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**Choctawhatchee Beach Mouse  
Perdido Key Beach Mouse  
and  
Alabama Beach Mouse**



**Recovery Plan**



RECOVERY PLAN FOR THE  
ALABAMA BEACH MOUSE (Peromyscus polionotus ammobates),  
PERDIDO KEY BEACH MOUSE (P. p. trissyllepsis), and  
CHOCTAWHATCHEE BEACH MOUSE (P. p. altophrys)

prepared by

U.S. Department of the Interior  
Fish and Wildlife Service  
Southeast Region  
Atlanta, Georgia

Approved:   
Regional Director, Southeast Region  
U.S. Fish and Wildlife Service

Date: August 12, 1987



THIS IS THE COMPLETED PLAN FOR THE ALABAMA BEACH MOUSE, PERDIDO KEY BEACH MOUSE, AND CHOCTAWHATCHEE BEACH MOUSE. IT HAS BEEN APPROVED BY THE U.S. FISH AND WILDLIFE SERVICE. IT DOES NOT NECESSARILY REPRESENT OFFICIAL POSITIONS OR APPROVALS OF COOPERATING AGENCIES AND IT DOES NOT NECESSARILY REPRESENT THE VIEWS OF ALL INDIVIDUALS WHO PLAYED A ROLE IN PREPARING THIS PLAN. THIS PLAN IS SUBJECT TO MODIFICATION AS DICTATED BY NEW FINDINGS AND CHANGES IN SPECIES STATUS AND COMPLETION OF TASKS DESCRIBED IN THE PLAN. GOALS AND OBJECTIVES WILL BE ATTAINED AND FUNDS EXPENDED CONTINGENT UPON APPROPRIATIONS, PRIORITIES AND OTHER BUDGETARY CONSTRAINTS.

LITERATURE CITATIONS SHOULD READ AS FOLLOWS:

U.S. Fish and Wildlife Service. 1987. Recovery plan for the Choctawhatchee, Perdido Key and Alabama Beach Mouse. U.S. Fish and Wildlife Service, Atlanta, Georgia. 45 pp.

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RECOVERY PLAN EXECUTIVE SUMMARY  
for THREE BEACH MICE

1. Point or condition when the species can be considered recovered?

Each subspecies of beach mouse can be considered for reclassification to threatened status when there are 3 distinct, self-sustaining populations in each of the critical habitat areas, and a minimum of 50% of the critical habitat is protected and occupied by mice. However, due to the extensive and permanent loss of habitat for these beach mice, it will probably never be possible to safely remove them entirely from the protection of the Act.

2. What must be done to reach recovery?

The major actions necessary to reach the recovery plan's objectives are: a) maintain and/or restore suitable habitat for each subspecies; b) develop reestablishment programs; and c) educate the general public.

3. What specifically must be done to meet the needs of #2?

a) Protection of existing beach mouse habitat is probably the most essential task in the recovery of the beach mice. Alteration and destruction of habitat for recreational, commercial and residential development has been a major factor in the decline of beach mice.

b) Studies are needed to determine optimal habitat needs and life history parameters. With this knowledge, suitable but unoccupied habitats may be enhanced and used for reestablishment of new populations.

c) The general public must be educated about the existence of beach mice, through pamphlets, signs and educational programs. An educated public can provide support for preservation of the mice and their habitat. Many of the problems plaguing these beach mice today, such as feral house cats, poor sanitation, and destruction of the dune system, could be alleviated with public awareness.

4. What management/maintenance needs have been identified to keep the species "recovered"?

Protection and preservation of beach mouse habitat must continue after recovery levels are achieved. Reestablished populations should also be monitored on a regular basis.



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## Part I. INTRODUCTION

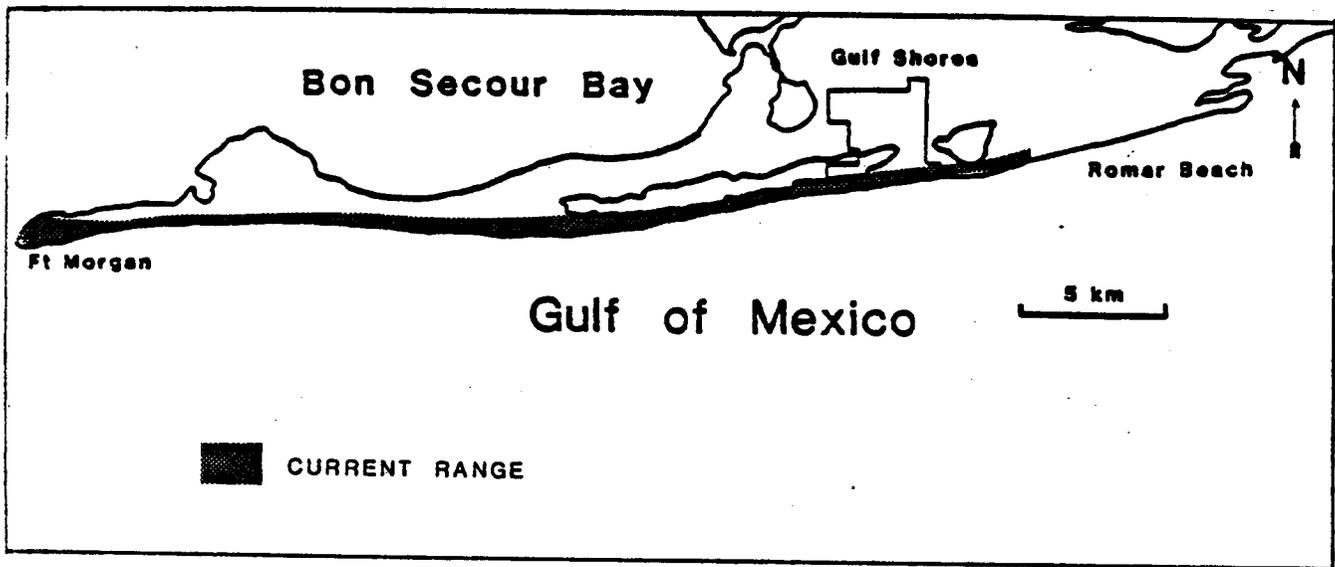
The oldfield mouse (Peromyscus polionotus) is distributed throughout northeastern Mississippi, Alabama, Georgia, South Carolina, and Florida. Certain subspecies occur on beaches and dunes of the Atlantic coast of Florida and the Gulf coast of Alabama and Florida, and are collectively known as "beach mice." These dune dwelling beach mice are distinctly paler than inland representatives of the species, and have been classified into eight subspecies based on minor morphological differences. Three of these subspecies occur along the Atlantic coast of Florida from Jacksonville to Hollywood Beach, and five occur on the Gulf coast from Mobile Bay, Alabama, to Cape San Blas, Florida (Hall, 1981). This recovery plan pertains to three of the Gulf coast subspecies of beach mice, all of which were listed as endangered pursuant to the Endangered Species Act of 1973 on June 6, 1985 (50 FR 23872): the Alabama beach mouse (Peromyscus polionotus ammobates), the Perdido Key beach mouse (Peromyscus polionotus trissyllepsis), and the Choctawhatchee beach mouse (Peromyscus polionotus allophrys). The needs of these three subspecies are collectively addressed in a single recovery plan because: 1) they are closely related systematically, morphologically similar, and have essentially identical habits and life histories; 2) they occur in close proximity to each other; 3) they face nearly identical threats to their continued survival; and 4) recovery efforts for all three will essentially involve the same measures.

### Description and Distribution

The three endangered subspecies of beach mice were originally described by Bowen (1968) and accepted by Hall (1981).

The Alabama beach mouse is pale gray with a faint dark stripe running down the upper surface of the tail; the abdomen is white. Head and body length ranges from 68 to 88 millimeters (mm) [2.7 to 3.4 inches (in.)]; tail length from 42 to 60 mm (1.6 to 2.3 in.); and hind foot from 17 to 19 mm (.6 to .7 in.). This subspecies is distributed along coastal dunes between Mobile Bay and Perdido Bay, Baldwin County, Alabama (Figure 1). The type locality is a sand bar west of Perdido Inlet (Alabama Point), Baldwin County, Alabama.

Figure 1.  
**RANGE MAP**  
**ALABAMA BEACH MOUSE**



The Perdido Key beach mouse is paler and slightly smaller than the Alabama beach mouse and lacks the faint dark stripe on the tail; the abdomen is white. Head and body length ranges from 70 to 85 mm (2.7 to 3.3 in.); tail length from 45 to 54 mm (1.8 to 2.1 in.); and hind foot from 16 to 18 mm (.6 to .7 in.). This subspecies is distributed on coastal dunes between Perdido Bay and Pensacola Bay, Alabama and Florida (Figure 2). The type specimen is from a sand bar east of Perdido Inlet (Florida Point), Baldwin County, Alabama.

The Choctawhatchee beach mouse is variable in coloration. Bowen (1968) described four color morphs for this subspecies, varying from orange to yellow on the back, with varying amounts of white on the face and nose. Head and body length is 70 to 89 mm (2.7 to 3.5 in.); tail, 43 to 64 mm (1.7 to 2.5 in.); hind foot, 16 to 19 mm (.6 to .7 in.). The tail of the Choctawhatchee beach mouse is relatively longer than that of any other subspecies of Gulf coast beach mouse. This subspecies is distributed in coastal dunes between Choctawhatchee Bay and St. Andrew Bay, Florida (Figure 3). The type locality is the coastal dunes near Morrison Lake, Walton County, Florida, about 16 kilometers (km) [10 miles (mi.)] east of Destin, Florida.

### Life History

The five subspecies of beach mice that occur on the Gulf coast dunes of Alabama and Florida are so closely related biologically, and occupy such similar habitats, that their life histories are undoubtedly similar; however, very little life history information is available. The only subspecies of the five that has been studied in any detail is the Santa Rosa beach mouse (Peromyscus polionotus leucocephalus), and this for only a single spring and fall season. The Santa Rosa beach mouse is found on Santa Rosa Island, Okaloosa County, Florida, between the range of the Perdido Key beach mouse to the west and the Choctawhatchee beach mouse to the east. The following life history data are taken from Blair (1951), unless otherwise noted; they are based on data from one year at one location, and should be viewed with caution. Although pertaining specifically to the Santa Rosa beach mouse, Blair's data most likely apply to all the Gulf coast beach mice, including the Alabama beach mouse, the Perdido Key beach mouse, and the Choctawhatchee beach mouse.

The sand dune systems inhabited by beach mice are not uniform; several microhabitats are distinguishable. The depth of the habitat from the beach inland varies depending on the configuration of the sand dune system and the vegetation. There are commonly several rows of dunes paralleling the shoreline, occasionally up to 14 meters (m)[46 feet (ft.)] in height. The frontal dunes are sparsely

Figure 2.  
RANGE MAP  
PERDIDO KEY BEACH MOUSE

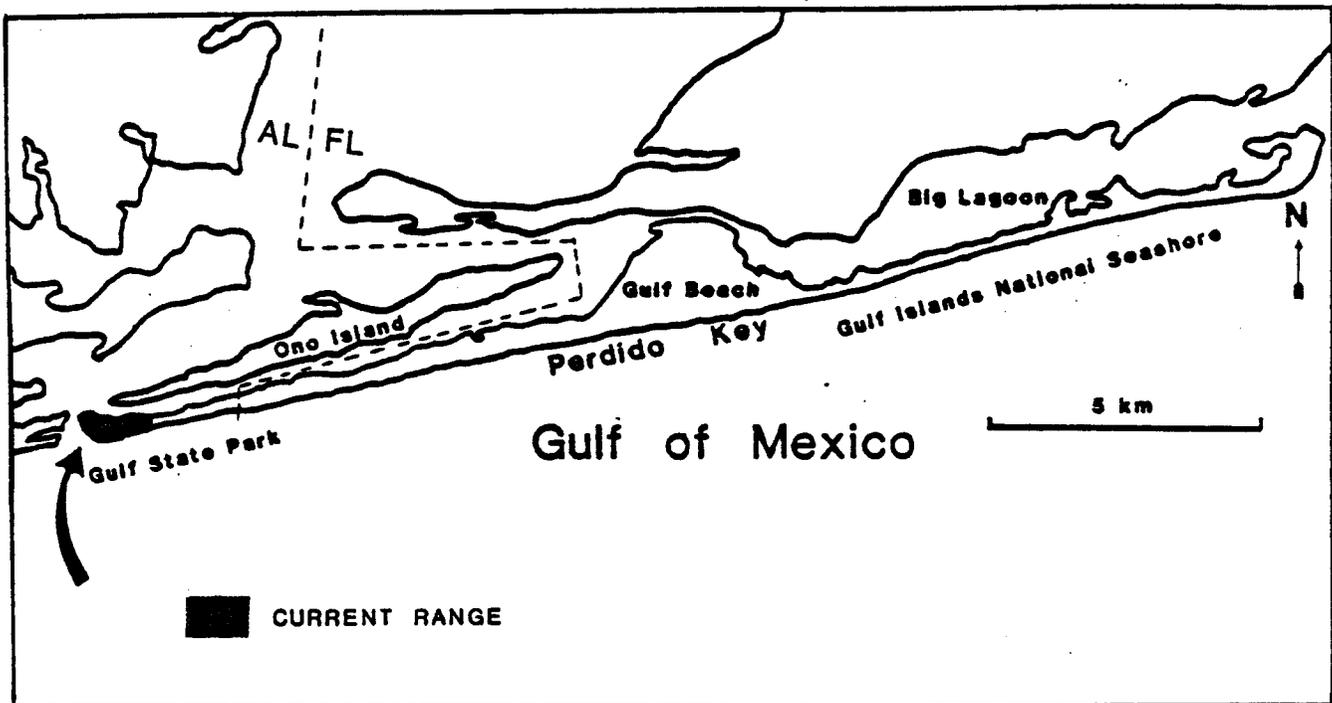
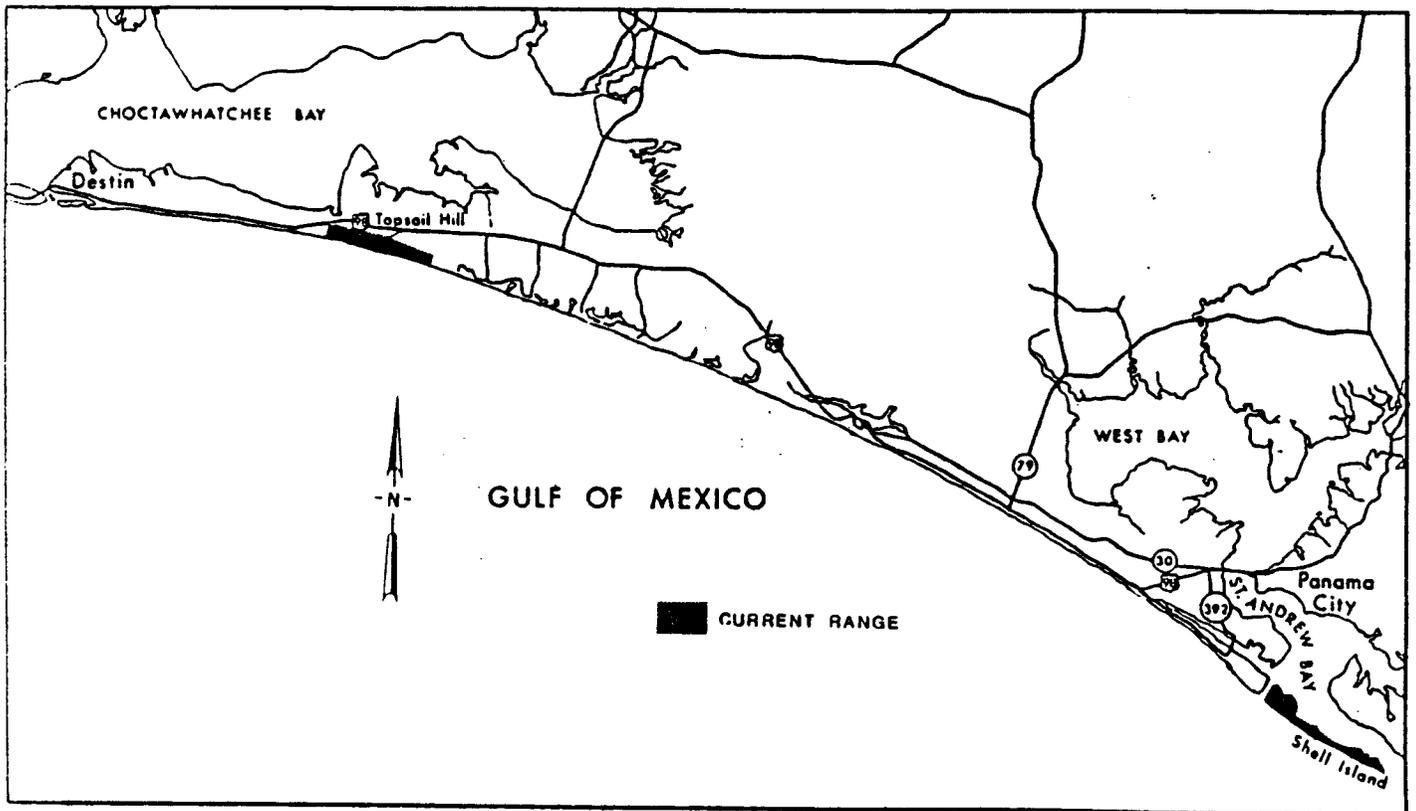


Figure 3.  
**RANGE MAP**  
**CHOCTAWHATCHEE BEACH MOUSE**



vegetated with widely scattered grasses including sea oats (Uniola paniculata), bunch grass (Andropogon maritimus), and beach grass (Panicum amarum and Panicum repens), and with seaside rosemary (Ceratiola ericoides), beach morning glory (Ipomoea stolonifera), and railroad vine (Ipomoea pes-caprae). Holler (pers. comm., 1986) noted that pennywort (Hydrocotyle bonariensis) and sea rocket (Cakile sp.) also occur on the primary dunes at Perdido Key, and he noted several sites where the sea rocket fruits were being eaten by mice in April 1986. The interdunal areas contain cordgrass (Spartina patens), sedges (Cyperus sp.), rushes (Juncus scirpoides), pennywort (Hydrocotyle bonariensis), and salt-grass (Distichlis spicata). The dunes farther inland support saw palmetto (Serenoa repens), slash pine (Pinus elliotti), sand pine (Pinus clausa), and scrubby shrubs and oaks, including yaupon (Ilex vomitoria), marsh-elder (Iva sp.), scrub oak (Quercus myrtifolia), and sand-live oak (Quercus virginiana var. maritima). Seaside goldenrod (Solidago pauciflosculosa), aster (Heterotheca subaxillaris), and Paronychia sp. may also be present (U.S. Fish and Wildlife Service, 1985; Holliman, 1983; Humphrey and Barbour, 1981; Linzey in Layne, 1978).

Meyers (1983), hypothesized, based on limited field work, that optimal beach mouse habitat should have: (1) high maximum elevation of coastal sand dunes; (2) relatively great differences between maximum dune height and minimum interdunal elevation; (3) close proximity of forest; (4) a sparse ground cover; and (5) relatively low cover of sea oats. Holler (pers. comm., 1986), however, noted that these inferences were based on data from restricted populations following extensive loss of dune habitat. He felt that further research is needed to fully document the importance of elements 3, 4, and 5 and to identify other important characteristics of preferred habitat.

The food plants most utilized by beach mice are beach grass and sea oats. The fruits of beach grass are readily available to the mice, but those of sea oats are usually obtainable only after they have been blown down by heavy winds. These foods are often found stored in mouse burrows. Beach mice also probably eat invertebrates from time to time, especially in the late winter or early spring when seeds are scarce (Ehrhart in Layne, 1978). Holler (pers. comm., 1986) found evidence of spring feeding on fruiting bodies of sea rocket (Cakile sp.) at both Perdido Key and Topsail Hill.

Based on his one year study, Blair (1951) found home ranges of beach mice living in the comparatively dense cover of the beach dunes averaged significantly larger in the spring than in the fall. The

home ranges of males and females do not seem to differ significantly in size.

Blair (1951) reported that population changes in particular areas seem to result primarily from the immigration and settlement of young mice, and/or the disappearance of resident adults. Young mice "move around" an average of  $432 \pm 27$  m ( $1,415 \pm 89$  ft.) before establishing a residence. The period of establishing residence in a new area appears to be critical in the life history of a beach mouse. The disappearance of resident adults presumably results mainly from predation. Only 19.5% of the mice resident in Blair's study area in January survived to early May.

Movements of a mouse within its home range are usually for foraging. Other motivations include breeding and the maintenance of various burrows utilized within the home range. Beach mice are nocturnal and the degree of illumination by the moon is the most important factor governing the amount of activity on any given night. Low illumination inhibits activity, and in general, the mice are least active on stormy nights.

Blair's evidence (1951) indicates that once a beach mouse settles in an area, it usually remains there for the duration of its life. Holes utilized in the home range are changed from time to time, suggesting that the location of a particular nest site has little to do with the location and permanence of a home range. Greater antagonism is evident between adult females than between adult males. In many cases a male and female are associated regularly in food gathering and sharing holes, indicating a fairly monogamous social pattern. A mated pair tends to remain associated as long as both partners remain alive. Some adult mice of either sex show no tendency to pair. Blair (1951), in his one year study, found that there was an excess of unpaired males in both fall and spring, but Holler (pers. comm., 1986) noted that of 19 specimens of *P. p. trissyllepsis* captured in April 1986, 10 were males and 9 female.

Beach mice are burrow-inhabiting animals. Ehrhart (in Layne, 1978) writing about the Atlantic coast pallid beach mouse (*Peromyscus polionotus decoloratus*) noted that its burrow entrance is usually placed on the sloping side of a dune. The three main parts of a typical burrow are: 1) the entrance tunnel, usually descending obliquely for some distance and then continuing straight into the bank; 2) a nest chamber formed at the level portion of the entrance tunnel at a depth of .6 to .9 m (2 to 3 ft.); and 3) an "escape tunnel" which rises steeply from the nest chamber to within 2.5 cm (.9 in.) of the surface. Blair (1951) stated that on Santa

Rosa Island, beach mice occupy either old burrows of ghost crabs (Ocypoda), or dig burrows themselves. Burrow entrance holes are nearly always located at the base of a shrub or clump of grass, or in proximity to some vegetational cover.

A beach mouse home range may contain up to 20 burrows in different parts of the range. These burrows give safe refuge from predators in whatever part of its home range the mouse may be. They serve, however, as more than simple safety refuges. A mouse will use one hole for a while, nesting and storing food in an adjoining hole. At another time, it will move to a different burrow in another area, and will nest and store its food there. This type of activity, in which several homesites are used within a single home range, and activities shift from one part of the home range to another, indicates that beach mice are semi-nomadic in habit.

Few reproductive data are available on the coastal forms of Peromyscus polionotus. From his one year study on Santa Rosa Island, Blair (1951) concluded that the resident breeding population gradually increased in number in the fall and remained rather stable during the spring season. Much breeding activity was evident in November, December, and early January, and large numbers of immature animals were in the population at that time. Holler (pers. comm., 1986) found evidence for fairly high breeding activity at Perdido Key in April, 1986. Eight of nine adult males had descended testes (condition of one male was not noted); five of nine females were lactating. Ehrhart (in Layne, 1978) stated that the reproductive potential for Peromyscus polionotus as a whole is high. Certain of the major aspects of the reproductive biology are variable (e.g. litter size), but it can be inferred that litter size ranges from two to seven, with an average of about four, and that young mice reach reproductive maturity as early as six weeks of age. Bowen (1968) found that, in the laboratory, a female beach mouse is capable of producing 80 or more young during her lifetime, and that litters are produced regularly at 26 day intervals. Blair (1948) reported that the life span in a closely related species (Peromyscus maniculatus) is less than five months in the wild, and only a few live out their full potential of three years or more. As noted previously, Blair (1951) found that only 19.5% of the Peromyscus polionotus leucocephalus in his study area on Santa Rosa Island in January survived to early May.

Meyers (1983) observed or tracked some potential beach mouse predators on the Gulf coast dunes including raccoons (Procyon lotor), skunks (Mephitis mephitis), snakes (Coluber constrictor and Masticophis flagellum), red foxes (Vulpes

vulpes), great blue herons (*Ardea herodias*), domestic dogs, and domestic cats. Bowen (1968) was so concerned about the role of domestic cats as predators on beach mice that he avoided trapping mice wherever he found cat tracks on the beaches. Blair (1951) believed predation was (in the 1940's) the single most important factor affecting the chances of survival of a beach mouse on Santa Rosa Island, although he obtained few records of actual predation.

Research is needed to determine the importance of red foxes as predators on beach mice. In recent years there has been a rapid increase in the number of foxes on Perdido Key and elsewhere. In these places, foxes may pose a serious threat to the beach mice. It should be noted that red foxes probably are not native to the area, and the high densities observed in some areas of beach mouse habitat (e.g. Perdido Key) should be investigated (Holler, pers. comm., 1986).

#### Present Status

Historically, the Alabama beach mouse, Perdido Key beach mouse and Choctawhatchee beach mouse, collectively, ranged along approximately 161 km (100 mi.) of coastal sand dunes in Baldwin County, Alabama and in Escambia, Okaloosa, Walton, and Bay Counties, Florida. Recent studies and observations (U.S. Fish and Wildlife Service, 1985; Holliman, 1983; Meyers, 1983; Humphrey and Barbour, 1981), however, have found that these beach mice occur at present on less than 35 km (22 mi.) of Gulf coast dunes, a reduction of nearly four-fifths of their original range.

As recently as 1950, most of the coastal ecosystems of the Alabama and Florida Gulf coast were intact, and the Alabama beach mouse, the Perdido Key beach mouse, and the Choctawhatchee beach mouse were apparently abundant and widespread throughout their respective ranges. Since that time, human alteration and destruction of these coastal ecosystems has brought about severe declines in beach mouse populations. Much prime habitat has been developed for residential, commercial, and recreational purposes. This has led to severe beach erosion, increased threats from natural calamities such as hurricanes, and changed normal vegetational succession.

Holliman (1983) found the Alabama beach mouse on disjunct tracts of the dune system from Ft. Morgan State Park to the Romar Beach area, but it apparently had disappeared from the remainder of its original range. He estimated that the entire population of this subspecies numbered less than 900 individuals, occupying fewer than 142 ha [350 acres (ac.)] of habitat.

The Perdido Key beach mouse appears to be the most endangered of the three subspecies. Humphrey and Barbour (1981) estimated that before Hurricane Frederick in September, 1979, only 78 individuals survived, of which 52 were at the Gulf Islands National Seashore, on the eastern end of Perdido Key, and 26 at Gulf State Park on western Perdido Key. However, after Hurricane Frederick, Holliman (1983) caught only a single Perdido Key beach mouse at Gulf State Park. In 1982, Meyers (1983) captured 13 beach mice at Gulf State Park but none at Gulf Islands National Seashore, suggesting that the subspecies had been extirpated from the latter area by Hurricane Frederick. At present, therefore, the Perdido Key beach mouse is known from only a single population on the western end of Perdido Key (Gulf State Park). Holler (pers. comm., 1986) found that in April, 1986, the population at Gulf State Park was about 30 animals.

As late as 1950, the Choctawhatchee beach mouse was widespread and abundant along the barrier beach between Choctawhatchee Bay and St. Andrew Bay. However, Bowen (1968) observed that more than two thirds of the habitat of the Choctawhatchee beach mouse had been lost since 1950 as a result of the coastal real estate boom. In 1979, Humphrey and Barbour (1981) found that the subspecies had been extirpated from seven of its nine historical localities, being present only on Shell Island, and in the Topsail Hill area. In 1982, Meyers (1983) reconfirmed Humphrey and Barbour's findings when he located Choctawhatchee beach mice on Shell Island. There are thought to be approximately 500 mice of this subspecies remaining in the wild.

#### Reasons for Decline

Alteration and destruction of beaches have been, and continue to be, the greatest threats to the survival of the three beach mice. The Gulf coast beaches of Florida and Alabama have become increasingly popular summer resorts in recent years, leading to large scale commercial and residential development in the area with consequent loss of available beach mouse habitat (Ehrhart, 1978; Meyers, 1983). In addition, recreational use of the sand dunes by pedestrians and vehicles has destroyed vegetation essential for dune development and maintenance. Loss of this vegetation has resulted in widespread wind and water erosion, and has reduced the effectiveness of the coastal dunes to act as protective barriers for other beach mouse habitat.

In addition to actually reducing the amount of habitat available to beach mice, residential and commercial development, particularly high density multiple housing, isolates groups of mice from each other, precluding gene flow between them. Not only does this weaken

the isolated populations genetically, it also prevents natural repopulation of depleted areas from areas of greater abundance.

An additional potential threat to beach mouse habitat may be the U.S. Army Corps of Engineers' routine channel maintenance program. This program involves removal of sand accretions from channels and passes, and the depositing of this sand along existing beach areas. Beach mouse habitat could be destroyed if the dredged sand is deposited on or near it. With careful planning, however, as was the case with the Corps' 1983 maintenance project at the Perdido Pass Channel, Alabama, conflicts between the Corps' activities and the needs of the beach mice can be eliminated; in fact, beach mouse habitat might actually be enhanced with such careful planning.

Although habitat loss has been, and continues to be, the primary threat to the beach mice in the Gulf coast region, other factors are also contributing to their decline. Predation by feral domestic cats could pose a serious threat. Holliman (1983) suggested that the absence of the Alabama beach mouse on Ono Island might be attributable to domestic cat predation. Potential predators of beach mice are attracted to the open refuse containers often associated with residential, commercial, and recreational developments, perhaps resulting in increased beach mouse predation (Layne, pers. comm.; Meyers, 1983).

Briese and Smith (1973) found that house mice competed with Peromyscus polionotus (animals from Savannah River Plant) for available habitat (space) when the Peromyscus polionotus population became depleted in an area through habitat disturbance or predation. The effect of house mice on beach mice populations has not been determined, but could be detrimental since beach mice live in highly disturbed habitats, and appear to be heavily preyed upon by cats.

Tropical storms can alter and destroy habitat and drown mice. Hurricane Frederick, which struck the Alabama and Florida Gulf coast on September 13, 1979, provided a good example of the damage a tropical storm can do to coastal ecosystems. Primary dune systems were completely washed away in some areas, much sand was removed beyond the beach dune complex, and flooding was widespread. Perdido Key was particularly hard-hit, and much of it was overwashed. Meyers (1983) speculated that the Perdido Key beach mouse may have been eliminated from the Gulf Islands National Seashore as a result of the effects of Hurricane Frederick. Hurricane Elena in 1984 was also detrimental to beach mouse habitat. The U.S. Fish and Wildlife Service (1986) estimated that this hurricane caused the loss of 75% of

the primary dune habitat at Fort Morgan State Park, Alabama. The remaining dunes have become isolated, and show evidence of extensive patrolling by foxes.

### Critical Habitat

The Alabama beach mouse, Perdido Key beach mouse, and Choctawhatchee beach mouse were listed as endangered on June 6, 1985 (50 FR 23872), at which time critical habitat was determined for all three. The combined critical habitats encompass 1094 ha (2,703 ac.). Of this total, 420 ha (1,037 ac.) are in Federal ownership, 441 ha (1,089 ac.) are owned by the States (321 ha [792 ac.] by Alabama and 120 ha [297 ac.] by Florida), and 234 ha (577 ac.) are in private ownership. Altogether, about 53.2 km (33 mi.) of coastline have been determined to be critical habitat for the beach mice.

For the Alabama beach mouse, 17.2 km (10.6 mi.) of critical habitat extends along the coast of the Fort Morgan Peninsula, Baldwin County, Alabama (Figure 4).

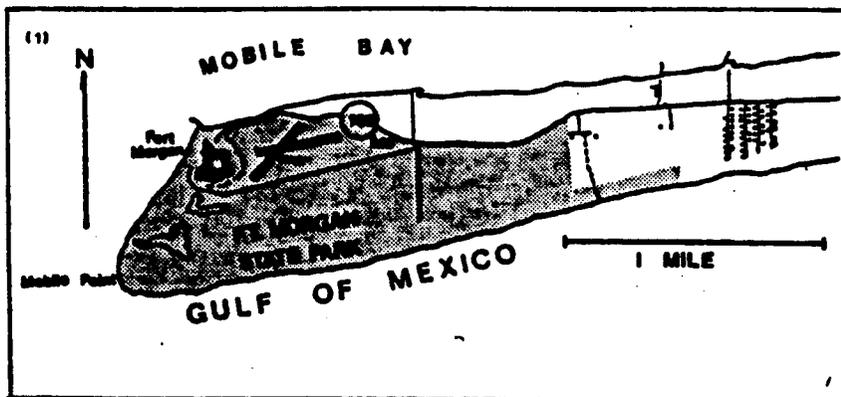
Critical habitat for the Perdido Key beach mouse occurs along 15.8 km (9.8 mi.) of coast on Perdido Key, Baldwin County, Alabama, and Escambia County, Florida, of which 1.9 km (1.2 mi.) at the Gulf State Park (Perdido Key Unit) at the western end of the Key is currently occupied by the subspecies, and 13.9 km (8.6 mi.) in the central and eastern end of the Key are not (Figure 5). The unoccupied areas are considered essential for the conservation of this animal. If populations cannot be reestablished in these areas, this subspecies will be confined to only one small stretch of suitable habitat, thereby being extremely vulnerable to any threat that may arise.

For the Choctawhatchee beach mouse, 20.2 km (12.6 mi.) of coast in Walton and Bay Counties, Florida, are critical habitat (Figures 6a and 6b). Of this, 15.9 km (10.0 mi.) are currently occupied by the subspecies; in the Topsail Hill area of Walton County, and on Shell Island, Bay County, Florida. The 4.3 km (2.6 mi.) of unoccupied critical habitat are in the Grayton Beach State Recreational Area and adjacent private land, and on the mainland portion of St. Andrews State Recreation Area. As with the Perdido Key beach mouse, the critical habitat in areas currently unoccupied by the Choctawhatchee beach mouse is essential to allow for reestablishment of populations.

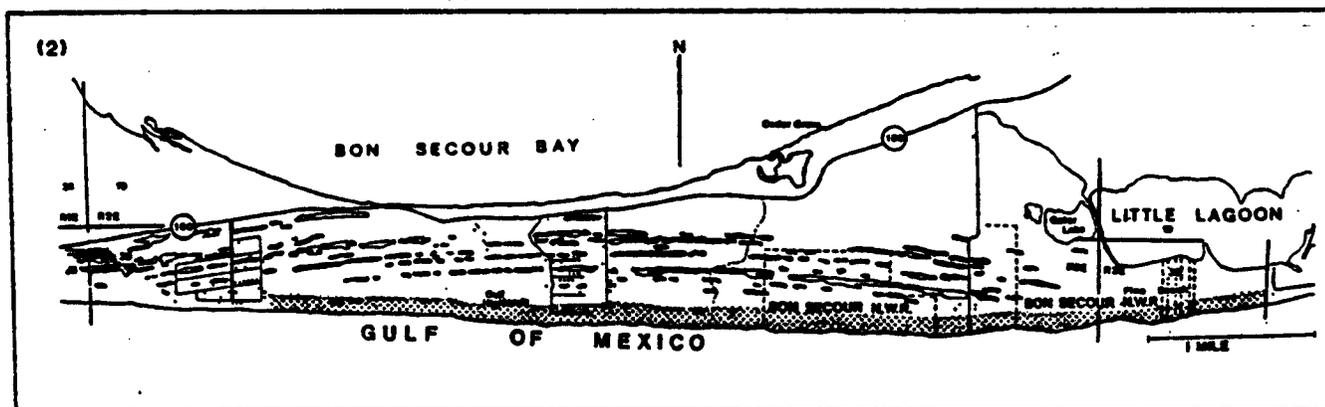
These critical habitat areas are of sufficient size to support populations of beach mice, and contain the essential elements to meet the needs of the animals. Because of the impacts that tropical storms and residential and commercial development have had on beach mouse

Figure 4. Alabama Beach Mouse Critical Habitat

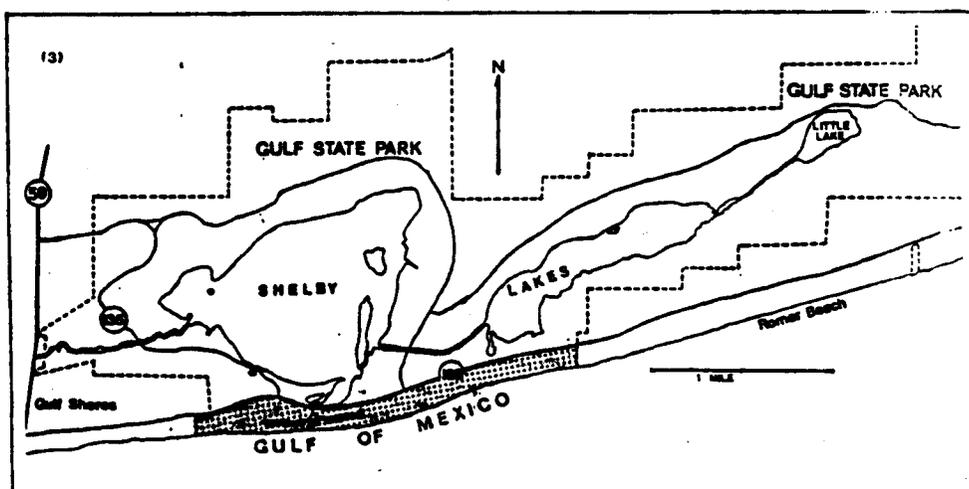
Alabama Beach Mouse Critical Habitat (1)



Alabama Beach Mouse Critical Habitat (2)



Alabama Beach Mouse Critical Habitat (3)



Perdido Key Beach Mouse Critical Habitat (Alabama)

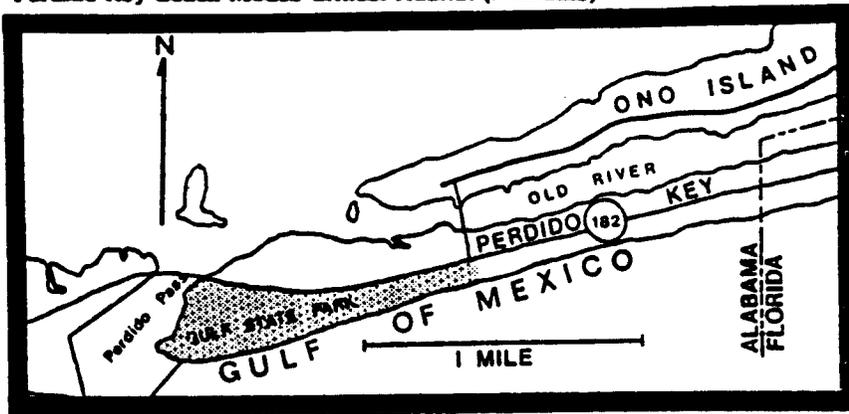
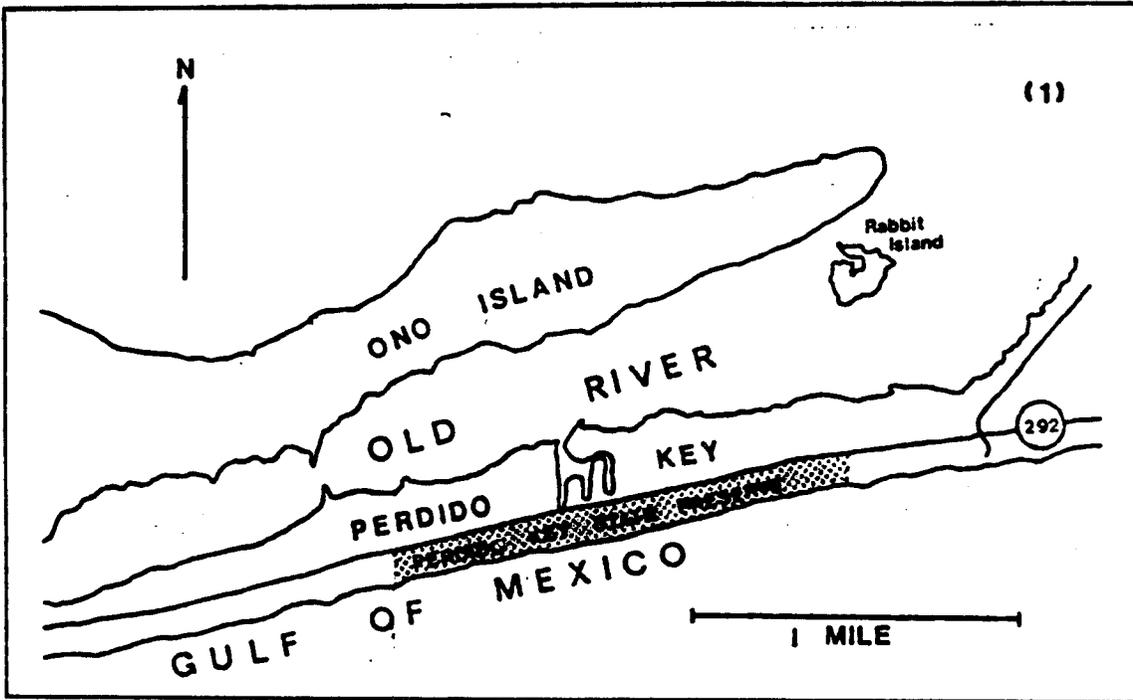


Figure 5. Perdido Key Beach Mouse Critical Habitat

Perdido Key Beach Mouse Critical Habitat (Florida—1)



Perdido Key Beach Mouse Critical Habitat (Florida—2)

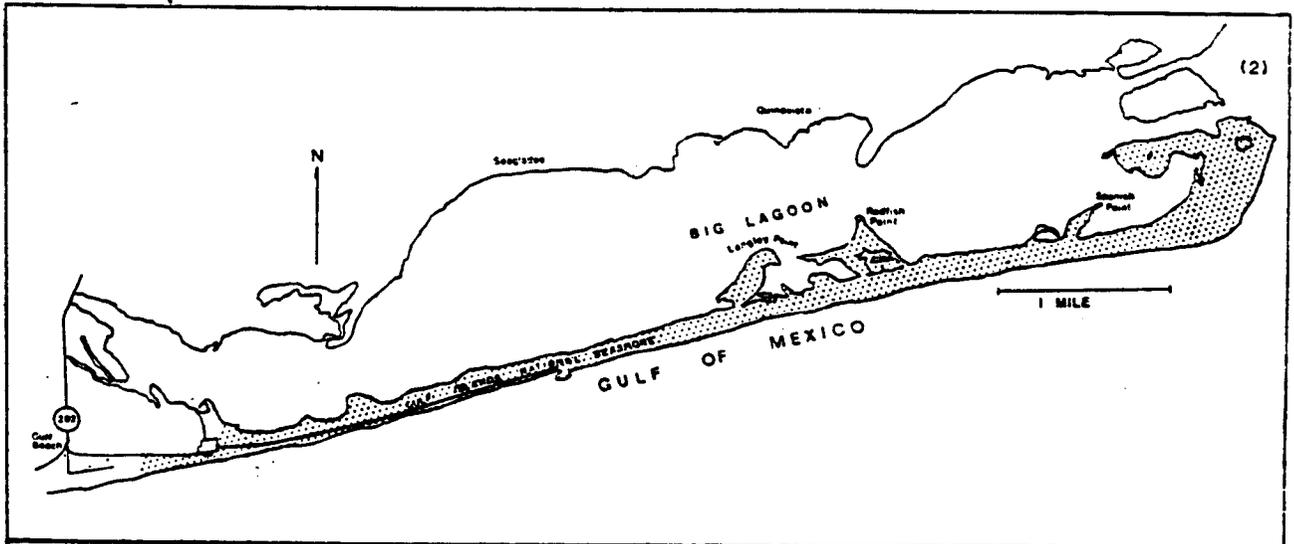
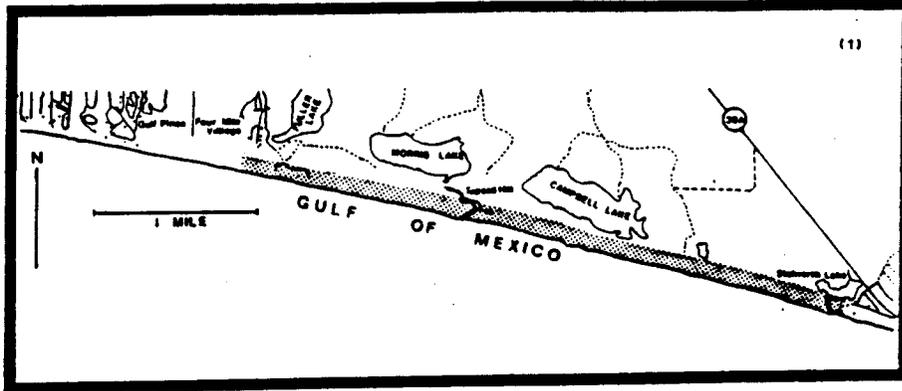
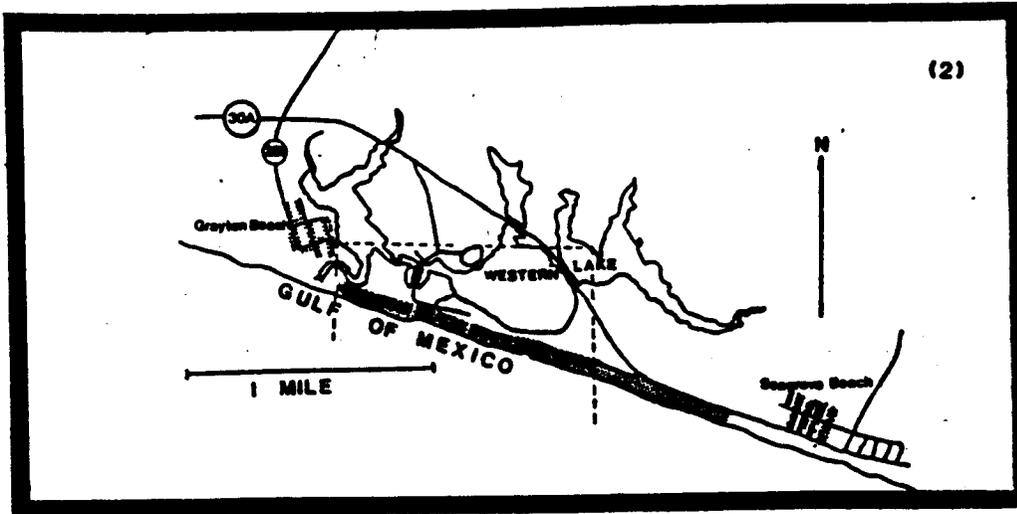


Figure 6a. Choctawhatchee Beach Mouse Critical Habitat  
Choctawhatchee Beach Mouse Critical Habitat (1)



Choctawhatchee Beach Mouse Critical Habitat (2)



Choctawhatchee Beach Mouse Critical Habitat (3)

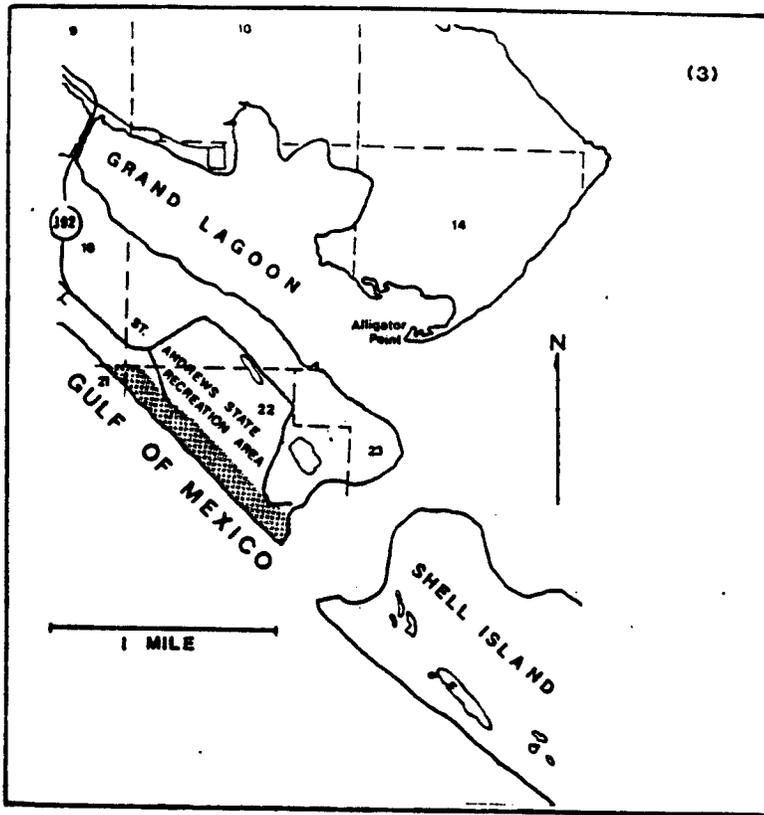
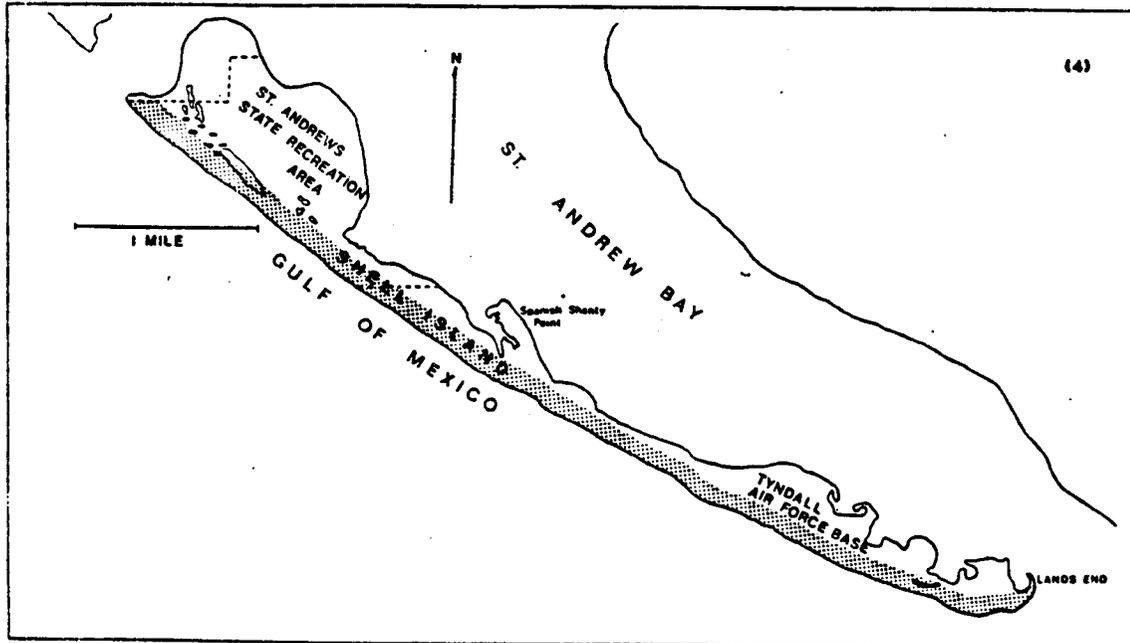


Figure 6b. Choctawhatchee Beach Mouse Critical Habitat (continued)

Choctawhatchee Beach Mouse Critical Habitat (4)



habitat, much of the habitat occupied at present no longer has all of the elements described by Meyers (1983) which characterize optimal habitat.

### Conservation Efforts

Although there are a number of state and county regulatory controls and mechanisms pertaining to residential, commercial, and recreational development on the Gulf coast beaches, none specifically addresses protection of beach mouse habitat. These regulatory devices essentially dictate requirements for siting and construction of buildings, utilities, and access corridors. Therefore, beach mouse habitat continues to be rapidly destroyed or altered by construction activities. The Federal Coastal Barrier Resources Act of 1982 prohibits the expenditure of most new Federal financial assistance in Units of the Coastal Barrier Resources System, but in these Units construction (with no Federal involvement) is still proceeding rapidly.

Effective July 18, 1987, the Alabama beach mouse and the Perdido Key beach mouse appear as protected species under Alabama's non-game regulation 87-GF-7, which does not allow anyone to take, capture, kill, possess, sell or trade these species without a permit.

The Perdido Key beach mouse and the Choctawhatchee beach mouse are listed as endangered in Title 39-27.002 of the Florida Administrative Code, affording them protection from killing, pursuit, molestation, harassment, harm, capture, possession, etc., but habitat per se is not protected.

Several other important State commitments to the conservation of the mice have been made: 1) the State of Alabama has indicated its willingness to assist in beach mouse translocation research and critical habitat management in any feasible manner; 2) the Alabama Division of Game and Fish has committed to coordinating the protection and enhancement of beach mice on state lands; 3) the Alabama State Parks Division has indicated it will work with the Game and Fish Division in managing the critical habitat on the Gulf State Park Units at Gulf Shores and Perdido Key; 4) the Alabama Historical Commission agreed on June 12, 1984, to grant to the U.S. Fish and Wildlife Service the wildlife resource management responsibilities for portions of the Fort Morgan State Park outside the perimeter wall; 5) the Florida Department of Natural Resources indicated that it may be

necessary to provide boardwalks in some locations at the Perdido Key State Preserve and St. Andrews State Recreation Area, including Shell Island, to protect beach mouse habitat from foot traffic; and 6) the Florida Game and Fresh Water Fish Commission has initiated a Perdido Key and Choctawhatchee beach mice range extension effort, with funds provided by the U.S. Fish and Wildlife Service and additional funds from the National Park Service, all under contractual arrangement with Auburn University.

The Gulf Islands National Seashore, National Park Service, is interested in reintroduction of the Perdido Key beach mouse onto the Seashore in order to reestablish the historic faunal component of the area.

## PART II. RECOVERY

## A. Recovery Objective

Historically, the combined ranges of the Alabama beach mouse, the Perdido Key beach mouse, and the Choctawhatchee beach mouse consisted of a narrow strip of Gulf coastal dune habitat in Alabama and Florida that was only about 161 km (100 mi.) in total length. Residential and commercial development in recent years has reduced these combined ranges to about 35.1 km (21.8 mi.), and it will never be possible for the beach mice to reoccupy the developed areas. The primary recovery objectives for the Alabama beach mouse, the Perdido Key beach mouse, and the Choctawhatchee beach mouse are to stabilize the present populations by preventing further habitat deterioration, and to reestablish populations in areas from which they have been extirpated in order to reduce the possibility of an entire subspecies being brought to extinction by a catastrophic storm. Each subspecies of beach mouse can be considered for downlisting to threatened when there are 3 distinct, self-sustaining populations in each of the critical habitat areas, and a minimum of 50% of the critical habitat is protected and occupied by mice. Because of the extensive and permanent loss of habitat for these beach mice, it will probably never be possible to safely remove them entirely from the protection of the Act.

The principal thrusts of the recovery plan to meet its objective are: 1) maintenance and/or restoration of suitable habitat for each subspecies; 2) development of reestablishment programs; and 3) education of the general public.

## B. Step-down Outline - Alabama Beach Mouse, Perdido Key Beach Mouse, and Choctawhatchee Beach Mouse

1. Protect habitat from further human encroachment.
  11. Conduct studies to determine optimal habitat needs and life history parameters for the three subspecies.
  12. Provide habitat protection on Federal and State-owned lands.
    121. Maintain suitability of habitat in areas where habitat is optimal.
      1211. Reevaluate all regulations for public use of dunes and beaches in light of beach mouse needs.
      1212. Ensure enforcement of all regulations.
      1213. Maintain predator control programs focused on feral cats and red foxes, where needed.

- 1214. Determine effects of feral house mice (Mus musculus) on beach mice, and, if warranted, take steps to eliminate house mice from beach mouse habitats.
- 1215. Develop agreements between Federal and/or State agencies to assure cooperation and sharing of resources and technical expertise.
- 1216. Install additional boardwalks as needed to protect habitat from pedestrian traffic.
- 1217. Evaluate location of parking areas and access trails to beaches, and relocate them if advantageous to preservation of beach mouse habitat.
- 1218. Install scavenger-proof receptacles in heavily used areas, and ensure frequent trash pick-up service.
- 122. Improve suitability of habitat in areas where habitat is suboptimal.
  - 1221. Develop cooperative State and Federal programs to reestablish beach dunes.
  - 1222. Plant suitable vegetation to stabilize and reestablish dunes.
  - 1223. Maintain suitability of habitat in improved areas.
- 13. Cooperate with landowners to protect privately-owned habitat.
  - 131. Obtain easements to allow beach habitat to be preserved wherever possible.
    - 1311. Encourage private landowners to maintain habitat.
    - 1312. Negotiate to protect intervening habitat on privately-owned lands between inhabited beach mouse areas.
  - 132. Encourage states to pursue tax incentive programs to encourage landowners to conserve undeveloped property.
  - 133. Encourage property owners to include restrictive agreements in sales and rental contracts requiring house cats to be confined.
- 14. Identify unprotected habitat important to beach mice, and take actions to protect it.
- 15. Monitor activities planned for privately-owned lands.
  - 151. Determine if planned activities will destroy or impact habitat for beach mice.
- 2. Reestablish and/or supplement populations.

21. Conduct genetic studies to estimate both degree of inbreeding and interrelatedness of the three subspecies.
22. Identify areas where populations have been extirpated and need to be reestablished, or where existing populations show indications of loss of genetic variability and need to be supplemented.
23. Identify populations from which mice may be removed for translocation or captive breeding.
  231. Determine population size and continue annual monitoring to establish population trends.
  232. Determine suitable age, sex and numbers of beach mice to be removed from specific existing populations and best season for capture.
  233. Based on (231) and (232) determine which of the following recovery actions to follow:
    - a) translocation
    - b) captive breeding
    - c) translocation and captive breeding
24. As appropriate, based on task 23, translocate beach mice directly into predetermined areas.
25. As appropriate, based on task 23, develop plans for captive breeding colonies of the three subspecies.
  251. Evaluate possible captive breeding strategies.
  252. Designate facilities to maintain and breed the three subspecies of beach mouse.
    2521. Investigate short-term breeding strategy potential.
    2522. Investigate long-term breeding strategy potential.
  253. Release captive raised mice into predetermined areas in the wild.
    2531. Determine most suitable age, sex, and numbers of mice and best season for release.
    2532. Release mice into enclosures designed to increase chances for success of initial release.
    2533. Monitor population growth or decline of introduced mice.
    2534. Develop plan to provide for disposition of excess animals.
3. Develop an educational program for the public.
  31. Provide public with information about life history and distribution of beach mice.
    311. Post signs.
    312. Distribute educational brochures.
    313. Issue news releases.

32. Inform public about need for careful sanitation around dwellings to reduce beach mouse predators.
  321. Request property owners, and other responsible parties, to keep garbage cans and other refuse containers tightly covered.
  322. Encourage local communities to provide more frequent trash collection services.
33. Seek public support in protecting dune vegetation, and in reporting violations of laws and regulations governing use of beaches and dunes.
34. Urge close confinement of cats in vicinity of beach mouse populations.
  341. Develop feral cat removal program.
4. Develop emergency procedures to provide protection to beach mouse habitat in case of off-shore oil spills.

#### C. Outline Narrative

1. Protect habitat from further human encroachment. Alteration and destruction of habitat for human recreational, commercial, and residential purposes have been major factors in the decline of the Alabama beach mouse, Perdido Key beach mouse, and Choctawhatchee beach mouse. Maintaining and improving the remaining habitat is essential for survival of these three subspecies.
  11. Conduct studies to determine optimal habitat needs and life history parameters for the three subspecies. Limited information is available on the life history of the beach mice, and their habitat needs have not been established with certainty. These factors must be known in order to manage the species and to protect, maintain, or reestablish suitable habitat.
  12. Provide habitat protection on Federal and State-owned lands. Large portions of the coastal beach within the range of these mice that contains suitable habitat have been determined to be critical habitat. The Federal and State-owned lands are the areas in which steps can be taken most quickly and effectively to secure the mice by protecting and/or improving the suitability of the habitat. Federal and State lands currently include: Fort Morgan State Park (Alabama), Bon Secour National Wildlife Refuge (Federal), Gulf State Park (Alabama), Perdido Key State Preserve (Florida), Gulf Islands National Seashore (Federal), Grayton Beach State Recreational Area (Florida), St. Andrews State Recreational Area (Florida), and Tyndall Air Force Base

(Federal). Species management plans should be developed to manage beach mice and their habitat on State and Federal lands.

121. Maintain suitability of habitat in areas where habitat is optimal. Some Federal and State-owned lands already contain prime habitat for beach mice. These habitats should be kept in prime condition.

1211. Reevaluate all regulations for public use of dunes and beaches in light of beach mouse needs. In order to protect prime beach mouse habitat, it may be necessary to entirely close some areas to human use, and to restrict night activities elsewhere. Vehicular traffic prohibitions must be strengthened. Construction regulations must ensure habitat protection. Each activity currently permitted must be reevaluated to determine the possible effect it may have on beach mouse habitat. New regulations must be promulgated for any such activity, if needed.

1212. Ensure enforcement of all regulations. Sufficient law enforcement personnel must be made available to ensure all regulations are obeyed.

1213. Maintain predator control programs focused on feral cats and red foxes, where needed. Feral house cats and red foxes, both of which are introduced predators, may prey upon beach mice. Holliman (1983) suggested feral cats may have been responsible for eliminating beach mice from Ono Island. Simons (Nat. Park Service Research Biologist, pers. comm.) believes red foxes may have contributed to the extirpation of Perdido Key beach mice from the Gulf Islands National Seashore. Immediate predator control for both cats and foxes should be initiated in areas where beach mice populations are under stress (e.g. Fort Morgan; Florida Point on Perdido Key) and in areas where mice are to be introduced (e.g. Gulf Islands National Seashore). In more secure areas (e.g. Bon Secour National Wildlife Refuge proper) the need for fox control is not established, and should be

investigated. House cat control, however, should be conducted wherever they are present.

1214. Determine effects of feral house mice (*Mus musculus*) on beach mice, and, if warranted, take steps to eliminate house mice from beach mouse habitats. House mice may compete with beach mice for available habitat. All house mice should be removed from areas where beach mice are to be reintroduced, and, if studies show it is warranted, they should be removed from all areas in which beach mice populations are depleted.
1215. Develop agreements between Federal and/or State agencies to assure cooperation and sharing of resources and technical expertise. Often it is possible for one Federal agency to assist another, or to assist a State agency, by providing a service that would otherwise be unavailable. The U.S. Army Corps of Engineers could assist in rebuilding dune areas, and provide advice on stabilizing dunes with fences or by other means. These actions have already begun on Perdido Key. The BLM land in beach mouse habitat (very small, scattered parcels of land) should be transferred to other conservation agencies. Every possibility for utilizing Federal and State resources to maintain and benefit beach mouse habitat should be investigated.
1216. Install additional boardwalks as needed to protect habitat from pedestrian traffic. Boardwalks are badly needed at Gulf State Park (Perdido Key Unit), Alabama. A study should be initiated to determine where additional boardwalks are most urgently needed such as on the Bon Secour National Wildlife Refuge, and State-owned recreation areas. Plans should be made to install boardwalks as promptly as possible.
1217. Evaluate location of parking areas and access trails to beaches, and relocate them if advantageous to preservation of beach mouse habitat. Parking areas should be

clearly marked and situated well away from beach mouse habitat. "No parking" areas should be designated where parking might damage beach mouse habitat. Vehicle barriers should be installed around parking areas to prevent vehicular access to the beach. Trails leading from parking areas to the beach should also be clearly marked, and planned so as to avoid disturbance of beach mouse habitat. Boardwalks should be laid along the trails where possible.

1218. Install scavenger-proof receptacles in heavily used areas, and ensure frequent trash pick-up service. Skunks, raccoons, red foxes, weasels, and feral house cats may prey on beach mice. These predators may all be attracted to beach areas by the refuse left behind by visitors. In order to minimize the number of such predators in beach mouse habitat, it is necessary to assure that ample scavenger-proof trash and refuse containers are available, and that they are emptied on a regular and frequent basis to avoid overflow.
122. Improve suitability of habitat in areas where habitat is suboptimal. Where habitat has deteriorated, efforts should be made to restore it to optimal conditions. Through the work of Myers (1983) much has been learned about habitat preferences of beach mice. However, more research is needed to define precise habitat requirements. Until such research can be completed, efforts should be made to maintain or restore the five elements identified by Myers as being necessary in optimal beach mouse habitat (see Life History section of this recovery plan).
1221. Develop cooperative State and Federal programs to reestablish beach dunes. Both Federal and State agencies may have the capability to restore dunes so that maximum dune height and minimum interdunal elevation are achieved. All Federal and State agencies should cooperate wherever possible in such dune restoration projects. Agencies which could cooperate include the U.S. Army Corps of Engineers, U.S. Fish and Wildlife

Service, U.S. Coast Guard, U.S. Air Force, Bureau of Land Management, Alabama Game and Fish Division, Alabama Historical Commission, Alabama State Parks Division, Florida Game and Fresh Water Fish Commission, and the Florida Department of Natural Resources.

1222. Plant suitable vegetation to stabilize and reestablish dunes. Sea oats, bunch grass, beach grass, and other native coastal dune vegetation should be planted wherever dunes have been restored in order to stabilize them and prevent further erosion.
1223. Maintain suitability of habitat in improved areas. The habitat should be monitored to assure that it maintains its suitability to support beach mice.
13. Cooperate with landowners to protect privately-owned habitat. Enlist the support of private landowners in protecting the dunes and interdunal areas on private property. Easements should be obtained to prevent building on the primary dunes.
131. Obtain easements to allow beach habitat to be preserved whenever possible. Agreements should be negotiated with private landowners to allow specially designated Federal or State wildlife agencies to assist in maintaining quality habitat so that mice can continue to exist on privately-owned lands.
1311. Encourage private landowners to maintain habitat. Owners of beach front property should be encouraged not to build on the primary dunes, to install and use boardwalks across dunes, to discourage trespassers, and to keep house cats confined. They should be urged to protect existing vegetation and encouraged to plant additional native vegetation where needed. Management plans for each species should be developed for private lands, possibly using cooperative conservation agreements.
1312. Negotiate to protect intervening habitat on privately-owned lands between inhabited beach mouse areas. One of the major threats to the survival of the beach mice is that small populations will become isolated

from each other and that gene flow between these populations will cease. The lack of genetic diversity in small isolated populations can result in loss of population viability. It is therefore essential that intervening habitat be maintained to the extent possible between areas that are currently occupied by beach mice. Such intervening habitat will allow beach mice from one area to move into another area and thereby assure that gene flow between populations is maintained. Special efforts should be made to locate and protect intervening habitat on private lands. To accomplish this, it is essential to obtain easements to prevent or discourage building on the primary dunes.

132. Encourage states to pursue tax incentive programs to encourage landowners to conserve undeveloped property. A tax incentive program can be an effective tool in protecting and managing undeveloped lands.
133. Encourage property owners to include restrictive agreements in sales and rental contracts requiring house cats to be confined. House cats may pose the primary predator threat to beach mice. Owners of rental properties and condominiums in the area should be encouraged to include in rental or purchase contracts a clause that would require cats to be confined at all times to the condominium or apartment.
14. Identify unprotected habitat important to beach mice. Relatively large tracts of undeveloped privately-owned land are still found within the ranges of the three subspecies of beach mice. An effort should be made to preserve as much of this dune ecosystem as possible and to establish preserves. Protection strategies may include easements, cooperative agreements, land exchanges, fee title acquisition or other means. These resulting preserves can provide multiple uses as beach recreational areas, and as habitat for the beach mice. Recreational facilities should be spaced at 1.0 to 1.5 km (.6 to .9 mi.) intervals with parking facilities inland as far as possible, outside beach mouse habitat with boardwalks leading to the beaches. Preserves should have a minimum of 50 ha (125 ac.) of beach mouse habitat,

preferably more (100 to 200 ha) (250 to 500 ac.). Some privately-owned areas are essential for beach mouse survival. One area includes part of the Choctawhatchee beach mouse's critical habitat map (1), figure 6a, which includes private land at the Topsail Hill Area west of Seagrove Beach, Walton County, Florida. Another area includes the private lands east of the Grayton Beach State Recreation Area, also in Walton County, Florida. These private lands are in Choctawhatchee beach mouse critical habitat map (2), figure 6a. For Alabama beach mouse habitat, the Land Protection Plan for Bon Secour National Wildlife Refuge cites the most desirable course of action for the Fish and Wildlife Service to protect those lands including beach mouse habitat, within the approved acquisition boundary for the Refuge, that face the greatest threat of land use change. These lands and adjacent private lands in Alabama beach mouse critical habitat map (2) figure 4 are essential for Alabama beach mouse protection and recovery. Private lands adjacent to the Fort Morgan State Park, in Alabama beach mouse critical habitat map (1) figure 4 are also essential.

15. Monitor activities planned for privately-owned lands. Through county planning boards, rezoning applications, various permit applications, etc., development plans for privately-owned lands should be monitored.
  151. Determine if planned activities will destroy or impact habitat for beach mice. Areas of suitable habitat for beach mice bordering new housing developments should be maintained. Action under Section 7 of the Act should be initiated if Federal agencies or actions are involved in destruction or alteration of such areas of suitable habitat.
2. Reestablish and/or supplement populations.
  21. Conduct genetic studies to estimate both degree of inbreeding and interrelatedness of the three subspecies. Such information is needed for future management decisions such as whether existing wild populations need to be supplemented with introduced mice from elsewhere in order to increase genetic viability.
  22. Identify areas where populations have been extirpated and need to be reestablished, or where existing populations present indications of loss of genetic variability and need to be supplemented. The goal is to establish and maintain healthy populations of each subspecies in as many localities as possible. Multiple populations will increase the probability that at least

some will survive in the event of a natural or human-caused catastrophe. Such areas should be at least 50 ha (125 ac.) in size (preferably 100 to 200 ha) (250 to 500 ac.), and contain all the necessary components for survival of beach mouse populations. The Perdido Key beach mouse is the most seriously threatened of the three subspecies. Only a relict population now exists at a single locality (Gulf State Park, Perdido Key Unit, Alabama). Therefore, it should receive the highest priority in recovery efforts. This subspecies should be reintroduced at Perdido Key State Preserve and Gulf Islands National Seashore. Unoccupied areas containing suitable habitat within the ranges of the Alabama beach mouse and the Choctawhatchee beach mouse should be identified. All such areas should be on public, conservation organization, or protected private lands so that they can receive adequate protection after mice are introduced.

In general, if mice are present in an area but in low numbers, supplementation by introduction of mice will not be advisable because of the risk of introduction of diseases. Additionally, the populations are probably low as a result of environmental factors. Supplementation probably would only be advisable in areas where there are indications of loss of genetic variability.

23. Identify populations from which mice may be removed for translocation or captive breeding. Care must be taken to ensure that the removal of mice from a specific site will not be detrimental to the continued survival of the subspecies.
  231. Determine population size and continue annual monitoring to establish population trends. This estimate is essential in making decisions regarding recovery actions.
  232. Determine suitable age, sex and numbers of beach mice to be removed from specific existing populations and best season for capture. The beach mice are so reduced in numbers that care must be taken not to jeopardize any of the subspecies by removing too many animals. Season of year and age and sex ratios of mice needed for translocation and captive breeding need to be determined.
  233. Based on (231) and (232) determine which of the following recovery actions to follow:
    - a) translocation - population estimate large

- enough to allow removal and relocation of predetermined number of individuals.
- b) captive breeding - population estimate too small to risk translocation.
  - c) translocation and captive breeding - population estimate large enough to allow removal of predetermined number of individuals; however, scarcity of existing populations dictates establishment of a captive breeding colony.
24. As appropriate, based on task 23, translocate beach mice directly into predetermined areas. The success of translocating wild caught animals directly into unoccupied habitat should be tested first. Then the impacts of translocating mice into existing small populations to supplement populations should be determined. Such supplementation probably would be desirable only if there are indications of a significant loss of genetic variability.
25. As appropriate, based on task 23, develop captive breeding colonies of the three subspecies. Breeding beach mice under captive conditions offers a possibility for obtaining animals for reintroduction purposes.
251. Evaluate possible captive breeding strategies. Both short-term captive breeding and long-term captive breeding should be investigated to determine which offers the best prospects for successful reintroductions. Determine survivability of captive-reared mice in the wild.
252. Designate facilities to maintain and breed the three subspecies of beach mouse. Each facility should be staffed with adequate, well-trained personnel, and have satisfactory cages, pens, and holding areas.
2521. Investigate short-term breeding strategy potential. Short-term breeding is defined as breeding of one or two generations with subsequent release of all captives and their offspring. Determine the merits of a short-term breeding program.
2522. Investigate long-term breeding strategy potential. Long-term breeding is maintaining large numbers of mice in a breeding colony over many generations, and periodically removing animals from the

- colony for release into the wild. Determine merits of a long-term breeding program.
253. Release captive-raised mice into predetermined areas in the wild. Mice bred and raised in captivity should be released at sites previously selected (see 22 above).
2531. Determine most suitable age, sex, and numbers of mice and best season for release. Beach mice are relatively short-lived, and reach sexual maturity at six weeks of age. Studies should be conducted to determine at what age, sex, and numbers they have the best potential for survival when released into the wild. The best time of year for a release should also be determined.
2532. Release mice into enclosures designed to increase chances for success of initial release. By releasing beach mice into an enclosure, burrowing activity into a certain area can be assured. Initial predation losses can also be prevented.
2533. Monitor population growth or decline of introduced mice. Through field signs and live-trapping determine the success or failure of the release program in each area.
2534. Develop plan to provide for disposition of excess animals. All captive bred animals may not be released into the wild. Introductions of such animals into existing populations could include a risk of introduction of diseases. Therefore, contingency plans should be developed to handle any excess mice that cannot be disposed of by introductions into the wild.
3. Develop an educational program for the public. Most of the public is completely unaware of the existence of beach mice, and often those individuals who do know of them have little concern for their well-being or survival. With the cooperation of the Florida and Alabama nongame programs, an educational program should be developed to obtain public support for preservation of the beach mice and their habitat.
31. Provide public with information about life history and distribution of beach mice. In order to obtain the support of the public for conservation efforts on behalf of beach mice, the public must be made aware of the

presence of the animals, and informed of their life histories and habits.

311. Post signs. At regular intervals throughout beach mouse critical habitat, signs should be posted to alert the public to the facts that 1) beach mice occur in the region; 2) they are listed as endangered species by the Federal Government; and 3) preserving the sand dunes, and the vegetation on the dunes, is necessary for the survival of the mice.
  312. Distribute educational brochures. Develop fact sheets on the subspecies and arrange for the information to be available through local newspapers, and by posting in public places such as motel lobbies, post offices, banks, etc.
  313. Issue news releases. Prepare and issue news releases.
32. Inform public about need for careful sanitation around dwellings to reduce mouse predators. The public should be made aware that house cats and other predators must be kept under control if beach mice are to survive, and that one of the most important tools in controlling predators is good sanitation around dwellings. Predatory animals are attracted to garbage, and concentrate in areas where it is left to accumulate.
321. Request property owners, and other responsible parties, to keep garbage cans and other refuse containers tightly covered. Managers of residential and commercial properties in areas of beach mouse habitat should be contacted and urged to keep all trash containers tightly covered, and if possible, to install scavenger proof receptacles.
  322. Encourage local communities to provide more frequent trash collection services. Community officials responsible for refuse collection should be contacted and requested to provide more frequent service in areas where garbage accumulates.
33. Seek public support in protecting dune vegetation, and in reporting violations of laws and regulations governing use of beaches and dunes. There are some individuals living along the Gulf coast beaches who have a keen interest in protecting and preserving the coastal dunes and associated wildlife. Special efforts should be made to seek out these people and enlist their aid in monitoring activities on the beaches and reporting

violators of laws and regulations governing the use of beach areas.

34. Urge close confinement of cats in vicinity of beach mouse populations. Through an organized information distribution system, owners of cats in private dwellings, hotels, motels, apartments, and condominiums, should be contacted and informed of the danger that free-roaming cats pose to beach mouse populations. Beach communities should be urged to establish leash laws pertaining to all cats and dogs.

341. Develop feral cat removal program. All feral cats found on public lands with designated critical habitat zones should be removed from the area.

4. Develop emergency procedures to provide protection to beach mouse habitat in case of off-shore oil spills. It is highly unlikely that beach mouse habitat will be subjected to oil spills, either those associated with possible future offshore drilling or from oil tankers breaking up during storms or other catastrophes. Nevertheless, contingency plans should be developed to deal with such emergencies if they occur. These plans should include methods to remove oil from beaches as quickly as possible. The plans must also insure that material removed from beaches is deposited in areas well away from beach mouse habitat. It is essential that during clean-up operations on beaches, oil spill refuse not be dumped over the dunes into beach mouse habitat. Such refuse should be trucked away to areas where it will cause little, if any, damage to wildlife.

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### PART III. IMPLEMENTATION SCHEDULE

Priorities in Column 4 of the following Implementation Schedule are assigned as follows:

- Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.
- Priority 2 - An action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.
- Priority 3 - All other actions necessary to provide for full recovery of the species.

In the following implementation schedule, the three subspecies of beach mice are addressed collectively due to their similar recovery requirements. In those instances where the agencies involved monitor separate subspecies, (i.e. Florida agencies for Choctawhatchee beach mouse; Alabama agencies for Alabama beach mouse; and agencies from both States for Perdido Key beach mouse) each subspecies is listed.

## GENERAL CATEGORIES FOR IMPLEMENTATION SCHEDULES \*

## Information Gathering - I or R (research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

## Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depredation control
6. Disease control
7. Other management

## Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

## Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

\*

(Column 1) - Primarily for use by the U.S. Fish and Wildlife Service.

IMPLEMENTATION SCHEDULE

Beach Mice		Responsible Agencies				Estimated Costs			Comments/Notes	
General Category	Plan Task	Task Number	Priority	Task Duration	Region	FWS and Others	FY1	FY2		FY3
R-1,2	Conduct life history and habitat studies. (All mice)	11	1	Ongoing	4	FWE, ACRU, FDNR, FGFC	1*	2*	3*	Task covered under Research proposal scheduled for completion 3/89. Funding is as follows: 1* \$15K 2* \$15K 3* \$ 5K
0-3	Reevaluate public use regulations (Al. beach mouse)	1211	2	Ongoing	4	FWE, NWR, ADNR, AHC				Bon Secour NWR, Gulf S.P. and Fort Morgan S.P.
	(P.K. beach mouse)					NPS, FGFC, FWE, ADNR, FDNR				P.K. State Preserve Gulf S.P. and Gulf Islands Nat'l Seashore
	(Choc. beach mouse)					FWE, FGFC, FDNR, USAF				State Recreation Areas Tyndall Air Force Base
0-3	Enforce all regulations (All mice)	1212	3	Continuous	4	Same as task # 1211				Same as task #1211

IMPLEMENTATION SCHEDULE

Beach Mice

General Category	Plan Task	Task Number	Priority	Task Duration	Region	Responsible Agencies				Comments/Notes
						FWS	and Others	FY1	Estimated Costs	
0-4	Maintain predator control programs (Al. beach mouse)	1213	2	As necessary	4	FWE, NWR, ACRU, ADNR	1*	2*	3*	Task covered under Research proposal scheduled for 3/89
	(P.K. beach mouse)					FWE, NPS, ADC, ACRU, ADNR	1K	.1K	1K	ADC doing predator control on Perdido Key
	(Choc. beach mouse)					FWE, FGFC, FDNR, ADC				
R-10	Determine effect of house mice on beach mice (All mice)	1214	2	3 yrs.	4	FWE, ADC, FDNR, FGFC, ACRU			10K each	
0-4	Develop cooperative agreements with other agencies (Al. beach mouse)	1215	3		4	FWE, NWR, BLM, COE, AHC, ADNR				FWS leases 350 ac. from AHC at Fort Morgan State Park for Management
	(P.K. beach mouse)			3 yrs.		FDNR, ADNR, COE, BLM, NPS, FGFC				FY86-FWS/ADNR CO-OP agreement for vehicle barriers at Gulf State Park. 5K
	(Choc. beach mouse)			1 yr.		FWE, FGFC, FDNR, USAF				FY86-FWS/FGFC reestablishment program

IMPLEMENTATION SCHEDULE

Beach Mice

General Category	Plan Task	Task Number	Priority	Duration	Region	Responsible Agencies				Comments/Notes
						FWS and Others	FY1	FY2	FY3	
M-3	Install boardwalks to protect habitat (All mice)	1216	2	2 yrs.	4	FWE, NWR, AHC, ADNR, FGFC, FDNR, USAF	10K each	10K each	10K each	
M-3	Relocate access trails and parking lots to protect habitat (Al. beach mouse)	1217	2	2 yrs.	4	FWE, NWR, AHC, ADNR				Bon Secour NWR, Gulf State Park, Fort Morgan State Park
	(P.K. beach mouse)					FWE, FDNR, NPS, ADNR				Perdido Key State Preserve, Gulf State Park, Gulf Islands National Seashore
	(Choc. beach mouse)					FWE, FDNR, USAF				Grayton Beach State Rec. Area, St. Andrews State Rec. Area, Tyndall AFB.
M-4	Install scavenger-proof trash receptacles and insure frequent pick-up (All mice)	1218	2	Continuous	4	FWE, NWR, FDNR, ADNR, AHC, USAF	5K each	5K each	5K each	Same comments as task #1217

IMPLEMENTATION SCHEDULE

Beach Mice		Responsible Agencies				Estimated Costs			Comments/Notes	
General Category	Plan Task	Task Number	Priority	Task Duration	Region	FWS and Others	FY1	FY2		FY3
M-3	Develop cooperative programs to reestablish beach dunes (Al. beach mouse)	1221	2	Ongoing	4	FWE, NWR, ADNR, AHC, COE, BLM	3K	3K	3K	NWR has ongoing project at Fort Morgan
	(P.K. beach mouse)					FWE, FGFC, NPS, FDNR, ADNR, COE, BLM				NPS has ongoing project at Gulf Islands National Seashore
	(Choc. beach mouse)					FWE, FGFC, FDNR				
M-3	Plant vegetation to stabilize and reestablish beach dunes (All mice)	1222	2	3 yrs.	4	FWE, NWR, ADNR, AHC, FDNR, NPS, FGFC	1K	1K	1K	each each each

IMPLEMENTATION SCHEDULE

Beach Mice

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agencies			Estimated Costs			Comments/Notes	
					Region	FWS and Others		FY1	FY2	FY3		
M-3	Maintain improved habitat areas (All mice)	1223	1	Continuous	4	Same as task #1222						
A-2	Obtain easements (Al. beach mouse)	131	2	Ongoing	4	FWE, RE, All state agencies, landowners						
	(P.K. beach mouse)								10K	10K	10K	Critical Habitat Zone 2
	(Choc. beach mouse)								10K	10K	10K	
A-7	Develop tax incentive programs (All mice)	132	3	Unknown	4	Same as task #131						
M-4	Condition sales and rental contracts to require confinements of house cats (All mice)	133	2	Continuous	4	FWE, landowners						
									10K	10K	10K	Critical Habitat Zone 1 & 4

IMPLEMENTATION SCHEDULE

Beach Mice

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agencies			Estimated Costs			Comments/Notes
					Region	FWS and Others	FY1	FY2	FY3		
I-2	Identify unprotected habitat (Al. beach mouse)	14	1	3 yrs.	4	FWE, NWR, ADNR, AHC					
	(P.K. beach mouse)					FWE, ADNR, FDNR, FGFC					
	(Choc. beach mouse)					FWE, FGFC, FDNR					
O-4	Monitor activities on privately owned lands (All mice)	15	2	Ongoing	4	FWE					Section 7 consultations
R-5	Conduct genetic studies (Al. beach mouse)	21	2	3 yrs.	4	FWE, ACRU					10K
	(P.K. beach mouse)					FWE, ACRU, FGFC					10K
	(Choc. beach mouse)					FWE, FCRU, FGFC, FDNR					10K

IMPLEMENTATION SCHEDULE

Beach Mice

General Category	Plan Task	Task Number	Priority	Task Duration	Region	Responsible Agencies			Estimated Costs			Comments/Notes
						FWS	and Others	FY1	FY2	FY3		
R-1	Identify areas where populations need to be reestablished or supplemented	22	1	Ongoing	4							
	(Al. beach mouse)					FWE, ACRU, NWR, ADNR, AHC		1*	2*	3*		Task covered under research proposal scheduled for 3/89
	(P.K. beach mouse)					FWE, ACRU, ADNR, FDNR, FGFC, NPS		1**	2**	3**		Task covered under research proposal scheduled for 4/88.
	(Choc. beach mouse)					FWE, FGFC, FDNR		1**	2**	3**		Funding is as follows: 1** \$11K 2** \$11K 3** \$4,575
R-1	Determine population size and monitor trends	231	1	Annual	4							
	(Al. beach mouse)					FWE, ACRU, NWR		1*	2*	3*		Task covered under research proposal scheduled for 3/89
	(P.K. beach mouse)					FWE, ACRU, FGFC, NPS		1**	2**	3**		Task covered under research proposal scheduled for 4/88
	(Choc. beach mouse)					FWE, FCRU, FGFC, FDNR		1**	2**	3**		

IMPLEMENTATION SCHEDULE

Beach Mice		Responsible Agencies			Estimated Costs			Comments/Notes		
General Category	Plan Task	Task Number	Priority	Task Duration	Region	FWS and Others	FY1		FY2	FY3
R-1	Determine age, sex, and number to be removed from existing populations (Al. beach mouse)	232	2	3 yrs.	4	FWE, ACRU,	1*	2*	3*	Task covered under research proposal scheduled for 3/89
	(P.K. beach mouse)					FWE, ACRU, FGFC, NPS	1**	2**	3**	Task covered under research proposal scheduled for 4/88
	(Choc. beach mouse)					FWE, FGFC, FCRU, FDNR	1**	2**	3**	
M-1,2	Determine which recovery action to follow (Al. beach mouse)	233	1	3 yrs.	4	FWE, FGFC, FDNR, ACRU, NPS				Based on information obtained in tasks 231 and 232
	(P.K. beach mouse)						1*	2*	3*	Task covered under research proposal scheduled for 3/89
	(Choc. beach mouse)						1**	2**	3**	Task covered under research proposal scheduled for 4/88

IMPLEMENTATION SCHEDULE

Beach Mice		Responsible Agencies				Estimated Costs			Comments/Notes	
General Category	Plan Task	Task Number	Priority	Task Duration	Region	FWS and Others	FY1	FY2		FY3
M-2	Translocate beach mice (Al. beach mouse) (P.K. beach mouse) (Choc. beach mouse)	24	1	3 yrs.	4	FWE, ACRU, NWR, ADNR, AHC FWE, ACRU, FGFC, NPS FWE, FGFC, FDNR	1** 1** 1**	2** 2** 2**	3** 3** 3**	Task covered under research proposal scheduled for 4/88
M-1	Develop plans for captive breeding colonies (Al. beach mouse) (P.K. beach mouse) (Choc. beach mouse)	25	2	3 yrs.	4	FWE, ACRU FWE, ACRU, FGFC, NPS FWE, FGFC, FDNR, FCRU	1** 1** 1**	2** 2** 2**	3** 3** 3**	Task covered under research proposal scheduled for 4/88. Information is applicable to all three subspecies

IMPLEMENTATION SCHEDULE

Beach Mice

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agencies			Estimated Costs			Comments/Notes
					Region	FWS and Others	FY1	FY2	FY3		
I-7	Evaluate possible captive breeding strategies (All mice)	251	2	3 yrs.	4	Same as for task #25		5K each	5K each		
I-7	Design facilities to maintain and breed beach mice (All mice)	252	2	3 yrs.	4	Same as for task #25	1**	2**	3**		Same comments as Task #25
I-7	Investigate short-term breeding strategy potential (All mice)	2521	2	3 yrs.	4	Same as for task #25		5K each	5K each		
I-7	Investigate long-term breeding strategy potential (All mice)	2522	2	3 yrs.	4	Same as above		5K each	5K each		
M-2	Determine age, sex, and number of mice to be released (Al. beach mouse)	2531	3	3 yrs.	4						
	(P.K. beach mouse)						1**	2**	3**		Information obtained from Research proposal due 4/88 is applicable to all 3 subspecies
	(Choc. beach mouse)						1**	2**	3**		

IMPLEMENTATION SCHEDULE

Beach Mice

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agencies			Estimated Costs			Comments/Notes
					Region	FWS and Others	FY1	FY2	FY3		
M-2	Release mice into enclosures (Al. beach mouse) (P.K. beach mouse) (Choc. beach mouse)	2532	2	3 yrs.	4	FWE, ACRU, NWR, AHC, ADNR	1**	2**	3**	Task covered under research proposal scheduled for 4/88	
I-1	Monitor introduced mice (Al. beach mouse) (P.K. beach mouse) (Choc. beach mouse)	2533	2	3 yrs.	4	FWE, ACRU, NWR, AHC, ADNR	1**	2**	3**	Task covered under research proposal scheduled for 4/88	

IMPLEMENTATION SCHEDULE

Beach Mice

General Category	Plan Task	Task Number	Priority	Task Duration	Region	Responsible Agencies			Estimated Costs			Comments/Notes
						FWS	and Others	FY1	FY2	FY3		
M-7	Develop plan to dispose of excess mice	2534	2	3 yrs.	4			1**	2**	3**	Task covered under research proposal scheduled for 4/88. Information is applicable to all subspecies	
	(Al. beach mouse)					FWE, ACRU, ADNR						
	(P.K. beach mouse)					FWE, ACRU, FGFC,						
	(Choc. beach mouse)					FWE, FGFC, FDNR						
0-1	Post signs	311	3	3 yrs.	4							
	(Al. beach mouse)					FWE, NWR, ADNR, AHC,		\$500	\$500	\$500	Bon Secour NWR, Gulf State Park, Fort Morgan State Park	
	(P.K. beach mouse)					FWE, FDNR, ADNR, NPS		\$500	\$500	\$500	Perdido Key State Preserve, Gulf State Park, Gulf Islands National Seashore	
	(Choc. beach mouse)					FWE, FGFC, FDNR, USAF		\$500	\$500	\$500	Grayton Beach State Rec. Area, St. Andrews State Rec Area, Tyndall AFB	

IMPLEMENTATION SCHEDULE

Beach Mice		Responsible Agencies				Estimated Costs				
General Category	Plan Task	Task Number	Priority	Task Duration	Region	FWS and Others	FY1	FY2	FY3	Comments/Notes
0-1	Distribute educational brochures (All mice)	312	3	3 yrs.	4	Same as task #311	\$500	\$500	\$500	
0-1	Request public to keep refuse containers tightly covered (Al. beach mouse)	321	3	Ongoing	4	FWE, NWR, ADNR, AHC, landowners				
	(P.K. beach mouse)					FWE, ADNR, FDNR landowners				
	(Choc. beach mouse)					FWE, FGFC, FDNR landowners				
0-1	Encourage more frequent trash collection (All mice)	322	3	3 yrs.	4	FWE, NWR, FDNR, local officials				
0-2	Seek public support in protecting beaches and dunes (All mice)	33	2	Ongoing	4	FWE, LE, NWR, local authorities				

IMPLEMENTATION SCHEDULE

Beach Mice

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agencies			Estimated Costs			Comments/Notes
					Region	FWS and Others	FY1	FY2	FY3		
0-1	Urge confinement of cats in beach mouse habitat (Al. beach mouse) (P.K. beach mouse) (Choc. beach mouse)	34	2	Continuous	4						
M-4	Develop feral cat removal program (All mice)	341	2	3 yrs.	4	FWE, NWR, ADNR, AHC, landowners FWE, FDNR, ADNR andowners FWE, FGFC, FDNR landowners					
I-12	Develop protection measures in case of off-shore oil spill (All mice)	4	3	3 yrs.	4	FWE, FGFC, FDNR NWR, ACRU, ADNR AHC, ADC FWE, CG					

## LIST OF ABBREVIATIONS

ACRU	=	Alabama Cooperative Fish and Wildlife Research Unit
ADC	=	Animal Damage Control (USDA)
ADNR	=	Alabama Department of Conservation and Natural Resources
AHC	=	Alabama Historical Commission
BLM	=	Bureau of Land Management
CG	=	United States Coast Guard
COE	=	Army Corps of Engineers
FCRU	=	Florida Cooperative Fish and Wildlife Research Unit
FDNR	=	Florida Department of Natural Resources
FGFC	=	Florida Game and Fresh Water Fish Commission
FWE	=	Fish and Wildlife Enhancement, Division of Endangered Species (FWS)
LE	=	Law Enforcement (FWS)
NPS	=	National Park Service
NWR	=	National Wildlife Refuge (FWS)
RE	=	Division of Realty (FWS)
USAF	=	United States Air Force



