October 11, 2001

Dr. Joseph E. Powers
Acting Regional Administrator
National Marine Fisheries Service
Southeast Region
9721 Executive Center Drive North
St. Petersburg, FL 33702

SUBJECT: CRYSTAL RIVER UNIT 3, SUPPLEMENT 1 TO THE CRYSTAL RIVER ENERGY COMPLEX BIOLOGICAL ASSESSMENT OF IMPACT TO ENDANGERED SEA TURTLES (TAC NO. MB1562)

Dear Dr. Powers:

On April 2, 2001, in a telephone conversation with Mr. Robert Hoffman of your regional office the Nuclear Regulatory Commission requested re-initiation of Section 7 consultation with the National Marine Fisheries Service (NMFS) for species of sea turtles for the Crystal River Energy Complex (CREC), operated by Florida Power Corporation (FPC). This request was made because of our concerns regarding an observed rate of increase in the number of live incidental takes of sea turtles. The request for re-initiation of consultation was acknowledged by NMFS in a letter to the U.S. Nuclear Regulatory Commission (NRC) dated April 9, 2001. The NRC conducted a site visit at the CREC on May 9, 2001. Mr. Hoffman attended the site visit.

The NRC issued a Biological Assessment (BA) in October 1998 for the CREC. On June 16, 1999, the NMFS issued a Biological Opinion (BO) to the NRC that included an Incidental Take Statement (ITS) establishing a biennial take limit of 50 live and moribund sea turtles. During the May 9, 2001, visit, the CREC staff presented a summary of the incidental takes; NRC and NMFS staff discussed the information that would be needed to supplement the October 1998 BA and possible modifications to the terms and conditions of the BO and the ITS. On June 27, 2001, FPC provided the NRC staff with information to supplement the October 1998 BA. The NRC staff relied on the FPC information, the October 1998 BA, the NMFS 1999 BO, as well as other technical documents, to prepare a Supplement to the 1998 BA.

As part of this re-initiation of consultation, the NRC requests a revision to the 1999 BO. During this consultation period, as of early September this year CREC staff collected 53 sea turtles, which is greater than the reporting threshold stated in the ITS prior to the end of the current two-year period. The NRC expects that CREC will continue to implement the reasonable and prudent measures described in the current ITS to minimize impacts on the Kemp's ridley, and the green, loggerhead, leatherback, and hawksbill turtles. The attached supplement to the BA proposes that the ITS be amended to eliminate the numeric limit on live and non-causally related mortalities and impose only an annual take limit of three causally-related mortalities for endangered sea turtles.

In addition, the NRC staff suggests that some modification of the terms and conditions contained in the 1999 BO be considered. Five nuclear power sites on the east coast have historically recorded incidental takes of Federally-protected species of sea turtles. The NRC staff would like to work with the NMFS and the utility industry to explore the possibility of developing a consistent set of terms and conditions and an ITS that would be applicable to all five nuclear power plant sites. We expect that this would provide consistency in the requirements and data collected, and reduce the frequency of reinitiation of consultation due to fluctuations or increases in the sea turtle populations. The suggestions for the CREC ITS for your consideration and terms and conditions of the CREC BO contained in the enclosed Supplement to the BA reflect our attempt to develop such a standard. We look forward to an opportunity to meet with your staff to refine requirements proposed for CREC with the goal of developing terms and conditions and an ITS that could provide the framework for other nuclear power plants as well. Your assistance in considering these requests would be appreciated.

If you have any questions, please contact Michael Masnik at (301) 415-1191 or John Goshen at (301) 415-1437.

Sincerely,

/RA/

Herbert N. Berkow, Director
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-302

Enclosure:
Biological Assessment

cc w/encl: See next page

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Docket No. 50-302

Enclosure:
Biological Assessment of Impact to Sea Turtles at Florida Power Corporation's Crystal River Energy Complex, Supplement 1

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FLORIDA POWER CORPORATION
CRYSTAL RIVER UNIT 3
DOCKET NO. 50-302/LICENSE NO. DPR-72

Biological Assessment of Impact to Sea Turtles at Florida Power Corporation's Crystal River Energy Complex

Supplement 1

ENCLOSURE

1.0 Introduction

On June 16, 1999, the National Marine Fisheries Service (NMFS) issued (NMFS, 1999) a Biological Opinion (BO) to the U.S. Nuclear Regulatory Commission (NRC) for the continued use of the cooling water intake system at the Crystal River Energy Complex (CREC). The CREC, is owned and operated by the Florida Power Corporation (FPC) and is located near the Gulf of Mexico in Citrus County, Florida. The BO reviewed the effects of CREC activity on five species of sea turtles and the endangered Gulf Sturgeon, *Acipenser oxyrinchus desotoi*, protected by the Endangered Species Act (ESA). The NRC issued the CREC BO to FPC in a letter dated July 15, 1999.

The BO was based on information provided in a Biological Assessment (BA) (FPC, 1998) dated October 1, 1998 and three meetings among NMFS, NRC, and CREC personnel were held in May 1998, April 1998, and March 1999. The BA analyzed the impacts to sea turtles caused by operations at the CREC.

After reviewing the current status of the affected species, the environmental baseline for the action area, and the effects of the action, it was NMFS's conclusion (NMFS, 1999) that the operation of the cooling water intake system of the CREC, as outlined in the NRC's BA, is not likely to jeopardize the continued existence of the loggerhead, leatherback, green, hawksbill, or Kemp's ridley sea turtles. NMFS also concluded that the Gulf Sturgeon and listed species of large whales are not likely to be adversely affected by the continued operation of CREC. There has been no critical habitat designated for these species in the action area, therefore none is affected.

NMFS estimated the impact of CREC's operation of its cooling water intake system on listed species of sea turtles. Based on that analysis, NMFS anticipated 50 live takes due to the rescue of sea turtles from the bar racks, five lethal takes (lethal take being turtle mortalities considered causally related to plant operations and verified by the Florida Fish and Wildlife Conservation Commission (FWC)), and eight dead turtles non-causally related to plant operations could be incidentally taken every 2 years (annual records are from January 1 to December 31 each year).

During the first biennial period of January 1, 1999 to December 31, 2000, live and lmoribund incidental takes at CREC were well within the anticipated limits. However, from March 8, 2001 through September 3, 2001, a total of 49 live incidental takes, three non-causally related mortalities, and one causally related mortality has been recorded at the CREC. The current reporting period began January 1, 2001 and runs through December 31, 2002.

Data indicate that the Kemp's ridley sea turtle is experiencing a rapid recovery in the Gulf of Mexico. Therefore, population numbers of juvenile and sub-adult Kemp's ridley turtles inhabiting shallow coastal areas is also increasing. Increased numbers of live takes at the CREC is largely a result of these population increases. There have been no changes to plant operations at the CREC that could be causally related to the increased number of incidental takes.

Since it is probable that the biennial limit of 50 live incidental takes will be exceeded well before the end of the next biennial period, the NRC advised the NMFS in the spring of 2001 that the NRC is reinitiating Endangered Species Act, section 7, consultation. Re-initiation was acknowledged by NMFS (2001) in a letter to the NRC dated April 9, 2001. The NRC conducted

a site visit and meeting at CREC on May 9, 2001. A representative from NMFS was present at the meeting. A summary of incidental takes by CREC was presented and discussions were held on the content of a supplement to the licensee's October 1998 BA (FPC, 1998) and also discussed were possible modifications to the incidental take statement and the terms and conditions in the Biological Opinion. On June 27, 2001, FPC (2001) provided the NRC staff with a supplement to the October 1, 1998 CREC BA. The NRC staff relied on the FPC supplement, the original October 1, 1998 BA, the NMFS 1999 (NMFS,1999) BO as well as other documents to prepare this Supplement to the BA.

2.0 Description of Facility

2.1 Location

The CREC is located on a site of approximately 2020 ha (5000 ac) near the Gulf of Mexico in Citrus County, Florida. The complex is approximately 12 km (7.5 mi) northwest of the city of Crystal River, within the coastal salt marsh area of west central Florida.

2.2 Crystal River Energy Complex (CREC)

The CREC contains five separate power plants. Unit 1 is an approximately 400 MW electric (MWe) coal-fueled plant, which began commercial operation in October 1966. Unit 2 is an approximately 500 MWe coal-fueled plant, which began commercial operation in November 1969. Unit 3 is an approximately 890 MWe pressurized water, nuclear-fueled plant, which began commercial operation in March 1977. Units 4 and 5 began commercial operation in December 1982 and December 1984, respectively.

The Gulf of Mexico provides cooling and receiving waters for the condenser and auxiliary cooling systems for Units 1, 2 and 3. Units 4 and 5 are cooled by natural draft cooling towers, with make-up water drawn from the discharge canal for Units 1, 2, and 3.

The discharge canal is a dredged canal and 4.5 km (2.8 mi) long with an average depth of 4.5 m (15 ft). It is located north of Units 1, 2, and 3 extending westward to the Gulf of Mexico.

The intake canal is a dredged canal and channel approximately 22.5 km (14 mi) long with an average minimum depth of 6 m (20 ft). The canal is bordered on both sides by land beginning from the plant site and extending 4.8 km (3 mi) to the west. The channel then extends westward an additional 17.6 km (11 mi) out into the Gulf of Mexico. The canal has the following specifications:

Depth: 6 m (20 ft) below mean low water level.

Width: From the plants proceeding west, 45.6 m (150 ft) wide for 4.5 km (2.8 mi), then 68.5 m (225 ft) wide for the next 10 km (6.25 mi), then 91 m (300 ft) wide for the next 7.8 km (4.9 mi) to marker #2 of the Cross Florida Barge Canal.

Length: Approximately 22.5 km (14 mi). The canal and channel alignment includes a dogleg at marker #10 and enters the Cross Florida Barge Canal at marker #8.

Spoils: The existing spoil area was extended 19 km (12 mi) on the north side of the intake in the seaward (west) direction. The dike dimensions are 15 - 30 m (50-100 ft) in top width, elevated approximately 3 m (10 ft) above mean low water.

Capacity: There is an intake canal water flow of approximately 82 m^3/sec (1.3 million gpm) during normal plant operation. This results in an incoming water velocity of approximately .3 m/sec (1 ft/sec) upstream of the intake structures.

2.3 Crystal River Mariculture Center

In addition to the five power plants, FPC operates the Crystal River Mariculture Center at the Energy Complex. This multi-species marine hatchery was established to offset fisheries concerns associated with the once-through cooling systems of Units 1, 2, and 3. FPC will culture and release twelve different marine species. The Mariculture Center consists of a two-story hatchery building outfitted with various tanks and filtered seawater systems along with eight .4 ha (1 ac) ponds. The facility is staffed by professionals trained in marine ecology fisheries science and aquaculture.

2.4 Intake Structures

The intake structures of the power plants are concrete structures with bar racks, traveling screens, and seawater pump components. Surface water trash barriers are deployed in front of the bar racks to collect large floating debris. Water is drawn from the intake canal through the bar racks, through the traveling screens, into the pumps and flows through the plant condensers and auxiliary systems. The water is then discharged through an outfall into the discharge canal. The discharge canal directs the water back to the Gulf of Mexico.

2.4.1 Bar Racks

The intake bar racks prevent trash and large debris carried by the seawater from entering the intake structure. The seawater must pass through a bar rack made of steel bars spaced on 10 cm (4 in) centers. The bar racks extend from well above the water line to the concrete base at the bottom of the intake canal.

Units 1 and 2, the two fossil fueled units, have two bar racks for each circulating water pump. There are a total of 8 circulating water pumps and 16 bar racks for the Units 1 and 2 plants. Unit 1 racks are each 2.5 m by 8 m (20 m^2) (8 ft 2 in by 26 ft 7.75 in (217.6 ft^2)). The Unit 2 racks are 2.2 m by 8 m (17.6 m^2) (7 ft 2 in by 26 ft 7.75 in (191 ft^2)). Both units have bar racks with a distance between the vertical bars of 9.2 cm (3.63 in). Each rack sits at an angle of 12° from vertical, with the bottom section extending out into the intake canal about 1.7 m (5.5 ft).

There are a total of eight bar racks at the Unit 3 intake structure. Unit 3 is the pressurized water nuclear reactor. Seven of the bar racks serve the circulating water condenser system. The other bar rack serves the nuclear services and decay heat water systems. The seven large bar racks are 10 m (33 ft) high and 4.75 m (15 ft 7.63 in) wide. The eighth bar rack is 10 m (33 ft) high and 2.8 m (9 ft 3.63 in) wide. All of the bar racks have 10 cm by 1 cm (4 in by .38 in) bars on 10 cm (4 in) centers, with a 9.2 cm (3.63 in) distance between the vertical bars. Each bar

rack is aligned at an angle of 10° from vertical, with the bottom section extending out into the canal about 1.5 m (5 ft).

Based on mean sea level circulation flow rate and flow area, the water velocity through Units 1 and 2 bar racks is less than .3 m/sec (1 ft/sec). The water velocity through Unit 3 is approximately .3 m/sec (1 ft/sec).

The Unit 3 bar racks are cleaned of large debris, as needed, with the use of a mechanical trash rake. This trash rake can be extended down to the bottom of the bar racks and drawn upward to the surface. During periods of high turtle activity in the intake canal, the rake was operated on a daily basis to check for underwater strandings of sea turtles. The Units 1 and 2 bar racks are periodically cleaned using a manual hand rake, and are also removed for cleaning as needed. Bar rack cleaning is performed mechanically by scraping and pressure washing. The bar racks are then coated with a biofouling preventative material.

2.4.2 Traveling Screens

Debris and marine life smaller than the bar rack 9.2 cm (3.63 in) openings are able to pass through the bar racks. The traveling screens effectively remove this floating or suspended debris from the intake water to assure a continuous supply of clean water to the condensers and heat exchangers. The traveling screens prevent debris larger than approximately 1 cm (.38 in) from getting to the pumps.

Intake water passes through these screens, which suspend debris and solid materials onto the screens. The screens are conveyed upwards to an overlapping water spray system which washes these materials off the screens and into a debris trough. The traveling screen systems are operated approximately three times each day.

2.4.3 Water Pumps

Each plant has four large circulating water pumps used to draw seawater into the plant. The water is then pumped through the condensers and out to the discharge canal. On Units 1 and 2, the total design flow is 40.2 m^3/s (638,000 gpm). Unit 3 design flow is 42.9 m^3/sec (680,000 gpm). In addition, Unit 3 has a low flow nuclear services water pumping system with a normal flow rate of approximately .63 m^3/s (10,000 gpm). Under emergency conditions, additional pumps would increase this flow up to approximately 1.3 m^3/s (20,000 gpm).

From the discharge of the pumps, the water flows to the main condensers, and for Unit 3, an additional flow path exists for the nuclear services and decay heat cooling water heat exchangers. After the seawater passes through the tubes of the condenser and/or heat exchangers, the seawater is transported in underground pipes to the discharge canal. The discharge canal directs the water back to the Gulf of Mexico.

3. Species List

Table 1. List of Federal Endangered or Threatened Marine Species Potentially Occurring at or Near the Crystal River Energy Complex[1]			
	Species	**Common Name**	**Federal Status**
1.	*Chelonia mydas*	Green turtle	Endangered[2]
2.	*Eretmochelys imbricata*	Hawksbill turtle	Endangered
3.	*Dermochelys coriacea*	Leatherback turtle	Endangered
4.	*Lepidochelys kempii*	Kemp's ridley	Endangered
5.	*Caretta caretta*	Loggerhead sea turtle	Threatened

1. Does not include endangered Cetaceans, or the Gulf sturgeon (*Acipenser oxyrinchus desotoi).* Also does not include Candidate Species. NMFS (1999) concluded that the Gulf sturgeon and listed species of large whales are not likely to be adversely affected by the proposed action. Although the Gulf sturgeon's migratory habits are not well known, NMFS (1999) believed it is unlikely that Gulf sturgeon will stray from mud and sand bottom marine foraging areas in the Gulf to enter the rocky bottomed intake canal of the CREC and be affected by the cooling water intake system. Studies conducted by CREC from 1980 to 1983, to determine the species of fish and invertebrates affected by the cooling water system, showed no evidence of Gulf sturgeon. Species of large whales are not likely to occur in the inshore shallow waters by the intake canal.

2. Green turtles are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific Coast of Mexico, which are listed as endangered.

4.0 Analysis of the Species

Of the above listed species occurring in the eastern Gulf of Mexico, NMFS (1999) believed that continued operation of the CREC is likely to adversely affect but not likely to jeopardize the continued existence of the five species of sea turtles known from the region.

4.1 Sea Turtles

Five species of sea turtles occur in Gulf of Mexico waters. Kemp's ridley and loggerhead turtles are the most common turtle species found in the Gulf as evidenced by strandings. However leatherbacks are not uncommon and hawksbill and green turtles occur regularly within stranding and incidental capture records. Historical accounts of the occurrence of sea turtles in Texas, Louisiana and Florida waters are consistent with current observations, although fluctuations in populations are apparent (Fuller, 1978, Cox and Mauermann, 1978, and Fuller and Tappan, 1986). Commercial fisheries remain the major known direct cause of sea turtle takes.

4.1.1 Green turtle (*Chelonia mydas*)

Green turtles (*Chelonia mydas*) are distributed circumglobally, mainly in waters between the northern and southern 20°C (68°F) isotherms (Hirth, 1971). Green turtles were traditionally highly prized for their flesh, fat, eggs, and shell, and fisheries in the United States (U.S.) and throughout the Caribbean are largely to blame for the decline of the species.

In the western Atlantic, several major nesting assemblages have been identified and studied (Peters, 1954; Carr and Ogren, 1960; Parsons, 1962; Pritchard, 1969; Carr *et* al., 1978). In the continental U.S., green turtle nesting occurs on the Atlantic Coast of Florida (Ehrhart, 1979). Occasional nesting has been documented along the Gulf Coast of Florida, at Southwest Florida beaches, as well as the beaches of the Eglin Air Force Base on the Florida Panhandle (Meylan, *et* al., 1995). Most documented green turtle nesting activity occurs on Florida index beaches, which were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the 6 years of regular monitoring since establishment of the index beaches in 1989 and for which data have been published, perhaps due to increased protective legislation throughout the Caribbean (Meylan, *et al.*, 1995)

While nesting activity is obviously important in identifying population trends and distribution, the major portion of a green turtle's life is spent on the foraging grounds. Green turtles are herbivores, and appear to prefer marine grasses and algae in shallow bays, lagoons and reefs (Rebel, 1974). Some of the principal feeding pastures in the Gulf of Mexico include inshore south Texas waters, the upper west coast of Florida and the northwestern coast of the Yucatan Peninsula. Additional important foraging areas in the western Atlantic include the Indian River Lagoon System in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito coast of Nicaragua, the Caribbean coast of Panama, and scattered areas along Colombia and Brazil (Hirth, 1971). The preferred food sources in these areas are *Cymodocea* sp., *Thalassi*a sp., *Zostera* sp., *Sagittaria* sp., and *Vallisneria* sp. (Babcock, 1937; Carr, 1952; 1954).

Green turtles were once abundant enough in the shallow bays and lagoons of the Gulf to support a commercial fishery, which landed over 450,000 kg (1 million lbs) of green turtle in 1890 (Doughty, 1984). Doughty (1984) reported the decline in the turtle fishery throughout the Gulf of Mexico by 1902. Currently, green turtles are uncommon in offshore waters of the northern Gulf, but abundant in some inshore embayments. Shaver (1994) live-captured a number of green turtles in channels entering into Laguna Madre, in South Texas. She noted the abundance of green turtle strandings in Laguna Madre inshore waters and opined that the turtles may establish residency in the inshore foraging habitats as juveniles. Algae along the jetties at entrances to the inshore waters of South Texas was thought to be important to green turtles associated with a radiotelemetry project (Renaud *et al.*, 1995). Transmitter-equipped turtles remained near jetties for most of the tracking period. This project was restricted to late summer months, and may, therefore, reflect seasonal influences. Coyne (1994) observed increased movements of green turtles during warm water months.

4.1.2 Hawksbill turtle (*Eretmochelys imbricata)*

The hawksbill turtle (*Eretmochelys imbricata)* is relatively uncommon in the waters of the continental U.S., preferring coral reefs, such as those found in the Caribbean and Central America. Hawksbills feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands. There are accounts of hawksbills on the reefs of south Florida, and a surprising number of small hawksbills are encountered in Texas. Most of the Texas records are probably in the 1-2 year class range. Many of the individuals captured or stranded are unhealthy or injured (Hildebrand, 1983). The lack of sponge-covered reefs and the cold winters in the northern Gulf of Mexico probably prevent hawksbills from establishing a strong presence in this area.

4.1.3 Leatherback turtle (*Dermochelys coriacea*)

The Recovery Plan for Leatherback Turtles (*Dermochelys coriacea*) contains a description of the natural history and taxonomy of this species (FWS [U.S. Fish and Wildlife Service] and NMFS, 1992). Leatherbacks are widely distributed throughout the oceans of the world, and are found throughout waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour, 1972). Leatherbacks are predominantly distributed pelagically, feeding primarily on jellyfish such as *Stomolophus* sp., *Chryaora* sp., and *Aurelia* sp. (Rebel, 1974). They may come into shallow waters if there is an abundance of jellyfish nearshore. Leary (1957) reported a large group of up to 100 leatherbacks just offshore of Port Aransas, Texas, associated with a dense aggregation of *Stomolophus* sp.

The status of the leatherback population is the most difficult to assess because major nesting beaches occur over broad areas within tropical waters outside the U.S.. The primary leatherback nesting beaches occur in French Guiana and Suriname in the western Atlantic and in Mexico in the eastern Pacific. Although increased observer effort on some nesting beaches has resulted in increased reports of leatherback nesting, declines in nest abundance have been reported from the beaches of greatest nesting densities. At Mexiquillo, Michoacan, Mexico, Sarti, *et al*. (1996) reported an average annual decline in leatherback nesting of about 23 percent between 1984 and 1996. The total number of females nesting on the Pacific coast of Mexico during the 1995-1996 season was estimated at fewer than 1000. The major western Atlantic nesting area for leatherbacks is located in the Surinam-French Guiana trans-boundary region. Chevalier and Girondot (1998) report that combined nesting in the two countries has been declining since 1992. Some nesting occurs on Florida's east coast, although nests are likely under-reported because surveys are not conducted during the entire period that leatherbacks may nest. In the eastern Caribbean, nesting occurs primarily in the Dominican Republic, the Virgin Islands, and on islands near Puerto Rico. Sandy Point, on the western edge of St. Croix, Virgin Islands, has been designated by the FWS as critical habitat for nesting leatherback turtles. Anecdotal information suggests nesting has declined at Caribbean beaches over the last several decades (NMFS, 1995).

4.1.4 Kemp's ridley (*Lepidochelys kempii*)

Of the seven extant species of sea turtles of the world, the Kemp's ridley has declined to the lowest population level. The Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) (FWS and NMFS, 1992b) contains a description of the natural history, taxonomy, and distribution of the Kemp's or Atlantic ridley turtle. Kemp's ridleys nest in daytime aggregations known as arribadas, primarily at Rancho Nuevo, a stretch of beach in Mexico. Most of the population of adult females nest in this single locality (Pritchard, 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand, 1963). By the early 1970s, the world population estimate of mature female Kemp's ridleys had been reduced to 2,500-5,000 individuals. The population declined further through the mid-1980s. Recent observations of increased nesting, discussed below, suggest that the decline in the ridley population has stopped, and there is cautious optimism that the population is now increasing.

The nearshore waters of the Gulf of Mexico are believed to provide important developmental habitat for juvenile Kemp's ridley sea turtles. Ogren (1988) suggests that the Gulf coast, from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult ridleys in the northern Gulf of Mexico. Stomach contents of Kemp's ridleys along the lower Texas coast had a predominance of nearshore crabs and mollusks, as well as fish, shrimp and other foods considered to be shrimp fishery discards (Shaver, 1991).

In recent years, unprecedented numbers of Kemp's ridley carcasses have been reported from Texas and Louisiana beaches during periods of high levels of shrimping effort. NMFS established a team of population biologists, sea turtle scientists, and managers, known as The Expert Working Group (TEWG) to conduct a status assessment of sea turtle populations. Analyses conducted by the group have indicated that the Kemp's ridley population is in the early stages of recovery; however, strandings in some years have increased at rates higher than the rate of increase in the Kemp's population (TEWG, 1998). While many of the stranded turtles observed in recent years in Texas and Louisiana are believed to have been incidentally taken in the shrimp fishery, other sources of mortality exist in these waters. These stranding events illustrate the vulnerability of Kemp's ridley turtles to the impacts of human activities in nearshore Gulf of Mexico waters.

TEWG (1998), developed a population model to evaluate trends in the Kemp's ridley population through the application of empirical data and life history parameter estimates chosen by TEWG. Model results identified three trends in benthic immature Kemp's ridleys. Benthic immatures are those turtles that are not yet reproductively mature but have recruited to feed in the nearshore benthic environment, where they are available to nearshore mortality sources that often result in strandings. Benthic immature ridleys are estimated to be 2-9 years of age and 20-60 cm (7.8 - 23.6 in) in length. Increased production of hatchling from the nesting beach beginning in 1966 resulted in an increase in benthic ridleys that leveled off in the late 1970s. A second period of increase followed by leveling occurred between 1978 and 1989 as hatchling production was further enhanced by the cooperative program between the FWS and Mexico's Instituto Nacional de Pesca to increase the nest protection and relocation program in 1978. A third period of steady increase, which has not leveled off to date, has occurred since 1990 and appears to be due to the greatly increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990 due, in part, to the introduction of turtle

excluder devices (TEDs) on nets employed in commercial fisheries operations. Adult ridley numbers have now grown from a low of approximately 1,050 adults producing 702 nests in 1985, to greater than 3,000 adults producing 1940 nests in 1995 and about 3,800 nests in 1998.

TEWG (1998) was unable to estimate the total population size and current mortality rates for the Kemp's ridley population. However, TEWG (1998) listed a number of preliminary conclusions. TEWG 1998 report indicated that the Kemp's ridley population appears to be in the early stage of exponential expansion. Over the period 1987 to 1995, the rate of increase in the annual number of nests accelerated in a trend that would continue with enhanced hatchling production and the use of TEDs. The population model in TEWG's 1998 report projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan, of 10,000 nesters by the year 2020 if the assumptions of age to sexual maturity and age specific survivorship rates used in their model are correct. It determined that the data reviewed suggested that adult Kemp's ridley turtles were restricted somewhat to the Gulf of Mexico in shallow near shore waters, and benthic immature turtles of 20 to 60 cm (7.8 - 23.6 in) straight line carapace length are found in nearshore coastal waters including estuaries of the Gulf of Mexico and the Atlantic.

TEWG (1998) identified an average Kemp's ridley population growth rate of 13 percent per year between 1991 and 1995. Total nest numbers have continued to increase. However, the 1996 and 1997 nest numbers reflected a slower rate of growth, while the increase in the 1998 nesting level has been much higher. The population growth rate does not appear as steady as originally forecasted by TEWG, but annual fluctuations, due in part to irregular inter-nesting periods, are normal for other sea turtle populations.

As noted by TEWG (1998), trends in Kemp's ridley nesting even on the Rancho Nuevo beaches alone suggest that recovery of this population has begun but continued caution is necessary to ensure recovery and to meet the goals identified in the Kemp's Ridley Recovery Plan.

Kemp's ridley turtles are largely confined to the Gulf of Mexico, with a few occurring along the U.S. eastern seaboard as far north as Long Island Sound. Immature Kemp's ridleys range widely throughout the Gulf of Mexico and in the North Atlantic from Florida northward to Nova Scotia and eastward to Bermuda, the Azores, and Europe. Within the Gulf of Mexico, juveniles are more common in the northern Gulf, particularly in the coastal waters from Texas to Florida.

Kemp's ridleys are associated with a wide range of coastal benthic habitats, usually sand or mud bottoms that support an abundance of crustaceans and other invertebrates. Their primary prey consists of portunid crabs, especially the genus *Callinectes.* However, other crab species are consumed, along with mollusks and other benthic species. This knowledge of food items at various life stages provides valuable insight into the foraging habitats, activities, and movement of Kemp's ridleys.

Little is known about the distribution or occurrence of Kemp's ridley hatchlings (less than 20 cm (7.8 in) in length) in the pelagic stage in the Gulf of Mexico. Young pelagic sea turtles usually enter sargassum drift lines, convergences, eddies, and rings where they feed at the surface of the water on floating organisms, further offshore.

Kemp’s ridleys apparently become benthic carnivores once they enter shallow coastal areas. Radiotelemetry studies by Schmid (2000) found that Kemp’s ridley turtles utilized unvegetated sand the most, but over 50 percent of the utilized sand sites had hard rock outcroppings. Compositional analyses of habitat preference (Schmid, 2000) indicated that Kemp’s ridley turtles used rock outcroppings in their foraging ranges at a significantly higher proportion than available within the study area. In addition, live bottom and green macroalgae assemblages in the foraging ranges of turtles were preferred over the seagrass assemblages.

The smallest post-pelagic individuals recorded are about 20 cm (7.8 in) in carapace length and are usually found in the shallow coastal waters, bays, and sounds in waters less than 2 m (6.5 ft) deep. Kemp’s ridley distribution along the coastal U.S. is frequently correlated with areas abundant in portunid crabs. It appears that Kemp’s ridley sub-adults (20 to 60 cm (7.8 - 23.6 in) in length) may be feeding opportunistically rather than selecting for a particular crab species, and their distribution may be more closely related to the distribution of all of the major crab species consumed rather than that of portunids. The major species of crabs occurring in the Kemp’s diet are found primarily in shallow waters from shore to 50 m (165 ft) depth, however, movement to deeper, warmer water in the winter months has also been reported. Adults and older sub-adults are found in deeper water than juveniles but appear to be restricted to the inshore zone or banks further offshore. Schmid (2000) reported that Kemp’s ridleys typically utilized and preferred 1-2 m (3.3 - 6.5 ft) depths within their foraging range. Seasonal and reproductive migrations also appear to be restricted to coastal rather than pelagic routes.

The coastal benthic zone of the northern Gulf of Mexico is an important developmental habitat for young Kemp’s ridleys after leaving the pelagic environment. Older sub-adults have historically been found in the eastern Gulf from Homosassa to Cedar Key, Florida. In the Atlantic, sub-adult Kemp’s ridleys appear to be highly migratory, foraging as far north as Chesapeake Bay in the spring, summer, and fall, then migrating south in winter to Cape Canaveral, Florida. In New England, small Kemp’s ridleys are frequently found cold-stunned in winter in Long Island Sound and Cape Cod Bay.

There have been numerous reports of Kemp’s ridleys being recaptured at sites of initial capture within relatively short periods of time. Short-term recapture has been reported along the eastern seaboard in Long Island Sound (Morreale and Standora, 1998), Chesapeake Bay (Musick and Limpus, 1997) and Cape Canaveral (Schmid, 1995). Schmid (1998) hypothesized that turtles remigrate to former capture sites and may do so for at least 4 years.

It is likely that the increases in Kemp’s ridley population numbers in the Gulf of Mexico, coupled with the presence of suitable foraging habitat for sub-adults in coastal west-central Florida is the reason for the periodic increases in sea turtle activity in the CREC intake canal. Opportunistic feeding by Kemp’s ridleys along the coast of west-central Florida will result in the likely appearance of sea turtles in the intake canal.

4.1.5 Loggerhead Sea Turtles (*Caretta caretta*)

The loggerhead (*Caretta caretta*) is a highly migratory species and is found in waters around the globe. The threatened loggerhead is the most abundant species of sea turtle occurring in U.S. waters. The nearshore waters of the Gulf of Mexico are believed to provide important developmental habitat for juvenile loggerheads. Studies conducted on loggerheads stranded on the lower Texas coast (South of Matagorda Island) have indicated that stranded individuals were feeding in nearshore waters shortly before their death (Plotkin *et al*., 1993), thereby illustrating the vulnerability of loggerhead turtles to the impacts of human activities in nearshore Gulf of Mexico waters.

TEWG (1998) identified four nesting subpopulations of loggerheads in the western North Atlantic based on mitochondrial DNA evidence. These include: (1) the northern subpopulation producing approximately 6,200 nests/year from North Carolina to northeast Florida: (2) the south Florida subpopulation occurring from just north of Cape Canaveral on the east coast of Florida and extending up to Naples on the west coast and producing approximately 64,000 nests/year: (3) the Florida Panhandle subpopulation, producing approximately 450 nests/year; and (4) the Yucatan subpopulation occurring on the northern and eastern Yucatan Peninsula in Mexico and producing approximately 1,500-2,000 nests/year.

Genetic analyses of benthic immature loggerheads collected from Atlantic foraging grounds identify a mix of the east coast subpopulations that is disproportionate to the number of hatchlings produced in these nesting assemblages. Although the northern nesting subpopulation produces only approximately 9 percent of the loggerhead nests, loggerheads on foraging grounds from the Chesapeake Bay to Georgia are nearly equally divided in origin between the two subpopulations (Sears, 1994; Sears *et al*., 1995; Norrgard, 1995). Of equal interest, 57 percent of the immature loggerheads sampled in the Mediterranean were from the south Florida subpopulation, while only 43 percent were from the local Mediterranean nesting beaches (Bowen, 1995). Genetic work has not yet been done on nesting or foraging loggerheads in the Gulf of Mexico.

TEWG (1998) considered nesting data collected from index nesting beaches to index the population size of loggerheads and to consider trends in the size of the population. TEWG (1998) constructed total estimates by considering a ratio between nesting data (and associated estimated number of adult females and therefore adults in nearshore waters), proportion of adults represented in the strandings, and in one method, aerial survey estimates. These two methods indicated that for the 1989-1995 period, there were averages of 224,321 or 234,355 benthic loggerheads, respectively. TEWG (1998) listed the methods and assumptions in their report, and suggested that these numbers are likely underestimates. Aerial survey results suggest that loggerheads in U.S. waters are distributed in the following proportions: 54percent in the southeast U.S. Atlantic, 29 percent in the northeast U.S. Atlantic, 12 percent in the eastern Gulf of Mexico, and 5 percent in the western Gulf of Mexico.

TEWG (1998) considered long-term index nesting beach datasets when available to identify trends in the loggerhead population. Overall, TEWG (1998) determined that trends could be identified for two loggerhead subpopulations. The northen subpopulation appears to be stabilizing after a period of decline; the south Florida subpopulation appears to have shown significant increases over the last 25 years suggesting the population is recovering, although

the trend could not be detected over the most recent seven years of nesting. An increase in the numbers of adult loggerheads has been reported in recent years in Florida waters without a concomitant increase in benthic immatures. These data may forecast limited recruitment to south Florida nesting beaches in the future. Since loggerheads take approximately 20-30 years to mature, the effects of decline in immature loggerheads might not be apparent on nesting beaches for decades. Therefore, TEWG (1998) cautions against considering trends in nesting too optimistically.

TEWG (1998) made a number of conclusions regarding the loggerhead population. The report concluded that four distinct nesting populations exist based on genetic evidence, although separate management is not possible because of insufficient information on the in-water distribution of each subpopulation. The report concluded that the recovery goal of more than 12,800 nests for the northern subpopulation was not likely to be met. Currently, nests number about 6,200 and no perceptible increase has been documented. The recovery goal or "measurable increases" for the south Florida (south of Canaveral and including southwest Florida) appears to have been met, and this population appears to be stable or increasing. However, index nesting surveys have been done for too short a time; therefore, it is difficult to evaluate trends throughout the region. Recovery rates for the entire subpopulation cannot be determined with certainty at this time. However, caution is warranted because, although nesting activity has been increasing, catches of benthic immature turtles at the St. Lucie Nuclear Power Plant intake canal, which acts as a passive turtle collector on Florida's east coast, have not been increasing. TEWG (1998) recommended establishing index nest survey areas in the Gulf of Mexico to monitor those populations which do not currently have recovery goals assigned to them.

4.2 Status of the Species of Sea Turtles Within the Action Area

The five species of sea turtles that occur in the action area are all highly migratory. The offshore waters of the eastern Gulf may be used by these species as post-hatchling developmental habitat, foraging habitat, or migratory pathways. NMFS (1999) concluded that no individual members of any of the species are likely to be year-round residents of the action area. Individual animals will make migrations into nearshore waters as well as other areas of the Gulf of Mexico, Caribbean Sea, and North Atlantic Ocean. Therefore, the range-wide status of the species most appropriately reflects the species status within the action area.

4.2.1 Factors Affecting the Species Within the Action Area

The offshore waters of the eastern Gulf of Mexico remain relatively free of human activities that impact listed species of sea turtles. The only Federal action in the action area impacting these species, whose effects have been previously considered in a biological opinion, is the pelagic fishery for swordfish, tuna, and shark. As discussed above, however, sea turtles are not strict residents of the action area and may be affected by human activities throughout their migratory range. Therefore , this section will discuss the impacts of Federal actions on sea turtles throughout the Gulf of Mexico and western North Atlantic.

Federally-regulated commercial fishing operations represent the major human source of sea turtle injury and mortality in U.S. waters. A detailed discussion of the sources of sea turtle mortality and injury is presented in the 1999 BO issued by NMFS (1999). The BO concludes

that the following activities are the most significant sources of sea turtle mortality and injury to Gulf populations:

- federally regulated commercial fishing operations;
- military activities which involve vessel operations and ordnance detonation;
- construction and maintenance of Federal navigation channels;
- impingement at electrical generating plants; and
- activities controlled by state or local government or private entities that cause or control the reduction of wetlands, increased marine debris, recreational activities on the water, polluted runoff, and oil spills.

Based on the examination of turtles collected in the vicinity of nuclear plants along the Atlantic and Gulf coasts over the past 20 years the staff has identified accidental boat strikes involving recreational boating as an additional in-shore significant source of sea turtle injury and mortality.

These activities have combined to slow the recovery of species of sea turtles protected by the ESA, throughout their range.

4.2.2 CREC Site Historical Perspective

Five species of marine turtles are known to occur in the Gulf of Mexico. Of the five species only the Kemp's ridley, green, hawksbill, and loggerhead have occasionally been sighted near the CREC. Leatherback and Hawksbill turtles have never been observed in the intake canal or vicinity of the CREC.

Years 1994 through 1997 Occurrences

Since Units 1, 2, and 3 began commercial operation, marine turtles have been occasional visitors in the intake canal. Records indicate that from 1994 through 1997, eight sea turtles were stranded on the Unit 3 intake bar racks. During these strandings, the Florida Marine Patrol Division of the Department of Environmental Protection was consulted and provided instructions on handling and disposition (FPC,2001).

Year 1998 Occurrences

The number of marine turtle sightings in the intake canal and strandings on the bar racks increased dramatically beginning in late March and early April 1998. The majority of these were Kemp's ridley sea turtles on the Unit 3 bar racks. The sightings and strandings decreased dramatically in May 1998. A total of 40 live strandings, eight non-causally related mortalities, and five causally related mortalities were recorded during 1998. This data formed the basis for the BO (NMFS, 1999) issued by NMFS (FPC, 1998).

Year 1999 Occurrences

The number of marine turtle sightings in the intake canal and strandings on the bar racks during 1999 was significantly lower than the numbers recorded in 1998. A total of nine live sea turtles were recovered from the bar racks at the CREC, with no causal or non-causally related mortalities being recorded (FPC, 2001).

During February 1999, one live Kemp's ridley was removed from the Unit 3 bar racks and subsequently released. During March 1999, three live Kemp's ridleys were removed from the intake bar racks. One live Kemp's ridleys was recovered from the bar racks at Units 1 and 2. This turtle had evidence of a boat-strike injury and was transferred to the Clearwater Marine Aquarium for rehabilitation. The other two live Kemp's ridleys turtles were recovered from the bar racks at Unit 3. Both had evidence of external skin infections and were transferred to the Clearwater Marine Aquarium for treatment and rehabilitation.

One live Kemp's ridley was recovered and released during April 1999. During June 1999, a loggerhead turtle was recovered, suffering severe trauma from a boat strike. The turtle was transferred to Clearwater Marine Aquarium. During November 1999, a green turtle suffering from a severe fibropapillomastosis was recovered from the Unit 3 bar racks. The turtle was transferred to Clearwater Marine Aquarium for treatment.

Two Kemp's ridleys were recovered during December 1999. One turtle suffered severe trauma from a boat strike, and was transferred to the Clearwater Marine Aquarium for treatment. The other turtle was healthy and was tagged and released.

Year 2000 Occurrences

The number of marine turtle sightings in the intake canal and strandings on the bar racks increased during 2000 when compared to 1999, though numbers were still significantly below those recorded in 1998. A total of 19 sea turtles were collected, of which 13 were live incidental takes, five non-causally related mortalities, and one causally related mortality (FPC, 2001).

During January 2000, one live green turtle was recovered from the Unit 3 bar racks and was tagged and released. During February, one live Kemp's ridley was recovered from the Unit 3 bar racks and was tagged and released. In March, a live loggerhead turtle suffering severe trauma from a boat strike was rescued from the Unit 3 intake bar racks. The turtle expired while in transit to the Clearwater Marine Aquarium for treatment. The licensee recorded and reported the specimen as a live rescue with severe injuries not causally related to facility operation.

In June 2000, a dead green turtle carcass was recovered from the intake canal. Wounds indicated the turtle died from a boat strike. In July, a live green turtle was captured. The turtle had fibropapillomastosis, a cracked carapace, and was entangled in monofilament fishing line. It was transferred to Clearwater Marine Aquarium for treatment. In September, a live Kemp's ridley with old injuries from an apparent boat strike was rescued and transferred to Clearwater Marine Aquarium for treatment.

During October, a total of seven sea turtles were encountered at the CREC. One green turtle carcass was recovered floating in the intake canal. Three Kemp's ridley carcasses were recovered floating in the intake canal, apparent victims of boat strikes. One Kemp's ridley was

recovered live and was tagged and released. One Kemp's ridley and one green turtle were recovered live but were suffering from boat strike injuries and were transferred to Clearwater Marine Aquarium for treatment.

In November 2000, the unidentified skeletal remains of a sea turtle were recovered from the bar racks during maintenance procedures. The cause of death could not be determined, but with no evidence to the contrary, it was classified as potentially causally related due to plant operations. Two live green turtles suffering from fibropapillomatosis were recovered and transferred to Clearwater Marine Aquarium for treatment. A live hawksbill turtle was recovered and was tagged and released. This was the first specimen of hawksbill recovered at CREC.

During December 2000, two live Kemp's ridleys were recovered from the Unit 3 bar racks and were tagged and released.

Year 2001 Occurrences

The number live incidental takes of marine turtles at CREC increased significantly during 2001 when compared to 1999 and 2000. From January to September 3, 2001, a total of 53 sea turtles have been encountered at the CREC. Of these, 49 live sea turtles were recovered, along with three non-causally and one causally related mortality (FPC, 2001).

During March, 35 incidental takes were recorded. Of these, 31 were live Kemp's ridleys. Three were suffering from non-causally related wounds or disease and were transferred to Clearwater Marine Aquarium for treatment. The remaining 28 turtles were tagged and released. One small Kemp's ridley carcass was recovered from the rotating screen wash basket of Units 1 and 2. Without external evidence to the contrary, the mortality was classified as causally-related to plant operations. Two live green turtles were recovered, tagged and released. One green turtle carcass was recovered floating in the intake canal with severe trauma, indicating a boat strike.

During April, eight live Kemp's ridley turtles were recovered. One juvenile loggerhead suffering from disease was recovered and transferred to Clearwater Marine Aquarium for treatment. Two non-causally related Kemp's ridley mortalities were recovered, one at the Unit 3 bar racks and the other at the Unit 1 and 2 intake screen floating trash boom.

During May, three live Kemp's ridley turtles were rescued. Two of the turtles were recovered healthy and were tagged and released. One Kemp's ridley was recovered with part of the right front flipper missing. This turtle was transferred to the Clearwater Marine Aquarium for treatment and rehabilitation.

During June, two live Kemp's ridley turtles were recovered. One turtle was severely emaciated and lethargic. It was transferred to the Clearwater Marine Aquarium for treatment and rehabilitation. The other Kemp's ridley turtle was healthy and was tagged and released.

During August 2001, one live green turtle was rescued from the Unit 3 bar racks. The turtle exhibited symptoms of internal injuries and was transferred to the Clearwater Marine Aquarium for treatment and rehabilitation.

During September 2001, one live Kemp's ridley turtle was recovered from the Unit 3 bar racks. Upon examination the turtle had sustained significant trauma to the lower jaw that appeared to be from a boat strike. The turtle was transferred to the Clearwater Marine Aquarium.

5.0 Analysis of Effects on Sea Turtles

The original incidental take statement for sea turtles established a biennial limit of 50 live incidental sea turtle takes was based on historical data of sea turtle occurrences at the CREC from 1994 through 1998. Additional data collected during 2001 indicates that the number of live incidental takes will likely exceed the present biennial incidental live take limit. Since there have been no changes in operation or activities at the CREC, it is likely the increase in sea turtle occurrences observed at the site is related to the increase in Kemp's ridley population numbers in the Gulf of Mexico. With increases in population numbers, there will be the likelihood of larger aggregations of sub-adults opportunistically feeding along the gulf coast of Florida. The sudden increase in sea turtle activity observed in the intake canal in March and April (43 turtles), with an equally rapid decrease in activity later in the year may be indicative of active, mobile feeding aggregations moving through the eastern Gulf of Mexico area. Collard 1990 identified a surface circulation eddy off western Florida south of Cape San Bias and West of Sarasota, Florida with hypothetical epipelagic Kemp's ridley turtle dispersal paths towards the coast of western Florida. Such an eddy and dispersal path coupled with increases in turtle population could account for the significant increase in turtle activity at the CREC.

FPC implemented long-term protective measures at the CREC, ensuring early detection and protection of sea turtles in the intake canal. The FPC protective measures for monitoring, rescue and resuscitation, and tagging and release activities in coordination with the FWC are effective in protecting sea turtles and minimizing the likelihood of power plant causally related mortalities. With these measures in place, and following the terms and conditions of the Incidental Take Statement, there will be no jeopardy to any sea turtle species with the continued use of the cooling water intake system at the CREC. While the total number of live incidental takes has increased, in light of the recovery of the Kemp's ridley turtle population, the increase in the rate of live takes in proportion to the size of the population is negligible.

Data indicate that the Kemp's ridley population is experiencing a rapid recovery in the Gulf of Mexico. As a result, the number of takes at the CREC intake bar racks is increasing. However, the sea turtle protective measures in place at the CREC have been effective in minimizing the number of lethal takes associated with plant operations. Live turtles are quickly and carefully removed from the bar racks and transported to a suitable holding tank for evaluation. Healthy turtles are weighed and measured, tagged and released. Sick or injured turtles are transported to a rehabilitation facility for treatment and eventual release.

Though sea turtle mortalities have been minimized, lethal takes will occur from both power plant causally related and non-causally related factors. These can occur despite the best reasonable and prudent protective measures. The only causally related mortality recorded during 2001 was a juvenile of a size class usually associated with a pelagic distribution. These smaller juveniles are generally found feeding within floating drift lines of vegetation, further offshore. The occurrence of this size turtle in the shallow coastal benthic habitat surrounding the intake canal area is quite rare, and turtles of this size would not be routinely expected in the intake canal.

Causally related mortalities from power plant operations have been minimized with the implementation of the sea turtle protection program. However, the CREC operations do not influence the occurrence of non-plant related mortalities. These mortalities are functions of the level of sea turtle activity along the coast and other factors external to FPC and its operations. FPC's experience with non-plant related mortalities and the Florida Wildlife Commission Sea Turtle Stranding and Salvage Network information indicates that mortalities from non-plant related causes are variable and increasing.

The most prevalent causes of these mortalities observed near CREC include incidental take by commercial fishery operations and boat strikes from recreational watercraft, as well as disease or other health factors. April 2001 has had the highest number of sea turtle strandings in Florida since data has been collected (strandings do not include live takes at CREC). The FWC has received reports on 575 strandings through April (though all data has not been compiled yet). This number is almost double the previous ten-year average, and it is the highest total ever for a period January through April by more than 100 strandings. The FWC documented elevated stranding numbers of Kemp's ridleys during February and March 2001 along the west coast of Florida (two times greater than normal).

The stranding numbers are greatly elevated for all species along the west coast of Florida. This also coincides with the greatest shrimping efforts in these areas. And though it has been reported that compliance with the TED requirements is quite high, there is still speculation that fishery operations are correlated with sea turtle strandings. Additionally, the number of recreational watercraft registered in Florida and visiting Florida continues to increase. With increased recreational boating activities and the popularity of personal watercraft, the likelihood of recreational watercraft collisions with sea turtles increases.

During 1998, eight non-causally related mortalities were recorded, with none occurring in 1999, five in 2000, and three to date during 2001 (FPL, 2001). Evaluations by FPC and FWC biologists indicate that recreational watercraft interaction or disease have been the likely cause for the majority of these mortalities.

6.0 Mitigative and Protective Measures Taken

FPC has implemented continuing long-term protective measures at CREC, ensuring the early detection and protection of sea turtles in the intake canal. These measures are described in FPC's AI-571 Sea Turtle Rescue and Handling Guidelines, Revision 2, issued March 15, 2001.

The appropriate sea turtle surveillance schedule and plant response are determined by the number of sea turtles observed in the intake canal. A continuous 24 hour per day turtle watch is provided when large numbers of sea turtles are observed in the intake canal or stranded on the bar racks. A minimum observation schedule of once every 2 hours is provided during known turtle presence. Periodic observation of the canal occurs throughout the remainder of the year. Trained turtle watch personnel routinely observe the intake basin and log any turtle sightings so that the presence of sea turtles is recorded and known. Appropriate plant personnel are immediately notified of any sea turtle strandings on the bar racks. Stranded turtles are immediately rescued by turtle watch personnel trained in the proper handling and care of sea turtles. Rescued sea turtles are transferred to a designated seawater holding tank at the Mariculture Center. The FPC turtle watch personnel perform an initial evaluation of the

rescued turtle's condition. If any obvious stress, injury, or disease is evident, a Mariculture Center staff biologist is immediately notified and responds on a 24 hour basis. The FWC is notified by the Mariculture Center personnel of each stranding and sea turtle condition. The FWC is consulted as to the disposition of distressed turtles.

Sea turtle observers and rescue personnel have been trained in appropriate sea turtle resuscitation techniques. Resuscitation techniques are described in AI-571, Sea Turtle Rescue and Handling Guidelines.

Recovered sea turtles are identified to species, measured, weighed, and examined for overall health and condition. Healthy turtles are tagged and returned to the Gulf of Mexico north of the plant site as soon as possible. Distressed or injured turtles are held until transfer to an approved rehabilitation facility. All turtles recovered are photographed dorsally and ventrally. Tags supplied by NMFS are attached to the proximal edge of the foreflipper. The tag numbers, taxonomic information, and morphometric data for each turtle is reported on a monthly basis to the FWC. These data are entered into the FWC Sea Turtle Stranding and Salvage Network database.

Nets are used to recover stranded turtles only. No netting of free (non-stranded turtles is currently performed. Any such netting of non-stranded turtles would only be undertaken after discussions with the FWC and NMFS. Guidance on the use of nets to recover stranded turtles is provided in AI-571, Sea Turtle Rescue and Handling Guidelines.

FPC has implemented and increased frequency of bar rack cleaning in an effort to discourage sea turtles from being attracted to the rack. AI-571, Sea Turtle Rescue and Handling Guidelines, allows for increased bar rack cleaning and operation of the trash rake at the request of the Environmental Coordinator. Marine growth on the bar racks may be attractive to turtles as a food source. As the turtles swim near the bar racks they may be drawn against the racks by the velocity of the water flowing through the racks. The sea turtle may be pressed tightly against the rack and if injured or distressed may be unable to extricate themselves from the rack and drown. By increasing the frequency of cleaning, FPC has reduced the amount of biofouling on the bar racks. This reduces the attractiveness of the racks to the sea turtles, as well as reducing the velocity of water through the racks. No specific frequency of bar rack cleaning is specified; however, historically they have been removed and cleaned three to four times per year. Operation of the trash rake is routinely performed by plant operators to keep the bar racks free of debris.

7.0 Summary of Conclusions

Table 2 provides a summary of the determinations regarding the potential effects of continued operation of the CREC on endangered and threatened species.

Table 2. Conclusions Regarding Potential Effects of the Crystal River Energy Complex on Federal Endangered or Threatened Species

	Species	Common Name	Conclusion
1.	*Chelonia mydas*	Green turtle	Is likely to adversely affect
2.	*Eretmochelys imbricata*	Hawksbill turtle	Is likely to adversely affect
3.	*Dermochelys coriacea*	Leatherback turtle	Is likely to adversely affect
4.	*Lepidochelys kempii*	Kemp's ridley	Is likely to adversely affect
5.	*Caretta caretta*	Loggerhead sea turtle	Is likely to adversely affect

7. Recommendations

The 1999 BO (NMFS,1999) required under the "Terms and Conditions" section specified the following:

1. Continued implementation of the FPC Sea Turtle Rescue and Handling Guidelines and the requirement that all changes to the guidelines be reviewed by the FWC and NMFS;

2. NMFS notification within 30 days of any listed species killed or injured in the intake canal or on the bar racks;

3. recording of all sea turtle takings, and an annual report to NMFS on all takings;

4. the requirement that if non-lethal takes reaches 40 individuals [or if] causally related lethal takes reaches 3 individuals, or if take of non-causally related dead turtles reaches 6 individuals, CREC will notify NMFS within 5 days. After these levels of take are reached any subsequent take must be reported to the NMFS within 24 hours; and

5. disposition of all sea turtles taken will be in accordance with the Sea Turtle Rescue and Handling Guidelines.

The BO (NMFS, 1999) goes on to state that NMFS believes that no more than 63 sea turtles will be incidently taken every 2 years as a result of plant operation. Thirteen of these takes will be lethal including 8 that are not causally related to plant operation.

Due to the variable distribution of opportunistic feeding aggregations of sea turtles, it is impossible to predict with any certainty the number of sea turtles expected in the intake canal. With 49 live takes recorded through early September 2001, it is possible that the number of live

incidental takes could exceed the present biennial limit this year. Therefore, it is recommended that an unlimited live take limit be established for the CREC. For this reason, the NRC proposes that the Incidental Take Statement be amended to have no specific numeric limit for non-causally related mortality.

It is also recommended that the limit of causally related lethal takes should be amended to an annual limit of three total for all endangered sea turtle species. In spite of increasing population numbers and increases in non-causally related mortalities, the causally related take limit will remain essentially the same, except for the change from a biennial to an annual limit.

As part of the sea turtle protection measures, FPC will continue to investigate and document the circumstances surrounding any sea turtle mortalities observed at the CREC. All sea turtle mortalities will be documented through FWC stranding reports.

The NRC suggests that the incidental take statement be amended to eliminate the numeric limit on live and non-causally related mortalities and impose only an annual take limit of three causally-related mortalities for endangered sea turtles. The NRC staff also suggests the following terms and conditions:

1. Implementation of the FPC Sea Turtle Rescue and Handling Guidelines document (AI-571), which specifies surveillance, reporting requirements, rescue, care and disposition of sea turtles. Changes to the procedures require notification and review by NMFS and the FWC, the authorized State organization permitted under the ESA.

2. All sea turtle takings shall be recorded by species, size, date and time collected, location collected, individual condition, and disposition. Details on the information to be collected and recorded shall be specified in the Sea Turtle Rescue and Handling Guidelines. Data collected will be tabulated and submitted annually on or before 1 March each year to the NMFS with a copy to the FWC and the NRC.

3. Causally related mortalities of any listed species shall be reported in writing to NMFS, with copies to the NRC and the FWC within thirty days of recovery. The report shall include a discussion of the circumstances surrounding the mortality, including but not limited to plant operating conditions at the time of recovery, location and circumstances of recovery, condition and description of the specimen, and disposition of the specimen as well as speculation as to the cause of death or injury.

4. The CREC shall be limited to no more than three (3) causally related sea turtle mortalities each calendar year. If the limit of three causally related mortalities is reached, FPC shall notify the NMFS within 5 days, and the NRC promptly. Each subsequent causally related mortality in that calendar year will be reported to NMFS within 24 hours.

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