United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

January 18, 2005

Memorandum

To: Gloria Bell, Chief of Endangered Species, Southeast Region
Attention: Victoria Davis

From: James J. Slack, Field Supervisor, South Florida Ecological Services Office

Subject: Biological opinion addressing effects of issuing a recovery permit (TE088850-0) to Dr. Stuart Pimm for research on the Cape Sable seaside sparrow

This document transmits the Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed issuance of a section 10(a)(1)(A) recovery permit to Dr. Stuart Pimm for research on the endangered Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*), in accordance with section 7 of the Endangered Species Act of 1973, as amended (ESA) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). All proposed activities covered by the research permit will be conducted in Miami-Dade and Monroe Counties, Florida. We concur with your determination that the proposed action "may adversely affect" the Cape Sable seaside sparrow.

This biological opinion is based on information provided in research reports, the complete permit application and subsequent correspondence, telephone conversations, field investigations, and other sources of information. A complete administrative record of this consultation is on file in this office.

CONSULTATION HISTORY

The Southeast Regional Office received a permit application from Dr. Stuart Pimm dated May 15, 2004. Permit number TE088850-0 was assigned to the proposed research.

On June 4, 2004, we received a request from the Regional Office Recovery Permit Biologist for formal consultation on the permit application.

On July 28, 2004, we sent an e-mail to Dr. Pimm requesting additional information regarding his research methods.

On August 16, 2004, Dr. Pimm sent an e-mail providing the additional information we requested in our e-mail of July 28, 2004.

On November 22, 2004, we sent an e-mail to Dr. Pimm requesting additional information regarding questions that were raised during in-house review of this biological opinion. These

questions were related to capturing adult females by flushing them from nests in subpopulation A, which has suffered severe decline since 1981.

On December 7, 2004, the Service (Tylan Dean and Dan Nehler) met with Dr. Pimm, Dr. Lockwood, and Sonny Bass (Everglades National Park) to discuss Cape Sable seaside sparrow issues. It was agreed that the intentional capture of adult females would not be allowed in any subpopulation except B, the only subpopulation where estimated population size in 2004 has increased since 1981.

On December 9, 2004, Dr. Pimm responded to our e-mail of November 22, 2004. He noted his agreement with items discussed during the meeting on December 7, 2004.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Proposed Action

The Cape Sable seaside sparrow has a very restricted range and now occurs only in the Everglades region of Miami-Dade and Monroe Counties in south Florida, almost exclusively within the boundaries of Everglades National Park (ENP), Big Cypress National Preserve (BCNP), and Southern Glades Wildlife and Environmental Area (SGWEA). There are six spatially separate subpopulations of the Cape Sable seaside sparrow (labeled A to F), including subpopulation D which has been extirpated. The species has suffered severe declines in both eastern and western subpopulations in recent years. Dr. Pimm's research on the sparrow involves monitoring of the species across a spectrum of spatial scales including small-scale work on intensive plots, banding birds to estimate demographic parameters, large-scale survey work, and the use of remote sensing to assess the extent of available sparrow habitat, as described below. The research will help understand the causes of sparrow decline, including the changes in its habitat, and recommend actions for recovery. Dr. Pimm will also continue to coordinate closely with research now being conducted under recovery permit TE075916-0 issued to Dr. Julie Lockwood. In addition, his group expects to add to her study by analyzing satellite imagery when needed as an extension of current efforts on wider areas.

Dr. Pimm expects the proposed research will result in annual range-wide population estimates, better estimates of the size and extent of those populations that are now severely depleted, an understanding of the long-term trends in vegetative cover in northeastern and western populations, integration of results with Dr. Lockwood's studies on the effects of fire, and continued estimates of population numbers, breeding success, and annual mortality on the intensive study plots.

Helicopter Surveys

Surveys of the Cape Sable seaside sparrow that employed helicopters to ferry observers to its remote locations began in 1974. In 1981 the first range-wide survey was undertaken. Since

1992, intensive helicopter surveys to assess general condition of the sparrow and its habitat have been conducted through cooperation with the National Park Service. Helicopter work involves surveying several hundred previously identified sites along a 1-kilometer (km) grid that covers all sparrow habitat throughout the range of the species. These surveys may be supplemented with a 0.5-km grid of survey points in selected areas. During the survey a helicopter drops off an observer who, after allowing the birds to settle for a few minutes following the disturbance, then records the number of sparrows seen or heard within a 7-minute interval. After each of the observers is dropped off, the helicopter flies out of earshot, lands for a few minutes without turning off its engine, then returns to pick up the observers. This is done for up to three hours each morning. It takes about 1 minute to drop off the observer and 1 minute to pick him up. Observers spend about 10 minutes on the ground at each site. No sparrow observations are done from the air. It is possible for three observers to each cover about 10 sites per morning. Pilots fly several hundred feet above the prairie and are required to meet all required safety protocols.

Researchers take particular care to visit all sites that they consider to have even a remote chance of being occupied by sparrows, although they do not observe sparrows at most of the sites they survey. The survey lasts from around April 1 until completion roughly 6 weeks later. A minimum of two surveyors will fly every survey day and three will fly on most days. Usually there is only one visit made to each site each year.

Researchers do not formally collect data from the helicopter while in the air, though they do make informal assessments of the prairies from the helicopter, and this is a very important part of understanding the vegetation changes. During the helicopter survey, researchers also classify the vegetation into broad categories (*e.g.,* "sawgrass") on the basis of a quick inspection of the area around the point where the helicopter drops them off. This takes a few minutes and is generally accomplished as the helicopter flies away. Water depth measurements will also be taken using a dip-stick.

In subpopulation A, the researchers will analyze the vegetation data, look for long-term trends, and try to determine the cause for what observations suggest has been a persistent loss of suitable habitat. Ground-truthing for aerial photography and Landsat remote sensing imagery, collected under a separate project, will also be done using the vegetation and water depth data.

Intensive Plot Surveys

On a finer spatial scale than the helicopter surveys, ground surveying of sparrows in subpopulation A and the core subpopulation B will continue. This work involves territory mapping, nest monitoring, and color-banding of as many adults and young as possible. The field season for this work is from April 1 to May 31, though the time frame may be extended to the last week or two in March and into June during unusually dry years. Heavy rains in late May often curtail nesting.

An on-the-ground presence will also be maintained continuously in area A for 1 to 4 months. This will probably involve 10 helicopter trips for the month to take the research teams and their supplies back and forth. Helicopter disturbance is limited to 10 minutes on the ground on the

day of field crew arrival and departure. No more than two helicopter arrivals per week are anticipated. The helicopter is landed in a marked area that has been surveyed for sparrows and where none were detected. The crew's responsibility will be to find nests on the existing study site (if there are any), complete a detailed nesting survey of adjacent areas and, to the extent practical, survey areas away from this site if the helicopter survey finds other concentrations of birds. Teams will also spend some time on the ground in D and F.

Territory mapping. Researchers will survey for banded sparrows by wandering the study plot in the early morning (around 6:00 to 10:00 am), locating singing males and reading their color bands using binoculars and spotting scopes (see banding protocol below). The use of a spotting scope allows them to stand over 50 meters (m) away from the sparrow under observation, thereby reducing or eliminating disturbance to it. Banded males can be accurately identified within 10 minutes. Territories are described using multiple observations of color-banded individuals plotted on a map. It requires 1 to 3 hours per week, with spans of up to 4 days between visits, to accurately map an individual's territorial extent. Global Positioning System units are used to take points of re-sighted sparrows. These points are later downloaded into ArcMap software to produce final territory maps.

Previous research on Cape Sable seaside sparrows shows that territory size is indicative of the suitability of sparrow habitat. Thus, collecting territory size information within different areas can lend insight into how suitable the site is for sparrows in terms of its ability to sustain a breeding pair. Territory information also allows researchers to identify non-territorial males (floaters) or territory holding males that do not mate in the population, and it allows for the calculation of more precise density estimates within the different areas. The information gained from territory mapping is used to identify: (1) when habitat becomes suitable for sparrow breeding; (2) whether, if it is used for breeding, it is sub-optimal habitat for sparrows and how long it stays sub-optimal; and (3) the way in which sparrows partition available habitat in relation to the effects of fire or inundation. This information can be used to improve our understanding of the effects of fire and flooding on sparrow populations, specifically their ability to successfully breed in previously burned or flooded habitat.

Nest monitoring. Nests are usually found in two ways, either the female is flushed when an observer passes nearby (incubation or early nestling periods), or the position of the nest is triangulated by observing the parents make multiple trips to the nest. When the female is flushed, researcher time spent at the nest is very brief, usually requiring around 5 minutes checking contents and erecting nest site markers. Triangulation involves observing parents at a distance that permits them to feed the young (approximately 50 m). Once the nest is located, time spent in the immediate vicinity is the same as when females are flushed. Researchers take great care not to trample the grass around the nest, taking advantage of natural breaks between the grass tufts and not approaching the nest from the same direction every time. They mark nests using two pink, numbered surveying flags placed in the ground 5 m to the north and south of the nest itself, such that the nest is directly in the center of a line in between the two flags. A larger pink flagging streamer is placed on a tall clump of grass 20 to 30 m away from the nest to guide the observer into the general area and to warn observers away from the nest.

Nests are generally monitored every 3 to 5 days by an observer checking the contents and counting the number of eggs or young. This requires a visit of 1 minute to the immediate vicinity of the nest so that the observer can look inside the nest itself. If the female is incubating eggs, this action usually flushes her. However, the researchers have regularly observed that the female flushes to a location less than 50 m away and returns to the nest within 15 minutes of the observation. The nest itself is never touched, except when the nestlings are banded (see protocol below). In cases where the final egg-laying date is known, nest checks are intentionally less frequent during the 2-week incubation period. Nests are checked daily for fledging starting at day 8. Checks are usually scheduled in the late morning. Researchers purposefully do not check nests within 2 hours of sunset to reduce the chance of a mammal following their scent trails. Nest predators of active sparrow nests are inferred by the condition of the depredated nest. For example, a shredded nest found with broken eggs or parts of young nearby is considered to be predated by a mammal, while an intact nest found with no sign of contents is considered to be predated by a snake. Researchers may decide to use cameras to detect potential nest predators. To do so, they would set up 'dummy nests' outside of the study plot more than 100 m from any active nest sites. No cameras or other devices will be placed near any Cape Sable seaside sparrow nest.

In some circumstances, researchers may also observe food items taken to the nest using a spotting scope while sitting more than 40 m from the nest itself. This distance is close enough to see what is being brought to the nest (held in the bill of the parent), but far enough away to prevent the adults from being disturbed. These observations last an hour per nest during nestling day 4 to 8, and are rarely repeated at the same nest.

Information on the breeding success (fecundity) of Cape Sable seaside sparrows is essential to estimating the current health and the recovery potential of the population. Since fire removes above ground vegetation and flooding significantly reduces it, sparrows may not be able to utilize these areas for breeding until the vegetation recovers. Finding and monitoring nests in and outside of damaged areas provides information on the effects on sparrow breeding success, and, if sparrows return to the site, the time it takes for breeding success to become similar (or surpass) what is observed in the undamaged areas. Collecting information on the food items brought to the young is useful for determining the suitability of the habitat for raising young. Such information will aid in determination of the immediate and long-lasting effects of habitat quality on sparrow populations. It also allows researchers to estimate the time needed for sparrow populations to recover to their pre-damaged levels. This information allows researchers to determine the maximum fecundity rate for sparrow populations under conditions of low density. This can be utilized in models of sparrow recovery, including those that incorporate ecosystem processes that are known to disrupt sparrow breeding such as extensive flooding.

Color-banding. Researchers will capture adult Cape Sable seaside sparrows using targeted netting techniques. Open nets are never left unattended. One or two nets (6 or 12 m length) are erected on the territory of a singing male. A recording of sparrow songs and calls is played to lure him into the net. Playing time will not exceed 30 minutes per bird. Male sparrows generally respond to the recordings within 15 minutes.

Researchers will also capture and band floater males and those that have fledged by flushing them into the net. Floater males and juveniles do not respond to recordings. Flushing them into nets involves setting one to two 12 m nets around a clustered group of sparrows, then physically walking toward the net with the sparrows in between the researchers and the net. If only one sparrow is caught, it will be removed from the net, processed, and immediately released. Total processing time is about 10 minutes. If more than one is captured at a time, sparrows will be held in cloth bags, one per bag.

Adult female Cape Sable seaside sparrows will only be captured in subpopulation B. To capture adult female sparrows, a 6 m net is set within 1 m of her nest, using naturally occurring breaks in the vegetation for a lane. The observer then moves toward the nest and flushes her into the net, from which she is extracted then banded. The net setup is immediately removed from the nest area. After banding, the female usually returns to her incubating duties within 15 minutes, which is within the time range that females naturally spend away from their nests in between incubation bouts. In order to minimize the risk of a female abandoning her clutch, females are only banded late in the incubation stage or during the first 1 to 2 days of brooding the young. Researchers will not attempt to capture and band a female if the vegetation structure around a nest is such that setting a net near it will permanently disrupt the vegetation.

Cape Sable seaside sparrows fledge 9 to 10 days after hatching. Nestlings will be banded 3 to 6 days after hatching to avoid premature fledging as a result of handling. Nestlings are carefully taken out of the nest by hand, banded about 5 m away to prevent additional nest site disturbance, and then immediately returned. Time needed to band nestlings ranges from 7 to 15 minutes, depending on the size of the brood.

Sparrows will be aged by plumage (if possible) and sexed using presence of brood patch, cloacal protuberance, and behavioral cues. Weight, wing, and tail measurements will be taken using a Pesola 50-gram spring scale and standard wing ruler. Researchers will determine body condition by weighing individuals and assessing visible subcutaneous fat deposits using the Helms/Drury scoring system (Helms and Drury 1960). All measurements, except for wing and tail, will be taken on nestlings. The color bands used are AC Hughes XCS celluloid with a diameter of 2.8 millimeters. One celluloid color band is placed above the Service aluminum band on one leg, and two color bands are placed together on the opposite leg. Color combinations are carefully coordinated with those used by Dr. Lockwood.

No sparrows will be captured if weather conditions are marginal (*e.g.,* high winds, high temperatures, rain). All captured individuals will be immediately released if they show signs of stress (*e.g.,* excessive molt, panting).

Past experience suggests that about 60 adults (mostly males), 60 nestlings, and 10 free-flying juveniles will be captured and color banded between March and August of each year. Nestlings and adults will only be handled once for banding, although occasionally an adult will accidentally be recaptured the same year. Adults may be recaptured in successive years to replace any color bands that have faded or been lost.

Banding Cape Sable seaside sparrows with a unique color combination as well as the Service bands allows researchers to track individual sparrows for territory mapping and for determining survivorship, recruitment, and fecundity without the need for recapture. Banding nestlings and juveniles is also the only reliable way to follow known-age birds because seaside sparrows are nearly impossible to age as second-year, or after-second-year, individuals by plumage. Banding information is used to derive age-specific dispersal estimates, especially into the burned area. It is also used to derive age-specific mortality rates. This information is used to determine which age group colonizes the burned site, and from where these individuals came. It is also used to determine differences in sparrow mortality between those that establish territories within the burned areas versus the unburned area. Combining this information with breeding success provides empirical estimates of demography needed to forecast range-wide increases or decreases in sparrow numbers given the implementation of various fire management regimes.

The condition of the young and adults is a secondary estimate of the suitability of available habitat for sparrows. Low body fat and weights of young and adults indicate poor habitat. Documenting this for burned and unburned areas allows researchers to detect possible effects of fires on sparrow health.

All bird banders and surveyors who will work under Dr. Pimm's project are very experienced, and there has been no known sparrow fatality during more than 10 years of research.

Remote Sensing

Dr. Pimm and his researchers will use remote sensing imagery and modeling to show the potential sparrow habitat from year-to-year. In addition, the researchers will compile and analyze all available data, including aerial photography, for the eastern populations. All available data, including aerial photography, will be compiled and analyzed for the eastern populations. Dr. Pimm will examine whether there have been long-term changes in bush cover in this area and relate them, if possible, to changes in water and fire regimes.

The aerial photography and Landsat remote sensing imagery are done under a separate project, and are not produced by Dr. Pimm. His group will simply use the products after they are collected by others, though they will do some ground-truthing during the helicopter surveys, as described above.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. The Service has determined that the action area for this project is throughout the range of the Cape Sable seaside sparrow, which occurs almost exclusively within the boundaries of ENP, BCNP, and SGWEA, in Monroe and Miami-Dade Counties, Florida.

STATUS OF THE SPECIES AND CRITICAL HABITAT RANGE-WIDE

Much of the following discussion is summarized from the *South Florida Multi-Species Recovery Plan* (MSRP) (Service 1999).

Species/Critical Habitat Description

The Cape Sable seaside sparrow is a medium-sized sparrow, 13 to 14 centimeters (cm) in length (Werner 1975). Of all the seaside sparrows, it is the lightest in color (Curnutt 1996). The dorsal surface is dark olive-grey and the tail and wings are olive-brown (Werner 1975). Adult sparrows are light grey to white ventrally, with dark olive grey streaks on the breast and sides. The throat is white with a dark olive-grey or black whisker on each side. Above the whisker is a white line along the lower jaw. A grey ear patch outlined by a dark line sits behind each eye. The lores of the head are yellow. The leading edge of each wing has a small yellow patch near the alula. The legs and bill are grey (Curnutt 1996). There are no noticeable differences in markings between the sexes. However, there are significant differences in the sizes of specific body parts between the sexes (Werner 1975). Young sparrows differ from adults in that they do not have whisker marks, lack the yellow lores, and have brown streaking on the back.

The Cape Sable seaside sparrow was listed as an endangered species on March 11, 1967, pursuant to the Endangered Species Preservation Act of 1966 (32 FR 4001). That protection was continued under the Endangered Species Conservation Act of 1969 and the ESA. The Cape Sable seaside sparrow was listed because of its limited distribution and threats to its habitat posed by large-scale conversion of land in southern Florida to agricultural uses. Critical habitat for the Cape Sable seaside sparrow was designated on August 11, 1977 (50 CFR § 17.95) (42 FR 40685). Currently, the critical habitat includes areas of land, water, and airspace in the Taylor Slough vicinity of Collier, Miami-Dade, and Monroe Counties. Much of this area is within the boundaries of ENP.

Life History

The currently preferred nesting habitat of Cape Sable seaside sparrows appears to be a mixed marl prairie community that often includes muhly grass (*Muhlenbergia filipes*) (Stevenson and Anderson 1994). These short-hydroperiod, mixed marl prairies contain moderately dense, clumped grasses, with open space permitting ground movements by the sparrow. Sparrows tend to avoid tall, dense, sawgrass-dominated communities, spike rush (*Eleocharis*) marshes, extensive cattail (*Typha*) monocultures, long-hydroperiod wetlands with tall, dense vegetative cover, and sites supporting woody vegetation (Werner 1975, Bass and Kushlan 1982). Cape Sable seaside sparrows avoid sites with permanent water cover (Curnutt and Pimm 1993).

Nesting has been observed from late February through early August (Service 1983). The majority of nesting occurs in the spring when large areas of the marl prairies are dry. Sparrows build new nests for each successive brood. The average height of the nests (*i.e.*, from soil surface to bottom of the nest structure) increases after the onset of summer rains in early June (Lockwood et al. 2001). Nests that hatch young before June 1 sit an average of 17 cm off the

ground, whereas nests that hatch young after June 1 sit an average of 21 cm off the ground (Lockwood et al. 2001). Similarly, average nest height varies from year to year. Lockwood et al. (2001) determined that during the 1996 and 1997 breeding seasons, Cape Sable seaside sparrows built nests closer to the ground than during the 1998 and 1999 breeding season. Sparrows construct their nests with materials that are locally common and sometimes place taller grasses over the nest to conceal it. Nests are placed in clumps of grasses composed primarily of *Muhlenbergia* and *Spartina* (Pimm et al. 1996).

Pimm et al. (2002) suggest that nesting will not be initiated if water levels are at a depth greater than 10 cm during the breeding season. The end of the breeding season appears to be triggered by the onset of the summer rains. When water levels rise above the mean height of the nests off the ground, sparrows cease breeding (Lockwood et al. 1997). Cape Sable seaside sparrows usually raise one or two broods in a season, although they may raise a third brood if weather conditions allow (Kushlan et al. 1982, Service 1983). Recent information indicates sparrows can produce up to four broods if conditions allow (Lockwood et al. 2001).

Cape Sable seaside sparrows lay three to four eggs in each clutch (Werner 1978). Incubation has been estimated to take 12 to 13 days (Sprunt 1968, Trost 1968). The young spend 9 to 11 days at the nest. Both parents rear and feed the young birds and may do so for an additional 10 to 20 days after the young fledge (Woolfenden 1956, 1968, Trost 1968). Fledglings often occur in groups of two to seven and are occasionally alone. They are incapable of flight until they are approximately 17 days of age; when approached, flightless fledglings will freeze on a perch until the threat is less than a meter away, and then run along the ground (Werner 1975, Lockwood et al. 1997).

Cape Sable seaside sparrows typically forage by gleaning items from low vegetation or from the substrate (Ehrlich et al. 1992). The sparrow is a dietary generalist (Pimm et al. 1996). It commonly feeds on soft-bodied insects such as grasshoppers, spiders, moths, caterpillars, beetles, dragonflies, wasps, marine worms, shrimp, grass, and sedge seeds (Stevenson and Anderson 1994). Significant differences were detected in nestling diet between years and sites (Lockwood et al. 1997), reflecting the patchy distribution of insects and opportunistic nature of the sparrow (Post and Greenlaw 1994). The sparrow appears to shift the importance of prey items in its diet in response to their availability (Pimm et al. 1996).

Competition and predation also threaten the Cape Sable seaside sparrow. Raccoons (*Procyon lotor*), snakes, rice rats (*Oryzomys palustris*), and hawks may be the chief predators (Lockwood et al. 1997, Dean and Morrison 1998). Predation by cottonmouth (*Agkistrodon piscivorus*) has been documented (T. Dean, Eagle Environmental, Incorporated, personal communication 1998, cited in Service 1999). Lockwood et al. (1997) also suggest that increasing water levels are associated with significant increases in predation rates.

The Cape Sable seaside sparrow is nonmigratory. The fidelity of breeding male sparrows to their territories is high, and many male seaside sparrows will defend the same area for 2 to 3 years (Werner 1975). Lockwood et al. (2001) followed banded individuals from one breeding season to the next and found that adult sparrows move an average of 212 m from the location where

they were banded the previous year (or in some cases, two or more years previously). This means that many sparrows probably do not move their territories from one year to the next, and the majority only adjust their positions (Lockwood et al. 2001).

Dean and Morrison (1998) utilized radio-transmitters to document sparrow movements over the non-breeding season within the western population (subpopulation B). Of the 17 individuals for which they recorded over 20 locations, all but two made movements greater than 370 m (Dean and Morrison 1998). Longer-range movements were recorded, sometimes up to 7 km. These movements were rare, however, and these individuals returned to their breeding territories by the end of the non-breeding season (Dean and Morrison 1998). Collectively, these observations indicate that adult sparrows are quite sedentary throughout the year. Adult immigration and emigration rates are low.

Lockwood et al. (2001) resighted or recaptured juveniles an average of 577 m from their place of hatching. This value is significantly different from that observed for equivalent time frames in adults and is in contrast to adult dispersal distances (Lockwood et al. 2001). Juvenile sparrows are more apt to move longer distances with a maximum recorded natal dispersal distance of over 1 km (Lockwood et al. 2001).

Population Dynamics

The results of several studies suggest that Cape Sable seaside sparrows exist as several subpopulations whose distribution, size, and importance to the persistence of the species changes with time. Bass and Kushlan (1982) described two core subpopulations of the sparrow, one northwest of Shark River Slough in the southeast portion of the BCNP (subpopulation A), and a second one in the Taylor Slough area southeast of Shark River Slough (subpopulation B). Curnutt and Pimm (1993) recognized six subpopulations (A-F) of the Cape Sable seaside sparrow that roughly correspond to the groupings recognized by Bass and Kushlan (1982). Pimm (1998) suggested that three breeding subpopulations are critical to the long-term survival of the Cape Sable seaside sparrow.

The sparrow was surveyed in 1981 and every year since 1992, including twice in 2000 (Pimm et al. 2002). Over this period, there have been substantial changes in many of the six populations. In 1981, there was an estimated total of 6,656 sparrows in the six subpopulations, with most of the sparrows in two core subpopulations (A and B), and four peripheral subpopulations (C-F) (Table 1). Core subpopulation A inhabited the marl prairies west of Shark River Slough extending into BCNP and held an estimated 2,688 individuals. Core subpopulation B held approximately 2,352 sparrows inhabiting the marl prairies southeast of Shark River Slough near the center of ENP. It remains one of the most abundant subpopulations, with estimated size remaining relatively stable. Peripheral subpopulation E, north of subpopulation B, held about 672 sparrows, while subpopulation C, located along the eastern boundary of ENP, and subpopulation D, just to the southeast of subpopulation C, held about 400 sparrows each. Peripheral subpopulation F, the northernmost peripheral subpopulation located on the western edge of the Atlantic coastal ridge, was the smallest subpopulation with an estimated 112 sparrows.

Table 1. Estimated total numbers of Cape Sable seaside sparrows in six subpopulations, A – F, during 14 different years. Two surveys were done in 2002. Estimated totals are derived from the number of sparrows actually observed during surveys in each subpopulation, using methods developed by Bass and Kushlan (1982).

Year	Subpopulation						Total
	A	B	C	D	E	F	
1981	2,688	2,352	432	400	672	112	6,656
1992	2,608	3,184	48	112	592	32	6,576
1993	432	2,464	0	96	320	0	3,312
1994	80[a]	2,224	NE	NE	NE	NE	2,416[a]
1995	240	2,128	0	0	352	0	2,720
1996	384	1,888	48	80	208	NE	2,624
1997	272	2,832	48	48	832	16	4,048
1998	192	1,808	80	48	912	16	3,056
1999	400	2,048	144	176	768	16	3,552
2000a	448	1,824	112	64	1,040	0	3,488
2000b	400	2,448	64	16	704	112	3,744
2001	128	2,128	96	32	848	32	3,264
2002	96	1,904	112	0	576	16	2,704
2003	128	2,368	96	0	592	32	3,216
2004	16	2,784	128	0	640	16	3,854

Data for all years except 2003 and 2004 are from Pimm et al. (2002, Table 5.3). Data for 2003 are from S. Bass and M. Alvarado (ENP, personal communication, 2003). Data for 2004 are from Everglades National Park (2004). NE = not estimated. [a]minimum estimate.

All six subpopulations were surveyed during the 2004 breeding season (ENP 2004, Table 1). The total estimated population was 3,584 birds, which is slightly up from the 3,216 birds estimated in 2003. Although the total population estimate has slightly increased over the past year, this increase is solely due to increases in subpopulations B and E. Subpopulation D appears to have become extirpated, and, based on extremely low population numbers and lack of evidence of successful breeding, subpopulations A and F are likely to become extirpated.

In 1981 and 1992, the area west of Shark River Slough, where subpopulation A occurs, supported nearly half of the total Cape Sable seaside sparrow population (Table 1). Subpopulation A has suffered the most dramatic sparrow population change observed, declining from more than 2,600 birds in 1992 to 432 birds in 1993 – a decrease of 84 percent (Pimm et al. 2002). In 1995, biologists found that the population had decreased again to just over half of the 1993 abundance. It has remained low ever since. Most recently, subpopulation A declined from an estimated 128 birds in 2003 to 16 birds in 2004 (ENP 2004). This decline represents a significant reduction in the likelihood that this population will persist in coming years. Additionally, more intensive on-the-ground surveys in subpopulation A indicated a very limited or absent reproductive effort as there was a relative lack of female birds or recently fledged young, compared to other subpopulations. The important ecological question is whether a decline of this size is remarkable given the normal year-to-year variation in population densities

found in comparable species. Pimm et al. (2002) determined that it is not only remarkable, but also unprecedented and attributed the changes to the flooding events of 1993 to 1995. Subpopulation A is the population most severely impacted by water management practices.

By 1992, subpopulation C had declined to 11 percent of its 1981 estimate (Table 1). After at least 2 years with no sparrows, 48 sparrows were estimated in this area in 1996 and 1997, and 80 sparrows were estimated in 1998. Since then, this subpopulation has remained stable through 2004, when a population of 128 sparrows was estimated (ENP 2004).

Subpopulation D declined 76 percent from 1981 to 1993 (Table 1). Although no sparrows were found in 1995, the population was estimated at 80 sparrows in 1996 and 176 in 1999. Numbers have decreased since 1999 with 32 sparrows estimated in 2001. As no sparrows were identified within subpopulation D during the past three years, 2002 through 2004, this subpopulation appears to have become extirpated. This area, like subpopulation A, has suffered high water levels that have precluded birds from nesting there successfully.

Subpopulation E has a particularly complex history. It is best understood by splitting the population into two pieces, northern and southern. Although the numbers are small, it appears that the southern piece held roughly 300 birds in 1992, but then there were only sporadic sightings until 2000 and 2001, when the area may have held more than 100 birds. These numbers add to the evidence that flooding has been detrimental for the sparrow (Pimm and Bass 2003). Although subpopulation E showed an increase to 640 birds in 2004 (ENP 2004), it is still well below its peak population count of 1,040 in 2000.

Estimates for subpopulation F declined 71 percent from 1981 to 1992 (Table 1). No sparrows were observed in 1993 or 1995. Only 16 sparrows were estimated for each year from 1997 to 1999. The population increased in 2000 to an estimated 112 sparrows, but only 16 sparrows were estimated in 2004, when on-the-ground surveys did not detect evidence of successful breeding, even late in the breeding season when females and young were readily detected in the larger subpopulations (ENP 2004).

Status and Distribution

In the 1930s, Cape Sable was the only known breeding range for the sparrow (Nicholson 1928). Areas on Cape Sable that were occupied by Cape Sable seaside sparrows in the 1930s have experienced a shift in vegetative communities from freshwater vegetation to mangroves, bare mud flats, and salt-tolerant plants such as *Batis maritima* and *Borrichia frutescens* (Kushlan and Bass 1983). The hurricane of 1935 is believed to have initiated the succession of the plant community on Cape Sable from one dominated by freshwater plants to one dominated by salt tolerant plants. Sea level rise, reduced freshwater flows to the area resulting from upstream water management practices, and another hurricane in 1960 were also likely factors in this habitat change. As a result, Cape Sable seaside sparrows no longer use this area.

The Cape Sable seaside sparrow has a very restricted range and now occurs only in the Everglades region of Miami-Dade and Monroe Counties in south Florida, almost exclusively

within the boundaries of ENP, BCNP, and SGWEA. It occurs in six spatially separate subpopulations.

Critical habitat for the Cape Sable seaside sparrow was designated on August 11, 1977, (50 CFR §17.95) before the full distribution of the subspecies was known. The critical habitat, as designated, does not adequately account for the distribution of the present-day core subpopulations, or the areas necessary for continued survival and recovery. The Service has recently concluded that re-designation of critical habitat is warranted and will be completed as funding and priorities allow. An important area west of Shark River Slough, which had supported one of two core subpopulations, nearly half of the entire population until 1993, is not included within the original designation. This area has experienced detrimental changes in habitat structure as a result of water management practices. Other parts of the originally designated critical habitat have been converted to agriculture and are no longer occupied by sparrows.

Constituent elements are not included within the original designation of critical habitat for the sparrow. A key constituent element should be a hydroperiod pattern that maintains the preferred vegetative communities for successful breeding. During the breeding season, surface water levels should be at or below the surface within the short hydroperiod prairies and should be achieved through adherence to a rainfall-driven operational schedule. Adherence to such a regulation schedule will provide for restoration of hydropatterns that best support Cape Sable seaside sparrows, in addition to other native Everglades species. Other constituent elements should include vegetative structure necessary to support successful breeding.

ENVIRONMENTAL BASELINE

Status of the Species/Critical Habitat Within the Action Area

The entire range of the Cape Sable seaside sparrow is included within the action area, as are portions of the designated critical habitat where sparrows actually occur. All information presented in the preceding Status of the Species and Critical Habitat Range-wide section is relevant here.

The estimated total sparrow population size for 2003 was 3,216 individuals (Table 1).

Factors Affecting Species Habitat Within the Action Area

The suitability of short-hydroperiod, mixed marl prairie communities for the sparrow is driven by a combination of hydroperiod and periodic fires (Kushlan and Bass 1983). Fires prevent hardwood species from invading these communities and prevent the accretion of dead plant material, both of which decrease the suitability of these habitats for Cape Sable seaside sparrows. In the Taylor Slough area, Werner (1975) found that sparrow numbers increased annually in areas that had been burned up to 3 years previously. Taylor (1983) suggested that the response of sparrow population following fire is dependent on the rate of vegetation recovery, the soil depth, and the amount of exposed pinnacle rock. Taylor (1983) found that on sites where soil depth was

40 cm or greater, or on soils without pinnacle rock, vegetation recovery is rapid, and the sparrows recovered more quickly following fire. At sites where soil depths are less than 20 cm and where considerable pinnacle rock occurs, the sparrows begin to reoccupy sites 4 years post fire (Taylor 1983). However, another study suggests that a 4-year fire return frequency reduces habitat suitability and causes decline in resident sparrow populations (Curnutt et al. 1998). Increased sparrow numbers were observed in this study up to at least 10 years post fire.

Pimm et al. (2002) found that sparrow nesting is delayed by at least 2 years following fires. Fires are most frequent along the eastern boundary of the sparrow's range, likely a result of this area being simultaneously drier than it was historically and adjacent to areas outside the natural system subject to human use.

Before the sparrow was listed as an endangered species, the distribution and abundance of the short hydroperiod prairies that provide habitat for it had declined by more than 50 percent due to destruction, fragmentation, and degradation of habitat for residential housing construction or agriculture. These areas are probably not restorable. Many of the remaining short-hydroperiod prairies that supported the Cape Sable seaside sparrow have been converted into long-hydroperiod wetlands, or have been degraded due to increased fire frequencies and/or woody species invasion as a result of reduced hydroperiods by water management practices in south Florida. The feasibility of fully restoring these areas is still uncertain.

The range of the sparrow has changed dramatically in the last century (Pimm et al. 2002). South Florida has the largest expanse of marl prairie, the preferred habitat of the sparrow. These prairies are naturally inundated on average from 3 to 7 months per year (around July through January), but are dry during the sparrow's breeding season (March through June). This expanse of potential sparrow habitat has become unsuitable as a result of drainage and development.

Nests are cups constructed of grasses 17 to 21 cm off the ground, depending on water levels, and nesting stops when water levels exceed certain levels (Lockwood et al. 2001, Lockwood et al. 2003). To be able to complete one nesting cycle and produce one brood, the sparrows must have dry habitat continuously for about 40 days (Pimm et al. 2002). Two broods require longer time. When the sparrow population as a whole can produce only one clutch per year, it probably will not increase (Pimm et al. 2002). Only when the population as a whole can produce two broods a year will the population increase.

During 2004, the National Park Service continued to implement the reasonable and prudent measure recommended in the 1999 jeopardy biological opinion (amended in 2001), which restricts water flow into the area occupied by subpopulation A such that the birds are afforded favorable hydrological conditions to produce one brood. The best available science indicated that if subpopulation A produced one brood per year the population would be sustained, however the decline in subpopulation A during the 2004 breeding season suggests that the hydrological protections may not be adequate to sustain this population. The threat of accidental fire was high during the 2004 summer due to unusually dry conditions and drought. Accidental fires within occupied habitat can be catastrophic to a subpopulation. The low numbers of birds in several subpopulations increases the risk of extinction for this species.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the species and/or critical habitat and its interrelated and interdependent activities. All activities authorized by the Service under section 10(a)(1)(A) of the ESA must meet permit issuance criteria at 50 CFR 17.22 and 17.32. All activities considered must be justified in relation to enhancement of survival and recovery, effects to the wildlife species, peer review, and qualifications of permittees. By definition, authorized activities should benefit species recovery with minimal adverse effects by qualified permittees.

Potential adverse effects from the proposed research include harassment, injury, and death. During the capture, banding, and monitoring of the Cape Sable seaside sparrow, individuals may be temporarily and permanently harmed through physical injury, behavioral modification, physiological stress, capture myopathy, and death. However, this type of work has been on-going for more than 10 years, during which Dr. Pimm has not had any sparrow fatalities, and all bird banders and surveyors who will work under the project are very experienced. Therefore, few adverse impacts are anticipated to occur. Because habitat alteration is not part of the proposed action, no destruction or adverse modification of critical habitat is anticipated.

Nearly all survey sites can only be reached by helicopter, and circumstantial evidence suggests that helicopter impacts are minimal. Researchers often hear birds singing as soon as the helicopter leaves, and, though they cannot hear the sparrows before the helicopter leaves, they have sporadic visual observations of sparrows with the beaks open, presumably singing against the din of the helicopter. Researchers have not observed the sparrows flushing when the helicopter returns. In those few places, such as subpopulation B, where researchers survey both from road access and during the range-wide helicopter survey, they have not observed nest failures after helicopter visits.

The Cape Sable seaside sparrow monitoring program has provided critical information about the sparrow population, and allowed biologists to identify serious threats to the persistence of sparrow populations. In addition, it has provided data on parameters such as survival, productivity, site fidelity, dispersal, and recruitment. Habitat measurements have also allowed biologists to analyze sparrow habitat selection, prey utilization, and the effects of fire and hydroperiod. Continuation of this research will allow biologists and resource managers to continue to evaluate the status of the sparrow and identify potential threats.

The expected benefit of the proposed research is the collection and analysis of data on current population trends that will ultimately aid in the recovery of the Cape Sable seaside sparrow. The MSRP (Service 1999) is the official recovery plan for the sparrow. It contains the following tasks related to the proposed research:

S1.1. Continue and expand distribution surveys;
S1.3. Review and revise the current critical habitat designation based on distribution surveys;

S1.4. Survey habitat components of both occupied and unoccupied habitat to determine why Cape Sable seaside sparrows are absent;
S4.1.2. Determine seasonal movement patterns and colonizing ability;
S4.2. Better define the habitat requirements of the Cape Sable seaside sparrow;
S4.3. Determine age-specific survivorship for Cape Sable seaside sparrows;
S4.4. Determine age-specific fecundity for Cape Sable seaside sparrows;
S4.5. Research predation rates and how water levels and other factors influence predation;
S4.6. Continue development of population models for the Cape Sable seaside sparrow;
S5. Monitor Cape Sable seaside sparrow subpopulations to assure that further declines in range and numbers do not occur and that recovery actions are being implemented and are effective;
S6. Increase public awareness about Cape Sable seaside sparrows;
H1.2. Develop detailed maps of Cape Sable seaside sparrow habitat;
H1.3. Monitor changes in habitat as a result of changes in hydrologic regimes and fire events;
H1.4. Determine the necessary management practices to maintain or restore Cape Sable seaside sparrow habitat;
H2.1. Define the constituent elements of critical habitat for Cape Sable seaside sparrows;
H2.3. Establish and implement the appropriate fire management necessary to support Cape Sable seaside sparrows;
H3.1. Conduct a quantitative study to better understand changes in dominant plant species that have occurred within the Cape Sable seaside sparrow's breeding habitat in response to local hydrological conditions in Taylor Slough, northeast Shark River Slough and west of Shark River Slough;
H3.2. Implement a study to determine the natural and anthropogenic factors that regulate woody plant growth and colonization in short-hydroperiod prairies;
H3.3. Develop methods to manipulate vegetative communities;
H3.4. Determine the effects of altered hydrologic patterns on the fire frequency of marl prairies;
H3.5. Continue research on the effects of fire frequency on Cape Sable seaside sparrow habitat use;
H4. Monitor Cape Sable seaside sparrow habitat by implementing a long-term vegetation monitoring program; and
H5. Increase public awareness about short-hydroperiod marl prairies and their key role in the Everglades ecosystem.

Although the contribution the Cape Sable seaside sparrow makes to the ecosystem functions of the Everglades is probably tiny, there are no other biological measurements taken from species typical of the short-hydroperiod marshes that fringe the main sloughs and that are as extensive and frequent. Sparrow numbers and distribution are an effective way of assessing subtle, extensive, and very important changes to these short-hydroperiod communities. In fact, it is the sparrow that has most effectively and immediately indicated massive problems in hydrology (deliberate flooding of prairies in the dry seasons of 1993 through 1995) and the consequent massive changes to the vegetation in the western population. The sparrow has pointed to excessive burning in the northeastern populations in much the same way. Monitoring the changes in sparrow numbers and understanding their causes is a vital element in understanding whether restoration is returning the short-hydroperiod marshes to their original condition.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area 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 ESA.

The Cape Sable seaside sparrow occurs almost exclusively within the boundaries of two Federal properties (ENP and BCNP) and SGWEA, a cooperative public wildlife and recreational area (12,182 hectares) managed by the South Florida Water Management District and the Florida Fish and Wildlife Conservation Commission (FWC). The purpose of a wildlife and environmental area is to conserve and protect unique and irreplaceable wildlife habitats, restore areas to their original condition as much as possible, and provide controlled multiple recreational and educational uses consistent with this purpose. As such, it is reasonable to assume that the SGWEA will not allow adverse impacts to the Cape Sable seaside sparrow or its habitat to occur. Also, a permit from the Army Corps of Engineers would likely be required for any future action in this area because this species lives in wetlands.

Given that the Cape Sable seaside sparrow now occurs almost exclusively within publicly-owned conservation lands, conversion to agriculture no longer constitutes a significant threat to it and is not likely to have future effects in the action area. However, hydrological manipulation and improper fire management may continue to eliminate, alter, and degrade habitat quantity and quality for this species.

SUMMARY OF EFFECTS

Although short-term, minimal adverse effects may occur to the Cape Sable seaside sparrow; this research will lead to an increased understanding of the natural history of this endangered species. The ability to recognize individual sparrows is necessary for the study of demographic topics including survivorship and dispersal. Results from the proposed study could lead to modification of current hydrological and fire management strategies for the maximum benefit of the species. The net effect of the research is beneficial.

CONCLUSION

After reviewing the status of the Cape Sable seaside sparrow, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the issuance of a recovery permit, as proposed, is not likely to jeopardize the continued existence of this species and is not likely to destroy or adversely modify designated critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined

as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to 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 behavioral patterns such as 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 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, the carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary and must be undertaken by the Service so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in action 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 applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

AMOUNT OR EXTENT OF TAKE

None of the proposed activities are expected to routinely result in death or injury to any individuals. The incidental take is expected to be in the form of harassment. Nest monitoring may result in a small increase in predation risk to nests or nestlings. It is nearly impossible to determine whether visitation of nests increases predation risk because it is not possible to monitor nests without visitation. However, we acknowledge that visitation may result in a 1 to 2 percent increase in predation risk, and consequently, up to one nest per year may be lost as a result of monitoring.

The Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 7 03-712), or the Bald Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

EFFECT OF THE TAKE

In summary, the proposed action will result in take of the Cape Sable seaside sparrow. Up to one nest per year may be lost as a result of increased predation. In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service is not aware of any further actions that can be taken to minimize incidental take.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the ESA, the Service must comply, or ensure that the applicant complies, with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

(1) The reporting and monitoring requirements outlined in the section 10(a)(1)(A) permit will also satisfy the reporting/monitoring requirements required pursuant to section 7 of the ESA and its implementing regulations.

(2) An annual report summarizing the authorized activities must be submitted to this office by December 31 of each year for which the permit is valid. A report must be submitted whether or not activities were conducted during the reporting period. Negative data should also be reported. Each report should include, at a minimum, the following information:

- Locations of where each activity took place, identified using figures and maps, and by referencing a common coordinate system (*e.g.,* latitude, longitude, Universal Transverse Mercator System);
- Survey methodology, including a description of area sampled, noting biotic and abiotic features that might influence results;
- The band numbers, location, and condition of all banded birds and their disposition;
- Results of all surveys, territory mapping, nest monitoring, and other research, including location of all birds observed, with discussions and interpretations of the data in context of recovery of the species; and
- Copies of all published papers and reports that result from activities authorized under the permit.

(3) The intentional capture of adult female Cape Sable seaside sparrows will not be allowed in any subpopulations except B. Any adult females incidentally caught outside subpopulation B shall be released immediately.

(4) If any injury or mortality should occur to the Cape Sable seaside sparrow as a result of authorized activities, all authorized activities must stop, and the permittee shall contact the Field Supervisor of this office by the next work day. The permitte shall also contact the Regional Permit Biologist. Based upon discussions between these offices, a decision will be made as to whether or not the authorized activities will be allowed to continue. A decision will also be made regarding the disposition of any injured or killed species. Permitted activities that appear to be resulting in excessive injury or death will be immediately suspended until more protective measures or an alternative resolution can be initiated.

(5) Upon locating a dead, injured, or sick Cape Sable seaside sparrow under circumstances not addressed in the permit, or any other threatened or endangered species, initial notification must be made immediately to the nearest Service Law Enforcement Office (9549 Koger Boulevard, Suite 111, St. Petersburg, Florida 33702; 727-570-5398). Secondary notification should be made to the FWC, South Region, 3900 Drane Field Road, Lakeland, Florida 33811-1299; 1-800-282-8002. Care should be taken in handling sick or injured specimens to ensure effective treatment and care, or in the handling of dead specimens to preserve biological material in the best possible state for later analysis as to the cause of death. In conjunction with the care of sick or injured specimens or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

CONSERVATION RECOMMENDATIONS

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

- The Service should continue to implement the MSRP (Service 1999).

For the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the proposed action. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions, please contact Melody Ray-Culp at 772-562-3909, extension 263.

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