FLORIDA POWER & LIGHT COMPANY

ST. LUCIE PLANT

ANNUAL ENVIRONMENTAL

OPERATING REPORT

2012

FLORIDA POWER & LIGHT COMPANY

JUNO BEACH, FLORIDA

&

INWATER RESEARCH GROUP, INC.

JENSEN BEACH, FLORIDA

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NRR

April 9, 2013

L-2013-125
10 CFR 50.4

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
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Re: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
2012 Annual Environmental Operating Report

In accordance with Section 5.4.1.2 of the St. Lucie Units 1 and 2 Environmental Protection Plans (EPP), enclosed is the Annual Environmental Operating Report for calendar year 2012.

Sincerely,

Eric S. Katzman
Licensing Manager
St. Lucie Plant

ESK/tlt

Enclosure: Florida Power & Light Company St. Lucie Plant Annual Environmental Operating Report 2012 (51 pages)

cc: FDEP Siting Office
FWC
NMFS

Environmental Operating Report

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Acronyms

ABI	Applied Biology, Inc.
BO	Biological Opinion
EAI	Ecological Associates, Inc.
ESA	Endangered Species Act
EPP	Environmental Protection Plan
FWC	Florida Fish and Wildlife Conservation Commission
FPL	Florida Power & Light
IRG	Inwater Research Group, Inc.
NMFS	National Marine Fisheries Service
NRC	Nuclear Regulatory Commission
PIT	Passive Integrated Transponder
SSCL	Straight Standard Carapace Length
STSSN	Sea Turtle Stranding and Salvage Network
USFW	U.S. Fish and Wildlife Service
UESI	Underwater Engineering Services, Inc.
UIDS	Underwater Intrusion Detection System

Executive Summary

Florida Power & Light Company (FPL), St. Lucie Plant, located on South Hutchinson island, consists of two 1,000 MWe nuclear-fueled electric generating units that use nearshore ocean waters for the plant's once-through condenser cooling system. Water for this system enters through three submerged intake structures located about 365 m offshore. Water passes through these structures and into submerged pipes (two 3.7 m and one 4.9 m in diameter) running under the beach. It then passes into a 1,500 m long intake canal, which transports water to the plant. Turtles entering the ocean intake structures are entrained with cooling water and rapidly transported through the intake pipes into the enclosed canal system where they must be manually captured and returned to the ocean.

South Hutchinson Island is also an important rookery for loggerhead (*Caretta caretta),* green (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*) turtles. Under the Endangered Species Act (ESA), the federal government has classified the loggerhead turtle as a threatened species and leatherbacks and the Florida nesting population of green turtles as endangered. One of FPL's primary environmental concerns is to ensure that the operation of the St. Lucie Plant does not adversely affect sea turtle nesting; they have sponsored monitoring of nesting activity on the island since 1971. Biologists use all-terrain vehicles to survey the island each morning during nesting season. New nests, non-nesting emergences (false crawls), and negatively nests affected by predators are recorded. Data collected from beach nesting surveys are reported to the Florida Fish and Wildlife Conservation Commission (FWC) as part of a state wide survey program. In 2012, 7,191 loggerhead, 351 green, and 369 leatherback nests were recorded on South Hutchinson Island.

Since the plant became operational in 1976, turtles entrained in the intake canal have been systematically captured, measured, weighed, tagged, and released. During 2012, 362 sea turtles were removed from the intake canal, including 232 loggerheads, 127 greens, two leatherbacks, and one hawksbill. The majority of these turtles (97.0 %) were captured alive and released back to the ocean. Eight (2.2%) were taken to rehabilitation facilities for treatment of injuries or disease and three turtles (0.8%) were found dead.

Injuries and mortalities are categorized in two ways—causal to power plant operations or non-causal to power plant operations. These decisions are made in consultation with FWC and/or a qualified veterinarian. Not all mortalities and injuries are causal to power plant operations, as some sea turtles enter the canal in either a moribund state or have pre-existing conditions related to fisheries, boat interactions or disease. Injuries causal to power plant operations are recorded and go against the take limit established by the most recent Biological Opinion (BO) set forth by the National Marine Fisheries Service (NMFS). The Incidental Take Statement in the most recent BO states that FPL will exceed their take limits for a calendar year if any of the following occur: more than 1,000 sea turtles are captured, more than 1% of the total number of loggerhead and green turtles (combined) are injured/killed due to plant operation, more than two Kemp's ridley sea turtles are injured/killed due to plant operation, or if any hawksbill or leatherback sea turtles are injured/killed due to plant operation. In the case where 1% of the

combined loggerhead and green turtle captures is not a whole number, it is rounded up (e.g. 520 combined captures = take limit of 6). Under section 7 of the ESA a new consultation with NMFS is required If FPL meets or exceeds the take limits specified in the Incidental Take Statement.

During 2012, there were two sea turtle mortalities and one injury that were causal to power plant operations. No leatherback, hawksbill or Kemp's ridley turtles were injured or killed. Based on the latest BO issued by NMFS, FPL did not exceed its take limit during 2012. However, FPL did exceed their sea turtle take limit at the St. Lucie Plant in 2006 and reinitiating a Section 7 consultation was required. This consultation is currently ongoing between NMFS and the Nuclear Regulatory Commission (NRC). A new BO is expected in 2013. FPL has identified and responded to correct the contributing factors that led to exceeding the take limit in 2006.

The current BO also mandates that the participation in the Sea Turtle Stranding and Salvage Network (STSSN) and Public Service Turtle Walks. As participants in the STSSN, biologists routinely respond to sea turtle strandings in St. Lucie and Martin Counties. This activity involves the collection of information on turtles that are found dead, debilitated, or that have been impacted by human-related activities. During 2012, IRG biologists responded to 25 stranding events. Sea turtle nesting walks are conducted by FPL as public service programs during the summer sea turtle nesting season. These turtle walks educate the public about relevant sea turtle protection issues and in most cases allow the public to view a nesting loggerhead sea turtle. During 2012, FPL conducted 10 turtle walks attended by 308 people.

The St. Lucie Plant sea turtle program continues to assist other sea turtle researchers, universities, nonprofit organizations, and state and federal agencies by providing data, specimens, and public outreach. Biologists collaborated with researchers on five projects in 2012.

1.0 Background

1.1 Area Description

Florida Power & Light Company (FPL), St. Lucie Plant, is located on a 457-hectare site on South Hutchinson Island on Florida's east coast (Figures 1 and 2). South Hutchinson Island is a barrier island that extends 36 km between inlets and attains its maximum width of 2 km at the plant site. The plant is approximately midway between Ft. Pierce and St. Lucie Inlets and is bounded on the east by the Atlantic Ocean and on the west by the Indian River Lagoon. Elevations approach five meters atop dunes bordering the beach and decrease to sea level in the mangrove swamps that are common on the western side. The Atlantic shoreline of South Hutchinson Island is composed of sand and shell hash with intermittent rocky promontories protruding through the beach face along the southern end of the island. Submerged coquinoid rock formations parallel much of the island off the ocean beaches. The ocean bottom immediately offshore from the plant site consists primarily of sand and shell sediments. The Gulf Stream (Florida Current), which flows parallel to the continental shelf margin, begins to diverge from the coastline at West Palm Beach. At South Hutchinson Island, the current is approximately 33 km offshore. Oceanic water associated with the western boundary of the current periodically meander over the inner shelf, especially during summer months.

1.2 Power Plant Description

The St. Lucie Plant consists of two 1,000 MWe nuclear-fueled electric generating units that use nearshore ocean waters for the plant's once-through condenser cooling system. Unit 1 was placed on-line in March 1976 and Unit 2 in April 1983. Water for this system enters through three submerged intake structures located about 365 m offshore (Figure 2). The intake structures are equipped with a velocity cap to minimize entrainment of marine life. Water passes through these structures and into submerged pipes (two 3.7 m and one 4.9 m in diameter) running under the beach. It then passes into a 1,500 m long intake canal, which transports it to the plant. After passing through the plant, the heated water is discharged into a 670 m long canal that leads to two buried discharge pipelines. These pass underneath the dunes and along the ocean floor to the submerged discharges, the first of which is approximately 365 m offshore and 730 m north of the intake.

1.3 Environmental Reporting

St. Lucie Units 1 and 2 use the Atlantic Ocean as a source of water for once through condenser cooling. Since 1971, the potential environmental effects resulting from the intake and discharge of this water have been the subject of FPL sponsored biotic studies at the site (Applied Biology, Inc. [ABI] 1978, 1980, 1986, 1987, 1988, 1989, 1994). Jurisdiction for sea turtle studies lies with the Nuclear Regulatory Commission (NRC), which is considered to be the lead federal agency relative to consultation under the Endangered Species Act (ESA). This document has been prepared to satisfy the requirements contained in Appendix B, Environmental Protection Plan

(EPP); St. Lucie Units 1 and 2 Facility Operating Licenses No. DPR-67 and No. NPF-16. Previous results dealing with sea turtle studies are contained in twenty-nine annual environmental operating reports covering the period from 1983 through 2011 (ABI 1983-1994; Quantum Resources, Inc. 1995-2009; Inwater Research Group, Inc. [IRG] 2010-2011). This report describes the 2012 environmental protection activities related to sea turtles as required by Subsection 4.2 of the St. Lucie Units 1 and 2 EPP. Other routine annual reporting requirements are addressed in Section 7.

2.0 Sea Turtle Nest Monitoring

Sea turtle nesting typically occurs along Florida's Atlantic coast from March through September. Furthermore, South Hutchinson Island is an important rookery for loggerhead (*Caretta caretta),* green (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*) turtles (Meylan, Schroeder, & Mosier, 1995). Under the ESA, the federal government has classified the loggerhead turtle as a threatened species and leatherbacks and the Florida nesting population of green turtles as endangered. One of FPL's primary environmental concerns is to ensure the operation of the St. Lucie Plant does not adversely affect sea turtle nesting and has sponsored monitoring of nesting activity on the island since 1971.

2.1 Methodology

2.1.1 Previous Methods and Projects

Daytime nesting surveys and nighttime turtle tagging programs were conducted in odd numbered years from 1971 through 1979. During daytime nesting surveys, nine 1.25 km-long survey areas were monitored five days per week (Figure 3). The St. Lucie Plant began operation in 1976; therefore, the first three survey years (1971, 1973, and 1975) provided baseline data for nesting activity on South Hutchinson Island. Though the power plant was not operating during 1975, the St. Lucie Plant Unit 1 ocean intake and discharge structures were installed during that year. Installation of these structures included nighttime construction activities conducted offshore from and perpendicular to the beach. The plant was in full operation during the 1977 and 1979 surveys.

A modified daytime nesting survey was conducted in 1980 during the preliminary construction of the ocean discharge structure for St. Lucie Plant Unit 2. Four of the previously established 1.25 km-long survey areas were monitored. To mitigate any adverse effects associated with construction activities, turtle nests proximal to the construction area were relocated.

The St. Lucie Plant, Unit 2 discharge structure was installed during the 1981 nesting season. Construction of the Unit 2 intake structure proceeded throughout the 1982 nesting season and was completed near the end of the 1983 season. Mitigation activities associated with installation of both structures were similar to those conducted when the Unit 1 intake and discharge structures were installed. Analysis demonstrated that the construction of the plant's offshore intake and discharge structures significantly reduced nesting at the plant site during construction years – 1975, 1981, 1982, and 1983 (ABI, 1987). However, nesting at the plant consistently returned to levels similar to or greater than those at a control site in years following the construction.

During 1991 a major offshore construction project was undertaken to replace damaged velocity caps on the three intake structures. A large elevated platform, from which repair activities were conducted, was erected around the three structures. Construction occurred throughout the nesting season. Work was restricted almost entirely to daylight hours, nighttime lighting of the work area was minimal, and no equipment or materials were used on the beach. A sea turtle

protection plan was implemented to mitigate any negative effects resulting from the required safety and navigational lighting on and near the platform. The plan included caging nests along a 1,500 m section of beach west of the platform and the release of hatchlings to unaffected areas to the north and south. During this period, nests were more abundant at the construction site than at the control site.

Reconstruction of the primary dune in front of the power plant was completed by FPL prior to the beginning of the 2005 sea turtle nesting season. This project was required due to the widespread obliteration of the primary dune during the 2004 hurricane season. Despite the compact material and erosion problems associated with the reconstructed dune, nesting success was not noticeably different from nesting success in unaffected survey zones to the north and south of the project area.

2.1.2 Current Methods

Nesting surveys to satisfy environmental reporting requirements were completed in 1986 (ABI, 1987) but continued voluntarily through 1998 with agreement from federal and state agencies. In 1998, the continuation of the nesting survey program was mandated as part of the BO and Incidental Take Statement issued by the National Marine Fisheries Service (NMFS). An amendment to the EPP was approved in 1999 to include these requirements.

From 1981 through 2012, 36 one-km-long segments comprising the island's coastline have been surveyed seven days a week during the nesting season (Figure 3). These "zones" are identified starting with zone A at the northern end of the island and continue through zone JJ at the southern end. Since the 1994 nesting season, the southern half of the island (zone T to zone JJ) has been surveyed by Ecological Associates, Inc. (EAI) and their data are included in this report. Biologists used all-terrain vehicles to survey the island each morning. New nests, non-nesting emergences (false crawls), and nests affected by predators were recorded for each zone. Data collected from beach nesting surveys are reported to the Florida Fish and Wildlife Conservation Commission (FWC) as part of the Index Nesting Beach Survey and the Statewide Nesting Beach Survey.

2.2 Results for 2012

In 2012, zones E-S were surveyed by Inwater Research Group, Inc. (IRG). EAI surveyed zones A-D as part of a beach renourishment project south of the Fort Pierce inlet. Data from those zones as well as the south end of South Hutchinson Island were supplied by EAI and were used to provide whole-island nesting totals (Figures 4 – 6).

From March 5 through March 25, several preliminary nesting surveys were conducted along South Hutchinson Island in areas A-S. Fifteen leatherback sea turtle nests were recorded in zones A-S prior to the beginning of formal nesting surveys on March 26. From March 26 through September 30, nest surveys were conducted on a daily basis.

Not all ventures onto the beach by a female turtle end in successful nests. These "false crawls" (non-nesting emergences) may occur for many reasons and are commonly encountered at

other rookeries. Davis and Whiting (1977) suggest that relatively high percentages of false crawls may reflect disturbances or unsatisfactory nesting beach characteristics. Historically, the distribution of loggerhead emergences on the island has been consistent with the distribution of nests, with no difference in nesting success among zones. We can only speculate the current causes for differences in nesting success between zones (Figure 7). Recent beach renourishment, coastal construction projects, formation of large escarpments that prevent turtles from crawling above the high tide line, and light pollution from inland sources may have all contributed to lower nesting success in the northern most zones. Nest success in the zone that includes the power plant was similar to the nest success of the zones surrounding the power plant (Figure 7).

2.2.1 Loggerhead Nesting

Most loggerhead nesting occurs on warm temperate and subtropical beaches (Dodd, 1988). Approximately 42,000 to 74,000 loggerhead turtle nests are deposited annually on Florida beaches (Turtle Expert Working Group [TEWG], 2000), ranking this loggerhead turtle rookery the second largest in the world (National Marine Fisheries Service [NMFS] and U.S. Fish and Wildlife Service [USFWS], 1991). The beaches in southeast Florida are especially prolific nesting areas, with South Hutchinson Island being a critically important nesting beach (Meylan, Schroeder, & Mosier, 1995). Between 4,000 and 8,000 loggerhead nests have been deposited annually on South Hutchinson Island during the last thirty years.

In 2012, 7,191 loggerhead nests were recorded on South Hutchison Island (Figure 4). In zones A-S (the north end of the island) biologists observed 3,235 nests (Figure 8). The first recorded nest was on April 22 and the last loggerhead nest was recorded on September 12. There were 3,290 loggerhead false crawls observed in zones A-S.

Seventy-four of the 3,235 loggerhead nests were marked to assess nest productivity: 47 nests were successfully inventoried, 21 were completely predated, five washed out, and one was not inventoried because another turtle had nested on top of the marked nest. The forty-seven inventoried nests contained a cumulative total of 5,141 eggs. Of these, 2,846 successfully hatched and emerged from the marked nests. This represents an emergence success rate of 55.4%. There were 35 live loggerhead turtles found in the nests, which were released and not accounted for in the emergence success rate.

Loggerhead nesting activity on South Hutchinson Island fluctuates considerably from year to year (Figure 6). Annual variations in nest densities are also common at other rookeries, and probably result from non-annual reproductive behavior (Heppell, Snover, & Crowder, 2003). No relationships between annual fluctuations in nesting activity and power plant operation or intake/discharge construction have been found. However, loggerhead nesting on South Hutchinson Island mirrors trends in nesting statewide.

2.2.2 Green Nesting

The green turtle is the second most common sea turtle on Florida nesting beaches. Approximately 99% of the green turtle nesting in Florida occurs on the Atlantic coast from Brevard through Broward Counties (Witherington, Herren, Bresette, 2006). On South Hutchinson Island, green turtles have had alternating years of nesting: a high nesting year followed by a low nesting year with little fluctuation, although this pattern has become less distinct in recent years. This biennial pattern is also seen at other locations throughout their nesting range (Witherington et al., 2006).

In 2012, 351 green turtle nests were recorded on Hutchison Island (Figure 5). Biologists observed a total of 156 green turtle nests in zones A-S (Figure 8). The first recorded nest was on May 24 and the last green turtle nest was recorded on September 24. There were 182 green turtle false crawls observed in zones A-S.

Nineteen of the 156 green turtle nests were marked to asses nest productivity: 13 nests were successfully inventoried, three washed out, one was completely predated, and two were not inventoried because another turtle nested on top the nests. The 19 inventoried nests contained a cumulative total of 1,636 eggs. Of these, 887 successfully hatched and emerged from the marked nests. This represents an emergence success rate of 54.2%. There were 13 live green turtles found in the nests, which were released and not accounted for in the emergence success rate.

2.2.2 Leatherback Nesting

Leatherback nesting occurs on subtropical and tropical beaches. Leatherbacks inhabit Florida waters primarily during the nesting season (March-June) and are generally found in higher densities close to shore, rather than offshore (Schroeder & Thompson, 1987).

In 2012, 369 leatherback turtle nests were recorded on Hutchison Island (Figure 8). Biologists observed a total of 129 leatherback sea turtle nests in zones A-S (Figure 8). The first recorded nest was on March 2 and the last leatherback sea turtle nest was recorded on July 7. There were 126 leatherback sea turtle false crawls observed in the surveyed areas A-S.

Nineteen of the 129 leatherback turtle nests were marked to assess nest productivity: 14 nests were successfully inventoried; one was completely predated, three washed out, and one was vandalized preventing biologists from locating the nest. The 14 nests contained a cumulative total of 1,148 eggs. Of these, 480 successfully hatched and emerged from the marked nests. This represents an emergence success rate of 41.8%. There were seven live leatherback turtles found in the nests, which were released and not accounted for in the emergence success rate.

The increase in leatherback nesting on South Hutchinson Island mirrors the nesting trend for the entire state of Florida. The number of leatherback nests in Florida has increased more than

10% per year since 1979 (Stewart et al., 2011), but it is unknown whether the increase is from new recruits to the population or if it represents migrants from other Caribbean nesting beaches.

2.2.3 Predation

Historically, raccoon (*Procyon lotor*) predation has been the leading cause of turtle nest destruction on South Hutchinson Island (ABI, 1989). Ghost crabs (*Ocypode quadrata*) are currently the most significant predators on South Hutchinson Island. Though turtle nests on South Hutchinson Island have probably been depredated by ghost crabs since nesting surveys began, quantification of ghost crab predation did not begin until 1983. Occasionally, sea turtles nests are depredated by other animals such as bobcats (*Lynx rufus*), fire ants (*Solenopsis invicta*), and various species of birds. However, this only accounts for a small portion of the total number of predation events on South Hutchinson Island.

IRG biologists recorded a total of 444 predation events for South Hutchinson Island in 2012 within beach sections E-S; EAI did not report predation events in zones A-D (Figure 9). Sea turtle nests on South Hutchinson Island were depredated by ghost crabs, raccoons, birds, fire ants, and bobcats. The most abundant predator was the ghost crabs with 125 events. Raccoons accounted for 107 individual predation events. An additional 184 predation events consisted of both raccoon and ghost crab predation.

Nest excavation provides an opportunity to more accurately account for predation activity. For example, fire ant and ghost crab predation are not always evident from a cursory inspection of the sea turtle nest's surface. Predators negatively affected 49.1% (55 of the 122) nests marked to evaluate hatch success. Twenty three marked nests were completely predated prior to inventory. Thirty-two additional nests were noted to be partially predated upon when the nest was inventoried.

3.0 Intake Canal Monitoring

Entrainment of sea turtles at the St. Lucie Plant has been attributed to the presumed physical attractiveness of the offshore structures housing the intake pipes rather than to plant operating characteristics (Ecological Associates, Inc., 2000). The velocity caps, which are supported above the openings to each intake pipe, eliminate vertical water entrainment and substantially reduce current velocities near the structures by spreading horizontal draw over a wider area. Even when both units are operating at full capacity, turtles must actively swim into the mouth of one of the structures before they encounter current velocities sufficient enough to entrain them. Turtles entering the ocean intake structures are entrained with cooling water and rapidly transported through the intake pipes into an enclosed canal system where they must be manually captured and returned to the ocean. Since the plant became operational in 1976, turtles entrained in the intake canal have been systematically captured, measured, weighed, tagged, and released.

3.1 Methodology

3.1.1 Barrier Nets

In 1978, a barrier net at the A1A bridge (Figure 2) was constructed to confine turtles to the easternmost section of the intake canal where capture techniques have been most effective. This net is constructed of large diameter polypropylene rope and has a mesh size of 20.3 cm x 20.3 cm. A cable and series of large floats are used to keep the top of the net above the water's surface and the bottom of the net is anchored by a series of concrete blocks. The net is inclined at a slope of 1:1, with the bottom positioned upstream of the surface cable. This reduces bowing in the center and minimizes the risk of a weak or injured turtle being pinned underwater by strong currents.

In the past, the integrity of the barrier net was occasionally compromised, and turtles were able to move west of A1A. These turtles were further constrained downstream by an underwater intrusion detection system (UIDS) consisting, in part, of a large barrier positioned perpendicular to the north-south arm of the canal (Figure 2). The UIDS security barrier has a mesh size of 22.9 cm x 22.9 cm. Prior to completion of the UIDS in December 1986, turtles unconfined by the A1A barrier net were usually removed from the canal at the intake wells of Units 1 and 2 (Figure 2). They were then retrieved by means of large mechanical rakes or specially designed nets. Following construction of the UIDS barrier, only the smallest individuals were able to reach the intake wells. Improvements made to the A1A barrier net in 1990 have effectively confined all turtles larger than 32.5 cm carapace length (28.7 cm carapace width) to the eastern end of the canal.

In response to the large numbers of small green turtles entrained in the intake canal in the 1990s, an improved design involving a small 12.7 x 12.7 cm mesh size barrier net was erected 150 m east of the A1A net in January 1996 (Figure 2). This primary barrier net was designed to

confine all turtles with a carapace width greater than 18 cm to the extreme eastern portion of the intake canal. However, the integrity of this net was often compromised by incursions of seaweed, drift algae, jellyfish, and siltation. During these events, water velocities around the net increased dramatically creating an insufficient net slope that caused several sea turtle mortalities. To address this design problem and to further alleviate mortalities, FPL constructed a new net with a stronger mesh and added support structures. Dredging of the canal east of the A1A net was also conducted to minimize water velocities around the new barrier net. Construction was completed in November 2002. These improvements have enabled the new net to withstand events that caused design failure of the old barrier net, thus reducing the potential for sea turtle mortalities.

3.1.2 Turtle Capture

Historically, most turtles entrained in the St. Lucie Plant intake canal were removed using large-mesh tangle nets set near the intake canal headwalls at the extreme eastern end of the intake canal (Figure 2). Nets used were from 30 to 40 m in length, 3 to 4 m deep, and composed of 40 cm stretch mesh multifilament nylon. Large floats were attached to the surface, and un-weighted lines were used along the bottom. Turtles entangled in the nets generally remained at the water's surface until removed. Nets were usually deployed on Monday morning and retrieved on Friday afternoon. During periods of deployment, the nets were inspected for captures at least twice each day (mornings and afternoons). St. Lucie Plant personnel checked the nets periodically and biologists were notified immediately if a capture was observed. Sea turtle specialists were on call 24 hours a day to retrieve captured turtles from the plant intake canal system.

Beginning in April 1990, after consultation with NMFS, net deployment was scaled back to daylight hours only. Concurrently, surveillance of the intake canal was increased and biologists remained on site for the duration of each day's netting activities. This measure decreased response time for removal of entangled turtles and provided an opportunity to improve daily assessments of turtle abundance within the canal.

During each day's directed capture efforts, formal inspections of the intake canal were made to determine the number, location and species of turtles present. Surface observations were augmented with periodic underwater inspections, particularly in and around the barrier nets. These observations allowed for a rough estimate of how many sea turtles were in each section of the canal on a given day.

The canal capture program has been under continual review and refinement in an attempt to minimize both entanglement time and injuries/mortalities to sea turtles. Better utilization of currents and eddies, adjustments to tethering lines, multi-net deployments and increased efforts to hand capture and dip net turtles have contributed to reduced entrainment times in recent years.

3.1.3 Data Collection

Regardless of capture method, all turtles removed from the canal were identified to species, measured, weighed, tagged, and examined for overall condition (wounds, abnormalities, parasites, etc.). Since 1994, all captured turtles have been photographed dorsally and ventrally prior to release. Additionally, as of July 2001, Passive Integrated Transponder (PIT) tags were injected subcutaneously into the right front flipper of all turtles as outlined in the BO issued by NMFS in May 2001. Healthy turtles were released into the ocean the same day of capture. When treatment was warranted, turtles were transported to an approved rehabilitation facility after consultation with FWC. As of 1982, necropsies were conducted on all dead turtles found in fresh condition. Currently, all fresh dead turtles are held on ice and taken to a qualified veterinarian for necropsy. Methodologies employed in the canal capture program have remained essentially unchanged since 1994, making data comparable from that year through the current reporting period.

3.2 Results for 2012

Methods to remove sea turtles from the intake canal included the use of tangle nets, dip nets, and hand capture. Long handled dip nets employed from small boats, the canal banks, and headwall structures were moderately effective in capturing turtles with carapace lengths of about 40 cm or less. Divers were employed to hand capture turtles whenever water visibility permitted. This technique has proven highly effective in the capture of turtles of all sizes, particularly less active individuals that are often found partially buried in the sediment near the primary barrier net. Hand capture efforts have successfully reduced residency times for turtles in the intake canal.

During 2012, 362 sea turtles were removed from the intake canal, including 232 loggerheads, 127 green turtles, two leatherbacks, and one hawksbill (Figures 10 and 11; Table 1). The majority of these turtles (97.0%) were captured alive and released back to the ocean. Eight (2.2%) were taken to rehabilitation facilities for treatment of injuries or disease and three (0.8%) turtles were found dead. One of the turtles taken to rehab facilities had injuries causal to power plant operations. Only two of the three turtles found dead were causal to power plant operations. Mortalities and injuries are discussed in Section 3.2.6.

In 2012, 99.7% (361) of all turtles entrained in the canal were captured east of the primary barrier net—158 by tangle nets, five off the primary barrier net, 40 by dip net, and 158 by hand capture. Proactive captures (hand capture and dip net) accounted for 54.7% of the turtles removed from the intake canal in 2012. No turtles captured in 2012 were removed from the intake wells, and only one turtle was captured west of the primary barrier net.

Extensive plant outages, to increase power production, starting in 2011 and continuing through 2012 likely reduced the number of captures in the intake canal due to decreased water flow during these periods. Unit 1 was in an outage from November 26, 2011, through March 1, 2012, and July 15 through 21, 2012. Unit 2 was in an outage from August 5 through November 23, 2012.

3.2.1 Loggerhead Captures

Historically, loggerheads have been the most abundant species entrained into the canal. The number of loggerheads captured each year ranged from 62 in 1981 to 623 in 2004. During 2012, monthly captures of loggerheads ranged from two in January to 37 in May (Table 2), with a monthly mean of 19.3. Loggerhead capture rates have exhibited considerable year-to-year fluctuation, but have shown an overall increasing trend since the plant started operation (Figure 10; Table 1). The size frequency of loggerheads captured at the intake canal of the power plant ranges from predominately juvenile to sub-adult animals, with mature adult animals captured mainly during the nesting season of April through September (Figure 12; Table 2).

Of the 232 loggerheads captured in 2012 for which straight standard carapace lengths (SSCL) are available, 152 were juveniles (SSCL $\leq$ 70 cm), 30 were adults (SSCL $\geq$ 85 cm), and 50 were transitional (SSCL 70-85 cm; Hirth, 1980, Figure 12). The latter group probably includes both mature and immature individuals. Of the 30 turtles classified as adults, 28 were females and two were males. Two additional loggerheads were recorded as a male even though their SSCL was less than 85 cm because sex was apparent from the animal's tail length.

3.2.2 Green Captures

The number of green turtles captured each year has ranged from three in 1979 to a record high of 673 in 1995 (Figure 10; Table 1). A spike in green turtle captures, driven mainly by small juveniles (Bresette, Gorham, & Peery, 1998), during the mid-1990s has leveled off to a capture rate consistently greater than numbers recorded prior to 1994. Size frequencies of green turtles at the intake canal are dominated by juvenile animals with adults captured in relatively small numbers during the nesting season of May-October (Figure 13 and Table 2).

During 2012, monthly green turtle captures ranged from two in both February and March to 34 in December (Table 2) with a monthly mean of 10.6. Of the 127 green turtles captured in 2012, there were 125 juveniles or sub-adults (SSCL < 83cm) and two adults (SSCL $\geq$ 83 cm; Witherington and Ehrhart, 1989, Figure 13). Of the two classified as adults, one was female and one was a male.

3.2.3 Leatherback, Hawksbill, and Kemp's ridley Captures

Captures of leatherback, hawksbill, and Kemp's ridley turtles have been infrequent and scattered throughout the years (Figure 11; Table 1). However, each species has shown rather pronounced seasonal occurrences (Table 3). Leatherbacks are typically captured in March and April. Hawksbills are captured between July and September, and Kemp's ridleys are caught between December and April.

In 2012, there were two leatherbacks and one hawksbill captured in the intake canal of the St. Lucie Plant (Table 3). A female leatherback was captured on March 23 and had a SSCL of

159.0 cm. The second female leatherback was captured on April 13 and had a SSCL of 137.3 cm. A female hawksbill was captured on July 27 and had a SSCL of 76.5 cm.

3.2.4 Recaptures

Since plant operation began in 1976, 15,064 sea turtles (including recaptures) have been captured, including 8,611 loggerhead, 6,304 green, 37 leatherback, 54 Kemp's ridley and 58 Hawksbill turtles (Table 1).

Most turtles removed from the intake canal have been tagged and released into the ocean at various locations along South Hutchinson Island. Consequently, individual turtles can be identified as long as they retain their tags. Over the history of the program at the St. Lucie Plant, 2,749 recapture events (653 loggerheads and 2,096 green turtles) have occurred. The recapture rate in 2012 was 8.2% for loggerheads and 35.4% for greens. Occasionally, turtles are captured that have been tagged by other researchers. There were three such captures in 2012 (two loggerheads and one leatherback turtles). One loggerhead was originally tagged off Cumberland Island, GA in 2000 and the other was tagged off of St. Augustine, FL in 2001. The leatherback was originally tagged in 2008 on Singer Island in Palm Beach County, FL. In 2012, there were also 23 incidences of turtles tagged at the intake canal being observed by other researchers. Twenty observations were in Florida and single observations occurred in South Carolina, Nicaragua, and Brazil.

3.2.5 Relative Condition

Turtles captured alive in the intake canal of the St. Lucie Plant are assigned a relative condition based on weight, activity, parasite infestation, epibiont coverage, injuries, and any other abnormalities that might affect overall vitality. Relative condition ratings can be influenced by a number of factors, some related and others unrelated to entrainment into the intake canal. A rating of good indicates that turtles have not been negatively impacted by their entrapment in the canal, as evidenced by physical appearance. Although ratings of fair or poor imply reduced vitality, the extent to which entrainment and entrapment are responsible is often indeterminable. In some instances, conditions responsible for lower ratings, such as boat collision, fisheries gear entanglement, or disease were obviously sustained prior to entrainment. However, in recent years, turtles have been found with fresh scrapes and cuts incurred during entrainment. Some of these incidents have had a negative effect on a sea turtle's overall condition and have been categorized as directly causal to power plant operation. Causal determinations are made by consultation with personnel from FWC and/or a qualified veterinarian.

During 2012, 95.7% (222) of all loggerheads found in the canal were alive and in good condition. Only 3.9% (9) of all loggerheads were individuals in fair or poor condition, and 0.4% (1) was found dead. Of the 127 green turtles removed from the intake canal in 2012, 92.9% (118) were in good condition, 5.5% (7) were in fair or poor condition and 1.6% (2) was found dead.

Of the 362 turtles removed from the intake canal during 2012, 300 (82.9%) were observed with fresh cuts and scrapes that may have been incurred during transit through the intake pipes. The scrapes varied in degree of severity, although most (87.7%) of the scrapes were classified as minor. However, some of the scrapes were moderate (12.3%). No scrapes were categorized as severe and warranted a turtle being sent to a rehabilitation facility.

3.2.6 Mortalities and Injuries

Injuries and mortalities are categorized in two ways: causal to power plant operation or non-causal to power plant operation. These decisions are made in consultation with FWC and/or a qualified veterinarian. Not all mortalities and injuries are causal to power plant operation, as some sea turtles enter the canal in either a moribund state or have had pre-existing conditions related to fisheries, boat interactions or disease. Injuries causal to power plant operation are recorded and go against the take limit established by the most recent BO set forth by NMFS.

Sea turtle mortalities have been closely monitored throughout the history of the capture program in an attempt to assign probable cause and take remedial action to minimize future occurrences. Modifications to capture procedures, improvements to barrier nets, and virtual elimination of low flow conditions within the intake pipes have resulted in a substantial reduction in sea turtle mortalities over the life of the canal capture program. Mortality rate declined from 7.8% during the period 1976-1984 to 1.3% for the period 1985 to present (Table 1). Over the entire monitoring program's history (1976-2012), 176 (2.0%; including hatchlings from 2006) loggerheads and 94 (1.5%) green turtles entrained in the canal were found dead. Only four Kemp's ridley mortalities have been documented at the St. Lucie Plant during 1987 and 1988. No dead leatherback or hawksbill turtles have ever been recorded.

In 2012, three mortalities were recorded at the St. Lucie Plant intake canal: one loggerhead and two green turtles. Both green turtle mortalities were considered causal to power plant operations. Additionally, one loggerhead sustained injuries that were considered casual to plant operations.

On May 5, a sub-adult loggerhead was found floating in the intake canal. The turtle appeared in good condition but was unusually lethargic. It also had a moderate fresh scrape below the left eye, exposing the skull. After consultation with FWC, it was determined that the injuries sustained were causal to plant operation and the turtle was sent to the Loggerhead Marinelife Center for rehabilitation. It was successfully treated and released on October 4.

On November 26 a dead juvenile green turtle was found submerged below the water on the primary barrier net. Two recreational fishing hooks with line and a three-ounce lead weight were found imbedded in the turtle's left front flipper. The fishing gear had become entangled on the barrier net, preventing the turtle from reaching the surface to breath. A necropsy determined that forced submergence secondary to fish gear entanglement was the likely cause of death.

On December 9, a juvenile green turtle was found dead on the barrier net. The turtle otherwise appeared to be in good condition. A necropsy found no evidence of life threatening disease or compromise and the veterinarian determined that forced submergence was the likely cause of death. The turtle presumably drowned during entrainment.

4.0 Sea Turtle Protective Activities

4.1 NMFS Section 7 Consultations

In accordance with Section 7 of the ESA, FPL must submit a Biological Assessment to NMFS for review if FPL exceeds the incidental take limit established by the most recent BO. The BO is an analytical document that looks at the effects of a federal action on endangered and threatened species.

Section 7(b)(4) of the ESA refers to the incidental take of listed species. It sets forth the requirements when a proposed agency action is found to be consistent with section 7(a)(2) of the ESA, and the proposed action may incidentally take listed species. NMFS is responsible for issuing a statement that specifies the impact of any incidental take of endangered or threatened species. It also states that reasonable and prudent measures, and terms and conditions to implement the measures, be provided to minimize such impacts.

In 1999, FPL exceeded their anticipated incidental take limit established by the 1997 BO set forth by NMFS. This required reinitiating of consultation under Section 7 of the ESA. As part of this consultation, FPL conducted a study on the factors influencing sea turtle entrainment (EAI, 2000). NMFS considered this new information when developing the new opinion. On May 4, 2001, NMFS issued its BO as part of the reinitiating of consultation subsequent to the 1997 BO.

In the new BO there were a number of changes, most importantly in the Incidental Take Statement. This states that FPL will exceed their take limits for a calendar year if any of the following occur: more than 1000 sea turtles are captured, more than 1% of the total number of loggerhead and green turtles (combined) are injured/killed due to plant operation, more than two Kemp's ridley sea turtles are injured/killed due to plant operation, or if any hawksbill or leatherback sea turtles are injured/killed due to plant operation. In the case where 1% of the combined loggerhead and green turtle captures is not a whole number, it is rounded up (e.g. 520 combined captures = take limit of 6). Under Section 7 of the Endangered Species Act a new consultation with NMFS is required If FPL meets or exceeds the take limits specified in the Incidental Take Statement.

During 2012, there were two sea turtle mortalities and one injury that were causal to power plant operations. No leatherback, hawksbill or Kemp's ridley turtles were injured or killed. A total of 362 turtles were captured in the FPL intake canal for the year. Based on the latest BO issued by NMFS, FPL did not exceed its take limit during 2012. However, FPL did exceed their sea turtle take limit at the St. Lucie Plant in 2006 and reinitiating a Section 7 consultation was required. This consultation is currently ongoing between NMFS and the NRC. A new BO is expected in 2013. FPL has identified the contributing factors that led to exceeding the take limit in 2006. The company has responded by cleaning the intake pipes and developing a plan to install turtle excluder grating at the offshore intake structures.

4.2 Sea Turtle Stranding and Salvage Network and Turtle Walks

An amendment to the EPP, Requirement 4.2.1 of the St. Lucie Unit 2 Operating License Appendix B, was approved in 1999. This mandated that the participation in the Sea Turtle Stranding and Salvage Network (STSSN) and Public Service Turtle Walks was to become part of the BO and Incidental Take Statement issued by NMFS.

As participants in the STSSN, IRG's sea turtle biologists routinely respond to sea turtle strandings in St. Lucie and Martin Counties. This activity involves the collection of information on turtles that are found dead, debilitated, or that have been impacted by human-related activities. All permit holders participating in this program are required to complete a STSSN stranding report for each dead or debilitated turtle encountered. Completed stranding reports are then sent to FWC.

Sea turtle nesting walks are conducted by FPL as part of their public outreach programs during the summer sea turtle nesting season. These turtle walks educate the public about relevant sea turtle protection issues and, in most cases, allow the public to view a nesting loggerhead sea turtle.

4.2.1 Results for 2012

During 2012, IRG biologists responded to 25 (9 loggerhead, 16 green) stranding events in St. Lucie County. The turtles were found in various stages of decomposition. Of these 25 turtles, the probable cause of death included one entanglement mortality, two shark attacks, and two boat strikes. The remaining 20 turtles were either too decomposed or had no visible wounds or abnormalities to indicate a probable cause of death.

FPL conducted 10 turtle walks between June 8 and July 7, 2012. During these programs a total of 308 people attended and on eight of the 10 turtle walks they were able to view a nesting female loggerhead turtle.

4.3 Collaborative Efforts

IRG biologists continue to assist other sea turtle researchers, universities, nonprofit organizations, and state and federal agencies by providing data, specimens, and public outreach. IRG biologists at the St. Lucie Plant continued to collaborate with other researchers on five research projects in 2012.

IRG biologists collected blood samples and biopsies from 41 loggerheads to assist with a project conducted by University of Central Florida researchers looking at stable isotope analysis in sub-adult and adult loggerheads. IRG biologists also collected blood samples from 21 juvenile green turtles to assist in a separate study by University of Central Florida researchers seeking to identify the sex of juvenile green turtles via a host of blood parameters. Blood was taken from eight loggerhead and green turtles captured in the canal to assist in a project

conducted by Florida Atlantic University researchers investigating the immune response in marine turtles with fibropapilloma tumors. Also, dorsal and lateral pictures were taken from 27 green sea turtles with an SSCL < 30cm to assist in a project conducted by a Florida Atlantic University researcher investigating changes in turtle shell morphology in relation to gape-limited predators. Extensive morphometric data were taken for a University of Tokyo student examining the morphological variation and taxonomy of green turtles. IRG biologists assisted in taking over 40 measurements of each green and loggerhead captured at the intake canal over 10 days to compare to measurements taken from turtles in the Pacific Ocean.

4.4 Barrier Net Maintenance

Maintaining the integrity of the barrier nets is essential to reducing mortality rates and residency times of entrained sea turtles and is mandated by the most recent BO issued by NMFS. Daily inspections are performed from a small boat to remove floating debris and to repair holes at or near the water's surface. Quarterly inspections and cleaning debris from the net when warranted was conducted by Underwater Engineering Services, Inc. (UESI). In addition to scheduled inspections and cleaning of the nets, divers are deployed when the integrity of the nets are threatened by algae events. These algae events can cause undue stress to the net structures and may cause the net to fail. Net failures increase both the risk of sea turtle mortalities and residency times. Turtles can become tangled in or pinned under a failed barrier net, leading to a causal drowning mortality. Furthermore, if turtles have access to larger portions of the intake canal, then it becomes more challenging to quickly entrap and release these animals back into their natural environment. The new primary barrier net, with few exceptions, has performed as designed and has effectively confined sea turtles to the eastern 200 meters of the intake canal.

In October 2009 the primary barrier net failed due to an algae event, submerging the north half of the net 0.6-1.5 m underwater (IRG, 2010). UESI installed large floating buoys onto the primary net in order to create a temporary barrier. However, this temporary barrier net was found to be susceptible to partial submergence or failure due to severe algae/jellyfish events or at extreme high tides. A permanent fix to the primary net is scheduled in 2013.

During 2012, there were multiple net failures. Two sections (5 m long and 1 m long) of the A1A net failed multiple times in February (6-9, 13-15, 18, 19), submerging sections of the net up to 3 inches below the water line. The failure was due to high water levels in the canal caused by the combined effects of power plant outage and unusually high tides. UESI fixed the net of February 22. Between August 31 and September 1, sections of the net were at or just below the water line again due to high water levels caused by the outage and extreme high tides. The net also failed again October 27 through 30 due to high water levels in the canal caused by the outage and the storm surge associated with tropical storm Sandy. A portion of the primary net was also 2.5 cm below the water line on October 27 and 28 due to extreme high water levels in the intake canal system.

In 2012, routine quarterly inspections of the temporary primary barrier net and the A1A net were completed. During these inspections, debris was removed from both nets and one hole was repaired in the primary barrier net. There were no holes found in the A1A net.

4.5 Intake Pipe Cleaning and Maintenance

Since 2002, there has been a steady increase in the number of sea turtles incurring scrapes during transit through the power plant intake pipes. The scrapes vary in degree of severity, with most being minor and similar to those found on sea turtles that inhabit near-shore reefs. However, some scrapes are moderate or severe, causing some turtles to be sent to rehabilitation facilities for treatment. This prompted FPL to inspect the intake pipes in 2006 and schedule cleaning of bio-fouling and marine debris that were thought to be causing the scrapes to entrained sea turtles.

Cleaning and removal of debris from the intake pipes and offshore intake structures began in October of 2007 and was completed in February 2011. Additionally, two openings that extended from the top of the two 12' intake pipes were also sealed off during this time.

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6.0 Figures and Tables

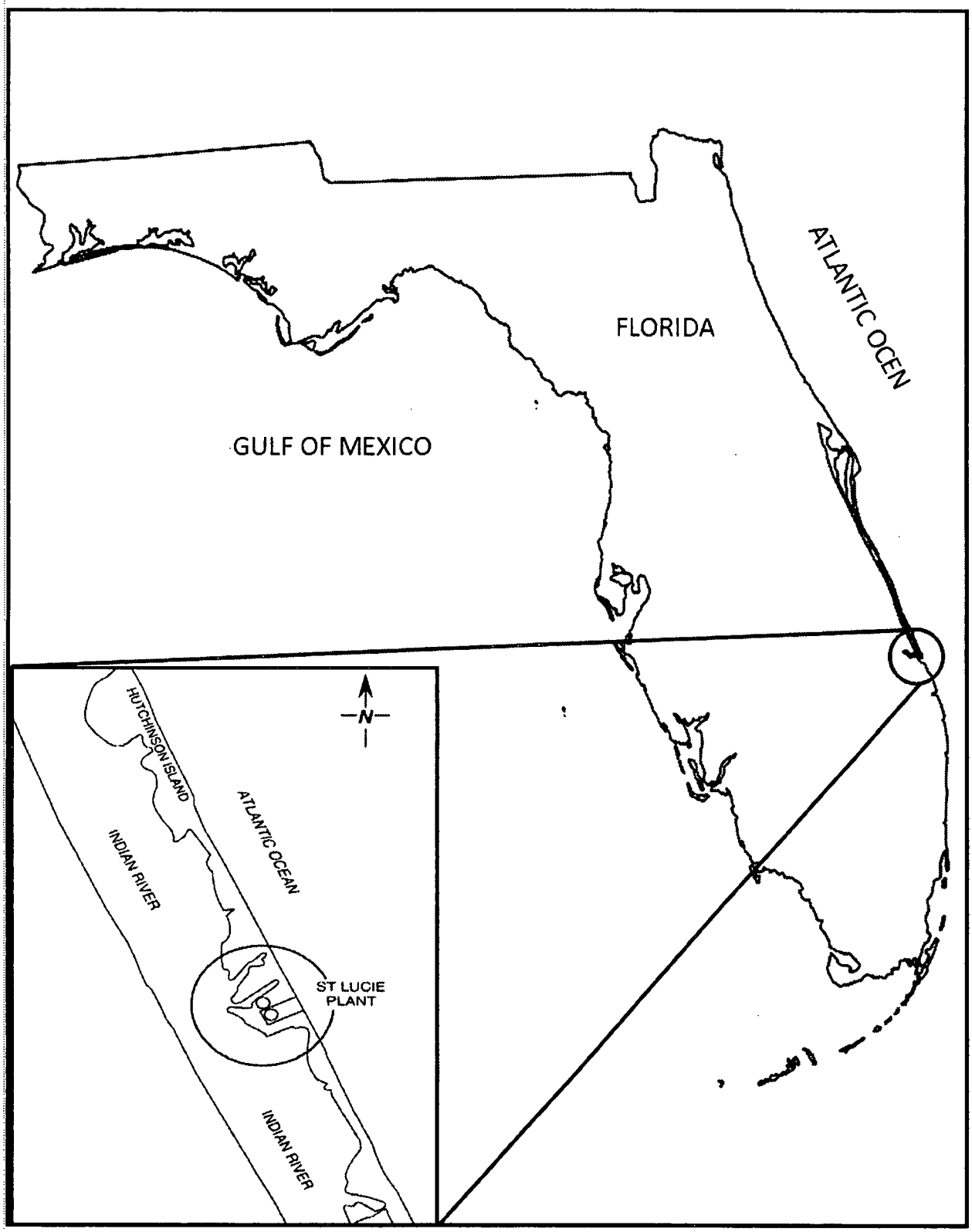

Figure 1. Location of St. Lucie Plant on South Hutchinson Island, Florida

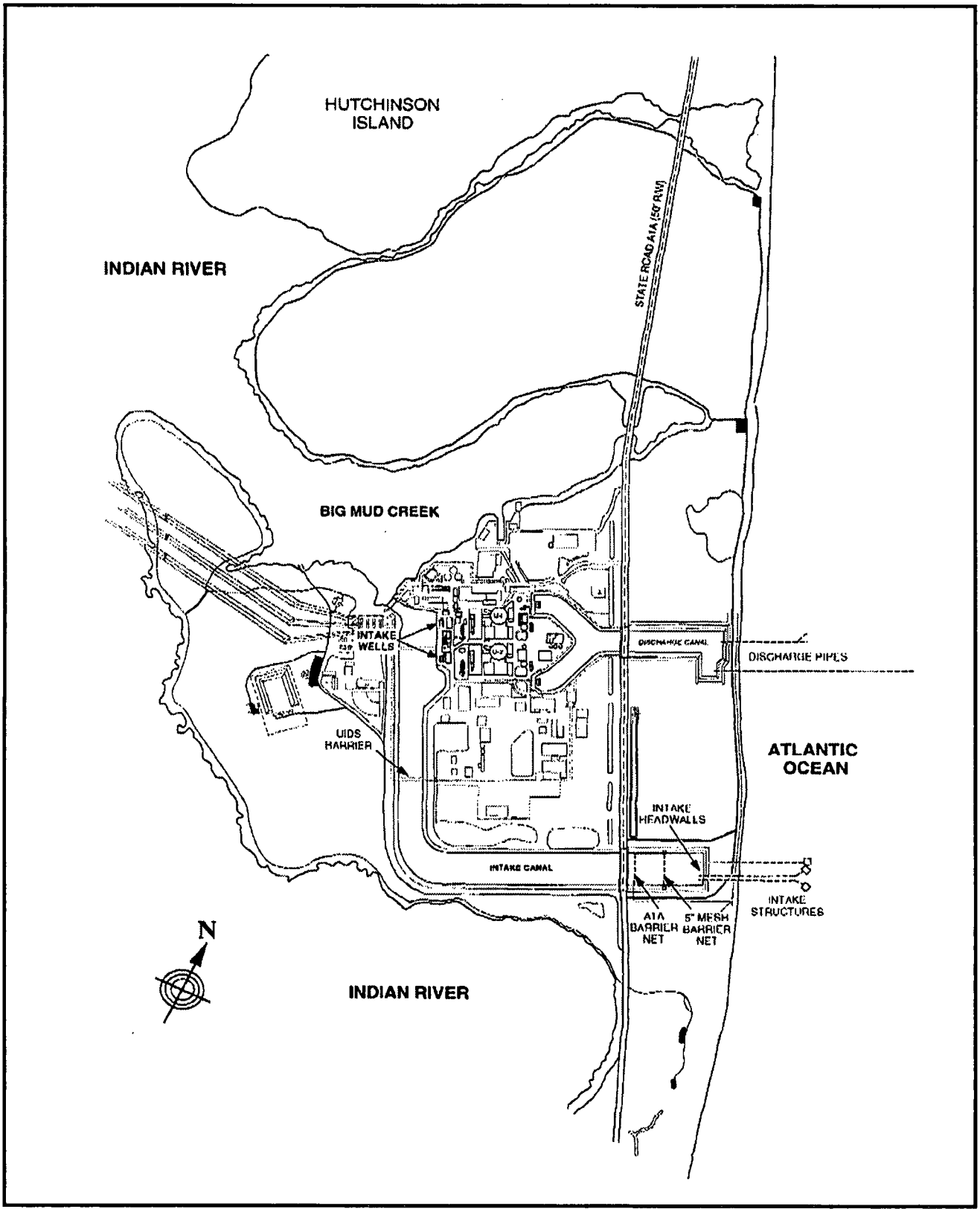

Figure 2. St. Lucie Plant cooling water intake and discharge system

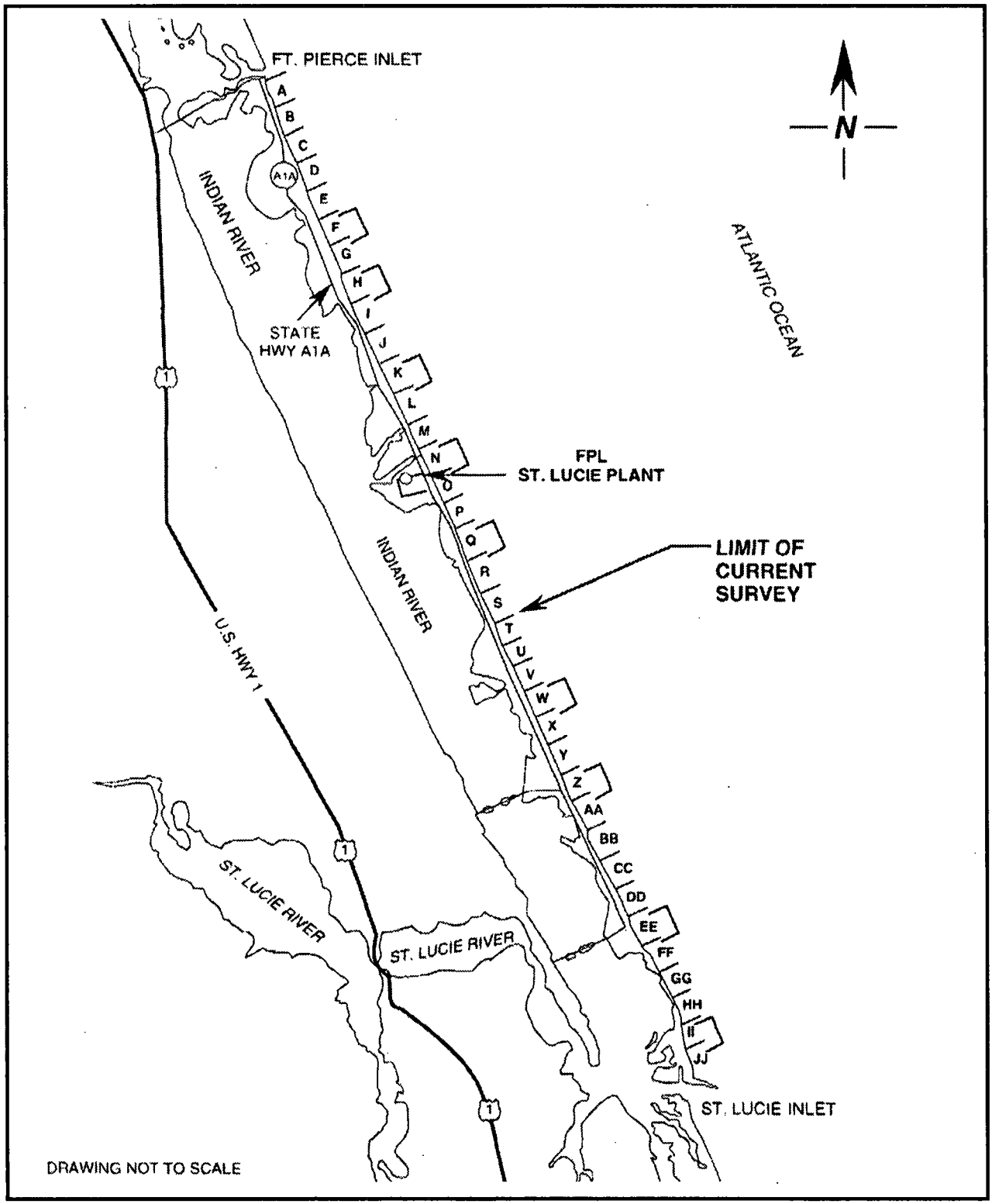

Figure 3. Designation and location of nine 1.25 km segments and thirty-six 1 km segments surveyed for sea turtle nesting on South Hutchinson Island (1971-2012)

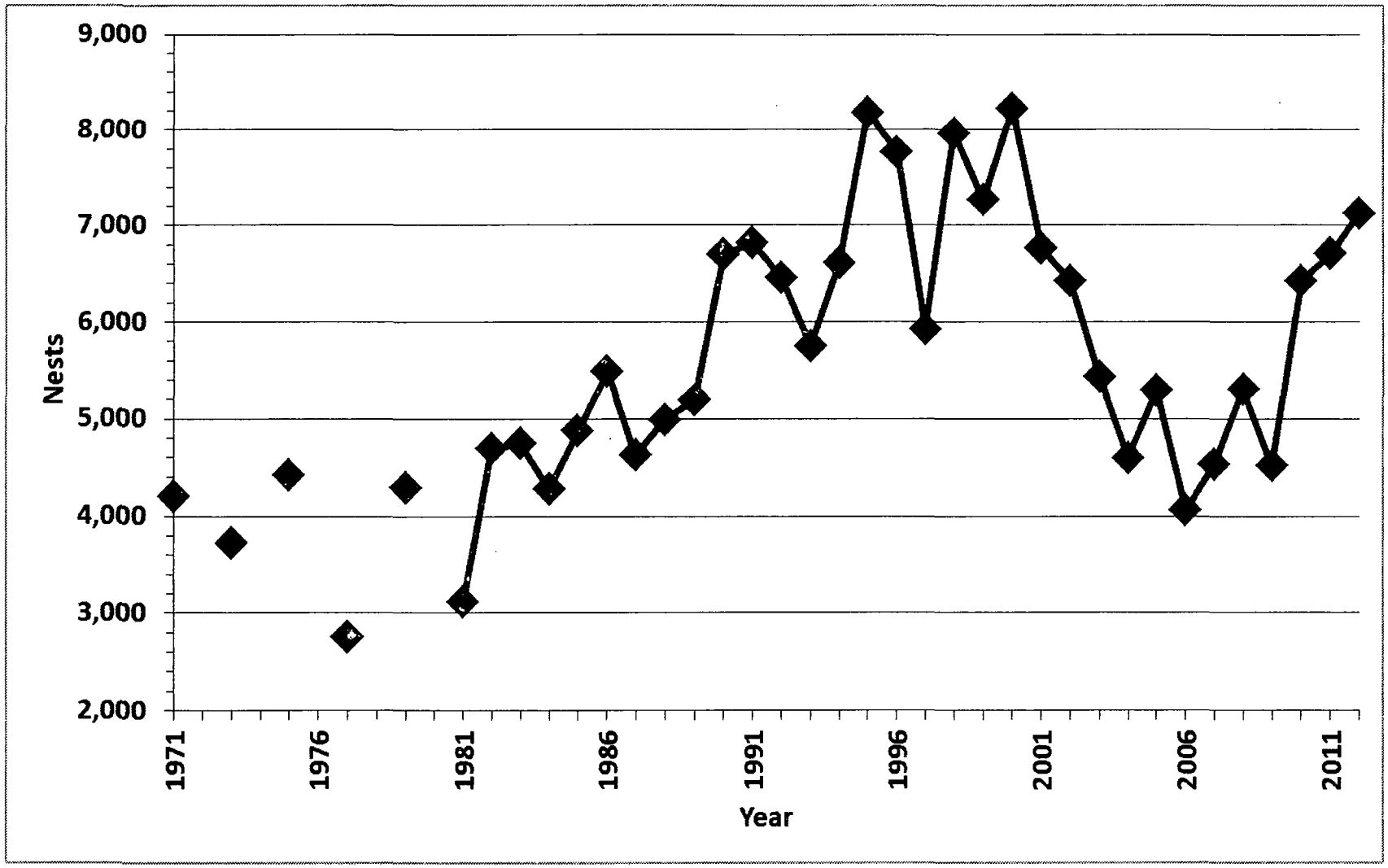

Figure 4. Number of loggerhead turtle nests on South Hutchinson Island from 1971 through 2012. Values for 1971 through 1979 are estimates (see section 2.1.1); values for 1981 through 2012 are from whole island surveys.

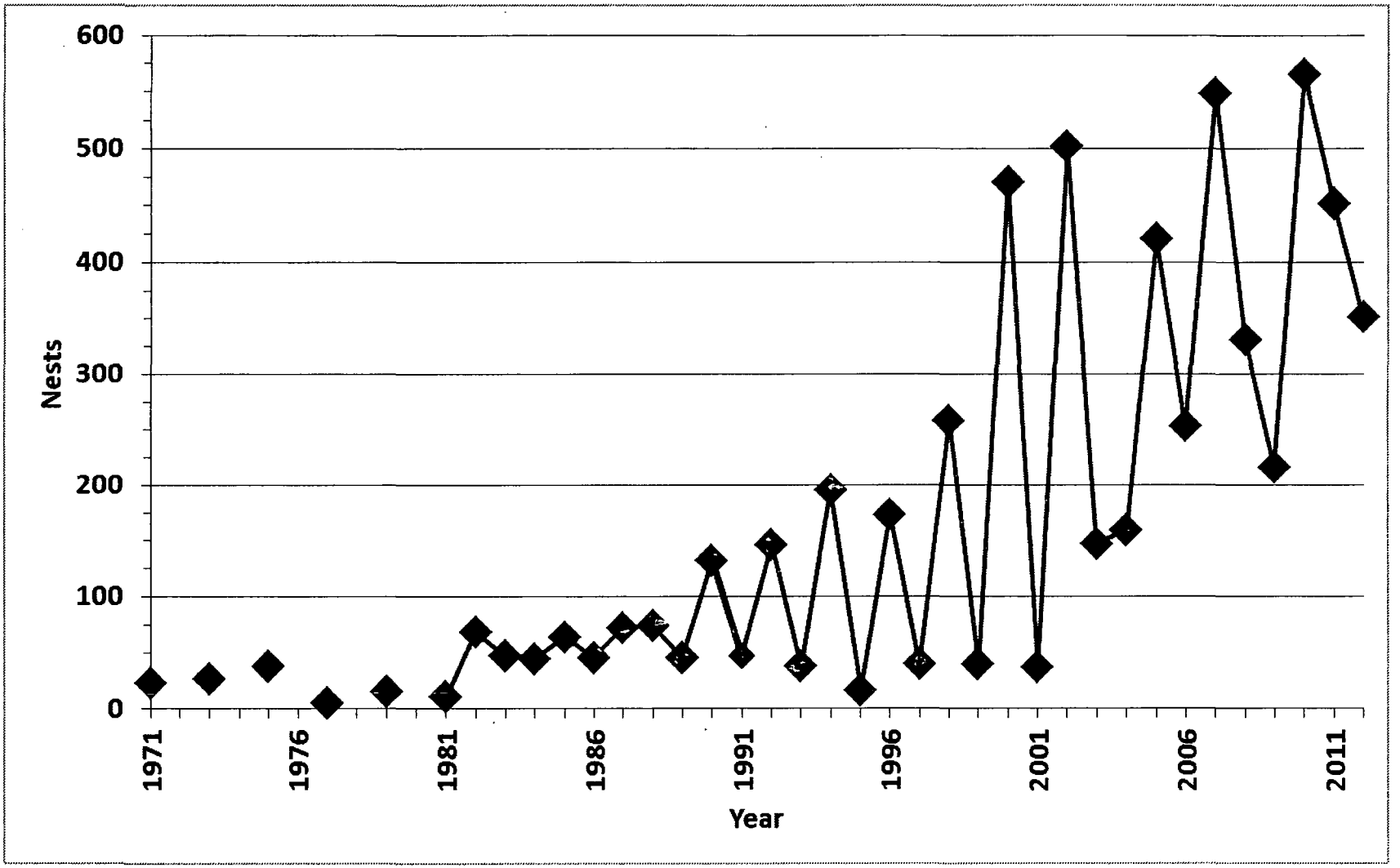

Figure 5. Number of green turtle nests on South Hutchinson Island from 1971 through 2012. Values for 1971 through 1979 are estimates (see section 2.1.1); values for 1981 through 2012 are from whole island surveys.

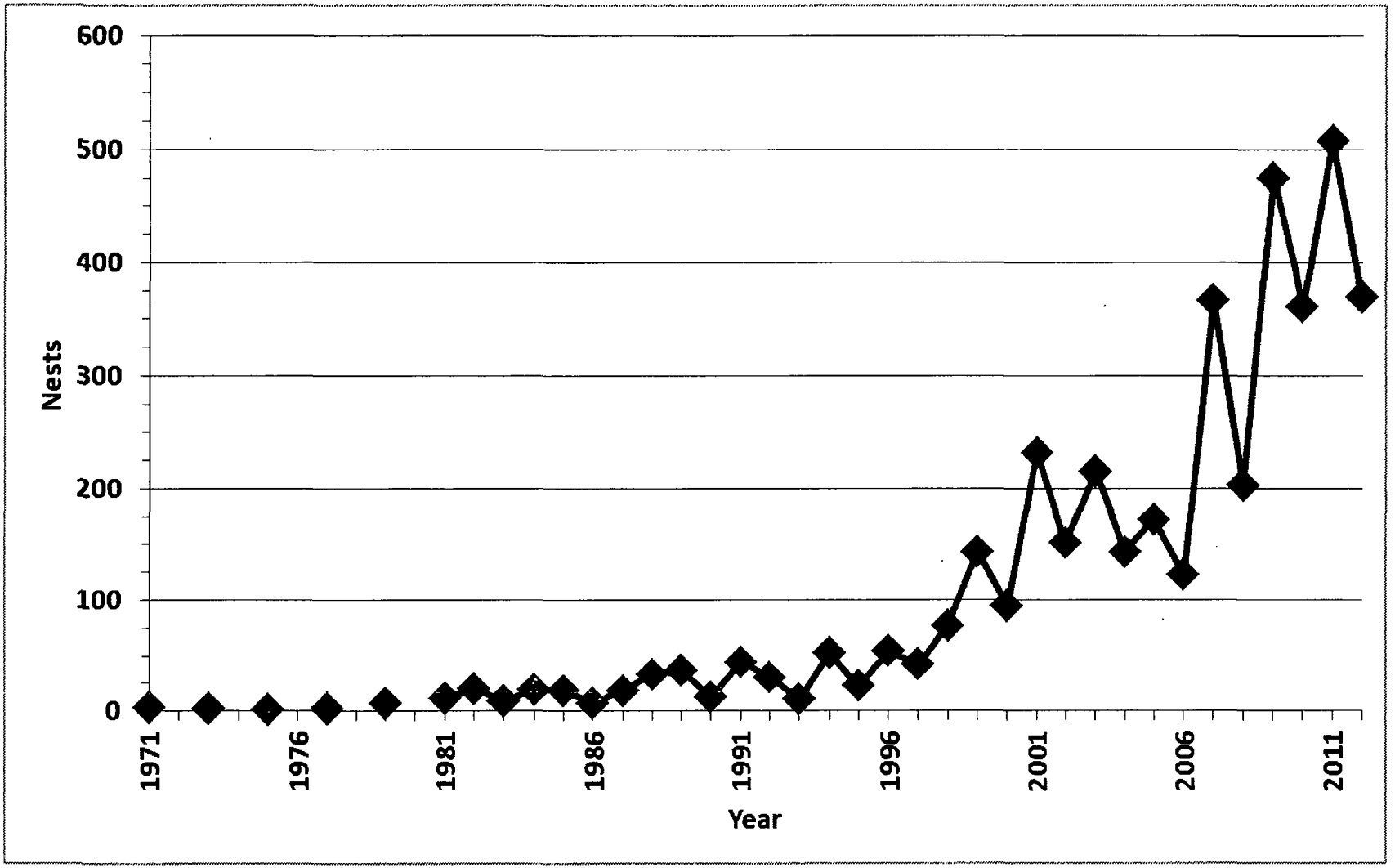

Figure 6. Number of leatherback turtle nests on South Hutchinson Island from 1971 through 2012. Values for 1971 through 1979 are estimates (see section 2.1.1); values for 1981 through 2012 are from whole island surveys.

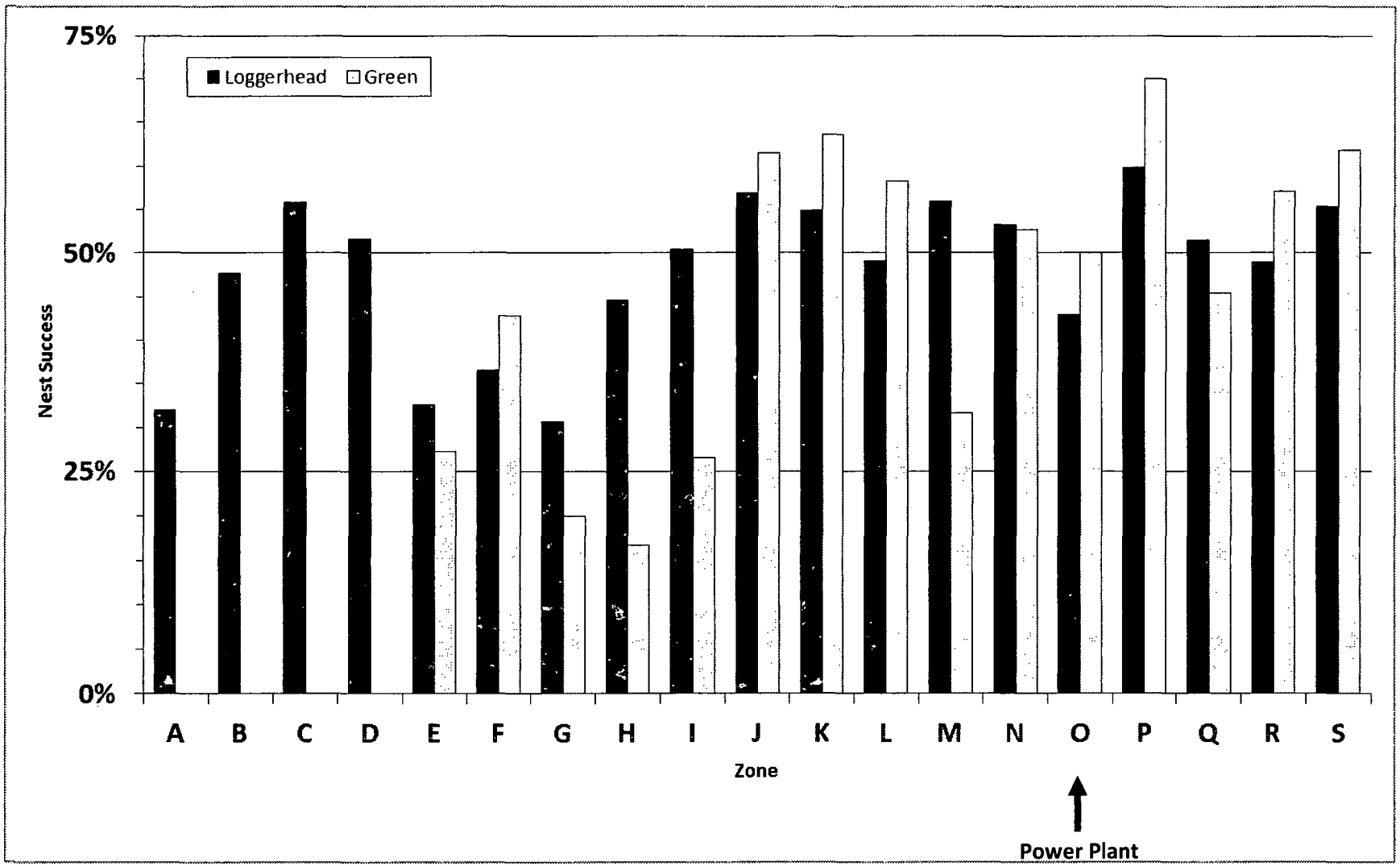

Figure 7. Loggerhead and green turtle nesting success (percentage of emergences resulting in nests) for each of the 1 km zones A through S (North to South) on South Hutchinson Island for the 2012 nesting season

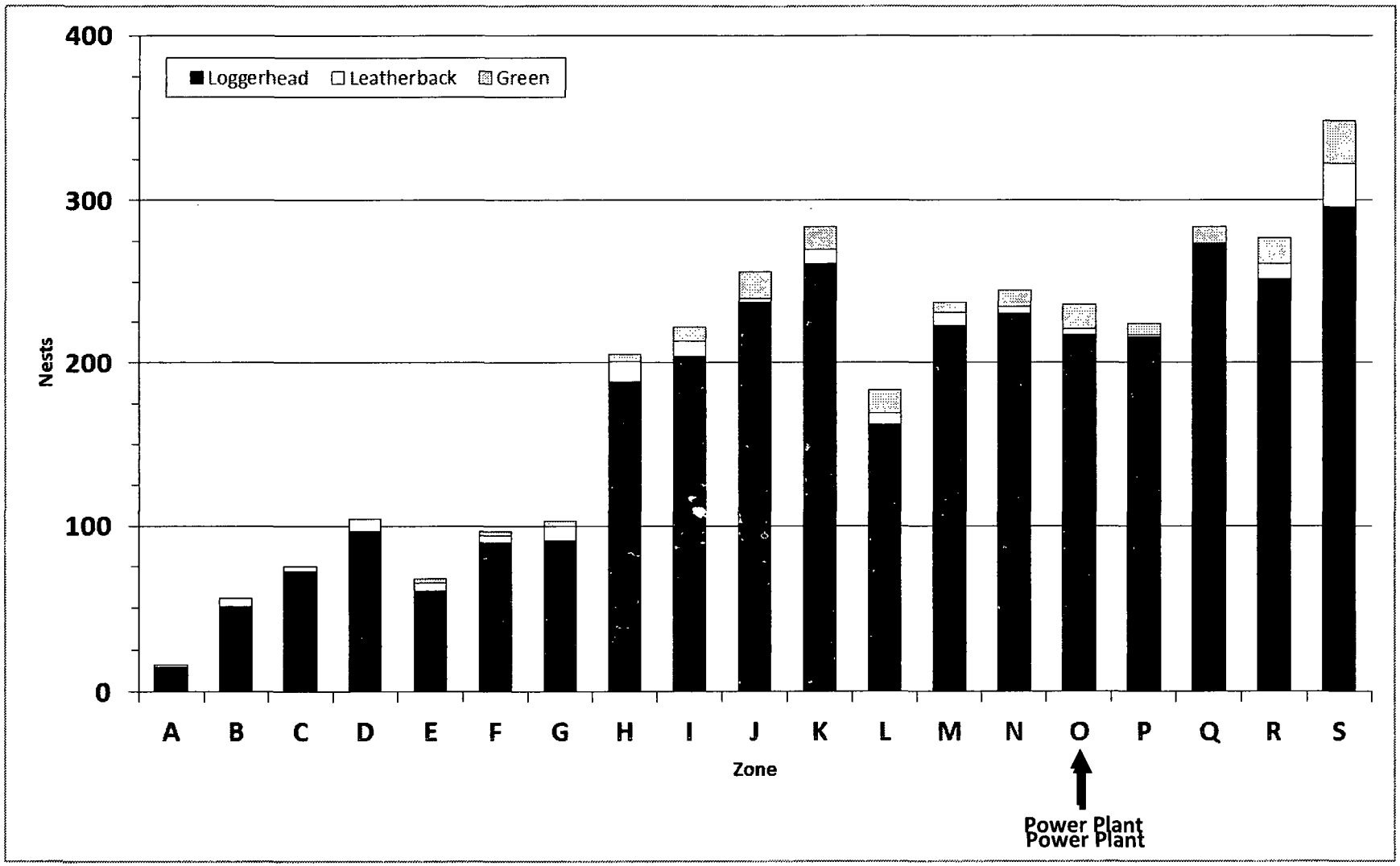

Figure 8. Number of turtle nests by species for each of the 1 km zones A through S (North to South) on South Hutchinson Island for the 2012 nesting season

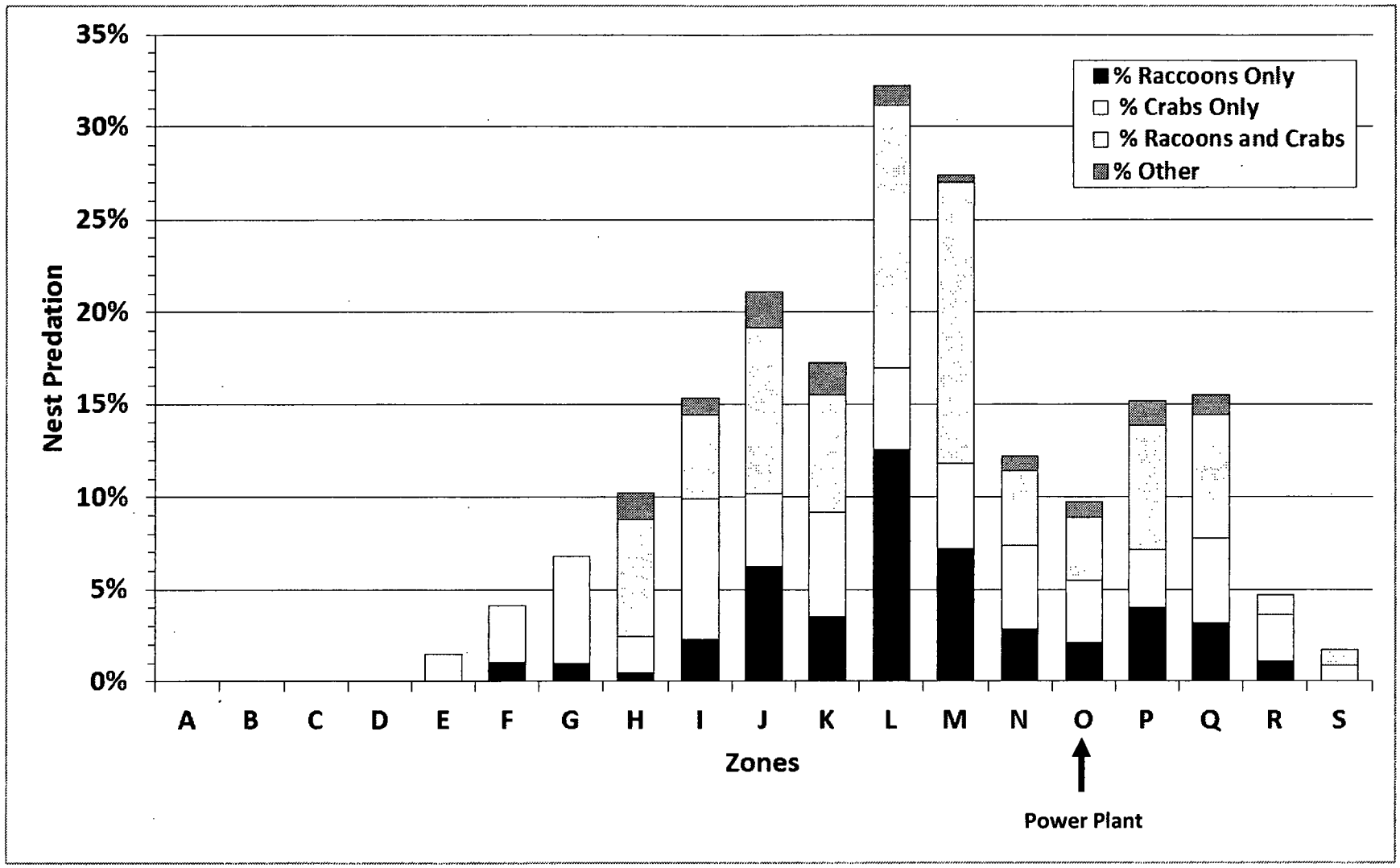

Figure 9. Percentage of sea turtle nests depredated by1 km zones E through S (North to South) on South Hutchinson Island for the 2012 nesting season. Nest predation data from zones A-D were not reported by EAI.

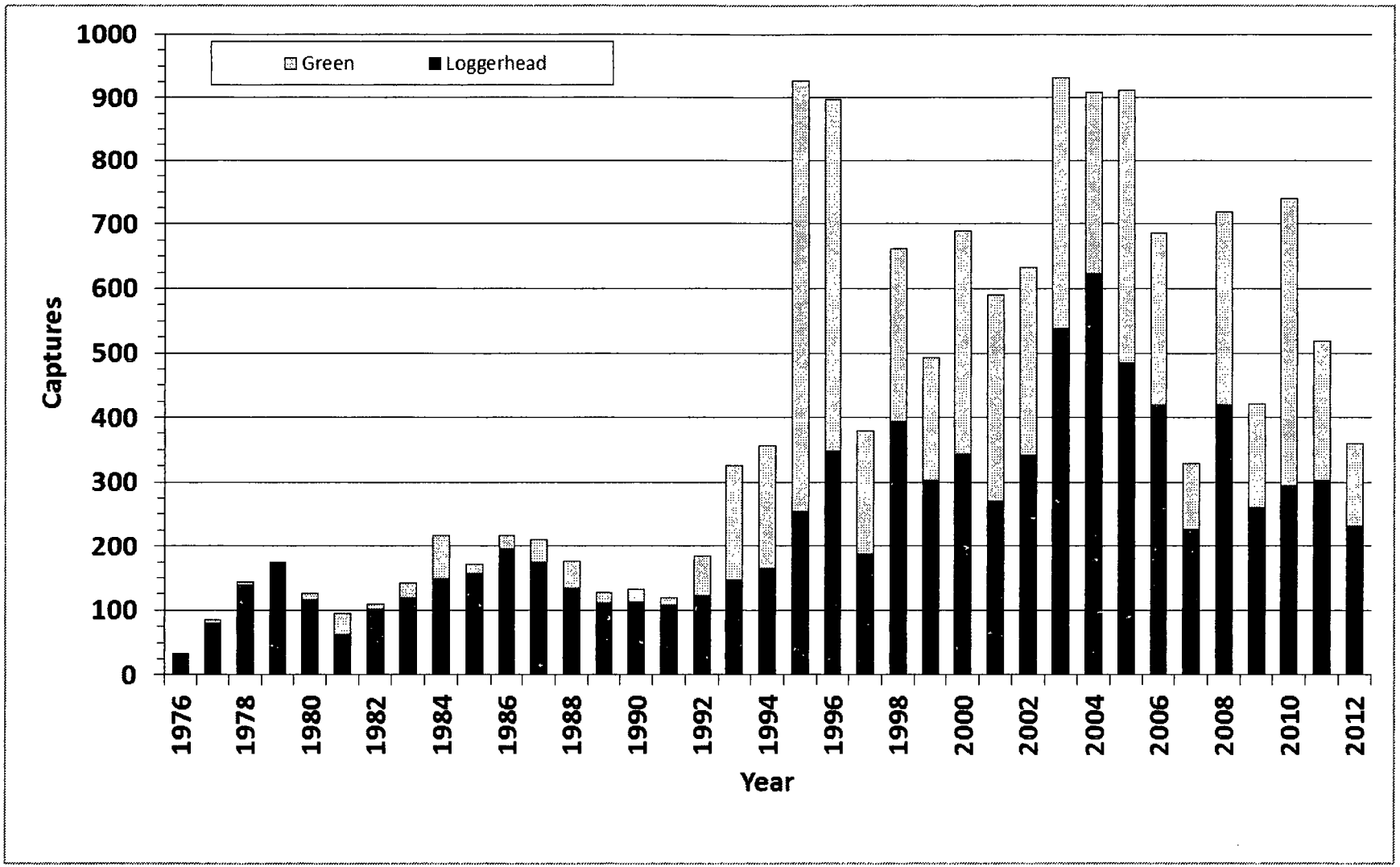

Figure 10. Number of loggerhead and green turtles captured and removed each year from the intake canal at the St. Lucie Plant, 1976 through 2012

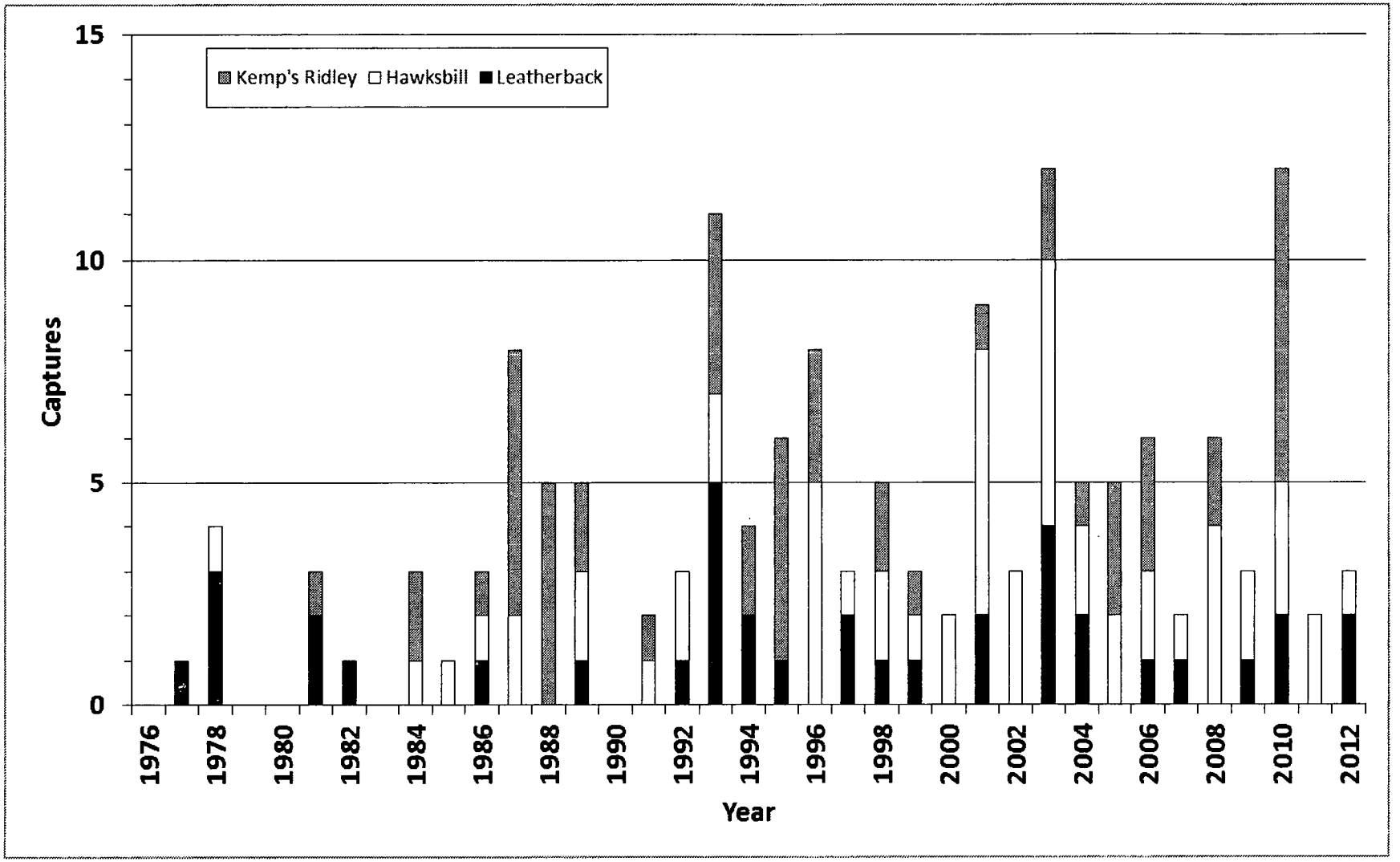

Figure 11. Number of Kemp's Ridley, Hawksbill, and Leatherback turtles captured and removed each year from the intake canal at the St. Lucie Plant, 1976 through 2012

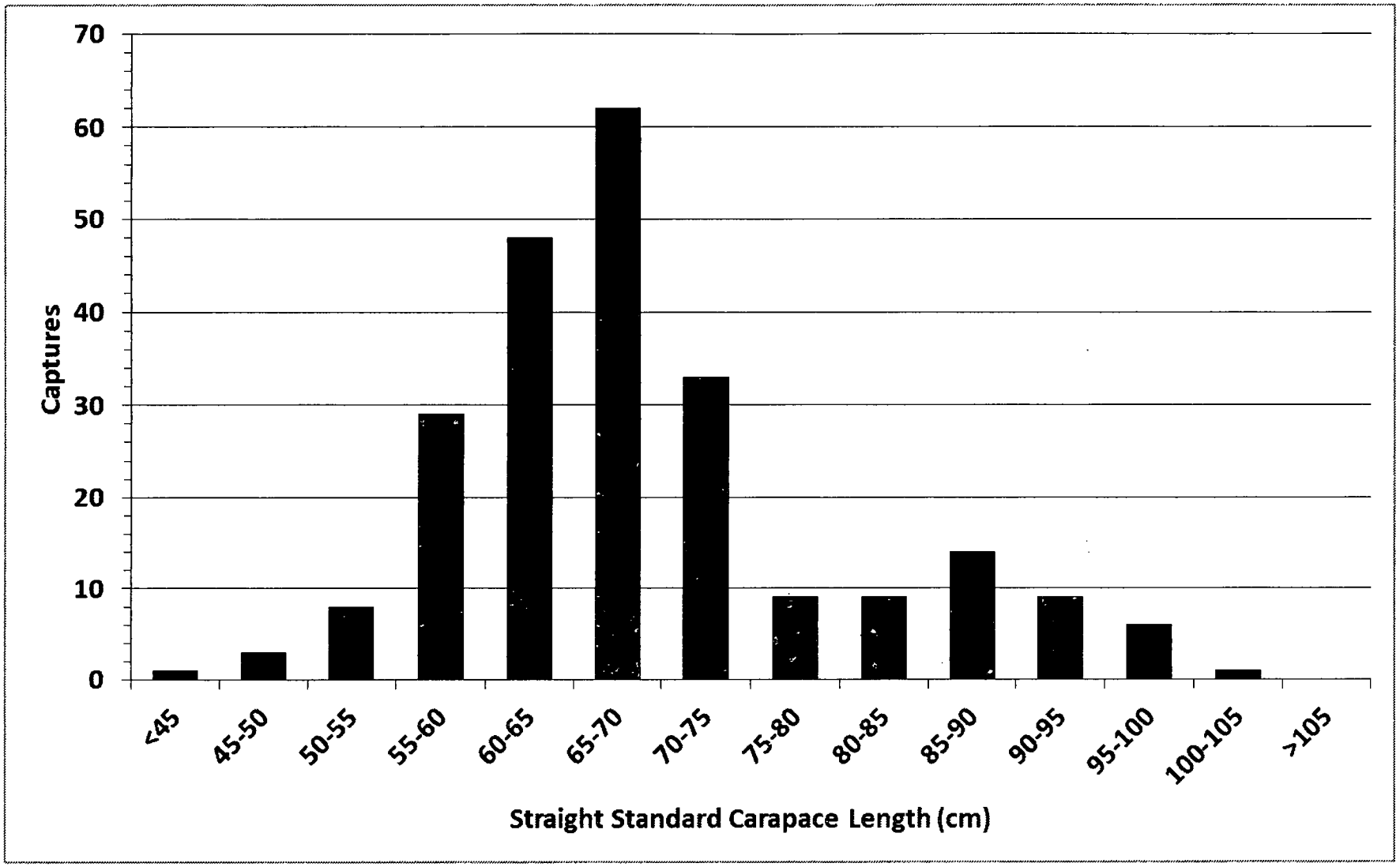

Figure 12. Size distribution (Straight Standard Carapace Length; SSCL) of loggerhead turtles (n=232) captured and removed from the intake canal at the St. Lucie Plant during 2012

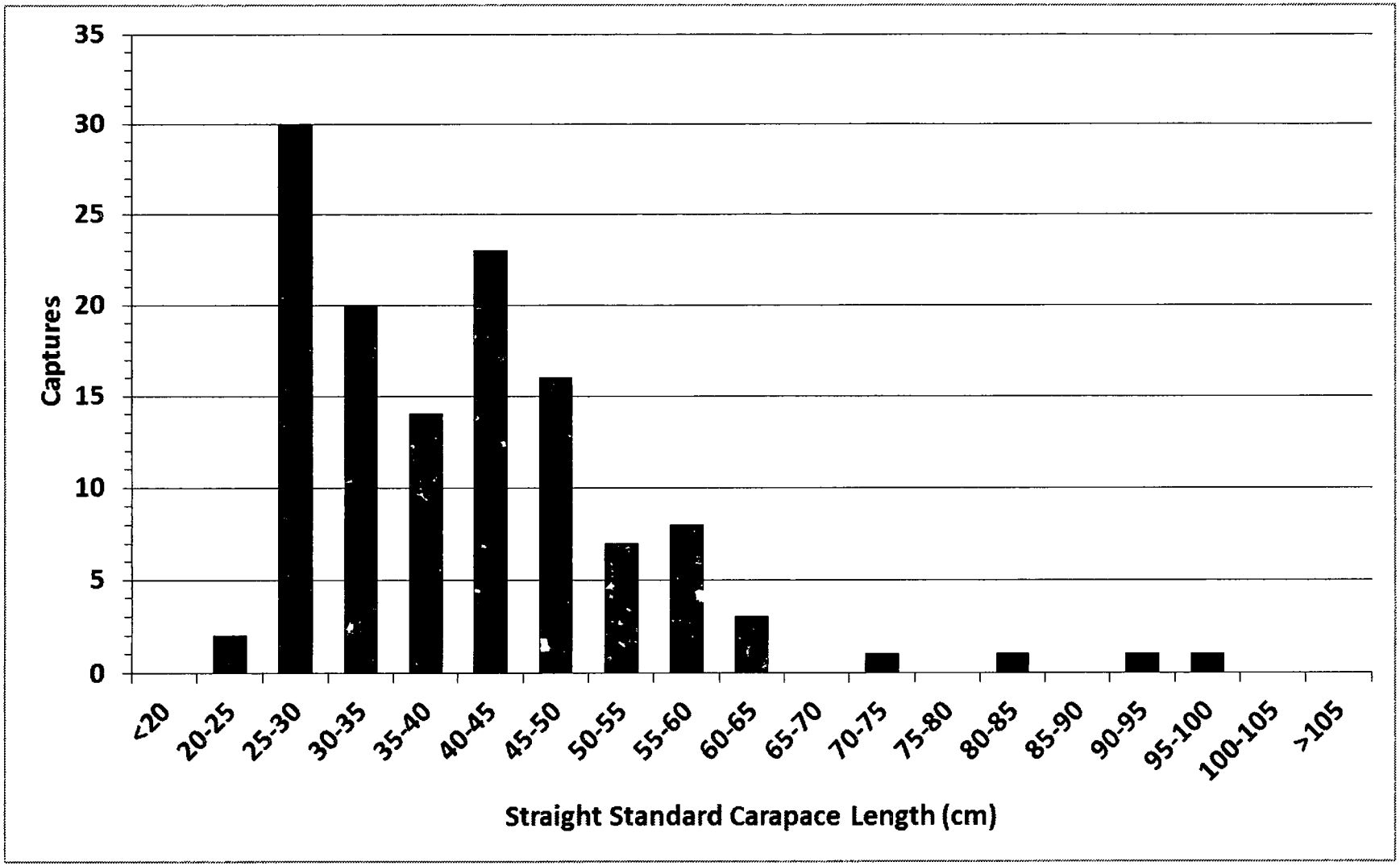

Figure 13. Size distribution (Straight Standard Carapace Length; SSCL) of green turtles (n=127) captured and removed from the intake canal at the St. Lucie Plant during 2012

Year	Loggerhead		Green		Leatherback		Hawksbill		Kemp's ridley		Total	
1976 - 1984	969	74	156	15	7		2		3		1137	89
1985	157	4	14				1				172	4
1986	195	27	22	1	1		1		1		220	28
1987	175	11	35				2		6		218	13
1988	134	6	42	2					5	2	181	10
1989	111	4	17	1	1		2		2	2	133	5
1990	112	1	20	2							132	3
1991	107	1	12				1		1		121	1
1992	123	2	61	2	1		2				187	4
1993	147		179	1	5		2		4		337	1
1994	164		193	4	2				2		361	4
1995	254	1	673	15	1				5		933	16
1996	349	3	549	4			5		3		906	7
1997	188		191	5	2		1				382	5
1998	393	1	268		1		2		2		666	1
1999	302	2	190	4	1		1		1		495	6
2000	344	2	345	2			2				691	4
2001	270	1	321	5	2		6		1		600	6
2002	341		292	3			3				636	3
2003	538		394	2	4		6		2		944	2
2004	623	2	286	1	2		2		1		914	3
2005	484	2	428	1			2		3		917	3
2006	419	22	267	2	1		2		3		692	24
2007	227	3	101	1	1		1				330	4
2008	420	2	299	4			4		2		725	6
2009	260	1	161	1	1		2				424	2
2010	295	2	444	6	2		3		7		751	8
2011	302	1	217	8			2				521	9
2012	232		127		2		1				362	3
Total	**8635**	**175**	**6304**	**92**	**37**	**0**	**58**	**0**	**54**	**4**	**15088**	**274**
Mean*	239.9	4.9	175.1	2.6	1.0	0	1.6	0	1.5	0.1	418.2	7.6

Table 1. Total number of captured turtles removed from the intake canal at the St. Lucie Plant from 1976 through 2012. Number of mortalities is highlighted in gray. Mean excludes partial year of 1976 when 33 loggerheads were captured.

	Loggerhead				Green			
Months	2012 Captures	Total Captures	Percent of Captures	Mean	2012 Captures	Total Captures	Percent of Captures	Mean
January	2	799	9.3%	22.2	5	766	12.2%	21.3
February	9	776	9.0%	21.6	2	664	10.5%	18.4
March	12	922	10.7%	25.6	2	739	11.7%	20.5
April	29	854	9.9%	23.7	9	464	7.4%	12.9
May	37	768	8.9%	21.3	8	423	6.7%	11.8
June	30	897	10.4%	24.9	5	391	6.2%	10.9
July	33	1122	13.0%	31.2	10	366	5.8%	10.2
August	19	744	8.6%	20.7	7	379	6.0%	10.5
September	11	535	6.2%	14.9	5	478	7.6%	13.3
October	15	439	5.1%	12.2	17	612	9.7%	17.0
November	7	330	3.8%	9.2	23	511	8.1%	14.2
December	28	416	4.8%	11.6	34	511	8.1%	14.2
Total	232	8602		238.9	127	6304		175.1

Table 2. Total number of loggerhead and green turtles removed each month from the intake canal at the St. Lucie Plant from 1977 through 2012. Monthly totals exclude the partial year 1976 when 33 loggerheads were captured.

	Leatherback				Hawksbill				Kemp's Ridley			
Months	2012 Captures	Total Captures	Percent of Captures	Mean	2012 Captures	Total Captures	Percent of Captures	Mean	2012 Captures	Total Captures	Percent of Captures	Mean
January	0	5	13.5%	0.1	0	0	0.0%	0.0	0	8	14.8%	0.2
February	0	4	10.8%	0.1	0	1	1.7%	0.0	0	13	24.1%	0.4
March	1	12	32.4%	0.3	0	7	12.1%	0.2	0	12	22.2%	0.3
April	1	6	16.2%	0.2	0	2	3.4%	0.1	0	11	20.4%	0.3
May	0	4	10.8%	0.1	0	2	3.4%	0.1	0	2	3.7%	0.1
June	0	2	5.4%	0.1	0	2	3.4%	0.1	0	2	3.7%	0.1
July	0	0	0.0%	0.0	1	13	22.4%	0.4	0	1	1.9%	0.0
August	0	0	0.0%	0.0	0	9	15.5%	0.3	0	0	0.0%	0.0
September	0	2	5.4%	0.1	0	11	19.0%	0.3	0	0	0.0%	0.0
October	0	0	0.0%	0.0	0	5	8.6%	0.1	0	1	1.9%	0.0
November	0	1	2.7%	0.0	0	5	8.6%	0.1	0	1	1.9%	0.0
December	0	1	2.7%	0.0	0	1	1.7%	0.0	0	3	5.6%	0.1
Total	2	37		1.0	1	58		1.6	0	54		1.5

Table 3. Total number of leatherback, hawksbill, and Kemp's ridley turtles removed each month from the intake canal at the St. Lucie Plant from 1977 through 2012. Monthly totals exclude the partial year 1976 when 33 loggerheads were captured.

7.0 Annual Environmental Operating Report

7.1 Introduction

The St. Lucie Units 1 & 2 Environmental Protection Plans (EPP) require the submittal of an annual report for various activities at the plant site including the reporting on sea turtle monitoring programs, and other matters related to Federal and State environmental permits and certifications.

7.2 Sea Turtle Monitoring and Associated Activities

Surveillance and maintenance of the light screen to minimize sea turtle disorientation as required by Section 4.2.3 of the EPP is ongoing. The vegetation light screen located on the beach dune between the power plant and the ocean is routinely surveyed to determine its overall vitality. Evidence of sea turtle disorientation that occurs would also indicate any significant problems. Trees, vegetation or shade cloth are replaced as necessary to maintain the overall integrity of the light screen. Plant parking lot lighting is also designed and maintained to minimize light levels on the beach.

7.3 Taprogge Condenser Tube Cleaning System Operation

A Taprogge condenser tube cleaning system (CTCS) became operational on St. Lucie Unit 2 in January 1996 and on Unit 1 in July 1996. This system utilizes sponge balls, approximately 23 mm in diameter, to clean the condenser tubes through which seawater flows to cool steam after its pass through the plant's turbines. This system improves plant performance while reducing the need for chemical treatments such and biocides or chlorine to control biofouling.

Normally, the St. Lucie CTCS utilizes about 1800 sponge balls, which are continually re-circulated through each of four "water boxes" on each unit. These sponge balls are retained in the system by a ball strainer located on the outlet of each water box. The ball strainers (mesh size 5 mm) are opened routinely to discharge debris, which can decrease flow and obstruct sponge ball movement through the system. The sponge balls are collected prior to opening, or back flushing, the ball strainers. At that time, the sponge balls are examined and replaced if they are worn to the point that they can no longer effectively clean the condenser tubes.

Sponge ball inventories and estimates of sponge ball loss to the environment have been performed since system start-up on both units. Number of ball strainer back flushes has also been tracked. In addition, daily beach surveys have been performed on plant property (approximately 2.5 miles) to note any sponge balls that may occur as a result of loss from the plant. This survey area has been extended during the turtle nesting season to almost 12 miles.

The results of the program for 2012 are presented in Table 1. Spikes in sponge ball loss have been identified as single events typically involving only one unit. Five spikes in sponge ball loss were recorded in 2012. The common causes of ball loss include debris stuck on the ball strainer, marine growth fouling system components (waterbox, ball strainers, injection nozzles), ball hide-out in dead air spaces, and prolonged use of the same sponge balls. Both units experienced a loss event in June algae and jellyfish influx. When the ball strainers become matted with debris, the sponge balls cannot be retrieved from the system and are lost during back flushing. Unit 1 experienced a loss event in October due to marine growth. Wormrock growth on water box tube sheet and ball strainers causes premature deterioration of the sponge balls and hang-up in the system resulting in poor recovery. Unit 1 also experienced loss events in November and December due to tube sheet liner debris. Deteriorated liners have been known to peel off in chunks collect on the strainers. The sponge balls become snagged on the strainer due do the excessive debris, and are lost during backwash. Unit 2 experience a loss event in January due to sponge balls being trapped in the system when a cooling water pump tripped. A ball collection could not be performed prior to placing the system back in service. Many of the sponge balls lost due to this event were recovered later during subsequent ball collections.

The waterboxes were operated based on system availability or system engineer recommendation. The Unit 1 system did not run from January through April and the Unit 2 system did not run from August through November due to a scheduled maintenance outages. Ball losses resulting from deteriorating waterbox liners was documented for water boxes on Unit 1 in 2012. To prevent further ball loss, the 1B1 and 1B2 water boxes were not loaded with sponge balls and remained in backwash from September into November. All water boxes were left in backwash during the Algae intrusion event in June.

Total sponge ball losses from Unit 1 were higher than Unit 1 in 2012. This was mainly due to the peak observed October through December. Elevated ball loss is the result of worm rock growth, algae intrusion and old tube sheet liner peels collecting on the strainers. Only 2 sponge balls were found whole in the environment near the plant in 2012. This number indicates that few balls actually reach the environment whole.

Figure 1 indicates that estimated sponge ball loss for both units generally remained low throughout the year, with exception to the previously discussed events. Average daily ball loss in 2012 is above the historic average, but indicates ball losses have decreased since the start of the tube sheet liner replacement project (Figure 2). Estimated sponge ball loss from both units was 25.9 balls per day for 2012. Average daily sponge ball loss since system start-up has been approximately 19 balls per day.

7.4 Other Routine Reports

The following items for which reporting is required are listed by section number from the plant's Environmental Protection Plan:

5.4.1.2(A) EPP Noncompliance Incidents and Corrective Actions Taken

No incidents of noncompliance under EPP Section 5.4.1(a) were determined to have occurred during 2012.

5.4.1.2(b) Changes in Station Design or Operation, Tests, and Experiments in Accordance with EPP Subsection 3.1

The NRC and State of Florida approved Extended Power Uprate Project was completed in 2012. The plant's allowable increase in effluent discharge temperature limits are captured in the Site's Industrial Wastewater Permit.

5.4.1.2(c) Non-routine reports submitted to the NRC for the year 2012 in accordance with EPP Subsection 5.4.2

On January 21, 2012, St. Lucie submitted to the NRC a copy of a Request for Minor Revision to IWW Permit No. FL 0002208 for typographical errors, clarifying statements, and a due date extension for Administrative Order AO022TL. Notification to the NRC occurred by FPL letter L-2011-036.

On March 23, 2012, St. Lucie submitted to the NRC a copy of a request for a minor Revision to IWW Permit No. FL 0002208 for a change in the pumping methodology from approved outfall-I008. Notification to the NRC occurred by FPL letter L-2012-135.

On March 30, 2013, St. Lucie submitted to the NRC a copy of the approval for a Minor Revision to IWW Permit No. FL 0002208. Notification to the NRC occurred by FPL letter L-2012-152.

On April 24, 2012, St. Lucie submitted to the NRC the 2011 Annual Environmental Operating Report for the calendar year 2011. Notification to the NRC occurred by FPL letter L-2012-170.

On May 15, 2012, St. Lucie submitted to the NRC a copy of the state approval for a Minor Revision to IWW Permit No. FL 0002208 pertaining to a change in pumping methodology for approved outfall I-008.

On November 25, 2012, and December 9, 2012, a dead juvenile green sea turtle (chelonian mydas) was recovered from the five-inch sea turtle barrier net. The determination is that both mortalities were causal to plant operations. Notification to the NRC occurred by FPL letter L-2012-448.

7.5 Figures and Tables

TABLE 1

2012 ST. LUCIE PLANT CONDENSER TUBE CLEANING SYSTEM SUMMARY

	Strainer Back Flushes		Estimated Ball Loss		Balls Found On Beach
Month	Unit 1	Unit 2	Unit 1	Unit 2	
January	0#	17	0	1330	0
February	0#	9	0	148	0
March	0#	16	0	236	0
April	0#	17	0	12	0
May	5	18	815	+266	0
June	5	10	1571	653	0
July	12	6	545	+17	0
August	17	0##	114	71	5
September	12	0##	229	0	26
October	8	0##	1886	0	1
November	4	0##	1072	0	1
December	13	9	805	243	0
Total	76	102	7037	2410	33

\# Unit 1 system shutdown during refueling, 11/26/11 to 5/1/12
Unit 2 system shutdown during refueling, 8/5/12 to 11/23/12
\+ Net gain in inventory
* Loss of abrasive balls

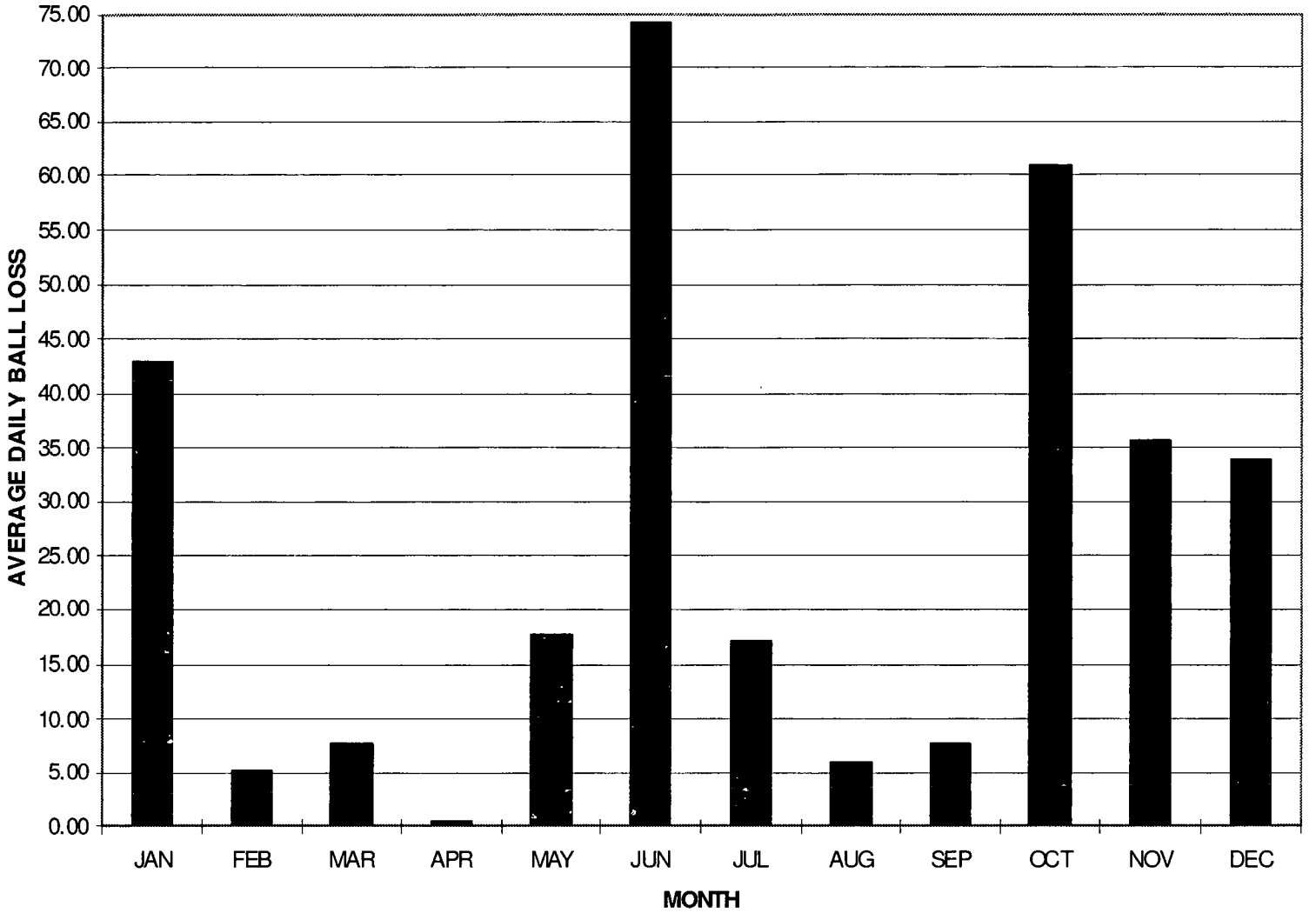

Figure 1. Estimated Average Daily Sponge Ball Loss by Month from St. Lucie Plant (Both Units) for 2012

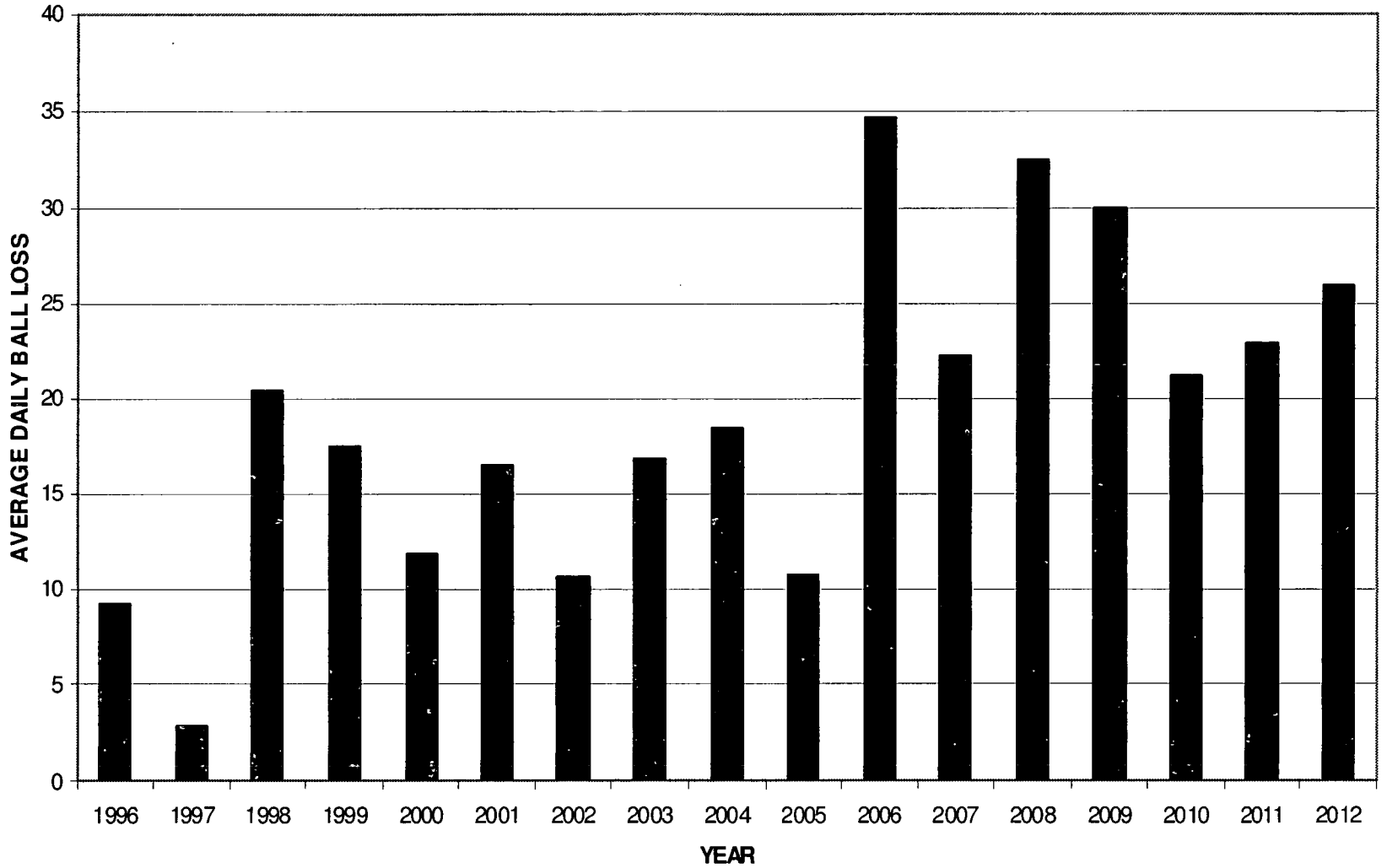

Figure 2. Average Daily Sponge Ball Loss from the St. Lucie Plant (Both Units) Since System Start-Up (January 1996)