lands (U.S. Air Force 1989, Provancha and Oddy 1992). The distribution of this subspecies in the South Florida Ecosystem, however, is severely limited and fragmented. There are not enough data available in South Florida to determine population trends for the southeastern beach mouse; however, recent surveys reveal that it occurs in very small numbers where it is found (Table 1).

In Indian River County, the Treasure Shores Park population has experienced a significant decline over the past few years, and it is uncertain whether populations still exist at Turtle Trail or adjacent to the various private properties (P. Tritaik, Archie Carr NWR, personal communication 1996). Trapping efforts during the past 6 years in this area have documented a decline from an estimated 300 individuals down to numbers in the single digits (L. Ehrhart, University of Central Florida, personal communication 1998). The status of the species south of Indian River County is currently unknown. No beach mice were found during recent surveys in St. Lucie County; it is possible that this species is extirpated there. The southeastern beach mouse no longer occurs at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach. Given these data and trends, it is likely that without management intervention the entire South Florida population of southeastern beach mice will be lost in the near future.

The primary threat to the survival and recovery of the southeastern beach mouse is the continued loss and alteration of coastal dunes. Large-scale commercial and residential development on the Atlantic coast has permanently altered beach mouse habitat in Palm Beach and Broward counties. This increased urbanization has also increased the recreational use of dunes, and harmed the vegetation essential for dune maintenance. The loss of dune vegetation results in widespread wind and water erosion and reduces the effectiveness of the dune to protect other beach mouse habitat.

In addition to increased urbanization, coastal erosion is responsible for the loss of the dune environment along the Atlantic coast, particularly during tropical storms and hurricanes. The construction of inlets has exacerbated coastal erosion problems along the Atlantic coast. There are six man-made inlets on the Atlantic coast from Brevard County to Broward County that disrupt longshore sediment transport; because of this disruption beach habitat is gained on the north side of an inlet and becomes severely eroded immediately to the south. In Indian River County, for example, erosion has been nearly 2 m per year at Sebastian Inlet SRA (just south of Sebastian inlet); this is six times the average erosion rate for the county (J. Taber, Indian River County, personal communication 1996). Erosion of the dune habitat adjacent to the Treasure Shores Park has accelerated by nearly 0.3 m per year over the past 10 years (DEP 1996). The encroachment of residential housing onto the Atlantic coast increases the likelihood of predation by domestic cats and dogs. A healthy population of southeastern beach mice on the north side of

Sebastian Inlet SRA in Brevard County was completely extirpated by 1972, presumably by feral cats (R. Johns, Sebastian Inlet SRA, personal communication 1996). Urbanization of coastal habitat could also lead to potential competition of beach mice with house mice and introduced rats.

Pressures

Southeastern beach mice live in a dynamic, harsh environment that is exposed to recurring tropical storms. Historically, beach mice populations fluctuated in response to changes in the environment. In the past, local populations probably became extinct when storms destroyed their habitat; these areas were then recolonized by adjacent populations that survived the storms. Today, however, increased urbanization along the Atlantic coast has eliminated much of the coastal dune and created isolated patches of habitat available to the beach mouse. Ongoing management practices within the range of the southeastern beach mice restrict beach access to designated crossovers (boardwalks) to minimize the human trampling of the dune systems. Since public beaches on Florida's east coast receive heavy public use, continuing to enforce these restrictions on dune access will be essential to the recovery of the southeastern beach mouse. Although there are a number of State and county regulations pertaining to residential, commercial and recreational development in coastal areas, none specifically address protection of beach mouse habitat. The regulations dictate requirements for siting and construction of buildings, utilities, and access corridors.

V. The SLOPES flowchart guide for the southeastern beach mouse (see attached)

As with the "SLOPES Process" flowchart, the first step is to require project specific information, which generally includes the project location, project description with figures, and habitat maps. The next step is to map the vegetative communities present in the project area. Also, review of South Florida beach mouse survey records (Table 1) or databases maintained by the Service or other organizations needs to be conducted to identify known siting locations. The remaining steps of the SLOPES will provide the action agency with guidance to reach the appropriate affects determination based on a series of questions related to: project location; presence or absence of suitable habitat in the project area; presence or absence of the species in the project area; whether conservation recommendations are incorporated into the project design, and to what extent conservation measures implementation will avoid or minimize the potential adverse affect of the action on the beach mouse.

Is Suitable Habitat Present and is the project is located in Indian River or northern St. Lucie County?

No affect:

If the project is located outside of Indian River County or northern St. Lucie County, then the action agency can determine that the action will have "no affect" on the beach mouse. Likewise, if the project occurs on the mainland or barrier island of these counties where suitable habitat (e.g., primary dune vegetation) is present, then it would be appropriate to determine that the action will not affect the beach mouse. If desired, the action agency can request concurrence from the Service.

May affect:
Project related actions may affect the beach mouse if the project site is located within Indian River County or northern St. Lucie County, specifically the barrier island between Sebastian and Fort Pierce Inlets and suitable habitat is located on or adjacent to the project site, also refer to Table 1.

If suitable habitat is present, then it should be presumed that beach mice are present. However, if the action agency believes that beach mice are not present though suitable habitat is present, then a survey to document the absence of the beach mouse should be implemented as described in the *Trapping Protocol to Ascertain the Presence of Beach Mice* (Appendix A)(how cite?). The SLOPES flow chart provides this option to conduct beach mouse surveys in areas with suitable habitat to ascertain the presence or absence of the species.

If the results of the survey indicate that the beach mouse is not present, then the action agency may determine that the proposed action will not affect the beach mouse. Conversely, if the survey detects the presence of the beach mouse, the action agency should determine that the project may affect the beach mouse. In both cases, a beach mouse trapping report that includes figures, methods, discussion, and results, should be submitted to the Service with the action agency's.

May Affect, But Is Not Likely To Adversely Effect

At this point, it has been established that suitable habitat is located within the project area and the species is present, or species is assumed to be present. Therefore, the construction activities associated with the project may affect the beach mouse. Often times during beach renourishment or similar coastal construction projects, access to the beach is necessary through sand dunes (suitable beach mouse habitat) for equipment storage, material storage, staging, ingress, and egress of heavy equipment (bulldozers and front-end loaders) to the project site. These activities may adversely affect beach mouse through: (1) behavior modification as a result of the alteration or removal of beach mouse primary and secondary foraging and nesting habitat; (2) destruction of beach mouse nests; (3) behavior modification as a result of stored material and equipment, as well as, equipment movement; and (4) direct mortality as a result of the ingress and egress of

heavy equipment to the project site. However, several protection measures can be implement to avoid and minimize possible adverse affects of the proposed action.

In addition, the beach mouse may be adversely affected as a result of the placement of sand on or adjacent to suitable habitat during beach renourishment projects. However, the beaches proposed for renourishment are usually considered critically eroded and include dune restoration and enhancement as design elements of the proposed project. These activities may benefit the beach mouse provided the sand proposed for placement is beach compatible and appropriate dune vegetation is utilized.

The key is, to the greatest extent possible, impacts to sea oats and primary dune vegetation during project construction. This can be accomplished by utilizing existing access areas that are free of, or significantly lack dune vegetation, such as fire breaks, existing heavy equipment access areas, or existing public beach access areas, or within habitat that is considered unsuitable for beach mice. In addition, the following measures should be implemented to protect dune vegetation adjacent the access corridor: (1) dune vegetation should not removed outside of the access corridor(s) or covered by equipment or material storage; (2) a physical barrier, e.g., silt screen, hay bales, etc., should be erected along the access corridors to minimize inadvertent damage to dune vegetation; (3) nighttime ingress and egress of heavy equipment should be avoided or limited to the greatest extent practicable; (4) if a mouse of any species is observed during the use of the corridor, the mouse should be allowed to move of its own volition; and (5) if dune vegetation is inadvertently impacted, provide a restoration plan. If these types of protection measures are implemented into the project design, then the action agency may determine that the project may affect, but is not likely to adversely affect the beach mouse.

May Affect, Likely To Adversely Effect

If a project proposes to remove, fill, or otherwise alter suitable habitat that is occupied (or assumed to be occupied) by the beach mouse, then the activities associated with the project is likely to adversely affect the beach mouse. Therefore, formal consultation should be initiated. I have not been able to find records of a BO written for the beach mouse.

“Non-Section 7" Projects

Projects such as multi-family/ single-family home/resort construction within suitable and occupied beach mouse habitat in Indian River and St. Lucie counties typically lack the section 7 Federal nexus since these areas usually do not have associated wetlands or discharge into waters

of the United States. It is important for coastal managers at the State and Local levels consider potential adverse affects to beach mice when evaluating and permitting construction, including beach cross-walks, on the coastal strand.

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GIS Data Layers:

[There are **no GIS layers** for the beach mouse in Indian River or St. Lucie County, though there should be since these are the only two counties in South Florida where they have not been extirpated.]

Table 1- Surveys conducted for *Peromyscus polionotus niveiventris* in South Florida (1987-1997).

APPENDIX A

SURVEY PROTOCOL FOR BEACH MICE