United States Department of the Interior

FISH AND WILDLIFE SERVICE
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1208-B Main Street
Daphne, Alabama 36526

IN REPLY REFER TO:

MEMORANDUM

To: Assistant Regional Director, ES, Southeast Region

From: Field Supervisor, Daphne, Alabama

Date: December 22, 2004

Subject: Biological Opinion for Issuance of an Incidental Take Permit Pursuant to Section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended, for Gulf State Park Hotel and Convention Center Demolition and Reconstruction between Gulf Shores and Orange Beach, Baldwin County, Alabama (TE-072831-0)

This document is the Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed issuance of an Incidental Take Permit (ITP) by the Service pursuant to section 10(a)(1)(B) of the Endangered Species Act of 1973 (Act), as amended (16 United States Code 1531 et seq.). The ITP is associated with the Demolition and Reconstruction of the Gulf State Park (GSP) Hotel and Convention Center, located in Baldwin County, Alabama. The Service evaluated the effects of this action on the endangered Alabama beach mouse (ABM) (*Peromyscus polionotus ammobates*), three endangered or threatened species of sea turtles [green, (*Chelonia mydas*) (endangered); loggerhead, (*Caretta caretta*) (threatened); and Kemp's ridley, (*Lepidochelys kempii*) (endangered)], and the threatened piping plover (*Charadrius melodus*) under section 7 of the Act.

This biological opinion is based on information provided in the December, 2004 environmental assessment (EA), draft habitat conservation plan (HCP), draft cumulative impact assessment for ABM (CIA), field investigations, and other sources of information. A complete administrative record of this consultation is on file at the Daphne, Alabama Ecological Services Field Office (DFO).

Consultation History

January 15, 2002: Contacted by Volkert Engineering, Brett Gaar, regarding HCP.

June 19, 2002: Meeting with Volkert Engineering - preliminary pre-application meeting.

August 20, 2002: Meeting with Brett Gaar, Volkert. They are preparing an HCP and EA. Plan to be presented to the Governor for approval on 8-23-02. Final plans not yet determined.

September 17, 2002: Notified by Volkert that the Pavilion needed to be removed. Discussion of impacts, permit requirements, whether ITP would be required or could Alabama State Collection Permit be used.

September 30, 2002: Meeting with Volkert, Alabama Department of Conservation and Natural Resources (ADCNR). Pavilion removal will be done under ADCNR recovery action permit because it is hazardous to the public. Minimal impact, restoration, methods to avoid take discussed.

October 10, 2002: Meeting with Volkert to discuss alternatives, Critical Habitat (CH) which has constituent elements of CH, ABM trapping information for GSP HCP.

December 1, 2002: Meeting with Volkert, regarding data needs for HCP and draft EA

December 16, 2002: Site visit to GSP between Celeste South and Brett Gaar to identify CH which has the constituent elements of CH.

January 21, 2003: Telephone conference with Brett Gaar and Scott Jackson, with Volkert, regarding 5-Point policy for HCPs, trapping information for GSP, questions about completion of HCP.

January 28, 2003: Meeting with Volkert and Bill Lynn, Panama City, to discuss previous trapping data and trap lines at GSP.

January 30, 2003: Telephone conversation with Scott Jackson, Volkert, discussion of HCP and mapping of habitat.

February 20, 2003: Telephone conversation, Scott Jackson, Volkert, regarding draft HCP.

March 3, 2003: Meeting at GSP with Scott Jackson and Hugh Branyon regarding plans for Convention Center.

March 5, 2003: Site visit to GSP for habitat mapping.

March , 2003: Meeting with Scott Jackson and Brett Gaar to discuss HCP alternatives.

May 7, 2003: Receipt of GSP Application for ITP, HCP.

May 12, 2003: ITP application and HCP forwarded to Southeast Regional Office (SRO).

December 10, 2003: Draft EA, with DFO comments included, received from Volkert.

December 13, 2003 ADCNR Application to Corps of Engineers (COE) for GSP Hotel and Convention Center.

June 26, 2004: Comments furnished by SRO

July 26, 2004: Solicitor review of HCP and draft EA.

July 30, 2004: Comments/additional information added to EA

August 30, 2004: Solicitor Comments incorporated into revised EA

September 15, 2004: Notice of availability of the HCP and EA was published in the Federal Register with a 30-day comment period for public comment.

Application No:	*TE-072831-0*
Ecosystem:	*Northeast Gulf of Mexico*
Applicant:	*Alabama Department of Conservation and Natural Resources*
Action Agency:	*U. S. Department of the Interior - Fish and Wildlife Service*
Project Title:	*Gulf State Park Hotel and Convention Center*
County:	*Baldwin County, Alabama*

Table 1. Species and CH evaluated for effects and those where the Service has made a "no effect" or "not likely to be adversely affected" determination.

SPECIES or CRITICAL HABITAT*	PRESENT IN ACTION AREA, BUT "NO EFFECT"	PRESENT IN ACTION AREA, BUT "NOT LIKELY TO BE ADVERSELY AFFECTED"
Alabama Beach Mouse/CH (*Peromyscus polionotus ammobates*)	No	No
Green sea turtle (*Chelonia mydas*)	No	Yes
Loggerhead sea turtle (*Caretta caretta*)	No	Yes
Kemp's ridley sea turtle (*Lepidochelys kempii*)	No	Yes
Piping plover (*Charadrius melodus*)	Yes	Yes

*The above species and CH with "no effect" or "not likely to be adversely affected" by this action will not be discussed further in this biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The proposed action consists of the demolition, replacement, occupancy, use, operation, and maintenance of GSP Hotel and Convention Center, lodging facilities, beach pavilion, amphitheater, and parking areas. GSP (Figure 1) consists of over 4,000 acres along the Gulf of Mexico coastline in Baldwin County, Alabama. The project area consists of 137.8 acres situated in the general vicinity of the existing Hotel and Convention Center and previously demolished (March-April 2004) beach pavilion in Sections 21 and 22, Township 9 South, Range 4 East between Alabama State Highway

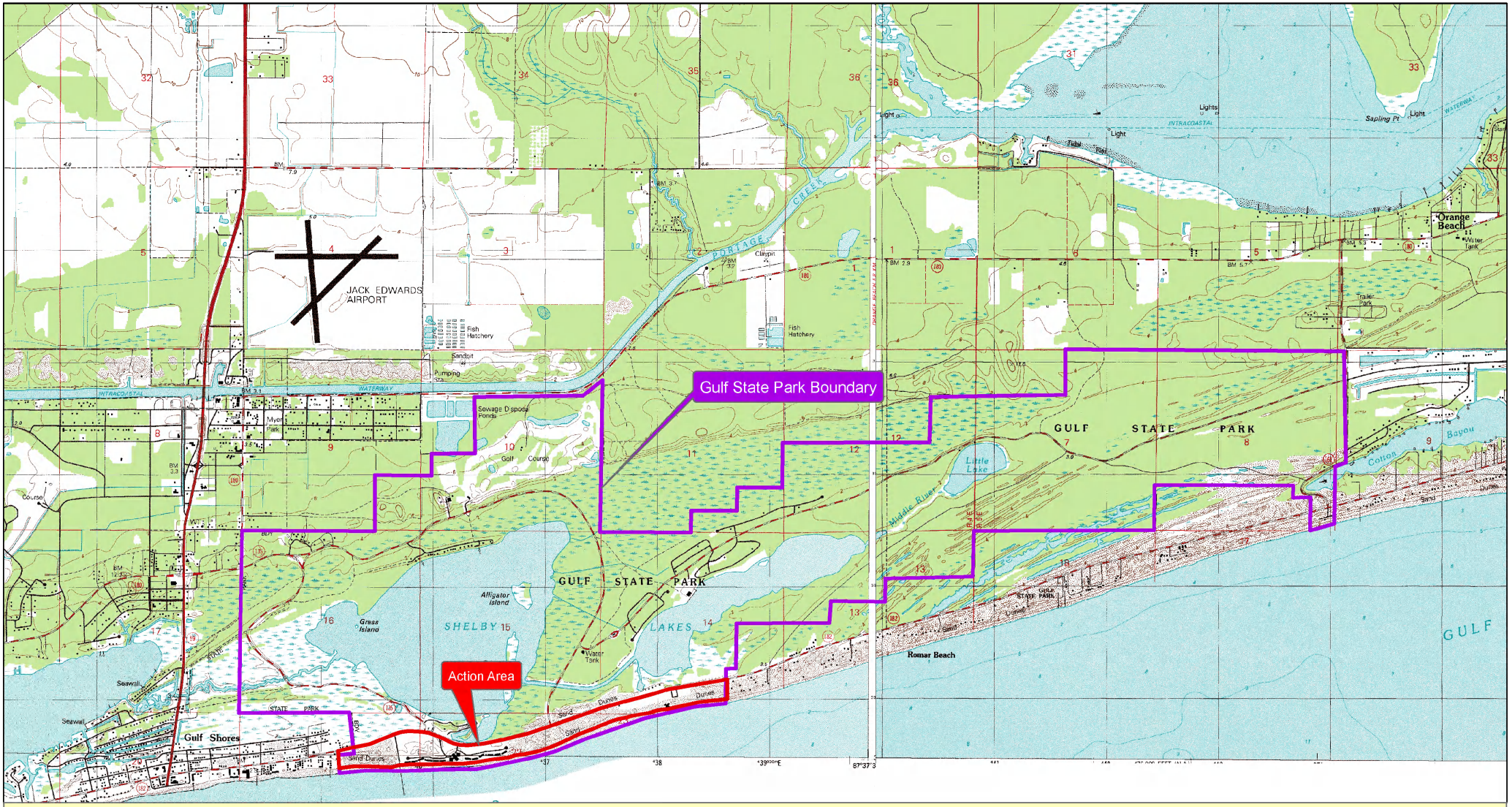

Figure 1: Site Vicinity - Gulf State Park Hotel/Convention Center & Pavilion Project

1 inch equals 2,750 feet

Map recreated 11-4-04 from
Volkert Environmental Group, INC. maps.

DWH-AR0296832

(AL) 182 and the Gulf of Mexico. The project (Figure 2) consists of a seven-story hotel (total of 311 rooms), a beach inn (total of 100 rooms), four beachside cottages (total of 16 rooms), and a new beach pavilion. Amenities included within these project features are an executive conference center, a wedding pavilion, swimming pools, a health spa, an amphitheater, restaurants, a retail village, and a beach boardwalk, as well as public and service space to support these features. Disturbed land (i.e., where the natural community has previously been altered by facilities, infrastructure, pedestrian traffic landscaping, etc.) within the project area consists of 42.4 acres. A total of 44.3 acres are included in the construction footprint of the proposed project.

Proposed HCP Conservation Measures

The permittee has proposed the following measures to minimize the adverse effects of construction and human occupation of the proposed development on the ABM and to avoid adverse effects to nesting sea turtles. These avoidance and minimization measures have been summarized directly from the HCP submitted to the Service:

- Layout of the development has been redesigned to minimize impacts and enhance restoration.
- Limits of construction for the project area shall be clearly marked, for the duration of construction, with a continuous fence, cable, or other substantial marking device. Signage shall be posted at intervals of no less than one hundred feet along its limits.
  Solid waste generated onsite during construction shall be securely stored, at all times, and shall be removed as necessary to prevent deposition of material on the ground.
  Lumber, metals, masonry, and other building materials shall be kept, stored, or accumulated *only* in areas of the property that are a part of the planned development "footprint".
- Tightly-closed, rodent- and scavenger-proof refuse containers shall be provided in sufficient capacity and placed in appropriate locations and kept in good repair, such that all refuse accumulated (both during construction activities and subsequent occupancy/use) between scheduled pick-ups is properly contained. These containers shall be monitored to ensure that they are kept closed, except when waste is being deposited or removed for disposal. A procedure shall be established for timely removal of refuse so as to avoid exceeding the capacity of the containers between waste removal intervals. The waste removal contractor servicing this equipment shall be furnished with a copy of the informational/educational brochure developed for this project and the contract shall make specific reference to these requirements. If any container becomes altered or damaged such that it is incapable of sufficiently tight closure to exclude rodents and/or scavengers, it shall be repaired or replaced immediately.
- The construction area shall be trapped for ABM immediately prior to (no more than one week) construction and all captured mice will be relocated as agreed to in coordination with the Service.
  If an active ABM burrow is encountered and presence of mice is confirmed, work at and within at least 50 feet from the point of observation shall temporarily cease and the designated Service representative shall be notified immediately. Further action (including, but not limited to, capture and relocation or reasonable modification of construction technology, procedure, or timing) shall then be decided upon by the Service, in coordination with the permittee.

Figure 2: Preferred Alternative (Alt.2) - Site Plan

Map recreated 11-4-04 from
Volkert Environmental Group, INC. maps
Aerial photography provided by Baldwin County 2001

If at any time during initial land development activity or subsequent occupancy/use, any ABM is killed, the "responsible party" (i.e., the permittee or contractor) shall immediately place the specimen in secure refrigerated storage and shall, within 24 hours, contact the designated Service representative, who shall make arrangements for transfer of the specimen to appropriate custody, or shall direct other disposition thereof.

If any ABM is injured during or following construction activity, and is thereby immobilized or otherwise traumatized sufficiently that it may be readily captured, the "responsible party" shall take custody of the injured mouse, using due caution to avoid further injury; shall remove it to a secure, quiet indoor location away from any extremes of temperature; shall immediately notify the designated Service representative concerning circumstances of the injury and apparent condition of the injured mouse; and shall follow such instructions as the Service representative provides concerning custody, care, and disposition.

Seven piling-supported dune walkovers, extending from the south edge of the developed footprint of the building strip to the north edge of the wet beach, shall be constructed. A dune management plan shall be completed and approved, and the alignment of each walkover shall be established in consultation with and with approval of the Service and the Alabama Department of Environmental Management (ADEM). Final alignments and elevations, including any necessary routing around or across existing major dunes, shall be based on the best prediction of future configuration of dunes in response to the dune enhancement measures of the dune management plan.

The permittee shall be responsible for ensuring that foot traffic is managed and that the practice of accessing and using the beach areas with off-road capable vehicles is eliminated, except for park personnel utilizing one approved location for beach access to remove waste and other refuse. The beach access shall consist of a boardwalk wide enough to accommodate the vehicle(s) that will be used by GSP personnel.

No equipment may be used for dune walkover construction or maintenance, except that which is essential to these purposes. All dune walkover construction activities shall be conducted in a "top-down" manner in order to prevent further degradation of the dunes. Any disturbed areas outlying the outer edges of the walkovers shall be restored.

Information and advisory signs shall be installed, visible to users of each dune walkover and visible from a point within 25 feet of its landward point of entry (one at each end of the walkovers). The signs shall advise walkover users of the presence and endangered status of the ABM, its dependence upon the sand dune system for food and shelter, and the need to protect this system by confining foot traffic to the dune walkover. The permittee shall maintain the signs and shall keep on hand one or more replacement signs for prompt replacement of any sign requiring replacement. Repair or replacement of signs shall occur within five working days of such loss or damage.

Directional outdoor floodlights or other lights that illuminate the primary dunes lying south of the property, the wet beach seaward of such dunes, or any portion of the Gulf of Mexico shall not be installed upon nor used on the property. The light emitting and/or reflecting portions of any light sources (including bulbs, tubes, reflectors, or globes) on the south side of the property shall be shielded or recessed, such that no portion of the cone or beam of light from any such sources is directed toward any area south of the crest of the primary dune.

Any fence(s) installed on the perimeter of developed portions of the property shall be of a vertical lattice, shadowbox design, or other design incorporating openings along its entire

length of an adequate width to permit unimpeded movement of beach mice through the fence. The design of the fence shall be such that accumulation of windblown sand at the base of the fence will provide no impediment to such movement. The permittee shall regularly inspect the fence(s) and shall remove any accumulations of litter or refuse so as to prevent development of habitat capable of shelter house mice or attracting predators that might prey upon beach mice. No domestic or free-roaming/feral cats shall be allowed, as pets or otherwise, within the project area. Tenants, or others, shall be prohibited from supporting the presence of domestic or free-roaming/feral cats by providing food, shelter, or any other life-supporting elements. If routine monitoring and reporting disclose the presence of cats and/or cat tracks in the project area, immediate control measures shall be instituted. Means of control shall be established, funded, and carried out by the permittee. Results will be reported to the Service during normal reporting cycles agreed to by the permittee and the Service. In addition to cats, predator control efforts shall include red fox and coyote. Any trapped predators shall be taken to the local animal control facility.

- If house mice are determined to exist, based on routine trapping operations as agreed to by the permittee and the Service, a house mice trapping and extermination effort shall be initiated and continued until trapping results show that house mice have been controlled. This determination shall be made in coordination between the Service and the permittee.

The permitee shall implement a program for monitoring, protecting, enhancing, and maintaining dunes in the project area. The permittee shall retain a qualified dune management consultant with demonstrated expertise in dune management to oversee this program. The permittee's dune management consultant, prior to implementing any specific dune management measures within the project area, shall develop a written dune management protocol for the project area. The protocol shall:

- Summarize available information concerning management of coastal sand dunes, including information on physical methods for the restoration of eroded dunes, "blown-out" dunes, dunes otherwise damaged by natural forces or by human influences, and techniques for planting of dune vegetation.
- Assess the condition of the dune system within the permit area as a baseline for the planning of dune management measures. This assessment shall include mapping of the dune system as necessary to depict elevation contours, vegetative cover patterns, and indicators of damage (blow-outs, other extensive areas of sparse/poor vegetative cover, and areas of dead, diseased, or otherwise stressed vegetation).
- Establish specific objectives for dune management in the project area, including but not limited to, enhancement of elevation differences in areas of suboptimal variation in surface relief; planting and encouragement of a plant species complex favoring species of known preference and with high food value for ABM; and promotion of protection of dune configurations in areas deemed most vulnerable to wind and tidal erosion.
- Be completed within six months of issuance of the ITP and submitted to and approved by the Service and ADEM prior to implementation of any measures described therein, except that, in the event of any major damage to the dune system between permit issuance and the approval of the protocol, the permittee's dune management consultant shall promptly assess the extent of such damage; report findings to the Service and ADEM; and implement such measures as are deemed reasonable and necessary by the Service and ADEM for stabilization and restoration of damaged dune habitat.

- Within 60 days after approval of the protocol, the dune management consultant shall prepare an annual work plan for dune management activities for a one-year period, to commence no later than sixty days following approval of the plan by the Service and ADEM. The annual work plan shall identify and describe, in detail, the specific dune management measures to be implemented during the first year of implementation of the dune management plan; describe the beneficial results anticipated as a result of these activities; and set forth a schedule for implementing the planned activities. The work plan shall be submitted to and approved by the Service and ADEM, with such reasonable modifications as deemed necessary, subject to funding provisions of this plan. If, at any time during the implementation of annual work plan measures, a hurricane or other major destructive storm causes substantial damage to the dune system, the dune management consultant shall promptly evaluate the effects of such storm damage and will revise the annual work plan to reflect any dune management and restoration needs that are not sufficiently provided for in the annual plan. Proposed revisions of the annual work plan will be submitted to the Service and ADEM for this review and concurrence before proposed work is commenced.
- On the anniversary date of approval of the first year's annual work plan, and on each successive anniversary date thereafter for 30 years, or other time period as approved by the Service, the dune management consultant shall submit to the Service and ADEM an annual progress report and a work plan for the coming year's dune management program. Each such work plan shall include, for the coming year, the basic elements prescribed above for the initial year's work plan.
- The progress report shall describe: (a) the dune management measures implemented during the previous year; (b) the extent to which the beneficial results anticipated from such measures have been, or are being, accomplished; (c) an explanation of the reason(s) for any failure to complete any activity that was a part of the previous year's work plan; and (d) the consultant's recommendations, if any, for modifications of the plan to enhance progress toward plan objectives. The report shall include topographic mapping and photographs as necessary to document any major damage occurring to the dune system during the reporting year. Major damage, for purposes of this report, shall include any blow-out of the primary dune system, any erosion damage that results in an estimated 25 percent, or greater, reduction of the height of any line of primary dunes for a lateral distance of 200 feet or more; or any damage, either from tidal scouring or from sand deposition or erosion, that results in a loss of all, or essentially all, dune vegetation over any area of 0.25 acre or more of any primary dune.
- The permittee's dune management program, as currently envisioned, is not intended to supplant or override natural dynamic forces affecting the evolution of coastal dune systems within the project area. It is recognized that these natural forces may be both constructive and destructive. It is further recognized, however, that employment of proven technologies for erosion control and dune growth and for planting of desirable plant species can be used to accelerate the rate of dune recovery from the impacts of erosive forces, and to, thereby, extend the intervals during which dunes provide high quality support for life functions of ABM, including feeding, nesting, and sheltering. Success criteria shall be based on the stabilization of restored dune areas as well as the

positive growth of the ABM population in the project area, as determined through seasonal trapping.

- Areas disturbed, but not permanently converted through construction, shall be restored to the maximum extent practicable. As a priority, such restoration will emphasize north-south natural corridors between the isolated scrub dunes and the open sand areas. The permittee shall retain a professional engineering firm, with recognized competence in protection, restoration, and enhancement of coastal dune systems, for providing planning, construction, and post-construction guidance in the conservation of scrub dune vegetation and topography. Based on that guidance, the permittee shall undertake prescribed dune conservation measure, such as the planting of native scrub vegetation and the selective placement of sand entrapment devices. These measures shall be undertaken with the goal of maintaining and enhancing the physical stability of the scrub dunes and preservation of a natural plant cover of value for wildlife habitat and as an aesthetic amenity of the project. The engineering firm responsible for the dune management will be given the goal of enhancement of the primary dune system to increase the value of that habitat for the ABM. An objective of increasing its value for ABM is to raise the population on undeveloped portions of the project area. The plan for the dune restoration system shall be developed in consultation with the Service.

The permittees have also outlined a plan to document the effectiveness of the conservation measures through monitoring. Should unforeseen or changed circumstances arise, the plan includes adaptive management procedures. The specific monitoring and adaptive management features provided in the permittee's HCP are hereby incorporated by reference.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

ALABAMA BEACH MOUSE

The old-field mouse, (*Peromyscus polionotus*) varies in form and structure, and is genetically diverse throughout its range in the southeastern United States (Bowen, 1968; Selander *et al.*, 1971). Currently, there are 16 recognized subspecies of old-field mice (Hall, 1981). The ABM is one of eight subspecies of the old-field mouse that occupy coastal rather than inland habitat and are referred to as "beach mice" (Lynn, 2000). The ABM is one of five subspecies of the old-field mouse restricted to the coastal dunes and adjacent habitat along the Gulf coast of Alabama and northwestern Florida. Two other existing subspecies of beach mice and one extinct subspecies are known from the Atlantic coast of Florida. These semi-fossorial (living part of their life underground) mammals are native to coastal ecosystems along the Gulf coast of Alabama and northwestern Florida, and the Atlantic coast of Florida (Lynn, 2000).

MacNeil (1950; as cited in Bowen, 1968) found that the line of abrupt change from pale (beach mice) to dark mice (old-field) coincided with the highest Pleistocene shoreline along the northern coast of the Gulf of Mexico. Generally seaward of that geologic formation, beach mice may be found. Soil

characteristics play an important role in determining the distribution of these semi-fossorial mice. Poorly drained soils and those underlain by hardpan constitute barriers to beach mice in creating underground burrows (Bowen, 1968).

All beach mice are differentiated from the inland subspecies by differences in fur patterns on the head, shoulders, and rump. The overall dorsal, back, coloration is more reduced in coastal subspecies, is lighter in color, and is less extensive than on those of the inland subspecies (Sumner, 1926; Bowen, 1968). The ABM has a white abdomen and a faint dark stripe that runs down the upper tail surface (but does not extend the entire length of the tail).

Howell (1909, 1921) first described ABM as being confined to the "drifting sand dunes" along the Baldwin County coast. Anderson (1960) collected 23 specimens from the Gulf Shores-Romar Beach area that were referred to as *P. p. albifrons*. Bowen (1968) reexamined the taxonomic status of this group and assigned the population from Mobile Bay to Alabama Point, and on Ono Island, to *P. p. ammobates*. He referred to the population east of Perdido Pass, from Florida Point to the Alabama-Florida state line and along Perdido Key to the east, as *P. p. trissyllepsis* [Perdido Key beach mouse (PKBM)].

Several geographically separate populations of three subspecies of beach mice [ABM, PKBM, and Choctawhatchee beach mouse (CBM)] are found along the northern Gulf Coast. These three subspecies were listed as endangered under the Act in 1985 and CH was designated for each at the time of listing (Service, 1985). CH, as defined by section 3 of the Act means:

> *(i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and*
>
> *(ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species.*

Primary constituent elements are the physical and biological features of designated or proposed critical habitat essential to the conservation of the species, including, but not limited to: (1) space for individual, and population, growth and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and (5) habitats that are protected from disturbance or are representative of the historic geographic and ecological distributions of a species.

The constituent elements of CH for ABM requiring special management considerations or protection include dunes and interdunal areas, and associated grasses and shrubs that provide food and cover (Service, 1985). CH in all areas extends at least 152 meters (500 feet) landward from the mean high tide line. In considering designation of the primary and secondary dunes as CH, the Service focused on the biological or physical constituent elements within the area essential to the conservation of the

ABM. The primary and secondary dune areas, designated as CH, satisfied the best available scientific criteria for the physiological, behavioral, ecological, and evolutionary requirements for the ABM at the time of designation. The information (Meyers, 1983) used in designating CH indicated that optimum beach mouse habitat was characterized by: (1) maximum elevation of the coastal sand dunes, (2) elevation differences between maximum dune height and minimum interdunal elevation, (3) location of adjacent forest (i.e., scrub), (4) ground vegetation with a moderate number (average 3.5) of plant species, and (5) amount of sea oats. Such land and vegetation conditions provide necessary food and cover for populations of beach mice, and the necessary elements to allow reproduction and maintenance of the population. Data developed since listing confirm importance of these constituent elements for ABM (Bates, 1992; Gore and Schaefer, 1992; Moyers, 1996; Moyers *et al.*, 1996; Novak, 1997).

CH (Service, 1985) designated for the ABM includes three "zones" in Baldwin County, Alabama, encompassing 1,038 acres along 10.6 miles of coastal dune habitat. Zone 1 comprises most of Fort Morgan State Park, also known as the Fort Morgan Unit (FMU) of BSNWR, and continues eastward to the dunes just east of Dune Drive (Figure 3A). Zone 2 extends from the west boundary of the Laguna Key development at the western terminus of AL 182 and extends westward through the dune habitats in front of the Kiva Dunes development (Figure 3B). Zone 3 includes dune habitats at GSP (Figure 3C). The majority of all ABM CH, 841 acres, occurs along 7.4 miles of shoreline west of Gulf Shores, Alabama, and comprises 672 acres along 5.9 miles on public lands comprising the Perdue Unit (PU) of the BSNWR and FMU, as well as 169 acres along 1.5 miles of privately owned shoreline. The remaining CH area is 197 acres along 2.2 miles of GSP. CH begins at the mean high tide line and proceeds inland 500 ft at the PU of BSNWR and includes private inholdings and adjacent properties. At FMU and adjacent private lands to the east, CH extends north to AL 180 except the most eastern 0.5 miles, where it extends 500 ft inland. At GSP, the portion of the park that is south of AL 182 is designated as CH. Prior to landfall of Hurricane Ivan on September 16, 2004, this CH area was occupied due to successful ABM reintroductions by the Service in 1998.

On February 2, 1999, the Sierra Club petitioned to revise the designation of CH for three endangered beach mouse species, including the ABM. This petition contended that the primary and secondary dunes alone were not adequate for the survival and recovery of beach mice. On May 12, 2000, the Sierra Club filed suit for failure to publish a 12-month finding. After considering the petition and other available information, the Service found that the requested action was warranted [65 *FR* (FR 57800), posted 26 September 2000] and that areas which include a greater diversity of habitat, including secondary and/or scrub dunes, may be essential to the survival and recovery of the three species. The Service also stated that timing of the rulemaking would depend upon the availability of funding and the presence of potentially higher priority listing and critical habitat actions(including court ordered critical habitat designations). On June 17, 2003, the Sierra Club filed suit in the United States District Court for the Southern District of Alabama, Southern Division, alleging that 1) The Service had failed to complete the revision of critical habitat, and 2) the failure to revise critical habitat is not in accordance with the Endangered Species Act and the Administrative Procedures Act. By Order dated February 13, 2004, the Court dismissed Plaintiff's claims under the Endangered Species Act.

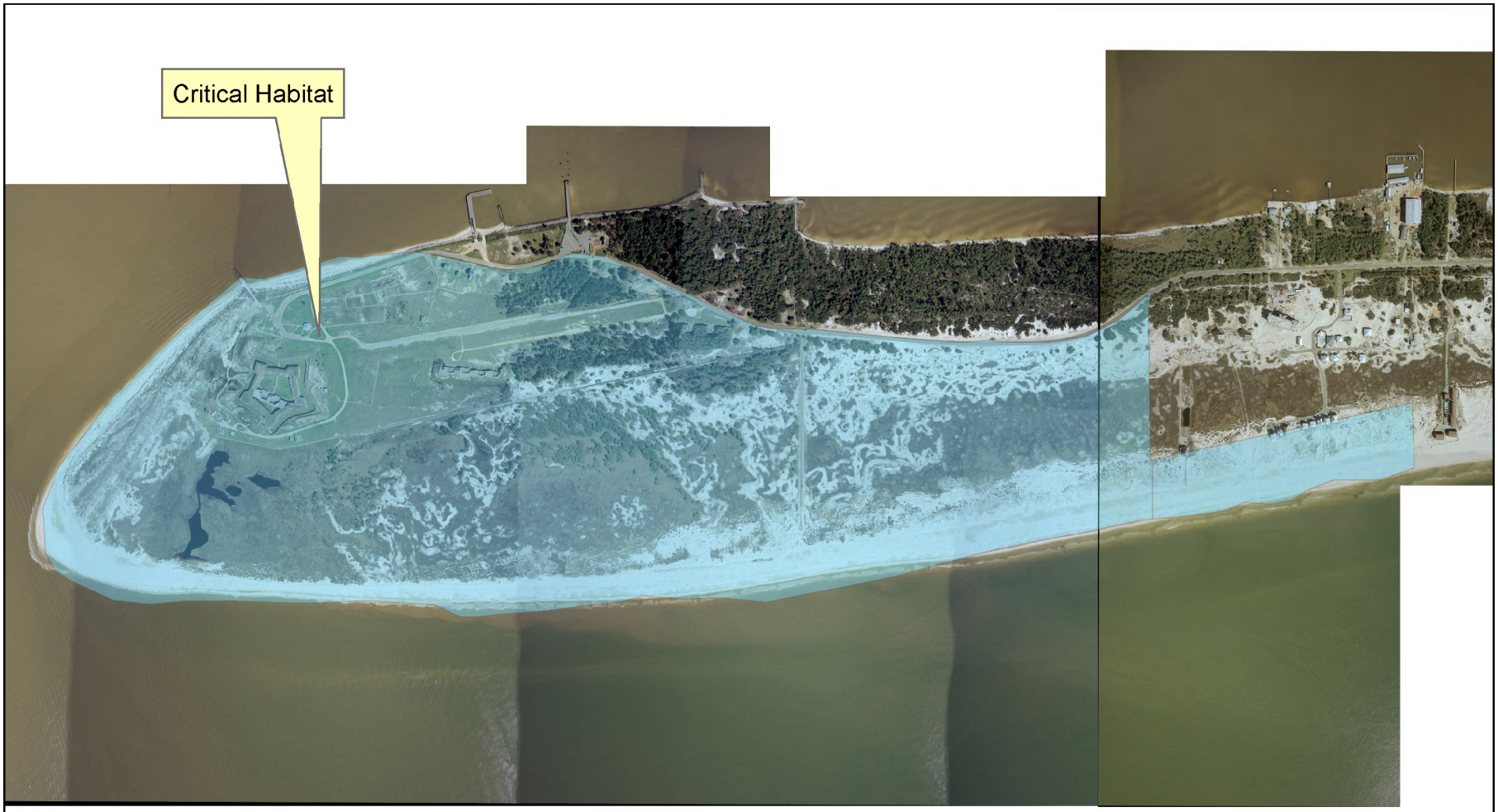

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Figure 3A: Critical Habitat at Ft. Morgan State Park

0 0.1 0.2 0.4 0.6 0.8 Miles

Map created 11-4-04

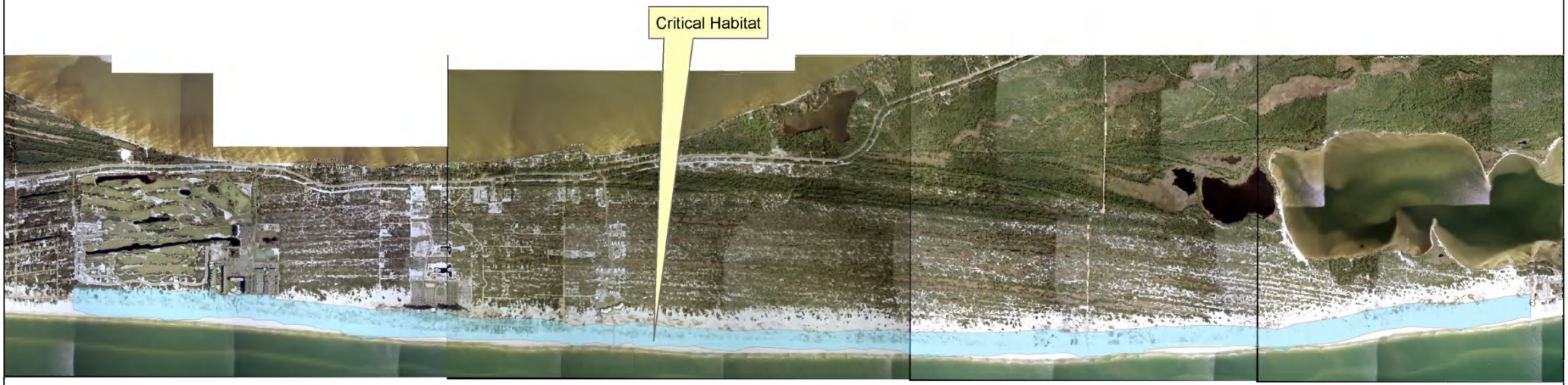

Figure 3B: Critical Habitat Between Kiva Dunes & Laguna Key.

0 0.25 0.5 1 1.5 2 Miles

Map created 11-4-04

Figure 3C: Critical Habitat at Gulf State Park

0 0.05 0.1 0.2 0.3 0.4 Miles

U.S. FISH & WILDLIFE SERVICE

Map created 11-4-04

The Recovery Plan (Service, 1987) for the ABM identifies the primary recovery objectives to be: (1) the stabilization of present populations by preventing further habitat deterioration, (2) the re-establishment of populations in areas where they have been extirpated, and (3) education of the general public (of the plight and recovery objectives of each subspecies). While the original plan is still operative at this time, the Service is currently developing a Revised Recovery Plan for the ABM with the assistance of a recovery team consisting of scientific experts, and individuals from local, state and federal government agencies, and community organizations.

Habitat and distribution

ABM habitat is a mix of interconnected habitats including primary, secondary, and scrub dunes, along with interdunal areas. Beach mice dig burrows in the primary, secondary, and interior scrub dunes where the vegetation provides cover. Most ABM surveys conducted prior to the early 1990s were in primary and secondary dunes that were typically thought to be preferred beach mouse habitat based on the best information available at the time. The distribution and relative abundance of ABM in scrub dunes and in other interior habitat types were less well known due to limited surveys. In coastal environments, the term "scrub" and "scrub dune" refer to habitat or vegetation types where scrub oaks are dominants of a community adjacent to, and landward of, secondary and primary dunes. Interior habitat can include vegetation types such as grassy forbs. There is substantial variation in scrub oak density and cover within and among scrub dunes throughout the range of beach mice. The variation, resembling an ecological gradient, is represented by scrub oak woodland with a relatively closed canopy at one extreme, with scrub dunes relatively open with patchy scrub ridges and intervening swales or interdunal flats dominated by herbaceous plants at the other extreme.

Meyers (1983) estimated that the minimum area needed to maintain a population of beach mice is about 50 hectares (124 acres), but the preferable size is at least 100-200 hectares (247-494 acres), and there should be natural corridors for migration between these areas. He also indicated that protection of several separate areas of habitat for beach mice was needed for long-term survival. For example, if a population of beach mice exists in only one small area of habitat, it will be much more vulnerable to extinction through the effects of tropical storms, disease outbreaks, predation, etc.

Recent information indicates habitat may be a limiting factor for some beach mouse species following periods of population increases or catastrophic weather events such as hurricanes (Swilling *et. al.,* 1996; Swilling *et al.,* 1998; Lynn, 2000; Sneckenberger, 2001). Scrub dunes, as well as other interior habitats landward of the currently designated CH, support beach mouse populations through seasonal and yearly fluctuations, provide habitat for population expansion, and reduce the risk of extirpation due to a hurricane by providing refuge habitat during and following the storm.

The Service estimated that there were about 2,697 acres of ABM habitat in 2003. It is divided into two distinct areas (GSP and the Fort Morgan Peninsula):

> *GSP.* ABM were extirpated at GSP by the early mid- to late-1980s. Extirpation was due to a combination of: isolation of the habitat; effects of tropical storms; predation (i.e., feral cats); and competition with house mice. ABM were reintroduced to GSP in 1998. Trapping in 1999-2000 demonstrated that the reintroduction was successful (i.e., reintroduced population

increasing). The Gulf Shores Unit of GSP contains approximately 110 acres of ABM habitat (Service, 2003). Service trapping efforts in 2003 indicated a growing ABM population in GSP on suitable habitat south of Middle Lake, Lake Shelby, and on the Park's west side south of AL 182.

Fort Morgan Peninsula. Efforts to characterize ABM populations and habitat, based on trapping, prior to the occurrence of Hurricane Opal in 1995 were restricted to primary and secondary dunes. Field observations since the occurrence of Hurricane Opal expanded the knowledge of habitat types utilized by ABM. Trapping efforts in recent years have included sampling of all ABM habitat types on the peninsula, and have confirmed ABM use of these habitats. ABM habitat on the peninsula extends from Little Lagoon Pass westward and generally south of AL 180 (with a few localized exceptions where ABM are found north of this road) to the tip of Fort Morgan, encompassing 2,587 acres (Service, 2003). This habitat is spread out amongst a mix of public and private lands (some of which is developed). The private lands consist of single family, low-density multi-family, and high-density multi-family housing zones.

The underlying components of ABM habitat include the availability of resources, such as burrow sites, cover, and/or foraging areas (Swilling, 2000). Limited abundance of these elements can negatively influence ABM populations. Habitat areas containing abundant resources are necessary for long-term population maintenance (Service, 2003). Areas included as ABM habitat provide at least one of the following attributes:

Burrowing sites – Burrows are invaluable resources for beach mice, providing protection from predators, intense heat, and other harsh environmental conditions, as well as refuge for various activities such as birthing, resting, and caching of food items. ABM are monogamous and one breeding pair may utilize several burrows for various activities. The presence of potential burrow sites may be a limiting factor in the availability of ABM habitat. ABM prefer to burrow on the slopes of dunes and in areas with greater vegetative cover, less soil compaction, and at sites higher above sea level.

2) Cover – Cover is described as an area that would not be used of foraging or burrowing, but provides vital protection from predators during ABM nocturnal activities.

3) Foraging areas – Foraging areas provide food sources suitable for ABM consumption. Foraging is often seasonally based and the amount of seed available in any given year is based on rainfall and tropical storms. In addition, ABM are opportunistic omnivores that can consume insects, seeds, and acorns. Insects (beetles in particular) appear to make up a substantial portion of their diet during the lean summer season.

Life History

Population demography includes the actual factors that contribute to the growth or decline of a population, including birth and death (especially juvenile and adult survivorship). Rates of dispersal into (immigration) and out of (emigration) populations are also components of demography (Pulliam and Dunning, 1997). The sex ratios of the breeding population and the age structure (proportion of the population found in each age class) are also considered demographic factors because they contribute to the birth and death rates.

The ABM life cycle consists essentially of four life-stage events: (1) newborns; (2) older weaned juveniles about 22 or more days of age; (3) subadults; and (4) adults. ABM populations have life-stage structure with a number of individuals in each stage at any particular time. For any particular ABM population, the change in adult population size between two time periods depends on the number of adult ABM that have survived since the last period plus the number of new adults recruited by reproduction in the population. Adult survivorship and reproductive recruitment will account for population change as long as two conditions are satisfied: (1) if the ABM does not disperse from or move away (emigrate) from a population; and (2) if the ABM does not immigrate to or arrive from another population. If these conditions exist, then population growth occurs when births or the recruitment of young ABM exceeds deaths. Field studies of two ABM populations have provided long-term data on population dynamics (Hill, 1989; Holler and Rave, 1991; Rave and Holler, 1992; Holler and Moyers, 1994). These studies were based on standard scientific trapping methods of mark-recapture studies. These investigations involved capturing ABM alive, marking new individuals (capture), immediately releasing all individuals, and recording any previously marked individuals (recapture).

Age/sex structure

Age structure is the proportion of individuals in different age groups. Age structures illustrate how the population might change in the future. Hill (1989) demonstrated that 87 percent of the ABM throughout her study (September 1987 - September 1988) lived four months or less beyond first capture. Hill (1989) found only five ABM (0.8 percent) lived at least twelve months or longer. Beach mice along the Gulf Coast of Florida and Alabama generally live about nine months, but may live as long as 20 months (Swilling, 2000 ; Blair, 1951; Rave and Holler, 1992). Holler *et al.*, (1997) found that about half of the beach mice captured for the first time survived into the following season. Mice held in captivity by Blair (1951) and at Auburn University have lived three years or more. Population turnover, as estimated by survivorship rates, is quite high and typical of mice (*Peromyscus*). In general, the vast majority of individuals in an ABM population is replaced with new individuals within a ten to twelve-month period (Hill, 1989; Rave and Holler, 1992).

ABM subadults are most abundant during winter and least abundant during summer (Blair, 1951; Hill, 1989; Holler and Rave, 1991). Male beach mice are generally considered to be more abundant than females, particularly in the spring and winter. However, females have been found to significantly outnumber males during winter at the FMU of BSNWR (Hill, 1989).

Reproductive Strategies

Foltz (1981), Smith (1966), and Lynn (2000) have reported that beach mice are monogamous, pairing for life. Male beach mice are capable of breeding at an age of 25 days. Female beach mice are able to begin breeding at an age of 35 days. The mean age of first estrus for *P. polionotus* is 30 days (Clark, 1938). Generally, a lactating female is also considered to be pregnant, which is typical for a species that has high growth and reproductive rate life history. Gestation averages 24 days and litter sizes average three to four with extremes of one and eight individuals. Littering intervals may be as short as 26 days with the peak breeding season in autumn and winter. However, pregnant and lactating beach mice have been caught during summer trapping periods (Moyers *et al.*, 1999). In essence, mature female beach mice can produce a litter every month and may live long enough to breed over a period

of about eight months. Thus, on an annual basis, a pair could produce an average of 24 to 32 young a year.

ABM population size is usually greater in winter and spring, reflecting seasonal differences in breeding activity and reproductive success, in contrast to the summer when the population cycle and reproductive success are lower (Rave and Holler, 1992). For example, the proportion of captured females exhibiting reproductive activity (lactating or pregnant) is lowest during summer and greatest in winter. Likewise, the number of subadult ABM captured is greater in winter and lower in summer. In addition to greater reproductive activity during winter, the actual survival of newborn offspring and recruitment of subadults apparently increases in autumn and winter when food resources are more abundant (Rave and Holler, 1992).

Recruitment and Dispersal

Swilling and Wooten (2002) concluded that ABM form family groups in patches of high quality habitat where home range overlap was generally tolerated. As densities increased, young individuals were forced to disperse into adjacent habitats (Swilling and Wooten, 2002). However, they found that habitat type (escarpment/scrub vs. primary/secondary dunes) did not appear to be a factor in the selection of habitat in which to settle for dispersing subadults. Dispersal, particularly of young away from birth areas, is a natural and genetically programmed adaptation to avoid inbreeding or resource competition with family members, and to locate mates (Frankel and Soule, 1998). Mean dispersal distances for ABM were significantly less than the mean dispersal distances for *P. polionotus* (Smith, 1968; Swilling and Wooten, 2002). Long distance movement was documented (up to 0.87 miles) by Swilling and Wooten (2002). It appeared from the study that adults share home ranges with subadults. For ABM, population density, reproduction, and survival are at seasonal highs simultaneously, so there are many subadults recruited into the population with fewer individuals dying. Therefore, instead of home ranges becoming available to potential dispersers through death, offspring appear to be accepted into the adult population (Swilling and Wooten, 2002).

Subadult males and females did not differ significantly in the likelihood of dispersal, dispersal distance, or the size of mean home ranges (Swilling and Wooten, 2002). Data also indicated that mice remaining within the birth site have significantly smaller home ranges than those that disperse. Increased predation is offered as a possible explanation (e.g. predators may have focused on areas of high ABM density). Swilling and Wooten (2002) found that 55 percent of the recaptured subadults remained within the natal site and these individuals survived for a significantly shorter duration than did dispersers.

Food Habits

Beach mice are nocturnal (active at night) and forage for food throughout the dune system. ABM are opportunistic omnivores that are capable of exploiting a variety of resources. They feed primarily on seeds and fruits of bluestem *(Schizachyrium maritimum)*, sea oats *(Uniola paniculata)*, and evening primrose *(Oenothera humifusa)*; however, insects are also an important component of their diet (Moyers, 1996). In most cases, seeds and fruits consumed by ABM are either produced by low-growing, prostrate plants, or become available as fallen seeds (Moyers, 1996).

ABM inhabiting the primary/secondary dunes experience feast and famine periods. In contrast, the escarpment/scrub habitat appears to maintain a more stable, though patchy, level of food resources

throughout the year. Weather conditions, and other factors, may also influence food availability, both temporally and spatially. Bird *et al.* (2003) determined that beach mice use of foraging areas was significantly affected by the presence of illumination, type of light, and the distance from the light source. Predation risks, which also may be increased by artificial lighting (Bird, 2003), play a role in beach mice foraging patterns (Sneckenberger, 2001).

Shorter foraging distances may result in energy conservation (Pyke, 1983). Foraging behavior is determined by both food quality and quantity. During winter and spring 1999/2000 at the PU of BSNWR, ABM inhabiting primary/secondary dunes traveled an average of 80-83 feet per night, whereas ABM inhabiting the escarpment/adjacent scrub traveled an average of 141-143 feet per night (Sneckenberger, 2001). In the fall of 1999, ABM inhabiting the escarpment/adjacent scrub traveled shorter distances on average: a reversal of the trend noted in the following winter and spring. Nutritional analysis of ABM foods indicated that plant species in both primary/secondary dunes and escarpment/scrub habitats provide a similar range of nutritional quality. Sneckenberger (2001) performed nutritional analyses of seed and fruit samples found in ABM habitats. Protein content ranged from 7.8 to 32.6 percent in the primary/secondary dunes and from 2.8 to 40 percent in the escarpment/adjacent scrub. Spartina, bluestem, panic grass, and sea oats were the most common plants used by ABM inhabiting the primary/secondary dunes. ABM in the escarpment/adjacent scrub habitat used sand live oak, bluestem, greenbrier, gopher apple, and jointweed (Sneckenberger, 2001). Sea oats and bluestem are hypothesized to be of high nutritional quality (Moyers, 1996) and are likely important dietary components during the primary reproductive season (Rave and Holler, 1992).

Available data regarding possible seasonal use of food has come from two recent studies (Moyers, 1996; Sneckenberger, 2001). These studies indicated that various habitats provide a variety of food types throughout the year and that some ABM exploit these differences.

Population dynamics

Estimating animal abundance or population size remains as an important and challenging scientific issue in wildlife biology (Otis *et al.*, 1978; Pollock *et al.*, 1990). A number of different census methods are available to estimate wildlife populations, each with particular benefits and biases. Beach mice surveys involve relatively standardized scientific methods, common to the study of small mammals. The basic census method for beach mice involves mark-recapture by live-trapping. Live-traps are, essentially, small aluminum boxes in which bait (usually oats) is placed on a trip-pan at the rear of the trap. When a mouse enters the trap and steps on the bait-pan to feed, the bait-pan depresses and the entrance door is triggered to close. ABM are captured at night in live-traps placed along lines or grids, each captured individual is checked to determine if it has been captured for the first time (unmarked) or if it is a recapture, indicated by an existing mark. Newly captured individuals are marked, and all trapped individuals are immediately released. The number of consecutive nights ABM are live-trapped for mark-recapture study varied in early surveys and studies, but, since 1987, a five-night minimum trapping period has become standard practice. The actual data produced from such surveys have been analyzed using various methods with varying degrees of accuracy and bias, as number of individual ABM captured, minimum number of ABM known alive, number of ABM captured per 100 trap-nights (ABM/100 trap-nights), or a mathematically modeled statistical population estimate (program CAPTURE).

Attempts to explain ABM population dynamics have revealed an incomplete understanding of the species and its population cycles. It is clear that ABM, like all rodents, are known for high

reproductive rates and experience extreme highs and lows in population numbers. Tropical storms and drought may be associated with depressed ABM populations; perhaps resulting from elimination of habitat and food supply reduction, respectively.

Generally, populations of beach mice reach peak numbers in the late autumn into spring (Rave and Holler, 1992; Holler *et al.*, 1997). This high population level follows increased availability of seeds and fruits from the previous growing season. Studies have indicated that there is monthly, seasonal, and annual variation in size of individual populations (Hill, 1989; Rave and Holler, 1992; Holler *et al.*, 1997; Swilling *et al.*, 1998). These fluctuations can be a result of reproduction rates, food availability, habitat quality and quantity, catastrophic events, disease, and predation (Blair, 1951; Bowen, 1968; Smith, 1971; Hill, 1989; Rave and Holler, 1992; Swilling *et al.*, 1998; Swilling 2000).

Status and distribution

Reasons for listing

ABM, PKBM, and CBM were listed as endangered species primarily because of the fragmentation, adverse alteration, and/or loss of habitat due to coastal development. The threat of development-related habitat loss continues to increase. Other contributing factors include low population numbers, habitat loss from a variety of sources (including hurricanes), predation or competition by animals related to human development (cats and house mice), and the lack of regulations on coastal development.

Coastal development

Habitat loss and fragmentation associated with residential and commercial real estate development is the single most important factor contributing to the endangered status of beach mice (Holler, 1992; Humphrey, 1992; James, 1992; Stout, 1992). Beachfront development along the Gulf coast began in the 1950s and continues, in earnest, today.

Current ABM habitat is now fragmented by residential and commercial developments which may act as partial or complete barriers. Isolation of habitats by imposing barriers to species movement is an effect of fragmentation that equates to reduction in total habitat (Noss and Csuti, 1977). Whether beach mice can be considered isolated by development depends on several factors, including the density and size of the development, the siting of the development in beach mouse habitat, the amount and type of beach mouse habitat affected by development, and the distance between tracts of undeveloped land containing beach mouse habitat. Meyers (1983) believed that intense development could act as a barrier to migration, isolating mice within habitat segments.

The influence of corridors amidst development on ABM movement is not known at this time. However, ABM have been found in dune habitat interspersed within single-family residential developments along the West Beach area of Gulf Shores and on the Fort Morgan Peninsula. These populations are probably connected to other populations through corridors of habitat. ABM have been documented in undeveloped blocks and single-family developments adjacent to high-density developments. Although beach mice may persist in these small parcels surrounded by high-density developments, they are probably more effectively isolated than those separated by low-density developments and are likely subjected to more problems associated with isolation, unless a means of exchange is provided for via habitat connection or corridors. High-density developments require larger

amounts of space for associated structures such as recreational facilities and parking lots which result in greater amounts of beach mouse habitat destroyed and/or altered.

The potential importance of corridors (areas of native vegetation or habitat connecting otherwise isolated sections) has been explored since the mid-1970s (Diamond, 1975; Hobbs, 1992). The basis for the importance of corridors included the following:

> If an area must be divided, chances of extinction will be lower when the fragments can be connected by corridors of natural habitat that provide adequate habitat for the movement of native animals;

2 If there are several disjunct reserves, connecting them by strips of the protected habitat may significantly improve their conservation function at little further cost in land withdrawn from development (Hobbs, 1992).

Douglass *et al.* [1999; as cited in South Alabama Regional Planning Commission (SARPC), 2001], determined that coastal development in southern Baldwin County (i.e., between Fort Morgan and the Florida/Alabama state line) more than doubled between 1970 (28%) and 1996 (61%). During the same interval, parcels with hotels and condominiums increased from 3% of the beachfront lands to 22% (10% in 1983). The total percentage of Baldwin County beachfront lands with single-family homes increased from 25% in 1970 to 39% in 1996. By 1996, little land suitable for development in Orange Beach and Gulf Shores remained (SARPC, 2001). Major features of the Peninsula now include single-family units along roads, residential subdivisions, duplexes, small condominiums and large, high-rise condominiums. Much of the remaining undeveloped beachfront tracts remain within FMU and PU of the BSNWR. Protection, management, and recovery of beach mice on public areas, such as BSNWR, continue to be a priority focus in the face of increased recreational use. Development pressures continue to increase throughout the entire range of ABM.

Hurricanes

Hurricanes[1] generally produce damaging winds, storm tides and surges, and rain that erode beaches and dunes on barrier islands, peninsulas, and mainland beaches, and flood inland coastal areas. Primary dune habitat sustains the heaviest damage during hurricanes leaving little or no habitat for beach mice in the areas of destruction. Hurricanes are a natural environmental phenomenon affecting the Atlantic and Gulf Coasts.

Hurricanes were probably responsible for maintaining coastal dune habitat upon which beach mice depend through repeated cycles of destruction, alteration, and recovery of dune habitat. The amount of pre-development, contiguous, coastal dune habitat along the Gulf Coast allowed beach mice to survive even the most severe hurricane events and to repopulate dune habitat as it recovered.

Hurricanes can impact beach mice either directly (e.g., drowning) or indirectly (e.g., loss of habitat). Hurricanes may result in beach mice being drowned in their burrows, surviving the storm in place, or seeking refuge in adjacent areas (during or after the storm). Additionally, hurricanes can affect beach mice on either a short-term basis or long term. The effects of hurricanes to beach mice depend

[1] Throughout this document, the word "hurricane(s)" refers to tropical weather systems.

primarily on hurricane characteristics (e.g., winds, storm surge, rainfall), time of year, and where the eye crosses land (e.g., side of hurricane; generally land areas affected by the east side of the eye wall are subjected to significantly more damage than land areas affected by the west side).

Beach mouse populations located in areas without secondary dunes and/or escarpment/scrub habitat are susceptible to catastrophic loss during tropical storms and hurricanes. Holliman (1983) first considered that higher, interior scrub habitats may provide a "refuge" for the population occupying primary and secondary dunes during a storm event (i.e., Hurricane Frederic in 1979), as a high ground for fleeing ABM and resident ABM to avoid drowning. In this sense the refugia was thought to be temporary (i.e., during the storm and immediately following). Following Hurricane Opal in 1995, Swilling *et al.* (1998) reported higher ABM densities in the scrub nearly one year after the storm. As dune vegetation began to recover, the primary and secondary dunes were re-occupied and population densities surpassed those in the scrub in the fall and winter following the storm.

Field investigations following Hurricane Georges in 1998 demonstrated ABM use of the escarpment and adjacent scrub habitat as a refuge. Interior habitats appeared to be used more in FMU than in PU due to the fact that more primary and secondary dune habitat remained after the hurricane in PU. All available cover was used within the primary and secondary dunes (including all debris lines) of PU. Seven months after Hurricane Georges, the interior habitat of FMU continued to provide a refuge for the displaced primary/secondary dune population that survived the storm.

Following hurricanes, the dune system begins a slow natural repair process that may take three to 20 years depending on the magnitude of dune loss (Salmon *et al.*, 1982). During this period, sea oats and pioneer dune vegetation become established, collecting sand and building dunes. As the dune becomes stable, other successional dune vegetation colonize the area (Gibson and Looney, 1994). Assessment of various types of experimental dune restoration techniques were conducted on Eglin AFB, Okaloosa/Santa Rosa Island after Hurricane Opal (Miller *et al.*, 1999). The study showed that a minimum of four years is needed between catastrophic events like hurricanes for dunes to become re-established. Additional work by Auburn University indicated that at BSNWR, six years are needed for dunes to be re-established (Boyd *et al.*, 2003). (Note: reestablished does not mean to pre-event size or height but stable and growing). In areas where dunes are left to naturally rebuild, habitat restoration may be delayed until pioneer plants begin to re-establish.

The landfall of Hurricane Ivan on September 16, 2004 impacted the majority of habitat throughout the entire range of ABM (Service, 2004). Comparisons of aerial photographs taken before and after the storm show ABM habitat (currently capable of providing food, shelter, water, cover, and space for mice) has been reduced and/or reconfigured in most areas. Post-storm assessment of ABM habitats, conducted by the Service, revealed that a significant portion of primary and secondary dunes have been flattened, and suspected ABM tracks were observed in a limited number of places. Very limited trapping has been conducted, to date, to determine presence/absence of ABM in remaining habitat that might be suitable for occupancy by ABM. While not comprehensive at this time, these assessments lead the Service to believe that ABM are reduced in distribution, and likely reduced in density, compared to pre-hurricane levels.

Predation

Beach mice have a number of natural predators including coachwhip and corn snakes, pygmy and diamondback rattlesnakes, short-eared and great-horned owls, great blue herons, Northern harriers,

foxes, skunks, and weasels (Novak, 1997; Blair, 1951; Bowen, 1968; Holler, 1992; Moyers *et al.*, 1999; Van Zant and Wooten, 2003). Predation in beach mouse populations that have sufficient recruitment and habitat availability is natural and not a concern. However, predation pressure from natural and non-native predators may result in the extirpation of small, local populations of beach mice.

A major issue for beach mice is predation from free-roaming and feral domestic cats. Feral cats are estimated to kill hundreds of millions of birds, small mammals, reptiles, and amphibians each year (American Bird Conservancy, 1999). Cat tracks have been observed in areas of low trapping success for beach mice (Moyers *et al.*, 1999).

Artificial factors influencing cat predation include groups or individuals that allow their pet cats to roam freely or provide food for feral cats by placing food in dune habitats. Pet cats are sometimes left behind by vacationers or lost after being allowed to roam freely in unfamiliar places. These activities have been considered to contribute to the low populations and possible extirpation of beach mouse populations. For example, cats roaming or ranging within dune habitats may have contributed to the loss of the PKBM population at the Florida Point Unit of GSP in Alabama, after the population became stressed by Hurricane Opal.

Other non-native predators such as the red fox (*Vulpes vulpes*) and coyote (*Canis latrans*) are of concern. Red fox are not native to the coastal habitats of northwest Florida or coastal Alabama, but were introduced to the area by fox hunters in the last century. They also compete with the native gray fox (*Urocyon cineroargenteus*) for habitat.

Competition

Beach mice are the only small mammal that live exclusively within the coastal dune landscape containing primary, secondary, and scrub dunes and associated interdunal and interior habitats. Other small mammals such as the cotton rat and cotton mice are commonly found in the forested portions of coastal habitats. The house mouse (*Mus musculus*) and other exotic rodent species such as the Norway and black rats occur in areas associated with humans.

Generally, research has shown that house mice exhibit overlapping food habitats (Gentry, 1966) with beach mice and commonly occupy the same habitat. It is thought the house mice may compete with beach mice for food resources. Other work has shown an inverse relationship between population densities of beach mice and house mice (Caldwell, 1964; Caldwell and Gentry, 1965; Gentry, 1966; Meyers, 1983). These studies concluded that house mice are poor competitors with beach mice under conditions optimal for beach mice, but may be capable of coexisting with beach mice. Briese and Smith (1973) concluded that house mice primarily invade disturbed areas or areas where human structures provide suitable places to live, but that the species seldom coexist in undisturbed natural habitats. Humphrey and Barbour (1981) documented mutually exclusive distribution patterns of Gulf Coast beach mice and house mice. They suggested that these patterns were a result of competitive exclusion of beach mice by house mice following habitat degradation and introduction of exotic predators. King (1957) studied aggressive behavior of house mice and *Peromyscus leucopus* and suggested that these species might aggressively compete in nature. However, Caldwell (1964) found no evidence of direct aggressive competition between house mice and beach mice under field or laboratory conditions, and even observed these species to share common nests under laboratory conditions.

Frank and Humphrey (1996) concluded from their work on the Anastasia Island beach mouse that house mice could coexist in dune habitats with beach mice and not be a serious threat to their persistence under conditions favorable for beach mice. The presence of house mice may be an indicator of poor habitat conditions for beach mice. In 1998, ABM were reintroduced GSP Gulf Shores. By 2000, beach mice had successfully occupied nearly all available habitats. In habitat separated by hotel units, only house mice were captured and no beach mice were captured. Factors such as presence of cats in this general area may also be influencing colonization by ABM.

Analysis of the species/critical habitat likely to be affected

The ABM population within the action area would be directly and indirectly affected by the proposed project. Affects to ABM would be from loss of natural habitat due to project construction and/or permanent infrastructure and associated effects including lighting; the presence of humans using the property; beach access and use; presence of trash and refuse; predators and competition; and habitat fragmentation.

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat. All GSP lands (191 acres) south of AL 182 are designated as ABM CH. Some of this area, however, has been disturbed by paving, building construction, etc. and does not exhibit the constituent elements of CH. Within the 137.8 acre project area, only 90.2 acres exhibited constituent elements of CH prior to landfall of Hurricane Ivan.

The landfall of Hurricane Ivan on September 16, 2004 impacted the majority of habitat throughout the entire range of ABM (Service, 2004). Comparisons of aerial photographs taken before and after the storm show ABM habitat (currently capable of providing food, shelter, water, cover, and space for mice) has been reduced and/or reconfigured in most areas. Field reconnaissance of the project area (Volkert, 2004) confirms this observation. Post-storm assessment of ABM habitats, conducted by the Service, revealed that a significant portion of primary and secondary dunes have been flattened, and suspected ABM tracks were observed in a limited number of places. Very limited trapping has been conducted, to date, to determine presence/absence of ABM in remaining habitat that might be suitable for occupancy by ABM. While not comprehensive at this time, these assessments lead the Service to believe that ABM are reduced in distribution, and likely reduced in density, compared to pre-hurricane levels.

The Service evaluated the effects of the proposed action on the endangered Alabama beach mouse (ABM) (*Peromyscus polionotus ammobates*), three endangered or threatened species of sea turtles [green sea turtle, (*Chelonia mydas*) (endangered); loggerhead turtle, (*Caretta caretta*) (threatened); and Kemp's ridley sea turtle, (*Lepidochelys kempii*) (endangered)], and the threatened piping plover (*Charadrius melodus*) under section 7 of the Act. As previously noted in Table 1, the proposed action should have "no effect" on piping plover and is "not likely to adversely affect" green sea turtles, loggerhead sea turtles, and Kemp's ridley sea turtle.

ENVIRONMENTAL BASELINE

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated CH), and ecosystem, within the action area (AA). The AA consists of 137.8 acres situated in the general vicinity of the existing Hotel and Convention Center at GSP. The AA is located in Sections 21 and 22 of Township 9 South, Range 4 East between AL 182 and the Gulf of Mexico. The portion of GSP which encompasses the AA is bounded by the towns of Gulf Shores, AL to the west and Orange Beach, AL to the east (Figure 1).

Status of the species within the action area

The combined effects of Hurricane Frederic and predation by feral cats are thought to have contributed to the extirpation of ABM at GSP (Holliman, 1983; Holler and Rave, 1991). Hurricane Opal, in 1995, also impacted ABM habitat at GSP. A program to remove feral cats from GSP was implemented in 1997. After which, ten ABM were reintroduced to GSP and the population had increased to about 70 individuals by 2001 (Lynn, 2001).

ABM have been found within the AA from east of the existing beachside cottages (at the Hotel and Convention Center) to the eastern boundary of the AA (east of the demolished beach pavilion) (Lynn, 2001). More recently (but still prior to landfall of Hurricane Ivan), mice have been found west of the GSP pier as well as north of AL 182 between State Park Road 2 and the eastern boundary of the park, extending onto private land just east of the park boundary. ABM occurred under and near the beach pavilion, which was demolished in 2004. The demolition of the pavilion likely improved ABM habitat in the vicinity and ABM likely immigrated into this area. The pavilion required immediate demolition to minimize risk of structural failure and avoid injury to the public.

Prior to landfall of Hurricane Ivan in September 2004, ABM are known to have occupied portions of GSP (Service, 2003). Trapping near the old beach swim pavilion in the fall of 2003 resulted in the capture of 32 ABM, and FWS personnel observed ABM tracks in other areas of GSP south of AL 182 extending from the eastern park boundary west to the area of the GSP pier, as well as in the dunes north of the highway, and including the AA. ABM densities in GSP are not known. ABM expanded from their initial 1998 reintroduction site near the pavilion to cover most of the available habitat in GSP (estimated to be about 110 acres) by March, 2004. The portion of the AA exhibiting constituent elements of CH and known to be occupied by ABM, as measured prior to landfall of Hurricane Ivan, consists of 55.8 acres.

Field reconnaissance of the AA (Volkert, 2004) nearly 6 weeks after landfall of Hurricane Ivan noted signs that the area had been overwashed by the storm surge with great quantities of sand having been transported inland by tidal action (i.e., wetland swale areas filled with sand). Two perpendicular breaches were created by the hurricane and will likely impede east-west migration of ABM. The western breach is just west of the GSP Pier, is 20-40 feet wide, and extends from the wet beach to AL 182. The eastern breach is approximately 400 feet west of the area where the old beach pavilion was removed, is 15-40 feet wide, and extends from the wet beach across AL 182 and into Little Lake. The primary and secondary dunes have eroded and spread out to a common ground level resulting in a lack of definition in contour. This will provide little future protection from storm surges until the dunes are rehabilitated and could result in a famine situation for ABM until vegetation returns and produces seeds. The few remaining dunes are located near the Hotel and Convention Center and were generally

vegetated with sand live oaks and/or sea oats. It is surmised that these dunes were protected from the full impact of the storm surge by the structures of the complex and by reduction in erosion attributed to the established vegetation.

Factors affecting species environment within the action area

There are no State, tribal, local or private actions already affecting ABM in the AA. The presence of feral and domestic cats in the AA is a continuing issue of concern. Removal of such animals is an ongoing project of GSP.

Hurricanes and tropical storms have caused impacts to ABM habitat in the AA. As mentioned above, ABM were extirpated from GSP in the wake of Hurricane Frederick (which hit in 1979) for reasons that are not fully understood. Large portions of the AA were submerged by storm surges and rainwater ponding. Just prior to the most recent reintroduction of ABM to GSP in 1998, much of the same area was inundated by Hurricane Georges. A complete description of hurricane effects on ABM populations is provided above. Hurricane effects could, based on past experience, eliminate all ABM within the AA. While not comprehensive at this time, initial assessments (described above) lead the Service to believe that ABM are reduced in distribution, and likely reduced in density, compared to pre-hurricane levels throughout the entire range and may no longer be present within GSP.

Habitat capable of supporting ABM can be enhanced and/or restored within the AA (as provided by the restoration component of the proposed project. These habitat enhancement/restoration efforts will hasten recovery of the dune ecosystem which was impacted by Hurricane Ivan. Reintroduction to these enhanced/restored habitats can be undertaken in the future to aid in recovery of ABM.

EFFECTS OF THE ACTION

Factors to be considered

The ABM may still be found throughout its historic range in areas of suitable habitat. Recent estimates from the Service's DFO indicate that 1091 hectares (2,697 acres) of suitable habitat existed (Service, 2003) prior to the September 16, 2004 landfall of Hurricane Ivan. Approximately 110 acres of this occurred on GSP. While various population estimates have been attempted for beach mice (subpopulations and in specific areas), differing sample methodologies and data gaps have rendered a total population estimate difficult. Since impacts cannot be assessed accurately in fluctuating populations on the sole basis of number of ABM affected, a corresponding measure is the amount of ABM habitat lost due to a project, and subsequently the ABM that depend on that habitat. A loss of one acre of habitat at one location can have different consequences as compared to the destruction of one acre of habitat at another location, depending on its connection to other habitats and value for ABM survival and recovery.

A numerical measure of the amount of habitat is related to a range of ABM numbers. Because of the fluctuations in ABM populations, loss of a specific habitat area will represent different numbers of ABM depending on season of the year, recent tropical systems, food supply, and other factors. Because of this population fluctuation, the exact number of ABM will not be precisely determined during project analysis. However, since the impact to ABM is being determined by loss of habitat, the direct impact to this habitat will be able to be determined.

A portion of the proposed development is located within ABM habitat, as determined prior to landfall of Hurricane Ivan in September 2004. There were 110 acres of ABM habitat within GSP prior to Hurricane Ivan. Of the 137.8 acre AA, 90.2 acres are designated CH that exhibited constituent elements of CH prior to Hurricane Ivan. A smaller portion (55.8 acres) of the designated CH area within the AA both exhibited constituent elements and was occupied by ABM prior to landfall of Hurricane Ivan (Figure 4).

Construction activities proposed by this project cover 44.3 acres and would have resulted in adverse impacts to 11.6 acres of ABM habitat (as existed prior to landfall of Hurricane Ivan) (Table 2). Conservation measures offered by the permittee include restoration of 14.7 acres of dune habitat within the 137.8 acre AA. Thus, upon completion of construction of the entire project, a net gain of 3.1 acres of ABM habitat would have been realized prior to Hurricane Ivan.

Since Hurricane Ivan altered virtually all available ABM habitat in GSP, the current suitable habitat acreage to be lost by the project is 0 (Table 2). The current acreage that will be restored to conditions suitable for ABM is 14.7 acres, all of which is a net gain in habitat compared to the current, post-Ivan state.

Table 2. Comparison of acreages to be impacted by project construction.

	Habitat Suitable for ABM in GSP (acres)	ABM Habitat Lost To Construction (acres)	ABM Habitat To Be Restored (acres)	Net Gain in ABM Habitat (Acres)
Pre-Hurricane Ivan Conditions	110*	11.6	14.7	3.1
Existing Conditions	Approximately 0	0**	14.7	14.7

*Total acres of habitat available for ABM within GSP (of the 137.8 acre AA, there are 90.2 acres of designated CH exhibiting constituent elements of CH, with 55.8 acres of those 90.2 acres occupied by ABM prior to Hurricane Ivan).

**Since it is estimated that no habitat is currently suitable for ABM within GSP, no habitat is lost due to project construction. However, 11.6 acres of native habitat will be permanently lost due to the construction footprint. Thus, while those acres do not currently provide habitat for ABM, they may have provided habitat again in the future either through natural recovery processes or deliberate restoration.

Direct Effects

If present, ABM may be injured, or killed, by becoming entombed or crushed in their burrows during preparation of the site for construction. If present, the activities of individual ABM may be altered by construction noise and/or lighting and the presence of construction equipment and stockpiled materials. However, due to the effects of Hurricane Ivan, it is possible that currently ABM are not present at the site. Limited, visual observation surveys completed at GSP since Hurricane Ivan have not documented the presence of ABM. The number of ABM actually killed or injured cannot be accurately predicted because their density cannot accurately be determined. Habitat alterations, including features within designated CH, associated with project development would disturb dune plants and sites used by ABM for feeding, burrowing, sheltering, and nesting on 11.6 acres during project construction. Also, 14.7 acres of dune habitat are to be restored through project implementation and should provide ABM

Figure 4 : Preferred Alternative (Alt. 2) - Habitat Distribution

μ

0 0.04 0.08 0.16 0.24 0.32 Miles

Map recreated 11-4-04 from
Volkert Environmental Group, INC. maps
Aerial photography provided by Baldwin County 2001

habitat after restoration. Therefore, as dune habitats recover post-Ivan, ABM habitat would experience a net gain of 3.1 acres compared to pre-Hurricane Ivan levels and an even greater gain compared to the situation immediately post-hurricane (+14.7 acres). Restoration of dune habitat should hasten recovery of the ecosystem and will be particularly important to ABM persistence in the aftermath of destruction caused by Hurricane Ivan.

Indirect Effects

Indirect effects typically include support of potential competitors (house mice) through inadequate refuse management; introduction of artificial lighting (providing potential predators an advantage and disrupting normal nocturnal ABM behavior); the introduction of predators such as the domestic/feral cat; and fragmentation of ABM habitat. All of these factors would reduce the ABM population in this area if ABM still exist or are reintroduced to the area at a later date. The permittee has proposed actions that would minimize the likelihood of potential competition from house mice, the introduction of artificial lighting, and support of predators. Details of these proposed actions can be found in the "DESCRIPTION OF PROPOSED ACTION" section.

Habitat fragmentation is not an issue at the proposed project site, which lies on the eastern edge of what is felt to be ABM habitat. GSP is publicly owned and is unlikely to experience further development of the coastal dune system.

Species response to a proposed action

The proposed action would render 11.6 acres of ABM habitat in the AA unavailable (by building construction) to ABM, followed by 14.7 acres of dune habitat restoration, thus resulting in a net gain of 3.1 acres of habitat available for occupancy by ABM. Adverse impacts to species recovery and long term resilience as a result of the project are not significant. The restoration of dune habitat should enhance persistence of ABM by hastening recovery of dunes damaged/destroyed by Hurricane Ivan. Indirect effects due to illumination from lighting associated with the project as well as other indirect effects identified above have been minimized.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the AA considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act. Prior to landfall of Hurricane Ivan in September 2004, GSP was estimated to have 110 acres of ABM habitat with 90.2 acres of CH exhibiting constituent elements of CH. Of those 90.2 acres, 55.8 acres were known to have been occupied by ABM prior to Hurricane Ivan. The AA is owned by ADCNR and is unlikely to experience further development of its coastal dune system. Any future actions would likely be covered under Section 7 or Section 10 reviews and, therefore, are not considered here.

CONCLUSION

After reviewing the current status of ABM, the environmental baseline for the Action Area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the ABM and is not likely to permanently destroy or adversely modify ABM CH. Areas of GSP which provided habitat for ABM prior to landfall of Hurricane Ivan have been reconfigured and individual ABM have likely been displaced and/or eliminated. Initial post-storm habitat assessments revealed the alteration of a great deal of ABM habitat within the action area. Additionally, no ABM tracks were found in the remaining beach dune areas. The Service has assumed, based on current conditions and past experience with the ABM population at GSP, that ABM may have been extirpated from this area. Reintroduction of ABM to GSP will likely be required in the near future to reestablish this population. The proposed project will aid those efforts by restoring habitat to a condition capable of supporting ABM, and will ultimately result in a net gain of ABM habitat. With implementation of this proposed project, designated critical habitat will remain functional for the species. Of the 90.2 acres of CH containing the constituent elements of CH in the AA prior to Hurricane Ivan, 11.6 acres will be impacted by the footprint of the project. However, dune habitat restoration on 14.7 acres will result in habitat suitable for use by ABM, which is an increase of 14.7 acres over the current amount of habitat available for ABM. As dune habitats recover post-Ivan, ABM habitat would experience a net gain of 3.1 acres compared to project implementation under pre-Ivan conditions and an even greater gain compared to the situation immediately post-Ivan (+14.7 acres). Critical habitat, as designated, will continue to serve the intended conservation role for the species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent that as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7 (b)(4) and section 7(o)(2), taking that is incidental and not intended as part of the agency action is not considered to be prohibited under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary and must be undertaken by the Service so that they become binding conditions of any grant or permit issued to the permittee, as appropriate, for the exemption in section 7(o)(2) to apply. The Service has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the Service: (1) fails to assume and implement the terms and conditions or (2) fails to require the permittee to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit document, the protective coverage of section 7 (O)(2) may lapse. In order to monitor the impact of incidental take,

the permittee must report to the Service the progress of the action and its impact on the species as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service anticipates that incidental take of this species during construction will be difficult to detect due to the fact that it may not be currently present (subsequent to Hurricane Ivan), and even when present it is unlikely that a dead or impaired individual would be found. Therefore, the maximum level of anticipated incidental take is based on the amount of ABM habitat to be impacted by the project. If take occurs it would likely occur on the 11.6 acres that will be constructed and would likely be in the form of wounding, killing, harming, or harassment. Additional incidental take may occur later during habitat restoration on 14.7 acres, and through occupancy of the new construction, if ABM remain or are reintroduced to the area. Such take would likely be in the form of wounding, killing, harming, or harassment due to disturbance and habitat destruction. Thus, the anticipated maximum level of take of ABM that could occur is on a total of 26.3 acres due to initial construction and subsequent habitat restoration efforts as a result of issuance of the ITP for this project. Take is anticipated for all individual ABM that may occur within the 26.3 acres of habitat which would be disturbed. With implementation of this proposed project, the entire designated critical habitat will remain functional for the species. The proposed project will not adversely impact more than 26.3 acres of ABM habitat.

EFFECT OF TAKE

In the accompanying BO, the Service determined that this level of expected take is not likely to result in jeopardy to the species or permanent destruction or adverse modification of CH.

REASONABLE AND PRUDENT MEASURES

The Service believes that the proposed conservation measures identified in the permittees' HCP are adequate to minimize the adverse impacts to the ABM and mitigate for the incidental take of the ABM under section 10(a)(1)(B) of the Act with the addition of the following terms and conditions. These measures are described in the HCP and summarized in the "DESCRIPTION OF PROPOSED ACTIONS" section above and are, hereby, incorporated by reference.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Service must include conditions in each ITP to constrain the permittees to comply with the following terms and conditions. These are in addition to the conservation measures described in the HCP and summarized in "DESCRIPTION OF PROPOSED ACTIONS" section above. These terms and conditions are non-discretionary.

Upon location of dead, injured, or sick individuals of a threatened or endangered species, initial notification must be made to the Service Law Enforcement Office, Alabama at (334) 285-9600. Additional notification must be made to the Fish and Wildlife Service Ecological Services Field Office, also located in Daphne, Alabama at (251) 441-5181. Care should be taken in handling sick or

injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed actions. The Service believes that no more than a total of 26.3 acres of ABM habitat will be disturbed during facility construction, habitat restoration, and facility occupancy. All ABM within the 26.3 acres would be incidentally taken as a result of our issuance of an ITP for this project. The 11.6 acres of habitat to be destroyed by construction will then be followed by restoration of 14.7 acres of dune habitat in the AA. As dune habitats recover post-Ivan, ABM habitat would experience a net gain of 3.1 acres compared to project implementation under pre-Ivan conditions and an even greater gain compared to the situation immediately post-Ivan (+14.7 acres). We would expect the amount of incidental take from indirect impacts to be insignificant (as defined by the Service handbook) at this time. If, during the course of these actions this level of incidental take is exceeded (i.e. increased acreage of disturbed areas), such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The permittee must immediately provide the Service with an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7 (a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action listed species or CH, to help carry out recovery plans, or to develop information.

The recovery plan for the Gulf coast subspecies of beach mice (including the ABM), published in 1987, identified three recovery objectives for the Gulf coast beach mouse species: stabilize populations by preventing further habitat deterioration, re-establish populations in areas from which they have been extirpated, and education of the general public. A comprehensive revision of the 1987 recovery plan, focusing specifically on the recovery needs of the ABM, is currently being developed to incorporate new information related to the range of the species, to update information regarding known habitat, to update the framework for addressing problems of the species and for prioritizing actions necessary for recovery. The Service is being assisted in this revision of the recovery plan by a Recovery Team made up of scientific experts, and individuals from local, state, and Federal government agencies, and community organizations. The Service should pursue the tasks identified in the current recovery plan and any additional tasks identified in the revised recovery plan (when available), or by other species experts to ensure ABM survival and recovery.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As written in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Service involvement or control over the actions has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take authorized by this BO is exceed; (2) new information reveals effects of the Service's

action that may affect listed species or designated CH in a manner or to an extent not considered in this BO; (3) the Service's action is subsequently modified in a manner that causes an effect to the listed species or designated CH not considered in this opinion; or (4) a new species is listed or CH designated that may be affected by the actions. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease until reinitiation of consultation is completed.

For this BO, the incidental take would be exceeded when the take exceeds 23.6 acres of ABM habitat or take of any ABM located outside of these acres which is what has been exempted from the prohibitions of Section 9 of the Act by this opinion. For further coordination, please contact the Service's DFO at (251) 441-5181.

LITERATURE CITED

American Bird Conservancy. 1999. Cats indoors! The campaign for safer birds and cats. Washington, D. C.

Anderson, H.G. 1960. Morphological variations of some subspecies of *Peromyscus polionotus* and their intergrades. Master's Thesis. University of Auburn. Auburn, Alabama.

Bates, S. G. 1992. Distribution of beach mice in coastal parks in northwest Florida. Final Report to Florida Game and Fresh Water Fish Commission.

Bird, B. L. 2003. Effects of predatory risk, vegetation structure, and artificial lighting on the foraging behavior of beach mice. Masters Thesis. University of Florida, Gainesville.

Bird, B. L., L. C. Branch, and D. L. Miller. 2003. (In press) Effects of coastal lighting on foraging behavior of beach mice. Conservation Biology.

Blair, W. F. 1951. Population structure, social behavior, and environmental relations in a natural population of the beach mouse (*Peromyscus polionotus leucocephalus*). Continental Laboratories of Vertebrate Biology. University of Michigan. 48:1-47.

Bowen, W.W. 1968. Variation and evolution of Gulf Coast populations of beach mice, *Peromyscus polionotus*. Bulletin of Florida State Museum of Natural History. 12:1-91

Boyd, R. S., J. M. Moffett, Jr., and M. C. Wooten. 2003. Effects of post-hurricane dune restoration and revegetation techniques on the Alabama beach mouse. Final research report. Auburn University, Alabama.

Briese, L. A. and M. H. Smith. 1973. Competition between *Mus musculus* and *Peromyscus polionotus*. Journal of Mammalogy. 54:968-969.

Caldwell, L. D. 1964. An investigation of competition in natural populations of mice. Journal of Mammalogy. 45:12-30.

Caldwell, L. D. and J. B. Gentry. 1965. Interactions of *Peromyscus* and *Mus* in a one-acre field enclosure. Ecology. 46:189-193.

Caughley, G. and A. Gunn. 1996. Conservation biology in theory and practice. Blackwell Science, Inc. Cambridge, Massachusetts.

Clark, F. H. 1938. Age of sexual maturity in mice of the genus *Peromyscus*. Journal of Mammalogy. 19: 230-234.

Diamond, J. M. 1975. The island dilemma: Lessons of modern biogeographic studies for the design of natural preserves. Biological Conservation. 7:129-146.

Douglass, S.L., T.A. Sanchez, and S. Jenkins. 1999. Mapping Erosion Hazard Areas in Baldwin County, Alabama and the Use of Confidence Intervals in Shoreline Change Analysis. Journal of Coastal Research, SI(28), pp. 95-105.

Foltz, D. W. 1981. Genetic evidence for the long-term monogamy in a small rodent, *Peromyscus polionotus*. American Naturalist. 117:665-675.

Frank, P. A. and S. R. Humphrey. 1996. Populations, habitat requirements, and management of endemic Anastasia Island beach mouse (*Peromyscus polionotus phasma*), emphasizing the potential threat of exotic house mice (*Mus musculus*). Final Report to Florida Game and Fresh Water Fish Commission. Tallahassee, Florida.

Frankel, O. H. and M. E. Soule. 1998. Conservation and evolution. *In* Wildlife-Habitat Relationships Concepts and Applications. 2nd Edition. (M. M. Morrison, B. G. Marcot and R. W. Mannan, ed.) Madison, WI., Univ. of WI. press. pp. 37 - 117

Gentry, J. B. 1966. Invasion of a one-year abandoned field by *Peromyscus polionotus* and *Mus musculus*. Journal of Mammalogy. 473:431-439.

Gibson, D. J. and P. B. Looney. 1994. Vegetation colonization of dredged spoil on Perdido Key, Florida. Journal of Coastal Research. 10(1):133-143.

Gore, J. A., and T. L. Schaefer. 1992. Santa Rosa beach mouse survey. Florida Game and Fresh Water Fish Comm. (Now Florida Fish and Wildlife Conservation Commission). Nongame Wildlife Program Final Performance Report.

Hall, E.R. 1981 The Mammals of North America. 2nd Ed. John Wiley and Sons. New York, New York.

Hill, E. A. 1989. Population dynamics, habitat, and distribution of the Alabama beach mouse Masters Thesis. Auburn University, Alabama.

Hobbs, R. J. 1992. The role of corridors in conservation: Solution or bandwagon? Trends in Ecology and Evolution. 7:389-393.

Holler N. R. 1992. Perdido Key beach mouse. *In* Rare and Endangered Biota of Florida, Volume Mammals. Ed. S.R. Humphrey. University Presses of Florida, Tallahassee. pp 102-109

Holler, N. R. and J. E. Moyers. 1994. Beach mouse research program: Gulf Islands National Seashore beach re-nourishment project. Annual Report to the Technical Review Committee.

Holler, N. R. and E. H. Rave. 1991. Status of endangered beach mouse populations in Alabama. Journal of Alabama Academy of Science. 62:18-27.

Holler, N. R., M. C. Wooten, and C. L. Hawcroft. 1997. Population biology of endangered Gulf coast beach mice (*Peromyscus polionotus*): conservation implications. Technical Report. Alabama Cooperative Fish and Wildlife Research Unit.

Howell, A. H. 1909. Notes on the distribution of certain mammals in the southeastern United States. Proceedings of the Biological Society of Washington. 22: 55-68.

Howell, A. H. 1921. A biological survey of Alabama. North American Fauna, 49:1-88.

Humphrey, S.A. 1992. Pallid beach mouse: recently extinct. *In* Rare and Endangered Biota of Florida, Vol. 1, Mammals. University Presses of Florida, Tallahassee. pp. 19-23.

Humphrey, S. R. and D. B. Barbour. 1981. Status and habitat of three subspecies of *Peromyscus polionotus* in Florida. Journal of Mammalogy. 62:840-844.

James, F. C. 1992. St. Andrews beach mouse. *In* Rare and Endangered Biota of Florida, Volume 1 Mammals. Ed. S.R. Humphrey. University Presses of Florida, Tallahassee. pp 87-93

King, J. A. 1957. Intra- and interspecific conflict of *Mus* and *Peromyscus*. Ecology 38:355-357.

Lynn, W. J. 2000. Social organization and burrow-site selection of the Alabama Beach Mouse *Peromyscus polionotus ammobates*). Masters Thesis. Auburn University. Auburn, Alabama.

Lynn, W. J. 2001. Gulf State Park trapping report for ABM.

MacNeil, F. S. 1950. Pleistocene shore lines in Florida and Georgia. U. S. Geological Survey, Professional Paper. 221F:59-107.

Meyers, J. M. 1983. Status, microhabitat, and management recommendations for *Peromyscus polionotus* on Gulf coast beaches. Report to U.S. Fish and Wildlife Service, Atlanta, GA

Miller, D. L., M. Thetford, L. Yager, and D. Pucci. 1999. Enhancement of dune building and revegetation processes on Santa Rosa Island. Final Report. University of Florida, West Florida Research and Education Center, Institute of Food and Agricultural Sciences. Milton, Florida. Exp. Station Journal Series N-01804.

Moyers, J. 1996. Food habitats of gulf coast subspecies of beach mice *Peromyscus polionotus spp.*). Masters thesis, Auburn Univ., AL.

Moyers, J. E., H. G. Mitchell, and N. R. Holler. 1996. Status and distribution of Gulf coast subspecies of beach mouse. Annual Report for Grant Agreement #1448-0004-94-9174, Alabama Cooperative Fish and Wildlife Research Unit, Auburn University, Alabama.

Moyers, J. E., N. R. Holler, and M. C. Wooten. 1999. Species status report: current distribution and status of the Perdido Key, Choctawhatchee, and St. Andrews beach mice. U. S. Fish and Wildlife Service Grant Agreement 1448-0004-94-9174.

Noss, R. F. and B. Csuti. 1997. Habitat Fragmentation. *In* Principles of Conservation. Ed. G. K. Meffe and C. R. Carroll. Sinauer Associates, Inc. pp 269-289.

Stout, I. J. 1992. Southeastern beach mouse. *In* Rare and Endangered Biota of Florida, Volume Mammals. Ed. S.R. Humphrey. University Presses of Florida, Tallahassee. pp 242-249.

Sumner, F. B. 1926. An analysis of geographic variation in mice of the *Peromyscus polionotus* group from Florida and Alabama. Journal of Mammalogy. 7:149-184.

Swilling, W.R. Jr. 2000. Ecological dynamics of the endangered Alabama beach mouse (*Peromyscus polionotus ammobates*). Master's Thesis. Auburn University, Alabama.

Swilling, W.R., Jr. and M.C. Wooten. 2002. Subadult dispersal in a monogamous species: the Alabama beach mouse (*Peromyscus polionotus ammobates*). Journal of Mammalogy. 83(1):252-259.

Swilling, W.R., W. J. Lynn, N. R. Holler, and M.C. Wooten. 1996. Sink or swim: Alabama beach mice *Peromyscus polionotus ammobates*) respond to Hurricane Opal. Poster presentation, 76th Annual Meeting of the American Society of Mammalogists. June 15-19, 1996. University of North Dakota. Grand Forks, North Dakota.

Swilling, W.R. Jr., M.C. Wooten, N. R. Holler, and W. J. Lynn. 1998. Population dynamics of Alabama beach mice *Peromyscus polionotus ammobates*) following Hurricane Opal. Amer. Midl. Nat. 140:287-298.

U.S. Fish and Wildlife Service. 1985. Determination of endangered status of three beach mice. Federal Register 50: 23872-23889.

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

U. S. Fish and Wildlife Service. 2003. Alabama beach mouse habitat maps. November 2003. Ecological Services Field Office, Daphne, Alabama.

U. S. Fish and Wildlife Service. 2004. Draft preliminary ABM habitat assessment following Hurricane Ivan.

Van Zant, J. L. and M. C. Wooten. 2003. Translocation of Choctawhatchee beach mice (*Peromyscu. polionotus allophrys*): Hard lessons learned. Conservation Biology. 112:405-413.

Volkert Environmental Group. 2004. Habitat assessment: Gulf State Park. Volkert Contract Number 414100.12. Foley, Alabama.