

Beach Mice¹

Brittany L. Bird, Lyn C. Branch, and Mark E. Hostetler²

Beach mice, as their name indicates, live on beaches in Florida and Alabama. Beach mice live in the dunes that are located just above the high-tide line (Figure 1). A variety of animals live with beach mice in these dune habitats, including the six-lined racer, monarch butterflies, snowy plovers, and coachwhip snakes. Beach mice occur *only* in dune habitats. Because they live only in this habitat, they are at high risk of extinction if their habitat is destroyed. Most beach mice are listed as threatened or endangered.



Figure 1. See the mouse? (Look in the center, near the plants.) The Santa Rosa beach mouse is well camouflaged for the white sand of its coastal habitat.

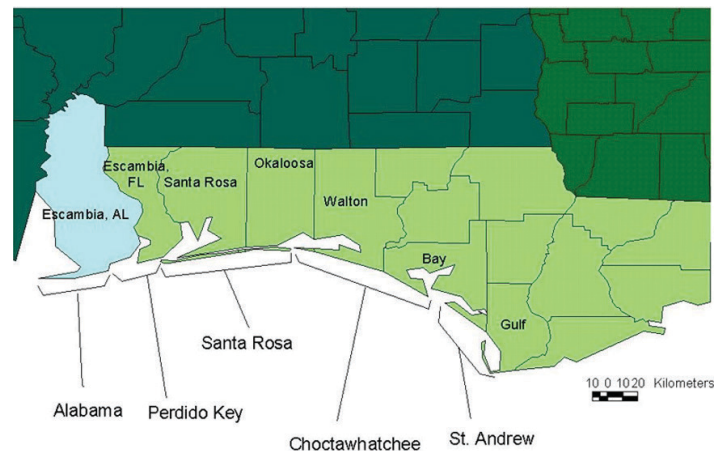
Credits: Florida Fish and Wildlife Conservation Commission

The main threats to beach mice are humans and coastal development. Coastal development—construction of homes and condominiums—has caused the destruction of dune habitats. In addition, domestic cats can affect beach

mice populations. In the long run, understanding beach mice and current conservation efforts will help the future survival of this species.

Distribution and Status

Beach mice comprise eight subspecies of the oldfield mouse (*Peromyscus polionotus*). The eight subspecies include five on the Gulf Coast and three (historically) on the Atlantic Coast. The five Gulf Coast subspecies are found in geographically distinct populations on barrier islands, keys, or coastal peninsulas between Mobile Bay, Alabama, and Cape San Blas, Florida (Figure 2).



Historic Ranges of the Gulf Coast Beach Mouse Subspecies

Figure 2. Habitat ranges of the gulf coast beach mouse subspecies.

Credits: Kathryn Smith

1. This document is WEC 165, one of a series of the Department of Wildlife Ecology and Conservation, UF/IFAS Extension. Original publication date August 2002. Revised March 2016. Reviewed April 2019. Visit the EDIS website at <https://edis.ifas.ufl.edu> for the currently supported version of this publication.
2. Brittany L. Bird, alumna (MS, 2002); Lyn C. Branch, professor; and Mark E. Hostetler, Extension wildlife specialist and professor; Department of Wildlife Ecology and Conservation; UF/IFAS Extension, Gainesville, FL 32611.

The Institute of Food and Agricultural Sciences (IFAS) is an Equal Opportunity Institution authorized to provide research, educational information and other services only to individuals and institutions that function with non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, marital status, national origin, political opinions or affiliations. For more information on obtaining other UF/IFAS Extension publications, contact your county's UF/IFAS Extension office.

U.S. Department of Agriculture, UF/IFAS Extension Service, University of Florida, IFAS, Florida A & M University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Nick T. Place, dean for UF/IFAS Extension.

Gulf Coast subspecies (5):

- Alabama beach mouse (*P. p. ammobates*)
- Perdido Key beach mouse (*P. p. tryssyllepsis*)
- Santa Rosa beach mouse (*P. p. leucocephalus*)
- Choctawatchee beach mouse (*P. p. allophrys*)
- St. Andrew beach mouse (*P. p. peninsularis*)

Of the remaining three subspecies, one has already been declared extinct—the Pallid beach mouse (*P. p. decoloratus*). The two surviving Atlantic Coast subspecies range along Florida’s Atlantic coast between Ponte Vedra Beach and Hollywood Beach.

Remaining Atlantic Coast subspecies (2):

- Anastasia Island beach mouse (*P. p. phasma*)
- Southeastern beach mouse (*P. p. niveiventris*)

Currently, all beach mice subspecies except Santa Rosa are listed as threatened or endangered by the US Fish and Wildlife Service or the Florida Fish and Wildlife Conservation Commission.

Description

Beach mice are small, pale mice with large ears and dark eyes (Figure 1 and Figure 5). Males and non-reproductive females average 12.5 g in weight. Pregnant females may exceed 20 g. The pale coloration of beach mice is believed to be an adaptation to the white sands of their coastal habitat. Although pale, beach mice exhibit a hint of brownish or grayish coloration across their backs. However, beach mice are normally much whiter than other mice. The amount and hue of coloration varies among subspecies, with the Santa Rosa beach mouse being the palest and the Alabama beach mouse having the most pigmentation. Subspecies also may be distinguished by the extent to which coat coloration extends onto their faces and down their sides and by the presence or absence of a tail stripe.

Life History and Behavior

Breeding and Dispersal

Beach mice are believed to have a monogamous mating system where one male mates with one female. For perspective, monogamy appears in less than 3% of all mammals. Mating among beach mice peaks in the winter but continues year-round if food is available. Once pregnant, it takes about 23 days before the mother gives birth. Females give birth to an average of 4 pups per litter and are ready to breed again within 24 hours. Beach mice live 9 months to

a year in the wild. Young mice have the ability to disperse several kilometers (1 km = 0.62 mile) from their birthplace to establish their own home ranges.

Home Range and Habitat Use

Home range size varies among subspecies but averages about 5000 m² (53,819 ft²). Individual home ranges commonly overlap. Beach mice often maintain multiple burrows within their home range. Burrows are used for sleeping, nesting, feeding, caching seeds, or as predator escapes. Burrows have a 1-2 inch triangular opening and a 2-3 foot tunnel leading to a main chamber. On the other side of the chamber, mice excavate a second tunnel that ends just below the sand surface. This serves as an escape tunnel from predators. If the burrow is disturbed, the resident mouse will often explode through this escape hatch. Burrows are occupied and maintained by a male-female pair, or by a female and her pups.

Beach mice prefer to construct their burrows in mature, sparsely vegetated dunes adjacent to the high tide line (primary dunes) (Figure 3) and the more densely vegetated dunes farther inland (secondary dunes). Sea oats (*Uniola paniculata*), dune panic grass (*Panicum amarum*), and blue-stem (*Schizachrium maritimum*) are the dominant plant species. The majority of foraging activity occurs in primary and secondary dunes. However, mice use other areas within the dune ecosystem. Seasonally wet areas between primary and secondary dune systems (called “swales”) often contain a thick cover of sedges (*Cyperus* spp.), rushes (*Juncus* spp.), and salt-grass (*Distichlis spicata*). Mice use highly vegetated swale areas to move between primary and secondary dune habitats and occasionally have burrows at the edges of swales.



Figure 3. Primary dunes. These dunes provide burrowing and foraging habitat for beach mice.

Credits: Florida Fish and Wildlife Conservation Commission

Beach mice forage and build burrows in the “scrub dunes” found on the bay side of islands (Figure 4). Scrub dunes are dominated by scrubby oaks (*Quercus virginiana*), dwarfed

magnolia (*Magnolia grandiflora*), sand pine (*Pinus clausa*), and false rosemary (*Ceratiola ericoides*). Scrub dunes are protected from storms by primary and secondary dunes. Thus, they may play a key role in providing safe habitat for beach mice when hurricanes disturb or flatten the primary dunes nearer the beach.



Figure 4. Scrub dunes, found on the bay-side of islands. Scrub dunes also are used by beach mice for foraging and burrowing.
Credits: Florida Fish and Wildlife Conservation Commission

Activity and Diet

Beach mice are active at night (nocturnal), spending the day sleeping in their burrows. Upon nightfall mice emerge from their burrows (often in pairs) and forage on seeds and fruits of beach plants, and insects. Mice gather seeds that have fallen or blown onto the sand or climb plant stems to harvest attached seed heads. Sea oats make up a large part of a beach mouse's diet (Figure 5). However, based on seasonal availability, beach mice also feed on bluestem, ground cherry (*Physallis angustifolia*), evening primrose (*Oenothera humifusa*), beach pea (*Galactia* spp.), dune spurge (*Chamaesyce ammannioides*), jointweed (*Polygonella gracilis*), seashore elder (*Iva imbricata*), and seaside pennywort (*Hydrocotyle bonariensis*).



Figure 5. Beach mice feed mainly on seeds and fruits of beach plants, especially sea oat seeds. Beach mice also eat insects.
Credits: Florida Fish and Wildlife Conservation Commission

During the course of one night, mice make several trips to and from their burrows. They gather seeds and store them in their burrow.

Conservation and Management Issues

Loss of Dune Habitat

Because of their specific habitat needs, beach mice are in danger. Both humans and natural environmental factors pose risks for beach mice. Construction of vacation and retirement homes has destroyed dune habitat. Dune habitats become fragmented and degraded (Figure 6). The threats imposed by commercial and residential development are particularly ominous on islands. The conversion of dune habitat on islands means that little dune habitat remains for beach mice. In addition, development aggravates the natural instability of the coastal island ecosystem. In the absence of development, coastal islands are subjected to a dynamic hurricane-dune regeneration cycle. This cycle maintains the preferred dune habitat of beach mice. However, on heavily developed islands, human-made structures hinder rates of natural, post-hurricane dune regeneration.



Figure 6. Conversion of dunes to vacation resorts destroys beach mouse habitat.
Credits: Florida Fish and Wildlife Conservation Commission

After a hurricane, dune plants must regenerate. As the plants grow, sand accumulates around them and small dunes begin to form. As the plants grow larger, the dunes also grow as the root systems act to hold more sand in place. This process is inhibited when buildings are constructed on the beaches. Natural plants are often destroyed during the construction process or are purposely removed to make way for new buildings. When this happens, there are no plants left to stabilize the dunes so the dunes are quickly blown away by the wind or washed away by the

ocean. A long period of time will pass before new dunes can regenerate. Mice must persist for prolonged periods in marginal burrowing and foraging sites while dunes reform. Following hurricanes, the remains of sea oat plants often are raked up and discarded because they are unsightly. Over time this practice reduces the sea oats available for food for beach mice and reduces the plants that would help reform dunes. In contrast, if pieces of sea oat plants that have roots are left on the beach, many will become re-established and soon grow into hearty plants that once again provide food for beach mice and accumulate sand to form dunes. Loss of dune habitat and reduction in dune regeneration rates may decrease the availability of safe havens for beach mice. Human development also contributes to the isolation of beach mouse populations. This isolation may restrict recolonization of habitat following the disappearance of local populations.

Introduced Predators

Beach mice populations are at risk from introduced predators. The domestic cat (*Felis catus*) and red fox (*Vulpes vulpes*) hunt beach mice. On islands, beach mice have evolved in the absence of these predators. They lack appropriate predator recognition and avoidance mechanisms and are highly vulnerable to predation by foxes and cats. Many scientists and agencies have cited introduced cats and foxes as a major threat to beach mouse populations and a potential cause of their decline. Removal of these species from beach mouse habitat is now recommended as a conservation practice. Some effort has been made to eradicate cats from Anastasia Island and foxes from Santa Rosa Island. However, no broad campaign has been established to control or eliminate introduced predators from beach mouse habitat as a whole.

Helping Remaining Beach Mice Populations

To help conserve and expand remaining beach mouse populations, biologists and wildlife managers recommend using translocation and reintroduction techniques. Both wild and captive-bred beach mice can be used in these techniques. *Translocation* involves adding beach mice to existing but small populations. Often beach mice are taken from a large population and released into a small population. The goal is to strengthen the small population by increasing the number of individuals and the genetic diversity. *Reintroduction* involves releasing beach mice into an area where beach mice were found in the past (historic range) but are not currently found there. When reintroducing beach mice into areas of historical range, biologists

hope the beach mice will be able to successfully survive there again and rebuild a stable population.

In 1987, the Florida Game and Freshwater Fish Commission (now called the Florida Fish and Wildlife Conservation Commission) launched a translocation program for the Choctawhatchee beach mouse. A year-long effort resulted in a small but persistent population of the mice at Grayton Beach, Florida. More recently, efforts to reintroduce the Perdido Key beach mouse to the Gulf Islands National Seashore have resulted in a well-established population of mice in that area.

While these efforts have been successful, habitat loss limits the number of areas available for future translocations and reintroductions.

What You Can Do

There are several things you can do to help protect the remaining populations of beach mice. If you are a resident of a beach community, you can reduce the risk of cat predation by keeping cats indoors. Feeding stray cats in beach areas should be avoided as this will encourage stray cats to become permanent residents in beach mouse habitat. In addition, by staying off of the dunes while at the beach, you will help to preserve fragile beach mouse habitat. Over time, excessive foot traffic on dunes causes damage to native plants and ultimately destabilizes the dunes. You can reduce destruction of beach mouse habitat by remaining in the designated visitor areas or on designated walkways.

Encouraging the growth of native dune plants around private beach residences is another way to limit the negative effects that development can have on beach mouse habitat. Also, leave uprooted sea oats plants on the beach after hurricanes so that they can re-establish. Native dune plants such as sea oats, bluestem, evening primrose, and ground cherry can add color and structure to the landscape while providing food for beach mice and encouraging dune regeneration. In addition, reducing outdoor lighting in areas with dunes can help beach mice because beach mice avoid foraging in areas with artificial light.

Finally, share with others what you have learned about beach mice here. The more awareness there is about these unique mice, the more hope there is that beach mice will survive well into the future.

Selected References

Extine, Douglas, D. & J. Jack Stout. (1987). "Dispersion and habitat occupancy of the beach mouse, *Peromyscus polionotus niveiventris*." *Journal of Mammalogy*. 68(2): 297–304.

Gore, J.A. & T.L. Schaffer. (1993). "Distribution and conservation of the Santa Rosa beach mouse." *Proceedings of the Annual Conference of the Southeast Association of Fish and Wildlife Agencies*. 47: 378–385.

Humphrey, S.R. (1992). Beach Mice. Pp. 76-91. *In Rare and Endangered Biota of Florida. Vol. I Mammals*. University Press of Florida, Gainesville.

Moyers, J.E. (1996). Food habits of Gulf Coast subspecies of beach mice (*Peromyscus polionotus spp.*). [Masters thesis]. 83p. Auburn University.

Oli, M., N.R. Holler, & M.C. Wooten. (2000). "Viability analysis of endangered Gulf Coast beach mouse (*Peromyscus polionotus*) populations." *Biological Conservation*. (0): 1–12.

Swilling, W.R., M.C. Wooten, N.R. Holler, & W.J. Lynn. (1998). "Population dynamics of Alabama beach mice (*Peromyscus polionotus ammobates*) following hurricane Opal." *American Midland Naturalist*. 140: 287–298.

U.S. Fish and Wildlife Service. (2000). Gulf Coast Beach Mouse Workshop Manual.

Wood, D.A. (2001). Beach Mice. Pp. 87–98. *In Florida's Fragile Wildlife: Conservation and Management*. University Press of Florida, Gainesville.