United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
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January 10, 2007

Colonel Paul L. Grosskruger
District Commander
U.S. Army Corps of Engineers
701 San Marco Boulevard, Room 372
Jacksonville, Florida 32207-8175

Service Federal Activity Code: 41420-2006-FA-0043
Service Consultation Code: 41420-2007-F-0040
Corps Application No.: SAJ-2005-4263(LP-JLT)
Formal Consultation Initiation Date: January 30, 2006
Applicant: Pompano II Associates Ltd.
County: Broward

Dear Colonel Grosskruger:

This document is the Fish and Wildlife Service's (Service) biological opinion for the multi-slip dock project listed above, resulting in eight new slips in Broward County, Florida. The biological opinion addresses the potential effects of the proposed project on the Broward County segment of the Atlantic Subpopulation of the West Indian (= Florida) manatee (*Trichechus manatus*) (manatee), in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*), the Marine Mammal Protection Act of 1972, as amended (MMPA) (16 U.S.C. 1361 *et seq.*), and the provisions of the Fish and Wildlife Coordination Act of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 *et seq.*).

This biological opinion was prepared based on information provided by the U.S. Army Corps of Engineers (Corps), the Corps' Reach Characterization Analysis, the *Florida Manatee Recovery Plan* (Service 2001), the *South Florida Multi-Species Recovery Plan* (MSRP) (Service 1999), data supplied by the Florida Fish and Wildlife Conservation Commission (FWC), and other sources of information.

Broward County has not yet completed their Manatee Protection Plan (MPP) and is one of 13 coastal (= key) counties directed by the Governor and Cabinet to develop a MPP. Furthermore, the State recommended new or expanded boating facilities in Broward County be limited to one powerboat slip per 100 linear feet of shoreline (the 1:100 ratio) until Broward County implements its MPP. Although Broward County is currently developing a MPP, the plan has not been approved by the State. The slip density of the proposed multi-slip dock listed above exceeds the 1:100 ratio. The Service believes the facility as proposed is not consistent with the State's recommended 1:100 ratio for new watercraft access projects in a key county without a State-approved MPP and, therefore, may have an adverse affect on the manatee.

A complete administrative record of this consultation is on file at the Service's South Florida Ecological Services Office in Vero Beach, Florida.

Consultation History

On the date listed above, the Corps issued the Public Notice for the proposed multi-slip dock project. The Corps provided a determination of "may affect" for the endangered manatee.

The Service examined the July 2005 version of the Manatee Key along with its attachments and agrees with its structure and content. Service concurrence for the Manatee Key was provided in letters to the Corps dated July 12, 2005, and September 30, 2005. Based on implementation of Interim II and the effects determination procedure described in the Manatee Key, the Service has sufficient information to provide formal consultation for the proposed multi-slip docking facility.

FISH AND WILDLIFE RESOURCES

The proposed project has the potential to impact wetlands (including mangroves) and submerged aquatic resources (including seagrasses). The Service believes fish and wildlife resources will be affected and recommends the Corps require the applicants avoid, minimize, and mitigate for anticipated resource impacts.

For projects where there is dredging or filling, methodology and turbidity containment should be employed such that any seagrasses or live hardbottom near the project footprint and de-watering area are not impacted by sedimentation during operations. If there are wetlands along the shoreline and/or seagrasses in the project area, the Service recommends the applicant adheres to the *Dock Construction Guidelines for Florida* developed by the Corps and National Marine Fisheries Service (NOAA Fisheries) (Corps and NOAA Fisheries 2001). Specifically, the dock should be configured to minimize impacts to mangroves, seagrasses, and other submerged aquatic resources. The Service also recommends in-kind mitigation be provided for any unavoidable impacts to seagrasses, live bottom, and mangroves.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is located with Reach 4 of the Corps' Reach Characterization Analysis. Vessels using the new multi-slip docks would likely travel through the Atlantic Intracoastal Waterway (AIW) in Broward County, Florida.

Pompano II Associates Ltd proposes to construct a 180-foot long by 14-foot wide marginal dock. The proposed dock will accommodate eight boats. The proposed facility would provide eight boat slips along approximately 270 feet of shoreline. The Corps has assigned application SAJ-2005-4263 (LP-JLT) to this project. The project is located at 815 North Riverside Drive in Pomano Beach, Section 31, Township 48 South, Range 43 East, Broward County, Florida.

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 includes the coastal waters of Broward County within Reach 4, the most likely travel route of watercraft leaving from this facility.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/Critical Habitat Description

The West Indian manatee is federally listed as an endangered species under the Act (32 FR 4001) and the species is further protected as a depleted subpopulation under the MMPA.

Manatees are large fusiform-shaped mammals with skin that is uniformly dark grey, wrinkled, sparsely haired, and rubber-like. Manatees possess paddle-like forelimbs, no hind limbs, and a spatulate, horizontally flattened tail. Females have two axillary mammae, one at the posterior base of each forelimb. Their bones are massive and heavy with no marrow cavities in the ribs or long bones of the forearms (Odell 1982). Adults average about 10 feet in length and 2,200 pounds in weight, but may reach lengths of up to 15 feet (Gunter 1941) and weigh as much as 3,570 pounds (Rathbun et al. 1990). Newborns average 4 to 4.5 feet in length and about 66 pounds (Odell 1981). The nostrils located on the upper snout, open and close by means of muscular valves as the animals surface and dive (Husar 1977; Hartman 1979). A muscular flexible upper lip is used with the forelimbs to manipulate food into the mouth (Odell 1982). Bristles are located on the upper and lower lip pads (Marshall et al. 2000). Molars designed to crush vegetation form continuously at the back of the jaw and move forward as older ones wear down (Domning and Hayek 1986). The eyes are very small, close with sphincter action, and are equipped with inner membranes that can be drawn across the eyeball for protection. The ears are external, minute, with no pinnae. The anatomy of the internal ear structure suggests they can hear sounds within a relatively narrow low-frequency range, their hearing is not acute, and they have difficulty in localizing sound (Ketten et al. 1992). However, Gerstein (1995) suggested manatees may have greater low-frequency sensitivity than other marine mammal species that have been tested.

Critical habitat for the Florida subspecies was designated in 1976 [50 CFR § 17.95(a)]. Critical habitat is described as the specific area within the geographic area occupied by the species, at the time it is listed under the provisions of section 4 of the Act, which are found on those physical or biological features (*i.e.*, constituent elements): (1) essential to the conservation of the species; and (2) which may require special management considerations or protection [Act § 3(5)(A)]. No specific primary or secondary constituent elements were included in the critical habitat designation. However, experts agree that essential habitat features for the manatee include seagrasses for foraging, shallow areas for resting and calving, channels for travel and migration, warmwater refuges during cold weather, and fresh water for drinking (Service 2001a).

Designated manatee critical habitat on the Atlantic Coast of Florida includes the waters of the AIW connecting rivers and bays from the Florida/Georgia border south to Key Largo in Monroe County, excluding those waters in Broward County, Florida. The Atlantic Subpopulation of manatees also uses critical habitat identified between Key Largo and mainland Miami-Dade County in Florida Bay.

Designated critical habitat on the west coast of Florida includes Crystal River in Citrus County, portions of the Little Manatee River in Hillsborough County; portions of the Manatee River in Manatee County; portions of the Myakka River in Sarasota and Charlotte Counties; portions of the Peace River in Desoto and Charlotte Counties; portions of the Caloosahatchee River and all

coastal waters in Lee County; and all coastal waters in Collier and Monroe Counties between Gordon's Pass (Collier County) and Whitewater Bay (Monroe County).

Life History

Manatees are herbivores that feed opportunistically on a wide variety of aquatic vegetation. Feeding rates and food preferences depend, in part, on the season and available plant species. Manatees frequently feed in waters 3 to 9 feet in depth where aquatic vegetation is abundant. Seagrasses appear to be a staple of the manatee diet in coastal areas (Ledder 1986; Provancha and Hall 1991; Kadel and Patton 1992; Koelsch 1997; Lefebvre et al. 2000). Manatees can remain submerged for several minutes with the longest submergence record lasting 24 minutes (Reynolds 1981).

Breeding takes place when one or more males (ranging from 5 to 22 individuals) are attracted to an estrous female to form an ephemeral mating herd (Rathbun et al. 1995). Mating herds can last up to 4 weeks, with different males joining and leaving the herd daily (Hartman 1979; Bengston 1981; Rathbun et al. 1995; Rathbun 1999). Permanent bonds between males and females do not form. During peak activity, the males in mating herds compete intensely for access to the female (Hartman 1979). Successive copulations involving different males have been reported. Some observations suggest larger, presumably older, males dominate access to females early in the formation of mating herds and are responsible for most pregnancies (Rathbun et al. 1995). Although breeding has been reported in all seasons, Hernandez et al. (1995) reported histological studies of reproductive organs from carcasses of males showed evidence of sperm production in 94 percent of adult males found between March and November. Females appear to reach sexual maturity by about age 5 but have given birth as early as age 4 (Marmontel 1995; Odell et al. 1995; O'Shea and Hartley 1995; Rathbun et al. 1995). Males may reach sexual maturity at 3 to 4 years of age (Hernandez et al. 1995). Manatees may live in excess of 50 years (Marmontel 1995), and evidence for reproductive senescence is unclear (Marmontel 1995; Rathbun et al. 1995).

Calf dependency usually lasts 1 to 2 years after birth (Hartman 1979; O'Shea and Hartley 1995; Rathbun et al. 1995; Reid et al. 1995). Calving intervals vary greatly among females, with an average birth cycle of 2 to 2.5 years. Intervals may be considerably longer depending on age and perhaps other factors (Marmontel 1995; Odell et al. 1995; Rathbun et al. 1995; Reid et al. 1995). Females that abort or lose a calf due to perinatal death (small manatees, less than 60 inches in length) (O'Shea and Hartley 1995), may become pregnant again within a few months (Odell et al. 1995) or even weeks (Hartman 1979).

Manatees often use secluded canals, creeks, embayments, and lagoons, particularly near the mouths of coastal rivers and sloughs, for feeding, resting, cavorting, mating, and calving (Marine Mammal Commission [MMC] 1986; MMC 1988). Manatees frequent coastal, estuarine, and riverine habitats and are capable of extensive north-south migrations. Based on telemetry, aerial surveys, photo-identification sighting records, and other studies over the past 20 years, manatee distribution in the southeastern United States is better understood (Beeler and O'Shea 1988; O'Shea 1988; MMC 1984; MMC 1986; Lefebvre et al. 1989). In general, the data reveal manatees exhibit opportunism, as well as predictable patterns in their distribution and movement.

They are able to undertake extensive north-south migrations with seasonal distribution determined by water temperature below 68 degrees Fahrenheit (20 degrees Celsius). Manatees depend on areas with access to natural springs, manmade warmwater refugia, vascular plants, and freshwater sources. Manatees normally migrate along shorelines and use deeper corridors to access shallow water feeding and resting areas. When ambient water temperatures drop below 68 degrees Fahrenheit in autumn and winter, manatees aggregate within the confines of natural or artificial warmwater refuges (Lefebvre et al. 1989) or move to the southern tip of Florida (Snow 1991). Most artificial refuges are created by warm water outfalls from power plants or paper mills. As water temperatures rise, manatees disperse from these winter aggregation areas. While some remain near their winter refuges, others undertake extensive migrations along both Florida coasts and far up rivers and canals. Many manatees return to the same warmwater refuges each year. However, some manatees use different refuges in different years, and others use two or more refuges in the same winter (Reid and Rathbun 1984; Rathbun et al. 1990; Reid et al. 1991). There are many lesser known, minor aggregation areas used as temporary thermal refuges. Most of these are canals or boat basins where warmwater temperatures persist as temperatures in adjacent bays and rivers decline.

Population Dynamics

The Florida manatee population is divided into four subpopulations: Northwest, Southwest, Atlantic, and Upper St. Johns River. Long-term studies suggest four regional populations of manatees in Florida: (a) the Northwest Subpopulation, comprising approximately 12 percent of the total Florida manatee population, and consisting of the counties along the Gulf of Mexico from Escambia County east and south to Hernando County, Lafayette, and Gilchrist Counties, and Marion County adjacent to the Withlacoochee River; (b) the Upper St. Johns River Subpopulation, comprising approximately 4 percent of the total Florida manatee population, and consisting of Putnam County from Palatka south, Volusia, Flagler, and Marion Counties adjacent to the St. Johns River or its tributaries, and Lake and Seminole Counties; (c) the Atlantic Subpopulation, comprising approximately 42 percent of the total Florida manatee population, and consisting of counties along the Atlantic coast from Nassau County south to Miami-Dade County, the portion of Monroe County adjacent to the Florida Bay and the Florida Keys, Okeechobee County, and counties along the lower portion of the St. Johns River north of Palatka, which includes Putnam, St Johns, Clay, and Duval Counties; and (d) the Southwest Subpopulation, comprising approximately 42 percent of the total Florida manatee population, and consisting of counties along the Gulf of Mexico from Pasco County south to Whitewater Bay in Monroe County and DeSoto, Glades and Hendry Counties. These divisions are based primarily on documented manatee use of wintering sites and from radio-tracking studies of individuals' movements (Bengston 1981; MMC 1988; Rathbun et al. 1990; Beck and Reid 1995; Rathbun et al. 1995; Reid et al. 1995; Deutsch et al. 1998).

The previous recovery plan (Service 1996) identified the need for a population status working group to assess manatee population size and trends. The first meeting of the Manatee Population Status Working Group (MPSWG), a subcommittee of the Recovery Team, was held in March 1998. The goals of the MPSWG are to: (1) assess the status of the Florida manatee population; (2) advise the Service on population recovery criteria for determining when recovery has been achieved; (3) provide interpretation of available information on manatee population

biology to managers; (4) make recommendations concerning needed research directions and methods; and (5) obtain rigorous external review of manatee population data, conclusions, and research methods by independent researchers with expertise in population biology.

In 2001, the MPSWG provided a statement summarizing what they believed to be the status of the Florida manatee at that time (Wildlife Trust 2001). The MPSWG stated that, for the Northwest and Upper St. Johns River subpopulations, available evidence indicated that there had been a steady increase in animals over the last 25 years. The statement was less optimistic for the Atlantic Subpopulation due to an adult survival rate that was lower than the rate necessary to sustain population growth. The MPSWG believed that this subpopulation had likely been growing slowly in the 1980s, but since then may have leveled off or even possibly declined. They considered the status of the Atlantic Subpopulation to be "too close to call." Such finding was consistent with high levels of human-related and, in some years, cold-related deaths in this subpopulation.

Regarding the Southwest Subpopulation, the MPSWG acknowledged that further data collection and analysis would be necessary to provide an assessment of the manatee's status in this subpopulation. Preliminary estimates of adult survival available to the MPSWG at that time indicated that the Southwest Subpopulation was similar to the Atlantic Subpopulation and "had substantially lower [adult survival estimates] than for the Northwest and Upper St. Johns River [subpopulations]." The Southwest Subpopulation was noted for having high levels of watercraft-related manatee deaths and injuries and natural mortality events (*i.e.*, red tide and cold stress). According to more recent analyses by Runge et al., growth rates in the Southwest Subpopulation approximate a rate of -1.1 percent per year (95 percent confidence interval of -5.4 to 2.4). Estimated growth rates are thought to be highest in the Upper St. Johns River Subpopulation (+6.2 percent per year [95 percent confidence interval of 3.7 to 8.1]), followed by the Northwest Subpopulation (+3.7 percent per year [95 percent confidence interval of 1.6 to 5.6]), and the Atlantic Subpopulation (+1.0 percent per year [95 percent confidence interval of -1.2 to 2.9]).

A Population Viability Analysis (PVA), in which random events, such as red tide, extremely cold weather, and loss of warmwater sites are incorporated into a model, was carried out for manatees based on age-specific mortality rates estimated from the age distribution of manatees found dead throughout Florida from 1979 through 1992 (Marmontel et al. 1997). This method of estimating survival relied on certain assumptions that were not fully testable; despite this, the results again pointed out the importance of adult survival to population persistence. Given a population size that reflected a 1992 minimum population estimate, the PVA showed if adult mortality as estimated for the study period were reduced by a modest amount (for example, from 11 percent down to 9 percent), the Florida manatee population would likely remain viable for many years. However, the PVA also showed slight increases in adult mortality would result in extinction of manatees within the next 1,000 years.

Status and Distribution

Based on telemetry studies, aerial surveys, photo-identification studies, and other research over the past 20 years, manatee distribution in the southeastern United States is better understood (Beeler and O'Shea 1988; O'Shea 1988; MMC 1984; MMC 1986; Lefebvre et al. 1989). Florida manatees can be found in Florida waters throughout the year, and nearly all manatees use the

waters of peninsular Florida during the winter months. In winter months, most manatees rely on warm water from industrial discharges and natural springs for warmth. In warmer months, they expand their range and occasionally are seen as far north as Rhode Island on the Atlantic Coast and as far west as Texas on the Gulf Coast.

Despite significant efforts dating back to the late 1970s and early 1980s, scientists have been unable to develop a statistically and scientifically repeatable means of estimating or monitoring trends in the size of the overall manatee population in the southeastern United States (O'Shea 1988; O'Shea et al. 1992; Lefebvre et al. 1995). Even though many manatees aggregate at warmwater refuges in winter and most, if not all, such refuges are known, direct counting methods (*i.e.*, by aerial and ground surveys) are unable to account for the number of animals that may be away from these refuges at any given time, the number of animals not seen because of turbid water, and other factors. The use of mark-resighting techniques to estimate manatee population size based on known animals in the manatee photo-identification database is also not a statistically and scientifically repeatable method.

It is possible, however, to monitor the number of manatees using the Blue Spring (Volusia County) and Crystal River (Citrus County) warmwater refuges. At Blue Spring (in the Upper St. Johns River Subpopulation), with its unique combination of clear water and confined spring area, it has been possible to count the number of resident animals by identifying individual manatees from scar patterns. The data indicate this group of animals has increased steadily since the early 1970s when it was first studied. During the 1970s, the number of manatees using the spring increased from 11 to 25 (Bengston 1981). In the mid 1980s, about 50 manatees used the spring (Service 2001), and by the winter of 1999-2000, the number had increased to 147 (Hartley 2001).

In the Northwest Subpopulation, the clear, shallow waters of Kings Bay (Citrus County) have made it possible to monitor the number of manatees using this warmwater refuge at the head of Crystal River. Large aggregations of manatees apparently did not exist there until recent times (Service 2001). The first careful counts were made in the late 1960s. Since then, manatee numbers have increased significantly. From 1967 to 1968, Hartman (1979) counted 38 animals in Kings Bay. By 1981-1982, the maximum winter count had increased to 114 manatees (Powell and Rathbun 1984) and, in November 2000, the maximum count was 301 (J. Kleen, Service, personal communication).

In the Atlantic and Southwest subpopulations, no similar shallow, clear water areas are present that make it possible to monitor the number of manatees using warmwater refugia, although such refugia are present. In these locations, visual counts of those manatees that can be seen by aerial surveys are the basis of the population estimates and estimates of adult survival and population growth.

The only data on population size include uncalibrated indices based on maximum counts of animals at winter refuges made within 1 or 2 days of each other. Based on such information in the late 1980s, the total number of manatees throughout Florida was originally thought to include at least 1,200 animals (Service 2001). Because aerial and ground counts at winter refuges are highly variable depending on the weather, water clarity, manatee behavior, and other factors (Packard et al. 1985; Lefebvre et al. 1995), interpretation of these data to assess short-term trends is difficult (Packard and Mulholland 1983; Garrott et al. 1994).

Beginning in 1991, the State of Florida initiated a statewide, synoptic, aerial survey program to count manatees in potential winter aggregation areas during periods of severe cold weather (Ackerman 1995). The highest statewide minimum count from these surveys was 3,276 manatees in January 2001 with 1,520 individuals on the east coast and 1,756 individuals on the west coast. A more recent survey conducted on January 21-22, 2003, provides a minimum population estimate that includes 3,113 individuals with 1,814 and 1,299 manatees on the east and west coasts, respectively (http://www.floridamarine.org).

While aircraft synoptic surveys provide a "best estimate" of the minimum Florida manatee population size, there are no confidence intervals (derived through reliable, statistically based, population-estimation techniques) for these estimates. With the exception of a few places where manatees may aggregate in clear, shallow water, not all manatees can be seen from aircraft because of water turbidity, depth, surface conditions, variable times spent submerged, and other considerations (Lefebvre et al. 1995). While these results are of value in providing information on where manatees occur, likely relative abundance in various areas, and seasonal shifts in manatee abundance, they do not provide good population estimates nor can they reliably measure trends in the manatee population. Consequently, the *Florida Manatee Recovery Plan* (Service 2001) concludes that "despite considerable effort in the early 1980s, scientists have been unable to develop a useful means of estimating or monitoring trends in size of the overall manatee populations in the southeastern United States."

At the end of winter, manatees leave warmwater aggregation sites and head for warm weather use areas. There appears to be no significant spring aggregation areas on the west coast, although Charlotte Harbor was visited in the spring by almost half of 35 manatees radio-tagged at the Fort Myers Power Plant in Lee County in the early 1980s (Lefebvre and Frohlich 1986). During the summer, manatees can be found throughout Florida where water depths and access channels are greater than 1 to 2 meters (3.3 to 6.6 feet) (O'Shea 1988). Summer use areas are generally typified by extensive foraging resources. Seagrasses and other food sources occur throughout coastal Florida.

Reasons for Legal Protection

In 1967, both the Florida and Antillean subspecies of manatees (*T. manatus latirostris* and *T. manatus manatus*) were listed as endangered (32 FR 4061) and received Federal protection with the passage of the Act in 1973. Since the manatee was designated as an endangered species prior to enactment of the Act, there was no formal listing package identifying threats to the species, as required by section 4(a)(1) of the Act. However, since that time, threats to the manatee (discussed below) have been identified.

Manatees are also protected under the MMPA. The MMPA establishes, as national policy, maintenance of the health and stability of marine ecosystems and, whenever consistent with this primary objective, obtains and maintains optimum sustainable populations of marine mammals. It also establishes a moratorium on the taking of marine mammals, which includes harassing, hunting, capturing, killing, or attempting to harass, hunt, capture, or kill any marine mammal. Section 101(a)(5)(A) of the MMPA allows the Service, upon request, to authorize by specific regulation the incidental, unintentional take of marine mammals by persons engaged in identified activities within specific geographic areas, if the Service determines that such taking would have

a negligible impact on the species or subpopulation. Since the manatee, which is comprised of the Florida and Antillean manatee subpopulations, is currently listed as "endangered" under the Act, they are considered "depleted" under the MMPA.

Section 115(b) of the MMPA requires conservation plans be developed for marine mammals considered "depleted." In the case of the Florida manatee, the Service developed the initial recovery plan for the manatee in 1980. This initial plan focused primarily on manatees in Florida, but included Antillean manatees in the Commonwealth of Puerto Rico and the United States Virgin Islands. In 1986, the Service adopted a separate recovery plan for manatees in Puerto Rico. To reflect new information and planning needs for manatees in Florida, the Service revised the original plan in 1989 and focused exclusively on the Florida manatee. This first revision covered a 5-year planning period ending in 1994. The Service revised and updated the plan again in 1996, which again covered a 5-year planning period ending in 2000. In 1999, the Service initiated the process to revise the plan for a third time. An 18-member recovery team, consisting of representatives of the public, agencies, and groups that have an interest in manatee recovery and/or could be affected by proposed recovery actions, was established to draft the third revision. The latest manatee recovery plan, which also covers a 5-year planning period, was finalized in October 2001.

Threats

The main threat faced by manatees in Florida is death or serious injury from watercraft strikes. Another threat includes uncertainty in the availability of warmwater refuges as deregulation of the power industry in Florida occurs. Consequences from an increasing human population and intensive coastal development are also long-term threats to the manatee. Their survival will depend on maintaining the integrity of ecosystems and habitat sufficient to support a viable manatee population. A viable manatee population includes values that are indicative of a stable or increasing population for the periods of analysis and provides us with additional positive recovery indicators, such as progressively higher minimum counts, increasing adult manatee survival, reproduction (cows with calves), and population growth rates.

The largest identified human cause of manatee deaths is collisions with watercraft and/or propellers of watercraft. Between 1976 and 2002, watercraft-related manatee deaths accounted for 25 percent of the total mortality. Data on manatee deaths in the southeastern United States have been collected since 1974 (O'Shea et al. 1985; Ackerman et al. 1995; FWC unpublished data). Data since 1976 were used in the following summary, as carcass collection efforts were more consistent following that year. These data indicate an increase in manatee deaths over the last 25 years (Ackerman et al. 1995; FWC unpublished data). This is an increase of an average of 7.2 percent per year (Ackerman et al. 1995; FWC unpublished data). Watercraft-related manatee deaths were lower in 1992 and 1993, but increased thereafter. From 1996 to 2002, watercraft-related manatee deaths were the highest on record, which also corresponds to an increase in the manatee population and an increase in registered watercraft.

In a parallel fashion, residential growth and visitation to Florida have increased dramatically. It is expected that Florida will have 83 million visitors annually by the year 2020, up from 48.7 million visitors in 1998. In concert with this increase of human population growth and visitation is the increase in the number of watercraft that travel Florida waterways. In 2002,

961,719 watercraft were registered in the State of Florida (Division of Motor Vehicles 2003). This represents an increase of 59 percent since 1993. The Florida Department of Community Affairs estimates that, in addition to watercraft belonging to Florida residents, between 300,000 and 400,000 watercraft registered in other States use Florida waters each year.

As noted above, there has been an increasing trend in watercraft-related manatee mortality in all four subpopulations over the past decade. This is reflected in increases in the average annual number of watercraft-related manatee mortalities as the period over which the average is taken becomes more recent.

For instance, in the Atlantic Subpopulation, the mean observed mortality due to watercraft was 25.8 deaths per year for the period 1990-1999, 29.8 per year for the period 1993-2002, and 37 per year for the 5-year period from 1998-2002. This trend is statistically significant in all four subpopulations. The slope of the increase (as fit to the period 1992-2002) does not differ between the Upper St. Johns River and Northwest subpopulations (5.96 percent) nor does it differ between the Atlantic and Southwest subpopulations (9.53 percent). To interpret these mortality rates of increase, however, it is important to compare them to the historic growth rates (1990-1999) in each subpopulation, to account for the increase in manatee mortalities that would be expected due to increases in manatee population size. In the Atlantic and Southwest subpopulations, the rate of increase in watercraft-related manatee mortality over that period exceeded the estimated growth rate of those populations (by 8.5 percent in the Atlantic and 10.6 percent in the Southwest). In the Northwest Subpopulation, the rate of increase in mortality (6.0 percent) is somewhat larger than the estimated growth rate (3.7 percent).

The next largest human-related cause of manatee deaths is entrapment or crushing in water control structures and navigational locks. This accounts for approximately 4 percent of the total mortalities recorded between 1976 and 2002 (Ackerman et al. 1995; FWC unpublished data). These deaths were first recognized in the 1970s (Odell and Reynolds 1979), and steps have been taken to eliminate this source of mortality. Beginning first in the early 1980s, gate-opening procedures were modified. Annual numbers of deaths initially decreased after this modification. However, the number of deaths subsequently increased and, in 1994, a record 16 deaths were documented. Manatee mortality decreased during 2000-2002 with 14 manatee mortalities for the 3-year period. An ad hoc interagency task force was established in the early 1990s and now includes representatives from the District, Corps, Service, Miami-Dade Department of Environmental Research Management, FWC, and the Florida Department of Environmental Protection (DEP). This group meets annually to discuss recent manatee deaths and develop measures to protect manatees at water control structures and navigational locks as well as to prevent entrapment in culverts and pipes. The overall goal is to eliminate structure-related manatee deaths.

Other known causes of human-related manatee deaths include poaching and vandalism, entanglement in shrimp nets, monofilament line (and other fishing gear), and ingestion of debris. These account for about 3 percent of the total mortality from 1976 to 2002. Together, deaths attributable to these causes have remained constant and have accounted for a low percentage of total known deaths, *i.e.*, about 4 percent between 1976 and 1980, 3 percent between 1981 and 1985, 2 percent between 1986 and 1991, and 2 percent between 1992 and 2002 (Ackerman et al.

1995; FWC unpublished data). Entrapment in shrimp nets is the largest component of this category. Eleven deaths between 1976 and 1998 (seven in Florida, four in other States) were thought to be related to shrimping activities (Nill 1998). These deaths have become less common since regulations on inshore shrimping, the 1995 Florida Net Ban regulations, and education efforts about protecting manatees were implemented.

These data on causes of manatee mortality, particularly the increasing number of watercraft-related manatee deaths, should be viewed in the context of Florida's growing human population, which increased by 130 percent since 1970, from 6.8 to 15.7 million people (Florida Office of Economic and Demographic Research 2001). The rise in manatee deaths during this period is, at least in part, the result of the increasing numbers of people and watercraft sharing the same waterways.

Human activity has other effects on manatees besides direct mortality. Dredge and fill activities, polluted runoff, and propeller scarring have resulted in the loss of vegetated areas. Quiet backwaters have been made more accessible to human activities, and increasing levels of vessel traffic have made manatees increasingly vulnerable to watercraft collisions in travel corridors. For example, industrial warmwater discharges and deep-dredged areas are now used as wintering sites, stormwater pipes and freshwater discharges in marinas provide manatees with drinking water, and the imported exotic plant, hydrilla (*Hydrilla verticilata*, which has supplanted native aquatic species), has become an important food source at wintering sites.

While some changes substitute for natural biological needs, some activities have an adverse effect on the species. The loss of industrial warmwater discharges can result in the deaths of individuals using these sites. Other activities may also affect manatees, albeit on a much more subtle level. Harassment by watercraft and swimmers may drive animals away from preferred natal areas and winter refugia, and the loss of vegetation in certain areas (*e.g.*, winter foraging areas) may require manatees to travel greater distances to feed. The impact of these kinds of activities on the survival, recovery, and mortality of the species is not fully understood.

Natural causes of death include disease, parasitism, reproductive complications, and other nonhuman-related injuries as well as occasional exposure to cold and red tide (O'Shea et al. 1985; Ackerman et al. 1995). These natural causes of death accounted for 13 percent of all deaths between 1976 and 2002 (FWC unpublished data). Perinatal deaths accounted for 20 percent of all deaths in the same period. A prominent natural cause of death in some years is exposure to cold. Following a severe winter cold spell at the end of 1989, at least 46 manatee carcasses were recovered in 1990; cause of death for each was attributed to cold stress. Exposure to cold is believed to have caused many deaths in the winters of 1977, 1981, 1984, 1990, 1996, and 2001; and have been documented as early as the 19th century (Ackerman et al. 1995; O'Shea et al. 1985; FWC unpublished data).

In 1982, a large number of manatees also died coincidentally with a red tide dinoflagellate (*Gymnodinium breve*) outbreak between February and March in Lee County (O'Shea et al. 1991). At least 37 manatees died, perhaps in part, due to incidental ingestion of filter-feeding tunicates that had accumulated the neurotoxin-producing dinoflagellates responsible for causing the red tide. In 1996, from March to May, at least 149 manatees died in a red tide event over a

larger region of southwest Florida (Bossart et al. 1998; Landsberg and Steidinger 1998). Although the exact mechanism of manatee exposure to the red tide brevetoxin is unknown in the 1982 and 1996 outbreaks, ingestion, inhalation, or both are suspected (Bossart et al. 1998). Since January 2003, the current red tide outbreak has been responsible for the deaths of 75 manatees (http://www.floridamarine.org). The critical circumstances contributing to red tide-related deaths are concentration and distribution of the red tide, timing and scale of manatee aggregations, salinity, and timing and persistence of the outbreak (Landsberg and Steidinger 1998).

Perinatal deaths include aborted fetuses, stillborn, or those that die of natural causes within a few days of birth. Some may die from disease, reproductive complications, and/or congenital abnormalities. The cause of many perinatal deaths cannot be determined, because these carcasses are generally in an advanced state of decomposition at the time of recovery. Additionally, watercraft-related manatee injuries or disturbance or other human-related factors affecting pregnant and nursing mothers may also be responsible for some of the perinatal deaths. It has been suggested that some may die from harassment by adult males (O'Shea and Hartley 1995). Between 1976 and 2002, perinatal deaths increased at an average of 9.2 percent per year (Ackerman et al. 1995; FWC unpublished data).

Status and Distribution of the Atlantic Subpopulation

Manatee distribution and dispersal patterns, and numbers of individuals within an area, can vary considerably from year-to-year and season-to-season. This variability in dispersal patterns is dependent on a variety of biotic and abiotic factors, such as warmwater discharges, freshwater supplies, high quality feeding areas, and mating season.

The project discussed in this biological opinion is located in waters accessible to the Atlantic Subpopulation of manatees which comprises approximately 42 percent of the total Florida manatee population. The Atlantic Subpopulation of manatees includes all coastal areas from Nassau County south to Miami-Dade County, the portion of Monroe County adjacent to the Florida Bay and the Florida Keys, Okeechobee County, and counties along the lower portion of the St. Johns River north of Palatka, which includes Putnam, St Johns, Clay, and Duval Counties.

In recent years, the most important spring habitat along the east coast of Florida has been the northern Banana River and Indian River Lagoon and their associated waters in Brevard County; more than 300 to 500 manatees have been counted in this area shortly before dispersing in late spring (Provancha and Provancha 1988; FWC unpublished data).

The MPSWG indicates the Atlantic Subpopulation appears to have been growing slowly during the 1980s and may have leveled off in the 1990s. Runge (Runge 2004) has suggested that the Atlantic Subpopulation is stable (95 percent confidence interval). Population statistics for adult manatee survival, reproduction (cows with calves), and population growth rate have been published for the manatee population using data from the late 1970s, 1980s, and early 1990s. All of these values are indicative of a stable or slightly increasing population for the periods of analysis.

The Service agrees with the current status statement of the Atlantic Subpopulation presented by the MPSWG. However, we also believe the other qualitative information warrants consideration in developing a complete view of the overall status of the subpopulation. We believe there are more manatees now than there were in the 1970s and 1980s. However, this does not mean the threats have been reduced.

Threats to the Atlantic Subpopulation

Data on manatee deaths in the Atlantic Subpopulation have been collected since 1974 (O'Shea et al. 1985; Ackerman et al. 1995; FWC unpublished data). Data since 1976 were used in the following summary as carcass collection efforts were more consistent following that year. These data indicate an increase in manatee deaths over the last 26 years. Most of the increase can be attributed to increases in watercraft-related manatee mortality and perinatal deaths (MMC 1993), which also corresponds to an increase in the human population and registered watercraft.

Between 1976 and 2005, 2,218 manatee deaths were recorded within the Atlantic subpopulation. The cause of death categories includes watercraft, flood gate/canal lock, other human causes, perinatal, cold stress, natural, and undetermined. Death category quantities for the period above are as follows:

Watercraft	Gate/Lock	Other Human	Perinatal	Cold Stress	Natural	Undetermined
572	126	77	490	114	208	631

Other threats include uncertainty in the availability of warmwater refuges as deregulation of the power industry in Florida occurs. We believe an increasing human population and intensive coastal development are long-term threats to the manatee. As Florida's human population increases, particularly in coastal counties, threats to submerged aquatic vegetation communities may increase. These submerged aquatic vegetation communities are an important component in the survival and recovery of the manatee. The combined effects of propeller scarring of seagrass beds, water pollution from stormwater discharges, new docks, dredging, and filling may further degrade the seagrass beds. These activities may continue to degrade habitat thus reducing foraging opportunities for manatees.

Manatee Protection Plans

Concerned with an increased number of manatee mortalities and boating accidents, the Governor and Cabinet directed the Florida Department of Natural Resources (DNR) in June 1989 to make recommendations for specific actions to protect the manatee and its habitat and to make the State's waterways safer for the boating public. DNR's final report, *Recommendations to Improve Boating Safety and Manatee Protection on Florida Waterways*, found that over 80 percent of all watercraft-related manatee mortality occurred in 10 counties: Brevard, Broward, Citrus, Collier, Miami-Dade, Duval, Lee, Martin, Palm Beach, and Volusia. Though watercraft-related mortality was not high for St. Lucie, Indian River, and Sarasota, these three counties were considered important areas as travel corridors as well as foraging and resting areas for manatees.

The Governor and Cabinet directed each of these 13 coastal (= key) counties to develop an MPP. The purpose of an MPP is to present a summary of existing information about manatee use and watercraft use within the county and to develop strategies to balance manatee protection, resource protection, waterway uses, boating facility siting, speed zones and signage, boating safety, and to educate the boating public. The final report recommended new or expanded boating facilities in these key counties should be limited to one powerboat slip per 100 linear feet of shoreline (the 1:100 ratio) until the county implements its State-approved MPP, which includes a boating facility siting component. Watercraft access projects that are consistent with a county's MPP provides a level of boater access and activity that is within the capacity of the manatee protection measures provided. Projects that are not consistent with an MPP may exceed the capacity of these protective measures and, therefore, may result in incidental take of manatees. Countywide MPPs are identified in the *Florida Manatee Recovery Plan* (Service 2001) as a method for protecting manatees and manatee habitat.

Citrus County was the first county to have a State and federally-approved MPP in 1991. The county's MPP identified actions that address manatee mortality and included a boating facility siting plan. The MPP also discussed conservation measures to protect manatee habitat. Subsequent to its approval, the State established regulatory speed zones for watercraft. The State of Florida subsequently approved MPPs for Collier County in May 1995 followed by Miami-Dade County in December 1995; Duval County in June 1999; Indian River County in August 2000 which was amended in February 2002; St. Lucie County in March 2002; Martin County in June 2002; Brevard County in February 2003; Sarasota County in February 2004, Lee County in June 2004; and Volusia County in October 2005.

The Service believes county MPPs are one of the best vehicles to address such issues as boating facilities (marinas, docks, boat ramps, dry storage areas); boating activity patterns; manatee information; a boat facility siting plan; manatee protection measures; and an education and awareness program for the boating public. They are valuable planning tools and provide an excellent venue for local manatee protection efforts. In addition, it is our view an effective MPP must contain components that address manatee protection areas (*e.g.*, manatee refuges), speed zone enforcement, funding for manatee protection efforts, and a reporting/monitoring element. Implementation of a State-approved MPP will have met State standards and addressed our concerns in maximizing benefits to the manatee while providing regulatory certainty to the public.

Analysis of the Species/Critical Habitat Likely to be Affected

Due to the increase in the number of slips resulting from the proposed action, the Corps has determined that the proposed project "may affect" the manatee. We concurred with the Corps' determination and have performed a more complete analysis of the effects of the proposed action in order to determine whether or not the proposed activity is reasonably certain to result in the take of manatees through impacts to the Atlantic Subpopulation.

The construction of the proposed project may affect the manatee by increasing watercraft and human presence in the action area, and by increasing the potential to adversely affect submerged aquatic resources (*i.e.*, seagrasses). This may disrupt, disturb, or delay manatee migration to warmwater refugia, freshwater drinking sources, and cause additional stress to manatees and

calves present in the action area. An analysis of the project related effects and impacts to manatees and seagrasses will be considered further in the remaining sections of this document.

ENVIRONMENTAL BASELINE

This section analyzes all past and ongoing human and natural factors leading to the current status of the manatee in the action area. In 2000, Save the Manatee Club, other environmental groups, and several individuals filed suit in the District of Columbia against the Corps and the Service. Plaintiffs alleged violations of the Act, the National Environmental Policy Act, the MMPA, and the Administrative Procedure Act, with regard to the Florida manatee, and alleged that the Clean Water Act Section 404 permitting of Florida boating facilities was responsible for watercraft-related manatee mortality in Florida's coastal counties.

A settlement agreement was signed by all parties of the lawsuit on January 5, 2001, containing the following elements in which the Service agreed to complete and/or implement: (1) revision of the manatee recovery plan; (2) designation of manatee refuges and sanctuaries as manatee protection areas in peninsular Florida; (3) promulgation of a rule for incidental take of manatees under the MMPA; and (4) development of an interim guidance document to be used in section 7 consultations pending completion of the MMPA rule. The designation of refuges and sanctuaries as well as the interim strategy were short-term measures intended to address recent levels of mortality. A long-term solution to address historic levels of mortality depended on the development of small take regulations under the MMPA.

Under the interim strategy, the Service agreed to review the watercraft-related threats to the species and identify measures (as part of a proposed activity) which would offset project effects so that the project would not result in the take of manatees. If the Service's analysis determines that incidental take is likely, the Service would normally issue a biological opinion with an incidental take statement. However, the Service cannot provide an incidental take statement for a facility under the Act until and unless incidental take is authorized under the MMPA.

Within the Atlantic Subpopulation, the Service, based on an analysis of manatee mortality data, identified four prerequisites necessary to ensure incidental take would be unlikely to occur. These four prerequisites are: (1) appropriate speed zones; (2) appropriate signage; (3) speed zone enforcement to prevent watercraft collisions with manatees from occurring as a result of the proposed project; and (4) placement of these measures prior to project implementation. If these prerequisites are not met, the Service believes a new watercraft facility in this area would result in the incidental take of manatees and the Service would identify the area as an area with "inadequate protection."

Within the range of the Atlantic Subpopulation, the Service designated in 2001 several locations as areas with "inadequate protection" including a portion of the Tomoka River and that reach of the Halifax River from and including the Tomoka Basin south to the Dunlawton Avenue Bridge in Volusia County; and all waters in the Banana and Indian Rivers, including their respective tributaries, from Haulover Canal south to the north end of the existing slow speed zone in the town of Grant in Brevard County. Since designating these waterways as "areas of inadequate protection" for the manatee, the Service has been working with the State, county, and city entities to ameliorate the watercraft collision threats specific to these regions.

The designation of "areas of inadequate protection" was lifted in 2003 when the Service established two manatee refuges. The Halifax and Tomoka Rivers Manatee Refuge in Volusia County was established to regulate vessel speeds from the Volusia/Flagler county line south to New Smyrna Beach. The Lower St. Johns River Manatee Refuge in Duval, Clay, and St. Johns was established to regulate vessel speeds from Channel Marker "73" upstream to the mouth of Peter's Branch (including Doctors Lake) in Clay County on the western shore, and to the southern shore of the mouth of Julington Creek in St. Johns County on the eastern shore.

Although many actions the State has identified to reduce watercraft-related manatee mortality (*e.g.*, speed zones, increased State law enforcement, public education) apply to the manatee's conservation throughout the species' range in the State, other actions proposed by individual counties, cities, and other municipalities, and in some instances Federal and State agencies, are specific to designated areas. In addition to those approved by the State, manatee speed zones can be designated by both the county and city with the County Sheriff as well as City Police Department providing enforcement of these local zones within their respective jurisdictional boundaries. Specific Federal and State actions can include the establishment of refuges, sanctuaries, and parks with enforcement of speed zones within these areas.

ACTION AREA

We chose to use counties as the basic geographic analysis area because many factors important to manatee protection are provided at the county level. MPPs are produced by counties, manatee speed zones are designated by the State of Florida with county participation or by the county itself, and county sheriff's departments provide enforcement within their boundaries. These factors make county-by-county and reach-by-reach review the most logical and manageable way to analyze data and provide recommended courses of action. The Service has determined the action area for this project includes the coastal waters of Reach 4 in Broward County. Specifically, the action area is the most likely travel route of watercraft leaving this facility on the AIW and going to the Atlantic Ocean via the AIW.

Status of the Species Within the Action Area

No designated manatee critical habitat is found within the action area. The critical habitat designation does not include specific primary or secondary constituent elements. However, important components of manatee critical habitat include areas of submerged vegetation for foraging, shallow areas for resting and calving, channels for travel and migration, warmwater refugia for cold weather events, and fresh water for drinking.

The Atlantic Subpopulation of manatees migrates through the waters of Broward County. Manatee distribution and dispersal patterns as well as numbers of individuals within an area can vary considerably from year-to-year and season-to-season. This variability in dispersal patterns is dependent on a variety of biotic and abiotic factors, such as warmwater discharges, freshwater sources, foraging areas, and mating season.

Manatee abundance in Broward County has been documented repeatedly through aerial surveys conducted from 1995 to 2002; however, the survey data do not indicate the number of manatees observed in Reaches 3 and 4. During January 2003, there were three synoptic aerial surveys

covering Florida. A total of 1,695; 1,814; and 1,705 manatees were observed along the east coast of Florida. These surveys did not delineate how many manatees were observed within Broward County.

Results of aerial surveys and anecdotal evidence indicate that manatees exhibit seasonal movements within Broward County. Manatees respond to cool ambient temperatures during the winter by aggregating within deeper water such as power plant discharge sites. However, during mild winters (>68 degrees Fahrenheit ambient temperature), manatees may remain in the action area. Throughout the warm season, manatees are widely dispersed within the action area and known to use the large beds of seagrasses located throughout Broward County's waterways.

The nearest primary warmwater refuge to the project site is the Florida Power and Light's Fort Lauderdale Power Plant, and the Florida Power and Light Port Everglades Power Plant. Many of the artificial waterways (*i.e.*, manmade canals) in the action area are known to be used by manatees for resting and calving.

Factors Affecting Species Environment Within the Action Area

Watercraft

Commercial and recreational boat use in the action area is increasing. According to information provided by the State of Florida, the total number of registered vessels in Broward County since 2000 is as follows:

Year	2001	2002	2003	2004	2005
Registered vessels	41,719	47,841	47,812	49,223	50,843

New watercraft resulting from the proposed project will likely travel within the waters of the AIW and connecting tributaries and residential canal systems in Broward County, Florida. The most likely effects to manatees caused by increased watercraft traffic are deaths or injuries from collisions with watercraft and alteration of seagrass beds used as feeding or resting areas.

Mortality

In accordance with the final interim strategy implemented on August 21, 2001 (66 FR 43885), the Service assessed the effectiveness of the State's law enforcement efforts by comparing watercraft-related manatee mortality data for 2001 with mortality data for 2000. From December 31, 2000, to December 31, 2001, manatee mortality increased from 2 to 4 individuals in Broward County. From January 1, 2000, through December 31, 2006, 24 manatees died as a result of a watercraft collision in the Broward County, Florida.

Year	2000	2001	2002	2003	2004	2005	2006
Broward County	2	4	3	5	1	2	7

Speed Zones

On November 30, 1999, Florida Administrative Code 68C-22.010 established manatee speed zones on Broward County waterways. The zones were established for the purpose of regulating the speed and operation of motorboats within Broward County, including all associated and

navigable tributaries, lakes, creeks, coves, bends, backwaters, canals, channels and boat basins, unless otherwise designated or excluded.

Watercraft speed zones within Broward County include "No Entry" zones, "Idle Speed" zones, "Slow Speed" zones, and "25 mph" zones, and areas of open water that are unregulated. Zone types and locations were based on manatee congregation data, manatee death data, watercraft usage data, and other manatee natural resource needs. The DEP and the Florida Inland Navigation District install and maintain speed zone signs in Broward County waters. The Broward County Department of Natural Resources is responsible for placement and maintenance of manatee signs throughout Broward County. Manatee speed zone areas are inspected by Broward County to ensure that adequate marking is present, and that no hazards to navigation exist. The zones were established for the purpose of regulating the speed and operation of motorboats within Broward County, including all associated and navigable tributaries, lakes, creeks, coves, bends, backwaters, canals, channels and boat basins, unless otherwise designated or excluded.

For a speed zone to be enforced the zone must be correctly signed and the signs must be in compliance with State-approved design parameters. The first manatee speed zones were established in the action area in October 1999, with speed zone signs in compliance with State-approved design parameters (68D-23 Florida Administrative Code).

Enforcement

Enforcement of posted speed zones in Broward County is provided by the FWC, local city enforcement officers, Broward County Sheriff Deputies, and the U.S. Coast Guard. The FWC has 28 officers that patrol the waters of Broward County. Designated manatee speed zones are enforced by members of all duly authorized law enforcement agencies within the county. The U.S. Coast Guard and the Service also provide speed zone enforcement through special task force events.

Gorzelany (1998) monitored boater compliance in Lee County during 1997-1998. General trends and problem areas were identified in the report. Statistically significant comparisons between compliance levels and the presence and absence of law enforcement activities were determined. Specifically, Gorzelany demonstrated that "the presence of a law enforcement vessel influenced the speed and compliance of vessels."

Education

Aside from enforcement, another factor influencing boater compliance is education. Boater education is an integral component of county MPPs. The purpose of an MPP is to present a summary of existing information about manatee use and watercraft use within the county and to develop strategies to balance manatee protection, resource protection, water resource uses, facility siting, speed zones, boating safety, and provide for public education.

In reviewing the baseline and to determine if speed zones or levels of enforcement were sufficient to minimize the likelihood of adverse effects to manatees, we looked at existing speed zones, levels of enforcement, manatee aggregation areas, warmwater refugia, freshwater sources, seagrass beds, and mortality data, as well as other biological factors. Based on this review, we

focused on manatee mortality because this is the only form of take for which quantitative data are available. For Broward County, the result of all these factors (*i.e.*, zones in the right place with the appropriate signage for officers to enforce) is that between 1997 and 2006, 31 watercraft-related manatee deaths were recorded within Broward County, including 2 in 2000, 4 in 2001, 3 in 2002, 5 in 2003, 1 in 2004, 2 in 2005, and 7 in 2006.

We know sublethal forms of take (such as injury and harassment) occur, but some of these forms are immeasurable. Sublethal injury to manatees due to boat interactions is a significant factor. On a continued basis, this type of injury could have an impact on maintaining a healthy and viable population. In that regard, most manatee carcasses examined bear scars from previous strikes with watercraft (Wright et al. 1995), and a significant number of living, but scarred, manatees exist. A photo-identification system and database of scarred manatees currently maintained by the Sirenia Project (Beck and Reid 1995) contain only individuals with distinct scars, the vast majority of which appear to have been inflicted by propeller blades or keels. This database now documents 1,184 living individuals scarred from collisions with boats. Most of these manatees (1,153, or 97 percent) have more than one scar pattern, indicating multiple strikes with boats. Carcasses examined at necropsy also bear healed scars of multiple past strikes by boats; one extreme case, recently noted by the FMRI, had evidence of more than 50 past boat collisions (O'Shea et al. 2001). The severity of these boat strikes, including completely severed tails, major tail mutilations, and multiple disfiguring dorsal lacerations, is thought by some manatee researchers to impact population processes by reducing calf production (and survival) in wounded females, although there are no reliable data to establish this cause and effect relationship. Overall, the full effects of harm to manatee population dynamics resulting from boat strikes remain largely unknown.

In addition to direct injury due to boat strikes, harassment by boats and swimmers may drive animals away from preferred sites thus altering manatee behavior and movement patterns. Significant and/or long-term harassment may require manatees to travel greater distances to feed or to reach warmwater refugia. Furthermore, some researchers are concerned that manatee calves can be separated from their mothers and some individuals may be driven from preferred warmwater refuges due to harassment.

Summary

Designated manatee critical habitat is not present within the action area. The action area contains seagrasses for foraging, shallow areas for resting and calving, channels for travel and migration, warmwater refugia for cold weather events, and fresh water for drinking. Seagrasses are distributed throughout the action area. Between 2000 and 2006, 24 watercraft-related manatee deaths were recorded in Broward County.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the manatee and its interrelated and interdependent activities.

Factors to be Considered

New watercraft access projects may have a number of direct and indirect effects on manatees and manatee habitat. Direct impacts include alteration of manatee habitat through dredge and fill activities associated with construction of the development and potential direct harm or harassment of manatees during construction activities. Anticipated direct impacts to habitat are addressed through modifications in the project design during the permit review process. Direct impacts to manatees during construction are dealt with through application of the *Standard Manatee Construction Conditions* (FWC 2005), which are routinely included as conditions of Department of the Army permits issued for construction projects in manatee habitat.

Indirect effects include effects to manatees and manatee habitat caused by operation of the facility. Construction of new watercraft access projects may provide increased access by watercraft to areas frequented by manatees or may alter watercraft traffic patterns in such a way as to increase watercraft-manatee interactions. This may lead to increased harassment of manatees or increased watercraft collisions with manatees. Depending on the location of the project, construction of watercraft access projects may encourage boats to travel through important manatee habitat features such as submerged aquatic vegetation and warmwater refuges; thereby potentially altering manatee habitat and manatee habitat use patterns.

This project is in an area occupied by manatees. The project is located in Broward County within the southern portion of the geographic range of the Atlantic Subpopulation of the manatee. The timing of construction for the project (when it will be constructed) as it relates to sensitive periods of the manatee's life cycle is unknown. Manatees may be found adjacent to the proposed construction footprint during the spring, summer, and fall. Due to cooler water temperatures generally present during mid-winter, there is a significantly lower likelihood manatees will be adjacent to the construction footprint during this time. There is a high probability during the cooler months manatees will be present at the Florida Power and Light – Port Everglades Power Plant, or at the Florida Power and Light – Fort Lauderdale Power Plant. This project will be constructed in a single, disruptive event, followed by perpetual activities, such as maintenance of the dock structures and watercraft ingress and egress. The entire construction sequence is expected to be completed in less than 3 months. Although users of watercraft associated with this project must operate at posted speeds within the action area, and must be cautioned about the possible presence of manatees, physical contact or harassment is still possible.

Analyses for Effects of the Action

The Corps has determined the proposed project is located within the Broward County portion of Reach 4, as defined by the Corps' Reach Characterization Analysis. Furthermore, the Corps has determined all projects within Reach 4 cause an increased risk to the manatee due to several reach characteristics including: (1) the very high extent of shallowness in high speed areas; (2) the very high dock and boating density; (3) the very high potential for watercraft traffic to cross manatee aggregation areas; and (4) the reach is very close to a manatee aggregation area.

Beneficial Effects - There are no known beneficial effects to manatees from the proposed activity.

Direct Effects - Direct effects are those effects that are caused by implementation of the proposed action, at the time of construction, and are reasonably certain to occur. The direct effects that this project will have on the manatee within the action area include noise from barge operation and construction equipment; in-water movement of construction equipment and work watercraft; placing and securing dock support structures and mooring piles; and barge ingress and egress to the construction site.

To reduce potential construction-related impacts to the manatee and critical habitat (where present), the Corps has agreed to include as a condition of the permit, and the applicant has agreed to implement as part of their construction, the *Standard Manatee Construction Conditions* (FWC 2005), which are as follows:

a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the MMPA, the Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a 4-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a manatee shall be reported immediately to the FWC Hotline at 888-404-FWCC. Collision and/or injury should also be reported to the Fish and Wildlife Service in Jacksonville (904-232-2580) for north Florida or Vero Beach (772-562-3909) for south Florida.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Awareness signs that have already been approved for this use by FWC must be used. One sign measuring at least 3 feet by 4 feet which reads *Caution: Manatee Area* must be posted. A second sign measuring at least 81/2" by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

With the incorporation of the above *Standard Manatee Construction Conditions* (FWC 2005) into the project permit by the Corps, the Service believes the construction of the proposed project will not directly affect the manatee.

Interrelated and Interdependent Actions - There are no interdependent or interrelated actions associated with the proposed activity that is expected to impact manatees.

Indirect Effects - Indirect effects are those long-term effects that are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Authorizing a dock or marina or boat ramp in some manatee-inhabited areas indirectly affects manatees by increasing the likelihood of manatee mortality and injury resulting from collisions with new vessels associated with the permitted facility. Placement of watercraft access points has the potential to concentrate boating activities to that particular vicinity. If this area is frequented by manatees, the likelihood of watercraft collisions with manatees is increased proportional to the number of watercraft using the area, given the boats are operating at a speed that could result in collisions with manatees. Also, take in the form of harassment from watercraft could increase in certain areas with the addition of more sublethal watercraft-manatee interactions. However, the likelihood of take is reduced if the adequate and appropriate regulatory measures (*i.e.*, designated manatee speed zones with the appropriate signage coupled with the necessary speed zone enforcement to prevent watercraft collisions with manatees from occurring as a result of the proposed project) are in place.

Watercraft-related manatee mortality was assessed for the action area. Between 1997 and 2006, 31 manatees died as a result of a watercraft collision in Broward County. Furthermore, the Service believes the vessels using the proposed facility are reasonably certain to result in the take of manatees in the form of harassment. As defined by the Act, take is not just death and injury, but includes actions (= harassment) that create the likelihood of injury to manatees by significantly disrupting normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering.

As stated earlier, an MPP is one means of providing adequate planning to address effects of watercraft access projects on manatees and manatee habitat. Such plans provide a level of manatee protection commensurate with a certain level of boater access. Projects that are consistent with a State-approved MPP provide a level of boater access and activity that is within the capacity of the manatee protection measures provided in the plan. Projects that are not consistent with the approved MPP may exceed the capacity of the protective measures present and, therefore, may result in adverse effects to manatees.

Although Broward County is currently developing an MPP, the plan has not been approved by the State. Therefore, the Service believes the facility as proposed is not consistent with the State's recommended 1:100 ratio for new watercraft access projects in a key county without a State-approved MPP and, therefore, may have an adverse effect on the manatee.

Species response to the proposed action

Watercraft using the proposed multi-slip dock facility will likely travel within the waters of Intracoastal Waterway and the Atlantic Ocean. The most likely effects to manatees caused by

increased watercraft traffic are deaths or injuries from collisions with watercraft and alteration of seagrass beds used as feeding or resting areas.

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 are not considered in this section because they require separate consultation under section 7 of the Act. The Service has considered cumulative effects within the action area, and based on the above discussion, have not identified any additional cumulative effects beyond those already discussed in the Environmental Baseline.

However, based on the absence of the necessary measures to protect manatees (*e.g.*, a State approved MPP and limited enforcement of speed zones) in the project action areas, the Service believes the proposed action is reasonably certain to result in the take of manatees in the form of additional deaths and injuries.

CONCLUSION

After reviewing the current status of the manatee, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's opinion the action, as proposed, is not likely to jeopardize the continued existence of the manatee and is not likely to destroy or adversely modify designated critical habitat. However, the Service believes the proposed action may result in incidental take of manatees. The Service believes county MPPs are one of the best vehicles to address such issues as boating facilities (marinas, docks, boat ramps, dry storage areas); boating activity patterns; manatee information; a boat facility siting plan; manatee protection measures; and an education and awareness program for the boating public. They are valuable planning tools and provide an excellent venue for local manatee protection efforts. Although Broward County is currently developing a MPP, the plan has not been approved by the State. The Service believes the facility as proposed is not consistent with the recommended 1:100 ratio for new watercraft access projects in a key county without a State-approved MPP and, therefore, may have an adverse effect on the manatee. Therefore, the Service believes the proposed action is reasonably certain to result in the take of manatees in the form of additional deaths and injuries.

INCIDENTAL TAKE STATEMENT

The Service anticipates the proposed action is reasonably certain to result in the take of manatees. However, the Service is not including an incidental take authorization for marine mammals at this time because the incidental take of marine mammals has not been authorized under section 101(a)(5) of the MMPA and/or its 1994 Amendments. Following issuance of such regulations or authorizations, the Service may amend this biological opinion to include an incidental take statement for marine mammals, as appropriate.

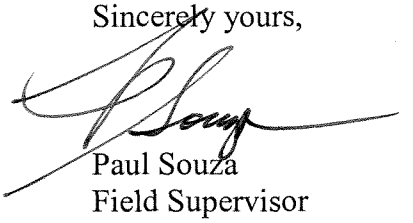
REINITIATION - CLOSING STATEMENT

This concludes section 7 consultation on the proposed issuance of the Corps permit applications SAJ-2005-4263 (LP-JLT).

As provided in 50 CFR § 402.15, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained and if: (1) the amount of incidental take is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered by this consultation, (3) the action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered by this consultation, or (4) a federally listed species or its critical habitat not addressed in this biological opinion may be affected by the action. In instances where incidental take occurs, any operations causing such take must cease, pending reinitiation.

The above findings and recommendations constitute the report of the Department of the Interior. Thank you for your cooperation and effort in protecting fish and wildlife resources. If you have any questions regarding this project, please contact Chuck Kelso at 772-562-3909, extension 241.

Sincerely yours,



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