NRC FORM 464 Part I
(6-1998)

U.S. NUCLEAR REGULATORY COMMISSION

RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) / PRIVACY ACT (PA) REQUEST

FOIA/PA	RESPONSE NUMBER
2000-0058	1

RESPONSE TYPE: ☐ FINAL ☑ PARTIAL

REQUESTER: Paul Gunter

DATE: DEC 16 1999

PART I. -- INFORMATION RELEASED

- ☐ No additional agency records subject to the request have been located.
- ☐ Requested records are available through another public distribution program. See Comments section.
- ☐ APPENDICES _____ Agency records subject to the request that are identified in the listed appendices are already available for public inspection and copying at the NRC Public Document Room.
- ☑ APPENDICES A Agency records subject to the request that are identified in the listed appendices are being made available for public inspection and copying at the NRC Public Document Room.
- ☐ Enclosed is information on how you may obtain access to and the charges for copying records located at the NRC Public Document Room, 2120 L Street, NW, Washington, DC.
- ☑ APPENDICES A Agency records subject to the request are enclosed.
- ☐ Records subject to the request that contain information originated by or of interest to another Federal agency have been referred to that agency (see comments section) for a disclosure determination and direct response to you.
- ☑ We are continuing to process your request.
- ☐ See Comments.

PART I.A -- FEES

AMOUNT *
$

* See comments for details

- ☐ You will be billed by NRC for the amount listed.
- ☐ You will receive a refund for the amount listed.
- ☐ None. Minimum fee threshold not met.
- ☐ Fees waived.

PART I.B -- INFORMATION NOT LOCATED OR WITHHELD FROM DISCLOSURE

- ☐ No agency records subject to the request have been located.
- ☐ Certain information in the requested records is being withheld from disclosure pursuant to the exemptions described in and for the reasons stated in Part II.
- ☐ This determination may be appealed within 30 days by writing to the FOIA/PA Officer, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Clearly state on the envelope and in the letter that it is a "FOIA/PA Appeal."

PART I.C COMMENTS (Use attached Comments continuation page if required)

SIGNATURE - FREEDOM OF INFORMATION ACT AND PRIVACY ACT OFFICER

Carol Ann Reed

DAILY STATUS REPORT
Florida Power & Light
St Lucie Nuclear Power Station
12/01/99

* * * INDUSTRIAL SAFETY * * *

NAME: Jim Parker DATE/TIME: 11/30/99

SAFETY	INJURIES PREVIOUS WORKDAY	PSL INJURIES YTD
Minor Injuries:	0	65
Serious Injuries:	0	16
Severe Injuries:	0	3

Comments:

No Injuries.

Safety 2000 Team meeting today @ 12:40 PM in room 4011.

Serious Injury:

* * * OPERATIONS * * *

NAME: D Emling DATE/TIME: 12/01/99

OPERATING PARAMETERS		UNIT 1	UNIT 2
Y-T-D Equivalent Availability (11/28/99):	%	86.39	96.24
Power Level:	%	100	99.95
Electrical Output (Gross):	MWe	906	904
Heat Rate:	BTU/KWHr	10172	10196
Days Online or Shutdown:	No.	32	173
RCS Boron Concentration:	ppm	881	356
RCS Identified Leak Rate:	gpm	0	0
RCS Unidentified Leak Rate:	gpm	.14	0
RCS Total Leak Rate:	gpm	.14	0
Containment Temperature:	Deg F	96	94
Lighted Control Room Annunciators:	No.	2	6
Active TSA's:	No.	1	2
Condenser Air Ejector Flow Rate, Total:	Scfm	5.6	1.4
Condenser Back Pressure:	in/hg	2.3	2.5
Intake Water Temperatures:	Deg F	75	75
Hypo System (Pri) Status:		Out of Svc	Out of Svc
CTCS Status:		In Svc	In Svc

A/1

NAME: Ward/Williams DATE/TIME: 11/30/99

OTHER ISSUES:

3-Day CRs:

*** * * SHIFT TECHNICAL ADVISOR * * ***

NAME: Ward/Williams DATE/TIME: 12/01/99

OPERATING LOG HIGHLIGHTS:

Unit 1 Time	Log Entry
11/30/99 0650	RECEIVED ANN D-24 GLAND SEAL PRESSURE ALARM, ALARM IMMEDIATELY RESET
0845	RE AND OPS WILL BE MOVING SPENT FUEL BUNDLES IN THE SPENT FUEL POOL. 0925 - MOVEMENT OF SPENT FUEL IN THE SFP IS COMPLETE.
0915	STARTED THE 1A CHARGING PUMP AND SECURED THE 1C CHG PP DUE TO SEAL TANK LEAKAGE AND PREPERATION FOR MECH MAINT. WORK NEXT WEEK.
1055	NI CALIBRATION IS COMPLETE, LOGIC RESTORED TO TWO-OUT-OF-FOUR.
1102	STA PREPORTS MAKING 10 CFR 50.72 NOTIFICATION TO NRC REGARDING CONTACT WITH THE FLORIDA DEP ABOUT AN INJURED SEA TURTLE REMOVED FROM THE INTAKE CANAL BARRIER NET. NPS AND NRC RESIDENT INSPECTOR WERE NOTIFIED.
1334	RECEIVED ANN R-28 "SI HEADER PRESS HIGH LOOP 1B2" INVESTIGATING CAUSE. 1345 - PERFORMED DS #25, BLED PRESSURE DOWN TO 240 PSI, MONITORED FOR 10 MINUTES AND THE CHECK VALVE APPEARS TO BE HOLDING (NO LEAKAGE). CONTACTED OSE ON THE STATUS OF THE SI HEADER.
1500	NRC DISCOVERED CEA #30 IS ON THE LOWER GRIPPER AT THE COIL POWER PROGRAMMER PANEL. NOTIFIED I&C, NPS, AND OPS MGMT. SUBMITTED GMP-21 AND NPWO (WR#29011405). 1655 - I&C REPORTS THAT CEA #30 TRANSFERRED DUE TO LOW CURRENT TO UPEER GRIPPER. WILL CHANGE UPPER GRIPPER HALL EFFECT CURRENT TRANSDUCER WHEN PACKAGE HAS BEEN PLANNED. CEA #30 WILL REMAIN ON LOWER GRIPPER IN THE INTERIM. CEA REMAINS OPERABLE.

"There was no loss of hazardous/radioactive material or radioactive/radiological contamination exposure as a result of this event."

Portsmouth personnel notified the NRC resident inspector and plan to notify the Department of Energy site representative.

Power Reactor — Event Number: 36465

FACILITY: SAINT LUCIE	REGION: 2
UNIT: [1] [2] []	STATE: FL
RXTYPE: [1] CE,[2] CE	
NRC NOTIFIED BY: DAVE WILLIAMS	
HQ OPS OFFICER: LEIGH TROCINE	
NOTIFICATION DATE: 11/26/1999	
NOTIFICATION TIME: 09:12[EST]	
EVENT DATE: 11/26/1999	
EVENT TIME: 08:00[EST]	
LAST UPDATE DATE: 11/26/1999	
PERSON: LEN WERT	ORGANIZATION: R2
EMERGENCY CLASS: N/A	
10 CFR SECTION: APRE 50.72(b)(2)(vi)	OFFSITE NOTIFICATION

UNIT	SCRAM CODE	RX CRIT	INIT PWR	INIT RX MODE	CURR PWR	CURR RX MODE
1	N	Y	100	Power Operation	100	Power Operation
2	N	Y	100	Power Operation	100	Power Operation

EVENT TEXT

OFFSITE NOTIFICATION REGARDING A LIVE SEA TURTLE REMOVED FROM THE INTAKE CANAL BARRIER NET

The following text is a portion of a facsimile received from the licensee:

"At approximately 0730 on 11/26/99, a live juvenile loggerhead sea turtle was removed from the barrier net in the common plant intake canal. The Florida Department of Environmental Protection was notified at approximately 0800 for transfer to a rehabilitation facility."

The licensee notified the NRC resident inspector.

Power Reactor — Event Number: 36466

FACILITY: CALLAWAY	REGION: 4
UNIT: [1] [] []	STATE: MO
RXTYPE: [1] W-4-LP	
NRC NOTIFIED BY: GARY OLMSTEAD	
HQ OPS OFFICER: STEVE SANDIN	
NOTIFICATION DATE: 11/26/1999	
NOTIFICATION TIME: 17:16[EST]	
EVENT DATE: 11/26/1999	
EVENT TIME: 12:27[CST]	
LAST UPDATE DATE: 11/26/1999	
PERSON: BLAIR SPITZBERG	ORGANIZATION: R4
EMERGENCY CLASS: N/A	
10 CFR SECTION: ARPS 50.72(b)(2)(ii)	RPS ACTUATION
AESF 50.72(b)(2)(ii)	ESF ACTUATION

UNIT	SCRAM CODE	RX CRIT	INIT PWR	INIT RX MODE	CURR PWR	CURR RX MODE

A/2

1	A/R	Y	100	Power Operation	0	Hot Standby

EVENT TEXT

Unit experienced an automatic reactor trip following a momentary loss of power to an I&C power supply that resulted in a low Steam Generator water level.

"This event is being reported in accordance with 10CFR50.72(b)(2)(ii) due to an automatic Reactor Trip and subsequent Aux Feedwater actuation and Feedwater isolation:

"On 11/26/99 at 1227 CST with Callaway plant at 100% reactor power, a Reactor Trip occurred on low Steam Generator 'A' level due to an apparent momentary loss of power in Control Cabinet [Relay Panel] RP043. At 1204, annunciator 93A 'Power Control System (PCS) Power Failure' alarmed due to a failed RP043 primary power supply. Initial investigation revealed a failed fuse in the RP043 primary power supply. The secondary power supply immediately picked up load without incident.

"Subsequent to the primary power supply failure, I&C technicians were sent to the RP043 cabinet and the Primary Equipment Operator was sent to RP043 supply breaker PG19GCR218 to investigate. During this investigation, Main Feedwater Regulating valve [MFRV] 'A' went shut and both Main Feedwater Pumps [MFPs] went to their low speed stops. Attempts by the Reactor Operator to take manual control of 'A' MFRV and the MFPs were unsuccessful resulting in the aforementioned Reactor Trip.

"Discussions with I&C personnel stationed at RP043 indicated the secondary power supplies appeared energized throughout the event. Discussions with the Primary EO indicated he checked PG19GCR218 in the closed position coincident with the trip. Plant personnel are currently investigating PG19GCR218 and the apparent momentary loss of power to RP043. The plant is currently stable in Mode 3 with RCS pressure at 2237 psig and RCS temperature at 557.8 F.

"Additional information: The NRC Senior Resident Inspector was contacted at 1310 and responded to the Control Room."

Auxiliary Feedwater is currently supplying the Steam Generators with steam flow to the Main Condenser for decay heat removal. All control rods fully inserted.

Power Reactor — Event Number: 36467

FACILITY: SAINT LUCIE REGION: 2	NOTIFICATION DATE: 11/26/1999
UNIT: [1] [2] [] STATE: FL	NOTIFICATION TIME: 17:34[EST]
RXTYPE: [1] CE,[2] CE	EVENT DATE: 11/26/1999
	EVENT TIME: 17:12[EST]
NRC NOTIFIED BY: DAVE WILLIAMS	LAST UPDATE DATE: 11/26/1999
HQ OPS OFFICER: STEVE SANDIN	

EMERGENCY CLASS:	N/A	PERSON	ORGANIZATION
10 CFR SECTION:		LEN WERT	R2
APRE 50.72(b)(2)(vi)	OFFSITE NOTIFICATION		

UNIT	SCRAM CODE	RX CRIT	INIT PWR	INIT RX MODE	CURR PWR	CURR RX MODE
1	N	Y	100	Power Operation	100	Power Operation
2	N	Y	100	Power Operation	100	Power Operation

EVENT TEXT

OFFSITE NOTIFICATION TO STATE AGENCY REGARDING DEAD SEA TURTLE FOUND IN BARRIER NET OF THE INTAKE CANAL

"[A] NOTIFICATION [WAS] MADE TO [THE] FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) REGARDING [THE] REMOVAL OF [A] DEAD SUB-ADULT LOGGERHEAD SEA TURTLE FROM THE BARRIER NET IN THE COMMON PLANT INTAKE CANAL. THE TURTLE WAS REMOVED AT APPROXIMATELY 1700 [HOURS] ON 11/26/99, AND THE FLORIDA DEP WAS NOTIFIED AT 1710 HOURS. [THE] ANIMAL WAS FOUND WITH MONOFILAMENT FISHING LINE AROUND [THE] FRONT FLIPPERS AND [THE] MORTALITY IS NOT BELIEVED TO BE CAUSALLY RELATED TO PLANT OPERATIONS. THE LICENSEE WILL NOTIFY THE NRC RESIDENT INSPECTOR."

Hospital

Event Number: 36468

REP ORG: FAIRVIEW SOUTHDALE HOSPITAL
LICENSEE: FAIRVIEW SOUTHDALE HOSPITAL
CITY: EDINA
COUNTY:
LICENSE#: 22-00015-02
DOCKET:
REGION: 3
STATE: MN
AGREEMENT: N

NOTIFICATION DATE: 11/26/1999
NOTIFICATION TIME: 23:46[EST]
EVENT DATE: 11/25/1999
EVENT TIME: 07:05[CST]
LAST UPDATE DATE: 11/26/1999

PERSON	ORGANIZATION
RONALD GARDNER	R3
JOE HOLONICH	NMSS

NRC NOTIFIED BY: DR. L. LEWANOWSKI
HQ OPS OFFICER: STEVE SANDIN

EMERGENCY CLASS: N/A
10 CFR SECTION:
LADM 35.33(a) MED MISADMINISTRATION

EVENT TEXT

FEMALE PATIENT RECEIVED LESS THAN THE PRESCRIBED DOSE DUE TO TECHNICIAN ERROR

A FEMALE PATIENT UNDERGOING TREATMENT FOR ENDOMETRIAL CANCER RECEIVED 5072 RATHER THAN THE 6500 CENTIGRAY PRESCRIBED DUE TO TECHNICIAN ERROR IN LOADING TWO (2) OLD CESIUM-137 SOURCES INTO THE APPLICATOR. THE NEWER SOURCES (25 MILLIGRAMS RADIUM EQUIVALENT EACH) WERE CLEARLY LABELED AND INDICATED ON THE HOSPITAL FORMS. THE PRESCRIBING PHYSICIAN WAS INFORMED AND REQUESTED THAT THE PATIENT NOT BE NOTIFIED PENDING AN EVALUATION OF WHETHER ADDITIONAL TREATMENT IS REQUIRED. THE LICENSEE WILL SUBMIT A WRITTEN REPORT WITHIN FIFTEEN DAYS.

CALLTHE HEADQUARTERS OPERATIONS OFFICER FOR CONTACT INFORMATION.

DAILY STATUS REPORT
Florida Power & Light
St Lucie Nuclear Power Station
11/29/99

* * * INDUSTRIAL SAFETY * * *

NAME: Jim Parker DATE/TIME: 11/24/99

SAFETY	INJURIES PREVIOUS WORKDAY	PSL INJURIES YTD
Minor Injuries:	0	65
Serious Injuries:	0	16
Severe Injuries:	0	3

Comments:

No Injuries.

Serious Injury Investigation Team form to assist LJASC to determine Root Cause of OSHA Recordable on 11/23/99.

Serious Injury:

* * * OPERATIONS * * *

NAME: JP Honeysett DATE/TIME: 11/29/99 0500

OPERATING PARAMETERS		UNIT 1	UNIT 2
Y-T-D Equivalent Availability (11/22/99):	%	86.09	96.16
Power Level:	%	100.00	99.95
Electrical Output (Gross):	MWe	904	902
Heat Rate:	BTU/KWHr	10203	10196
Days Online or Shutdown:	No.	30	171
RCS Boron Concentration:	ppm	882	360
RCS Identified Leak Rate:	gpm	.00	.06
RCS Unidentified Leak Rate:	gpm	.04	.03
RCS Total Leak Rate:	gpm	.04	.09
Containment Temperature:	Deg F	93	96
Lighted Control Room Annunciators:	No.	2	6
Active TSA's:	No.	1	2
Condenser Air Ejector Flow Rate, Total:	Scfm	6.8	1.1
Condenser Back Pressure:	in/hg	2.4	2.7
Intake Water Temperatures:	Deg F	76	76

A/3

LER Number	Rev	Due Date	Description	CR Number
99-007	0	11/29/99	MANUAL RX TRIP DUE TO LOW SG LEVEL	99-2185
99-008	0	12/17/99	SETPOINTS FOR THE PZR SAFETY VLVS FOUND TO BE OUTSIDE THE TS TOLERENCE LIMIT OF +/- 1%.	99-2313

UNIT 2:
NONE

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* * * PROTECTION SERVICES * * *

NAME: R. Walker DATE/TIME: 11/24/99

EMERG ASSESS/OFFSITE RESP/COMM CAPABILITIES:	SITE
ERDADS:	OK
Emergency Response Facilities (ERFS):	OK
Emergency Communication Equipment:	OK
Prompt Notification System incl. Sirens:	OK

Comments

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* * * MAINTENANCE SERVICES * * *

NAME: NWhiting DATE/TIME: 11/29/99

ENVIRONMENTAL COMPLIANCE STATUS: **SITE**

One sick sea turtle and another dead sea turtle were removed from the plant intake canal 11/26/99. As per sea turtle permit, State Bureau of Protected Species has to be notified of these events, prompting NRC 4-hour notification. Initial investigation indicates that neither incident was causally related to plant operation.

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* * * SECURITY * * *

NAME: B. Boskey DATE/TIME: 11/29/99

GENERAL INFORMATION

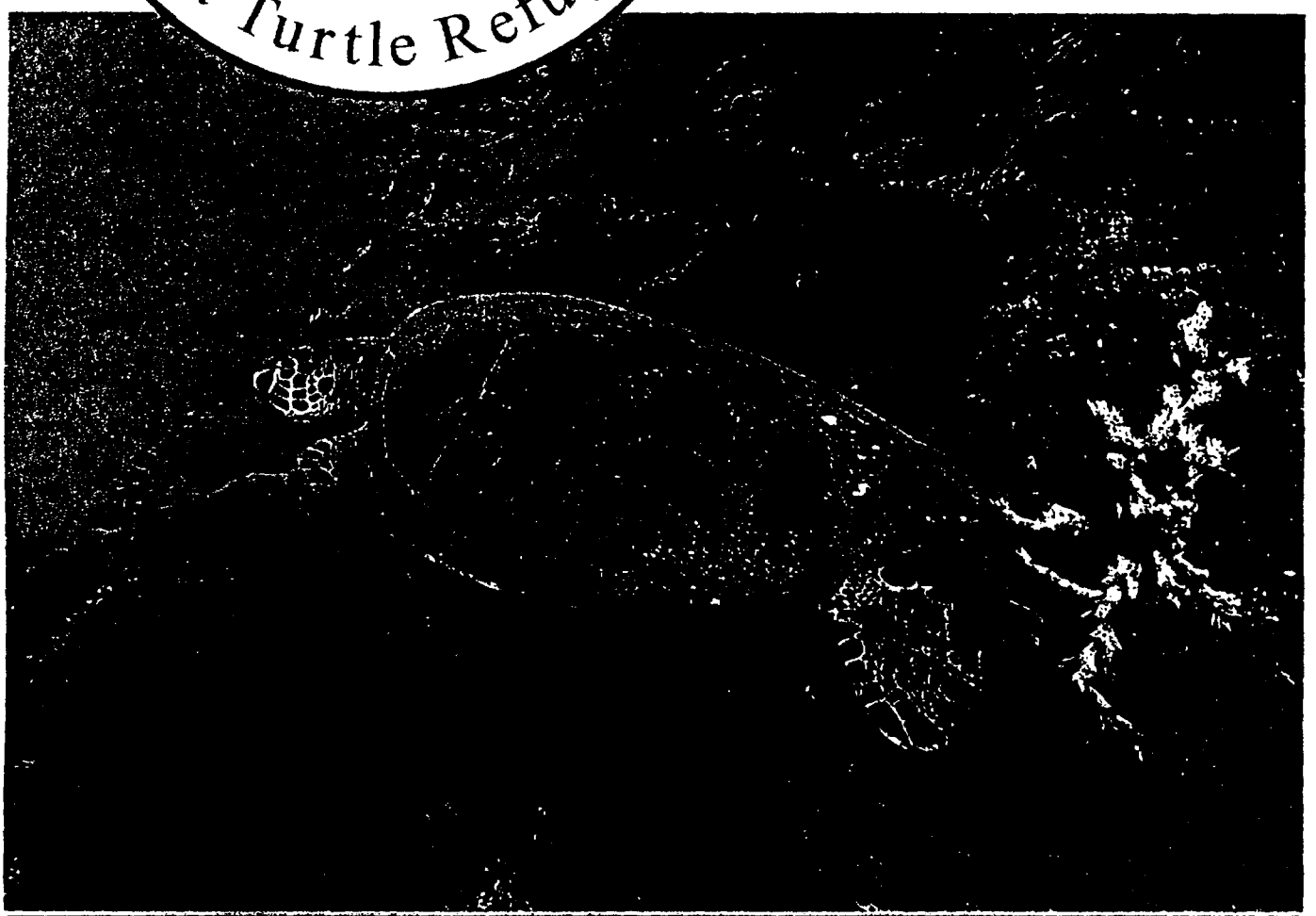
Loggable Events:	0
Compensatory Posts:	0

COMMENTS

None

St. Lucie Nuclear Plant

Sea Turtle Refuge



SEA TURTLE MEETING

NOVEMBER 10, 1999

A/4

Meeting Agenda
St. Lucie Plant
November 10, 1999

Purpose: To discuss the reinitiation of consultation with National Marine Fisheries Service (NMFS) and other information and developments regarding endangered and threatened species at St. Lucie Plant. The second part of the meeting is intended to satisfy the requirement for the biannual meeting, as discussed in the St. Lucie Plant Technical Specifications, Appendix B, "Environmental Protection Plan."

Agenda

0830 - 0835 Arrival at FPL Land Utilization Building (plant entrance "B") and introductions (FPL, NRC, NMFS, State of Florida)

0835 - 0945 Tour of FPL facilities; plant intake canal; plant screens; net structures; turtle recovery area. (All)

1000 - 1010 Start of Public Meeting; required announcements to General Public (NRC)

1010 - 1145 General discussion (All)

1145 - 1200 Conclusion of Public Meeting and schedule for future meetings

Topics

- "Take" Status Update
- Reinitiation of Consultation with NMFS
- Discussion Of Options
- Discussion of information and developments regarding endangered and threatened species at St. Lucie Plant

1200 - 1245 Lunch on site

1245 If business complete; depart site

G:\PDII-2\St. Lucie\MA6374mtgagenda.wpd

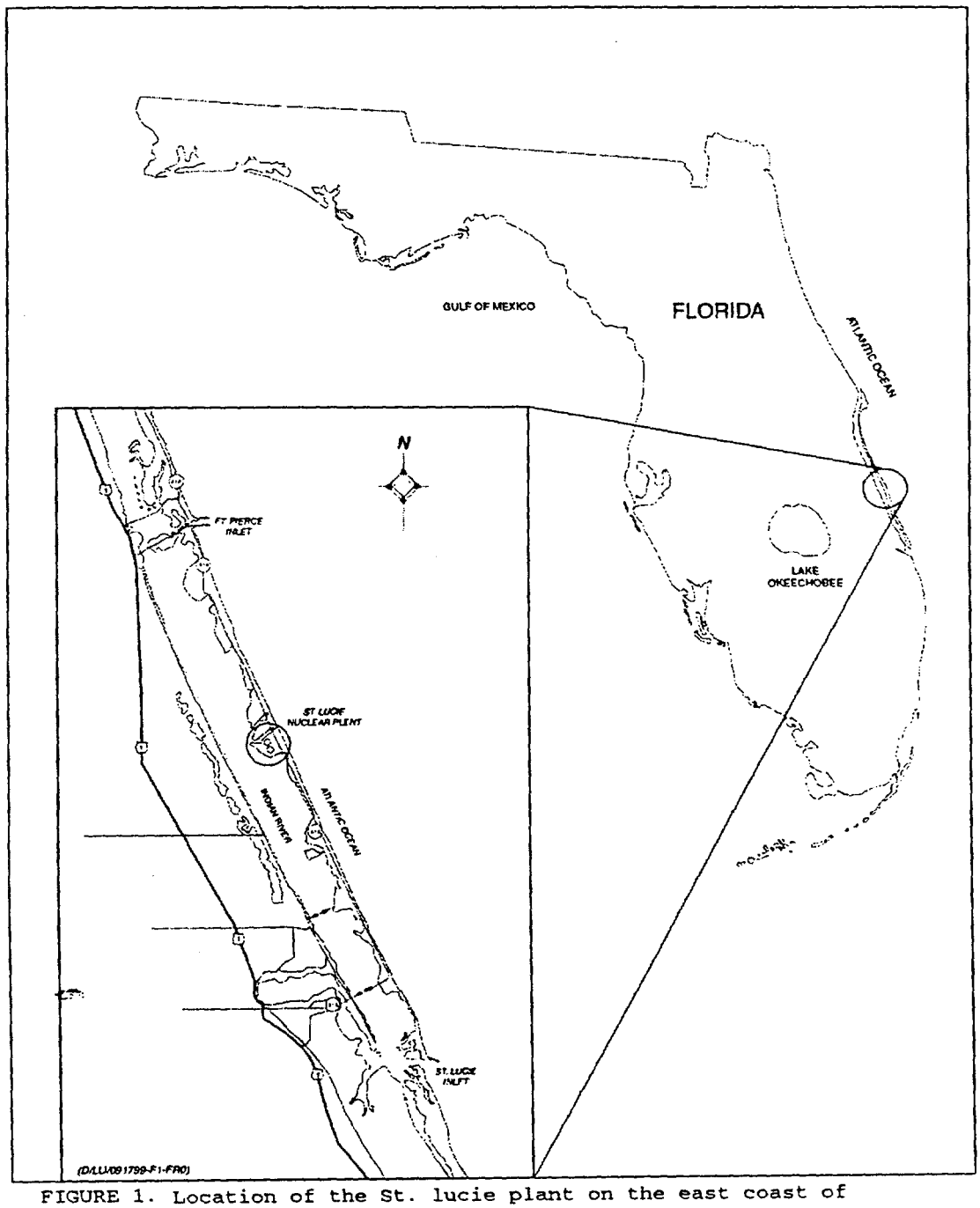


FIGURE 1. Location of the St. lucie plant on the east coast of Florida. The plant is located on South Hutchinson Island, barrier island, and is about 7 miles (11.3 km) south of Ft. Pierce and about 7 miles (11.3 km) north of Stuart.

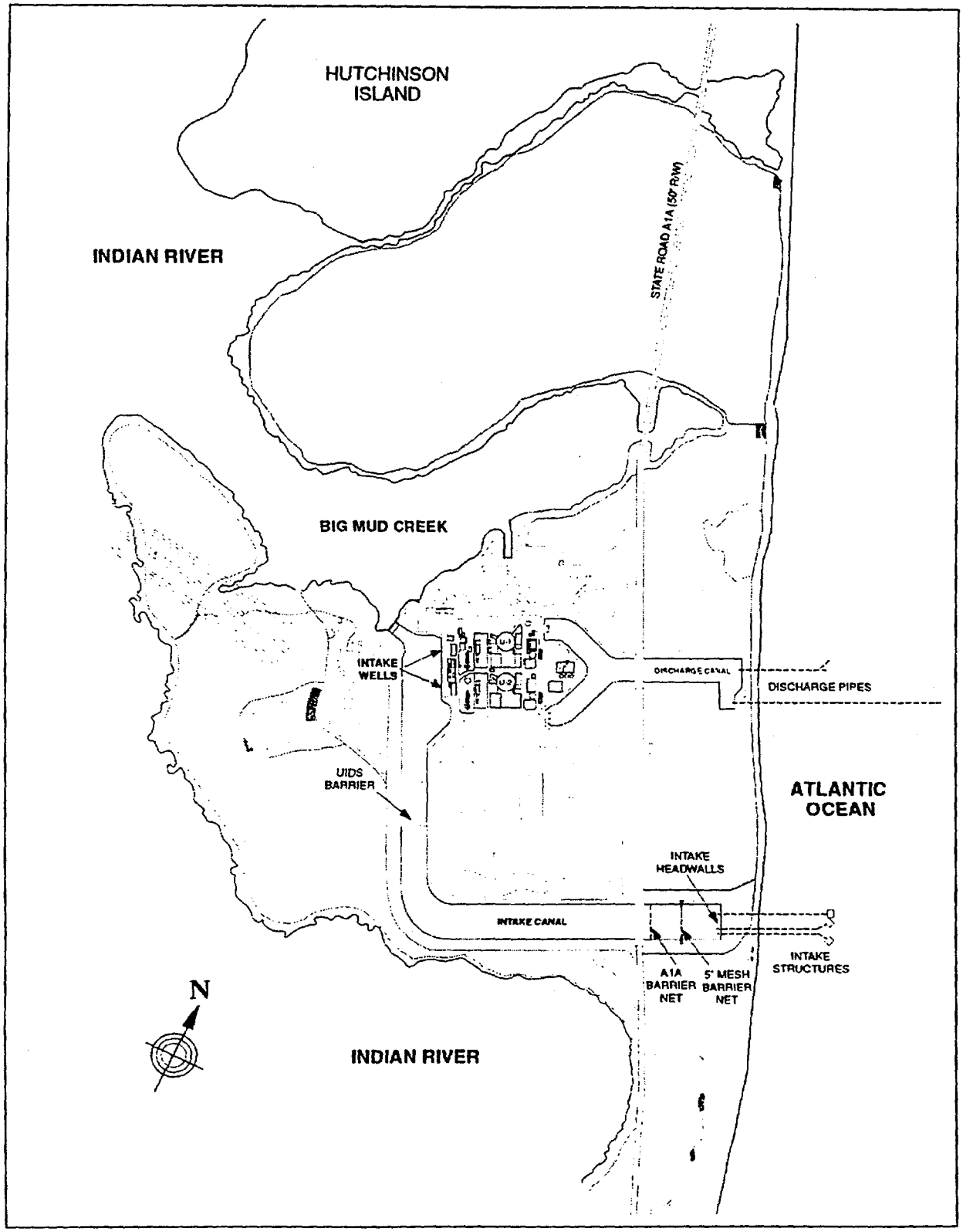


Figure 2. Design of the st. lucie plant showing the relationship between units 1 and 2 and the configuration of the cooling water intake and discharge system with key features labeled.

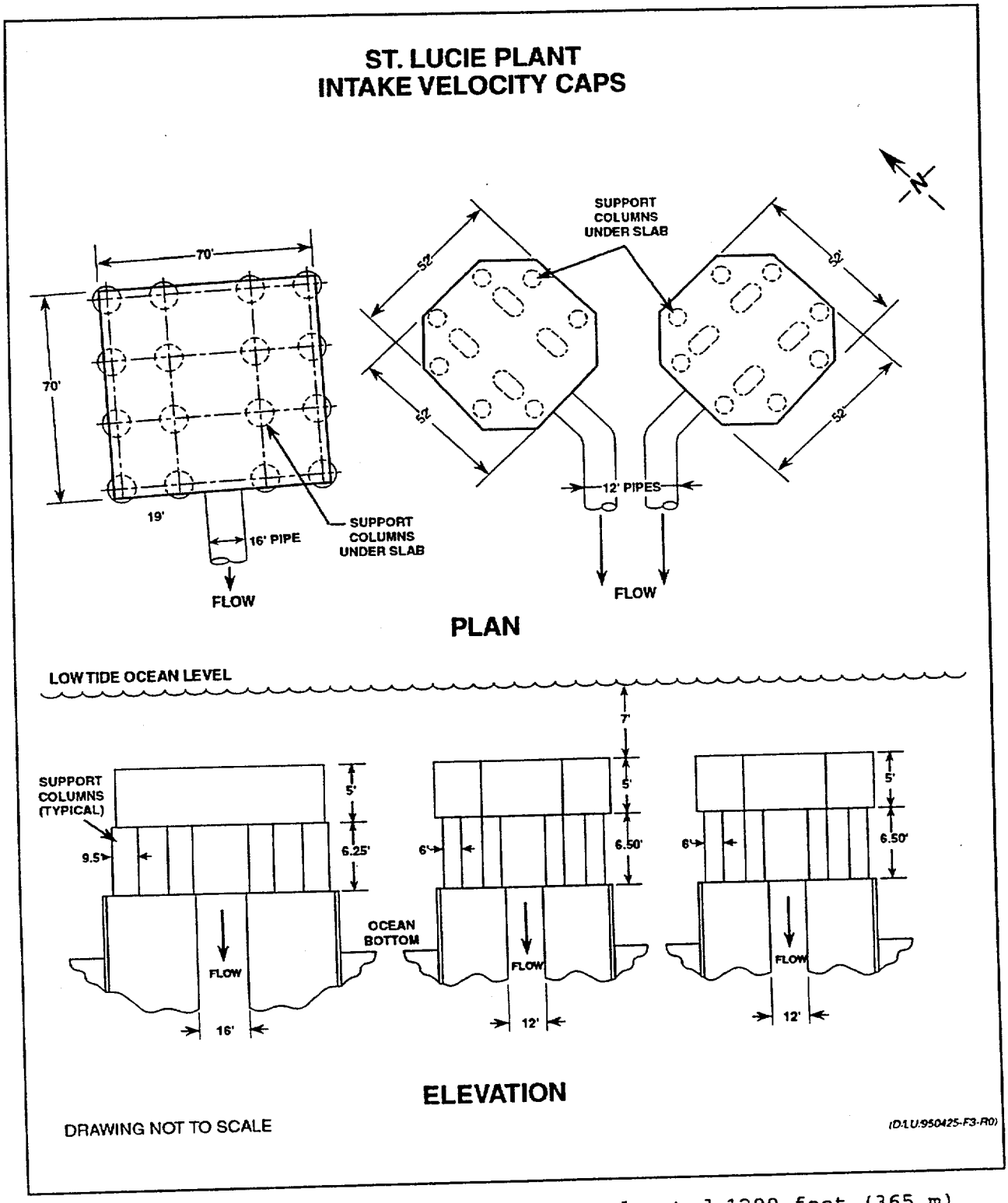


Figure 3. Diagram of the intake structures located 1200 feet (365 m) offshore of the shoreline at the St. Lucie Plant.

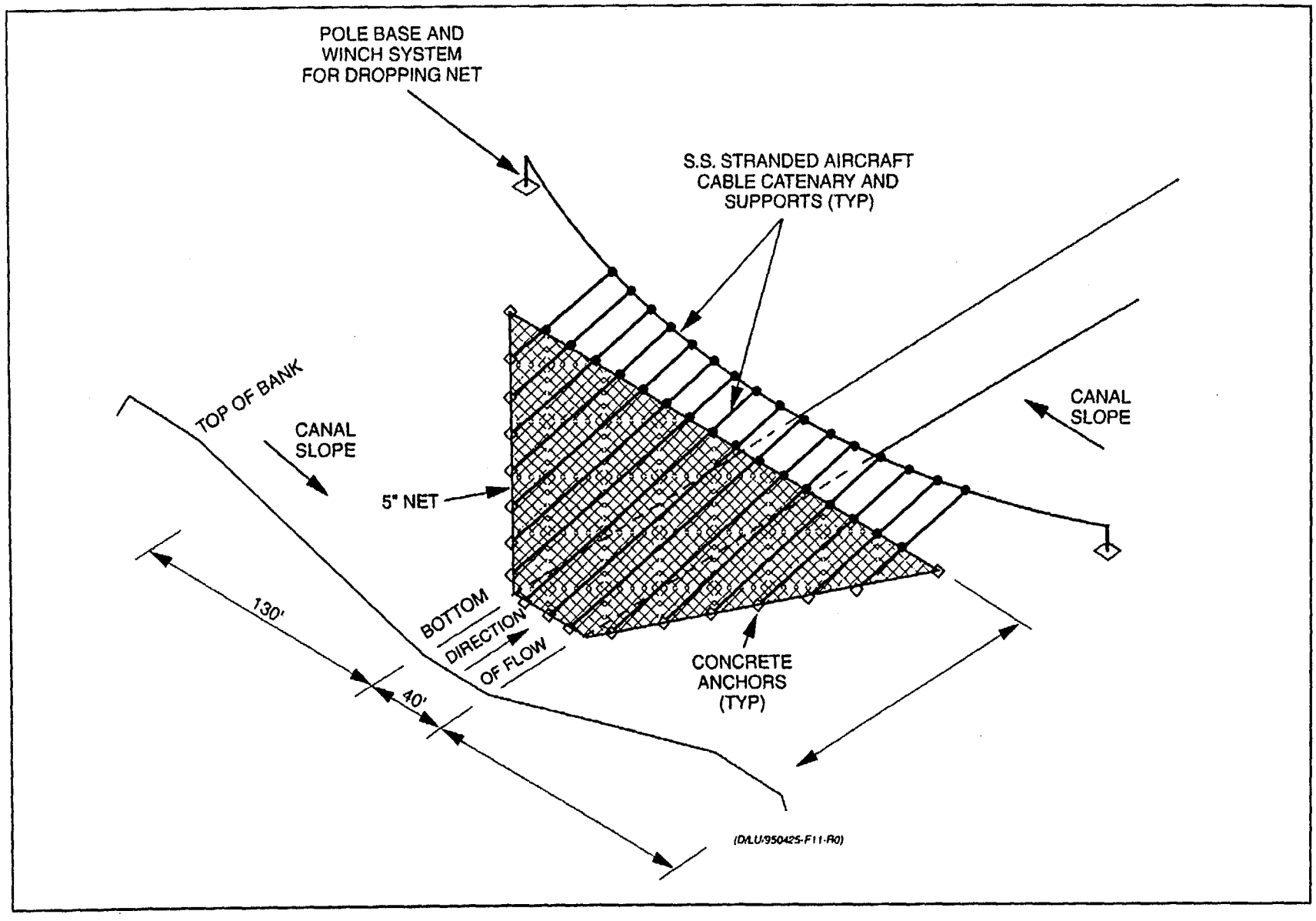


Figure 11. Conceptual design for a 5 inch (12.7 cm) square mesh barrier net to be installed in the intake canal of the St. Lucie Plant.

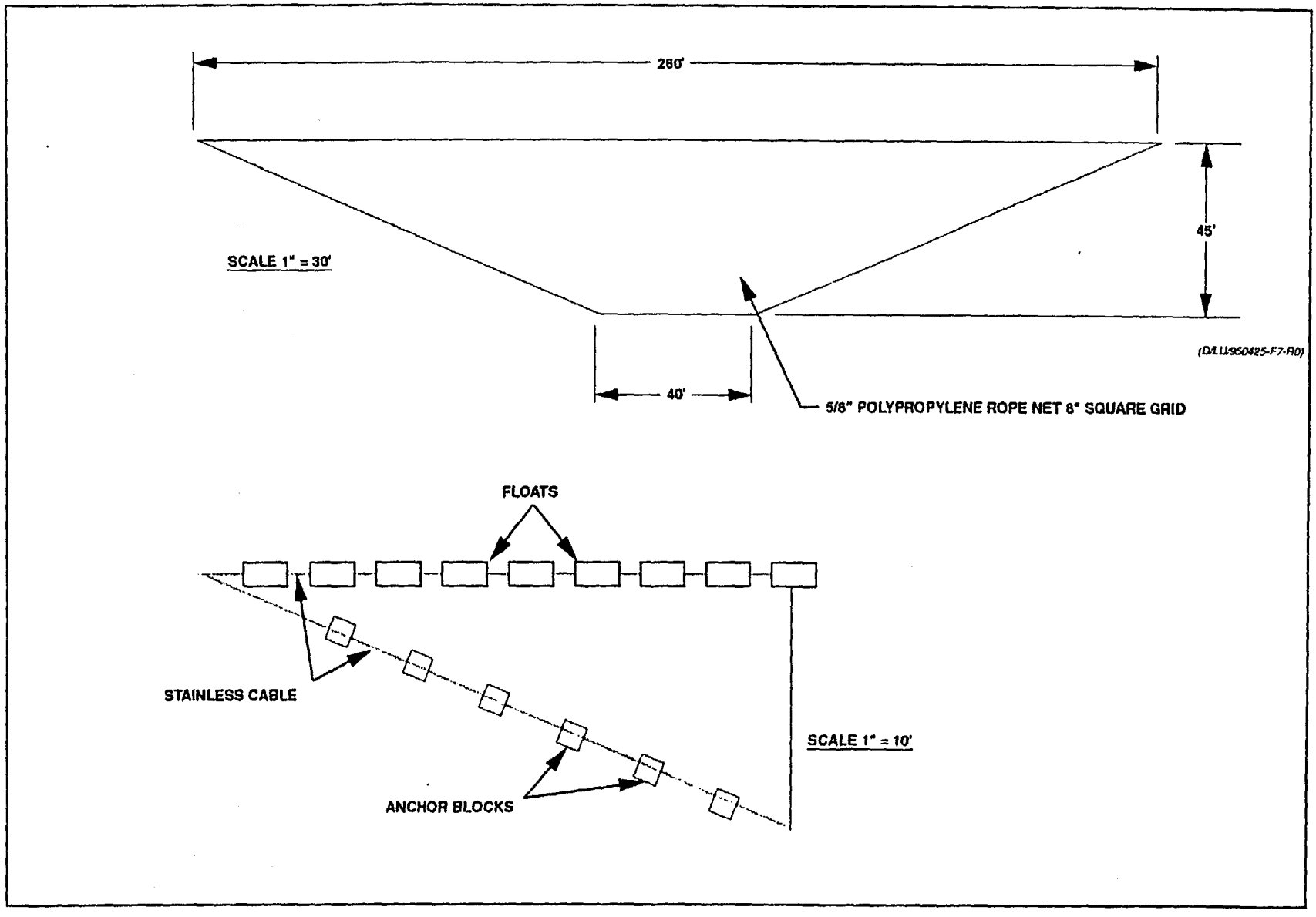


Figure 7. Diagram of the turtle barrier net used in the intake canal of the St. Lucie Plant. This net is located at the A1A bridge (see Figure 2)

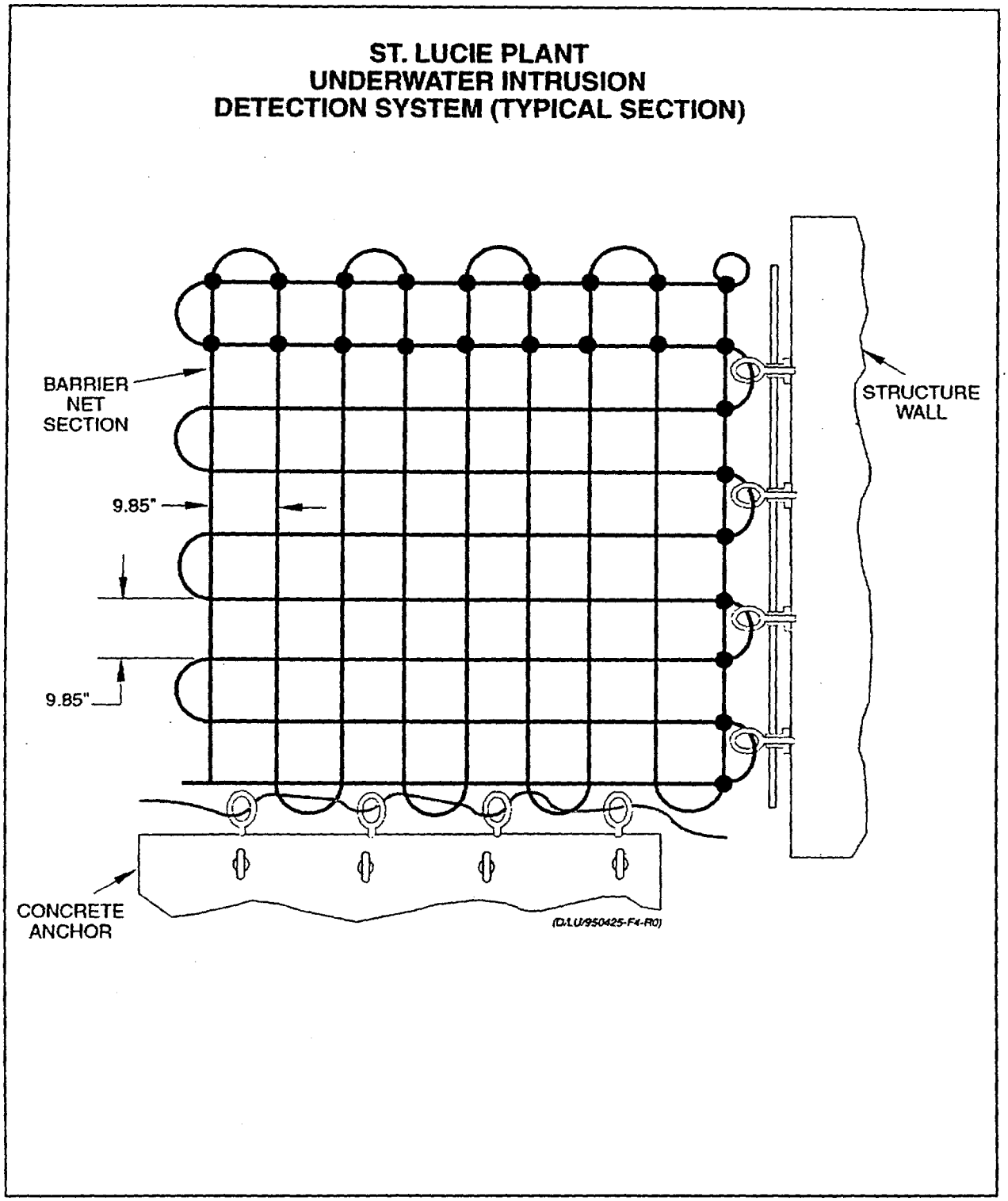


Figure 4. Diagram of the Underwater Intrusion Detection System at the St. Lucie Plant.

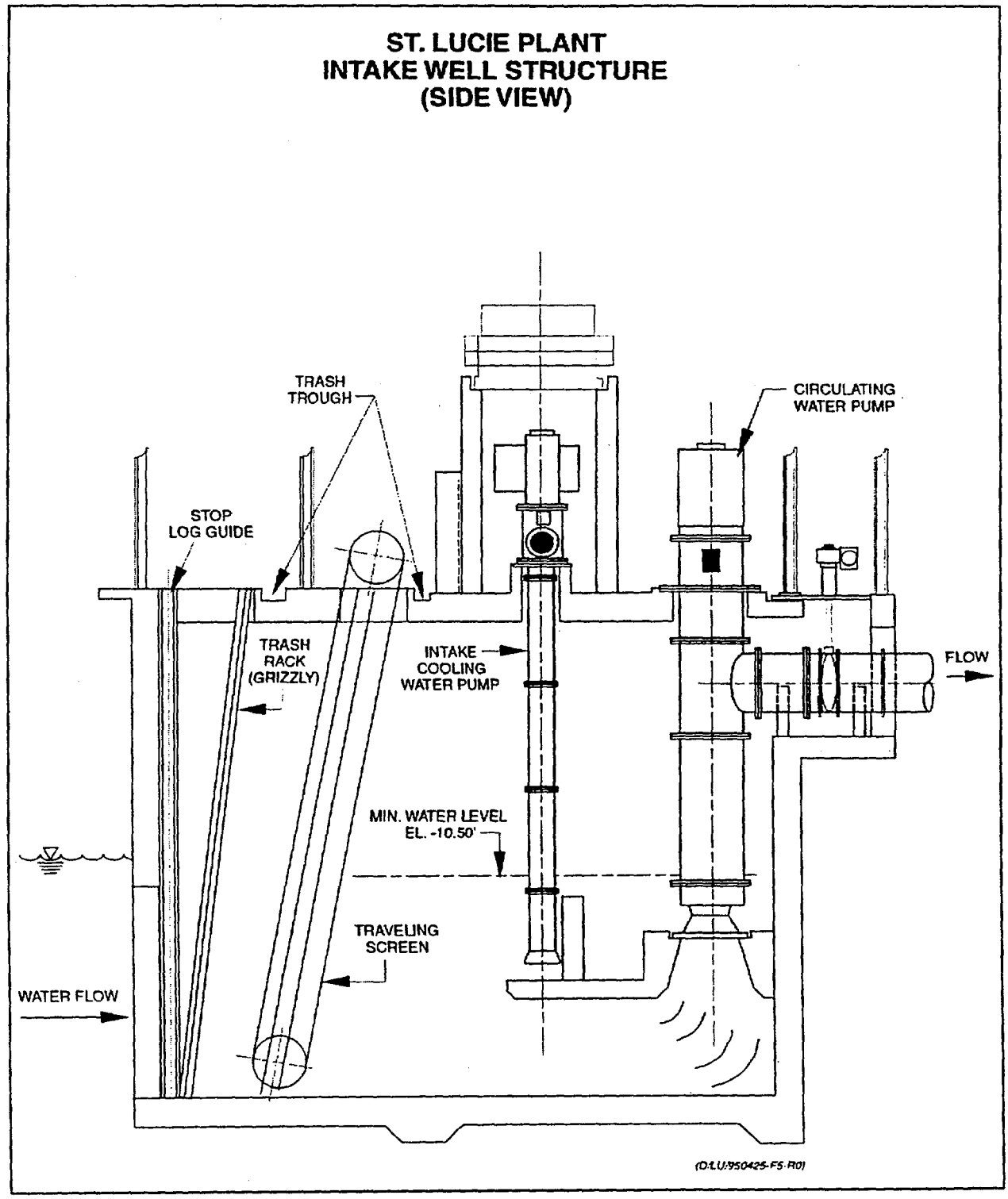
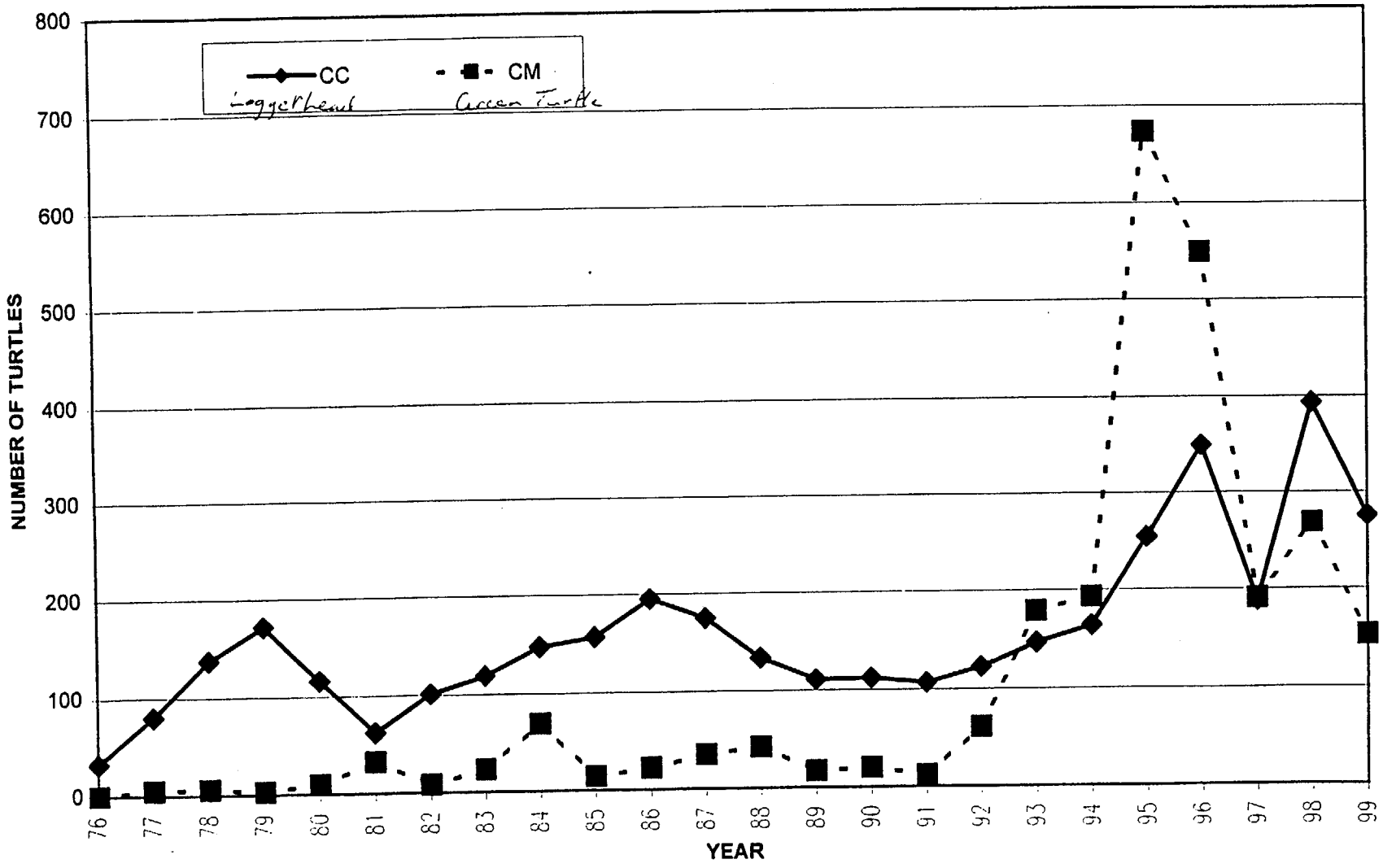


Figure 5. Diagram of an intake well at the St. Lucie Plant.

CANAL CAPTURES ST. LUCIE POWER PLANT, 1976 -1999*



* 1999 captures through October.

SEA TURTLES CAPTURED AT PSL - 1998

MONTH	GREEN	LOGGERHEAD	KEMPS RIDLEY	HAWKSBILL	LEATHERBACK	TOTAL
Mortality Limit as per NMFS	*3 or 1.5%, whichever is greater*	*2 or 1.5%, whichever is greater*	*1 or 1.5%, whichever is greater*	*1 or 1.5%, whichever is greater*	*1 or 1.5%, whichever is greater*	
JANUARY	25	36	0	0	0	61
FEBRUARY	58	28	2	0	0	88
MARCH	30	60	0	0	0	90
APRIL	20	47	0	0	0	67
MAY	35	29	0	1	0	65
JUNE	16	26	0	0	1	43
JULY	7	57	0	0	0	64
AUGUST	22	44	0	0	0	66
SEPTEMBER	10	17	0	0	0	27
OCTOBER	27	25 (1)	0	1	0	53 (1)
NOVEMBER	10	10	0	0	0	20
DECEMBER	9	13	0	0	0	22
TOTAL TO DATE	269	392 (1)	2	2	1	666 (1)

mortality

( ) Mortalities

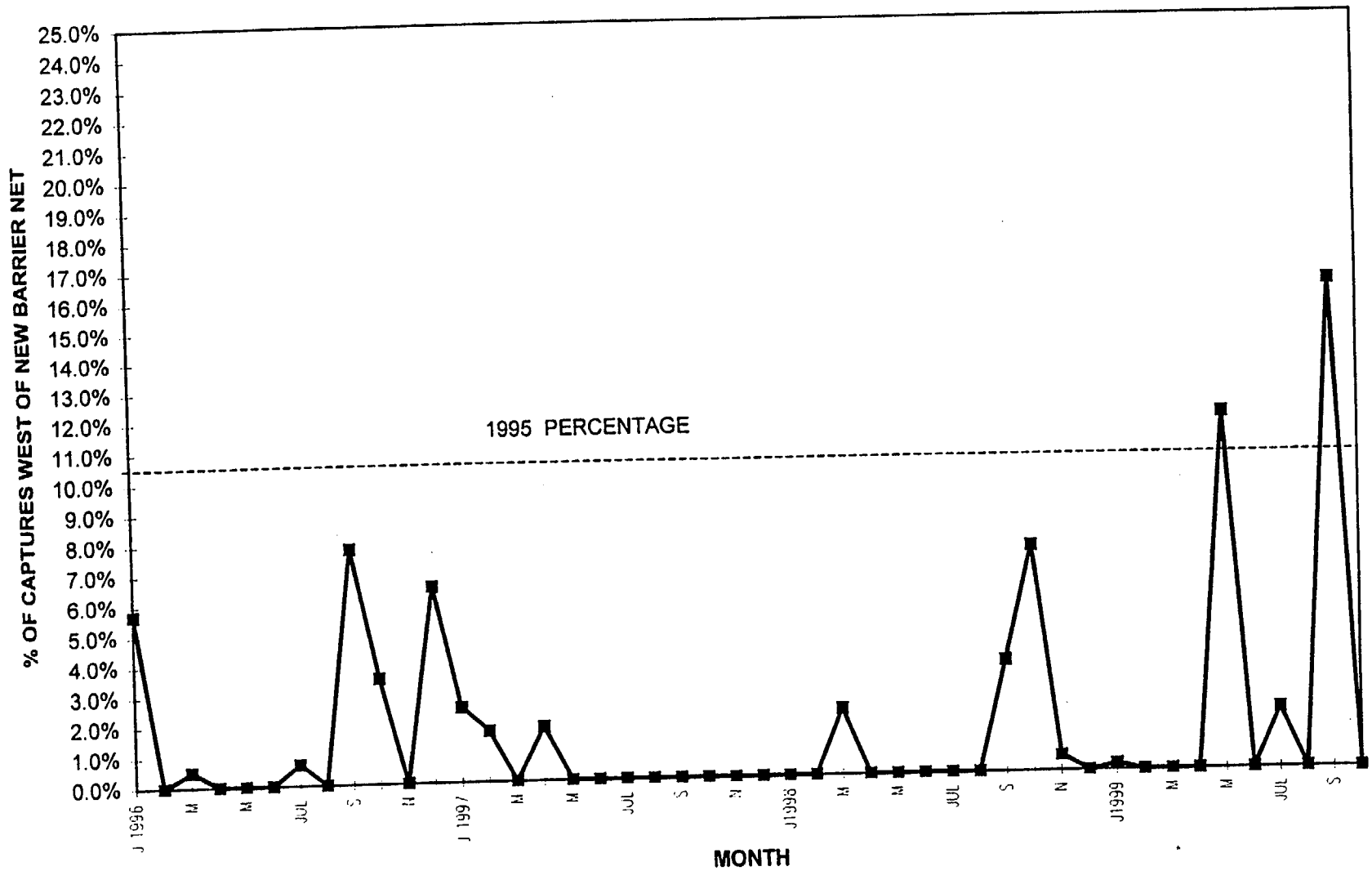
SEA TURTLES CAPTURED AT PSL - 1999

MONTH	GREEN	LOGGERHEAD	KEMPS RIDLEY	HAWKSBILL	LEATHERBACK	TOTAL
Mortality Limit as per NMFS	*3 or 1.5%, whichever is greater*	*2 or 1.5%, whichever is greater*	*1 or 1.5%, whichever is greater*	*1 or 1.5%, whichever is greater*	*1 or 1.5%, whichever is greater*	
JANUARY	17	38	0	0	0	55
FEBRUARY	12 (1)	24	0	0	0	36 (1)
MARCH	8	14	0	0	1	23
APRIL	7	26	0	0	0	33
MAY	12	39	0	0	0	51
JUNE	7	29	0	0	0	36
JULY	10	41 (1)	0	0	0	51 (1)
AUGUST	15	25	0	0	0	40
SEPTEMBER	39 (3)	28	0	0	0	67 (3)
OCTOBER	21	11	0	1	0	33
NOVEMBER						
DECEMBER						
TOTAL TO DATE	148 (4)	275 (1)	0	1	1	425 (5)

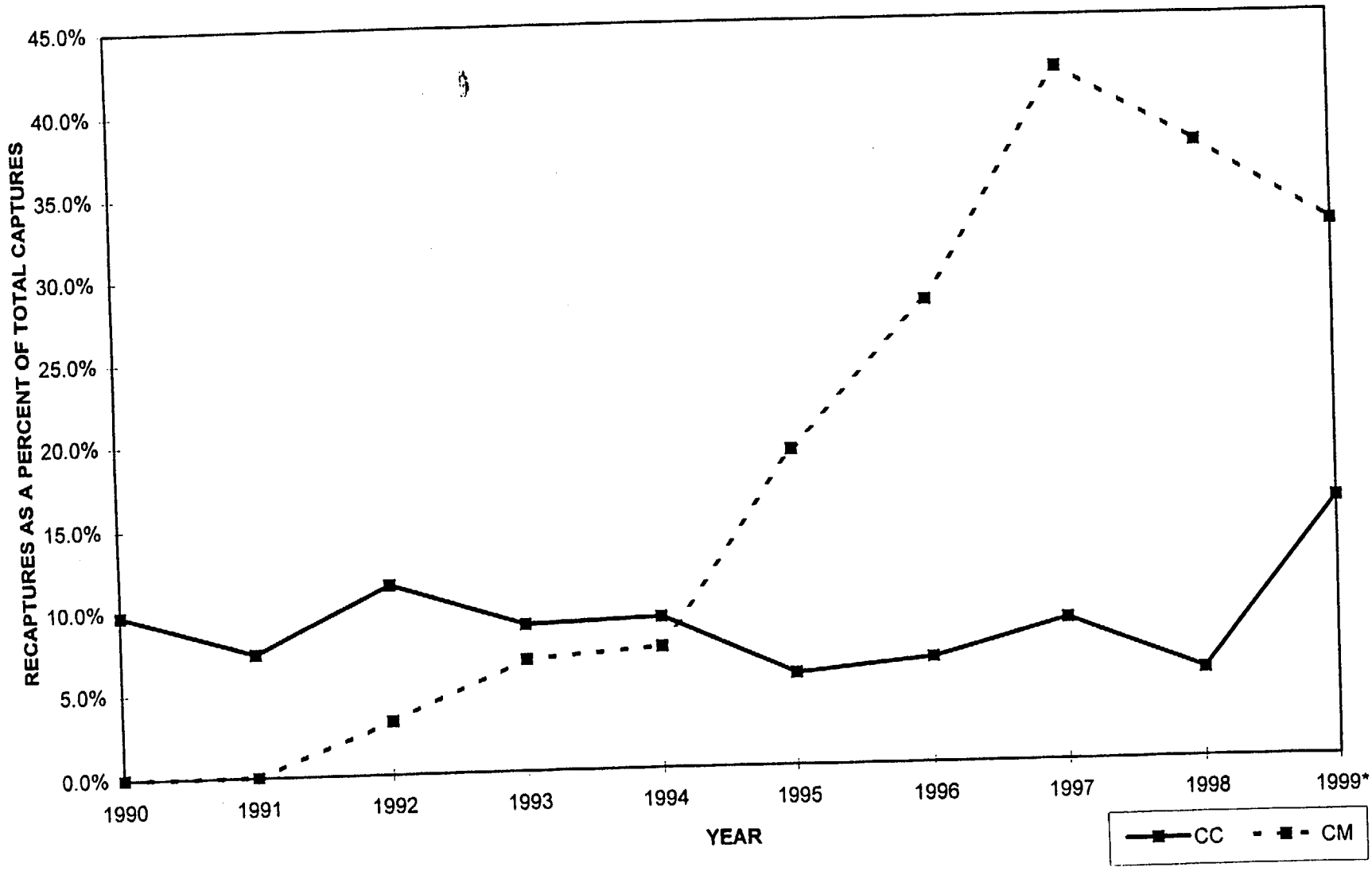
mortality (exceeds limit of 3)

( ) Mortalities

BARRIER NET PERFORMANCE

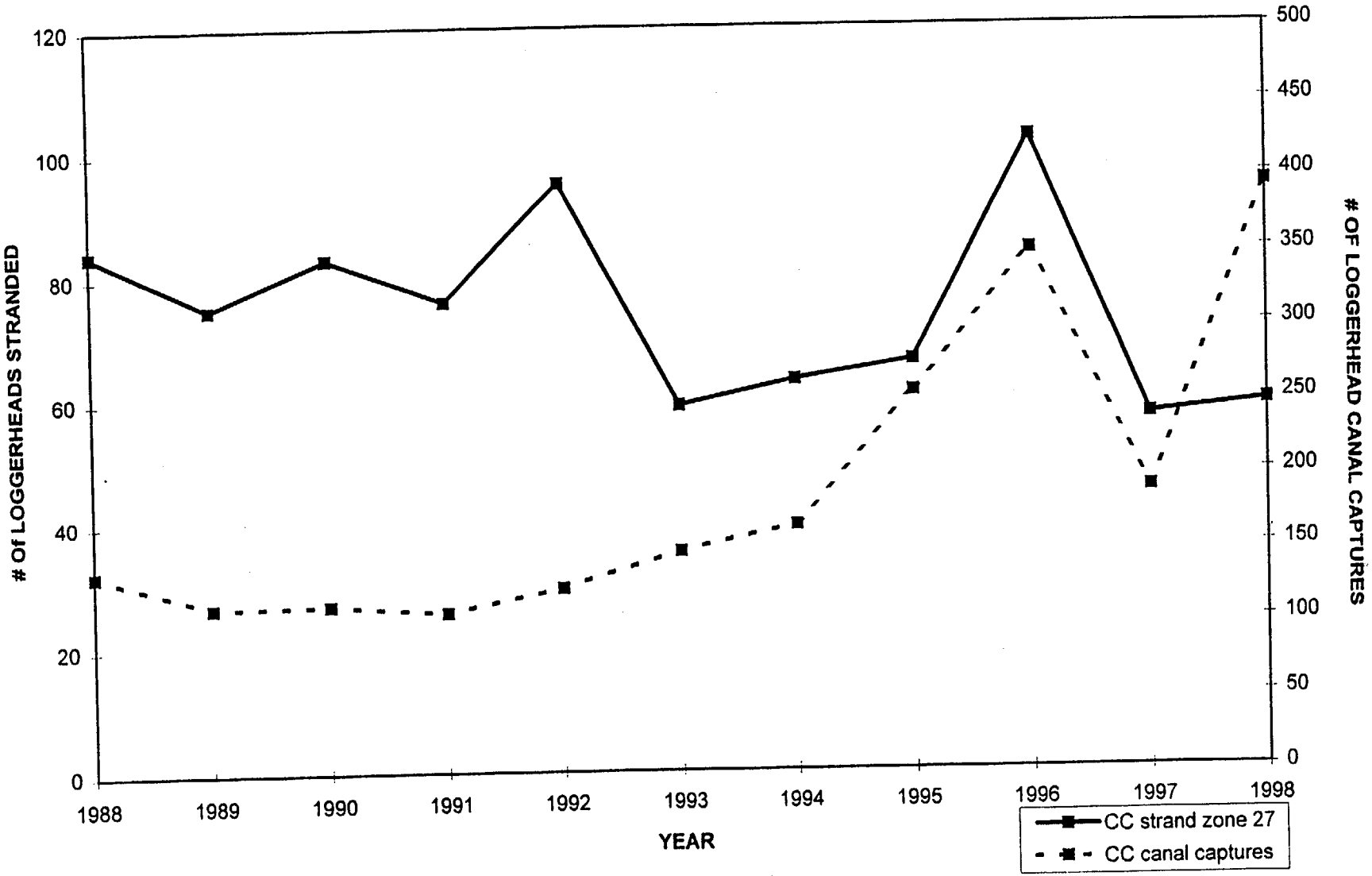


PERCENT RECAPTURES, INTAKE CANAL 1990 -1999*



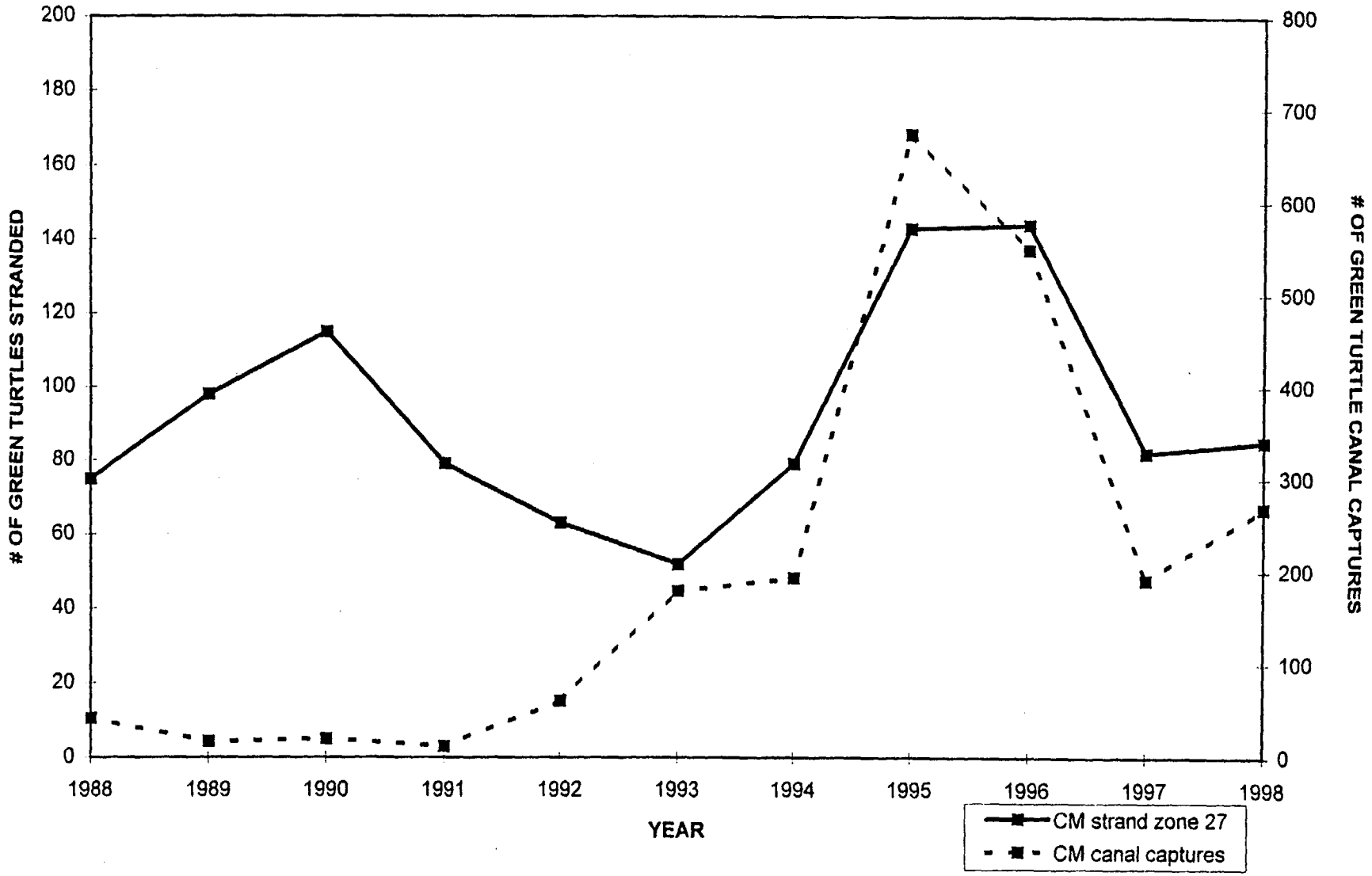
*1999 data through October.

LOGGERHEAD STRANDING* AND CANAL CAPTURE DATA 1988 - 1998



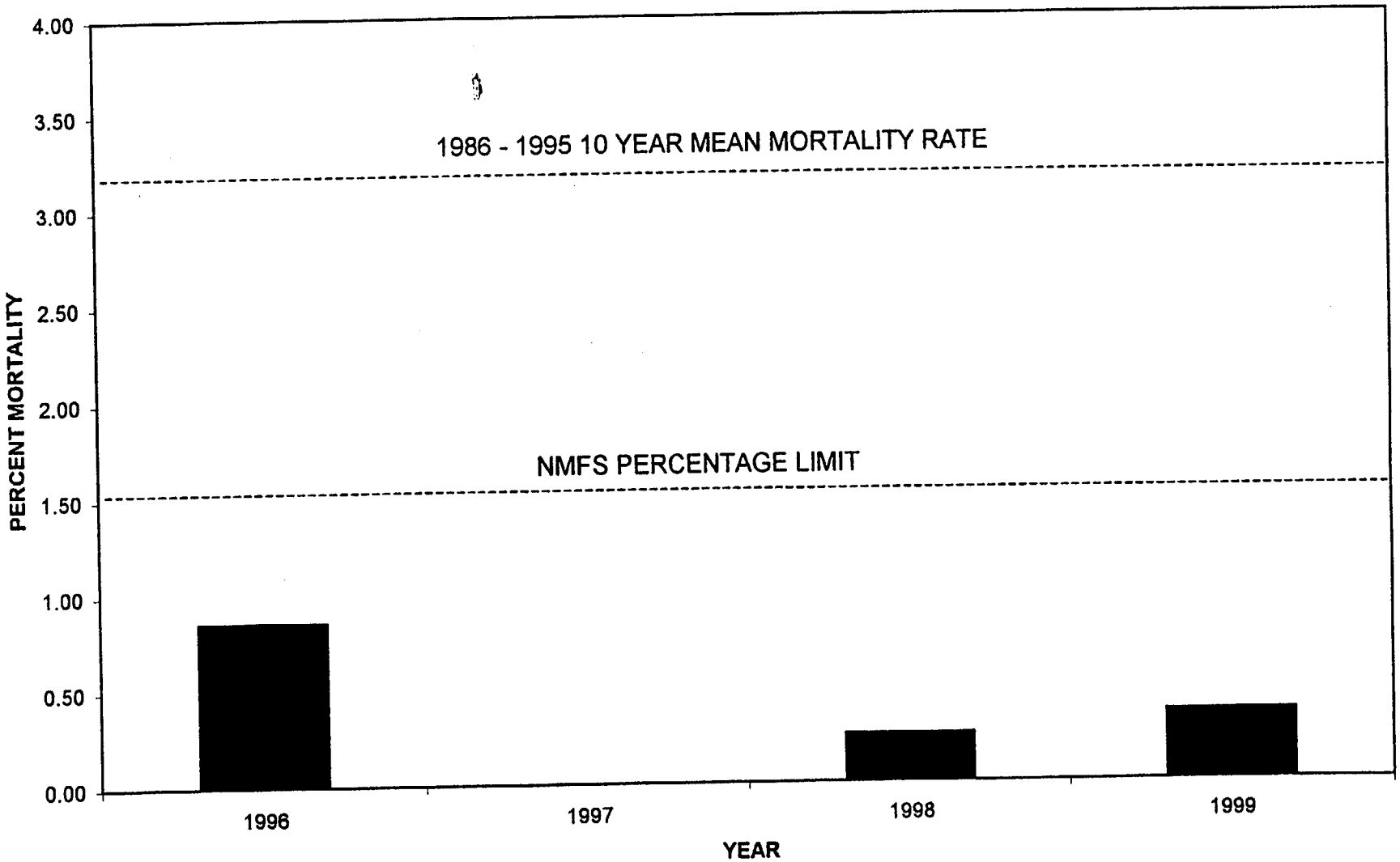
*Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Sea Turtle Stranding and Salvage Network Database, October 25, 1999.

GREEN TURTLE STRANDING* AND CANAL CAPTURE DATA 1988 - 1998



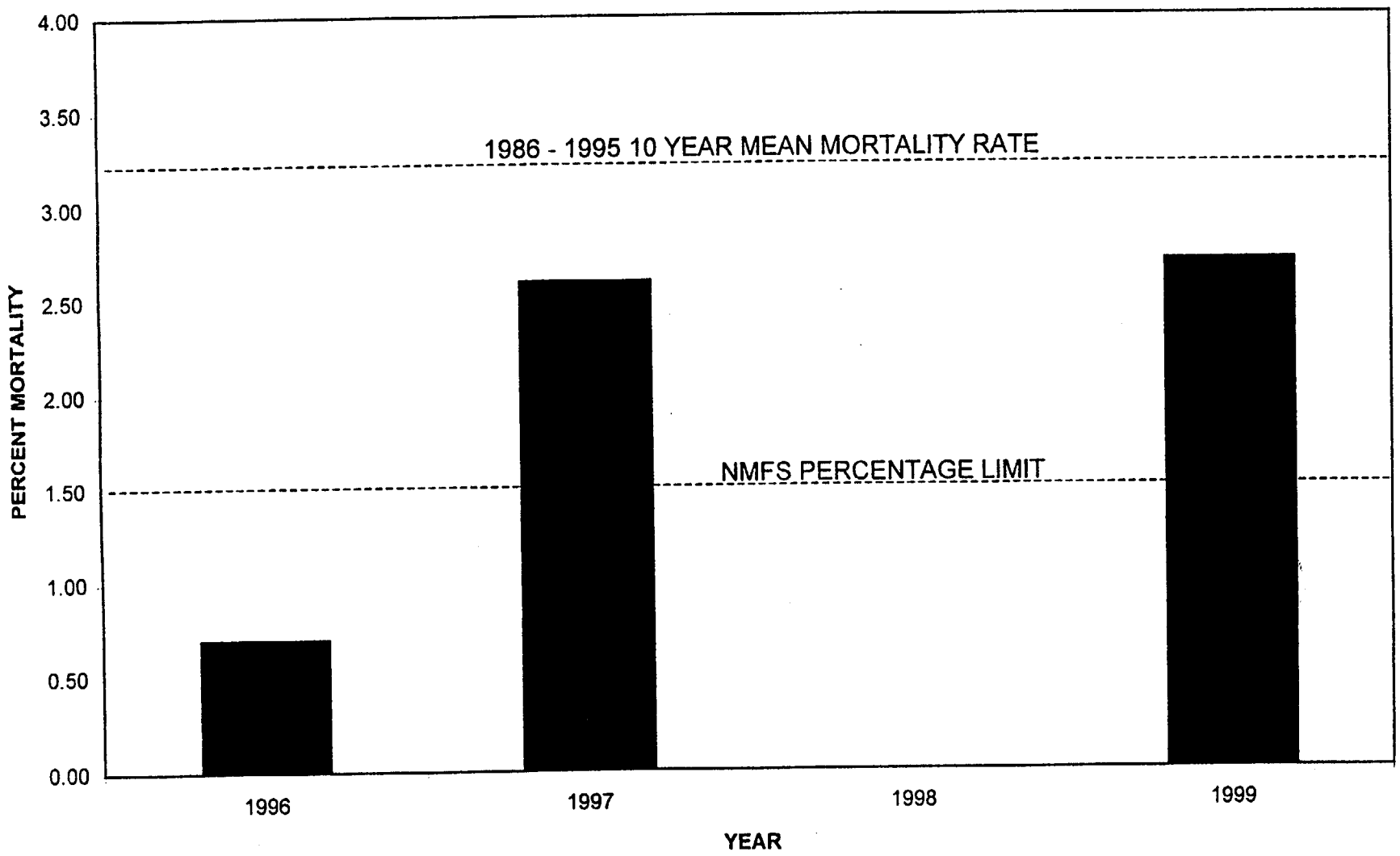
*Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Sea Turtle Stranding and Salvage Network Database, October 25, 1999.

LOGGERHEAD TURTLE MORTALITY RATES, 1996 - 1999*



* 1999 through October
OVERALL MORTALITY RATE = 0.415%

GREEN TURTLE MORTALITY RATES, 1996 - 1999*



* 1999 through October
OVERALL MORTALITY RATE = 1.1%

STATUS OF RELATED SEA TURTLE PROTECTION ACTIVITIES

1. Turtle Stranding and Salvage Network:

   FPL responded to 20 sea turtle strandings in 1998 and 28 strandings to date in 1999 from the local area.

2. Public Service Turtle Walks:

   FPL conducted a total of 52 public service turtle walks during the 1998 and 1999 nesting seasons. A total of approximately 2,200 members of the public attended these events.

3. Study to Elucidate the Effect of Various Factors on Turtle Entrapment:

   The study scope approved by NMFS is currently being conducted by Ecological Associates, Inc. The first progress report was completed October 11, 1999. Final report is due March 1, 2000.

DAILY STATUS REPORT
Florida Power & Light
St Lucie Nuclear Power Station
09/20/99

* * * INDUSTRIAL SAFETY * * *

NAME: Jim Parker DATE/TIME: 09/19/99

SAFETY	FPL	1999 FPL TARGET	CONTRACTOR
Minor Injuries Since Last Report:	0		0
Minor Injuries To Date:	27		18
Serious Injuries Since Last Report:	0		0
Serious Injuries Year-To-Date:	8	5	3
Severe Injuries Year-To-Date:	1	0	0

Comments:

Serious Injury:

* * * OPERATIONS * * *

NAME: Rick Bashwiner DATE/TIME: 09/20/99/0500

OPERATING PARAMETERS		UNIT 1	UNIT 2
Y-T-D Equivalent Availability ():	%	97.43	95.27
Power Level:	%	0	100
Electrical Output (Gross):	MWe		897
Heat Rate:	BTU/KWHr		10276
Days Online or Shutdown:	No.	7	104
RCS Boron Concentration:	ppm	2097	480
RCS Identified Leak Rate:	gpm		.03
RCS Unidentified Leak Rate:	gpm		0
RCS Total Leak Rate:	gpm		.03
Containment Temperature:	Deg F		102
Lighted Control Room Annunciators:	No.		5
Active TSA's:	No.		1
Condenser Air Ejector Flow Rate, Total:	Scfm		.6
Condenser Back Pressure:	in/hg		3.3
Intake Water Temperatures:	Deg F		84

Hypo System (Pri) Status: Out of Svc
CTCS Status: In Svc

HOT ITEMS LIST

A/5

None

* * * PROTECTION SERVICES * * *

NAME: R. Walker DATE/TIME: 09/17/99

EMERG ASSESS/OFFSITE RESP/COMM CAPABILITIES:	SITE
ERDADS:	OK
Emergency Response Facilities (ERFS):	OK
Emergency Communication Equipment:	OK
Prompt Notification System incl. Sirens:	OK

Comments

* * * MAINTENANCE SERVICES * * *

NAME: NWhiting DATE/TIME: 09/18/99

ENVIRONMENTAL COMPLIANCE STATUS: **SITE**

A relatively small green turtle (approx. 25 lbs) was found dead against the A1A barrier net 9/19/99. Cause of death could not be determined. This is the third green turtle death in the intake in less than one month. Offshore conditions (heavy seas/increased occurrence of drift algae) prompted the new barrier net to be lowered several times recently. When turtles get behind this net, chances increase for a mortality. NRC was notified as per 10 CFR 50.72.

* * * SECURITY * * *

NAME: B. Boskey DATE/TIME: 09/20/99

GENERAL INFORMATION

Loggable Events:	0
Compensatory Posts:	2

COMMENTS

Personnel and Equiptment hatch posted for SL 1 16

DAILY STATUS REPORT
Florida Power & Light
St Lucie Nuclear Power Station
09/08/99

* * * INDUSTRIAL SAFETY * * *

NAME: Jim Parker DATE/TIME: 09/07/99

SAFETY	FPL	1999 FPL TARGET	CONTRACTOR
Minor Injuries Since Last Report:	0		0
Minor Injuries To Date:	25		17
Serious Injuries Since Last Report:	0		0
Serious Injuries Year-To-Date:	7	5	3
Severe Injuries Year-To-Date:	1	0	0

Comments:

No Injuries.

Serious Injury:

* * * OPERATIONS * * *

NAME: WL Parks DATE/TIME: 09/08/99 0500

OPERATING PARAMETERS		UNIT 1	UNIT 2
Y-T-D Equivalent Availability (8/22/99):	%	99.99	94.85
Power Level:	%	99.91	99.95
Electrical Output (Gross):	MWe	889	891
Heat Rate:	BTU/KWHr	10340	10349
Days Online or Shutdown:	No.	13	89
RCS Boron Concentration:	ppm	69	510
RCS Identified Leak Rate:	gpm	.04	.03
RCS Unidentified Leak Rate:	gpm	.18	.00
RCS Total Leak Rate:	gpm	.22	.03
Containment Temperature:	Deg F	105	104
Lighted Control Room Annunciators:	No.	9	9
Active TSA's:	No.	11	1
Condenser Air Ejector Flow Rate, Total:	Scfm	1.9	0.3
Condenser Back Pressure:	in/hg	3.2	3.5
Intake Water Temperatures:	Deg F	86	86
Hypo System (Pri) Status:		In Svc	In Svc
CTCS Status:		In Svc	In Svc

A/6

EMERG ASSESS/OFFSITE RESP/COMM CAPABILITIES:	SITE
ERDADS:	OK
Emergency Response Facilities (ERFS):	OK
Emergency Communication Equipment:	OK
Prompt Notification System incl. Sirens:	OK

Comments

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* * * MAINTENANCE SERVICES * * *

NAME: NWhiting DATE/TIME: 09/07/99

ENVIRONMENTAL COMPLIANCE STATUS: **SITE**

Another small green turtle was found dead against the old barrier net at the A1A bridge the morning of 9/7/99. This is reportable to FDEP and subsequently to the NRC. Cause of death is unknown at this time. The new 5-inch barrier net was raised enough to effectively retain turtles that enter the canal but several turtles are known to be behind this net. Efforts to capture these turtles are underway.

---

* * * NUCLEAR MATERIALS MANAGEMENT * * *

NMM Supplying the Right Parts at the Right Time at the Right Cost

NAME: Norm Quesada DATE/TIME: 09/03/99

Current Material Issues

==========

Daily Inventory Status

System Acct (SARA) Statistics :	Inv ($) (millions)	Variance	Trend
PSL Site Inventory Balance Posting	$33.87M	$18.88K	Up
PTN Site Inventory Balance Posting	$29.83M	$41.46K	Up
Negative Inventory Contributors (in millions):			
OverMax Inventory Value	$5.25M		Up
Dormant/Obsolete Inventory	$0.0K		

Inventory Goal: $31.0M EOY

DAILY STATUS REPORT
Florida Power & Light
St Lucie Nuclear Power Station
09/07/99

* * * INDUSTRIAL SAFETY * * *

NAME: Jim Parker DATE/TIME: 09/03/99

SAFETY	FPL	1999 FPL TARGET	CONTRACTOR
Minor Injuries Since Last Report:	0		0
Minor Injuries To Date:	25		17
Serious Injuries Since Last Report:	0		0
Serious Injuries Year-To-Date:	7	5	3
Severe Injuries Year-To-Date:	1	0	0

Comments:

No Injuries.

Serious Injury:

* * * OPERATIONS * * *

NAME: WL Parks DATE/TIME: 09/07/99 0500

OPERATING PARAMETERS		UNIT 1	UNIT 2
Y-T-D Equivalent Availability (8/22/99):	%	99.99	94.85
Power Level:	%	99.95	99.95
Electrical Output (Gross):	MWe	890	892
Heat Rate:	BTU/KWHr	10358	10329
Days Online or Shutdown:	No.	12	88
RCS Boron Concentration:	ppm	73	512
RCS Identified Leak Rate:	gpm	.04	.03
RCS Unidentified Leak Rate:	gpm	.15	.02
RCS Total Leak Rate:	gpm	.19	.05
Containment Temperature:	Deg F	105	104
Lighted Control Room Annunciators:	No.	7	10
Active TSA's:	No.	11	1
Condenser Air Ejector Flow Rate, Total:	Scfm	1.6	0.0
Condenser Back Pressure:	in/hg	3.2	3.5
Intake Water Temperatures:	Deg F	86	86
Hypo System (Pri) Status:		In Svc	In Svc
CTCS Status:		In Svc	In Svc

HOT ITEMS LIST

A/2

NAME: DATE/TIME: 09/03/99

EMERG ASSESS/OFFSITE RESP/COMM CAPABILITIES:	SITE
ERDADS:	OK
Emergency Response Facilities (ERFS):	OK
Emergency Communication Equipment:	OK
Prompt Notification System incl. Sirens:	OK

Comments

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* * * MAINTENANCE SERVICES * * *

NAME: NWhiting DATE/TIME: 09/03/99

ENVIRONMENTAL COMPLIANCE STATUS: **SITE**

Small green turtle was found dead in the Unit 1 intake well early 9/6/99. FDEP has to be notified of these events as per permit. The new barrier net was lowered 8/29/99 due to large influx of drift algae. This allowed this small turtle to get back toward the intakes. Net will be lifted as soon as conditions permit.

---

* * * SECURITY * * *

NAME: B. Boskey DATE/TIME: 09/07/99

GENERAL INFORMATION

Loggable Events:	0
Compensatory Posts:	0

COMMENTS

NONE

Florida Power & Light Company, 6351 S. Ocean Drive, Jensen Beach, FL 34957

FPL

August 13, 1999

L-99-183
10 CFR 50.36b
EPP 4.1

'99 AUG 17 12:16

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

RE: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Environmental Protection Plan Report
Event Date: July 17, 1999
Unusual or Important Environmental Event

The attached report is being submitted pursuant to the requirements of Section 4.1 of the St. Lucie Units 1 and 2 Environmental Protection Plans to provide a description of a reportable sea turtle mortality at the St. Lucie Plant.

This is the first mortality for this species so far this year at the St. Lucie Plant. The limits for mortalities of this species in the National Marine Fisheries Biological Opinion, issued to the site by the NRC in 1997, is two or 1.5% of the total captured, whichever is greater.

Should you have any questions on this information, please contact us.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

JAS/GRM

cc: ✓Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Plant

A/8

St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
L-99-183 Attachment

ST LUCIE PLANT SEA TURTLE MORTALITY
30-DAY WRITTEN REPORT

EVENT DESCIPTION

At approximately 0820 hours on July 17, 1999, a dead Loggerhead Turtle (*Caretta caretta*) weighing 67 pounds was recovered from the St. Lucie Plant intake canal. The turtle, which was in poor physical condition, was found against the 8-inch barrier net located at the A1A Bridge.

This is the first mortality for this species so far this year at the St. Lucie Plant. The limits for mortalities of this species in the National Marine Fisheries Biological Opinion, issued to the site by the NRC in 1997, is two or 1.5% of the total captured, whichever is greater.

CAUSE OF THE EVENT

The 5-inch barrier net, which was installed upstream of the 8-inch barrier net, had been lowered due to heavy loading of drift algae approximately 10 days prior to the event. The 8-inch net had been cleaned of accumulated algae and repaired following the lowering of the 5-inch net. Even though the apparent cause of the turtle's death was drowning, it was probably moribund when it entered the intake canal and would not have survived in that condition in any environment.

CORRECTIVE ACTIONS

The 5-inch barrier net was cleaned of accumulated algae and was raised into position July 19, 1999. This net, due to its steeper slope design and smaller mesh, might possibly keep a turtle in poor condition from drowning before it could be captured and rehabilitated.

AGENCIES NOTIFIED

The Florida Department of Environmental Protection was notified in compliance with Marine Turtle Permit #99.

A 4-hour notification was made to the NRC Operations Center at 1130 hours on July 17, 1999 as per 50.72(b)(2)(vi).

DAILY STATUS REPORT
Florida Power & Light
St Lucie Nuclear Power Station
07/19/99

* * * INDUSTRIAL SAFETY * * *

NAME: N. King DATE/TIME: 07/16/99

SAFETY	FPL	1999 FPL TARGET	CONTRACTOR
Minor Injuries Since Last Report:	0		0
Minor Injuries To Date:	16		12
Serious Injuries Since Last Report:	0		0
Serious Injuries Year-To-Date:	3	5	3
Severe Injuries Year-To-Date:	0	0	0

Comments:

Serious Injury:

* * * OPERATIONS * * *

NAME: J R Martin DATE/TIME: 07/19/99 0500

OPERATING PARAMETERS		UNIT 1	UNIT 2
Y-T-D Equivalent Availability (7/6/99):	%	100	93.57
Power Level:	%	100	100
Electrical Output (Gross):	MWe	897	899
Heat Rate:	BTU/KWHr	10330	10296
Days Online or Shutdown:	No.	511	39
RCS Boron Concentration:	ppm	210	591
RCS Identified Leak Rate:	gpm	.07*	.01
RCS Unidentified Leak Rate:	gpm	.29	.02
RCS Total Leak Rate:	gpm	.36	.03
Containment Temperature:	Deg F	100	99
Lighted Control Room Annunciators:	No.	5	3
Active TSA's:	No.	8	0
Condenser Air Ejector Flow Rate, Total:	Scfm	1.1	1.9
Condenser Back Pressure:	in/hg	2.8	3.0
Intake Water Temperatures:	Deg F	80	80
Hypo System (Pri) Status:		In Svc**	In Svc**
CTCS Status:		In Svc	In Svc

HOT ITEMS LIST

A/9

UNIT 1:
NONE

UNIT 2:
NONE

---

* * * PROTECTION SERVICES * * *

NAME: R. Walker DATE/TIME: 07/16/99

EMERG ASSESS/OFFSITE RESP/COMM CAPABILITIES:	SITE
ERDADS:	OK
Emergency Response Facilities (ERFS):	OK
Emergency Communication Equipment:	OK
Prompt Notification System incl. Sirens:	OK

Comments

Reminder: Jensen Causeway Bridge to be closed 9 A.M. Tuesday July 20, 1999 til 4 P.M. Wednesday July 21, 1999.

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* * * MAINTENANCE SERVICES * * *

NAME: NWhiting DATE/TIME: 07/19/99

ENVIRONMENTAL COMPLIANCE STATUS: **SITE**

A dead juvenile Loggerhead turtle was found on the A1A barrier net Saturday 7/17/99. In that notification had to be made to FDEP by permit, NRC was notified by STA as per 50.72 requirements. The turtle was apparently not in good condition when it entered the intake canal. The 5 inch net has been lowered due to algae loading. This net will be cleaned place back in service this week.

Mr. T. F. Plunkett
President - Nuclear Division
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

July 2, 1999

SUBJECT: ST. LUCIE PLANT UNITS 1 AND 2 - ISSUANCE OF AMENDMENTS REGARDING THE ENVIRONMENTAL PROTECTION PLANS (TAC NOS. M99396, M99397, MA4605, AND MA4606)

Dear Mr. Plunkett:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment Nos. 162 and 103 to Facility Operating License Nos. DPR-67 and NPF-16 for the St. Lucie Plant, Unit Nos. 1 and 2, respectively. These amendments consist of changes to Appendix B (Appendix B, Part II for Unit 1), "Environmental Protection Plan (Non-Radiological)," of the Technical Specifications in response to your application dated December 1, 1997, as supplemented by letter dated August 26, 1998. The Environmental Protection Plans for both units are now revised to implement the terms and conditions of the Incidental Take Statement included in the Biological Opinion issued by the National Marine Fisheries Service with regard to sea turtles under the Endangered Species Act.

The supplements contained clarifying information that did not change the original no significant hazards consideration determination.

TAC Nos. MA4605 and MA4606 are closed. The clarification that resolves FP'Ls request for alternate environmental reporting is provided in Section 4.1 of enclosure 3.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Original signed by:

William C. Gleaves, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-335, 50-389

Enclosures: 1. Amendment No. 162 to DPR-67
2. Amendment No. 103 to NPF-16
3. Safety Evaluation

cc w/enclosures: See next page

Distribution	RJolly	CCraig	OGC
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DATE	06/11/99		06/11/99		06/ /99		06/15/99		06/ /99		06/ /99	

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

July 2, 1999

Mr. T. F. Plunkett
President - Nuclear Division
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: ST. LUCIE PLANT, UNITS 1 AND 2 - ISSUANCE OF AMENDMENTS REGARDING THE ENVIRONMENTAL PROTECTION PLANS (TAC NOS. M99396, M99397, MA4605, AND MA4606)

Dear Mr. Plunkett:

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The supplements contained clarifying information that did not change the original no significant hazards consideration determination.

TAC Nos. MA4605 and MA4606 are closed. The clarification that resolves FPL's request for alternate environmental reporting is provided in Section 4.1 of enclosure 3.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

William C. Gleaves, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-335, 50-389

Enclosures: 1. Amendment No.162 to DPR-67
2. Amendment No. 103 to NPF-16
3. Safety Evaluation

cc w/enclosures: See next page

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FLORIDA POWER & LIGHT COMPANY

DOCKET NO. 50-335

ST. LUCIE PLANT UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 162
License No. DPR-67

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Florida Power & Light Company (the licensee), dated December 1, 1997, as supplemented by letter dated August 26, 1998, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, Facility Operating License No. DPR-67 is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and by amending paragraph 2.C.(2) to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix B, as revised through Amendment No. 162, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of receipt.

FOR THE NUCLEAR REGULATORY COMMISSION

Sheri R. Peterson, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: July 2, 1999

ATTACHMENT TO LICENSE AMENDMENT NO. 162

TO FACILITY OPERATING LICENSE NO. DPR-67

DOCKET NO. 50-335

Replace the following pages of the Appendix "B" Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Page	Insert Page
6	6
7	7
-	8 through 12

3.3 Changes Required for Compliance with Other Environmental Regulations

Changes in plant design or operation and performance of tests or experiments which are required to achieve compliance with or approval from other Federal, State, or local environmental regulations are not subject to the requirements of Section 3.1.

4.0 Environmental Conditions

4.1 Unusual or Important Environmental Events

Any occurrence of an unusual or important event that indicates or could result in significant environmental impact causally related to station operation shall be recorded and promptly reported to the NRC Operations Center within 72 hours via Emergency Notification System described in 10 CFR 50.72. In addition, the reporting requirement time frame shall be consistent with 10 CFR 50.72 for environmental protection issues. The initial report shall be followed by a written report as described in Section 5.4.2. No routine monitoring programs are required to implement this condition. Events covered by Section 3.2 of this EPP will be subject to reporting requirements as defined in that section and not subject to these requirements.

The following are examples of unusual or important events: excessive bird impaction events; onsite plant or animal disease outbreaks; mortality (causally related to station operation), or unusual occurrence of any species protected by the Endangered Species Act of 1973; unusual fish kills; increase in nuisance organisms or conditions; and unanticipated or emergency discharge of waste water or chemical substances.

4.2 Terrestrial/Aquatic Issues

This section addresses the issues on endangered or threatened sea turtles raised in the Unit 2 FES-OL, and in the Endangered Species Biological Assessment (March 1982). In May 1995, the NRC initiated a formal consultation with the National Marine Fisheries Service (NMFS) regarding sea turtle entrapment at the St. Lucie Plant. As a result of this consultation, an updated Sea Turtle Biological Assessment was submitted by FPL letter L-95-309 dated November 20, 1995. This assessment was reviewed by the NMFS which issued a Biological Opinion dated February 7, 1997. The sea turtle issues will be addressed by the following programs.

4.2.1 Reinitiation of Endangered Species Act Section 7 Consultation

Reinitiation of formal consultation is required if: (1) the amount or extent of taking specified in the Incidental Take Statement is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat (when designated) in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the NMFS Biological Opinion dated February 7, 1997, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

4.2.2 Incidental Take Statement

Section 7(b)(4) of the ESA requires that when an agency action is found to comply with Section 7(a)(2), NMFS will issue a statement specifying the impact of any incidental taking, providing reasonable and prudent measures necessary to minimize impacts, and setting forth terms and conditions that must be followed. Only incidental taking by the licensee that complies with the specified terms and conditions is authorized.

Based on historical records of sea turtle capture and mortality at the St. Lucie Plant cooling water intake canal, NMFS anticipates that continued operation of the circulating water system at St. Lucie Plant may result in the capture and mortality of loggerhead, leatherback, Kemp's ridley, green, and hawksbill turtles. Therefore, an incidental take level, and terms and conditions necessary to minimize and monitor takes is established. Variability in the rate of turtle entrapment at the St. Lucie Plant is considered to be primarily a function of the local abundance of turtles, since the operational characteristics of the intake structures have remained constant over the years. In recent years, green turtle entrapment has increased at a dramatic and unpredicted rate and may continue to increase. Therefore, no take level will be specified for entrapment, capture, and release of any species of turtle.

4.2.2.1 Lethal Take Levels

The lethal take levels are based on the historical observed lethal takes, but provide for increased total numbers of lethal takes as entrapment levels increase. Consequently, two lethal take levels are specified: one is a fixed level of the number of turtles of each species entrapped during the calendar year, while the other is a percentage of the number of turtles of each species entrapped during the calendar year. The allowable take level will be the greater of the two numbers, considering the prevailing entrapment rates. The annual incidental lethal take levels are established by the NMFS in the current ITS and specified in plant procedures.

4.2.2.2Terms and Conditions of the Incidental Take Statement

The following terms and conditions are established to monitor the level of take and to minimize the adverse impacts of entrapment and the possibility of lethal takes:

1) FPL shall install and maintain a five inch (12.7 cm) mesh barrier net across the intake canal, east of the previously existing eight inch mesh barrier net. The new net shall receive regular inspection, maintenance, and repair on at least a quarterly basis. The regular maintenance schedule notwithstanding, any holes or damage to the net that are discovered shall be promptly repaired to prevent the passage of turtles through the barrier net.

2) The existing eight inch mesh barrier net shall be retained to serve as a backup to the new five inch mesh barrier net, which may be lowered occasionally because of fouling and water flow problems. The eight (8) inch mesh net shall receive regular inspection, maintenance, and repair on at least a quarterly basis. The regular maintenance schedule notwithstanding, any holes or damage to the net that are discovered shall be promptly repaired to prevent the passage of turtles through the barrier net.

3) FPL shall continue its current program to capture and release turtles from the intake canals. The handling of captured turtles, treatment and rehabilitation of sick and injured turtles, and disposition of dead turtle carcasses shall be in accordance with permits granted to FPL or FPL's contractor through the FDEP.

4) Capture netting in the intake canal shall be conducted with a surface floating tangle net with an unweighted lead line. The net must be closely and thoroughly inspected via boat at least once per hour. Netting shall be conducted whenever sea turtles are present in the intake canal according to the following schedule:

   a) 8 hours per day, 5 days per week, under normal circumstances;

   b) 12 hours per day or during daylight hours, whichever is less, 7 days per week, under any of the following circumstances:
      i) an adult turtle appears in the canal during mating or nesting season (March 1 through September 30),
      ii) an individual turtle has remained in the canal for 7 days or more,
      iii) a leatherback turtle appears in the canal,

iv) an apparently sick or injured turtle appears in the canal.

Reasonable deviations from this schedule due to human safety considerations (i.e., severe weather) are authorized.

5) If a turtle is observed in the intake canal west of the 8 inch barrier net, directed capture efforts shall be undertaken to capture the turtle and to prevent it from entering the intake wells.

6) FPL shall implement an NMFS approved program to monitor for turtles at the cooling water intake wells. The program should include visual inspection of the intake wells by plant operation, security, or biology personnel. It must also include provisions for notifying appropriate response personnel if turtles are detected and for safely removing turtles from the intake wells.

7) FPL shall propose a plan for the design and implementation of a study to elucidate the effect of various factors on turtle entrapment. These factors may include, but are not limited to, the influence of characteristics of sea turtle behavior, population dynamics, and plant operational characteristics or environmental factors on turtle capture rates. The proposed study plan, design, and implementaion date must be approved by NMFS.

8) FPL shall continue to participate in the Sea Turtle Stranding and Salvage Network (STSSN), under proper permits and authority, in order to assess any possible delayed lethal impacts of capture as well as to provide background data on the mortality sources and health of local sea turtles. As a point of clarification, stranded sea turtles are not counted against the authorized level of lethal incidental take in the Incidental Take Statement. Stranding information may be used as the basis for the determination that unanticipated impacts or levels of impacts are occurring.

9) FPL shall continue to conduct, under proper permits and authority, the ongoing sea turtle nesting programs and public service turtle walks.

10) Routine Reports

a) Copies of monthly reports covering sea turtle entrapment, capture, rehabilitation, turtle mortalities, and any pertinent, unusual events shall be furnished to NMFS.

b) A discussion of the topics specified in ITS condition 10) a), the inspection and maintenance of the barrier nets, and the operation of the Taprogge condenser tube cleaning system including any associated sponge ball loss shall be included in the Annual Environmental Operating Report required by Section 5.4.1. A copy of this annual report shall be furnished to NMFS.

c) A meeting shall be convened between FPL, NRC, and NMFS to discuss endangered and threatened species information and developments at the St. Lucie Plant approximately every two years beginning January 2000.

4.2.3 Light Screen to Minimize Turtle Disorientation

Suitable plants (i.e., native vegetation such as live oak, native figs, wild tamarind, and others) shall be planted and maintained as a light screen along the beach dune line bordering the plant property to minimize turtle disorientation. In addition, FPL owner controlled area lighting shall be shielded so that none of the light is diverted skyward.

4.3 General Exceptions

The environmental conditions of the EPP Section 4 are contingent upon licensee or its contractors being able to obtain the necessary FDEP endangered species permits to take, handle, and experiment with sea turtles. If licensee is unable to obtain the necessary permits, then NRC shall be notified of alternatives by the licensee.

5.0 Administrative Procedures

5.1 Review and Audit

The licensee shall provide for review and audit of compliance with the Environmental Protection Plan. The audits shall be conducted independently of the individual or groups responsible for performing the specific activity. A description of the organization structure utilized to achieve the independent review and audit function and results of the audit activities shall be maintained and made available for inspection.

5.2 Records Retention

Records and logs relative to the environmental aspects of plant operation shall be made and retained in a manner convenient for review and inspection. These records and logs shall be made available to NRC on request.

Records of modifications to plant structures, systems and components determined to potentially affect the continued protection of the environment shall be retained for the life of the plant. All other records, data and logs relating to this EPP shall be retained for five years or, where applicable, in accordance with the requirements of other agencies.

5.3 Changes in Environmental Protection Plan

Request for change in the Environmental Protection Plan shall include an assessment of the environmental impact of the proposed change and a supporting justification. Implementation of such changes in the EPP shall not commence prior to NRC approval of the proposed changes in the form of a license amendment incorporating the appropriate revision to the Environmental Protection Plan.

5.4 Plant Reporting Requirements

5.4.1 Routine Reports

5.4.1.1Monthly Reports

Copies of monthly reports covering sea turtle entrapment, capture, rehabilitation, and sea turtle mortalities shall be furnished to NMFS.

5.4.1.2Annual Environmental Operating Report

An Annual Environmental Operating Report describing implementation of this EPP for the previous calendar year shall be submitted to the NRC prior to May 1 of each year.

The report shall include summaries and analyses of the results of the environmental protection activities required by Section 4.2 of this Environmental Protection Plan for the report period, including a comparison with preoperational studies, operational controls (as appropriate), and previous non-radiological environmental monitoring reports, and an assessment of the observed impacts of the plant operation on the environment. If harmful effects or evidence of trends towards irreversible damage to the environment are

observed, the licensee shall provide a detailed analysis of the data and a proposed course of action to alleviate the problem.

The Annual Environmental Operating Report shall also include:

(a) A list of EPP noncompliances and the corrective actions taken to remedy them.

(b) A list of all changes in station design or operation, tests, and experiments made in accordance with Subsection 3.1 which involved a potentially significant unreviewed environmental issue.

(c) A list of nonroutine reports submitted in accordance with Subsection 5.4.2.

(d) A discussion of the sea turtle entrapment, capture efforts, turtle mortalities, available information on barrier net inspections and maintenance, and the Taprogge condenser tube cleaning system operation including sponge ball loss at St. Lucie Plant

In the event that some results are not available by the report due date, the report shall be submitted noting and explaining the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

5.4.2 Nonroutine Reports

A written report shall be submitted to the NRC in accordance with 10 CFR 50.4 within 30 days of occurrence of a nonroutine event. The report shall (a) describe, analyze, and evaluate the event, including extent and magnitude of the impact and plant operating characteristics, (b) describe the probable cause of the event, (c) indicate the action taken to correct the reported event, (d) indicate the corrective action taken to preclude repetition of the event and to prevent similar occurrences involving similar components or systems, and (e) indicate the agencies notified and their preliminary responses.

Events reportable under this subsection which also require reports to other Federal, State, or local agencies shall be reported in accordance with those reporting requirements in lieu of the requirements of this subsection. The NRC shall be provided a copy of such reports within 30 days of the date they submitted to the other agency.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FLORIDA POWER & LIGHT COMPANY

ORLANDO UTILITIES COMMISSION OF

THE CITY OF ORLANDO, FLORIDA

AND

FLORIDA MUNICIPAL POWER AGENCY

DOCKET NO. 50-389

ST. LUCIE PLANT UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 103
License No. NPF-16

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Florida Power & Light Company, et al. (the licensee), dated December 1, 1997, as supplemented by letter dated August 26, 1998, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, Facility Operating License No. NPF-16 is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and by amending paragraph 2.C.2 to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix B, as revised through Amendment No. 103 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of receipt.

FOR THE NUCLEAR REGULATORY COMMISSION

Sheri R. Peterson, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: July 2, 1999

ATTACHMENT TO LICENSE AMENDMENT NO. 103

TO FACILITY OPERATING LICENSE NO. NPF-16

DOCKET NO. 50-389

Replace the following pages of the Appendix "B" Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Page	Insert Page
Title page	Title page
4-1	4-1
4-2	4-2
4-3	4-3
4-4	4-4
-	4-5
5-1	5-1
5-2	5-2
5-3	5-3

APPENDIX B

TO FACILITY OPERATING LICENSE NO. NPF-16

ST. LUCIE UNIT 2

ENVIRONMENTAL PROTECTION PLAN

(NON-RADIOLOGICAL)

4.0 Environmental Conditions

4.1 Unusual or Important Environmental Events

Any occurrence of an unusual or important event that indicates or could result in significant environmental impact causally related to station operation shall be recorded and promptly reported to the NRC Operations Center within 72 hours via Emergency Notification System described in 10 CFR 50.72. In addition, the reporting requirement time frame shall be consistent with 10 CFR 50.72 for environmental protection issues. The initial report shall be followed by a written report as described in Section 5.4.2. The initial report shall be followed by a written report as described in Section 5.4.2. No routine monitoring programs are required to implement this condition. Events covered by Section 3.2 of this EPP will be subject to reporting requirements as defined in that section and not subject to these requirements.

The following are examples of unusual or important events: excessive bird impaction events; onsite plant or animal disease outbreaks; mortality (causally related to station operation), or unusual occurrence of any species protected by the Endangered Species Act of 1973; unusual fish kills; increase in nuisance organisms or conditions; and unanticipated or emergency discharge of waste water or chemical substances.

4.2 Terrestrial/Aquatic Issues

This section addresses the issues on endangered or threatened sea turtles raised in the Unit 2 FES-OL, and in the Endangered Species Biological Assessment (March 1982). In May 1995, the NRC initiated a formal consultation with the National Marine Fisheries Service (NMFS) regarding sea turtle entrapment at the St. Lucie Plant. As a result of this consultation, an updated Sea Turtle Biological Assessment was submitted by FPL letter L-95-309 dated November 20, 1995. This assessment was reviewed by the NMFS which issued a Biological Opinion dated February 7, 1997. The sea turtle issues will be addressed by the following programs.

4.2.1 Reinitiation of Endangered Species Act Section 7 Consultation

Reinitiation of formal consultation is required if: (1) the amount or extent of taking specified in the Incidental Take Statement is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat (when designated) in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the NMFS

Biological Opinion dated February 7, 1997, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

4.2.2 Incidental Take Statement

Section 7(b)(4) of the ESA requires that when an agency action is found to comply with Section 7(a)(2), NMFS will issue a statement specifying the impact of any incidental taking, providing reasonable and prudent measures necessary to minimize impacts, and setting forth terms and conditions that must be followed. Only incidental taking by the licensee that complies with the specified terms and conditions is authorized.

Based on historical records of sea turtle capture and mortality at the St. Lucie Plant cooling water intake canal, NMFS anticipates that continued operation of the circulating water system at St. Lucie Plant may result in the capture and mortality of loggerhead, leatherback, Kemp's ridley, green, and hawksbill turtles. Therefore, an incidental take level, and terms and conditions necessary to minimize and monitor takes is established. Variability in the rate of turtle entrapment at the St. Lucie Plant is considered to be primarily a function of the local abundance of turtles, since the operational characteristics of the intake structures have remained constant over the years. In recent years, green turtle entrapment has increased at a dramatic and unpredicted rate and may continue to increase. Therefore, no take level will be specified for entrapment, capture, and release of any species of turtle.

4.2.2.1 Lethal Take Levels

The lethal take levels are based on the historical observed lethal takes, but provide for increased total numbers of lethal takes as entrapment levels increase. Consequently, two lethal take levels are specified: one is a fixed level of the number of turtles of each species entrapped during the calendar year, while the other is a percentage of the number of turtles of each species entrapped during the calendar year. The allowable take level will be the greater of the two numbers, considering the prevailing entrapment rates. The annual incidental lethal take levels are established by the NMFS in the current ITS and specified in plant procedures.

4.2.2.2 Terms and Conditions of the Incidental Take Statement

The following terms and conditions are established to monitor the level of take and to minimize the adverse impacts of entrapment and the possibility of lethal takes:

1) FPL shall install and maintain a five inch (12.7 cm) mesh barrier net across the intake canal, east of the previously existing eight inch mesh barrier net. The new net shall receive regular inspection, maintenance, and repair on at least a quarterly basis. The regular maintenance schedule notwithstanding, any holes or damage to the net that are discovered shall be promptly repaired to prevent the passage of turtles through the barrier net.

2) The existing eight inch mesh barrier net shall be retained to serve as a backup to the new five inch mesh barrier net, which may be lowered occasionally because of fouling and water flow problems. The eight (8) inch mesh net shall receive regular inspection, maintenance, and repair on at least a quarterly basis. The regular maintenance schedule notwithstanding, any holes or damage to the net that are discovered shall be promptly repaired to prevent the passage of turtles through the barrier net.

3) FPL shall continue its current program to capture and release turtles from the intake canals. The handling of captured turtles, treatment and rehabilitation of sick and injured turtles, and disposition of dead turtle carcasses shall be in accordance with permits granted to FPL or FPL's contractor through the FDEP.

4) Capture netting in the intake canal shall be conducted with a surface floating tangle net with an unweighted lead line. The net must be closely and thoroughly inspected via boat at least once per hour. Netting shall be conducted whenever sea turtles are present in the intake canal according to the following schedule:

   a) 8 hours per day, 5 days per week, under normal circumstances;

   b) 12 hours per day or during daylight hours, whichever is less, 7 days per week, under any of the following circumstances:
      i) an adult turtle appears in the canal during mating or nesting season (March 1 through September 30),
      ii) an individual turtle has remained in the canal for 7 days or more,
      iii) a leatherback turtle appears in the canal,
      iv) an apparently sick or injured turtle appears in the canal.

   Reasonable deviations from this schedule due to human safety considerations (i.e., severe weather) are authorized.

5) If a turtle is observed in the intake canal west of the 8 inch barrier net, directed capture efforts shall be undertaken to capture the turtle and to prevent it from entering the intake wells.

6) FPL shall implement an NMFS approved program to monitor for turtles at the cooling water intake wells. The program should include visual inspection of the intake wells by plant operation, security, or biology personnel. It must also include provisions for notifying appropriate response personnel if turtles are detected and for safely removing turtles from the intake wells.

7) FPL shall propose a plan for the design and implementation of a study to elucidate the effect of various factors on turtle entrapment. These factors may include, but are not limited to, the influence of characteristics of sea turtle behavior, population dynamics, and plant operational characteristics or environmental factors on turtle capture rates. The proposed study plan, design, and implementaion date must be approved by NMFS.

8) FPL shall continue to participate in the Sea Turtle Stranding and Salvage Network (STSSN), under proper permits and authority, in order to assess any possible delayed lethal impacts of capture as well as to provide background data on the mortality sources and health of local sea turtles. As a point of clarification, stranded sea turtles are not counted against the authorized level of lethal incidental take in the Incidental Take Statement. Stranding information may be used as the basis for the determination that unanticipated impacts or levels of impacts are occurring.

9) FPL shall continue to conduct, under proper permits and authority, the ongoing sea turtle nesting programs and public service turtle walks.

10) Routine Reports

a) Copies of monthly reports covering sea turtle entrapment, capture, rehabilitation, turtle mortalities, and any pertinent, unusual events shall be furnished to NMFS.

b) A discussion of the topics specified in ITS condition 10) a), the inspection and maintenance of the barrier nets, and the operation of the Taprogge condenser tube cleaning system including any associated sponge ball loss shall be included in the Annual Environmental Operating Report required by Section 5.4.1. A copy of this annual report shall be furnished to NMFS.

c) A meeting shall be convened between FPL, NRC, and NMFS to discuss endangered and threatened species information and developments at the St. Lucie Plant approximately every two years beginning January 2000.

4.2.3 Light Screen to Minimize Turtle Disorientation

Suitable plants (i.e., native vegetation such as live oak, native figs, wild tamarind, and others) shall be planted and maintained as a light screen along the beach dune line bordering the plant property to minimize turtle disorientation. In addition, FPL owner controlled area lighting shall be shielded so that none of the light is diverted skyward.

4.3 General Exceptions

The environmental conditions of the EPP Section 4 are contingent upon licensee or its contractors being able to obtain the necessary FDEP endangered species permits to take, handle, and experiment with sea turtles. If licensee is unable to obtain the necessary permits, then NRC shall be notified of alternatives by the licensee.

5.0 Administrative Procedures

5.1 Review and Audit

The licensee shall provide for review and audit of compliance with the Environmental Protection Plan. The audits shall be conducted independently of the individual or groups responsible for performing the specific activity. A description of the organization structure utilized to achieve the independent review and audit function and results of the audit activities shall be maintained and made available for inspection.

5.2 Records Retention

Records and logs relative to the environmental aspects of plant operation shall be made and retained in a manner convenient for review and inspection. These records and logs shall be made available to NRC on request.

Records of modifications to plant structures, systems and components determined to potentially affect the continued protection of the environment shall be retained for the life of the plant. All other records, data and logs relating to this EPP shall be retained for five years or, where applicable, in accordance with the requirements of other agencies.

5.3 Changes in Environmental Protection Plan

Request for change in the Environmental Protection Plan shall include an assessment of the environmental impact of the proposed change and a supporting justification. Implementation of such changes in the EPP shall not commence prior to NRC approval of the proposed changes in the form of a license amendment incorporating the appropriate revision to the Environmental Protection Plan.

5.4 Plant Reporting Requirements

5.4.1 Routine Reports

5.4.1.1 Monthly Reports

Copies of monthly reports covering sea turtle entrapment, capture, rehabilitation, and sea turtle mortalities shall be furnished to NMFS.

5.4.1.2 Annual Environmental Operating Report

An Annual Environmental Operating Report describing implementation of this EPP for the previous calendar year shall be submitted to the NRC prior to May 1 of each year.

The report shall include summaries and analyses of the results of the environmental protection activities required by Section 4.2 of this Environmental Protection Plan for the report period, including a comparison with preoperational studies, operational controls (as appropriate), and previous non-radiological environmental monitoring reports, and an assessment of the observed impacts of the plant operation on the environment. If harmful effects or evidence of trends towards irreversible damage to the environment are observed, the licensee shall provide a detailed analysis of the data and a proposed course of action to alleviate the problem.

The Annual Environmental Operating Report shall also include:

(a) A list of EPP noncompliances and the corrective actions taken to remedy them.

(b) A list of all changes in station design or operation, tests, and experiments made in accordance with Subsection 3.1 which involved a potentially significant unreviewed environmental issue.

(c) A list of nonroutine reports submitted in accordance with Subsection 5.4.2.

(d) A discussion of the sea turtle entrapment, capture efforts, turtle mortalities, available information on barrier net inspections and maintenance, and the Taprogge condenser tube cleaning system operation including sponge ball loss at St. Lucie Plant

In the event that some results are not available by the report due date, the report shall be submitted noting and explaining the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

5.4.2 Nonroutine Reports

A written report shall be submitted to the NRC in accordance with 10 CFR 50.4 within 30 days of occurrence of a nonroutine event. The report shall (a) describe, analyze, and evaluate the event, including extent and magnitude of the impact and plant operating characteristics, (b) describe the probable cause of the event, (c) indicate the action taken to correct the reported event, (d) indicate the

corrective action taken to preclude repetition of the event and to prevent similar occurrences involving similar components or systems, and (e) indicate the agencies notified and their preliminary responses.

Events reportable under this subsection which also require reports to other Federal, State, or local agencies shall be reported in accordance with those reporting requirements in lieu of the requirements of this subsection. The NRC shall be provided a copy of such reports within 30 days of the date they submitted to the other agency.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 162 TO FACILITY OPERATING LICENSE NO. DPR-67

AND AMENDMENT NO. 103 TO FACILITY OPERATING LICENSE NO. NPF-16

FLORIDA POWER AND LIGHT COMPANY, ET AL.

ST. LUCIE PLANT, UNIT NOS. 1 AND 2

DOCKET NOS. 50-335 AND 50-389

1.0 INTRODUCTION

In 1995, a Section 7 consultation under the Endangered Species Act of 1973 was initiated as a result of a large increase in the frequency of small green turtles taken incidentally and occasionally killed by entrapment in the St. Lucie Plant's cooling water intake canal. The consultation was performed to consider the effects of the continued operation of the cooling water system at the plant on listed species of sea turtles. Florida Power and Light Co. (FPL or the licensee) submitted a biological assessment (BA) to the U.S. Nuclear Regulatory Commission (NRC) in a letter dated November 20, 1995, which was reviewed by the NRC staff and forwarded to the National Marine Fisheries Service (NMFS) on February 7, 1996. NMFS issued its biological opinion (BO) to the NRC in a letter dated February 7, 1997. The BO concluded that continued operation of the plant may adversely affect, but is not likely to jeopardize, the continued existence of listed sea turtle species under NMFS jurisdiction. An incidental take statement (ITS) was included in the BO to establish lethal take levels for listed species of sea turtles. The ITS included terms and conditions necessary to monitor and minimize adverse impacts and the lethal takes of sea turtles. NMFS considers these terms and conditions to be reasonable, prudent, and necessary. The NRC staff held a public meeting with the licensee and the Florida Department of Environmental Protection (FDEP) on May 7, 1997, to discuss a study regarding sea turtle entrapment required by a condition of the ITS. Other areas of the ITS that needed clarification or revision, or both, were identified by the licensee. The NRC staff forwarded the BO to the licensee in a letter dated May 30, 1997, and requested FPL propose changes to the St. Lucie Units 1 and 2 Environmental Protection Plans (EPPs), located in Appendix B to Facility Operating Licenses DPR-67 and NPF-16, to implement the terms and conditions of the ITS. In a letter dated August 4, 1997, FPL proposed revisions to the EPPs. In a letter dated October 6, 1997, the staff informed FPL that the NRC and NMFS disagreed with the proposed changes and requested that FPL make changes to the EPP consistent with the BO and the ITS.

Proposed amendments to the EPP were submitted by FPL to NRC in a letter dated December 1, 1997; however, FPL had several further questions concerning the terms and conditions of the ITS. The staff held another public meeting with the licensee and representatives from FDEP and NMFS to discuss these issues. The meeting was held on

January 20, 1998. Subsequent to the meeting, NMFS amended its BO in a letter to the NRC dated May 8, 1998. The NRC forwarded the ITS amendments to FPL in a letter dated June 17, 1998, and requested that FPL amend the application for the EPP revisions. FPL provided an amended application by letter dated August 26, 1998. By letter dated October 8, 1998, the NRC forwarded FPL's revised proposed amendment, which included an intake well monitoring program and the proposed plan for the entrapment study, to NMFS for review and approval. In a letter to FPL dated, February, 22, 1999, NRC endorsed NMFS's approval of the proposed study of turtle entrapment.

The supplements contained clarifying information that that did not change the no significant hazards consideration.

2.0 EVALUATION

The proposed changes to Sections 4 and 5 of the EPP to incorporate the terms and conditions of the ITS and BO are discussed in this evaluation.

The Unit 1 EPP does not contain all of the environmental conditions for the protection of sea turtles that are contained in the Unit 2 EPP. FPL proposed to modify Section 4 and add Section 5 in the Unit 1 EPP to conform to Sections 4 and 5 in the Unit 2 EPP. This change would make the Unit 1 and Unit 2 EPPs identical. All of these changes are discussed in this evaluation. If there is not currently a similar requirement for Unit 1, a note will be made to that effect.

Section 4.1, "Unusual or Important Environmental Events" - FPL proposed changes to clarify the reporting requirements for unusual or important environmental events. For Unit 1, the description of the exact contents for a written report to NRC is deleted. For both Units, the clarifications included adding a statement that for any species protected by the Endangered Species Act of 1973, mortalities causally related to plant operation are included in the definition of a unusual or important environmental event. In addition, this section states that the reporting requirement time frame is to be consistent with §50.72 for environmental protection issues. Although this sentence was not originally proposed by FPL in its earlier requests, this sentence was added after telephone discussion between George Madden, FPL, and William Gleaves, NRC, on May 21, 1999. This sentence was inserted to clarify the timeliness for reporting of issues that relate to the environment. This modification provides clarifying information that did not change the original no significant hazards consideration determination. Therefore, these changes are acceptable.

Section 4.2, "Terrestrial/Aquatic Issues" - There is a similar section designation but no similar requirement in the current Unit 1 EPP (see discussion in Section 4.2.4, below). FPL proposed adding an introductory paragraph providing background on the St. Lucie consultation. The introductory paragraph conveys that in May 1995, NRC initiated the formal consultation with NMFS resulting in an updated Sea Turtle BA submitted by FPL on November 20, 1995. NMFS reviewed this assessment and in return issued a BO dated February 7, 1997. This change is acceptable.

Section 4.2.1, "Beach Nesting Surveys" - There is no similar requirement in the current Unit 1 EPP. This section originally discussed the beach nesting surveys required for the early years of operation. FPL has been conducting nesting studies as part of the St. Lucie reporting requirements for the U.S. Fish and Wildlife Service and the FDEP and is involved in providing data for long-term nesting index surveys. FPL proposed relocating the requirements for nesting surveys to a new Section 4.2.2.2, Item 9. The surveys required in this section of the EPP have been completed and the ongoing surveys are captured under other requirements. Therefore, the staff agrees with deletion of this section.

FPL proposed a new Section 4.2.1, titled, "Reinitiation of Endangered Species Act Section 7 Consultation," to address the criteria for reinitiating a Section 7 consultation. The criteria outlined in Section 4.2.1 for reinitiation of an Endangered Species Act Section 7 consultation are consistent with those outlined in the NMFS BO. The deletion is acceptable.

Section 4.2.2, "Studies to Evaluate and/or Mitigate Intake Entrapment" - Deleted. This section originally discussed the requirements to have a program to deter turtles from the plant intake structure and to perform studies to evaluate the effectiveness of the program in mitigating intake structure entrapment. These studies, titled, "Studies to Evaluate and/or Mitigate Intake Entrapment," were completed in 1985 and the results were provided to the NRC in FPL letter dated April 18, 1985. Because these studies are complete, and mitigation measures are discussed in the BO and terms and conditions of the ITS, deleting the original Section 4.2.2 requirements is acceptable.

FPL proposed a new Section 4.2.2, "Incidental Take Statement," to address the background of incidental take statements and basis for the incidental take limits. This is a new requirement for both Units 1 and 2. It also addresses the basis for not establishing a take limit for the entrapment, capture, and release of any species of turtle. These changes are acceptable.

Section 4.2.2.1, "Lethal Take Levels" - This is a new section for both Units 1 and 2. This section discusses the basis for the lethal take levels for sea turtles by species as specified in the ITS. The numerical limits will be established by NMFS in the current ITS and included in plant procedures and will allow for a case-by-case review and change in lethal take limits without a need for a license amendment. The lethal take levels are based on historical observed lethal takes, but provide for an increase in total numbers of lethal takes as entrapment levels increase. Two lethal levels are specified: one is a fixed level of lethal takes per calendar year, while the other is a percentage of the total number of entrapments per calendar year. The allowable take level will be the greater of the two numbers. These take levels are consistent with the ITS and therefore, are acceptable.

Section 4.2.2.2, "Terms and Conditions of the Incidental Take Statement" - This is a new section for both Units 1 and 2. This section discusses the terms and conditions of the ITS. These terms and conditions state the characteristics and inspection criteria of the mesh barrier, repair requirements for nets, and implements a study and monitoring program of the turtles. These measures are discussed in the BA and BO and generally reflect current practices at St. Lucie. In response to the NMFS BO, FPL took exception to items 6, 7, 9, and 10. In the May 8, 1998, letter from NMFS to the NRC, NMFS amended the BO with regard to these issues. Each of the terms and conditions is discussed below.

Item 1 establishes the requirement and basis for FPL to install, inspect, maintain, and repair the five-inch barrier net across the intake canal. FPL shall inspect, maintain, and repair the five-inch net on at least a quarterly basis and promptly repair any hole or damage to nets that are discovered outside of the regular maintenance program.

Item 2 establishes the requirement and basis for FPL to inspect, maintain, and repair the existing eight-inch barrier net as back up to the new five-inch net. It also describes its basis for being a backup to the five-inch net. FPL shall inspect, maintain, and repair the eight-inch net on at least a quarterly basis and promptly repair any hole or damage to nets that are discovered outside of the regular maintenance program.

Item 3 establishes the requirement and basis provisions for FPL or FPL's contractor to continue the current capture and release program for turtles in their intake canal in accordance with permits granted by FDEP.

Item 4 establishes the method for capture netting in the intake canal. It also specifically defines the minimum number of required hours, the conditions to increase netting activities, and the criteria for deviating from these requirements.

Item 5 directs capture efforts if a turtle is observed west of the eight-inch barrier net.

Item 6 requires FPL to implement a monitoring program of the intake wells for sea turtles and specifies the FPL staff responsible to conduct intake well monitoring and the provisions for notifying response personnel if a turtle is detected in the intake well.

Item 7 requires that FPL propose a plan for a study of the effect of various factors on turtle entrapment. It also requires that the study be approved by NMFS. NMFS originally requested a study using remote videography or a similarly designed methodology that would not interfere with turtle behavior while the study is being performed. Based on the meetings at the site, NMFS and FDEP agreed with FPL that such a study was not feasible, however, a different type of study would be acceptable. On June 17, 1998, NRC issued a letter to FPL containing revisions to the ITS, including a discussion of a study to be performed to elucidate the effect of various factors on turtle entrapment. After initiation of the study, FPL is to report quarterly on progress and provide a final report approximately one year after initiation. FPL submitted a request for proposal for the study in letter dated August 26, 1998. NMFS reviewed the request for proposal and determined that it met the intent of the BO as indicated by letter dated February 22, 1999, from NRC to FPL approving the study.

Item 8 requires that FPL continue to participate in the Sea Turtle Stranding and Salvage Network under FDEP authority and permits. This is to assess any possible delayed lethal impacts of capture as well as to provide background data and health of local turtles. Stranded turtles will not be counted against the authorized level of lethal incidental takes for St. Lucie.

Item 9 requires that FPL continue to conduct, under FDEP permit, the ongoing sea turtle nesting program and public service turtle walks.

Item 10, "Routine Reports," requires copies of monthly reports covering various aspects of the sea turtle program be furnished to NMFS. It also requires that FPL furnish the annual environmental operating report which includes information related to the inspection and maintenance of barrier nets and the operation of the Taprogge condenser tube cleaning system to NMFS. This section also requires biennial meetings between FPL, NRC, and NMFS to discuss endangered and threatened species information and developments at St. Lucie, beginning January 2000.

Items 1 through 10 listed above are consistent with the NMFS BO dated, May 8, 1998, and ITS. Therefore, these changes are acceptable.

Section 4.2.3, "Studies to Evaluate and/or Mitigate Intake Canal Mortality" - There is no similar requirement in the current Unit 1 EPP. This section is to be deleted for Unit 2. This section originally discussed the requirement to perform studies to evaluate and/or mitigate intake canal mortality. These studies were documented in FPL letter dated November 20, 1995, and were discussed in the BA and resulting BO. Many of these mitigation measures are captured in separate sections of the EPP. Because these original studies were completed and mitigation measures are discussed in other sections of the EPP, deleting this section is acceptable.

Section 4.2.4, "Light Screen to Minimize Turtle Disorientation" - This section has been renumbered to Section 4.2.3 and modified. The St. Lucie, Unit 1, EPP has a similar Section 4.2, which will also be renumbered to Section 4.2.3, and modified as discussed. The State of Florida has an ongoing program to replace nonindigenous species of plants with native varieties of plants as light screens along the beaches. The Australian pine is not a native plant species. Therefore, the reference to "Australian pine" has been deleted and generalized to "suitable plants" for light screen along the beach dune. The requirement for the shielding perimeter lights from Unit 1 License Condition 2.F.(1) will be deleted from the Unit 1 license and added to Section 4.2.3 of the Unit 1 and Unit 2 EPP. This shielding requirement is not currently in the Unit 2 License and is being moved to generate consistency between the Unit 1 and Unit 2 Licenses and EPPs. These changes are consistent with Information Notice 97-043, dated July 1, 1997. These changes are acceptable.

Section 4.2.5, "Capture and Release Program" - There is no similar requirement in the current Unit 1 EPP. This section is to be deleted for Unit 2. This section originally outlined the requirements of the capture and release program for sea turtles removal from the intake canal. The section has been deleted in its entirety because the capture and release program is now covered by Section 4.2.2.2, Item 3. These changes are acceptable.

Section 4.3, "General Exceptions" - There is no similar requirement in the current Unit 1 EPP. This section has been changed to highlight that the environmental conditions of the EPP Section 4 are contingent upon FPL obtaining the required FDEP permits to take, handle, or experiment with sea turtles. These changes are acceptable.

Section 5.0, "Administrative Procedures" - There is no similar requirement in the current Unit 1 EPP. This section is new for Unit 1 and remains the same as the current EPP for Unit 2. This section provides requirements for the review and audit of the EPP (Section 5.1), records retention (Section 5.2), the process for changing the EPP (Section 5.3) and plant routine

reporting (Section 5.4 and Section 5.4.1). This change for Unit 1 makes the EPPs for both units to be consistent, therefore, these changes are acceptable.

Section 5.4.1.1, "Monthly Reports" - This section is new for Unit 1 and is modified for Unit 2. This section requires that monthly reports on the sea turtle program be provided to NMFS. This monthly reporting requirement is also identified in Section 4.2.2.2, Item 10. The reporting requirements are consistent with the ITS and therefore are acceptable.

Section 5.4.1.2, "Annual Environmental Operating Report" - This section is new for Unit 1. This was Section 5.4.1 for Unit 2 and has been modified and renumbered. It outlines what types of information should be included in the annual environmental operating report. FPL proposed deletion of the requirement referencing the initial annual report covering the period of time from operating license issuance date to December 31, 1983. The initial report has been completed. FPL also added a new section, (d), which requires a summary of the monthly reports to NMFS be included in the annual environmental operating report. The annual environmental operating report should be furnished to NMFS and NRC. This change is consistent with the ITS requirement to furnish NMFS an annual report. Therefore, these changes are acceptable.

Section 5.4.2, "Nonroutine Reports" - This section outlines the schedule and information to be included in the nonroutine written event reports submitted to NRC. This section was modified and renumbered from the original Section 4.1 for Unit 1. This section was modified for Unit 2. Several editorial changes were made to Section 5.4.2 to clarify reporting requirements for reports required by NRC and reports required by other agencies. Section 4.1 refers to this section for written reports. For written reports required by NRC, they shall be submitted within 30 days of the occurrence of a nonroutine event in accordance with 10 CFR 50.4.

For written reports of nonroutine events required by other Federal, State, or local agencies, they shall be submitted in accordance with those reporting requirements in lieu of the requirements of this section. A copy of these written reports shall be submitted to NRC within 30 days of the date that they are submitted to the other agency. These changes are acceptable.

3.0 STAFF CONCLUSION

The staff has reviewed the FPL proposed changes to the St. Lucie, Units 1 and 2, Operating License, Appendix B, "Environmental Protection Program (Non-Radiological) Technical Specifications." The licensee's proposed additions and modifications to the current EPPs meet the intent of the relevant review criteria and the requirements of the NMFS Incidental Take Statement and Biological Opinions that resulted from the Section 7 consultation under the Endangered Species Act of 1973. Therefore, the proposed modifications to St. Lucie, Unit 1 and 2, Operating Licenses, Appendix B, are acceptable.

4.0 STATE CONSULTATION

By Letter dated March 8, 1991, Mary E. Clark of the State of Florida, Department of Health and Rehabilitative Services, informed Deborah A. Miller, Licensing Assistant, U.S. NRC, that the State of Florida does not desire notification of issuance of license amendments.

5.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32 and 51.35, an environmental assessment and finding of no significant impact was published in the Federal Register on June 29, 1999 (64 FR 34833). Accordingly, based upon the environmental assessment, the Commission has determined that issuance of this amendment will not have a significant effect on the quality of the human environment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: Claudia M. Craig, Robert S. Jolly, Kimberly D. Leigh

Dated: July 2, 1999

Mr. T. F. Plunkett
Florida Power and Light Company

ST. LUCIE PLANT

cc:
Senior Resident Inspector
St. Lucie Plant
U.S. Nuclear Regulatory Commission
P.O. Box 6090
Jensen Beach, Florida 34957

Joe Myers, Director
Division of Emergency Preparedness
Department of Community Affairs
2740 Centerview Drive
Tallahassee, Florida 32399-2100

M. S. Ross, Attorney
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. Douglas Anderson
County Administrator
St. Lucie County
2300 Virginia Avenue
Fort Pierce, Florida 34982

Mr. William A. Passetti, Chief
Department of Health
Bureau of Radiation Control
2020 Capital Circle, SE, Bin #C21
Tallahassee, Florida 32399-1741

J. A. Stall, Site Vice President
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. R. G. West
Plant General Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

E. J. Weinkam
Licensing Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. John Gianfrancesco
Manager, Administrative Support
and Special Projects
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. Rajiv S. Kundalkar
Vice President - Nuclear Engineering
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. J. Kammel
Radiological Emergency
Planning Administrator
Department of Public Safety
6000 SE. Tower Drive
Stuart, Florida 34997

Mr. T. F. Plunkett
President - Nuclear Division
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

June 23, 1999

SUBJECT: ST. LUCIE PLANT, UNITS 1 AND 2 - ENVIRONMENTAL ASSESSMENT REGARDING THE APPENDIX B - ENVIRONMENTAL PROTECTION PLAN (NON-RADIOLOGICAL) TECHNICAL SPECIFICATIONS (TAC NOS. M99396 AND M99397)

Dear Mr. Plunkett:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for amendment dated August 4, 1997, as supplemented, December 1, 1997, May 8, 1998, and August 26, 1998. The proposed amendments would revise the St. Lucie Plant, Units 1 and 2, Technical Specifications, Appendix B, "Environmental Protection Plan (Non-Radiological)" (EPP), to incorporate the terms and conditions of the Incidental Take Statement in the Biological Opinion issued by the National Marine Fisheries Service (NMFS) on February 7, 1997, and subsequently modified on May 8, 1998. The proposed amendments will replace Section 4, "Environmental Conditions," of the EPPs for both Units 1 and 2, and add Section 5, "Administrative Procedures," to the Unit 1 EPP and revise the current EPP Section 5 for Unit 2.

The assessment is being forwarded to the Office of the Federal Register for publication.

Sincerely,

Original signed by:

William C. Gleaves, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-335, 50-389

Enclosure: Environmental Assessment

cc w/encl: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 23, 1999

Mr. T. F. Plunkett
President - Nuclear Division
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: ST. LUCIE PLANT, UNITS 1 AND 2 - ENVIRONMENTAL ASSESSMENT REGARDING THE APPENDIX B - ENVIRONMENTAL PROTECTION PLAN (NON-RADIOLOGICAL) TECHNICAL SPECIFICATIONS (TAC NOS. M99396 AND M99397)

Dear Mr. Plunkett:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for amendment dated December 1, 1997, as supplemented August 26, 1998. The proposed amendments would revise the St. Lucie Plant, Units 1 and 2, Technical Specifications, Appendix B, "Environmental Protection Plan (Non-Radiological)" (EPP), to incorporate the terms and conditions of the Incidental Take Statement in the Biological Opinion issued by the National Marine Fisheries Service (NMFS) on February 7, 1997, and subsequently modified on May 8, 1998. The proposed amendments will replace Section 4, "Environmental Conditions," of the EPPs for both Units 1 and 2, and add Section 5, "Administrative Procedures," to the Unit 1 EPP and revise the current EPP Section 5 for Unit 2.

The assessment is being forwarded to the Office of the Federal Register for publication.

Sincerely,

William C. Gleaves, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-335, 50-389

Enclosure: Environmental Assessment

cc w/encl: See next page

7590-01-P

UNITED STATES NUCLEAR REGULATORY COMMISSION

FLORIDA POWER & LIGHT COMPANY, INC., ET AL.

DOCKET NOS. 50-335 AND 50-389

ST. LUCIE PLANT, UNITS 1 AND 2

ENVIRONMENTAL ASSESSMENT AND FINDING OF

NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (the Commission) is considering issuance of amendments to Facility Operating License Nos. DPR-67 and NPF-16, issued to Florida Power and Light Company (the licensee), for operation of the St. Lucie Nuclear Plant, Units 1 and 2 located in St. Lucie County, Florida.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action:

The proposed amendments would revise the St. Lucie Plant, Units 1 and 2, Technical Specifications, Appendix B, "Environmental Protection Plan (Non-Radiological)" (EPP), to incorporate the terms and conditions of the Incidental Take Statement in the Biological Opinion issued by the National Marine Fisheries Service (NMFS) on February 7, 1997, and subsequently modified on May 8, 1998. The proposed amendments will replace Section 4, "Environmental Conditions," of the EPPs for both Units 1 and 2, and add Section 5, "Administrative Procedures," to the Unit 1 EPP and revise the current EPP Section 5 for Unit 2.

The proposed action is in accordance with the licensee's application for amendment dated December 1, 1997, as supplemented in a letter dated August 26, 1998.

The Need for the Proposed Action:

The proposed action would incorporate the terms and conditions of the Incidental Take Statement of the Biological Opinion issued by NMFS into St. Lucie Units 1 and 2 operating licenses as well as provide consistency between the Unit 1 and Unit 2 Environmental Protection Plans.

Environmental Impacts of the Proposed Action:

The Commission has completed its evaluation of the proposed action and concludes that implementation of the Incidental Take Statement in St. Lucie's Environmental Protection Plan for Units 1 and 2 would support the National Marine Fisheries Service conclusion that the continued operation of the circulating water system at St. Lucie Plant is not likely to jeopardize the continued existence of threatened or endangered sea turtle species under NMFS jurisdiction. The Incidental Take Statement identifies actions that have been or will be taken by St. Lucie to ensure the takes of endangered sea turtles are limited. These actions include the use of two different mesh barrier nets across the intake canal, a capture and release program for endangered sea turtles found in the intake canal, a program to monitor for endangered sea turtles at the cooling water intakes on a regular basis, and a study to elucidate the effect of various factors on turtle entrapment.

The proposed action will not increase the probability or consequences of accidents, no changes are being made in the types of any effluents that may be released off site, and there is no significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the proposed action.

With regard to potential non-radiological impacts, the proposed action does not involve any historic sites. It does not affect non-radiological plant effluents and has no other environmental impact. Therefore, there are no significant non-radiological environmental impacts associated with the proposed action.

Accordingly, the Commission concludes that there are no significant environmental impacts associated with the proposed action.

Alternatives to the Proposed Action:

As an alternative to the proposed action, the staff considered denial of the proposed action (i.e., the "no-action" alternative). Denial of the application would result in St. Lucie not implementing the Incidental Take Statement which would lead to takes of endangered sea turtles outside the NMFS Biological Opinion. The environmental impacts of the proposed action are less than the alternative action.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the Final Environmental Statement for the St. Lucie Nuclear Plant.

Agencies and Persons Consulted:

On June 9, 1999, the staff consulted with William Passetti, Chief, Department of Health, Bureau of Radiation Control, for the state of Florida, regarding the environmental impact of the proposed action. The state official had no comments.

FINDING OF NO SIGNIFICANT IMPACT

On the basis of the environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the Commission has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letter dated December 1, 1997, as supplemented in a letter dated August 26, 1998, which are available for public inspection at the Commission's Public Document Room, The Gelman Building, 2120

L Street, NW., Washington, DC, and at the local public document room located at the Indian River Community College Library, 3209 Virginia Avenue, Fort Pierce, Florida 34981-5596.

Dated at Rockville, Maryland, this 23rd day of June 1999.

FOR THE NUCLEAR REGULATORY COMMISSION

William C. Gleaves, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Mr. T. F. Plunkett
Florida Power and Light Company

ST. LUCIE PLANT

cc:
Senior Resident Inspector
St. Lucie Plant
U.S. Nuclear Regulatory Commission
P.O. Box 6090
Jensen Beach, Florida 34957

Joe Myers, Director
Division of Emergency Preparedness
Department of Community Affairs
2740 Centerview Drive
Tallahassee, Florida 32399-2100

M. S. Ross, Attorney
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. Douglas Anderson
County Administrator
St. Lucie County
2300 Virginia Avenue
Fort Pierce, Florida 34982

Mr. William A. Passetti, Chief
Department of Health
Bureau of Radiation Control
2020 Capital Circle, SE, Bin #C21
Tallahassee, Florida 32399-1741

J. A. Stall, Site Vice President
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. R. G. West
Plant General Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

E. J. Weinkam
Licensing Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. John Gianfrancesco
Manager, Administrative Support
and Special Projects
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. Rajiv S. Kundalkar
Vice President - Nuclear Engineering
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. J. Kammel
Radiological Emergency
Planning Administrator
Department of Public Safety
6000 SE. Tower Drive
Stuart, Florida 34997

Heinz Mueller [5]
Environmental Review Coordinator
US EPA Region 4
61 Forsyth Street, SW.
Atlanta, Georgia 30303-3104

Florida Power & Light Company, 6351 S. Ocean Drive, Jensen Beach, FL 34957

FPL

April 28, 1999

L-99-94
10 CFR 50.4
10 CFR 50.36

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Re: St. Lucie Unit 2
Docket No. 50-389
1998 Annual Environmental Operating Report

In accordance with Section 5.4.1 of the St. Lucie Unit 2 Environmental Protection Plan (EPP), enclosed is the St. Lucie Unit 2 Annual Environmental Operating Report for calendar year 1998.

As agreed at the first biennial sea turtle meeting held at St. Lucie Plant on January 20, 1998, this report includes discussions of the 5-inch barrier net maintenance and Taprogge condenser tube cleaning system ball loss for 1998. In addition, copies of the report are being furnished to the Florida Department of Environmental Protection, Tequesta Office, and the National Marine Fisheries Service, Southeast Region.

Should there be any questions on this information, please contact us.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

JAS/GRM

Enclosure

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant
Florida Department of Environmental Protection, Tequesta Office
National Marine Fisheries Service, Southeast Region

A/12

FLORIDA POWER & LIGHT COMPANY

ST. LUCIE UNIT 2

ANNUAL ENVIRONMENTAL OPERATING REPORT

1998

FLORIDA POWER & LIGHT COMPANY

JUNO BEACH, FLORIDA

QUANTUM RESOURCES, INC.

PALM BEACH GARDENS, FLORIDA

ENVIRONMENTAL OPERATING REPORT

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1.0 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The St. Lucie Plant is an electric generating station on Hutchinson Island in St. Lucie County, Florida. The plant consists of two nuclear-fueled 850 net MWe units; Unit 1 was placed on-line in March 1976 and Unit 2 in April 1983. This document has been prepared to satisfy the requirements contained in Appendix B, Environmental Protection Plan (EPP), to St. Lucie Unit 2 Facility Operating License No. NPF-16. This report primarily discusses environmental protection activities related to sea turtles as required by Subsection 4.2 of the EPP. Other routine annual reporting requirements are addressed in Volume 2.

1.2 TURTLE NESTING SURVEY

Since monitoring began in 1971, there have been considerable year-to-year fluctuations in sea turtle nesting activity on Hutchinson Island. However, data collected through 1998 have shown no long-term reductions in nesting on the island. Relatively high nesting during recent years may actually reflect an increase in the number of nesting females in the study area. On a smaller scale, power plant operation has had no significant effect on nesting near the plant. Low nesting activity in 1975 and again in 1981-1983 in the vicinity of the plant was attributed to nighttime construction activities associated with installation of plant intake and discharge structures. Nesting returned to normal or above normal levels following both periods of construction. During 1991, daytime construction activities associated with velocity cap repairs had no apparent effect on nesting. Formal requirements to conduct nesting surveys expired in 1986, but this program has been continued through 1998 with agreement from federal and state agencies. In 1998, the continuation of the nesting survey program was mandated as part of the biological opinion and incidental take statement issued by the National Marine Fisheries Service.

1.3 INTAKE CANAL MONITORING

Since plant operation began in 1976, 6086 sea turtles (including recaptures) representing five different species have been removed from the intake canal. The majority of the turtles captured (59 percent) were loggerheads. Differences in the numbers of turtles found during different months and years, including dramatic increases in green turtle captures in recent years, have been attributed primarily to natural variation in the occurrences of turtles in the vicinity of the plant, rather than to operational influences of the plant itself. The majority of turtles removed from the intake canal (about 97 percent) were captured alive and released back into the ocean. Ongoing evaluations and improvements to the canal capture program have substantially reduced mortalities of entrapped sea turtles during recent years. Turtles confined between the barrier net and intake headwalls typically reside in the canal for a relatively short period prior to capture, and most are in good to excellent condition when caught. An improved design barrier net completed in January 1996 is expected to further reduce the residence times and potential for mortalities to sea turtles in the intake canal system.

2.0 INTRODUCTION

2.1 BACKGROUND

This document has been prepared to satisfy the requirements contained in Appendix B, Environmental Protection Plan, to St. Lucie Unit 2 Facility Operating License NPF-16.

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. Jurisdiction for sea turtle studies is with the NRC, which is considered to be the lead federal agency relative to consultation under the Endangered Species Act. Previous results dealing with sea turtle studies are contained in fourteen annual environmental operating reports covering the period from 1983 through 1997. This report describes the 1998 environmental protection activities related to sea turtles, as required by Subsection 4.2 of the St. Lucie Unit 2 Environmental Protection Plan.

2.2 AREA DESCRIPTION

The St. Lucie Plant is located on a 457-hectare site on Hutchinson Island on Florida's East Coast (Figures 1 and 2). The plant is approximately midway between the Ft. Pierce and St. Lucie Inlets. It is bounded on the East Side by the Atlantic Ocean and on the West Side by the Indian River Lagoon. Hutchinson Island is a barrier island that extends 36 km between inlets and attains its maximum width of 2 km at the plant site. Elevations approach 5 m atop dunes bordering the beach and decrease to sea level in the mangrove swamps that are common on much of the western side. The Atlantic shoreline of 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 Florida Current, which flows parallel to the continental shelf margin, begins to diverge from the coastline at West Palm Beach. At Hutchinson Island, the current is approximately 33 km offshore. Oceanic water associated with the western boundary of the current periodically meanders over the inner shelf, especially during summer months.

2.3 PLANT DESCRIPTION

The St. Lucie Plant consists of two 850 net MWe nuclear-fueled electric generating units that use near shore ocean waters for the plant's once-through condenser cooling water system. Water for the plant enters through three submerged intake structures located about 365 m offshore (Figure 2). Each of the intake structures is equipped with a velocity cap to minimize fish entrainment. From the intake structures, the water passes through submerged pipes (two 3.7 m and one 4.9 m in diameter) under the beach and dunes that lead to a 1,500 meter long intake canal, which transports water to the plant. After passing through the plant, the heated water is discharged into a 670 meter long canal that leads to two buried discharge pipelines. These pass underneath the dunes and beach 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.

3.0 TURTLES

3.1 INTRODUCTION

Hutchinson Island, Florida, is an important rookery for the loggerhead turtle, Caretta caretta, and also supports some nesting of the green turtle, Chelonia mydas, and the leatherback turtle, Dermochelys coriacea. State and federal statutes protect all three species. The federal government has classified the loggerhead turtle as a threatened species. The federal government endangered species lists include the leatherback turtle and the Florida nesting population of the green turtle. It has been an FPL goal that the St. Lucie Plant would not adversely affect the Hutchinson Island rookery. Because of this concern, FPL has sponsored monitoring of marine turtle nesting activity on the island since 1971.

Daytime surveys to quantify nesting, as well as 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) were pre-operational. Though the power plant was not operating during 1975, 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. Construction had been completed and 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 Unit 2. During this study, four of the previously established 1.25 km-long survey areas were monitored. Additionally, eggs from turtle nests potentially endangered by construction activities were relocated.

Every year from 1981 through 1998, 36 one-km-long survey areas comprising the entire island were monitored seven days a week during the nesting season (Figure 3). Beginning in 1994, the southern half of the island has been surveyed by Ecological Associates of Jensen Beach, Florida, and their data is included in this report. The St. Lucie Unit 2 discharge structure was installed during the 1981 nesting season. Offshore and beach construction of the Unit 2 intake structure proceeded throughout the 1982 nesting season and was completed near the end the 1983 nesting season. Construction activities associated with installation of both structures were similar to those conducted when Unit 1 intake and discharge structures were installed. Eggs from turtle nests potentially threatened by construction activities were relocated.

During 1991, another 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. However, in contrast to previous offshore projects, 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 implemented in support of the project included caging of nests along a 1,500 meter section of beach west of the platform and release of hatchlings to unaffected areas to the north and south. This plan was

intended to mitigate any negative effects potentially resulting from required safety and navigational lighting on and near the platform.

Requirement 4.2.1 of the St. Lucie Unit 2 Appendix B Environmental Protection Plan was complete with submission of the 1986 nesting survey data (ABI, 1987). The nesting survey was continued voluntarily through 1998 with agreement from federal and state agencies. Results are presented in this report and discussed in relation to previous findings.

In addition to monitoring sea turtle nesting activities and relocating nests away from plant construction areas, removal of turtles from the intake canal has been an integral part of the St. Lucie Plant environmental monitoring program. 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 entrapped in the intake canal have been systematically captured, measured, weighed, tagged, and released.

Previous publications and technical reports have presented findings of the nesting surveys, nest relocation activities and canal capture program (ABI, 1994) (Quantum, 1995, 1996, 1997, 1998). Results of studies to assess the effects of thermal discharges on hatchling swimming speed have also been reported (ABI, 1978). In July 1994, responsibility for sea turtle research and conservation activities was transferred from Ecological Associates, Inc. (formerly Applied Biology, Inc.) to Quantum Resources, Inc. Methodologies employed in both the nesting surveys and canal capture operations remained essentially unchanged so that data collected in 1994 through the present are directly comparable to previous year's data. The purpose of this report is to: 1) present 1998 sea turtle nesting survey data and summarize observed spatial and temporal nesting patterns since 1971, 2) document and summarize predation on turtle nests since 1971, and 3) present 1998 canal capture data and summarize comparable data collected since 1976.

3.2 MATERIALS AND METHODS

3.2.1 Nesting Survey

Methodologies used during previous turtle nesting surveys on Hutchinson Island were described in earlier reports (ABI 1994). Methods used during the 1998 survey were designed to allow comparisons with these previous studies.

In 1998, only areas A-S were surveyed by Quantum Resources biologists (Figure 3). Data supplied by Ecological Associates, Inc. are used to provide whole island nesting totals in Figures 6, 8, and 9.

From March 24, 1998 through April 14, 1998, several preliminary nest surveys were conducted along Hutchinson Island in areas A-S. No nesting was recorded in areas A-S prior to the beginning of formal nesting surveys on April 15, 1998. From April 15, 1998 through September 8, 1998, nest surveys were conducted on a daily basis. The last nest recorded in area A-S was on September 7, 1998. Biologists used small off-road motorcycles to survey the island each morning. New nests, non-nesting emergences (false crawls), and nests destroyed by

predators were recorded for each of the 1-km-long survey areas A - S (Figure 3). The 1.25-km-long survey areas that were established in earlier studies also were monitored so comparisons could be made with previous studies.

Data collected from beach nesting surveys were reported to the Florida Department of Environmental Protection (FDEP) as part of the FDEP Index Nesting Beach Survey. In a cooperative effort, data from stranded turtles found during beach surveys were routinely provided to the Florida Department of Environmental Protection and the National Marine Fisheries Service (NMFS) through the Sea Turtle Stranding and Salvage Network.

3.2.2 Intake Canal Monitoring

Most turtles entrapped in the St. Lucie Plant intake canal were removed by means of large-mesh tangle nets fished near the intake canal headwalls at the extreme eastern end of the intake canal (Figure 2). Nets used during 1998 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 unweighted lines used along the bottom. Turtles entangled in the nets generally remained at the water's surface until removed. Since its inception in 1976, the canal capture program has been under continual review and refinement in an attempt to minimize both entrapment time and injuries/mortalities to entrapped sea turtles. Prior to April 1990, turtle 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). Additionally, St. Lucie Plant personnel checked the nets periodically, and biologists were notified immediately when a capture was observed. Sea turtle specialists, that retrieve captured turtles from the plant intake canal system, were on call 24 hours a day.

Beginning 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 from nets and provided an opportunity to improve daily assessments of turtle levels within the canal. Records of daily canal observations were compared with capture data to assess capture efficiencies.

In 1978, a barrier net at the A1A Bridge 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 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). There they were retrieved by means of large mechanical rakes or specially designed nets. Following construction of the UIDS barrier, all but the smallest individuals were unable to reach the intake wells. Improvements made to the A1A barrier net during 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 turtles encountered in the intake canal in recent years, an improved design, small mesh barrier net was erected east of the A1A barrier net. Construction was complete in January 1996. This improved barrier net is designed to confine all turtles with a carapace width greater than 18 cm to the extreme eastern portion of the intake canal.

Formal daily inspections of the intake canal were made to determine the numbers, locations, and species of turtles present. Surface observations were augmented with periodic underwater inspections, particularly in and around the barrier nets.

In addition to the use of tangle nets, dip nets and hand captures using snorkel and SCUBA were also employed. 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 30 cm or less. Divers were employed to hand capture turtles whenever underwater visibility permits, and this technique has proven highly effective in the capture of turtles of all sizes, particularly less active individuals often found partially buried in the sediment in the vicinity of the barrier nets. Hand capture efforts have had a significant impact in reducing entrapment times for turtles in the intake canal.

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.). Beginning in July 1994, all turtles captured have been photographed dorsally and ventrally prior to release, and the photographs retained for future reference. Healthy turtles were released into the ocean the same day of capture. Sick or injured turtles were treated and occasionally held for observation prior to release. When treatment was warranted, turtles were transported to an approved rehabilitation facility.

Resuscitation techniques were used if a turtle was found that appeared to have died recently. Beginning in 1982, necropsies were conducted on dead turtles found in fresh condition.

Florida Power & Light Company and Quantum Resources, Inc. continued to assist other sea turtle researchers in 1998. Since the program began, data, specimens and/or assistance have been given to the Florida Department of Environmental Protection, National Marine Fisheries Service, US Fish and Wildlife Service, US Army Corps of Engineers, Smithsonian Institution, South Carolina Wildlife and Marine Resources Division, Center for Sea Turtle Research (University of Florida), Florida Atlantic University, University of Central Florida, Texas A & M University, University of Rhode Island, University of South Carolina, University of Illinois, University of Georgia, Virginia Institute of Marine Science, Western Atlantic Turtle Symposium, South Atlantic Fishery Management Council, Florida Marine Fisheries Commission, Harbor and Branch Oceanographic Institution and the National Research Council.

3.3 RESULTS AND DISCUSSION

3.3.1 Nesting Survey

3.3.1.1 1998 Loggerhead Nesting Summary

In 1998, 7962 loggerhead turtle nests were recorded in the 36 one-kilometer segments comprising Hutchinson Island. This figure is in accordance with a general increase in loggerhead turtle nesting on Hutchinson Island since surveys began in 1971, although significant year to year fluctuations are evident. loggerhead nests and emergences for survey areas A-S is presented in Figure 4.

3.3.1.2 Spatial Distribution of Loggerhead Turtle Nests

From 1981 through 1998, 36 one-km-long segments comprising the island's coastline have been surveyed. The distribution of nests among these 36 survey areas has shown an increase in nesting from north to south along the northern half of the island (ABI, 1987, 1994). Along the southern half of the island there has been either no gradient or a gradient of decreasing nesting from north to south. Though beach dynamics may sometimes affect the selection of nesting sites by loggerhead turtles, relationships between spatial nesting patterns and specific environmental conditions are often difficult to establish because of the interrelationship of the factors involved.

Not all ventures onto the beach by a female turtle culminate 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) suggested that relatively high percentages of false crawls might reflect disturbances or unsatisfactory nesting beach characteristics. Therefore, certain factors may affect a turtle's preference to emerge on a beach, while other factors may affect a turtle's tendency to nest after it has emerged. An index, which relates the number of nests to the number of false crawls in an area, is useful in estimating the post-emergence suitability of a beach for nesting. In the present study this index is termed "nesting success" and is defined as the percentage of total emergences that result in nests. loggerhead nesting success for areas A - S in 1998 is presented in Figure 5.

Historically, the pattern of loggerhead emergences on the island has generally paralleled the distribution of nests (ABI, 1987, 1994). In contrast, nesting success by loggerheads along the island has typically lacked gradients (ABI, 1987, 1994). Thus, the relatively high numbers of loggerhead nests observed in certain areas are usually a result of more turtles coming ashore in those areas rather than of more preferable nesting conditions being encountered by the turtles after they emerged. A variety of environmental factors (i.e., offshore bottom contours, distribution of reefs, type and extent of dune vegetation, and human activity on the beach at night) may effect loggerhead turtle emergence patterns and several have been reported to affect emergence patterns on Hutchinson Island (ABI, 1988, 1989). Undoubtedly, a combination of factors accounts for the overall distribution of emergences and therefore the overall nesting pattern on the island.

Nesting surveys on Hutchinson Island were initiated in response to concerns that the operation of the St. Lucie Plant might negatively impact the local sea turtle rookery. Previous

analysis, using log-likelihood tests of independence (G-test; Sokal and Rohlf, 1981) 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, 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 construction. During 1991 when offshore construction was restricted almost entirely to daylight hours, nests were more abundant at the plant site than at the control site. Data collected through 1998 have shown that power plant operation exclusive of nighttime intake/discharge construction has had no apparent effect on nesting.

3.3.1. 3 Long-Term Trends in Loggerhead Turtle Nesting

Various methods were used during surveys prior to 1981 to estimate the total number of loggerhead nests on Hutchinson Island based on the number of nests found in the nine 1.25 km-long survey areas (ABI, 1980a). Each of these methods was subsequently found to consistently overestimate island totals (ABI, 1987). Since whole-island surveys began in 1981, it has been possible to determine the actual proportion of total nests deposited in the nine areas. This has allowed extrapolation from the nine survey areas to the entire island for years prior to 1981.

From 1981 through 1993 the total number of nests in the nine areas varied from 32.5 to 35.6 percent of the total number of nests on the island. This is slightly higher than the 31.3 percent, which would be expected, based strictly on the proportion of linear coastline comprised by the nine areas. Using the thirteen-year mean of 33.81 percent, estimates of the total number of nests on Hutchinson Island can be calculated by multiplying the number of nests in the nine areas by 2.958. This technique, when applied to the nine survey areas during the thirteen years in which the entire island was surveyed, produced whole-island estimates within 5.3 percent of the actual number of nests counted. Because the proportion of nests recorded in the nine survey areas remained relatively constant over the last thirteen years, this extrapolation procedure provides a fairly accurate estimate of total loggerhead nesting for years prior to 1981, and is used to generate data points for 1971 through 1979 in Figure 6.

It is clear that loggerhead-nesting activity on Hutchinson Island fluctuates considerably from year to year (Figure 6). Annual variations in nest densities also are common at other rookeries, and may result from non-annual reproductive behavior. Despite high variability, data collected through 1998 suggest an overall increase in nesting on Hutchinson Island since surveys began in 1971. Total nesting activity was greatest during 1995 when 8184 loggerhead nests were recorded. No relationships between total nesting activity and power plant operation or intake/discharge construction were indicated by year-to-year variations in total nesting on Hutchinson Island.

3.3.1.4 Seasonal Patterns of Loggerhead Turtle Nesting

The loggerhead turtle nesting season usually begins between mid-April and early May, attains a maximum during June or July, and ends by mid-September (ABI, 1987). Nesting activity during 1998 followed this same pattern.

Cool water intrusions frequently occur over the continental shelf of southeast Florida

during the summer (Smith, 1982). These intrusions may have been responsible for the temporary declines in loggerhead turtle nesting activity previously observed on Hutchinson Island (ABI, 1994). Though natural fluctuations in temperature have been shown to affect temporal nesting patterns on Hutchinson Island, there has been no indication that power plant operation has affected these temporal patterns (ABI, 1988).

3.3.1.5 Predation on Loggerhead Turtle Nests

Since nest surveys began in 1971, raccoon predation has been a major cause of turtle nest destruction on Hutchinson Island. Researchers at other locations have reported raccoon predation levels as high as 70 to nearly 100 percent (Hopkins et al., 1979). Raccoon predation of loggerhead turtle nests on Hutchinson Island has not approached this level during any study year, though levels for individual 1.25 km-long areas have been as high as 80 percent. Overall predation rates for survey years 1971 through 1977 were between 21 and 44 percent, with a high of 44 percent recorded in 1973. A pronounced decrease in raccoon predation occurred after 1977 and overall predation rates for the nine areas have not exceeded 10 percent since 1979. A decline in predation rates on Hutchinson Island may be attributable to trapping programs, construction activities, habitat loss, and disease.

During 1998, raccoon predation levels were extremely low, with only one loggerhead nest in areas A-S depredated by raccoons (Figure 7). In previous years (ABI, 1994), predation of turtle nests was primarily restricted to the more undeveloped portions of the island.

Ghost crabs have been reported by numerous researchers as important predators of sea turtle nests (Hopkins etal, 1979; Stancyk, 1982). Though turtle nests on Hutchinson Island probably have been depredated by ghost crabs since nesting surveys began in 1971, quantification of ghost crab predation did not begin until 1983.

Overall predation rates by ghost crabs have varied from 0.1 to 2.1 percent from 1983-1998. During 1998, three loggerhead nest in areas A-S were depredated by ghost crabs (Figure 7). Nests destroyed by a combination of raccoon and ghost crab predation have been included as raccoon predations in previous discussions. When these combination predations are included as crab predations, the overall predation rates by ghost crabs range from 0.1 to 4.7 percent. During 1998, no such combination predations were recorded.

3.3.1.6 1998 Green and Leatherback Nesting Summary

In 1998, 258 green turtle and 77 leatherback turtle nests were recorded in the 36 one-km segments comprising Hutchinson Island. The green turtle total represents a new record for Hutchinson Island green turtle nesting and a substantial increase from last year's totals. 1998 was also a record year for leatherback turtle nesting on Hutchinson Island (Figures 8 and 9). Although strong year to year fluctuations are common, the general trend since 1971 may reflect an increase in the numbers of nesting females in the Hutchinson Island area.

3.3.1.7 Trends in Green and Leatherback Turtle Nesting

Green and leatherback turtles nest on Hutchinson Island, but in fewer numbers than loggerhead turtles. Prior to 1981, both survey (nine 1.25 km-long sections) and inter-survey areas were monitored for the presence of green and leatherback nests. Thirty-one kilometers of beach from Area 1 south to the St. Lucie Inlet were included in that effort. During whole-island surveys from 1981 through 1993, only 2.6 percent (7) of the leatherback nests (n=266) and only 1.4 percent (12) of the green turtle nests (n=831) were recorded on the five kilometers of beach north of Area 1. Therefore, previous counts of green and leatherback nests within the 31 kilometers surveyed probably were not appreciably different from total densities for the entire island. Based on this assumption, green and leatherback nest densities may be compared among all survey years, except 1980, when less than 15 kilometers of beach were surveyed.

Since surveys began in 1971, the number of nests observed on the island ranged from 5 to 258 for green turtles and from 1 to 77 for leatherbacks (Figures 8 and 9). Temporal nesting patterns for these species differ from the pattern for loggerhead turtles. Green turtles typically nest on Hutchinson Island from mid-June through the first or second week of September. Leatherback turtles usually begin nesting in March or April and continue to nest through early to mid-July. Considerable fluctuations in green turtle nesting on the island have occurred among survey years (Figure 8). This is not unusual since there are drastic year-to-year fluctuations in the numbers of green turtles nesting at other breeding grounds (Carr et al., 1982). Despite these fluctuations, data collected through 1998 suggest an overall increase in nesting since 1971 and may reflect an increase in the number of nesting females in the Hutchinson Island area. During 1998, green turtles nested most frequently along the southern half of the island. This is consistent with results of previous surveys.

Leatherback turtle nest densities have remained low on Hutchinson Island, however, increased nesting during recent years (Figure 9) may reflect an overall increase in the number of nesting females in the Hutchinson Island area.

3.3.2 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 (ABI, 1980b and 1986). 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 pipes before they encounter current velocities sufficiently strong to effect entrainment. Consequently, a turtle's entrapment relates primarily to the probability that it will detect and subsequently enter one of the intake structures.

3.3.2.1 1998 Canal Capture Summary

In 1998, 666 sea turtles were captured in the intake canal of the St. Lucie Plant. Captures included 393 loggerheads, 268 green turtles, 1 leatherback, 2 hawksbill, and 2 Kemp's ridley turtles (Table 1).

3.3.2.2 Relative Abundance and Temporal Distribution

Since intake canal monitoring began in May 1976, 3578 loggerhead (including 222 recaptures), 2432 green (including 478 recaptures), 21 leatherback, 33 Kemp's ridleys, and 21 hawksbill capture have taken place at the St. Lucie Plant. Annual catches for all species combined ranged from a low of 33 in 1976 (partial year of plant operation and monitoring) to 933 in 1995.

Except for 1993 through 1997, when the green turtle was the most abundant species in the canal, loggerheads have dominated annual captures. Since 1977, the first full year of plant operation, the number of loggerheads captured each year ranged from 62 in 1981 to 393 in 1998 (Figure 10). Numbers have exhibited considerable year-to-year fluctuations with no persistent trends evident, although recent year's data are suggestive of a possible increasing trend.

The number of green turtles captured each year since 1977 have ranged from 3 in 1979 to a record high of 673 in 1995 (Figure 10). Increasing numbers of captures over recent years may reflect an increase in the number of turtles inhabiting the nearshore coastal area near the plant or may simply represent statistical variation. Green turtle captures were down sharply in 1997, but showed a modest rebound in 1998. Additional years of capture data will be required before any long-term trends can be established.

During 1998, the monthly catch of loggerheads ranged from 10 (November) to 60 (March), with a monthly mean of 32.7 (Table 2). Over the entire history of the capture program, monthly catches have ranged from 0 to 87, with the greatest number of captures occurring during July 1996.

During 1998, the monthly catch of green turtles ranged from 7 (July) to 58 (February), with a monthly mean of 23.3 (Table 3). The March 1996 catch of 147 green turtles is the largest number of captures for this species for any month on record. Seasonal abundance patterns of

green turtles have typically been much more pronounced than for loggerheads, with over 50 percent of all captures occurring between January and March. In 1995 through 1998, however, no such seasonal pattern was evident, with captures distributed more or less evenly throughout the year.

Catches of leatherbacks, hawksbills, and Kemp's ridleys have been infrequent and scattered throughout the years. Each species has shown rather pronounced seasonal occurrences; over 60 percent of all leatherbacks were captured in March and April, over 60 percent of the hawksbills were captured between July and September, and almost 90 percent of the Kemp's ridleys were caught between December and April.

3.3.2.3 Size-Class Distributions

The size-class distribution for loggerheads removed from the intake canal in 1998 is presented in Figure 11. The size class distribution for green turtles removed from the intake canal in 1998 are presented in Figure 12. ABI (1994) presents size-class data for turtles removed from the intake canal from 1976-1993. The leatherback captured in 1998 was an adult, with a straight-line carapace length (SLCL) of over 121 cm (Hirth, 1980). Both hawksbills captured in 1998 were adults (SLCL > 63cm) (Witzell, 1983). Both Kemp's ridleys captured in 1998 were juveniles SLCL < 60cm) (Hirth, 1980).

3.3.2.4 Sex Ratios

Of the 390 loggerheads captured in 1998 for which straight line carapace lengths are available, 276 were juveniles with a straight line carapace length (SLCL) less than or equal to 70 cm, 81 were adults (SLCL > 85 cm) and 33 were transitional (SLCL 71-85 cm) (Hirth, 1980). The latter group probably includes both mature and immature individuals. Of the 81 individuals classified as adults for whom sex was recorded, 76 were females and five were males, with females predominating by a ratio of 15:1.

Of the 267 green turtles captured in 1998 for which straight line carapace lengths are available, 263 were juveniles or sub-adults (SLCL < 83 cm) (Whitherington and Ehrhart, 1989). Of the 4 adult green turtles captured in 1998, 2 were males and 2 were females. ABI (1994) discusses sex ratio data for previous years.

3.3.2.5 Capture Efficiencies

Netting methodologies have been under continual review and refinement as net materials, configurations, and placement be varied in an effort to minimize sea turtle entrapment times. Additionally, alternative capture techniques have been evaluated, and potential deterrent systems tested in the laboratory. Current capture procedures have proven to provide a safe, efficient, and cost-effective program for removing entrapped turtles from the intake canal.

Formal daily inspections of the intake canal are conducted every day that capture nets are deployed, and the number, location and relative size of entrapped turtles are recorded on field observation forms. Better utilization of currents and eddies, adjustments to tethering lines, multi-

net deployments and increased efforts to hand capture turtles have contributed to reduced entrapment times during recent years.

Entrapment times may be extended for turtles swimming past the A1A barrier net (ABI, 1987). Because capture efforts west of the A1A bridge were generally less effective than those near the intake headwalls, most turtles breaching the barrier net were not caught until they entered the intake wells of Units 1 and 2. Because of their relatively small sizes, virtually all the turtles reaching the intake wells are green turtles. During 1998, 5 of the 268 green turtle captures (1.8 percent) occurred at the intake wells. The substantial decrease in the percentage of captures at the plant intake wells compared to the 1995 figure of 14.5 percent is attributed to the effectiveness of the new small mesh barrier net installed east of AIA in January 1996.

During 1998, 99.1 percent of all turtles entrapped in the canal were captured east of the A1A Bridge, 547 by tangle nets and 119 by hand or dip net capture. The effective confinement of turtles east of A1A has been a major contributor to the high capture efficiency achieved during recent years. The installation of an improved barrier net completed in January 1996 has further increased capture efficiency by more effectively confining turtles of all sizes to a smaller area east to the A1A barrier net.

3.3.2.6 Barrier Net Maintenance

Barrier net maintenance is critical in reducing the opportunity for mortalities in the plant intake well area and in reducing residence times for turtles in the intake canal system. Daily inspections are performed from a small boat to remove floating debris and to repair holes near or at the water surface. When underwater visibility conditions permit, a weekly underwater inspection is conducted. A formal inspection is conducted monthly, including hole repair, debris removal, and airlift dredging of accumulated silt if needed. Maintenance conducted in 1998 included the repair of any holes in the mesh discovered during the daily, weekly and monthly inspections and extensive debris removal and airlift dredging of accumulated sediment conducted in November. In September, October, and November 1998, large influxes of jellyfish into the intake canal required the primary barrier net to be lowered periodically, sometimes for days at a time, to prevent the net from failing under the weight of accumulated jellyfish. The lowering mechanism functioned as designed and no damage was sustained.

3.3.2.7 Relative Condition

Turtles captured alive in the intake canal of the St. Lucie Plant were assigned a relative condition based on weight, activity, parasite infestation, barnacle coverage, wounds, injuries and any other abnormalities which might have affected overall vitality. During 1998, 95.2% percent (373) of all loggerheads found in the canal were alive and in good condition. Only 4.8 percent (19) loggerhead captures involved individuals in fair or poor condition, and one was dead. Of the 268 green turtles removed from the intake canal during 1998, 254 (94.8 percent) were in good condition, 14 (5.2 percent) were in fair or poor condition, and none were dead. The 2 hawksbills, 2 Kemp's ridleys, and the leatherback captured in 1998 were all in good condition.

Relative condition ratings can be influenced by a number of factors, some related and others unrelated to entrainment and/or entrapment in the intake canal. A rating of good indicates that turtles have not been negatively impacted by their entrapment in the canal, at least as evidenced by physical appearance. Although ratings of fair or poor imply reduced vitality, the extent to which entrainment and entrapment is responsible is often indeterminable. In some instances, conditions responsible for lower ratings, such as boat collision or fisheries gear entanglement injuries obviously were sustained prior to entrainment.

During 1998, 71 of the 666 turtles captured (10.7 percent) had notable injuries such as missing appendages, broken or missing pieces of carapace, or deep lacerations. Many of these were old, well-healed wounds, and did not require veterinary attention.

Of the 665 live removals during 1998, 652 were released into the ocean the day of capture. Nine turtles (all loggerheads) in obvious ill health or suffering serious injuries were transported to Sea World of Florida or the Marinelife Center of Juno Beach for treatment and rehabilitation. Two had serious carapace damage, presumably from a boat collision, one had ingested monofilament fishing line, and six were weak, lethargic, and emaciated when captured. Fifteen green turtles with fibropapilloma tumors were removed from the canal in 1998. Three turtles with extensive tumors were transferred to the Florida DEP for transportation to a rehabilitation facility. Twelve turtles with minor tumors were tagged and released. One green turtle was held overnight for installation of a satellite-tracking transmitter and was later released.

3.3.2.8 Mortalities

Sea turtle mortalities have been closely monitored throughout the life of the canal capture program in an attempt to assign probable causes and take appropriate remedial action to minimize future occurrences. Previous analyses of capture data identified drowning in nets (A1A barrier net, UIDS barrier, and tangle nets), drowning in the intake pipes during periods of reduced intake flow, injuries sustained from dredging operations, and injuries sustained from the mechanical rakes used in the intake wells as probable mortality factors (ABI, 1987) (FPL, 1995). Although difficult to quantify, the entrapment and subsequent demise of injured or sick turtles has probably accounted for a portion of observed mortalities.

Over the entire monitoring program history, 135 (3.8 percent) of the 3578 loggerheads and 52 (2.1 percent) of the 2432 green turtles entrapped in the canal were found dead. Mortalities spanned the range of size classes for loggerheads (SLCL = 47.5-103 cm), while all green turtle mortalities involved juveniles less than 42 cm in length. The four Kemp's ridley mortalities documented at the plant during 1987 and 1988 were the only deaths for this species to date; no dead leatherback or hawksbill turtles have been recovered at the St. Lucie Plant.

Modifications to capture procedures, improvements to barrier nets, and virtual elimination of low flow conditions within the canal have resulted in a substantial reduction in sea turtle mortalities over the life of the canal capture program. Mortality rate, expressed as the percentage of total captures involving dead animals, declined from 7.8 percent during the period 1976-1984 to 2.1 percent since 1984, and 1.0% since 1990 (Table 1).

In 1998, one turtle (a loggerhead) was removed dead from the intake canal, for an overall mortality rate of 0.15percent. The turtle was found floating up against the A1A barrier net during a period when the primary barrier net was lowered due to a jellyfish influx. The turtle was moderately decomposed, and no cause of death could be determined.

In response to the 1995 mortalities and the dramatic increase in intake canal captures in 1995, consultation was initiated with FPL, NRC, and the NMFS under Section 7 of the Endangered Species Act. As a result of that consultation, FPL has designed and constructed an improved, smaller mesh barrier net located between the A1A barrier net and the intake canal headwalls (Figure 2). Construction of the net was completed in January 1996. This barrier net prevents turtles from reaching the intake wells or UIDS barrier and increases capture efficiency by confining turtles to a smaller area of the intake canal.

3.3.2.9 Recapture Incidents

Since the St. Lucie Plant capture program began, most turtles removed from the intake canal have been tagged and released into the ocean at various locations along 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, 700 recaptures (222 loggerheads and 478 green turtles) have occurred, and a number of turtles have been recaptured more than once. The recapture rate for green turtles in 1998 was 37 percent and the recapture rate for loggerheads was only 5.3 percent. The large number of green turtle recaptures probably reflects the saturation of local green turtle populations with turtles tagged at the St. Lucie Plant and possibly indicates a difference in site fidelity between green turtles and loggerheads. Several other turtles with tag scars have also been recovered indicating that the actual number of recaptures may be higher.

3.3.3 SUMMARY

A gradient of increasing loggerhead turtle nest densities from north to south along the northern half of Hutchinson Island has been shown during most survey years. This gradient may result from variations in beach topography, offshore depth contours, distribution of nearshore reefs, onshore artificial lighting, and human activity on the beach at night. Low nesting activity in the vicinity of the power plant during 1975 and from 1981 through 1983 was attributed to nighttime construction activities associated with installation of power plant intake and discharge structures. Nesting returned to normal or above normal levels following both periods of construction. During 1991, daytime construction activities associated with velocity cap repairs had no apparent effect on nesting. Statistical analyses indicate that power plant operation, exclusive of nighttime construction, has had no significant effect on nest densities near the plant. In 1998, 7962 loggerhead turtle nests were recorded on Hutchinson Island. There have been considerable year-to-year fluctuations in loggerhead nesting activity on Hutchinson Island from 1971 through 1998. Fluctuations are common at other rookeries and may result from non-annual reproductive behavior. Despite these fluctuations, loggerhead-nesting activity has remained high during recent years and may reflect an overall increase in the number of nesting females in the Hutchinson Island area. No relationship between total nesting on the island and power plant operation or intake/discharge construction was indicated.

Temporal nesting patterns of the Hutchinson Island population may be influenced by natural, large scale fluctuations in water temperature, such as those produced by the cool water intrusions that frequently occur over the continental shelf of southeast Florida during the nesting season. However, localized fluctuations in water temperature associated with power plant operation have had no apparent effect on nesting.

Since nesting surveys began in 1971, raccoon predation has been one of the major causes of turtle nest destruction on Hutchinson Island. From 1971 through 1977, overall predation rates in the nine survey areas were between 21 and 44 percent. However, a pronounced decrease in raccoon predation occurred after 1977, and overall predation rates in the nine survey areas have not exceeded ten percent since 1979. Decreased predation by raccoons probably reflects a decline in the raccoon population. More years of survey data will be required to determine if the extremely low level of raccoon predation in 1996 through 1998 is an isolated occurrence or part of a continuing trend. Ghost crab predation on the turtle nests may be more significant than previously documented but remains relatively minor compared to raccoon predation.

During 1998, 258 green turtle and 77 leatherback turtle nests were recorded on Hutchinson Island, a record high for both species. Nesting activity by these two species has exhibited considerable annual fluctuations, as has been recorded at other rookeries, but has remained relatively high during recent years. This may reflect an overall increase in the number of nesting green and leatherback turtles in the Hutchinson Island area.

During 1998, 393 loggerheads, 268 green turtles, 2 hawksbills, 2 Kemp's ridleys, and one leatherback were removed from the St. Lucie Plant intake canal. Since monitoring began in May 1976, 3578 loggerhead, 2432 green, 21 leatherback, 21 hawksbill and 33 Kemp's ridley turtles have been captured and tagged. Over the life of the monitoring program, annual catches for loggerhead turtles have ranged from 33 in 1976 (partial year of plant operation and monitoring) to a high of 393 in 1998. Yearly catches of green turtles have ranged from 0 in 1976 to 673 in 1995. Differences in the number of turtles entrapped during different years and months are attributed primarily to natural variation in the occurrence of turtles in the vicinity of the offshore intake structures, rather than to plant operation characteristics.

Size-class distributions of loggerhead turtles removed each year from the canal have consistently been dominated by juveniles between 50 and 70 cm in straight-line carapace length. Over 75 percent of all green turtles entrapped in the canal were juveniles 40 cm or less in length. For both species, the largest number of captures for all years combined occurred during winter, but, with the exception of 1995, and to lesser extent 1996, these seasonal peaks were much more pronounced for green turtles. The sex ratio of loggerheads caught in the canal continued to be biased towards females.

During 1998, about 95 percent of all loggerheads and green turtles removed from the canal were categorized by physical appearance as being in good condition.

About 10 percent of the turtles removed from the intake canal during 1998 had substantial injuries, and the vast majority of those were well healed and apparently sustained prior to entrapment. Once in the canal, turtles confined east of A1A had very brief residency times. Thus

the relative condition of most turtles was not affected by their entrapment.

During 1998, only one mortality was recorded in the intake canal. Program modifications, including continual surveillance of tangle nets during periods of deployment, improvements to the integrity of the barrier net system, and greater effort to hand capture turtles have contributed to a substantial decline in sea turtle mortalities during recent years. The design and construction of an improved barrier net completed in January 1996 was expected to reduce mortalities and entrapment times for turtles in the intake canal. Data since then indicate that the new barrier net configuration has been highly effective in excluding turtles from the plant intake wells, but has not been as effective in reducing the overall mortality rate as anticipated, although the 1998 mortality rate of 0.15%, the lowest mortality rate in the program's history, was an outstanding achievement and a hopeful sign for the future.

4.0 LITERATURE CITED

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5.0 FIGURES

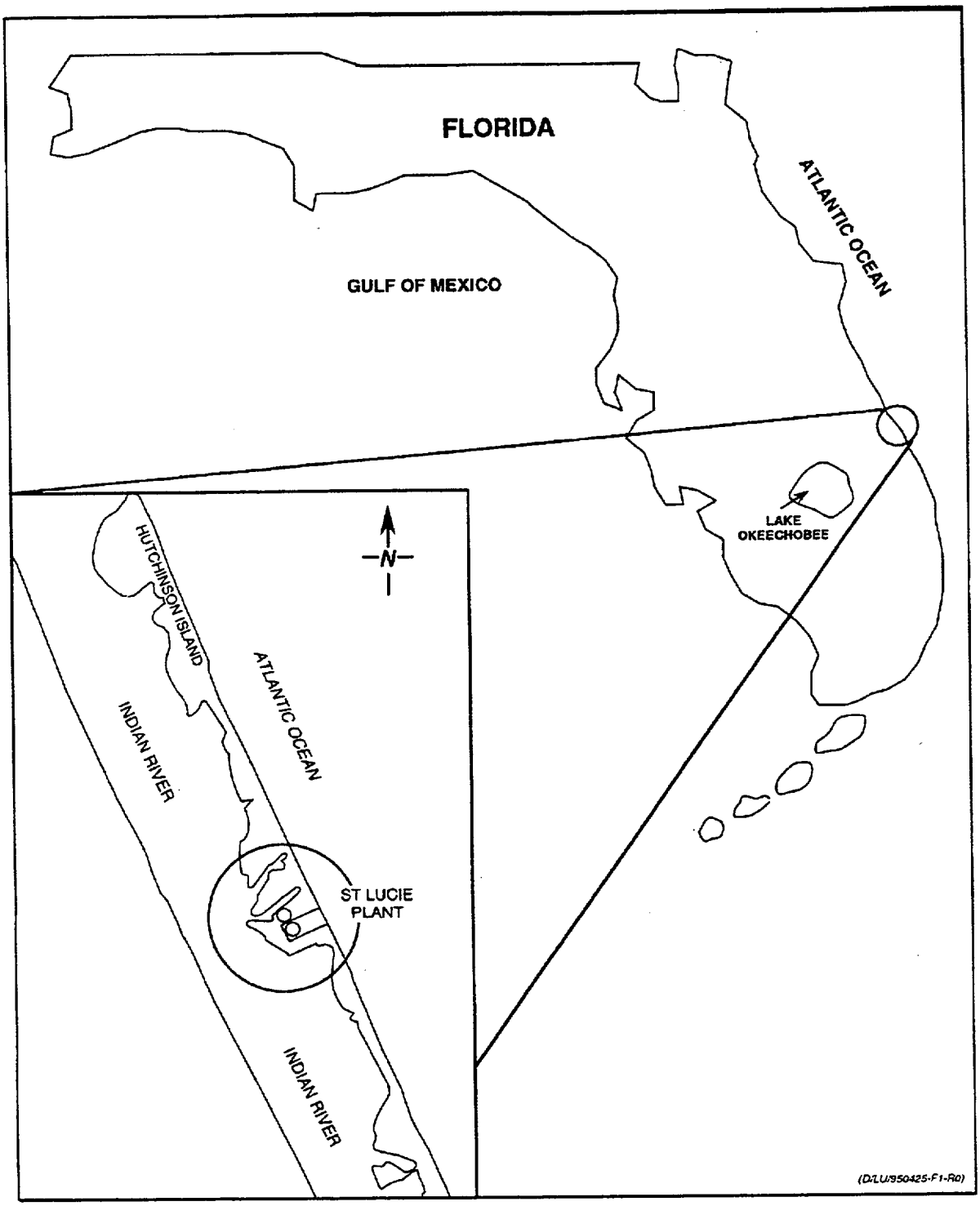

Figure 1. Location of St. Lucie Plant

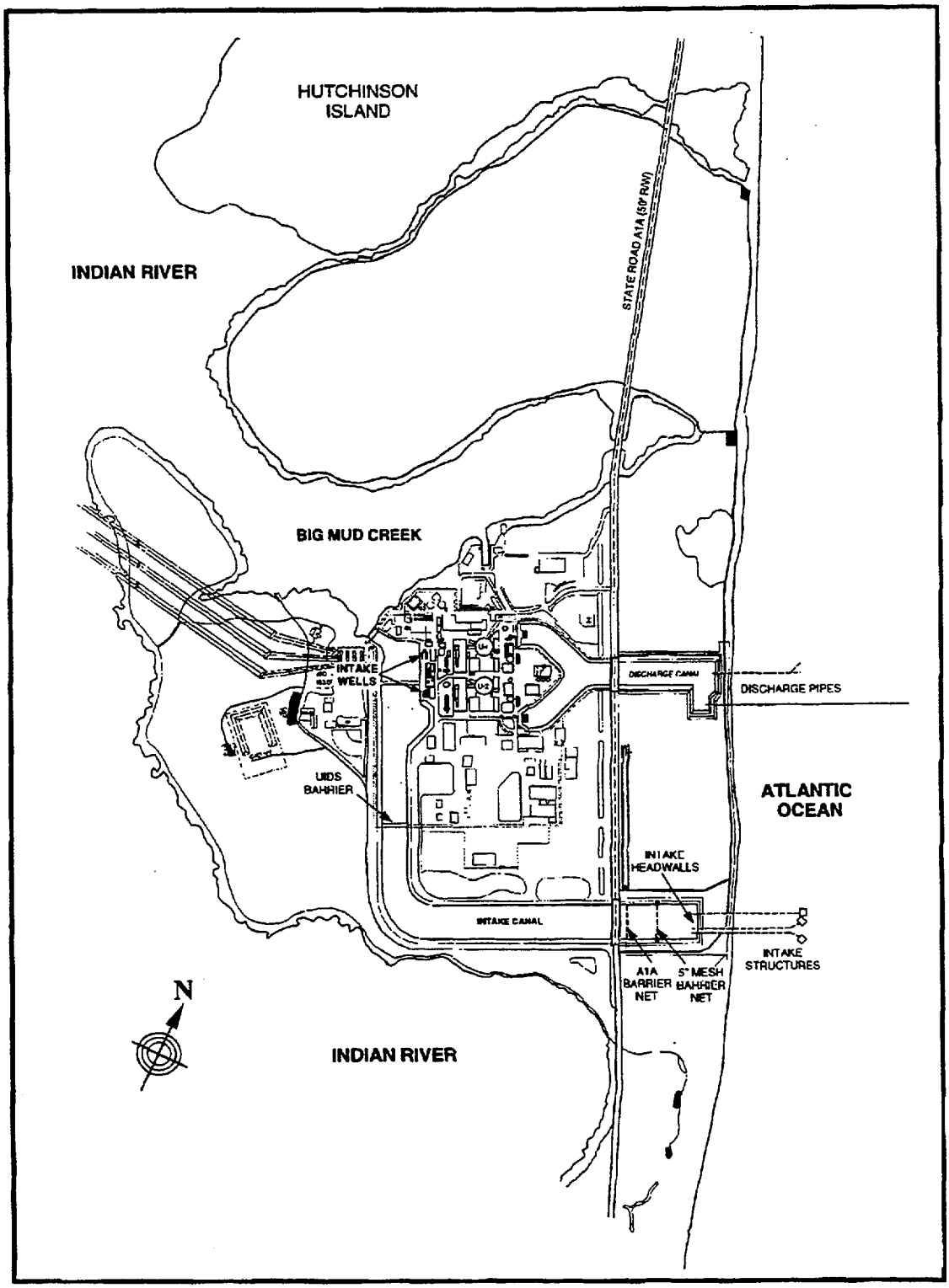

Figure 2. St. Lucie Plant Cooling Water Intake and Discharge System

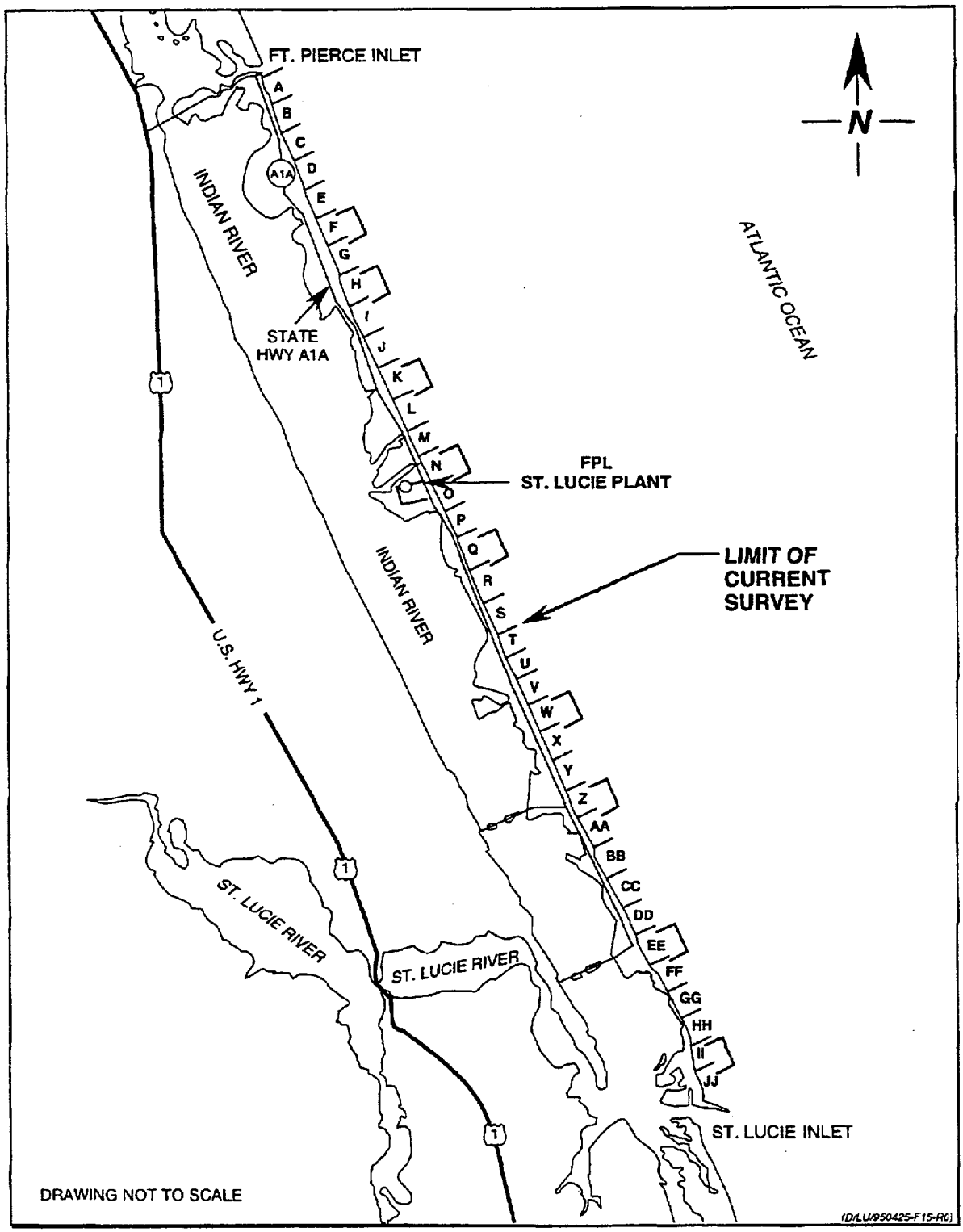

Figure 3. Designation and Location of Nine 1.25-Km Segments and Thirty-Six 1-Km Segments Surveyed for Sea Turtle Nesting, Hutchinson Island. 1971-1998.

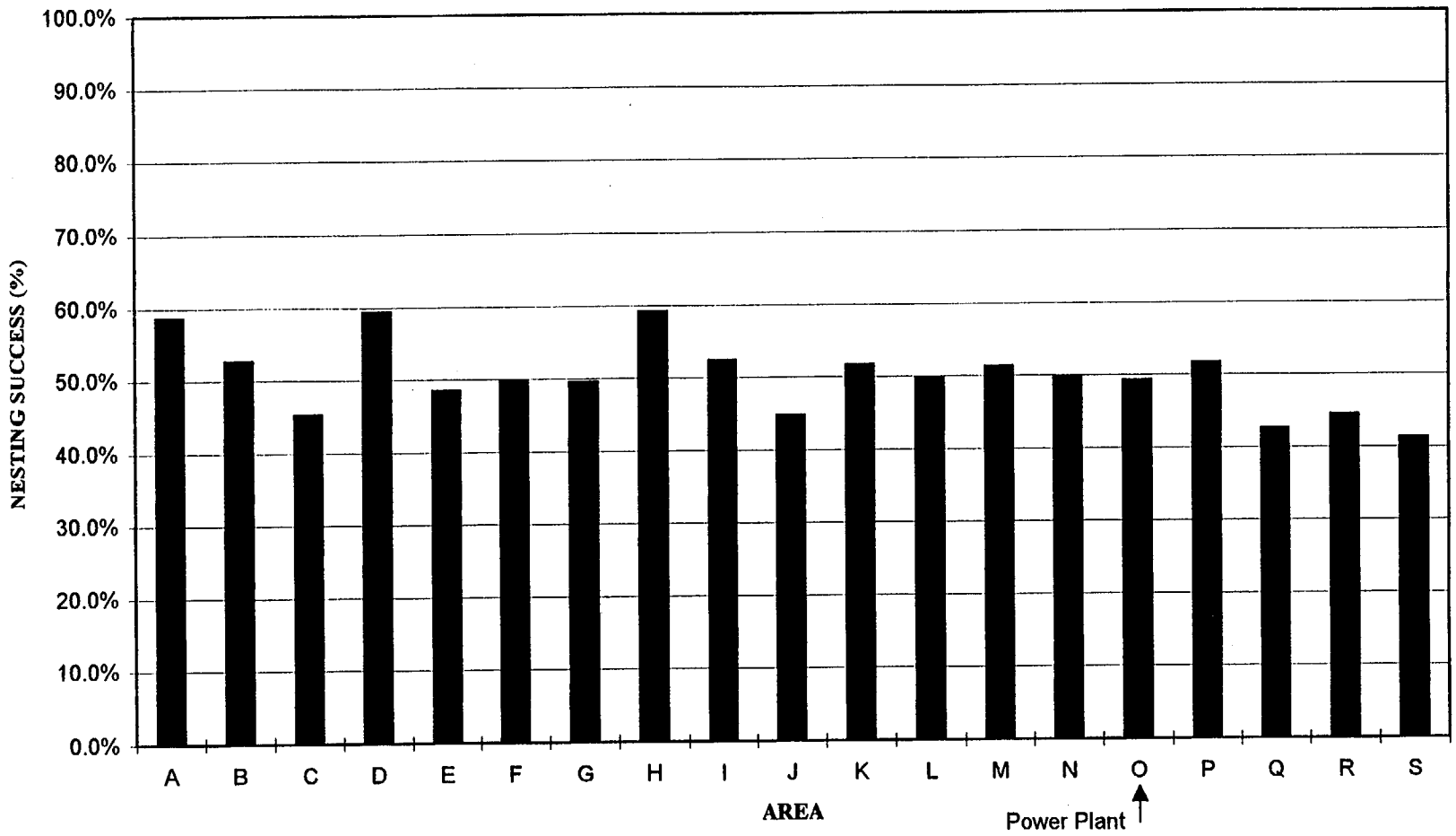

Figure 4. Number of Loggerhead Turtles Nests and Emergences for Areas A Through S, Hutchinson Island, April Through September 1998.

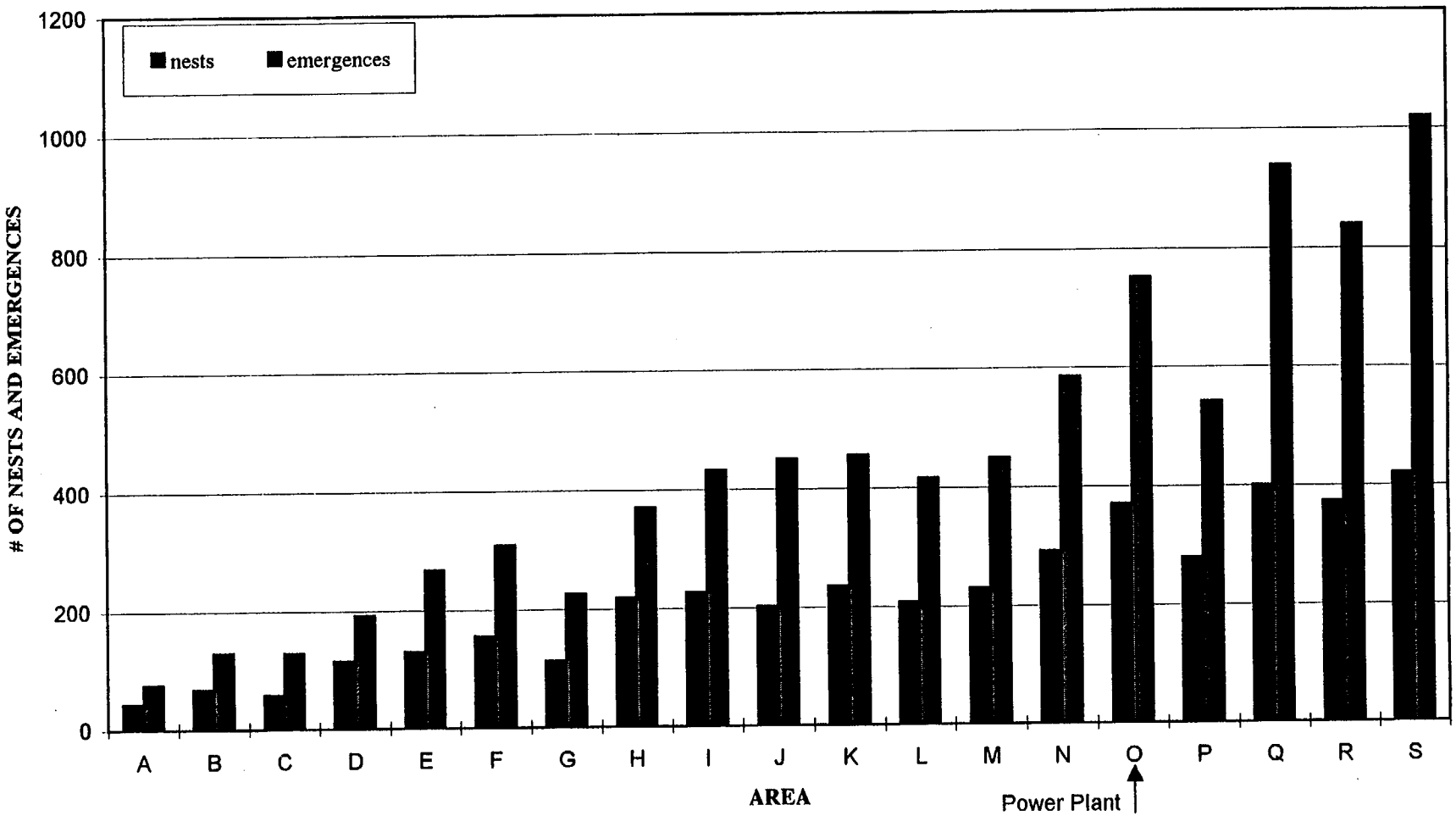

Figure 5. Loggerhead Turtle Nesting Success (Percentage of Emergences Resulting in Nests) for Areas A Through S, Hutchinson Island, April Through September 1998.

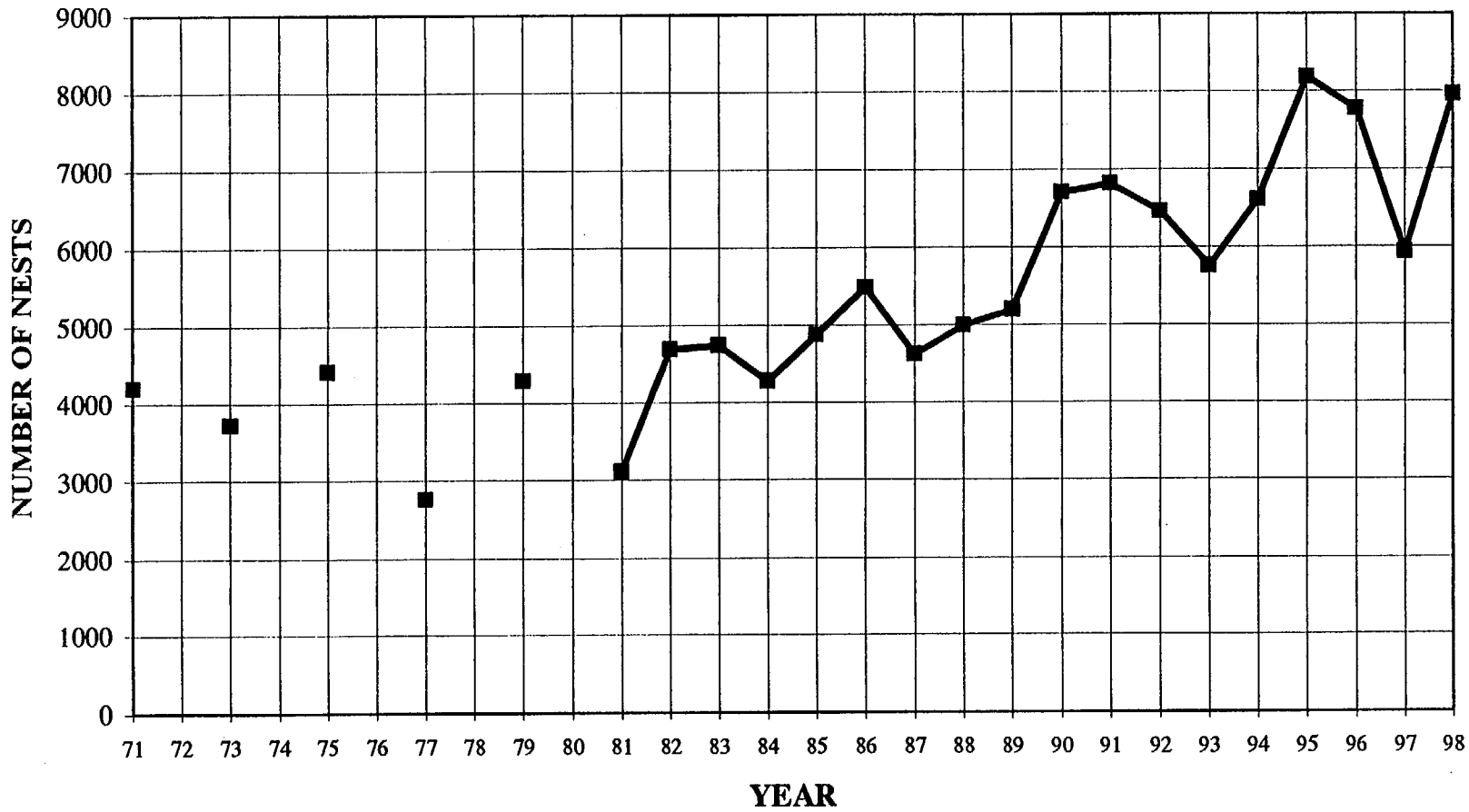

Figure 6. Number of Loggerhead Turtle Nests, Hutchinson Island 1971 Through 1998. Values for 1971 Through 1979 Are Estimates (See Text); Values for 1981 Through 1998 Are From Whole Island Surveys.

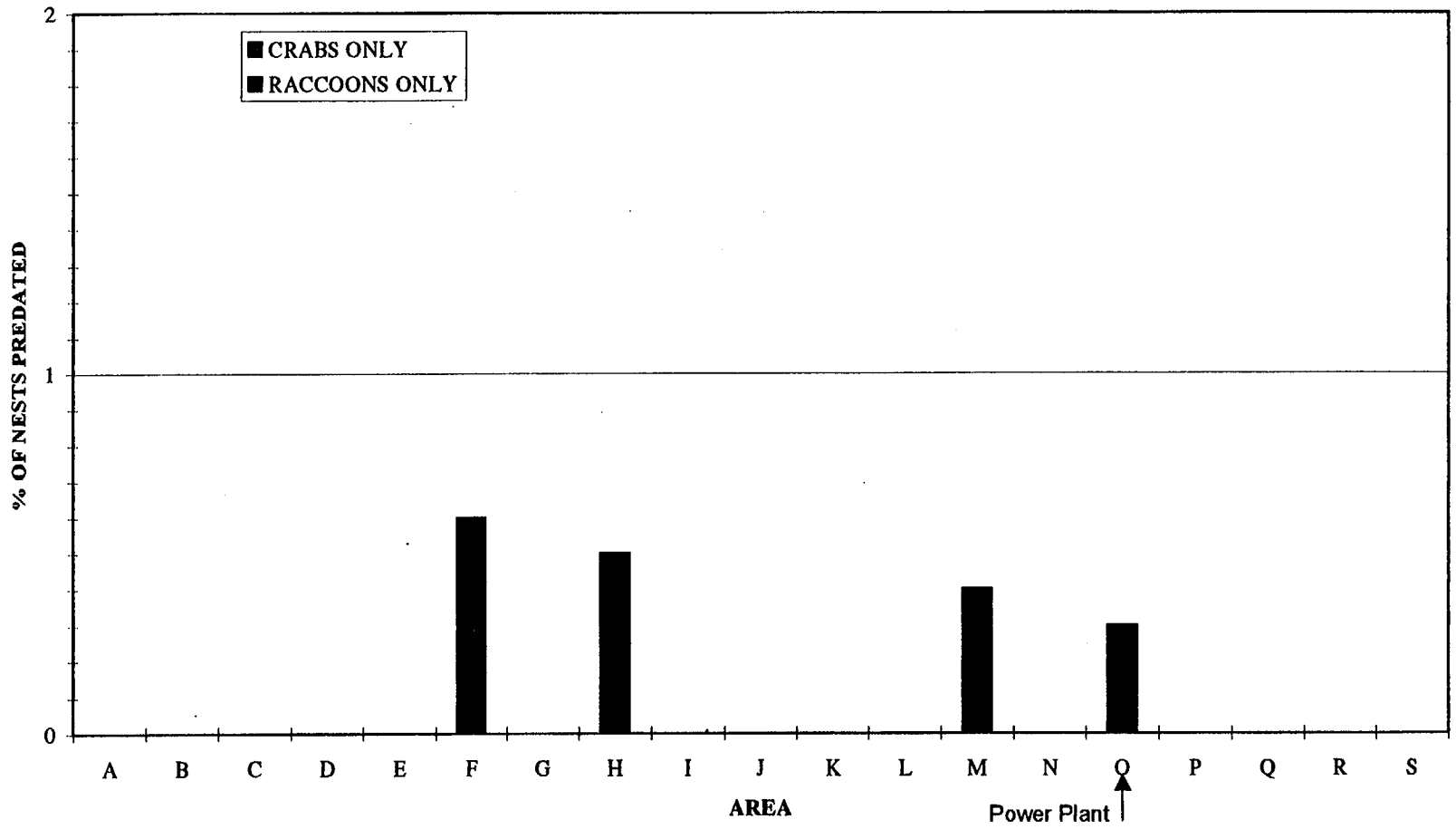

Figure 7. Percentage of Loggerhead Turtle Nests Predated by Raccoons and/or Ghost Crabs in Areas A Through S, Hutchinson Island, April Through September 1998.

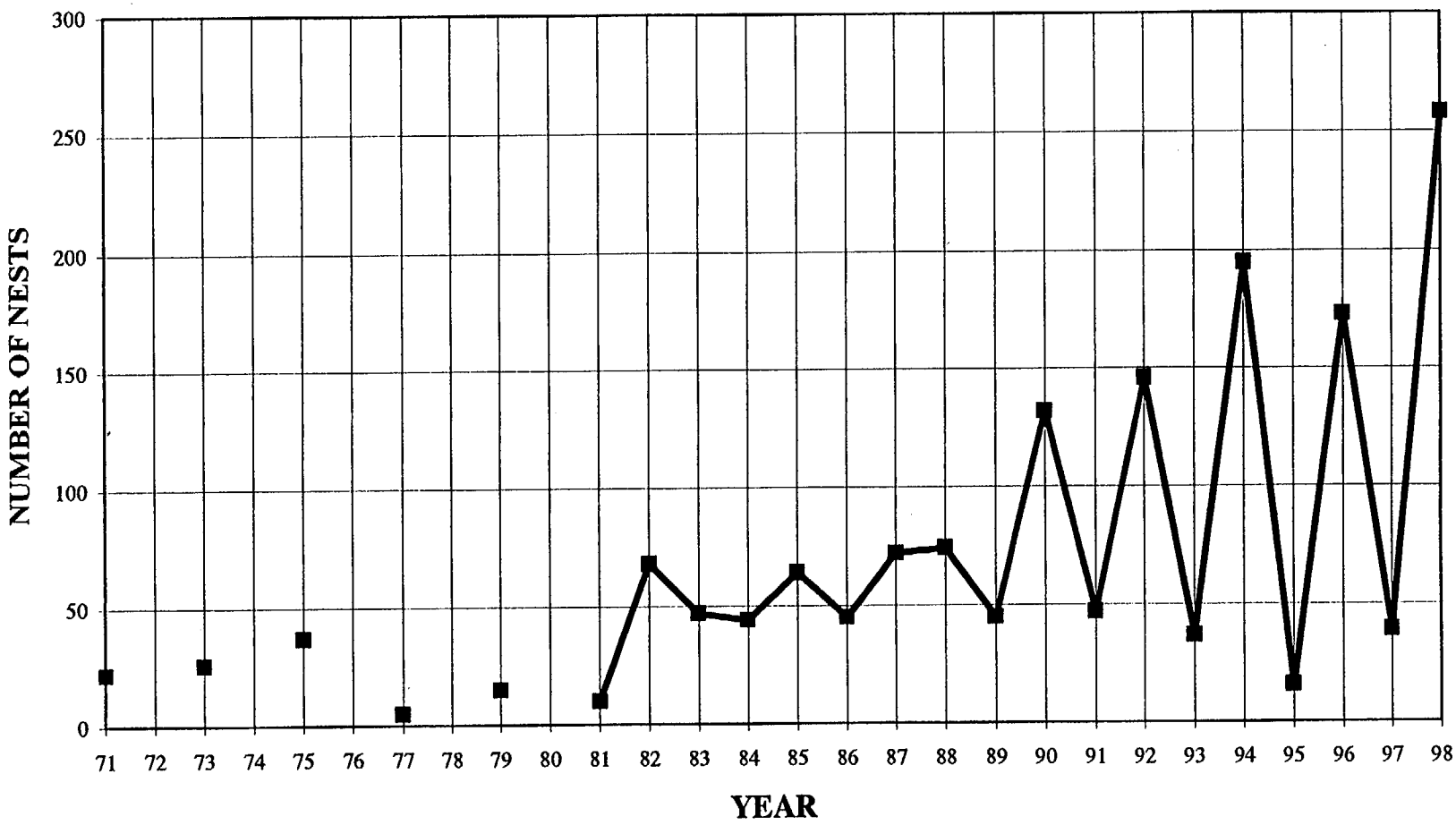

Figure 8. Number of Green Sea Turtle Nests, Hutchinson Island, 1971 Through 1998. Values for 1971 Through 1979 Are Estimates (See Text). Values for 1981 Through 1998 Are from Whole Island Surveys.

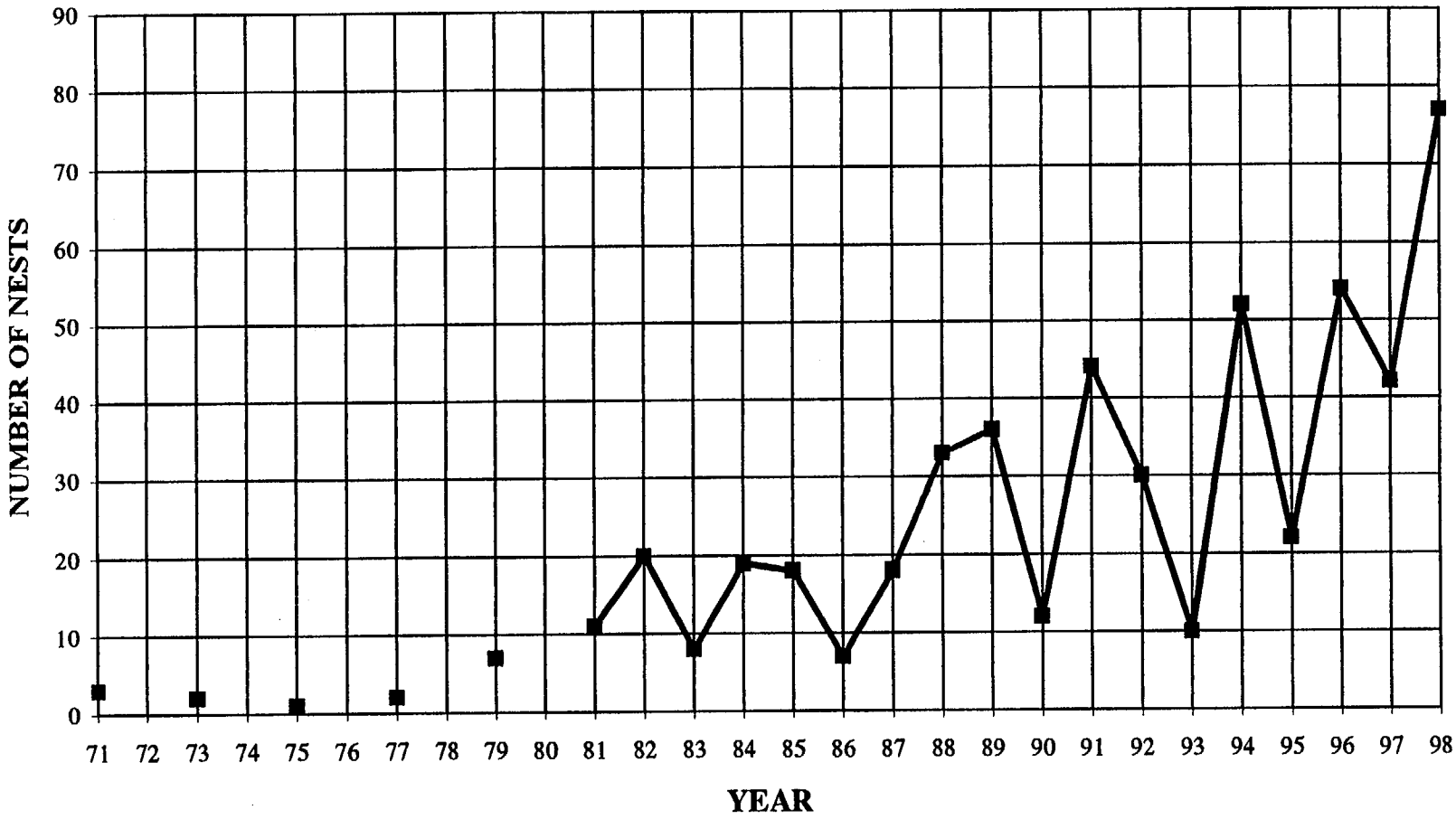

Figure 9. Number of Leatherback Turtle Nests, Hutchinson Island, 1971 Through 1998. Values for 1971 Through 1979 Are Estimates (See Text). Values for 1981 Through 1998 Are from Whole Island Surveys.

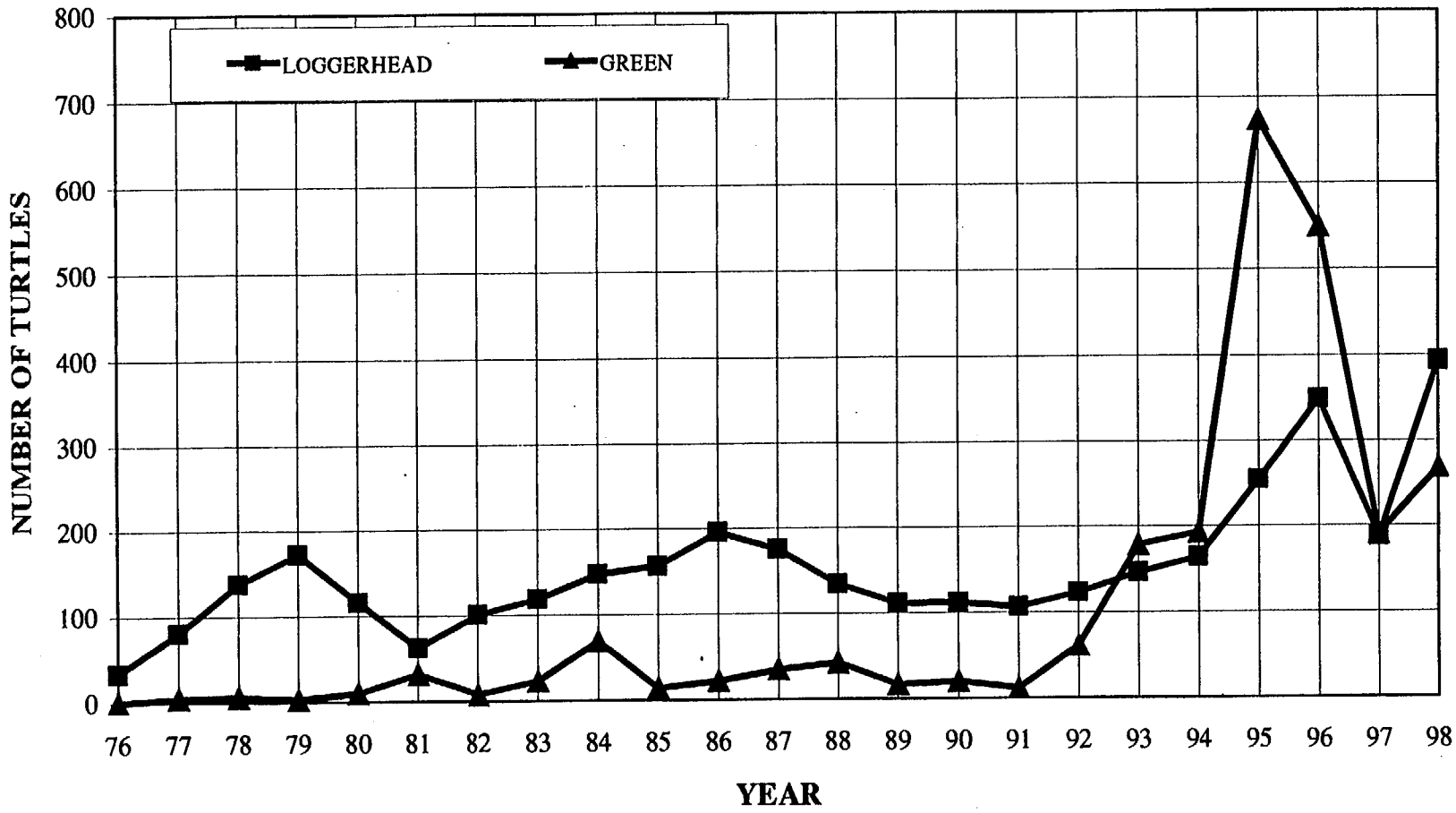

Figure 10. Number of Loggerhead and Green Turtles Removed Each Year from the Intake Canal, St. Lucie Plant, 1976 Through 1998.

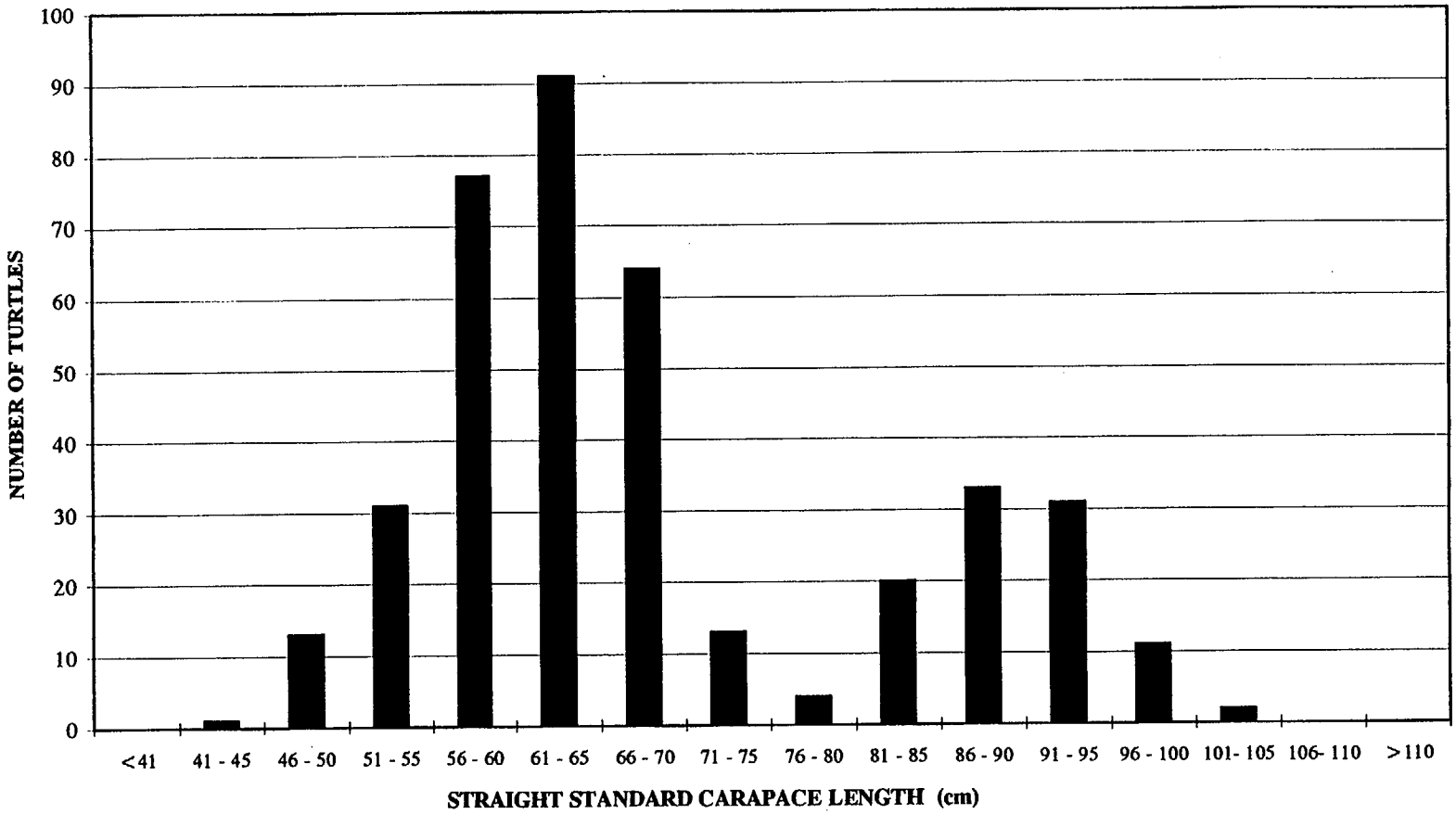

Figure 11. Size Distribution (SSCL) of Loggerhead Turtles (N=391) Removed from the Intake Canal, St. Lucie Plant, 1998.

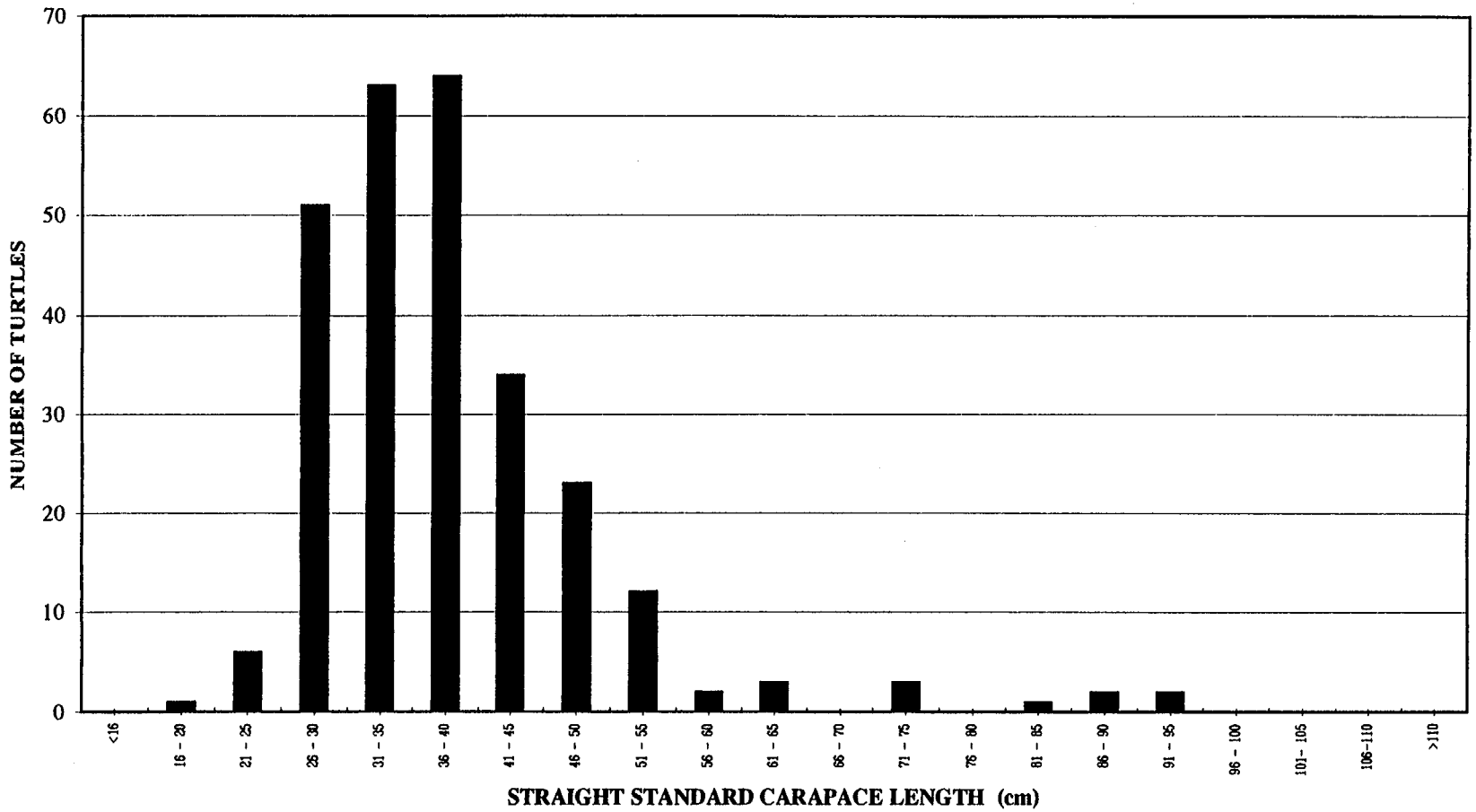

Figure 12. Size Distribution (SSCL) of Green Turtles (N=267) Removed from the Intake Canal, St. Lucie Plant, 1998.

6.0 TABLES

YEAR	Loggerhead	Green	Leatherback	Hawksbill	Kemp's Ridley	Total
			Species			
1976	33 (4)					33 (4)
1977	80 (5)	5 (2)	1			86 (7)
1978	138 (19)	6 (1)	3	1		148 (20)
1979	172 (13)	3 (1)				175 (14)
1980	116 (5)	10 (3)				126 (8)
1981	62 (5)	32 (2)	2		1	97 (7)
1982	101 (16)	8	1			110 (16)
1983	119 (4)	23 (4)				142 (8)
1984	148 (3)	69 (2)		1	2	220 (5)
1985	157 (4)	14		1		172 (4)
1986	195 (27)	22 (1)	1	1	1	220 (28)
1987	175 (11)	35		2	6 (2)	218 (13)
1988	134 (6)	42 (2)			5 (2)	181 (10)
1989	111 (4)	17 (1)	1	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)
Total	**3578** (135)	**2432** (52)	**21**	**21**	**34** (4)	**5420** (191)
Annual Mean*	162.6	110.5	1.0	1.0	1.5	275.1

* Excludes 1976 (partial year of plant operation).

Table 1. Total Number of Captures and (Number of Dead) Turtles Removed from the Intake Canal

Month	Number of Captures	Percent of All Captures	Minimum	Maximum	Mean	Standard Deviation	1998
January	421	11.9%	6	39	19.1	10.2	**36**
February	335	9.4%	5	34	15.2	8.4	**28**
March	354	10.0%	1	60	16.1	14.7	**60**
April	364	10.3%	0	47	16.5	12.7	**47**
May	304	8.6%	0	40	13.8	10.4	**29**
June	364	10.3%	3	42	16.5	11.1	**26**
July	405	11.4%	0	87	18.4	20.1	**57**
August	324	9.1%	2	43	14.7	12.2	**43**
September	194	5.5%	1	19	8.8	5.2	**17**
October	193	5.4%	0	27	8.8	6.3	**27**
November	125	3.5%	0	15	5.7	3.9	**10**
December	162	4.6%	1	13	7.4	4.1	**13**
Total	**3545**		**0**	**87**			**393**
Mean					13.4		32.8
Std. Deviation					4.6		16.3

* First full year of plant operation. An additional 33 loggerheads were captured during 1976.

Table 2. Total Number of Loggerhead Turtles Removed Each Month from Intake Canal, St. Lucie Plant, 1977 - 1998.

Month	Number of Captures	Percent of All Captures	Minimum	Maximum	Mean	Standard Deviation	1998
January	284	11.7%	0	59	12.9	15.5	**25**
February	289	11.9%	0	64	13.1	18.3	**58**
March	370	15.2%	0	147	16.8	35.6	**30**
April	210	8.6%	0	64	9.5	17.3	**20**
May	180	7.4%	0	91	8.2	20.2	**35**
June	137	5.6%	0	52	6.2	12.6	**16**
July	125	5.1%	0	61	5.7	14.1	**7**
August	151	6.2%	0	64	6.9	15.2	**23**
September	148	6.1%	0	77	6.7	17.8	**10**
October	198	8.1%	0	54	9.0	15.4	**25**
November	150	6.2%	0	42	6.8	10.8	**10**
December	190	7.8%	0	68	8.6	15.8	**9**
Total	**2432**		**0**	**147**			**268**
Mean					9.2		22.3
Std. Deviation					3.4		14.4

* First full year of plant operation.

Table 3. Total Number of Green Turtles Removed Each Month from the Intake Canal, St. Lucie Plant, 1977-1998.

ANNUAL ENVIRONMENTAL OPERATING REPORT

PART II

1.0 INTRODUCTION

The St. Lucie Unit 2 Environmental Protection Plan (EPP) requires 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.

2.0 SEA TURTLE MONITORING AND ASSOCIATED ACTIVITIES

Surveillance and maintenance of the light screen to minimize sea turtle disorientation as required by Section 4.2.4 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. The vegetation line is surveyed for any gaps occurring from mortality, which would result in unacceptable light levels on the beach. Trees, vegetation, or shade cloths 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.

3.0 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 24 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 recirculated 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 have appeared 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 1998 are presented in Table 1. Larger sponge ball losses occurred on Unit 2 for the year. These losses are probably related to the fact that 1998 represents the end of fuel cycle for that unit. Estimated sponge ball loss from both units was 20.2 balls per day for 1998. Fifty sponge balls were found whole in the environment near the plant. This is an increase

over previous years, but the number indicates that few balls actually reach the environment whole. Figure 1 indicates that estimated sponge ball loss generally increased through the month of April of 1998. Average daily ball loss in 1998 increased from the 1996 and 1997 totals (Figure 2). It is believed that much of the losses are caused by increased growth inside the waterboxes. New coatings on these surfaces are being used to try to eleviate this problem. These coating were applied to Unit 2 in December 1998. If the coating proves effective it will be applied to Unit 1 in September 1999.

4.0 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(a) EPP NONCOMPLIANCES AND CORRECTIVE ACTIONS TAKEN

No noncompliance's under EPP Section 5.4.1(a) were determined to have occurred during 1998.

5.4.1(b) CHANGES IN STATION DESIGN OR OPERATION, TESTS, AND EXPERIMENTS IN ACCORDANCE WITH EPP SUBSECTION 3.1

FPL letter L-98-180 transmitted the request for modification of Wastewater Permit Application to FDEP. The modification includes the use of biocide in the plant closed cooling water systems and the use of dimethylamine and carbohydrazide in the plant steam generator blowdown. This letter was transmitted June 26, 1998.

5.4.1(c) NONROUTINE REPORTS SUBMITTED TO THE NRC FOR THE YEAR 1998 IN ACCORDANCE WITH EPP SUBSECTION 5.4.2

1. Report concerning the mortality Least Terns at the plant Nuclear Training Center July 6, 1998 and July 17, 1998. Deaths occurred in the building's drainage system during heavy rainfall. Events were reported to NRC by FPL letter L-98-196 on July 23, 1998.

2. Report concerning an increase of jellyfish and subsequent effect of plant operation on September 9, 1998; reported to the NRC by FPL letter L-98-250 on October 1, 1998.

TABLE 1

1998 ST. LUCIE PLANT CONDENSER TUBE CLEANING

SYSTEM SUMMARY

MONTH	STRAINER BACK FLUSHES		ESTIMATED BALL LOSS		BALLS FOUND ON THE BEACH
	UNIT 1	UNIT 2	UNIT 1	UNIT 2	
January	5*	10	26	169	13
February	7	22	+26***	86	11
March	8	22	254	276	1
April	8	25	241	852	3
May	0^	29	242	580	3
June	2	24	+22***	448	3
July	33	23	130	586	1
August	29	27	66	744	8
September	25	20	114	483	3
October	31	23	129	228	1
November	24	1**	623	229	1
December	25	8**	76	759	2
Total	197	234	1853	5510	50

^ Due to poor sponge ball recovery, strainers were not back-flushed. Unit was down-powered, waterboxes taken out of service for manual removal of growth and balls.

* Unit 1 system shutdown during refueling, 1/1 to 1/19/98.

** Unit 2 system shutdown during refueling, 11/6 to 12/12/98.

*** Net gain in inventory.

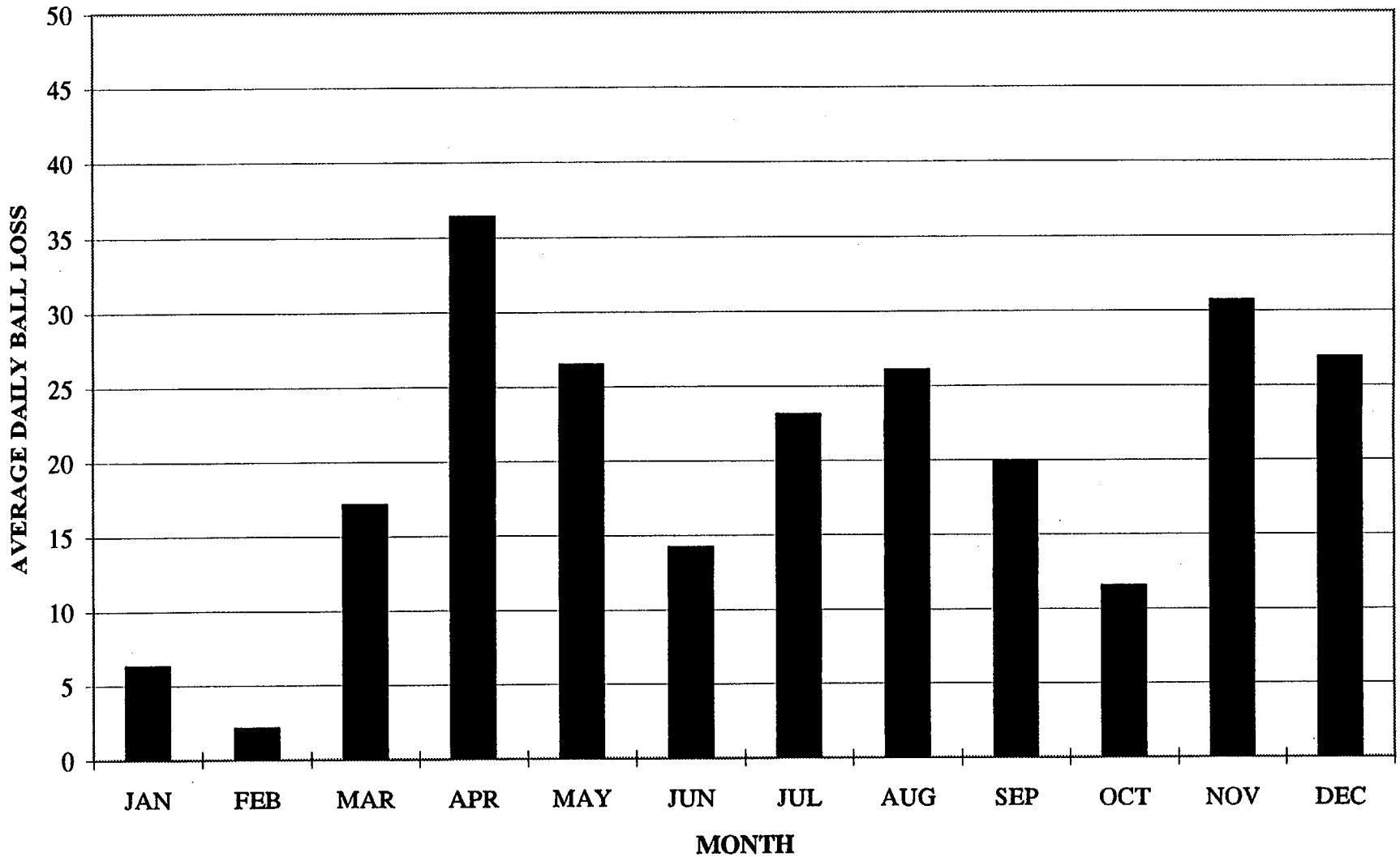

Figure 1. Estimated Average Daily Sponge Ball Loss by Month from St. Lucie Plant (Both Units) for 1998.

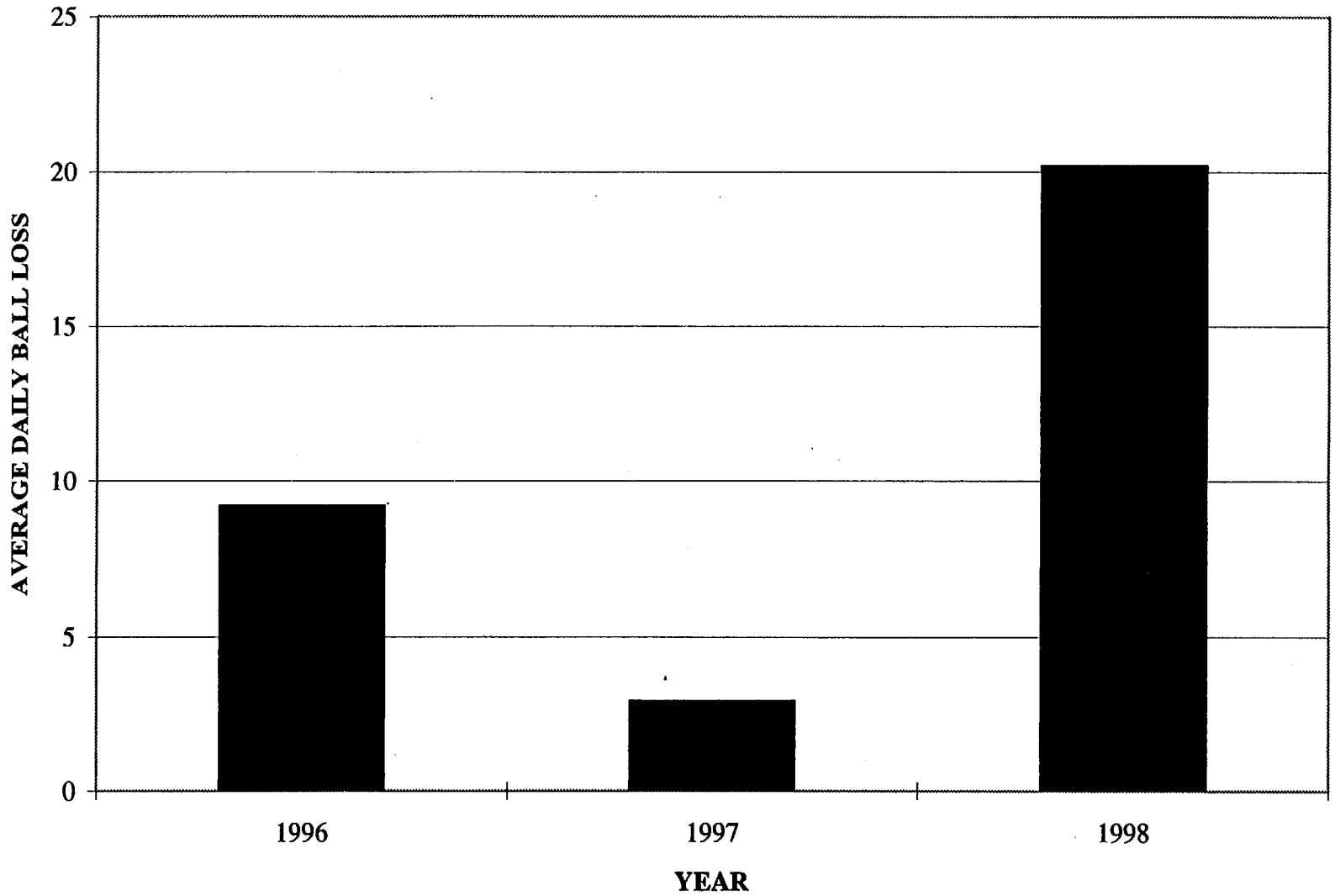

Figure 2. Average Daily Sponge Ball Loss from the St. Lucie Plant (Both Units) Since System Start-Up (January 1996)

DAILY STATUS REPORT
Florida Power & Light
St Lucie Nuclear Power Station
02/09/99

* * * INDUSTRIAL SAFETY * * *

NAME: Jim Parker DATE/TIME: 02/05/99

SAFETY	FPL	1999 FPL TARGET	CONTRACTOR
Minor Injuries Since Last Report:	0		0
Minor Injuries To Date:	5		0
Serious Injuries Since Last Report:	0		0
Serious Injuries Year-To-Date:	0	5	0
Severe Injuries Year-To-Date:	0	0	0

Comments:

Serious Injury:

* * * OPERATIONS * * *

NAME: R Lamb DATE/TIME: 02/09/99/0500

OPERATING PARAMETERS		UNIT 1	UNIT 2
Y-T-D Equivalent Availability (1/31/99):	%	100.0	99.97
Power Level:	%	100	100
Electrical Output (Gross):	MWe	903	903
Heat Rate:	BTU/KWHr	10182	10201
Days Online or Shutdown:	No.	351	63
RCS Boron Concentration:	ppm	728	896
RCS Identified Leak Rate:	gpm	0.0	.01
RCS Unidentified Leak Rate:	gpm	.09	..02
RCS Total Leak Rate:	gpm	..09	.03
Containment Temperature:	Deg F	96	94
Lighted Control Room Annunciators:	No.	2	5
Active TSA's:	No.	4	0
Condenser Air Ejector Flow Rate, Total:	Scfm	0.0	0
Condenser Back Pressure:	in/hg	2.4	2.7
Intake Water Temperatures:	Deg F	76	76
Hypo System (Pri) Status:		In Svc	In Svc
CTCS Status:		In Svc	In Svc

A/B

Comments

---

* * * MAINTENANCE SERVICES * * *

NAME: NWhiting DATE/TIME: 02/08/99

ENVIRONMENTAL COMPLIANCE STATUS: **SITE**

A small green turtle died in intake canal capture net 2/7/99. Plant has an "allowance" now for sea turtle mortalities but this will likely be reported to NRC 2/9/99 as per Environmental Protection Plan of the Tech Specs.

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* * * NUCLEAR MATERIALS MANAGEMENT * * *

NMM Supplying the Right Parts at the Right Time at the Right Cost

NAME: John Edgar DATE/TIME: 02/05/99

Current Material Issues

==========

Daily Inventory Status

System Acct (SARA) Statistics :	Inv ($) (millions)	Variance	Trend
PSL Site Inventory Balance Posting	$32.51M	$32.10K	Up
PTN Site Inventory Balance Posting	$29.28M	$16.77K	Up
Negative Inventory Contributors (in millions):			
OverMax Inventory Value	$4.28M		Up
Dormant/Obsolete Inventory	$0.0K		

Inventory Goal: $32.5M EOY

Monthly Inventory Statistics

Repair Program Status:	Dollar Value	L/I	Charges Transportation	Charges Expediting
Items Out for Repair	$386.49K	36	$0.0	$0.0

Florida Power & Light Company, 6351 S. Ocean Drive, Jensen Beach, FL 34957

FPL

December 18, 1998

L-98-307
10 CFR 50.4
10 CFR 50.72

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

RE: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Proposed Alternate Environmental Reporting
Guidance - 10 CFR 50.72(b)(2)(vi)

Florida Power & Light Company (FPL) requests endorsement of alternate reporting guidance for complying with the requirements of 10 CFR 50.72(b)(2)(vi) for certain environmental events as set forth in Section 3.3.7 of NUREG 1022, *Event Reporting Guidelines 10 CFR 50.72 and 50.73.* FPL has historically and proposes in the future to report unusual or important environmental events involving endangered species at St. Lucie Plant in accordance with the requirements in Section 4.1 of the Environmental Protection Plan (EPP), Appendix B, of the St. Lucie Unit 1 and Unit 2 Operating Licenses.

In January 1998, the NRC issued Revision 1 to NUREG 1022. NUREG 1022 Section 3.3.7, *News Release or Other Government Notifications*, provides guidance for meeting the reporting requirements of 10 CFR 50.72(b)(2)(vi). The stated purpose of this criterion is to ensure the NRC is made aware of issues that will cause heightened public or government concern related to the radiological health and safety of the public or on-site personnel or protection of the environment. There are no corresponding 10 CFR 50.73 requirements.

In the general discussion of Section 3.3.7 of NUREG 1022, the NRC states that licensees generally do not have to report media and government interactions unless they are, among other things, related to protection of the environment. The section goes on to state that the NRC does not generally need to be informed under this criterion of minor deviations from sewage or chlorine effluent limits, or routine reports of effluent releases to other agencies. However under the guidance for *Other Government Notifications* example (6), *Reports Regarding Endangered Species*, the guidance states that notifications to U.S. Fish & Wildlife Service and to a state agency that an endangered species of sea turtle was found in their circulating water structure trash bar would require emergency notification system (ENS) notification. It is not clear how the turtle's condition (dead or alive) impacts whether or not a report would be required. The basis given for requiring ENS notification is that the NRC has statutory responsibilities regarding protection of endangered species.

St. Lucie is a dual unit site using the Atlantic Ocean as its heat sink. Since initial plant operation, FPL has been removing endangered sea turtles, under state permits, that become entrapped in the circulating water intake canal. FPL files monthly reports with the State of Florida Department of Environment Protection (FDEP) and the National Marine Fisheries Service (NMFS) on the

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quantity and condition of the sea turtles handled. The state permit requires a notification to FDEP within twelve hours for all turtle mortalities in the intake canal. Section 4.1 of the EPP for each unit requires a 72-hours verbal notification to the NRC for all endangered species' mortalities that are determined to be causal to plant operation. This verbal report is required to be followed by a 30-day written report discussing the event and the corrective actions to prevent recurrence.

FPL handles a significant number of endangered sea turtles (400-1000 turtles each year) at St. Lucie Plant and has a staff of marine biologists under contract to remove and release the turtles under state permits. Reporting every sea turtle handled at St. Lucie Plant is an unnecessary burden and not in keeping with the intent of the regulation to notify the NRC of significant environmental events and would also conflict with the more detailed reporting requirements already in place in Section 4.1 of the EPPs.

FPL has historically and proposes to continue to make reports involving endangered species only when required by Section 4.1 of the St. Lucie Plant EPPs. Endangered species telephone reports to the NRC Operations Center are made within 72-hours of the event and then only when required by Section 4.1 of the EPP (i.e., a mortality causal to plant operation.) For 10 CFR 50.72(b)(2)(vi) purposes, environmental conditions related to endangered species are considered in the category of events of which the NRC does not generally need to be informed under this criterion because of the routine nature of the events and the additional reporting requirements in the operating licenses.

Currently, the Staff is in the process of revising the reporting requirements of 10 CFR 50.72 and 10 CFR 50.73. FPL suggests that, as part of the proposed rulemaking and NUREG 1022 updating, the Staff incorporate this alternative into the NRC guidance since a significant number of operating licenses contain environmental reporting requirements. An alternative to this rulemaking proposal would be for the Staff to recommend through a generic communication that licensees remove the EPP reporting requirements for unusual or important environmental events from their licenses and report environmental events only under the 10 CFR 50.72 criterion.

Please contact us if there are any questions regarding this submittal.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

JAS/GRM

cc: ✓Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant

DAILY STATUS REPORT
Florida Power & Light
St Lucie Nuclear Power Station
10/13/98

* * * INDUSTRIAL SAFETY * * *

NAME: N. King DATE/TIME: 10/12/98

SAFETY	FPL	FPL TEMP	CONTRACTOR
Minor Injuries Since Last Report:	0	0	1
Minor Injuries To Date:	36	2	28
Serious Injuries Since Last Report:	0	0	0
Serious Injuries Year-To-Date:	5	0	9
Severe Injuries Year-To-Date:	1		

Comments:

Observations: From Saturday, 10/10/98.

1. Welders in the Unit 2 PASS room welding on piping system were following all applicable safety rules. (Posted Hot Work Permit, Proper PPE, practicing good housekeeping.)

2. Maintenance Support moving the Clearance Center from the Unit 1 Mezzanine to the SSB. Proper PPE being worn and areas were roped off to keep personnel out of danger areas.

3. Various areas on Unit 2 where scaffold was being erected and noted that personnel erecting scaffolding highter than 6 Ft. were wearing fall protection, gloves and all other PPE Housekeeping was on going for removal of debris from work being performed.

Minor Injury:

1. An SBI employee reported an injury that occurred 10/09/98 while opening a door outside " Heat & Ventilation". Possible strain lower abdominal muscles.

Serious Injury:

* * * OPERATIONS * * *

NAME: J Sandy DATE/TIME: 10/13/98 0500

OPERATING PARAMETERS		UNIT 1	UNIT 2
Y-T-D Equivalent Availability (10/11/98):	%	92.45	99.15
Power Level:	%	100	99.91
Electrical Output (Gross):	MWe	892	885
Heat Rate:	BTU/KWHr	10325	10422
Days Online or Shutdown:	No.	232	203
RCS Boron Concentration:	ppm	1000	90
RCS Identified Leak Rate:	gpm	.017	0

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LER Number	Rev	Due Date	Description	CR Number
98-006	0	10/19/98	INADVERTENT ACTUATION OF AFAS-1 WHILE PERFORMING AFAS MONTHLY FUNCTIONAL SURVEILLANCE	98-1403
98-007	0	10/19/98	APPENDIX R RE-VERIFICATION IDENTIFIED POTENTIAL CABLE FAILURE MODES THAT AFFECT THE PORVs AND THE 2A EDG	98-1407

* * * PROTECTION SERVICES * * *

NAME: R. Walker DATE/TIME: 10/12/98

EMERG ASSESS/OFFSITE RESP/COMM CAPABILITIES:	SITE
ERDADS:	OK
Emergency Response Facilities (ERFS):	OK
Emergency Communication Equipment:	OK
Prompt Notification System incl. Sirens:	OK

Comments

* * * MAINTENANCE SERVICES * * *

NAME: NWhiting DATE/TIME: 10/12/98

ENVIRONMENTAL COMPLIANCE STATUS: **SITE**

A small loggerhead turtle was found dead against the old barrier net under the A1A bridge 10/11/98. Due to its condition, its death does not appear to have been caused by conditions in the plant intake canal. As per plant environmental reporting procedure it is, therefore, not reportable to NRC as per the EPP. It will count as the first mortality of the year for loggerheads as per the NMFS incidental take statement. The limit for loggerheads is 2 or 1.5%, whichever is greater. Since we have captured over 327 loggerhead turtles to date, the limit for this year will be at least 5.

* * * NUCLEAR MATERIALS MANAGEMENT * * *

NMM Supplying the Right Parts at the Right Time at the Right Cost

NAME: John Edgar DATE/TIME: 10/09/98

Current Material Issues

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Daily Inventory Status

FPL

Florida Power & Light Company, 6501 South Ocean Drive, Jensen Beach, FL 34957

October 1, 1998

(S12)

L-98-250
10 CFR 50.36b
EPP 5.4.2

'98 OCT 13 P4:23

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Re: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Environmental Protection Plan Report
Date of Event: September 3 - 18, 1998
Non-Routine Environmental Event

The attached report is being submitted pursuant to the requirements of Section 5.4.2 of the St. Lucie Units 1 and 2 Environmental Protection Plans to provide a description of a reportable occurrence of nuisance organisms, moon jellyfish, at the St. Lucie Plant. The attached report provides the 30 day written report for moon jellyfish intrusion events between September 3 - 18, 1998.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

JAS/GRM

Attachment

cc: Regional Administrator, USNRC Region II
Senior Resident Inspector, USNRC, St. Lucie Plant

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JELLYFISH INTRUSION IN THE ST. LUCIE PLANT INTAKE CANAL

EVENT DESCRIPTION

An influx of jellyfish into the St. Lucie Plant intake canal increased to the point that the 5-inch mesh sea turtle barrier net had to be lowered on the afternoon of September 3, 1998. This barrier net was installed near the intake canal headwall to retain sea turtles in a small area of the canal so they can be quickly captured and removed. Large numbers of moon jellyfish, *Aurelia aurita*, accumulated on the net to the point that the net itself was in jeopardy of tearing away from its supports. When the net was lowered, at least two sea turtles passed behind the net, at which point sea turtle biologists increased capture efforts between the net and the plant intake wells. Increases in jellyfish occurred on several other occasions during the month of September, prompting the plant to lower the net. Each time, plant operations and security personnel were notified that there was an increased probability of a turtle being captured in the plant intake wells.

On several occasions, jellyfish loading increased differential pressure across the intake travelling screens of the plant. During the afternoon of September 8, 1998, Unit 2 responded to the increase in jellyfish by throttling the circulating water pump system and reducing unit power to approximately 96% for about half a day. On the evening of September 14, 1998, the breaker for the Unit 1 travelling screen 1A1 tripped due to excessive jellyfish buildup. The 1A1 circulating water pump was secured, and the unit down-powered to approximately 60% power. The unit was returned to full power the following day. During the early morning of September 18, 1998, Unit 1 was down-powered again to approximately 93% due to increasing differential pressure across the intake travelling screens. Actions taken included throttling three of the four circulating water pumps. The unit was returned to full power prior to noon that day.

A courtesy notification to the Florida Department of Environmental Protection, Division of Protected Species, concerning the sea turtle barrier net issue prompted a 4-hour notification to the NRC as per 10 CFR 50.72 on September 3, 1998. The increase of jellyfish and subsequent effect on plant operation prompted 72-hour notifications to the NRC, pursuant to the Environmental Protection Plan (EPP), Operating License Appendix B, on September 9, 14, and 18, 1998.

The increased incidence of jellyfish in the St. Lucie Plant intake system is a natural phenomenon that has occurred from time to time in the history of the plant. The 5-inch turtle barrier net was designed to be lowered under such circumstances and performed its function satisfactorily. Following a breach in the net, increased turtle capture efforts downstream toward the plant is the required protocol which is designed to reduce impact on protected

species of sea turtles that have entered the plant intake canal system. Plant operations and maintenance personnel took appropriate action to mitigate the effect of jellyfish loading on plant intake systems.

FPL

Florida Power & Light Company, 6501 South Ocean Drive, Jensen Beach, FL 34957

August 26, 1998

L-98-208
10 CFR 50.90

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

RE: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Proposed License Amendment
Supplement 1 to the Proposed
Environmental Protection Plan Revision

Pursuant to 10 CFR 50.90, Florida Power & Light Company (FPL) hereby supplements the request to amend Facility Operating Licenses for St. Lucie Units 1 and 2 submitted by FPL letter L-97-296 dated December 1, 1997.

The proposed amendment revises the Unit 1 and Unit 2 Environmental Protection Plans (EPP) Section 4, "Environmental Conditions," and Section 5, "Administrative Procedures," to incorporate the proposed terms and conditions of the Incidental Take Statement (ITS) included in the Biological Opinion issued by the National Marine Fisheries Service (NMFS) on February 7, 1997, and subsequently modified on May 8, 1998. On June 17, 1998, the NRC requested that FPL supplement the proposed license amendment.

Specifically, FPL was requested to submit the proposed program to monitor for turtles at the cooling water intake wells and to submit the design and implementation plan for a study to elucidate the effect of various factors on turtle entrapment. A copy of the proposed sea turtle monitoring program for the intake wells is provided as Attachment 4. A copy of the request for proposal for the study is provided as Attachment 5 to this submittal. In accordance with conditions 6 and 7 of the ITS, NRC is requested to forward Attachments 4 and 5 for NMFS review and approval prior to implementation of these conditions.

Attachment 1 is a description of the proposed changes to the EPP and the analysis in support of the proposed changes. Attachment 2 is a marked up copy of the St. Lucie Unit 1 EPP. Attachment 3 is a marked up copy of the Unit 2 EPP.

The revisions contained herein result in no change to the no significant hazards consideration evaluation previously submitted as Attachment 3 to FPL letter L-97-296 dated December 1, 1997, and subsequently published in 62 Federal Register 68305 on December 31, 1997.

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This revision to proposed amendment has been reviewed by the St. Lucie Facility Review Group and the FPL Company Nuclear Review Board. In accordance with 10 CFR 50.91 (b)(1), a copy of the proposed amendment revision is being forwarded to the State Designee for the State of Florida.

Please contact us if there are any questions regarding this supplement.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

JAS/GRM

Attachments

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant
Mr. William A. Passetti, Florida Department of Health and Rehabilitative Services

STATE OF FLORIDA)
) ss.
COUNTY OF ST. LUCIE)

J. A. Stall being first duly sworn, deposes and says:

That he is Vice President, St. Lucie Plant, for the Nuclear Division of Florida Power & Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information and belief, and that he is authorized to execute the document on behalf of said Licensee.

J. A. Stall

STATE OF FLORIDA

COUNTY OF St. Lucie

Sworn to and subscribed before me

this 26th day of August, 1998
by J. A. Stall, who is personally known to me.

Leslie J. Whitwell
Name of Notary Public - State of Florida

Leslie J. Whitwell
MY COMMISSION # CC646183 EXPIRES
May 12, 2001
BONDED THRU TROY FAIN INSURANCE, INC.

(Print, type or stamp Commissioned Name of Notary Public)

ATTACHMENT 1

DESCRIPTION OF THE PROPOSED CHANGE

Background

On May 11, 1995, based on the increasing number of sea turtles being removed from the St. Lucie Plant intake canal, the NRC requested a formal Endangered Species Act (ESA) Section 7(a) consultation with the National Marine Fisheries Service (NMFS), the Florida Department of Environmental Protection (FDEP), and Florida Power & Light Company (FPL). The increasing number of sea turtles being removed from the intake canal was reported in the 1994 Annual Environmental Operating Report, Volume 1, for the St. Lucie Plant. The scope and schedule for the ESA Section 7 consultation were discussed at meetings among FPL, NRC, NMFS, and FDEP on May 23, 1995, and October 20, 1995. FPL letter L-95-309 dated November 20, 1995, submitted a Biological Assessment, *Assessment of the Impacts of the St. Lucie Nuclear Generating Plant on Sea Turtles Found in the Nearshore Waters of Florida*, which, after review by NRC, was transmitted to the NMFS on February 7, 1996.

On February 7, 1997, the NMFS issued its Biological Opinion to the NRC with a request that the terms and conditions of the Incidental Take Statement be incorporated into the FPL license. After a meeting at St. Lucie Plant on May 7, 1997, the NRC issued the NMFS Biological Opinion to FPL on May 30, 1997, and requested FPL to provide comments and proposed methods to incorporate the Biological Opinion and the Incidental Take Statement into the St. Lucie Plant licenses.

The Biological Opinion was the result of the Endangered Species Act (ESA) Section 7(a) consultation regarding the continued operation of the circulating water system of the St. Lucie Plant. The NMFS has concluded that the continued operation of St. Lucie Units 1 and 2 is not likely to jeopardize the continued existence of the species listed in the opinion under their jurisdiction. The NMFS developed an Incidental Take Statement, which includes terms and conditions necessary to monitor and minimize the lethal take of sea turtles in the plant cooling water intake canal.

In a letter to FPL dated October 6, 1997, NRC requested FPL to submit proposed changes to the Environmental Protection Plan (EPP), Appendix B of the St. Lucie Units 1 and 2 operating licenses within 60 days of receipt. The proposed changes incorporate the Incidental Take Statement included in the Biological Opinion and provide assurance that reasonable and prudent measures, as detailed in the Incidental Take Statement, will be taken. By FPL letter L-97-296 dated December 1, 1997, FPL submitted the proposed changes to the EPP implementing the ITS.

On January 20, 1998, FPL met with the NRC, NMFS, and FDEP. One of the items discussed was a request to modify ITS conditions 6, 7, 9, and 10. On May 8, 1998, the NMFS issued a letter to the NRC modifying ITS conditions 6, 7, 9, and 10. On June 17, 1998, the NRC forwarded the revised ITS to FPL and requested FPL to supplement its December 1, 1997, application for changes to the EPP.

The Unit 1 EPP did not contain all of the environmental conditions for the protection of sea turtles as are contained in the Unit 2 EPP. FPL proposes that the wording suggested for Sections 4 and 5 of the Unit 2 EPP also be included verbatim in Sections 4 and 5 of the Unit 1 EPP for consistency. The proposed language that would appear in both EPPs is included in Attachment 3. The proposed deletion of the existing Section 4 in the Unit 1 EPP is included in Attachment 2.

Description of the Change

St. Lucie Unit 1

The proposed change deletes Section 4, Environmental Conditions, of the EPP, replaces this section with new wording, and adds a new Section 5, Administrative Procedures, identical to the wording in the Unit 2 EPP for these sections. Section 4.1, Unusual or Important Environmental Events, is replaced by a new section 4.1. Section 4.2, Light Screen to Minimize Turtle Disorientation, is replaced with the wording from the Unit 2 EPP, in a renumbered Section 4.2.3 for consistency.

In addition, a requirement to shield the owner controlled lighting so that none of the light is diverted skyward has been added. This transfers the requirement for shielding perimeter lights from Unit 1 License Condition 2.F.(1) to Section 4.2.3 of the Unit 1 and Unit 2 EPP. Unit 1 License Condition 2.F.(1) should be deleted. This requirement is not currently in the Unit 2 License.

St. Lucie Unit 2

Section 4.1 - Unusual or Important Environmental Events

The change replaces the generic term "NRC" with the specific NRC location, "NRC Operations Center," and specifies the use of the "Emergency Notification System described in 10 CFR 50.72" for the initial 72-hour report to the NRC. The changes clarify that follow-up reports be submitted in accordance with Section 5.4.2, "Nonroutine Reports," which standardizes the reporting time frame for all nonroutine reports at 30 days for consistency.

Section 4.2 - Terrestrial/Aquatic Issues

This introductory paragraph has been modified to discuss the NMFS Biological Opinion and the Incidental Take Statement. The existing Section 4.2.1, "Beach Nesting Surveys," is being replaced by the new Section 4.2.2.2.(9) which requires sea turtle nesting programs and public service walks. The study required by Section 4.2.2, "Studies to Evaluate and/or Mitigate Intake Entrapment," was completed in 1985 and submitted to the NRC by FPL letter L-85-158 dated April 18, 1985. The studies required by Section 4.2.3, "Studies to Evaluate and/or

Mitigate Intake Canal Mortality," were discussed in the Biological Assessment, *Assessment of the Impacts of the St. Lucie Nuclear Generating Plant on Sea Turtles Found in the Nearshore Waters of Florida*, which was submitted to the NRC by FPL letter L-95-309 dated November 20, 1995. The requirements of these sections have been deleted because the studies and actions are historical and have been completed or were incorporated into the conditions of the NMFS ITS.

Section 4.2.1 - Reinitiation of Endangered Species Act (ESA) Section 7 Consultation

This section sets forth the conditions for reinitiation of the ESA Section 7 consultation that were specified in the NMFS Biological Opinion dated February 7, 1997, and as modified by NMFS on May 8, 1998.

Section 4.2.2 - Incidental Take Statement

This new section provides the basis for the Incidental Take Statement in Sections 7(b)(4) and 7(a)(2) of the Endangered Species Act. It also presents the basis for not establishing a take limit on entrapment, capture, and release of any species of sea turtles in the St. Lucie intake canal.

Section 4.2.2.1 - Lethal Take Levels

This section establishes that the lethal take levels for sea turtles by species will be established by the NMFS and specified in plant procedures. The limits to be included in plant procedures will be taken from the Incidental Take Statement as modified by NMFS. This allows for a case-by-case review and change in the lethal take limits for a species without the need for a license amendment. This action is similar to the method used by the NRC in the letter dated October 6, 1997, which after consultation with the NMFS, increased the lethal take limit for green turtles from three to six for the calendar year 1997.

Section 4.2.2.2 - Terms and Conditions of the Incidental Take Statement

This section includes the terms and conditions established to monitor the level of take and to minimize the adverse impacts of entrapment and the possibility of lethal takes.

Section 4.2.2.2.(1) establishes the requirement for FPL to install, inspect, and maintain the 5-inch mesh barrier net in the St. Lucie intake canal. This condition is consistent with Condition 1 of the NMFS ITS.

Section 4.2.2.2.(2) establishes the requirement for FPL to inspect and maintain the existing 8-inch mesh barrier net west of the new 5-inch mesh net. This condition implements Condition 2 of the NMFS ITS.

Section 4.2.2.2.(3) requires FPL to continue its current capture and release program in accordance with permits granted to FPL or FPL's contractor through FDEP. This condition implements Condition 3 of the NMFS ITS.

Section 4.2.2.2.(4) establishes the conditions for capture netting in the intake canal and specifies the minimum number of hours and the conditions when increased netting activities are required. It also permits reasonable deviations based on human safety considerations (i.e., severe weather). This condition implements Condition 4 of the NMFS ITS.

Section 4.2.2.2.(5) requires directed capture efforts whenever a sea turtle is observed in the intake canal west of the 8-inch barrier net. This condition implements Condition 5 of the NMFS ITS.

Section 4.2.2.2.(6) implements the revised Condition 6 specified in the NMFS letter dated May 8, 1998. The condition requires that FPL implement a program to monitor the plant intake wells for sea turtles and that the program has to be approved by the NMFS. The dates specified in the revised Condition 6 have been removed because the dates were changed by the NRC transmittal letter dated June 17, 1998. As proposed, Condition 6 will allow for changes to the program to be approved based on operating experience. This condition implements modified Condition 6 of the NMFS ITS dated May 8, 1998. Attachment 4 is a description of the proposed program to monitor for turtles at the cooling water intake wells.

Section 4.2.2.2.(7) provides an alternative to the revised Condition 7 specified in NMFS letter dated May 8, 1998. As proposed, this condition requires FPL to propose the design and implementation of a study to elucidate the effect of various factors on turtle entrapment. The request for proposal for the study is provided as Attachment 5 to this submittal. The requirement to design and implement the study has been changed to a requirement for FPL to propose the design and implementation of a study. Since FPL, NRC, and NMFS have not reached agreement on the scope and schedule of the desired study, it is inappropriate to establish a commitment to perform a study with a specific end date at this time. The condition does include a requirement that the NMFS approve the design, scope, and implementation schedule. The end date for the final report has not been included to allow flexibility in the completion date without the need for a license amendment. The scheduled date of August 31, 1998, for FPL to submit the proposed plan was changed by the NRC transmittal letter dated June 17, 1998.

Section 4.2.2.2.(8) requires FPL to continue to participate in the Sea Turtle Stranding and Salvage Network (STSSN), under proper permits and authority. This condition stated as a point of clarification that stranded sea turtles will not normally be counted against the authorized level of lethal incidental take in the NMFS ITS. FPL has clarified this in the proposed Condition 8 that stranded sea turtles are not counted against the authorized level of lethal take. As part of the STSSN, strandings are reported to the FDEP. This condition

implements Condition 8 of the NMFS ITS. The marine turtle monthly report required by Condition 10 (a) will provide the NMFS information on all sea turtle mortalities.

Section 4.2.2.2(9) requires FPL to continue to conduct, under proper permits and authority, the ongoing sea turtle nesting program and public service turtle walks. The lead permitting agency for the turtle nesting studies and public service turtle walks is the FDEP.

Section 4.2.2.2.(10) requires FPL to submit several routine reports that are currently required by FDEP permits to NMFS. Subsection (a) establishes a condition to submit copies of monthly reports covering sea turtle entrapment, capture efforts, turtle mortalities. Subsection (b) requires that FPL submit copies of the Annual Environmental Operating Report required by EPP Section 5.4.1 and that the annual report include a discussion of the topics in Section 4.2.2.2.(10)(a), the inspection and maintenance of the turtle barrier nets, and the operation of the Taprogge condenser tube cleaning system including any associated ball loss. Subsection (c) establishes a condition to convene a meeting between FPL, NRC, and NMFS to discuss endangered and threatened species information and developments at the St. Lucie Plant approximately every two years beginning in January 2000. The wording of this condition has been modified to clarify the reports and the submittal of copies of the reports to NMFS. The requirement for the annual report was changed to be consistent with the Annual Environmental Operating Report required by EPP Section 5.4.1.

Section 4.2.3 - Light Screen to Minimize Turtle Disorientation

Section 4.2.4 has been renumbered as Section 4.2.3. In addition, the reference to Australian Pine was deleted and generalized into "suitable plants" for the light screen along the beach dune. The State of Florida has an ongoing program to remove non-indigenous species, like Australian Pine, and replace them with native varieties of plants. In addition, a requirement to shield the owner controlled area (which includes the perimeter fence and parking lot) lighting so that none of the light is diverted skyward has been added. This transfers the requirement for shielding perimeter lights from Unit 1 License Condition 2.F.(1) to Section 4.2.3 of the Unit 1 and Unit 2 EPP. Unit 1 License Condition 2.F.(1) should be deleted. This requirement is not currently in the Unit 2 License.

Section 4.2.5 - Capture and Release Program

Section 4.2.5 is deleted. Section 4.2.2.2.(3) requires FPL to continue its current capture and release program in accordance with permits granted to FPL or FPL's contractor through FDEP. The FDEP is the lead permitting agency for the capture and release program.

Section 4.3 - General Exceptions

The final paragraph in Section 4 was designated Section 4.3, "General Exceptions," and changed slightly to refer specifically to the environmental conditions of Section 4 and that the

conditions are contingent upon FPL being able to obtain the necessary FDEP permits to take, handle, and experiment with sea turtles. The FDEP is the lead permitting agency for all the sea turtle permits.

Section 5.4.1 - Routine Reports

A new Section 5.4.1.1, "Monthly Reports," was added to delineate the new monthly report to NMFS required by Condition 4.2.2.2 (10).

The original Section 5.4.1 has been renumbered as Section 5.4.1.2, "Annual Environmental Operating Report." In addition the last sentence of the first paragraph was deleted. It stated, what is now a historical fact, that the first report would cover the period from the date of the Operating License issuance until December 31, 1983.

A new subsection 5.4.1.2.(d) was added to require a discussion of the sea turtle entrapment, capture efforts, turtle mortalities, available information on the barrier net inspections and maintenance, and Taprogge cleaning system operation and sponge ball loss in the Annual Environmental Operating Report.

Section 5.4.2 - Nonroutine Reports

A clarification was added to this section that nonroutine reports be submitted to the NRC in accordance with 10 CFR 50.4. In addition, for other nonroutine reports that require reports to other Federal, State, or local agencies, the NRC shall be provided a copy of such reports within "30 days of the date" the report is submitted to the other agency instead of "at the same time." This allows time for the plant to process a submittal to the NRC with the appropriate NRC docket information.

ATTACHMENT 2

MARK UP OF THE UNIT 1

ENVIRONMENTAL PROTECTION PLAN

Note

Proposed changes to the St. Lucie Unit 1 Environmental Protection Plan to incorporate the terms and conditions of the NMFS Biological Opinion and Incidental Take Statement include the deletion of the current Section 4 (see below). This Section will be replaced with the proposed changes to Section 4 and Section 5 of the St. Lucie Unit 2 Environmental Protection Plan. (See Attachment 3)

~~4.0 Environmental Conditions~~

~~4.1 Unusual or Important Environmental Events~~

~~Any occurrence of an unusual or important event that indicates or could result in significant environmental impact causally related to station operation shall be recorded and promptly reported to the NRC within 72 hours followed by a written report within 30 days. No routine monitoring programs are required to implement this condition.~~

~~The written report shall (a) describe, analyze, and evaluate the event, including extent and magnitude of the impact and plant operating characteristics, (b) describe the probable cause of the event, © indicate the action taken to correct the reported event, (d) indicate the corrective action taken to preclude repetition of the event and to prevent similar occurrences involving similar components or systems, and (e) indicate the agencies notified and their preliminary responses.~~

~~Events reportable under the subsection which also require reports to other Federal, State or local agencies shall be reported in accordance with those reporting requirements in lieu of the requirements of this subsection. The NRC shall be provided a copy of such report at the same time it is submitted to the other agency.~~

~~The following are examples of unusual or important events: excessive bird impaction events; onsite plant or animal disease outbreaks; mortality or unusual occurrence of any species protected by the Endangered Species Act 1973; unusual fish kills; increase in nuisance organisms or conditions; and unanticipated or emergency discharge of wastewater or chemical substances.~~

~~4.2 Light Screen to Minimize Turtle Disorientation~~

~~Australian pine or other suitable plants (i.e., native vegetation such as live oak, native figs, wild tamarind and others) shall be planted and maintained as a light screen, along the beach dune line bordering the plant property to minimize turtle disorientation.~~

ATTACHMENT 3

MARK UP OF THE UNIT 2

ENVIRONMENTAL PROTECTION PLAN

Note

The following are the proposed changes to Section 4 and Section 5 of the St. Lucie Unit 2 Environmental Protection Plan to incorporate the terms and conditions of the NMFS Biological Opinion and the Incidental Take Statement. Proposed changes and additions are provided by the use of an underline with revision bars and strikeout.

4.0 Environmental Conditions

4.1 Unusual or Important Environmental Events

Any occurrence of an unusual or important event that indicates or could result in significant environmental impact causally related to station operation shall be recorded and promptly reported to the NRC Operations Center within 72 hours via Emergency Notification System described in 10 CFR 50.72. The initial report shall be followed by a written report ~~within 30 days~~ as described in Section 5.4.2. No routine monitoring programs are required to implement this condition. Events covered by Section 3.2 of this EPP will be subject to reporting requirements as defined in that section and not subject to these requirements.

The following are examples of unusual or important events: excessive bird impaction events; onsite plant or animal disease outbreaks; mortality (causally related to station operation), or unusual occurrence of any species protected by the Endangered Species Act of 1973; unusual fish kills; increase in nuisance organisms or conditions; and unanticipated or emergency discharge of waste water or chemical substances.

4.2 Terrestrial/Aquatic Issues

This section addresses the issues ~~Issues~~ on endangered or threatened sea turtles raised in the Unit 2 FES-OL, and in the Endangered Species Biological Assessment (March 1982). In May 1995 the NRC initiated a formal consultation with the National Marine Fisheries Service (NMFS) regarding sea turtle entrapment at the St. Lucie Plant. As a result of this consultation, an updated Sea Turtle Biological Assessment was submitted by FPL letter L-95-309 dated November 20, 1995. This assessment was reviewed by the NMFS which issued a Biological Opinion dated February 7, 1997. The sea turtle issues will be addressed by the following programs: ~~will be addressed by programs as follows:~~

4.2.1 Reinitiation of Endangered Species Act Section 7 Consultation

Reinitiation of formal consultation is required if: (1) the amount or extent of taking specified in the Incidental Take Statement is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat (when designated) in a manner or to an extent not previously considered, (3) the identified action is

subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the NMFS Biological Opinion dated February 7, 1997, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

4.2.2 Incidental Take Statement

Section 7(b)(4) of the ESA requires that when an agency action is found to comply with Section 7(a)(2), NMFS will issue a statement specifying the impact of any incidental taking, providing reasonable and prudent measures necessary to minimize impacts, and setting forth terms and conditions that must be followed. Only incidental taking by the licensee that complies with the specified terms and conditions is authorized.

Based on historical records of sea turtle capture and mortality at the St. Lucie Plant cooling water intake canal, NMFS anticipates that continued operation of the circulating water system at St. Lucie Plant may result in the capture and mortality of loggerhead, leatherback, Kemp's ridley, green and hawksbill turtles. Therefore, an incidental take level, and terms and conditions necessary to minimize and monitor takes is established. Variability in the rate of turtle entrapment at the St. Lucie Plant is considered to be primarily a function of the local abundance of turtles, since the operational characteristics of the intake structures have remained constant over the years. In recent years, green turtle entrapment has increased at a dramatic and unpredicted rate and may continue to increase. Therefore, no take level will be specified for entrapment, capture, and release of any species of turtle.

4.2.2.1 Lethal Take Levels

The lethal take levels are based on the historical observed lethal takes, but provide for increased total numbers of lethal takes as entrapment levels increase. Consequently, two lethal take levels are specified: one is a fixed level of the number of turtles of each species entrapped during the calendar year, while the other is a percentage of the number of turtles of each species entrapped during the calendar year. The allowable take level will be the greater of the two numbers, considering the prevailing entrapment rates. The annual incidental lethal take levels are established by the NMFS in the current ITS and specified in plant procedures.

4.2.2.2 Terms and Conditions of the Incidental Take Statement

The following terms and conditions are established to monitor the level of take and to minimize the adverse impacts of entrapment and the possibility of lethal takes:

1) FPL shall install and maintain a five inch (12.7 cm) mesh barrier net across the intake canal, east of the previously existing eight inch mesh barrier net. The new net shall receive regular inspection, maintenance, and repair on at least a

quarterly basis. The regular maintenance schedule notwithstanding, any holes or damage to the net that are discovered shall be promptly repaired to prevent the passage of turtles through the barrier net.

2) The existing eight inch mesh barrier net shall be retained to serve as a backup to the new five inch mesh barrier net, which may be lowered occasionally because of fouling and water flow problems. The eight (8) inch mesh net shall receive regular inspection, maintenance, and repair on at least a quarterly basis. The regular maintenance schedule notwithstanding, any holes or damage to the net that are discovered shall be promptly repaired to prevent the passage of turtles through the barrier net.

3) FPL shall continue its current program to capture and release turtles from the intake canals. The handling of captured turtles, treatment and rehabilitation of sick and injured turtles, and disposition of dead turtle carcasses shall be in accordance with permits granted to FPL or FPL's contractor through the FDEP.

4) Capture netting in the intake canal shall be conducted with a surface floating tangle net with an unweighted lead line. The net must be closely and thoroughly inspected via boat at least once per hour. Netting shall be conducted whenever sea turtles are present in the intake canal according to the following schedule:

a) 8 hours per day, 5 days per week, under normal circumstances;

b) 12 hours per day or during daylight hours, whichever is less, 7 days per week, under any of the following circumstances:
   i) an adult turtle appears in the canal during mating or nesting season (March 1 through September 30),
   ii) an individual turtle has remained in the canal for 7 days or more,
   iii) a leatherback turtle appears in the canal,
   iv) an apparently sick or injured turtle appears in the canal.

Reasonable deviations from this schedule due to human safety considerations (i.e., severe weather) are authorized.

5) If a turtle is observed in the intake canal west of the 8 inch barrier net, directed capture efforts shall be undertaken to capture the turtle and to prevent it from entering the intake wells.

6) FPL shall implement an NMFS approved program to monitor for turtles at the cooling water intake wells. The program should include visual inspection of the intake wells by plant operation, security, or biology personnel. It must also include provisions for notifying appropriate response personnel if turtles are detected and for safely removing turtles from the intake wells.

7) FPL shall propose a plan for the design and implementation of a study to elucidate the effect of various factors on turtle entrapment. These factors may include, but are not limited to, the influence of characteristics of sea turtle behavior, population dynamics, and plant operational characteristics or environmental factors on turtle capture rates. The proposed study plan, design, and implementaion date must be approved by NMFS.

8) FPL shall continue to participate in the Sea Turtle Stranding and Salvage Network (STSSN), under proper permits and authority, in order to assess any possible delayed lethal impacts of capture as well as to provide background data on the mortality sources and health of local sea turtles. As a point of clarification, stranded sea turtles are not counted against the authorized level of lethal incidental take in the Incidental Take Statement. Stranding information may be used as the basis for the determination that unanticipated impacts or levels of impacts are occurring.

9) FPL shall continue to conduct, under proper permits and authority, the ongoing sea turtle nesting programs and public service turtle walks.

10) Routine Reports

a) Copies of monthly reports covering sea turtle entrapment, capture, rehabilitation, turtle mortalities, and any pertinent, unusual events shall be furnished to NMFS.

b) A discussion of the topics specified in ITS condition 10) a), the inspection and maintenance of the barrier nets, and the operation of the Taprogge condenser tube cleaning system including any associated sponge ball loss shall be included in the Annual Environmental Operating Report required by Section 5.4.1. A copy of this annual report shall be furnished to NMFS.

c) A meeting shall be convened between FPL, NRC, and NMFS to discuss endangered and threatened species information and developments at the St. Lucie Plant approximately every two years beginning January 2000.

~~4.2.1 Beach Nesting Surveys~~

~~Beach nesting surveys for all species of sea turtles will be conducted on a yearly basis. for the period of 1982 through 1986. These surveys will be conducted during the nesting season from approximately mid-April through August.~~

~~The Hutchinson Island beach will be divided into 36 one km long survey areas. In addition, the nine 1.26 km long survey areas used in previous studies (1971-1979) will be maintained for comparison purposes. Survey areas will be marked with numbered wooden plaques and/or existing landmarks.~~

~~The entire beach will be surveyed seven days a week. All new nests and false crawls will be counted and recorded in each area. After counting, all crawl tracks will be obliterated to avoid recounting. Predation on nests by raccoons or other predators will be recorded as it occurs. Records will be kept of any seasonal changes in beach topography that may affect the suitability of the beach for nesting.~~

~~4.2.2 Studies to Evaluate and/or Mitigate Intake Entrapment~~

~~A program that employs light and/or sound to deter turtles from the intake structure will be conducted. The study will determine with laboratory and field experiments if sound and/or light will result in a reduction of total turtle entrapment rate.~~

~~The study shall be implemented no later than after the final removal from the ocean of equipment and structures associated with construction of the third intake structure and the experiments shall terminate 18 months later. Four months after the conclusion of the experimental period, a report on the results of the study will be submitted to NRC, EPA, National Marine Fisheries Survey (NMFS), and the U.S. Fish and Wildlife Service (USFWS) for their evaluation. If a statistically significant reduction in annual total turtle entrapment rate of 80% or greater can be demonstrated, using the developed technology and upon FPL receiving written concurrence by NRC, EPA, NMFS, and USFWS then permanent installation of the deterrent system shall be completed and functioning no later than 18 months after the agencies' concurrence. The design of this study needs to take into account the significant annual variation in turtle entrapment observed in the past.~~

~~If a 80% reduction of turtle entrapment cannot be projected to all three intake structures then, an interagency task force composed of NRC, EPA, NMFST USFWS, and FPL shall convene 18 months after completion of the third intake and determine if other courses of action to mitigate and/or reduce turtle entrapment are warranted (e.g., such as physical barrier, emergence of new technology or methods to deter turtles).~~

~~4.2.3 Studies to Evaluate and/or Mitigate Intake Canal Mortality~~

~~Alternate methods or procedures for the capture of sea turtles entrapped in the intake canal will be evaluated. If a method or procedure is considered feasible and cost effective and may reduce capture mortality rates, it will be field tested in the intake canal.~~

4.2.3 4 Light Screen to Minimize Turtle Disorientation

~~Australian pine or other s~~ Suitable plants (i.e., native vegetation such as live oak, native figs, wild tamarind, and others) shall be planted and maintained as a light ~~S~~screen along the beach dune line bordering the plant property to minimize turtle disorientation. In addition, FPL owner controlled area lighting shall be shielded so that none of the light is diverted skyward.

~~4.2.5 Capture and Release Program~~

~~Sea turtles removal from the intake canal will be conducted on a continuing basis. The turtles will be captured with large mesh nets, or other suitable nondestructive device(s) if deemed appropriate. A formalized daily inspection, from the shoreline, of the capture device(s) will be made by a qualified individual when the device(s) are deployed. The turtles will be identified to species, measured, weighed (if appropriate), tagged and released back into the ocean. Records of wounds, fresh, or old, and a subjective judgement on the condition of the turtle (e.g., barnacle coverage, underweight) will be maintained. Methods of obtaining additional biological/physiological data, such as blood analyses, and parasite loads, from captured sea turtles will be pursued. Dead sea turtles will be subjected to a gross necropsy, if found in fresh condition.~~

4.3 General Exceptions

The~~se~~ environmental conditions of the EPP Section 4 are contingent upon licensee or its contractors being able to obtain the necessary FDEP ~~an~~ endangered species permits to take, handle, and experiment with sea turtles. If licensee is unable to obtain the necessary permits, then NRC shall be notified of alternatives by the licensee.

5.0 Administrative Procedures

5.1 Review and Audit

The licensee shall provide for review and audit of compliance with the Environmental Protection Plan. The audits shall be conducted independently of the individual or groups responsible for performing the specific activity. A description of the organization structure utilized to achieve the independent review and audit function and results of the audit activities shall be maintained and made available for inspection.

5.2 Records Retention

Records and logs relative to the environmental aspects of plant operation shall be made and retained in a manner convenient for review and inspection. These records and logs shall be made available to NRC on request.

Records of modifications to plant structures, systems and components determined to potentially affect the continued protection of the environment shall be retained for the life of the plant. All other records, data and logs relating to this EPP shall be retained for five years or, where applicable, in accordance with the requirements of other agencies.

5.3 Changes in Environmental Protection Plan

Request for change in the Environmental Protection Plan shall include an assessment of the environmental impact of the proposed change and a supporting justification. Implementation of such changes in the EPP shall not commence prior to NRC approval of the proposed changes in the form of a license amendment incorporating the appropriate revision to the Environmental Protection Plan.

5.4 Plant Reporting Requirements

5.4.1 Routine Reports

5.4.1.1 Monthly Reports

Copies of monthly reports covering sea turtle entrapment, capture, rehabilitation, and sea turtle mortalities shall be furnished to NMFS.

5.4.1.2 Annual Environmental Operating Report

An Annual Environmental Operating Report describing implementation of this EPP for the previous calendar year shall be submitted to the NRC prior to May 1 of each year. ~~The initial report will cover the period from the date of OL issuance to December 31, 1983.~~

The report shall include summaries and analyses of the results of the environmental protection activities required by ~~Subs-~~ Section 4.2 of this Environmental Protection Plan for the report period, including a comparison with preoperational studies, operational controls (as appropriate), and previous non-radiological environmental monitoring reports, and an assessment of the observed impacts of the plant operation on the environment. If harmful effects or evidence of trends towards irreversible damage

to the environment are observed, the licensee shall provide a detailed analysis of the data and a proposed course of action to alleviate the problem.

The Annual Environmental Operating Report shall also include:

(a) A list of EPP noncompliances and the corrective actions taken to remedy them.

(b) A list ~~List~~ of all changes in station design or operation, tests, and experiments made in accordance with Subsection 3.1 which involved a potentially significant unreviewed environmental issue.

(c) A list of nonroutine reports submitted in accordance with Subsection 5.4.2.

(d) A discussion of the sea turtle entrapment, capture efforts, turtle mortalities, available information on barrier net inspections and maintenance, and the Taprogge condenser tube cleaning system operation including sponge ball loss at St. Lucie Plant

In the event that some results are not available by the report due date, the report shall be submitted noting and explaining the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

5.4.2 Nonroutine Reports

A written report shall be submitted to the NRC in accordance with 10 CFR 50.4 within 30 days of occurrence of a nonroutine event. The report shall (a) describe, analyze, and evaluate the event, including extent and magnitude of the impact and plant operating characteristics, (b) describe the probable cause of the event, (c) indicate the action taken to correct the reported event, (d) indicate the corrective action taken to preclude repetition of the event and to prevent similar occurrences involving similar components or systems, and (e) indicate the agencies notified and their preliminary responses.

Events reportable under this subsection which also require reports to other Federal, State or local agencies shall be reported in accordance with those reporting requirements in lieu of the requirements of this subsection. The NRC shall be provided a copy of such reports within 30 days of the date they are ~~at the same time it is~~ submitted to the other agency.

ATTACHMENT 4

PROPOSED

INTAKE WELL

MONITORING PROGRAM

INTAKE WELL MONITORING PROGRAM

Operations:

The intake well observations by the Operations Department personnel are delineated in Operations Instruction, O-OI-99-02. The intake wells on both units are inspected once per shift by plant operators.

Security:

Security Force Instruction, SFI #4, requires security officers to inspect the wells on both units for turtles between December 1 and March 31 of each year during their perimeter patrols. This is normally the period when turtles are stressed by colder water temperatures and cannot escape the current in the proximity of the intakes. The ability for turtles to survive in the well is also reduced when in a stressed condition. These inspections occur at various times during a security shift. For security reasons, the inspections are not performed at any standard periodicity.

If turtles are observed in the vicinity of the intake wells, biology personnel are notified and respond with directed capture efforts.

ATTACHMENT 5

STUDY

REQUEST FOR PROPOSAL

REQUEST FOR PROPOSALS

PHYSICAL AND ECOLOGICAL FACTORS INFLUENCING SEA TURTLE ENTRAINMENT LEVELS AT ST. LUCIE NUCLEAR POWER PLANT

In accordance with the Section 7 consultation under the Endangered Species Act, Florida Power & Light Company is soliciting proposals from qualified entities for a study to examine potential factors responsible for increases in sea turtle entrainment in recent years. The successful proposal will review existing St. Lucie Plant turtle capture data and integrate with available literature on population dynamics of *Caretta caretta* and *Chelonia mydas* in the Florida east central coast area and examine aspects of plant siting, design, and operating characteristics relating to sea turtle entrainment at St. Lucie Plant. FPL envisions that the study will use existing, available data, and will not require any field research.

BACKGROUND

A copy of the most recent St. Lucie Plant Annual Environmental Operating Report is appended to this request for proposals to provide background information on plant design and operating characteristics and a detailed summary of sea turtle entrainment history at the plant.

SCOPE OF WORK

1) Provide a general overview of St. Lucie Plant design and operation.

2) Review St. Lucie Plant sea turtle entrainment history.

3) Based on St. Lucie Plant baseline studies, existing aerial photographs, and other literature, evaluate habitat types found in the near shore environment adjacent to the plant with respect to suitability as developmental and foraging habitats for size classes of *Caretta caretta* and *Chelonia mydas* commonly entrained at the plant.

4) Examine the influence of variation in intake flow rates during plant outages on sea turtle entrainment rates.

5) Examine seasonal patterns of entrainment rates and the influence of oceanographic and meteorological events (e.g. upwellings, storms) on entrainment rates.

6) Based on design drawings and available video inspection footage, evaluate the offshore intake structures with respect to potential attractiveness as feeding and/or shelter sites.

7) Examine St. Lucie Plant capture/recapture data to determine the degree of site fidelity for size classes of *Caretta caretta* and *Chelonia mydas* commonly entrained at the plant.

8) Review the available literature on population trends of size classes of *Caretta caretta* and *Chelonia mydas* commonly entrained at the plant, with particular attention to population trends in the Florida east central coast.

9) Attend two meetings at the St. Lucie Plant. The first meeting will be a project kick off meeting and the second meeting will be toward the end of the project once the first draft of the report is completed and prior to final editing of the report.

AVAILABLE DATA

FPL will make available the extensive database on all turtles captured at the plant including full morphometric data, recapture events, photographs, and annual summaries of data collected since 1981. FPL will also provide available data on intake structure design and installation, baseline environmental studies, aerial photographs, plant operating history, and available oceanographic and climatic data.

DELIVERABLE WORK PRODUCTS

The desired final product will be a report addressing the above scope submitted to FPL for transmittal to the National Marine Fisheries Service and the Nuclear Regulatory Commission. This work product shall be the property of FPL and distributed at the Company's sole discretion. FPL would also be supportive of publication of results of the study in a peer reviewed journal, and would provide funds for preparation, page charges, etc., with the understanding that St. Lucie Plant biological staff would be listed as co-authors. Additionally, the contractor shall provide periodic progress reports to FPL as required by NMFS.

PROPOSAL REQUIREMENTS

Each proposal must contain a list of the personnel who will work on the study, a resume or curriculum vitae outlining publication history and qualifications, and their hourly rate. No overtime rates will be considered for this study. Proposals must include a detailed, specific methodology for addressing each item in the scope of work, a time line detailing the manner in which schedule requirements will be met, and identification of the sources of information to be used in the study. Each proposal must also include costs for preparing the study, conducting two meetings with FPL personnel at the St. Lucie Plant, and printing 15 copies of the report. The proposal must include any and all costs associated with the preparation of the study. These costs include, but are not limited to, such items as travel, hotels, meals, and rental transportation. All proposals must include a final lump sum cost which may not be exceeded and a schedule for

completion of the study. FPL retains the right not to select any contractors for this study if the proposals received do not meet our requirements.

SCHEDULE

Completed proposals must be submitted no later than January 1, 1999. Completion of a draft final report is anticipated six months from the date of formal issuance of the contract. Final report must be ready for submission by FPL to NMFS no later than January 31, 2000.

S. Rudisill
K. Baker

Florida Power & Light Company, 6351 S. Ocean Drive, Jensen Beach, FL 34957

FPL

April 15, 1998

L-98-105
10 CFR 50.4
10 CFR 50.36

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Re: St. Lucie Unit 2
Docket No. 50-389
1997 Annual Environmental Operating Report

In accordance with Section 5.4.1 of the St. Lucie Unit 2 Environmental Protection Plan (EPP), enclosed is the St. Lucie Unit 2 Annual Environmental Operating Report for the calendar year 1997.

As agreed at the first biennial sea turtle meeting held at St. Lucie Plant on January 20, 1998, this report includes discussions of the 5-inch barrier net maintenance and Taprogge condenser tube cleaning system ball loss for 1997. In addition, copies of the report are being furnished to the Florida Department of Environment Protection, Tequesta Office, and the National Marine Fisheries Service, Southeast Region.

Should there be any questions on this information, please contact us.

Very truly yours,

C. H. Wade for

J. A. Stall
Vice President
St. Lucie Plant

JAS/GRM

Enclosure

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant
Florida Department of Environmental Protection, Tequesta Office
National Marine Fisheries Service, Southeast Regional Office

A/18

Florida Power & Light Company St. Lucie Plant Unit 2

Annual Environmental Operating Report (FPL-97) April 1998

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT 2

ANNUAL ENVIRONMENTAL OPERATING REPORT 1997

FLORIDA POWER AND LIGHT COMPANY
JUNO BEACH, FLORIDA

QUANTUM RESOURCES, INC.
PALM BEACH GARDENS, FLORIDA

ENVIRONMENTAL OPERATING REPORT

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EXECUTIVE SUMMARY

Introduction

The St. Lucie Plant is an electric generating station on Hutchinson Island in St. Lucie County, Florida. The plant consists of two nuclear-fueled 2700 MWt units; Unit 1 was placed on-line in March 1976 and Unit 2 in April 1983. This document has been prepared to satisfy the requirements contained in Appendix B, Environmental Protection Plan (EPP), to St. Lucie Unit 2 Facility Operating License No. NPF-16. This report discusses environmental protection activities related to sea turtles as required by Subsection 4.2 of the EPP. Other routine annual reporting requirements are addressed in Volume 2.

Turtle Nesting Survey

Since monitoring began in 1971, there have been considerable year-to-year fluctuations in sea turtle nesting activity on Hutchinson Island. However, data collected through 1997 have shown no long-term reductions in nesting on the island. Relatively high nesting during recent years may actually reflect an increase in the number of nesting females in the study area. On a smaller scale, power plant operation has had no significant effect on nesting near the plant. Low nesting activity in 1975 and again in 1981-1983 in the vicinity of the plant was attributed to nighttime construction activities associated with installation of plant intake and discharge structures. Nesting returned to normal or above normal levels following both periods of construction. During 1991, daytime construction activities associated with velocity cap repairs had no apparent effect on nesting. Formal requirements to conduct nesting surveys expired in 1986, but this program has continued through 1997 with agreement from federal and state agencies. In 1997, the continuation of the nesting survey program was mandated as part of the biological opinion and incidental take statement issued by the National Marine Fisheries Service.

Intake Canal Monitoring

Since plant operation began in 1976, 5420 sea turtles (including recaptures) representing five different species have been removed from the intake canal. The majority of the turtles captured (59 percent) were loggerheads. Differences in the numbers of turtles found during different months and years, including dramatic increases in green turtle captures in recent years, have been attributed primarily to natural variation in the occurrences of turtles in the vicinity of the plant, rather than to operational influences of the plant itself. The majority of turtles removed from the intake canal (about 96 percent) were captured alive and released back into the ocean. Ongoing evaluations and improvements to the canal capture program have substantially reduced mortalities of entrapped sea turtles during recent years. Turtles confined between the barrier net and intake headwalls typically reside in the canal for a relatively short period prior to capture, and most are in good to excellent condition when caught. An improved design barrier net completed in January 1996 is expected to further reduce the residence times and potential for mortalities to sea turtles in the intake canal system.

INTRODUCTION

Background

This document has been prepared to satisfy the requirements contained in Appendix B, Environmental Protection Plan, to St. Lucie Unit 2 Facility Operating License No. NPF-16.

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. Jurisdiction for sea turtle studies is with the NRC, which is considered to be the lead federal agency relative to consultation under the Endangered Species Act. Previous results dealing with sea turtle studies are contained in thirteen annual environmental operating reports covering the period from 1983 through 1996. This report describes the 1997 environmental protection activities related to sea turtles, as required by Subsection 4.2 of the St. Lucie Unit 2 Environmental Protection Plan.

Area Description

The St. Lucie Plant is located on a 457-hectare site on Hutchinson Island on Florida's east coast (Figures 1 and 2). The plant is approximately midway between the Ft. Pierce and St. Lucie Inlets. It is bounded on the east side by the Atlantic Ocean and on the west side by the Indian River Lagoon. Hutchinson Island is a barrier island that extends 36 km between inlets and attains its maximum width of 2 km at the plant site. Elevations approach 5 m atop dunes bordering the beach and decrease to sea level in the mangrove swamps that are common on much of the western side. The Atlantic shoreline of 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 Florida Current, which flows parallel to the continental shelf margin, begins to diverge from the coastline at West Palm Beach. At Hutchinson Island, the current is approximately 33 km offshore. Oceanic water associated with the western boundary of the current periodically meanders over the inner shelf, especially during summer months.

Plant Description

The St. Lucie Plant consists of two 2700 MWt nuclear-fueled electric generating units that use near shore ocean waters for the plant's once-through condenser cooling water system. Water for the plant enters through three submerged intake structures located about 365 m offshore (Figure 2). Each of the intake structures is equipped with a velocity cap to minimize fish entrainment. From the intake structures, the water passes through submerged pipes (two 3.7 m and one 4.9 m in diameter) under the beach and dunes that lead to a 1,500 m long intake canal, which transports water 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 beach 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.

TURTLES

Introduction

Hutchinson Island, Florida, is an important rookery for the loggerhead turtle, Caretta caretta, and also supports some nesting of the green turtle, Chelonia mydas, and the leatherback turtle, Dermochelys coriacea. All three species are protected by state and federal statutes. The federal government has classified the loggerhead turtle as a threatened species. The leatherback turtle and the Florida nesting population of the green turtle are listed by the federal government as endangered species. It has been a prime concern of FPL that the St. Lucie Plant would not adversely affect the Hutchinson Island rookery. Because of this concern, FPL has sponsored monitoring of marine turtle nesting activity on the island since 1971.

Daytime surveys to quantify nesting, as well as 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) were preoperational. Though the power plant was not operating during 1975, St. Lucie Plant Unit No. 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. Construction had been completed and 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. During this study, four of the previously established 1.25 km-long survey areas were monitored. Additionally, eggs from turtle nests potentially endangered by construction activities were relocated.

Every year from 1981 through 1997, 36 one km long survey areas comprising the entire island were monitored seven days a week during the nesting season (Figure 3). Beginning in 1994, the southern half of the island has been surveyed by Ecological Associates of Jensen Beach, Florida, and their data is included in this report. The St. Lucie Plant Unit 2 discharge structure was installed during the 1981 nesting season. Offshore and beach construction of the Unit 2 intake structure proceeded throughout the 1982 nesting season and was completed near the end the 1983 nesting season. Construction activities associated with installation of both structures were similar to those conducted when Unit 1 intake and discharge structures were installed. Eggs from turtle nests potentially threatened by construction activities were relocated.

During 1991, another 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. However, in contrast to previous offshore projects, 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 implemented in support of the project included caging of 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. This plan was intended to mitigate any negative effects potentially resulting from required safety and navigational lighting on and near the platform.

Requirement 4.2.1 of the NRC's St. Lucie Unit 2 Appendix B Environmental Protection Plan was complete with submission of the 1986 nesting survey data (ABI, 1987). The nesting survey was continued voluntarily through 1997 with agreement from federal and state agencies. Results are presented in this report and discussed in relation to previous findings.

In addition to monitoring sea turtle nesting activities and relocating nests away from plant construction areas, removal of turtles from the intake canal has been an integral part of the St. Lucie Plant environmental monitoring program. 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 entrapped in the intake canal have been systematically captured, measured, weighed, tagged, and released.

Previous publications and technical reports have presented findings of the nesting surveys, nest relocation activities, and canal capture program (ABI, 1994)(Quantum, 1995, 1996, 1997). Results of studies to assess the effects of thermal discharges on hatchling swimming speed have also been reported (ABI, 1978). In July 1994, responsibility for sea turtle research and conservation activities was transferred from Ecological Associates, Inc. (formerly Applied Biology, Inc.) to Quantum Resources, Inc. Methodologies employed in both the nesting surveys and canal capture operations remained essentially unchanged so that data collected in 1994 and future years are directly comparable to previous years data. The purpose of this report is to: 1) present 1997 sea turtle nesting survey data and summarize observed spatial and temporal nesting patterns since 1971, 2) document and summarize predation on turtle nests since 1971, and 3) present 1997 canal capture data and summarize comparable data collected since 1976.

Materials and Methods

Nesting Survey

Methodologies used during previous turtle nesting surveys on Hutchinson Island were described in earlier reports (ABI 1994). Methods used during the 1997 survey were designed to allow comparisons with these previous studies.

In 1997, only areas A-S were surveyed by Quantum Resources biologists (Figure 3). Data supplied by Ecological Associates, Inc. are used to provide whole island nesting totals in Figures 6, 8, and 9.

From March 29, 1997 through April 15, 1997, preliminary nest surveys were conducted along Hutchinson Island in areas A-S. One leatherback turtle nest was found in areas A-S prior to the beginning of formal nesting surveys on April 15, 1997. From April 15, 1997 through September 15, 1997, nest surveys were conducted on a daily basis. The last nest recorded in area A-S was on September 11, 1997. Biologists used small off-road motorcycles to survey the island each morning. New nests, non-nesting emergences (false crawls), and nests destroyed by predators were recorded for each of the 1-km-long survey areas A - S (Figure 3). The 1.25-km-long survey areas established in earlier studies also were monitored so comparisons could be made with previous studies.

Data collected from beach nesting surveys were reported to the Florida Department of Environmental Protection (FDEP) as part of the FDEP Index Nesting Beach Survey. In a cooperative effort, data from stranded turtles found during beach surveys were routinely provided to the Florida Department of Environmental Protection and the National Marine Fisheries Service (NMFS) through the Sea Turtle Stranding and Salvage Network.

Intake Canal Monitoring

Most turtles entrapped in the St. Lucie Plant intake canal were removed by means of large-mesh tangle nets fished between the intake headwalls and a barrier net located at the Highway A1A bridge (Figure 2). Nets used during 1997 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 unweighted lines used along the bottom. Turtles entangled in the nets generally remained at the water's surface until removed. Since its inception in 1976, the canal capture program has been under continual review and refinement in an attempt to minimize both entrapment time and injuries/mortalities to entrapped sea turtles. Prior to April 1990, turtle 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). Additionally, 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 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 from nets and provided an opportunity to improve daily assessments of turtle levels within the canal. Records of daily canal observations were compared with capture data to assess capture efficiencies.

In 1978, a barrier net at the A1A bridge 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 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 uncontained by the A1A barrier net were usually removed from the canal at the intake wells of Units 1 and 2 (Figure 2). There they were retrieved by means of large mechanical rakes or specially designed nets. Following construction of the UIDS barrier, all but the smallest individuals were unable to reach the intake wells. Improvements made to the A1A barrier net during 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 turtles encountered in the intake canal in recent years, an improved design, small mesh barrier net was erected east of the A1A barrier net. Construction was complete in January 1996. This improved barrier net is designed to confine all turtles with a carapace width greater than 18 cm to the extreme eastern portion of the intake canal.

Formal daily inspections of the intake canal were made to determine the numbers, locations and species of turtles present. Surface observations were augmented with periodic underwater inspections, particularly in and around the barrier nets.

In addition to the use of tangle nets, dip nets, and hand captures using snorkel and SCUBA were also employed. 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 30 cm or less. Divers were employed to hand capture turtles whenever underwater visibility permits, and this technique has proven highly effective in the capture of turtles of all sizes, particularly less active individuals often found partially buried in the sediment in the vicinity of the A1A barrier net. Hand capture efforts have had a significant impact in reducing entrapment times for turtles in the intake canal.

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.). Beginning in July 1994, all turtles captured have been photographed dorsally and ventrally prior to release, and the photographs retained for future reference. Healthy turtles were released into the ocean the same day of capture. Sick or injured turtles were treated and

occasionally held for observation prior to release. When treatment was warranted, turtles were transported to an approved rehabilitation facility.

Resuscitation techniques were used if a turtle was found that appeared to have died recently. Beginning in 1982, necropsies were conducted on dead turtles found in fresh condition.

Florida Power & Light Company and Quantum Resources, Inc. continued to assist other sea turtle researchers in 1997. Since the program began, data, specimens, and/or assistance have been given to the Florida Department of Environmental Protection, National Marine Fisheries Service, US Fish and Wildlife Service, US Army Corps of Engineers, Smithsonian Institution, South Carolina Wildlife and Marine Resources Division, Center for Sea Turtle Research (University of Florida), Florida Atlantic University, University of Central Florida, Texas A & M University, University of Rhode Island, University of South Carolina, University of Illinois, University of Georgia, Virginia Institute of Marine Science, Western Atlantic Turtle Symposium, South Atlantic Fishery Management Council, Florida Marine Fisheries Commission, Harbor Branch Oceanographic Institution, and the National Research Council.

Results and Discussion

Nesting Survey

1997 Loggerhead Nesting Summary

In 1997, 5922 Loggerhead turtle nests were recorded in the 36 one-kilometer segments comprising Hutchinson Island. This figure is in accordance with a general increase in loggerhead turtle nesting on Hutchinson Island since surveys began in 1971, although significant year to year fluctuations are evident. Loggerhead nests and emergences for survey areas A-S are presented in Figure 4.

Spatial Distribution of Loggerhead Turtle Nests

From 1981 through 1997, 36 one-km long segments comprising the island's coastline have been surveyed. The distribution of nests among these 36 survey areas has shown an increase in nesting from north to south along the northern half of the island (ABI, 1987, 1994). Along the southern half of the island there has either been no gradient or a gradient of decreasing nesting from north to south. Though beach dynamics may sometimes affect the selection of nesting sites by loggerhead turtles, relationships between spatial nesting patterns and specific environmental conditions are often difficult to establish because of the interrelationship of the factors involved.

Not all ventures onto the beach by a female turtle culminate 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) suggested that relatively high percentages of false crawls may reflect disturbances or unsatisfactory nesting beach characteristics. Therefore, certain factors may affect a turtle's preference to emerge on a beach,

while other factors may affect a turtle's tendency to nest after it has emerged. An index which relates the number of nests to the number of false crawls in an area is useful in estimating the post-emergence suitability of a beach for nesting. In the present study, this index is termed "nesting success" and is defined as the percentage of total emergences that result in nests. Loggerhead nesting success for areas A - S in 1997 is presented in Figure 5.

Historically, the pattern of loggerhead emergences on the island has generally paralleled the distribution of nests (ABI, 1987, 1994). In contrast, nesting success by loggerheads along the island has typically lacked gradients (ABI, 1987, 1994). Thus, the relatively high numbers of loggerhead nests observed in certain areas are usually a result of more turtles coming ashore in those areas rather than of more preferable nesting conditions being encountered by the turtles after they emerged. A variety of environmental factors (e.g., offshore bottom contours, distribution of reefs, type and extent of dune vegetation, and human activity on the beach at night) may effect loggerhead turtle emergence patterns and several have been reported to affect emergence patterns on Hutchinson Island (ABI, 1988, 1989). Undoubtedly, a combination of factors account for the overall distribution of emergences and therefore, the overall nesting pattern on the island.

Nesting surveys on Hutchinson Island were initiated in response to concerns that the operation of the St. Lucie Plant might negatively impact the local sea turtle rookery. Previous analysis, using log-likelihood tests of independence (G-test; Sokal and Rohlf, 1981) 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, 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 construction. During 1991, when offshore construction was restricted almost entirely to daylight hours, nests were more abundant at the plant site than at the control site. Data collected through 1997 have shown that power plant operation, exclusive of nighttime intake/discharge construction, has had no apparent effect on nesting.

Long-Term Trends in Loggerhead Turtle Nesting

Various methods were used during surveys prior to 1981 to estimate the total number of loggerhead nests on Hutchinson Island based on the number of nests found in the 9 1.25 km long survey areas (ABI, 1980a). Each of these methods was subsequently found to consistently overestimate island totals (ABI,1987). Since whole-island surveys began in 1981, it has been possible to determine the actual proportion of total nests deposited in the nine areas. This has allowed extrapolation from the nine survey areas to the entire island for years prior to 1981.

From 1981 through 1993 the total number of nests in the nine areas varied from 32.5 to 35.6 percent of the total number of nests on the island. This is slightly higher than the 31.3 percent which would be expected based strictly on the proportion of linear coastline comprised by the nine areas. Using the 13 year mean of 33.81 percent, estimates of the total number of nests on Hutchinson Island can be calculated by multiplying the number of nests in the nine areas by 2.958. This technique, when applied to the nine survey areas during the13 years in which the

entire island was surveyed, produced whole-island estimates within 5.3 percent of the actual number of nests counted. Because the proportion of nests recorded in the nine survey areas remained relatively constant over the last thirteen years, this extrapolation procedure provides a fairly accurate estimate of total loggerhead nesting for years prior to 1981, and is used to generate data points for 1971 through 1979 in figure 6.

It is clear that loggerhead nesting activity on Hutchinson Island fluctuates considerably from year to year (Figure 6). Annual variations in nest densities also are common at other rookeries, and may result from non-annual reproductive behavior. Despite high variability, data collected through 1997 suggest an overall increase in nesting on Hutchinson Island since surveys began in 1971. Total nesting activity was greatest during 1995 when 8184 loggerhead nests were recorded. No relationships between total nesting activity and power plant operation or intake/discharge construction were indicated by year-to-year variations in total nesting on Hutchinson Island.

Seasonal Patterns of Loggerhead Turtle Nesting

The loggerhead turtle nesting season usually begins between mid-April and early May, attains a maximum during June or July, and ends by mid-September (ABI, 1987). Nesting activity during 1997 followed this same pattern.

Cool water intrusions frequently occur over the continental shelf of southeast Florida during the summer (Smith, 1982). These intrusions may have been responsible for the temporary declines in loggerhead turtle nesting activity previously observed on Hutchinson Island (ABI, 1994). Though natural fluctuations in temperature have been shown to affect temporal nesting patterns on Hutchinson Island, there has been no indication that power plant operation has affected these temporal patterns (ABI, 1988).

Predation on Loggerhead Turtle Nests

Since nest surveys began in 1971, raccoon predation has been a major cause of turtle nest destruction on Hutchinson Island. Researchers at other locations have reported raccoon predation levels as high as 70 to nearly 100 percent (Hopkins et al., 1979). Raccoon predation of loggerhead turtle nests on Hutchinson Island has not approached this level during any study year, though levels for individual 1.25 km long areas have been as high as 80 percent. Overall predation rates for survey years 1971 through 1977 were between 21 and 44 percent, with a high of 44 percent recorded in 1973. A pronounced decrease in raccoon predation occurred after 1977, and overall predation rates for the nine areas have not exceeded 10 percent since 1979. A decline in predation rates on Hutchinson Island may be attributable to trapping programs, construction activities, habitat loss, and disease.

During 1997, raccoon predation levels were extremely low, with only one loggerhead nest in areas A-S depredated by raccoons (Figure 7). In previous years (ABI, 1994), predation of turtle nests was primarily restricted to the more undeveloped portions of the island.

Ghost crabs have been reported by numerous researchers as important predators of sea turtle nests (Hopkins et al., 1979; Stancyk, 1982). Though turtle nests on Hutchinson Island probably have been depredated by ghost crabs since nesting surveys began in 1971, quantification of ghost crab predation did not begin until 1983.

Overall predation rates by ghost crabs have varied from 0.1 to 2.1 percent from 1983 through 1997. During 1997, one loggerhead nest in areas A-S was depredated by ghost crabs (Figure 7). Nests destroyed by a combination of raccoon and ghost crab predation have been included as raccoon predations in previous discussions. When these combination predations are included as crab predations, the overall predation rates by ghost crabs range from 0.1 to 4.7 percent. During 1997, no such combination predations were recorded.

1997 Green and Leatherback Nesting Summary

In 1997, 39 green turtle and 42 leatherback turtle nests were recorded in the 36 one-km segments comprising Hutchinson Island. The green turtle total represents a substantial decrease from last year's totals, while the leatherback total shows a modest increase. (Figures 8 and 9). Strong year to year fluctuations are common, however, and the general trend since 1971 may reflect an increase in the numbers of nesting females in the Hutchinson Island area.

Trends in Green and Leatherback Turtle Nesting

Green and leatherback turtles nest on Hutchinson Island, but the numbers are fewer than loggerhead turtles. Prior to 1981, both survey (nine 1.25 km-long sections) and inter-survey areas were monitored for the presence of green and leatherback nests. Thirty-one kilometers of beach from Area 1 south to the St. Lucie Inlet were included in that effort. During whole-island surveys from 1981 through 1993, only 2.6 percent (7) of the leatherback nests (n=266) and only 1.4 percent (12) of the green turtle nests (n=831) were recorded on the five kilometers of beach north of Area 1. Therefore, previous counts of green and leatherback nests within the 31 kilometers surveyed probably were not appreciably different from total densities for the entire island. Based on this assumption, green and leatherback nest densities may be compared among all survey years, except 1980, when less than 15 kilometers of beach were surveyed.

Since surveys began in 1971, the number of nests observed on the island ranged from 5 to 195 for green turtles and from 1 to 52 for leatherbacks (Figures 8 and 9). Temporal nesting patterns for these species differ from the pattern for loggerhead turtles. Green turtles typically nest on Hutchinson Island from mid-June through the first or second week of September. Leatherback turtles usually begin nesting in March or April and continue to nest through early to mid-July. Considerable fluctuations in green turtle nesting on the island have occurred among

survey years (Figure 8). This is not unusual since there are drastic year-to-year fluctuations in the numbers of green turtles nesting at other breeding grounds (Carr et al., 1982). Despite these fluctuations, data collected through 1997 suggest an overall increase in nesting since 1971 and may reflect an increase in the number of nesting females in the Hutchinson Island area. During 1997, green turtles nested most frequently along the southern half of the island. This is consistent with results of previous surveys.

Leatherback turtle nest densities have remained low on Hutchinson Island, however, increased nesting during recent years (Figure 9) may reflect an overall increase in the number of nesting females in the Hutchinson Island area.

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 (ABI, 1980b and 1986). 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 pipes before they encounter current velocities sufficiently strong to effect entrainment. Consequently, a turtle's entrapment relates primarily to the probability that it will detect and subsequently enter one of the intake structures.

1997 Canal Capture Summary

In 1997, 382 sea turtles were captured in the intake canal of the St. Lucie Plant. Captures included 188 loggerheads, 191 green turtles, 2 leatherbacks, and 1 hawksbill (Table 1).

Relative Abundance and Temporal Distribution

Since intake canal monitoring began in May 1976, 3185 loggerhead (including 201 recaptures), 2164 green (including 378 recaptures), 20 leatherback, 31 Kemp's ridleys and 19 hawksbill captures have taken place at the St. Lucie Plant. Annual catches for all species combined ranged from a low of 33 in 1976 (partial year of plant operation and monitoring) to 933 in 1995.

Except for 1993 through 1997, when the green turtle was the most abundant species in the canal, loggerheads have dominated annual captures. Since 1977, the first full year of plant operation, the number of loggerheads captured each year ranged from 62 in 1981 to 349 in 1996 (Figure 10). Numbers have exhibited considerable year-to-year fluctuations with no persistent trends evident, although recent years data are suggestive of a possible increasing trend.

The number of green turtles captured each year since 1977 have ranged from 3 in 1979 to a record high of 673 in 1995 (Figure 10). Increasing numbers of captures over recent years may reflect an increase in the number of turtles inhabiting the nearshore coastal area near the plant or may simply represent statistical variation. Green turtle captures were down sharply in 1997, but additional years of capture data will be required before any long-term trends can be established.

During 1997, the monthly catch of loggerheads ranged from 1 (November) to 42 (June), with a monthly mean of 15.7 (Table 2). Over the entire history of the capture program, monthly catches have ranged from 0 to 87, with the greatest number of captures occurring during July 1996.

During 1997, the monthly catch of green turtles ranged from 4 (November) to 30 (June), with a monthly mean of 15.9 (Table 3). The March 1996 catch of 147 green turtles is the largest number of captures for this species for any month on record. Seasonal abundance patterns of green turtles have typically been much more pronounced than for loggerheads, with over 50 percent of all captures occurring between January and March. In 1995 through 1997 however, no such seasonal pattern was evident, with captures distributed more or less evenly throughout the year.

Catches of leatherback, hawksbill, and Kemp's ridley turtles have been infrequent and scattered throughout the 20 year study period. Each species has shown rather pronounced seasonal occurrences; over 60 percent of all leatherbacks were captured in March and April, over 60 percent of the hawksbills were captured between July and September, and almost 90 percent of the Kemp's ridleys were caught between December and April.

Size-Class Distributions

The size-class distribution for loggerheads removed from the intake canal in 1997 is presented in Figure 11. The size class distribution for green turtles removed from the intake canal in 1997 is presented in Figure 12. ABI (1994) presents size-class data for turtles removed from the intake canal from 1976 through 1993. Of the two leatherbacks captured in 1997, one was an adult (SLCL > 121 cm) (Hirth, 1980) and one was a large subadult, falling just below the 121 cm mark. The hawksbill captured in 1997 was a juvenile (SLCL < 63cm) (Witzell, 1983).

Sex Ratios

Of the 188 loggerheads captured in 1997, 130 were juveniles with a straight line carapace length (SLCL) less than or equal to 70 cm, 34 were adults (SLCL > 85 cm) and 34 were transitional (SLCL 71-85 cm) (Hirth, 1980). The latter group probably includes both mature and immature individuals. Of the 34 individuals classified as adults for which sex was recorded, 32 were females and two were males, with females predominating by a ratio of 16:1.

Of the 191 green turtles captured in 1997, 186 were juveniles or sub-adults (SLCL < 83 cm) (Whitherington and Ehrhart, 1989). Of the five adult green turtles captured in 1997, three were males and 2 were females. ABI (1994) discusses sex ratio data for previous years.

Capture Efficiencies

Netting methodologies have been under continual review and refinement as net materials, configurations and placement have been varied in an effort to minimize sea turtle entrapment times. Additionally, alternative capture techniques have been evaluated, and potential deterrent systems tested in the laboratory. Current capture procedures have proven to provide a safe, efficient, and cost-effective program for removing entrapped turtles from the intake canal.

Formal daily inspections of the intake canal are conducted every day that capture nets are deployed, and the number, location and relative size of entrapped turtles are recorded on field observation forms. Better utilization of currents and eddies, adjustments to tethering lines, multi-net deployments and increased efforts to hand capture turtles have contributed to reduced entrapment times during recent years.

Entrapment times may be extended for turtles swimming past the A1A barrier net (ABI, 1987). Because capture efforts west of the A1A bridge were generally less effective than those near the intake headwalls, most turtles breaching the barrier net were not caught until they entered the intake wells of Units 1 and 2. Because of their relatively small sizes, virtually all the turtles reaching the intake wells are green turtles. During 1997, 3 of the 191 green turtle captures (1.6 percent) occurred at the intake wells. The substantial decrease in the percentage of captures at the plants intake wells compared to the 1995 figure of 14.5 percent is attributed to the effectiveness of the new small mesh barrier net installed east of AIA in January 1996.

During 1997, 99.2 percent of all turtles entrapped in the canal were captured east of the A1A bridge, 322 by tangle nets and 57 by hand or dip net capture. The effective confinement of turtles east of A1A has been a major contributor to the high capture efficiency achieved during recent years. The installation of an improved barrier net completed in January 1996 has further increased capture efficiency by more effectively confining turtles of all sizes to a smaller area east to the A1A barrier net.

Barrier Net Maintenance

Barrier net maintenance is critical in reducing the opportunity for mortalities in the plant intake well area and in reducing residence times for turtles in the intake canal system. Daily inspections are performed from a small boat to remove floating debris and to repair holes near or at the water surface. Twenty holes were discovered and repaired in the course of daily inspections in 1997. When underwater visibility conditions permit, a weekly underwater inspection is conducted. In 1997, twenty-five holes were discovered and repaired during weekly inspections. A formal inspection is conducted monthly by FPL Land Utilization personnel

including hole repair, debris removal, and airlift dredging of accumulated silt if needed. Fifty-three holes were discovered and repaired during monthly inspections in 1997.

Relative Condition

Turtles captured alive in the intake canal of the St. Lucie Plant were assigned a relative condition based on weight, activity, parasite infestation, barnacle coverage, wounds, injuries and any other abnormalities which might have affected overall vitality. During 1997, 95.2 percent (179) of all loggerheads found in the canal were alive and in good condition. Only 4.8 percent (9) loggerhead captures involved individuals in fair or poor condition and none were dead. Of the 191 green turtles removed from the intake canal during 1997, 178 (93.2 percent) were in good condition, eight (4.2 percent) were in fair or poor condition, and five (2.6 percent) were dead. The two leatherbacks captured in 1997 were in good condition. The hawksbill captured in 1997 was in good condition.

Relative condition ratings can be influenced by a number of factors, some related and others unrelated to entrainment and/or entrapment in the intake canal. A rating of good indicates that turtles have not been negatively impacted by their entrapment in the canal, at least as evidenced by physical appearance. Although ratings of fair or poor imply reduced vitality, the extent to which entrainment and entrapment is responsible is often indeterminable. In some instances, conditions responsible for lower ratings, such as boat collision or fisheries gear entanglement injuries, obviously were sustained prior to entrainment.

During 1997, 23 of the 382 turtles captured (6.0 percent) had notable injuries; such as missing appendages, broken or missing pieces of carapace, or deep lacerations. Many of these were old, well-healed wounds, and did not require veterinary attention.

Of the 377 live removals during 1997, 371 were released into the ocean the day of capture. Four turtles (all loggerheads) in obvious ill health or suffering serious injuries were transported to Sea World of Florida or the Marinelife Center of Juno Beach for treatment and rehabilitation. One had serious carapace damage, presumably from a boat collision, and three were weak, lethargic, and emaciated when captured. Eight green turtles with fibropapilloma tumors were removed from the canal in 1997. Two turtles with extensive tumors were transferred to the Florida DEP for transportation to a rehabilitation facility. Six turtles with minor tumors were tagged and released.

Mortalities

Sea turtle mortalities have been closely monitored throughout the life of the canal capture program in an attempt to assign probable causes and take appropriate remedial action to minimize future occurrences. Previous analyses of capture data identified drowning in nets (A1A barrier net, UIDS barrier, and tangle nets), drowning in the intake pipes during periods of reduced intake flow, injuries sustained from dredging operations, and injuries sustained from the mechanical

rakes used in the intake wells as probable mortality factors (ABI,1987)(FPL, 1995). Although difficult to quantify, the entrapment and subsequent demise of injured or sick turtles has probably accounted for a portion of observed mortalities.

Over the entire 20 year monitoring period, 134 (4.2 percent) of the 3185 loggerheads and 52 (2.4 percent) of the 2164 green turtles entrapped in the canal were found dead. Mortalities spanned the range of size classes for loggerheads (SLCL = 47.5-103 cm), while all green turtle mortalities involved juveniles less than 42 cm in length. The four Kemp's ridley mortalities documented at the plant during 1987 and 1988 were the only deaths for this species to date; no dead leatherback or hawksbill turtles have been recovered at the St. Lucie Plant.

Modifications to capture procedures, improvements to barrier nets, and virtual elimination of low flow conditions within the canal have resulted in a substantial reduction in sea turtle mortalities over the life of the canal capture program. Mortality rate, expressed as the percentage of total captures involving dead animals, declined from 7.8 percent during the period 1976 through 1984 to 2.3 percent since 1984 and 1.2% since 1990 (Table 1).

In 1997, five turtles (all green turtles) were removed dead from the intake canal, for an overall mortality rate of 1.3%. Four of the five green turtle mortalities were in fresh condition and one was moderately decomposed. All mortalities were recovered east of the primary barrier net. Three mortalities were found impinged at the water surface of the barrier net and one was apparently trapped beneath the water surface at the barrier net. The remaining mortality was discovered entangled in fishing line fouled on the canal bottom. Corrective action was taken in response to two of the 1997 mortalities. In the case of the turtle found impinged below the surface at the barrier net, it was determined that accumulated silt and algae had deformed the slope of the net, and cleaning and airlift dredging was performed to restore the design slope. In the case of the turtle found entangled in fishing line, divers searched for and removed lost fishing tackle and other entanglement hazards from the canal, and hook and line fishing in support of the fish tag and release program was curtailed. Two of the five 1997 mortalities involved turtles in very poor condition due to papilloma tumors which were moribund when entrained into the canal. All of the mortalities were held for DEP examination.

In response to the 1995 mortalities and the dramatic increase in intake canal captures in 1995, consultation was initiated with FPL, NRC, and the NMFS under Section 7 of the Endangered Species Act. As a result of that consultation, FPL has designed and constructed an improved, smaller mesh barrier net located between the A1A barrier net and the intake canal headwalls (Figure 2). Construction of the net was completed in January 1996. This barrier net prevents turtles from reaching the intake wells or UIDS barrier and should increase capture efficiency by confining turtles to a smaller area of the intake canal.

Recapture Incidents

Since the St. Lucie Plant capture program began, most turtles removed from the intake canal have been tagged and released into the ocean at various locations along 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, 579 recaptures (201 loggerheads and 378 green turtles) have occurred, and a number of turtles have been recaptured more than twice. Despite the striking decrease in total green turtle captures in 1997, the recapture rate for green turtles continued to increase, reaching 40% in 1997. Loggerhead recapture rates have remained stable at about 10%. The large number of green turtle recaptures probably reflects the saturation of local green turtle populations with turtles tagged at the St. Lucie Plant and possibly indicates a difference in site fidelity between green turtles and loggerheads. Several other turtles with tag scars have also been recovered, indicating that the actual number of recaptures may be higher. Occasionally, turtles are captured that have been tagged by other researchers. Three such captures occurred in 1997. One green turtle and two loggerheads with tags from the University of Florida, National Marine Fisheries Service, and Florida DEP were captured. The original tagging organization was contacted and supplied with tag return data. Several turtles tagged at the St. Lucie Plant were recaptured by other organizations in 1997, including a green turtle recaptured in Nicaragua.

Summary

A gradient of increasing loggerhead turtle nest densities from north to south along the northern half of Hutchinson Island has been shown during most survey years. This gradient may result from variations in beach topography, offshore depth contours, distribution of nearshore reefs, onshore artificial lighting, and human activity on the beach at night. Low nesting activity in the vicinity of the power plant during 1975 and from 1981 through 1983 was attributed to nighttime construction activities associated with installation of power plant intake and discharge structures. Nesting returned to normal or above normal levels following both periods of construction. During 1991, daytime construction activities associated with velocity cap repairs had no apparent effect on nesting. Statistical analyses indicate that power plant operation, exclusive of nighttime construction, has had no significant effect on nest densities near the plant. In 1997, 5922 loggerhead turtle nests were recorded on Hutchinson Island. There have been considerable year-to-year fluctuations in loggerhead nesting activity on Hutchinson Island from 1971 through 1997. Fluctuations are common at other rookeries and may result from non-annual reproductive behavior. Despite these fluctuations, loggerhead nesting activity has remained high during recent years and may reflect an overall increase in the number of nesting females in the Hutchinson Island area. No relationship between total nesting on the island and power plant operation or intake/discharge construction was indicated.

Temporal nesting patterns of the Hutchinson Island population may be influenced by natural, large scale fluctuations in water temperature, such as those produced by the cool water intrusions that frequently occur over the continental shelf of southeast Florida during the nesting

season. However, localized fluctuations in water temperature associated with power plant operation have had no apparent effect on nesting.

Since nesting surveys began in 1971, raccoon predation has been one of the major causes of turtle nest destruction on Hutchinson Island. From 1971 through 1977, overall predation rates in the nine survey areas were between 21 and 44 percent. However, a pronounced decrease in raccoon predation occurred after 1977, and overall predation rates in the nine survey areas have not exceeded ten percent since 1979. Decreased predation by raccoons probably reflects a decline in the raccoon population. More years of survey data will be required to determine if the extremely low level of raccoon predation in 1996 and 1997 is an isolated occurrence or part of a continuing trend. Ghost crab predation on the turtle nests may be more significant than previously documented, but remains relatively minor compared to raccoon predation.

During 1997, 39 green turtle and 42 leatherback turtle nests were recorded on Hutchinson Island. Nesting activity by these two species has exhibited considerable annual fluctuations, as has been recorded at other rookeries, but has remained relatively high during recent years. This may reflect an overall increase in the number of nesting green and leatherback turtles in the Hutchinson Island area.

During 1997, 188 loggerheads, 191 green turtles, one hawksbill, and two leatherbacks were removed from the St. Lucie Plant intake canal. Since monitoring began in May 1976, 3185 loggerhead, 2164 green, 20 leatherback, 19 hawksbill, and 31 Kemp's ridley turtles have been captured and tagged. Over the life of the monitoring program, annual catches for loggerhead turtles have ranged from 33 in 1976 (partial year of plant operation and monitoring) to a high of 349 in 1996. Yearly catches of green turtles have ranged from 0 in 1976 to 673 in 1995. Differences in the number of turtles entrapped during different years and months are attributed primarily to natural variation in the occurrence of turtles in the vicinity of the offshore intake structures rather than to plant operation characteristics.

Size-class distributions of loggerhead turtles removed each year from the canal have consistently been predominated by juveniles between 50 and 70 cm in straight line carapace length. Over 75 percent of all green turtles entrapped in the canal were juveniles 40 cm or less in length. For both species, the largest number of captures for all years combined occurred during winter, but, with the exception of 1995 and to lesser extent 1996, these seasonal peaks were much more pronounced for green turtles. Sex ratio of loggerheads caught in the canal continued to be biased towards females.

During 1997, about 95 and 93 percent, respectively, of all loggerheads and green turtles removed from the canal were categorized by physical appearance as being in good condition.

About six percent of the turtles removed from the intake canal during 1997 had substantial injuries, and many of those were well healed and apparently sustained prior to entrapment. Once

in the canal, turtles confined east of A1A had very brief residency times. Thus the relative condition of most turtles was not affected by their entrapment.

During 1997, mortalities of five green turtles were recorded in the intake canal. Program modifications, including continual surveillance of tangle nets during periods of deployment, improvements to the integrity of the A1A barrier net, and greater effort to hand capture turtles have contributed to a substantial decline in sea turtle mortalities during recent years. The design and construction of an improved barrier net completed in January 1996 was expected to reduce mortalities and entrapment times for turtles in the intake canal. Data for 1997 indicate that the new barrier net configuration has been highly effective in excluding turtles from the plant intake wells, but has not been as effective in reducing the overall mortality rate as anticipated.

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FIGURES AND TABLES

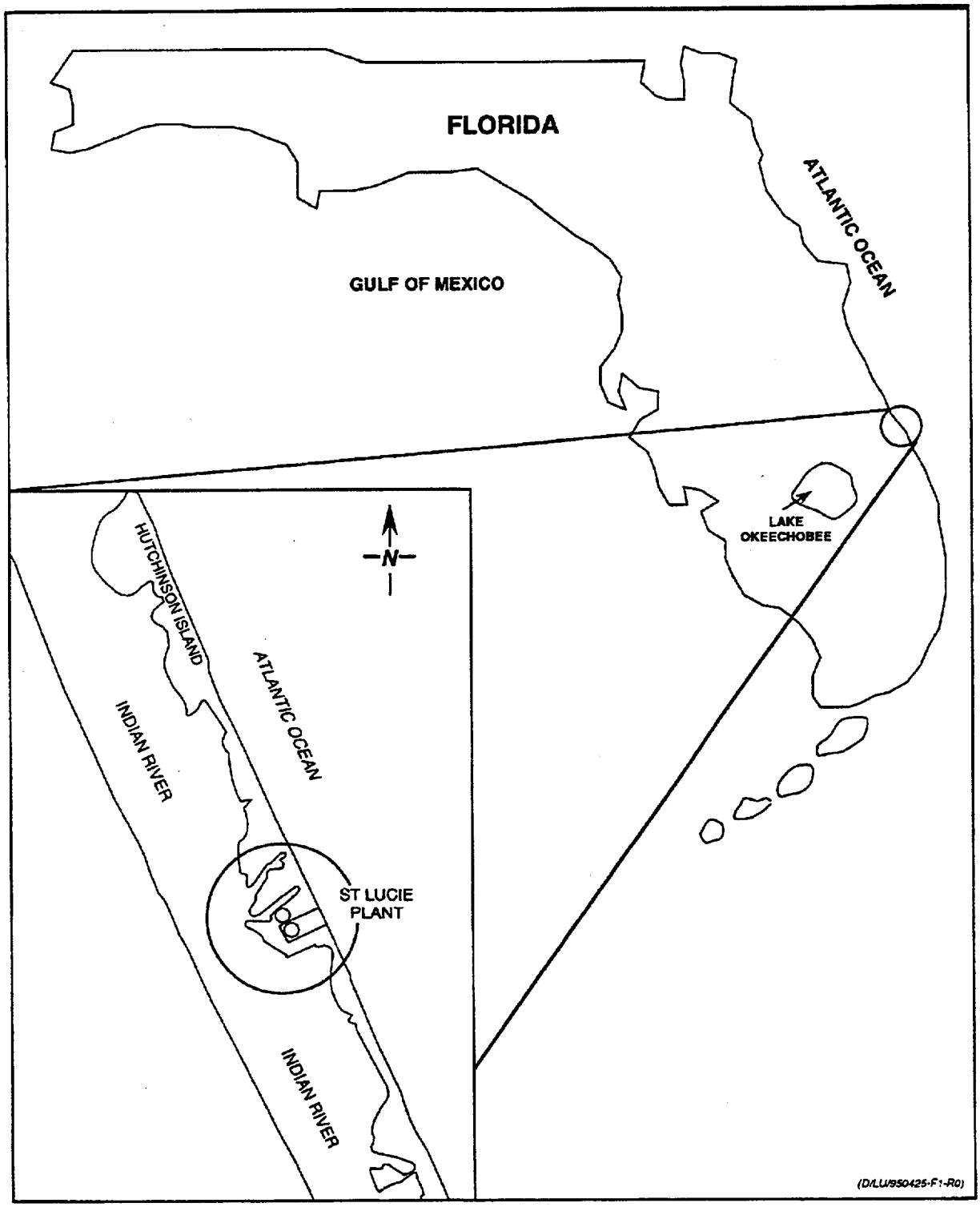


Figure 1. Location of the St. Lucie Plant

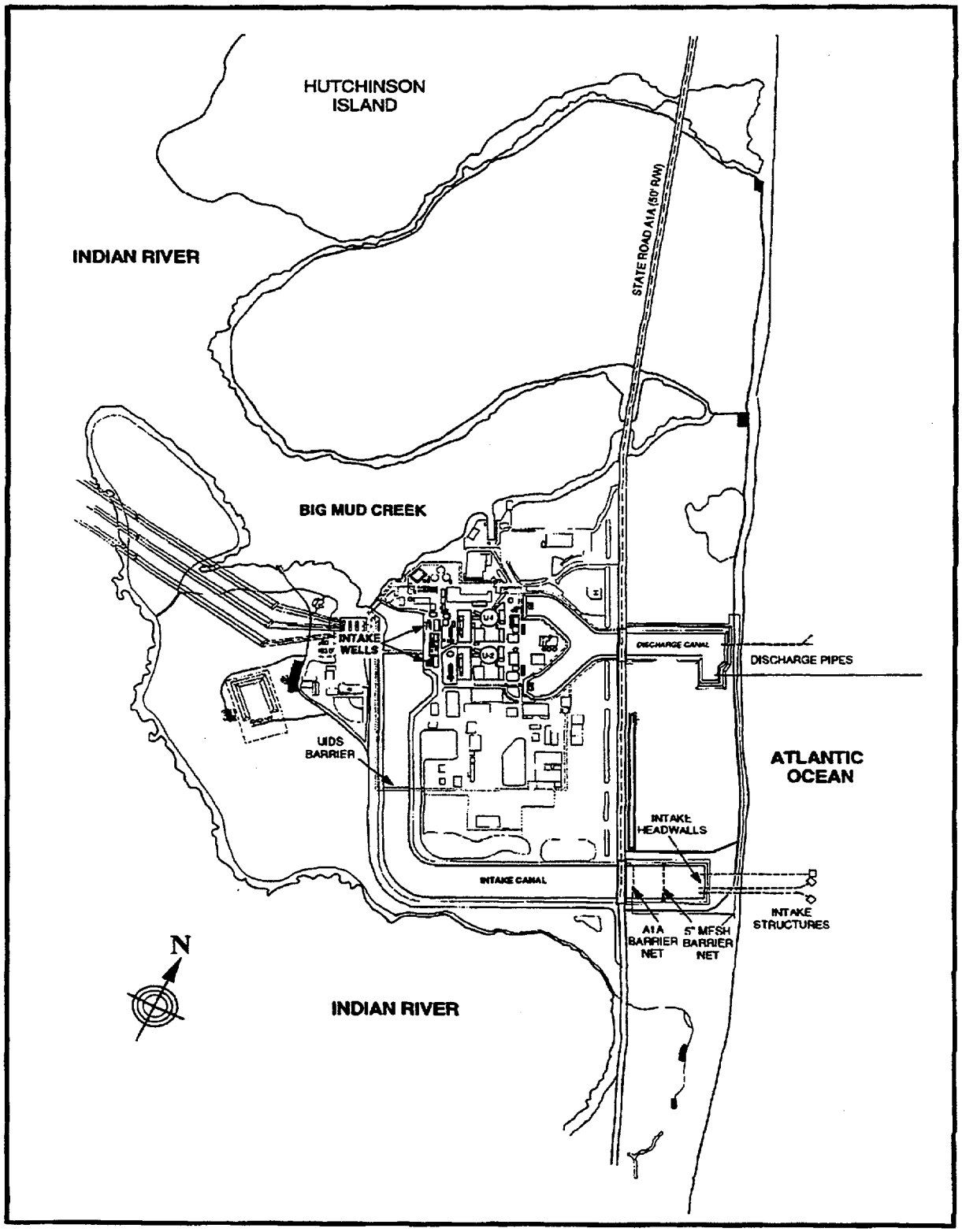


Figure 2. St. Lucie Plant cooling water intake and discharge system

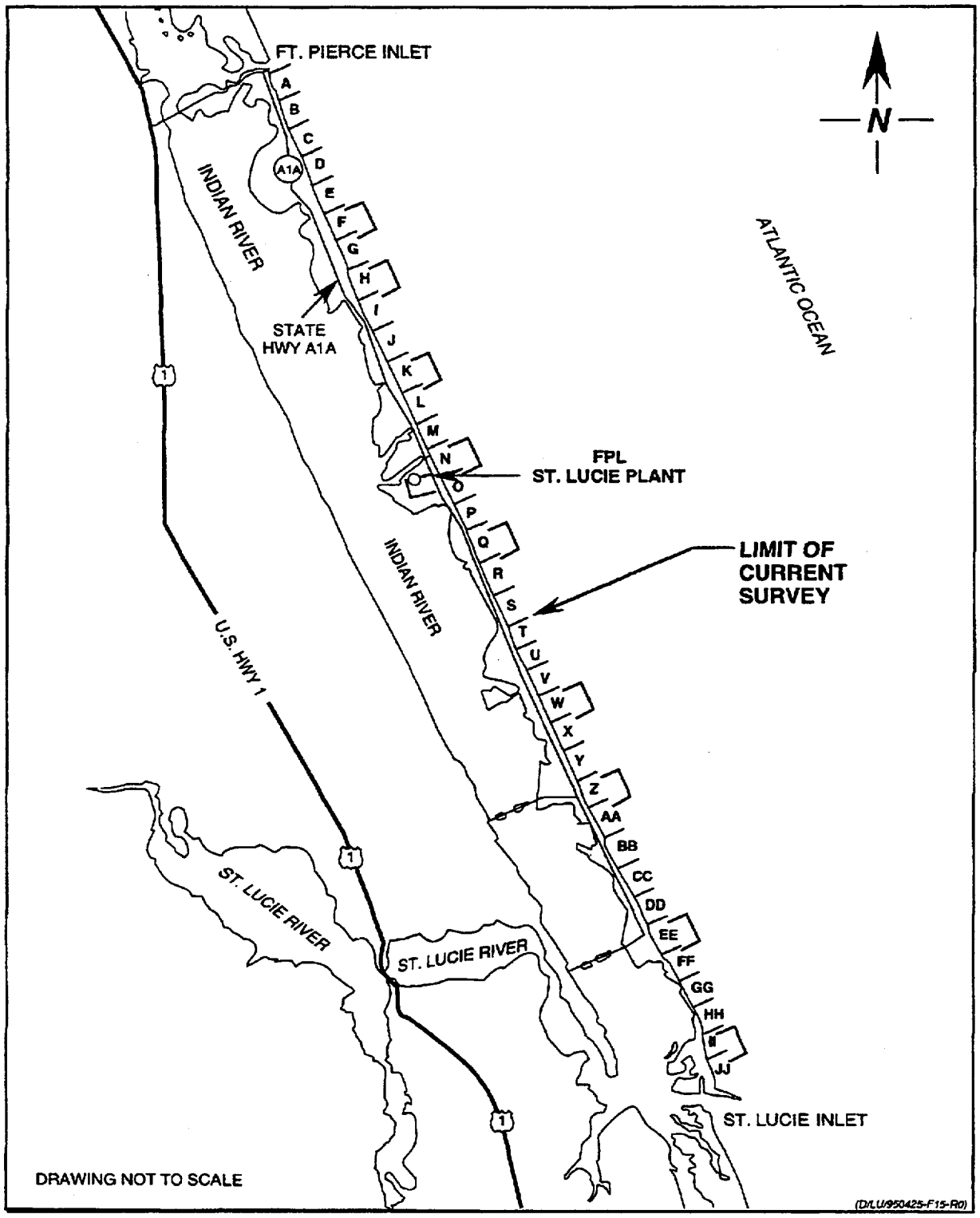


Figure 3. Designation and location of nine 1.25-km segments and thirty-six 1-km segments surveyed for sea turtle nesting, Hutchinson Island, 1971-1992

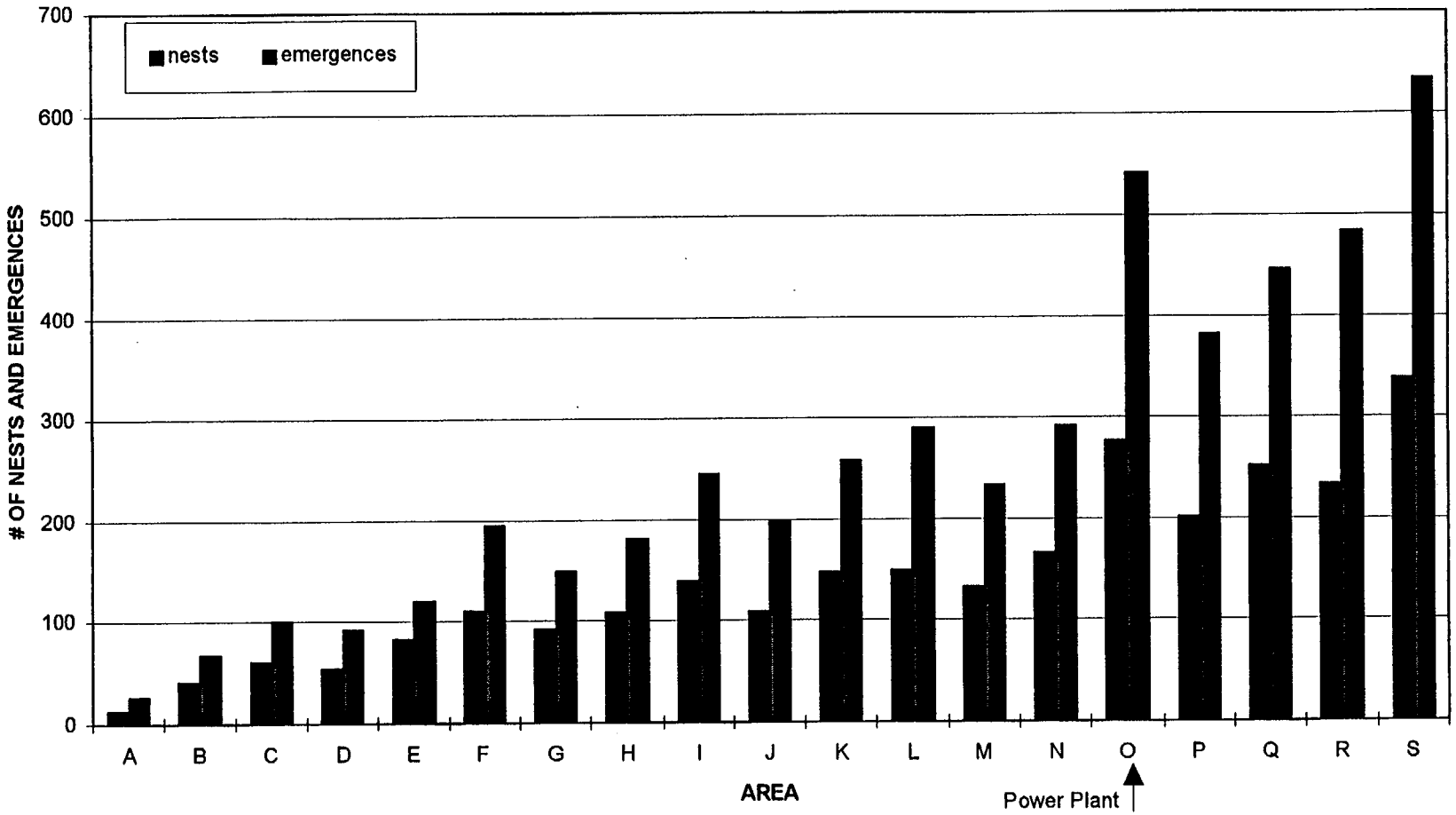


Figure 4. Number of loggerhead turtle nests and emergences for areas A through S, Hutchinson Island, April through September 1997.

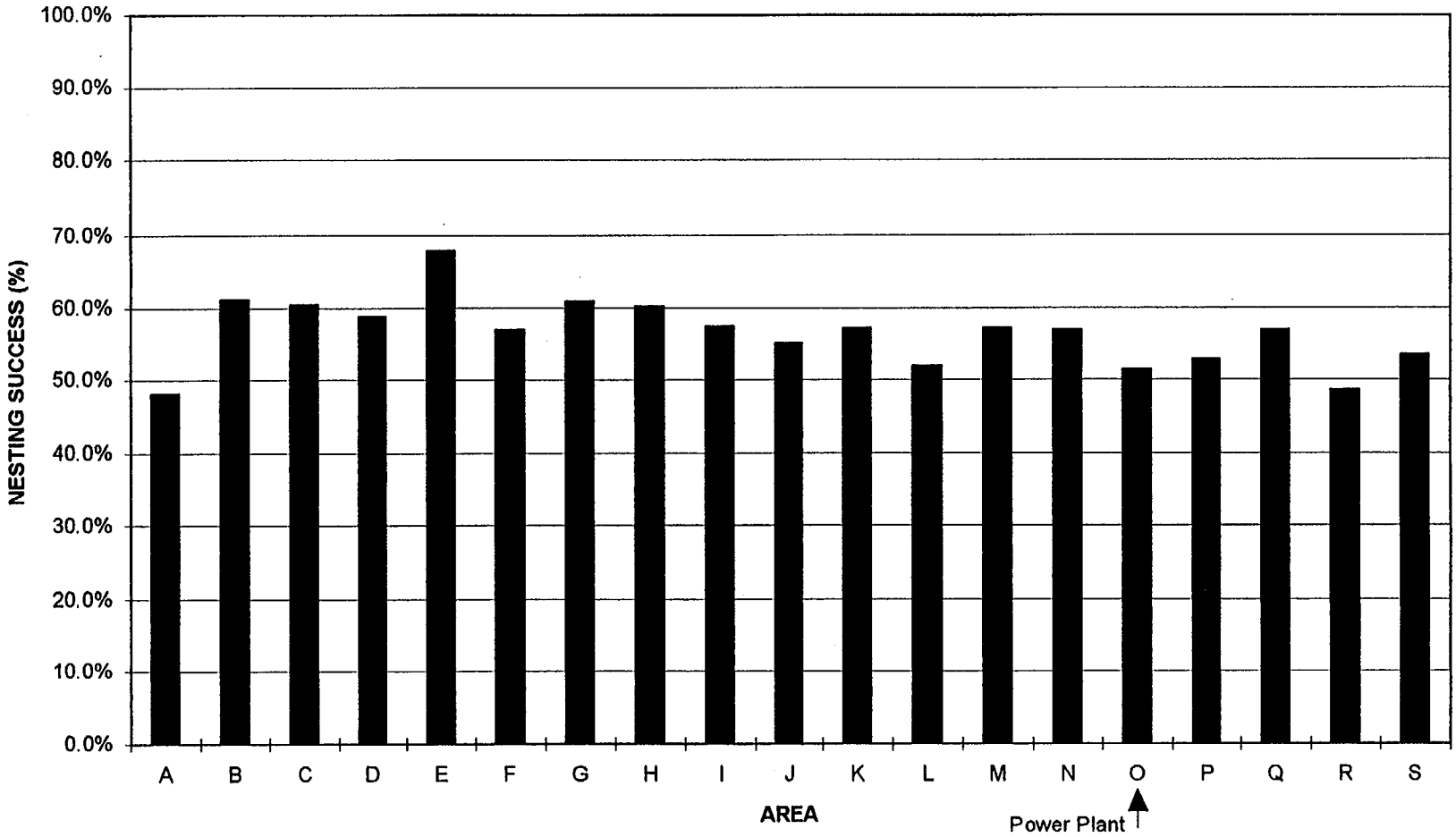


Figure 5. Loggerhead turtle nesting success (percentage results in nests) for areas A through S, Hutchinson Island April through September 1997.

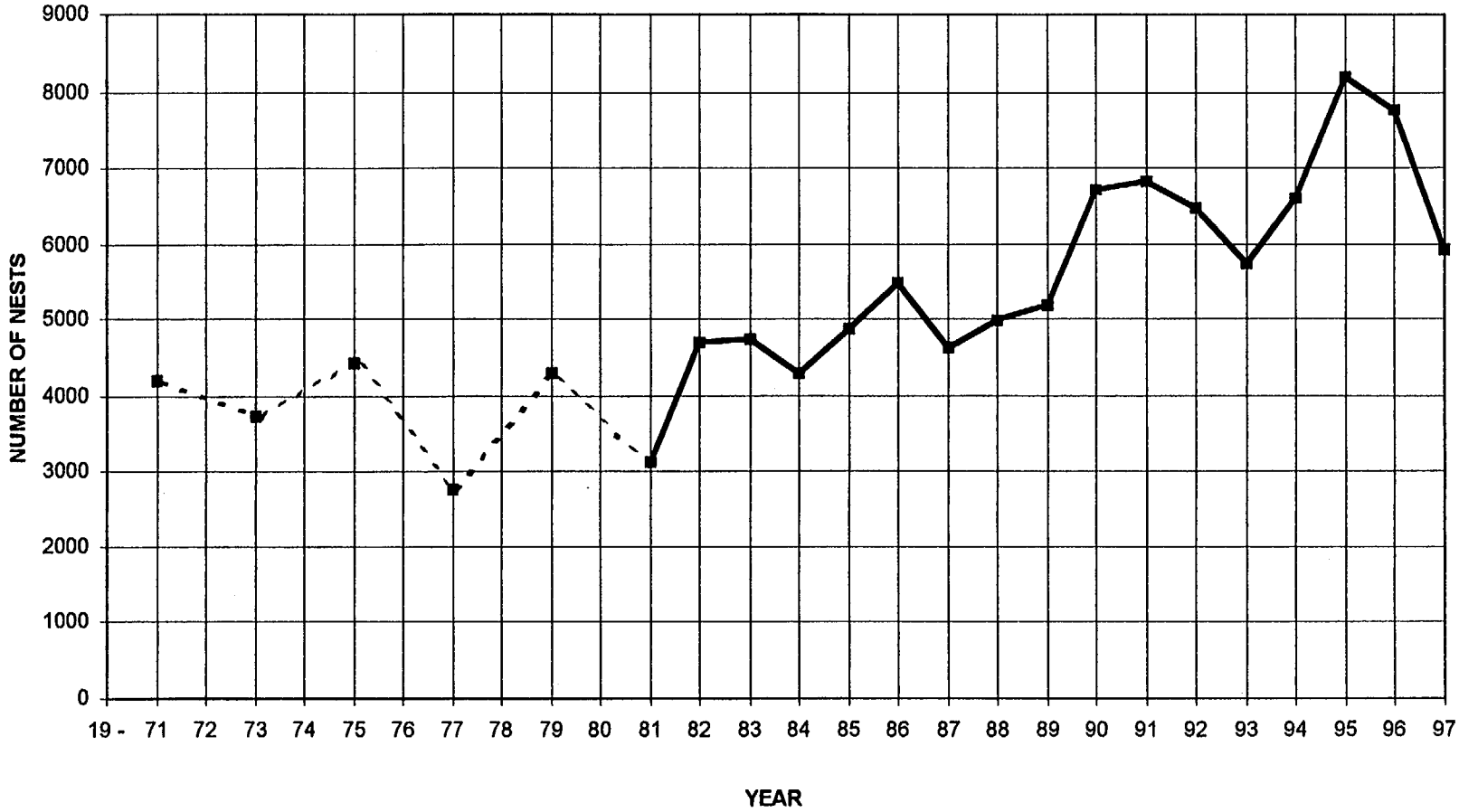


Figure 6. Number of loggerhead turtle nests, Hutchinson Island 1971 through 1997. Values for 1971 through 1979 are estimates (see text), values for 1981 through 1997 are from whole island surveys.

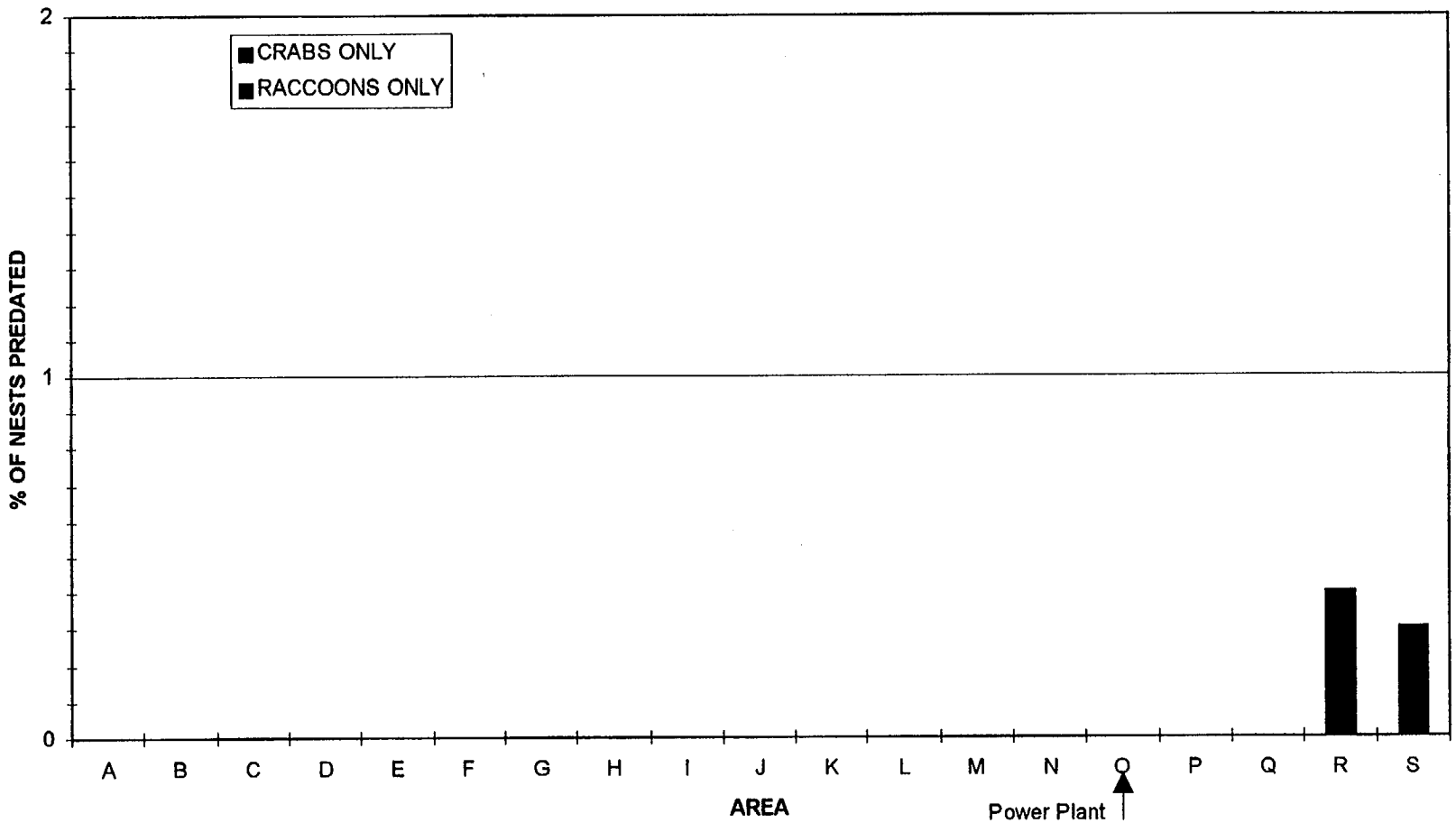


Figure 7. Percentage of loggerhead turtle nests predated by raccoons and/or ghost crabs in areas A through S, Hutchinson Island, April through September 1997.

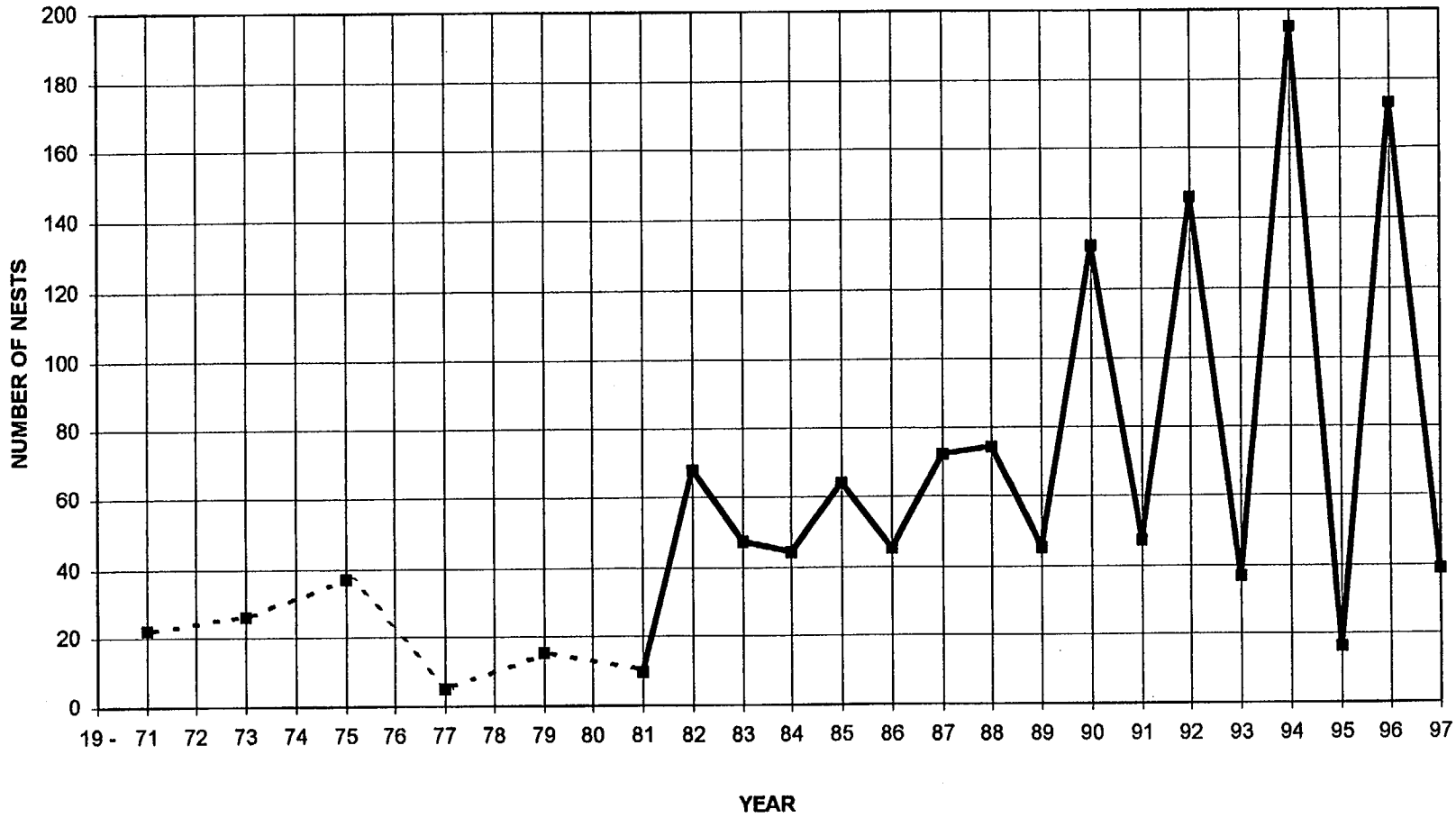


Figure 8. Number of green turtle nests, Hutchinson Island, 1971 through 1997. Values for 1971 through 1979 are estimates (see text). Values for 1981 through 1997 are from whole island surveys.

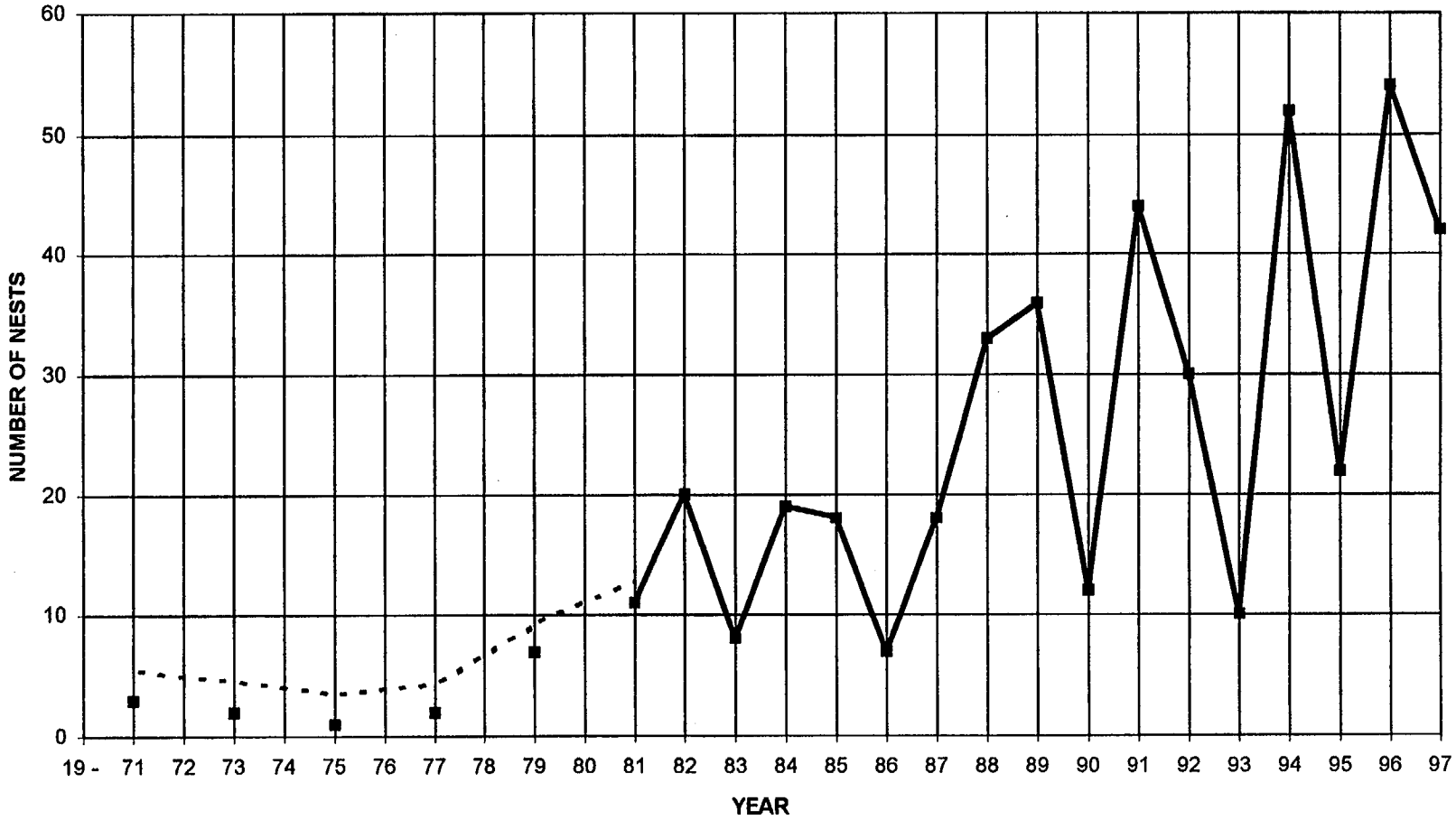


Figure 9. Number of leatherback turtle nests, Hutchinson Island, 1971 through 1979 are estimates (see text). Values for 1981 through 1997 are from whole island surveys.

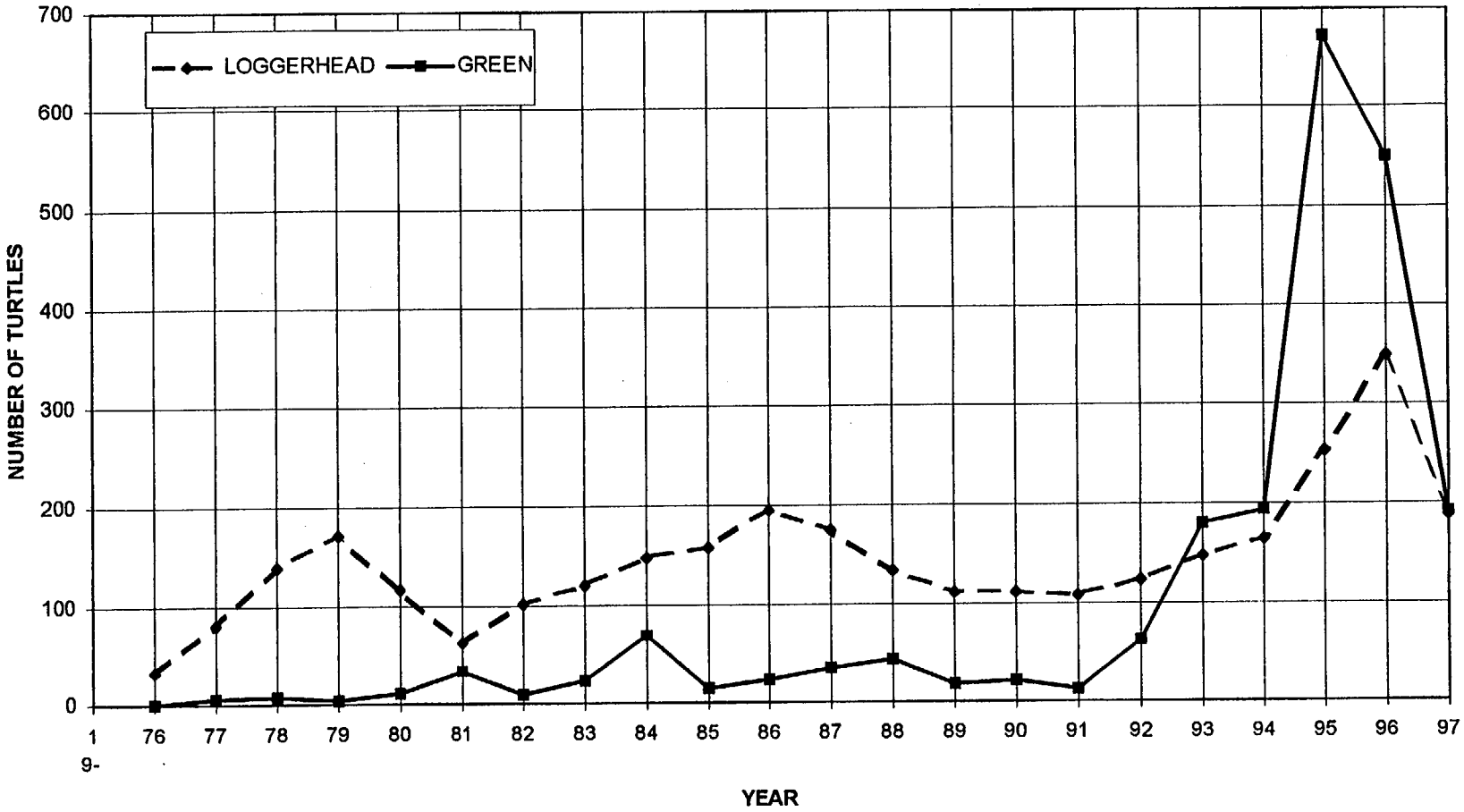


Figure 10. Number of loggerhead and green turtles removed from the intake canal, St. Lucie Plant, 1976 through 1997.

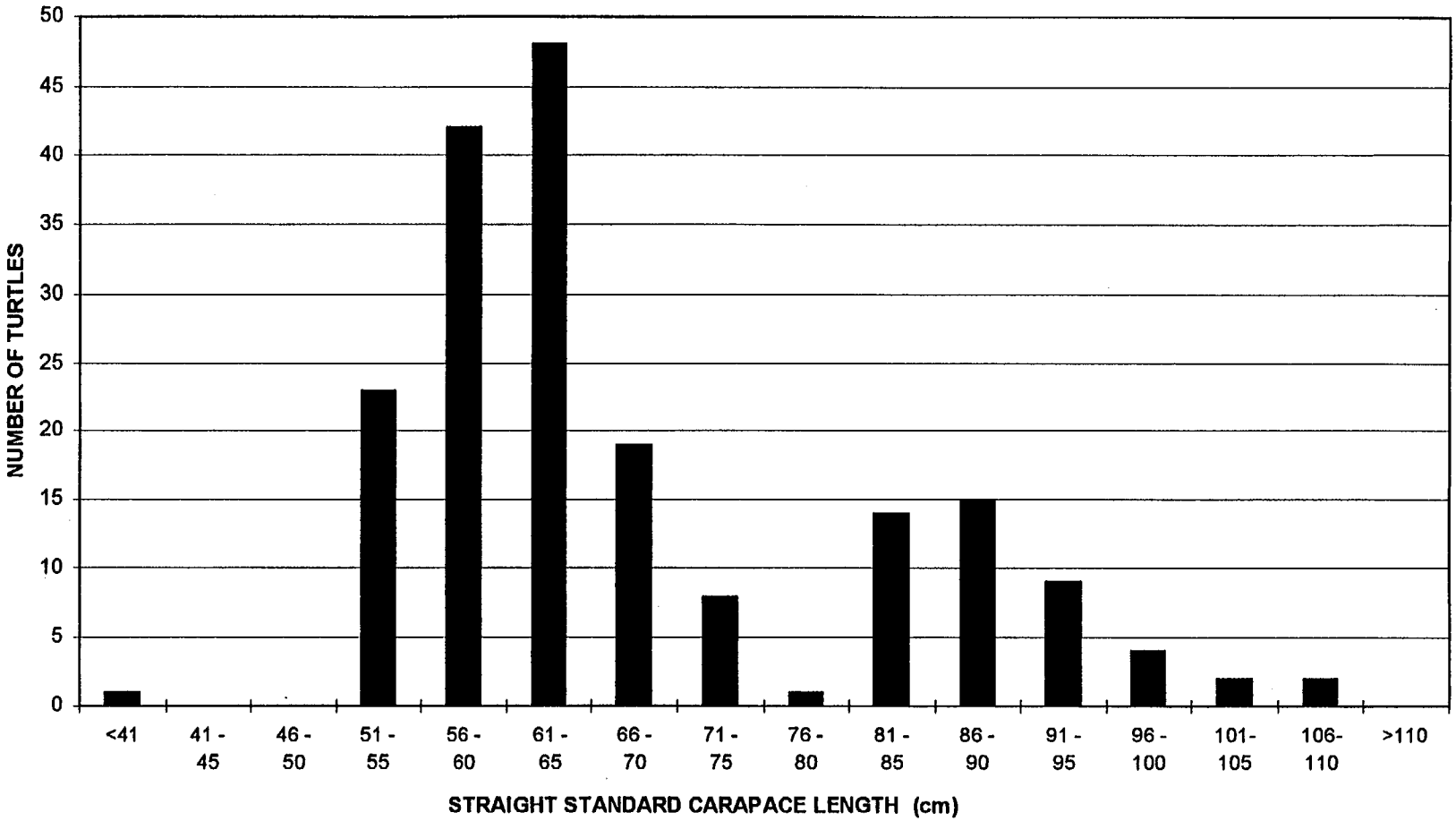


Figure 11. Length distribution (SSCL) of loggerhead turtles (N=188) removed from the intake canal, St. Lucie Plant 1997.

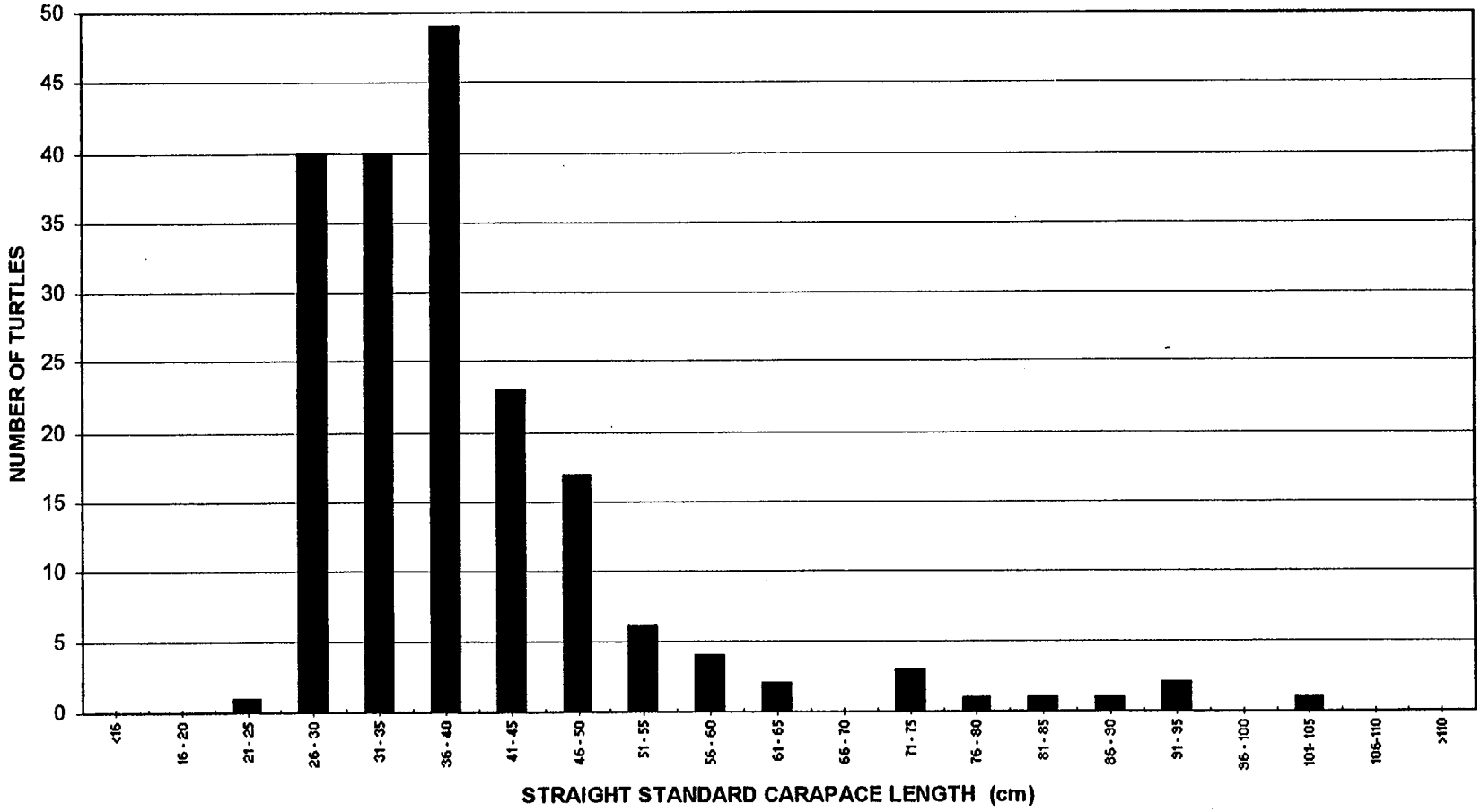


Figure 12. Length distribution (SSCL) of green turtles (N=191) removed from the intake canal, St. Lucie Plant 1997.

YEAR	Species					Total
	loggerhead	green	leatherback	hawksbill	kemp's ridley	
1976	33 (4)					33 (4)
1977	80 (5)	5 (2)	1			86 (7)
1978	138 (19)	6 (1)	3	1		148 (20)
1979	172 (13)	3 (1)				175 (14)
1980	116 (5)	10 (3)				126 (8)
1981	62 (5)	32 (2)	2		1	97 (7)
1982	101 (16)	8	1			110 (16)
1983	119 (4)	23 (4)				142 (8)
1984	148 (3)	69 (2)		1	2	220 (5)
1985	157 (4)	14		1		172 (4)
1986	195 (27)	22 (1)	1	1	1	220 (28)
1987	175 (11)	35		2	6 (2)	218 (13)
1988	134 (6)	42 (2)			5 (2)	181 (10)
1989	111 (4)	17 (1)	1	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)
Total	**3185** (134)	**2164** (52)	**20**	**19**	**32** (4)	**5420** (190)
Annual Mean*	150.1	103.0	1.0	0.9	1.5	256.5

* Excludes 1976 (partial year of plant operation).

Table 1. Total number of captures and (number of dead) turtles removed from the intake canal, St. Lucie Plant, 1976 - 1997.

Month	Number of Captures	Percent of All Captures	Minimum	Maximum	Mean	Standard Deviation	1997
January	385	12.2%	6	39	18.3	9.7	**15**
February	307	9.7%	5	34	14.6	8.1	**32**
March	294	9.3%	1	51	14.0	11.3	**23**
April	317	10.1%	0	44	15.1	10.9	**26**
May	275	8.7%	0	40	13.1	10.1	**18**
June	338	10.7%	3	42	16.1	11.2	**42**
July	348	11.0%	0	87	16.6	18.6	**9**
August	281	8.9%	2	41	13.4	10.7	**6**
September	177	5.6%	1	19	8.4	5.0	**6**
October	166	5.3%	0	17	7.9	5.0	**4**
November	115	3.6%	0	15	5.5	3.8	**1**
December	149	4.7%	1	13	7.1	4.0	**6**
Total	**3152**		**0**	**87**			**188**
Mean					12.5		15.7
Std. Deviation					4.2		12.8

* First full year of plant operation. An additional 33 loggerheads were captured during 1976.

Table 2. Total number of loggerhead turtles removed each month from the intake canal, St. Lucie Plant, 1977* - 1997.

Month	Number of Captures	Percent of All Captures	Minimum	Maximum	Mean	Standard Deviation	1997
January	259	12.0%	0	59	12.3	15.6	25
February	231	10.7%	0	64	11.0	15.7	26
March	340	15.7%	0	147	16.2	36.4	16
April	190	8.8%	0	64	9.0	17.6	29
May	145	6.7%	0	91	6.9	19.8	12
June	121	5.6%	0	52	5.8	12.7	30
July	118	5.5%	0	61	5.6	14.4	9
August	128	5.9%	0	64	6.1	15.2	12
September	138	6.4%	0	77	6.6	18.2	8
October	173	8.0%	0	54	8.2	15.3	13
November	140	6.5%	0	42	6.7	11.0	4
December	181	8.4%	0	68	8.6	16.2	7
Total	2164		0	147			191
Mean					8.6		15.9
Std. Deviation					3.2		9.2

* First full year of plant operation.

Table 3. Total number of green turtles removed each month from the intake canal, St. Lucie Plant, 1997* - 1997.

ANNUAL ENVIRONMENTAL OPERATING REPORT

PART II

INTRODUCTION

The St. Lucie Unit 2 Environmental Protection Plan (EPP) requires 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.

SEA TURTLE MONITORING AND ASSOCIATED ACTIVITIES

Surveillance and maintenance of the light screen to minimize sea turtle disorientation, as required by Section 4.2.4 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. The vegetation line is surveyed for any gaps occurring from mortality, which would result in unacceptable light levels on the beach. 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.

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 24 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 as biocides or chlorine to control biofouling.

Normally, the St. Lucie CTCS utilizes about 1800 sponge balls which are continually recirculated 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 have 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 1997 are presented in Table 1. The largest sponge ball loss for the year occurred in March on Unit 1. This loss has been attributed to infrequent back flushes

which allowed the accumulation of fine seaweed and small clams on the ball strainers. This, in turn, prevented all the sponge balls from being collected prior to strainer back flush. Since the event, ball strainer back flushes have been increased to reduce this type of loss. Including this event, however, estimated sponge ball loss from both units has been only 2.9 balls per day for 1997. Only one sponge ball was found whole in the environment near the plant. Figure 1 indicates that estimated sponge ball loss generally decreased through the period. Average daily ball loss in 1997 was approximately one third of that in 1996 (Figure 2). Performance of the St. Lucie Condenser Tube Cleaning System is constantly monitored and improvements made based on results of this process.

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(a) EPP NONCOMPLIANCES AND CORRECTIVE ACTIONS TAKEN

No noncompliances under EPP Section 5.4.1(a) were determined to have occurred during 1997.

5.4.1(b) CHANGES IN STATION DESIGN OR OPERATION, TESTS, AND EXPERIMENTS IN ACCORDANCE WITH EPP SUBSECTION 3.1

No plant site activities were determined to be reportable under Section 5.4.1.(b) during 1997.

Two courtesy transmittals were made in regard to the St. Lucie County South Hutchinson Island Water Reclamation Facility which was constructed to discharge reuse quality effluent into the St. Lucie Plant discharge canal under it's own Florida Department of Environmental Protection (FDEP) Wastewater Permit. FPL letter L-97-91 transmitted the facility's Wastewater Permit application on March 26, 1997, and FPL letter L-97-204 transmitted the facility's Wastewater Permit for operation on August 7, 1997.

FPL letter L-97-267 transmitted the request for modification to FDEP to delete the St. Lucie Plant's Sewage Treatment Plant (Unit 1) discharge from the St. Lucie Wastewater Permit when the site connected its sanitary sewers to the county facility. This letter was transmitted October 17, 1997.

5.4.1(c) NONROUTINE REPORTS SUBMITTED TO THE NRC FOR THE YEAR 1997 IN ACCORDANCE WITH EPP SUBSECTION 5.4.2

1. Report concerning the mortality of two green sea turtles on June 14 and June 30, 1997. Deaths were related to algae accumulation on the five inch barrier net and fishing line entanglement, respectively. Events were reported to NRC by FPL letter L-97-172 on July 7, 1997.

2. Report concerning an exceedence of the Wastewater (formerly NPDES) Permit minimum $CBOD_5$ percent removal for sewage treatment plant effluent on September 12, 1997; reported to the NRC by FPL letter L-97-266 on October 17, 1997.

3. Report concerning entrapment of a West Indian Manatee in the plant's intake canal on December 14, 1997, reported to NRC by FPL by FPL letter L-98-003 on January 8, 1998.

TABLE 1
1997 ST. LUCIE PLANT CONDENSER TUBE CLEANING
SYSTEM SUMMARY

MONTH	STRAINER BACK FLUSHES UNIT 1	STRAINER BACK FLUSHES UNIT 2	ESTIMATED BALL LOSS UNIT 1	ESTIMATED BALL LOSS UNIT 2	BALLS FOUND ON BEACH
January	4	5	19	58	0
February	4	6	0	25	0
March	4	2	355	51	0
April	4	6*	23	3*	0
May	4	0	40	83	0
June	4	0	12	0	0
July	9	12	57	90	1^
August	5	9	12	39	0
September	9	8	135	101	0
October	6**	8	11**	29	0
November	0	13	0	+38***	0
December	0	10	0	+63***	0
Total	53	79	664	378	1^

* Unit 2 system shutdown during refueling, 4/11 - 5/28.
** Unit 1 system shutdown during refueling, 10/17 through the end of the year.
*** Net gain in inventory.
^ Originally not believed to be from St. Lucie Plant.

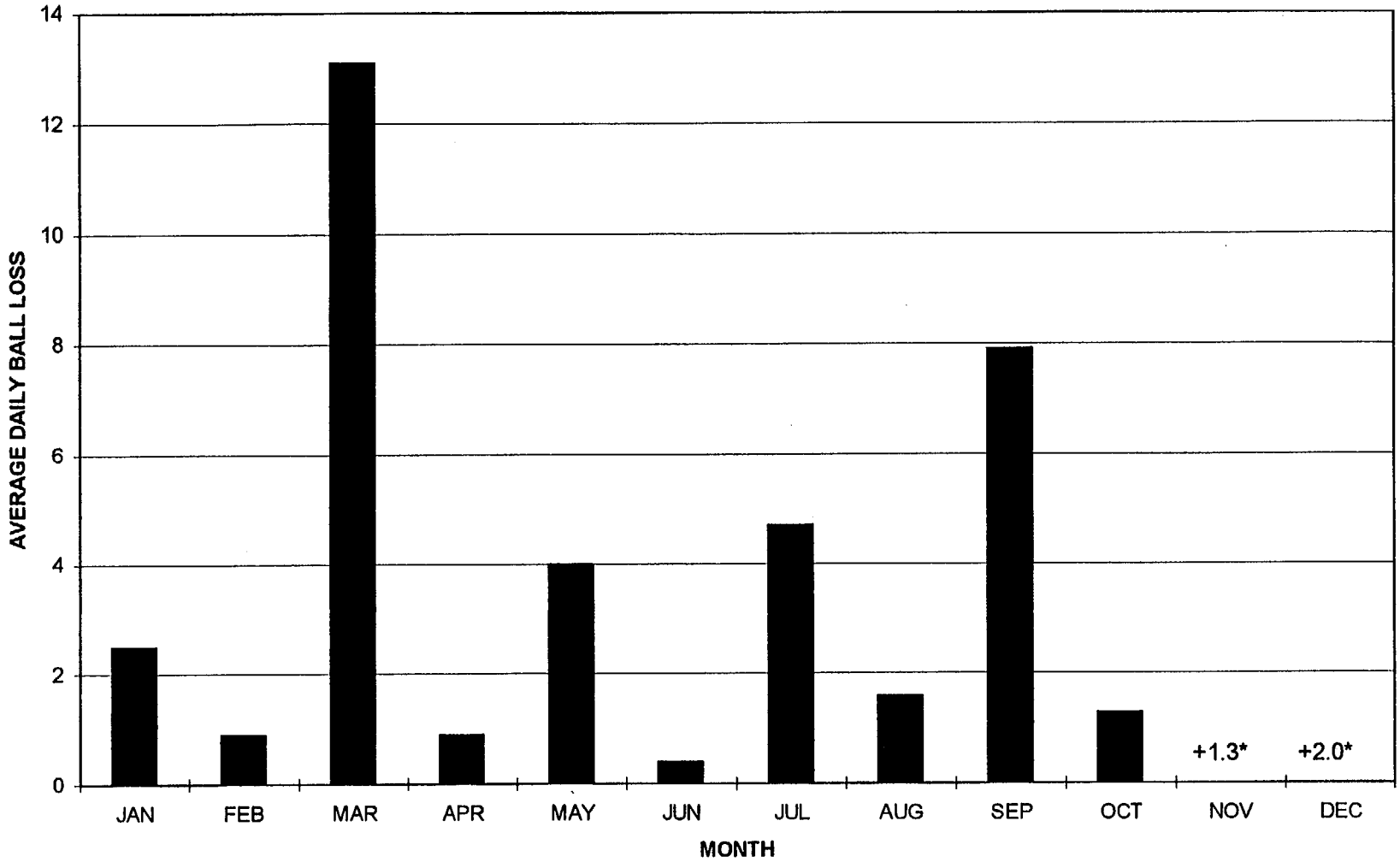


Figure 1. Estimated average daily sponge ball loss by month from the St. Lucie Plant (both units) for 1997.

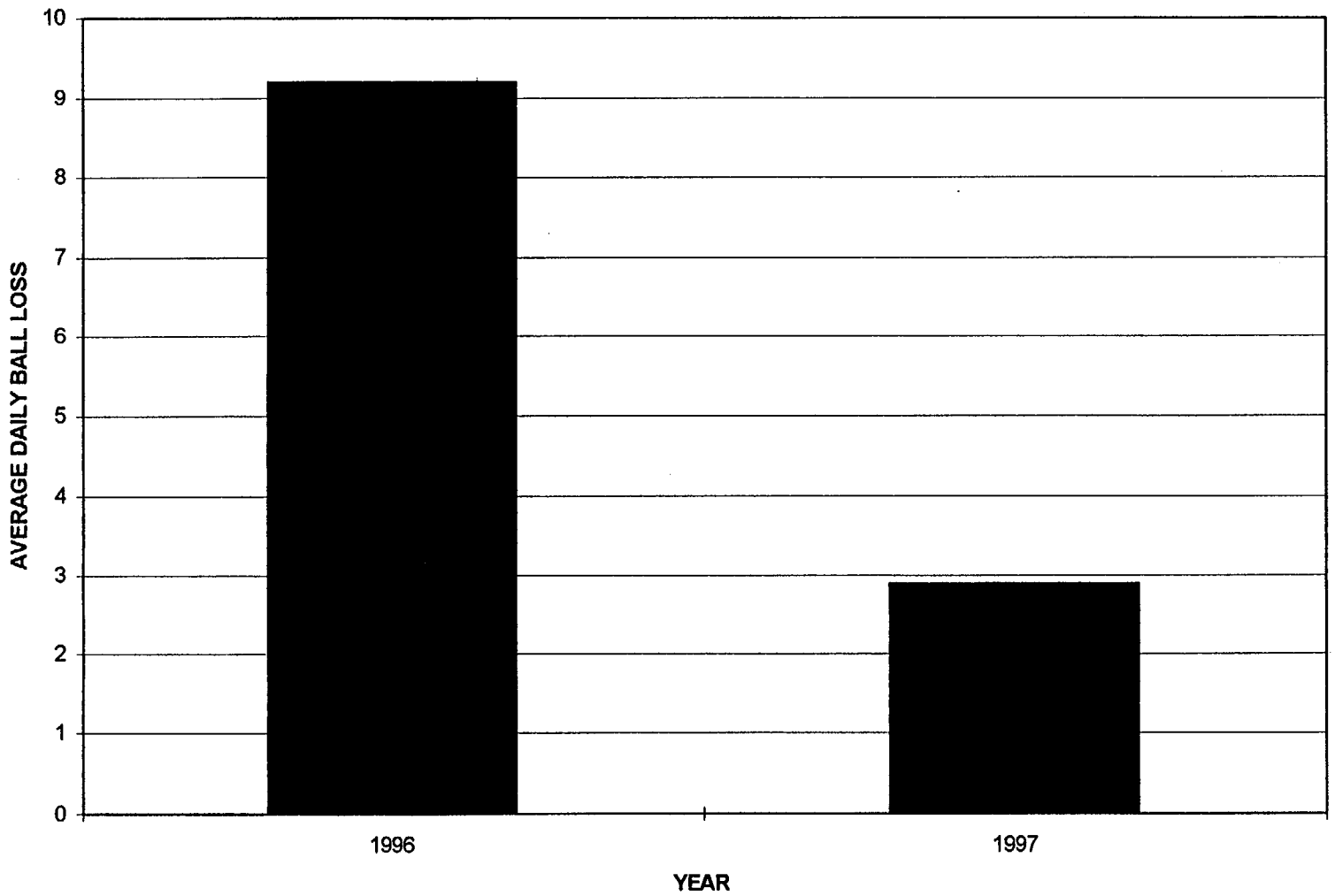


Figure 2. Average daily ball loss from St. Lucie Plant (both units) since system start-up (January 1996)

T. Johnson

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001
February 9, 1998

LICENSEE: Florida Power and Light Company

FACILITY: St. Lucie, Units 1 and 2

SUBJECT: SUMMARY OF MEETING ON JANUARY 20, 1998, REGARDING ENVIRONMENTAL PROTECTION PROGRAM FOR SEA TURTLES - ST. LUCIE UNITS 1 AND 2

On January 20, 1998, a meeting was held between representatives of the National Marine Fisheries Service (NMFS), Florida Department of Environmental Protection (FDEP), Nuclear Regulatory Commission (NRC) and Florida Power and Light Company (FPL), licensee for St. Lucie Plant, Units 1 and 2, to discuss endangered and threatened species information and developments at the St. Lucie site. This meeting was the initial meeting of planned biennial series of meetings to review the status of the environmental protection of sea turtles. This meeting was also an opportunity to discuss incorporation of the provisions of the NMFS Incidental Take Statement (ITS), which is part of the biological opinion issued by NMFS on February 7, 1997, into the Appendix B Environmental Protection Plan (EPP) of the St. Lucie operating licenses, as requested by NRC in a letter to FPL dated May 30, 1997. Enclosure 1 is an attendance list for the meeting. Enclosure 2 includes copies of the meeting handouts.

The licensee presented an overview of the general cooling water systems and associated turtle protection features. Data was presented and discussed concerning sea turtle captures, performance of the turtle net and monitoring of the condenser tube cleaning (Taprogge) system balls. Capture data indicated that the numbers of turtles entering the intake canal may be returning to lower levels after a significant increase during the past 2 years. However, more data would be needed to confirm this trend. The licensee provided data to show that a new 5-inch mesh turtle barrier net (which the licensee installed between the intake headwall and the existing 8-inch barrier net) was performing very well in containing turtles after improvements in net monitoring were implemented. The operation of the Taprogge condenser tube cleaning system was described, including the monitoring of the loss of cleaning balls used in the system. The licensee indicated that as their experience in operating the system has increased, the number of lost balls had significantly decreased, but due to the nature of the system, could not be totally eliminated.

After these discussions, proposed changes to the terms and conditions of the NMFS ITS were presented by the licensee. These changes fell into four categories: (1) changes to the intake well inspection frequency; (2) changes to the reporting frequency; (3) definition of the phrase "causal to plant operation" (with respect to determination of sea turtle mortalities); and, (4) requirement for a study of turtle behavior at the intake structure.

The licensee stated that due to the performance demonstrated to date of the 5-inch barrier net to prevent turtle passage to the area of the intake wells, inspections of the intake wells at frequent intervals for the specific purpose of detecting turtles were unnecessary. The licensee stated that inspections as part of routine operator (once per shift, or three times a day) and

A/19

security rounds (approximately every 2 hours) were sufficient for the purpose of ensuring that an infrequent turtle entry would be identified. The NMFS and FDEP representatives indicated that although it was not necessary to include a required specific number of inspections per day in the EPP, a requirement was desirable that intake well inspections would be conducted. It was agreed that the ITS would be modified to indicate that the licensee would have a program to inspect the intake well, with the details of the program, including the number of daily inspections, to be contained in plant procedures.

The licensee proposed to eliminate a required monthly report to FDEP on Taprogge condenser tube cleaning system ball losses and the results of barrier net inspections and maintenance. This information would be included in the annual report submitted to NMFS, a copy of which the licensee would also send to FDEP. FPL proposed that a significant Taprogge ball loss would be considered an unusual environmental event and would be reported to the NRC in a 72-hour report and a follow-up 30-day written report, with copies to NMFS and FDEP. The NMFS and FDEP representatives agreed that this was an acceptable change.

FPL proposed that a stranding of a turtle in the intake canal due to injury or illness not caused by plant operation not be counted against the authorized level of lethal takes in the ITS. The NMFS representative indicated that the limits in the ITS included consideration for turtle mortalities in the intake canal not causal to plant operations and that by doing so, provided authorization for all incidental takes up to the limit without the risk of subsequent reversal of an FPL determination of whether a mortality was indeed a stranding. The licensee was concerned about the need for frequent changes to the lethal take limits in the license (should the limits be incorporated in the Appendix B EPP) as accumulated data dictates changes to these limits. It was agreed by all attendees that significant flexibility was needed to allow future updating of these limits. It was proposed that the limits not be directly included in the licensee, but rather be referenced, such that the limits can be revised as necessary by letter request. The NRC representatives agreed to discuss the acceptability of this approach with the NRC legal counsel.

A condition in the ITS requires the licensee to propose a study at the intake structure on the behavior of sea turtles, and suggests a video study as an example. The licensee proposed to defer a decision on the need for this study until the next biennial meeting in order to gather more data on turtle captures. The NMFS representative indicated that there was a need for this study, even if the number of turtle captures returned to previous levels. Responding to licensee concerns on the potential cost of implementing actions as a result of any study, and the cost and difficulties of a video study, he indicated that even if the study indicated ways to prevent turtle entry, such methods would be evaluated against costs, the number of turtles being captured, and the benefit of the scientific data gained by the turtle captures. He also indicated that although a video study was cited as an example, other studies may be acceptable. An analysis of existing FPL data on turtle captures was suggested by a FDEP representative as a possible alternative study. The FPL St. Lucie licensing representative stated that licensee management was strongly opposed to any further studies considering the activities already supported by FPL to protect and gather data on turtle in the intake canal.

The NMFS representative stated that he would develop a supplement to the ITS to reflect the changes to the intake well inspection requirements and the reporting requirements discussed above. After discussions with his management, he will include a revised schedule for the

submittal of a proposed study and any revision to the study scope agreed to by his management.

A tour of the intake head wall, barrier nets and intake canal concluded the meeting. All in attendance indicated that it was a very informative and useful meeting.

L. A. Wiens, Senior Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-335 and 50-389

Enclosures: 1. Attendance List
2. Handouts

cc: See next page

Florida Power and Light Company

Senior Resident Inspector
St. Lucie Plant
U.S. Nuclear Regulatory Commission
7585 S. Hwy A1A
Jensen Beach, Florida 34957

Joe Myers, Director
Division of Emergency Preparedness
Department of Community Affairs
2740 Centerview Drive
Tallahassee, Florida 32399-2100

M. S. Ross, Attorney
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

John T. Butler, Esquire
Steel, Hector and Davis
4000 Southeast Financial Center
Miami, Florida 33131-2398

Mr. Douglas Anderson
County Administrator
St. Lucie County
2300 Virginia Avenue
Fort Pierce, Florida 34982

Mr. Bill Passetti
Office of Radiation Control
Department of Health and
Rehabilitative Services
1317 Winewood Blvd.
Tallahassee, Florida 32399-0700

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
61 Forsyth Street, SW., Suite 23T85
Atlanta, GA 30303-3415

H. N. Paduano, Manager
Licensing & Special Programs
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

ST. LUCIE PLANT

J. A. Stall, Site Vice President
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

J. Scarola
Plant General Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. Kerry Landis
U.S. Nuclear Regulatory Commission
61 Forsyth Street, SW., Suite 23T85
Atlanta, Georgia 30303-3415

Mr. T. F. Plunkett
President - Nuclear Division
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

E. J. Weinkam
Licensing Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. David Bernhart
National Marine Fisheries Service
Southeast Region
Protected Species Division
9721 Executive Center Drive North
St. Petersburg, FL 33702

Ms. Barbara Schroeder
National Marine Fisheries Service
Office of Protected Resources
Endangered Species Division
1315 East-West Highway
Silver Spring, MD 20910

Blair Witherington
Beth Morford
Florida Department of
Environmental Protection
19100 SE. Federal Highway
Tequesta, FL 33469

MEETING OF JANUARY 20, 1998

SUBJECT: ENVIRONMENTAL PROTECTION PROGRAM FOR SEA TURTLES

LIST OF ATTENDEES

NAME	ORGANIZATION
George Madden	FPL-LIC
Gary Bouska	FPL-LU
Jonathan Gorham	Quantum/FPL/LU
Melinda Malloy	NRC/NRR
Claudia M. Craig	NRC/NRR
Winifred Perkins	FPL-Envir. Services
David Bernhart	NMFS
Beth Morford	FDEP
Nick Whiting	FPL-PS
Len Wiens	NRC\NRR
Dennis Fadden	FPL-Services Manager
Blair Witherington	FDEP

Enclosure 1

SEA TURTLE MEETING

JANUARY 20, 1998

Enclosure 2

AGENDA

FIRST BIENNIAL SEA TURTLE MEETING

JANUARY 20, 1998

10:00 INTRODUCTION

10:30. UPDATES ON SEA TURTLE PROGRAM

GENERAL SYSTEM ARRANGEMENT
1997 SEA TURTLE STATISTICS
BARRIER NET MAINTENANCE
TAPPROGE SYSTEM PERFORMANCE
STATE PERMIT CONDITIONS RENEWAL
DISCUSSION OF NRC LICENSE

11:30 PROPOSED CHANGES TO TERMS AND CONDITIONS

4.2.2.2(6)	INTAKE WELL INSPECTION CHANGES
4.2.2.2(7)	STUDY- HELD IN ABEYANCE
4.2.22(8)	CAUSAL TO PLANT OPERATIONS & DEFINITION
4.2.2.2(10)	CHANGES TO THE REPORTING REQUIREMENTS

12:30 LUNCH & TOUR

2:00. STUDY

3:00 SUMMARY & CONCLUSIONS

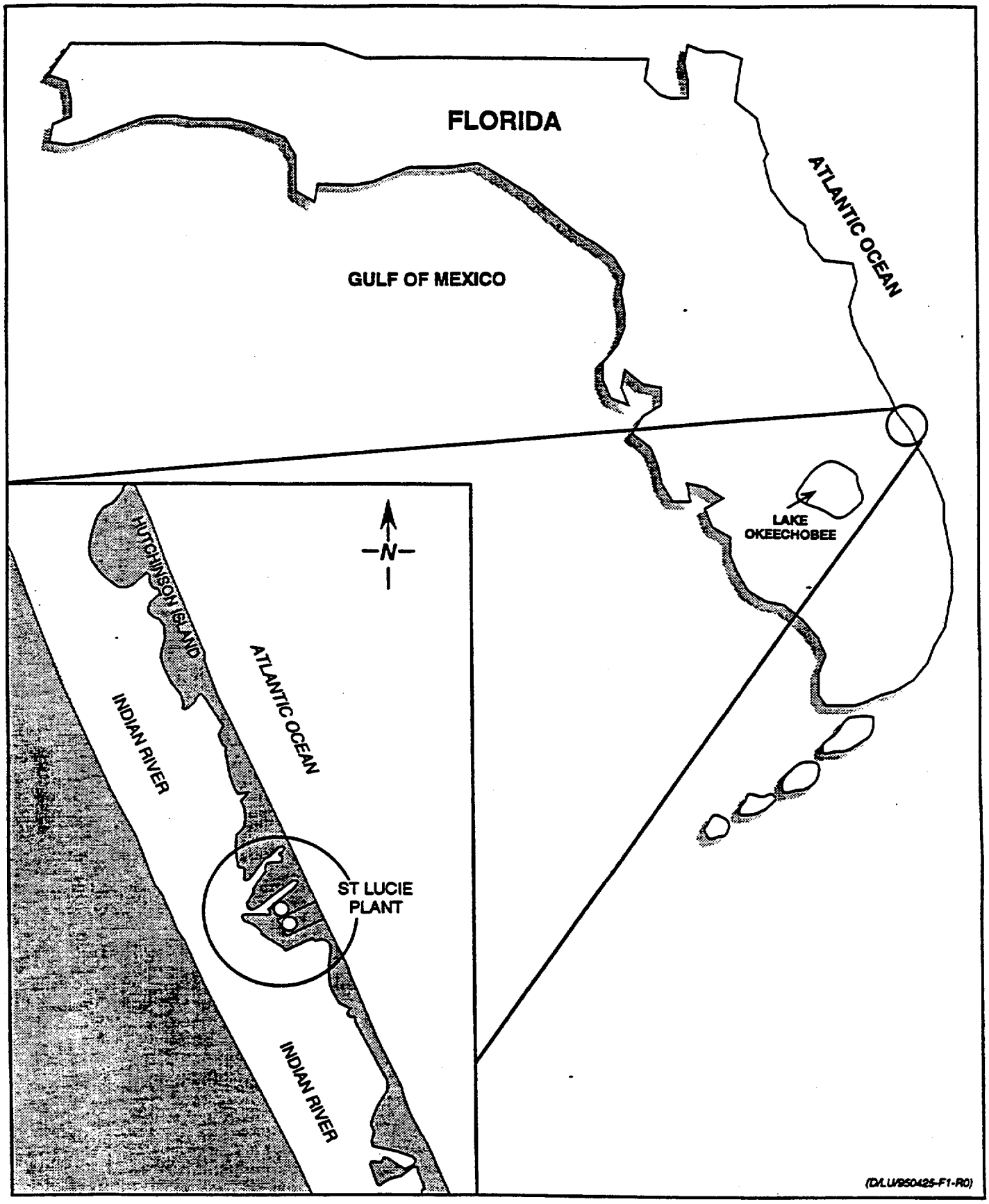


Figure 1. Location of the St. Lucie Plant on the east coast of Florida. The plant is located on South Hutchinson Island, a barrier island, and is about 7 miles (11.3 km) south of Ft. Pierce and about 7 miles (11.3 km) north of Stuart.

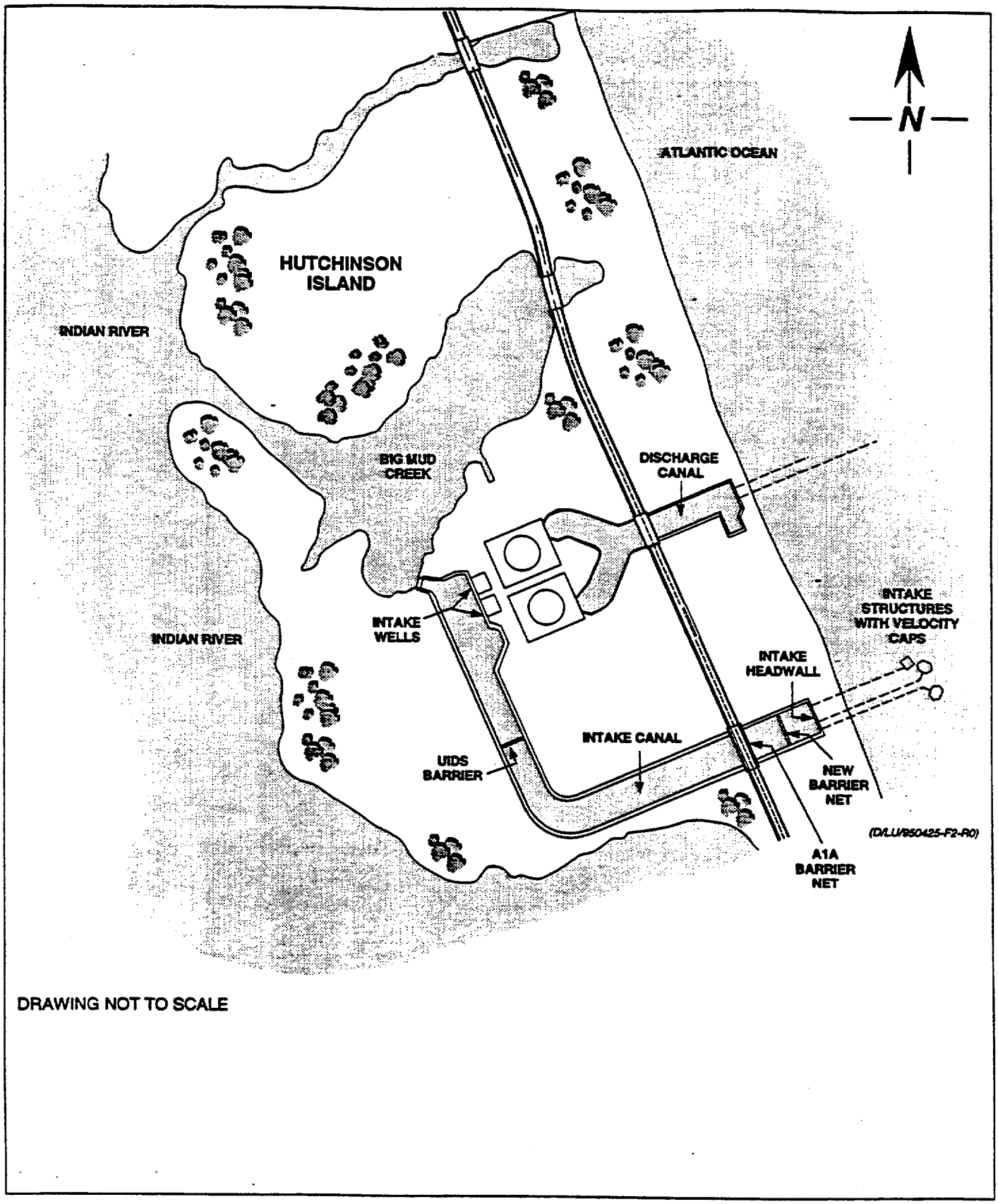


Figure 2. Design of the St. Lucie Plant showing the relationship between Units 1 and 2 and the configuration of the cooling water intake and discharge system with key features labeled.

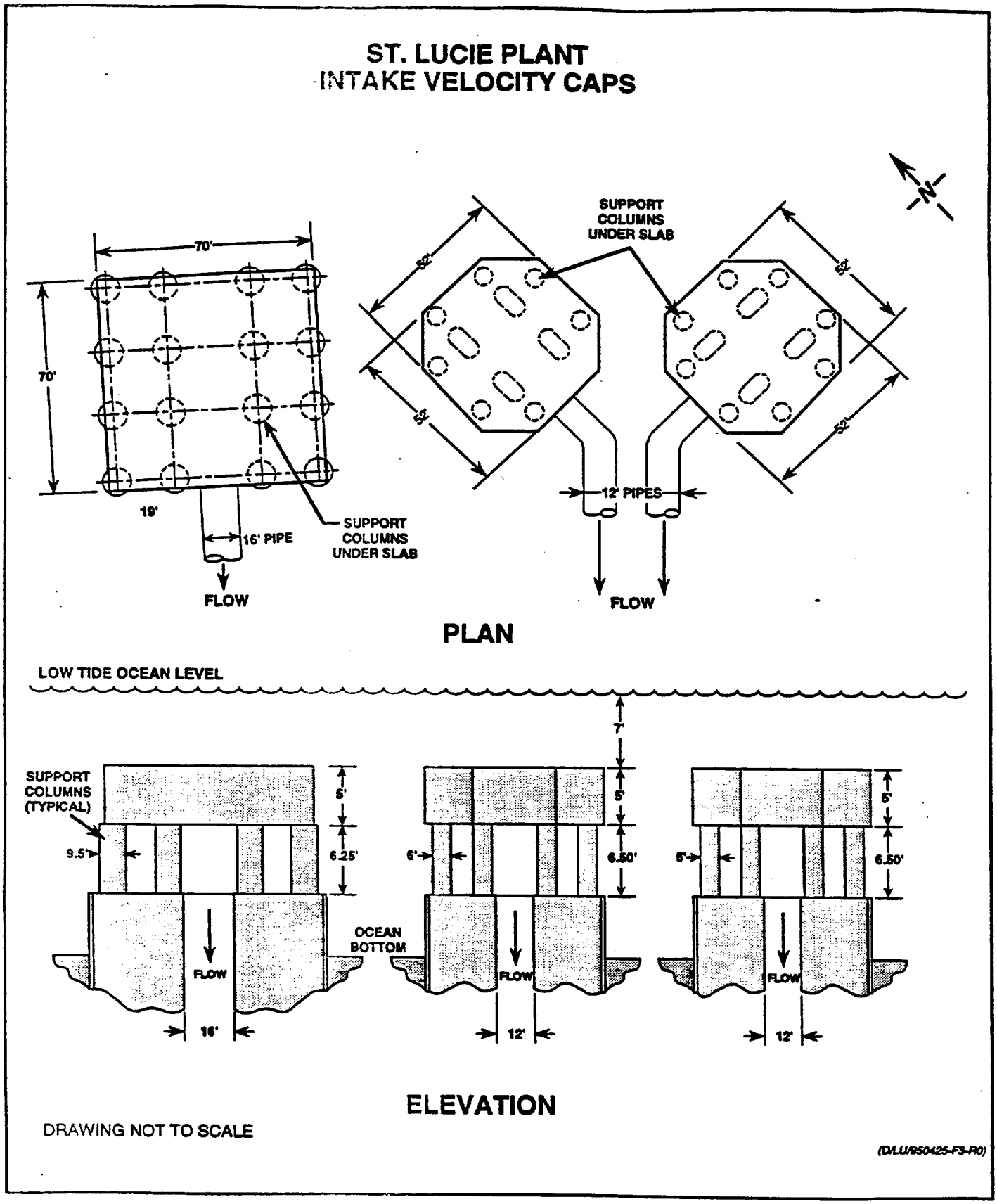


Figure 3. Diagram of the intake structures located 1200 feet (365 m) offshore of the shoreline at the St. Lucie Plant.

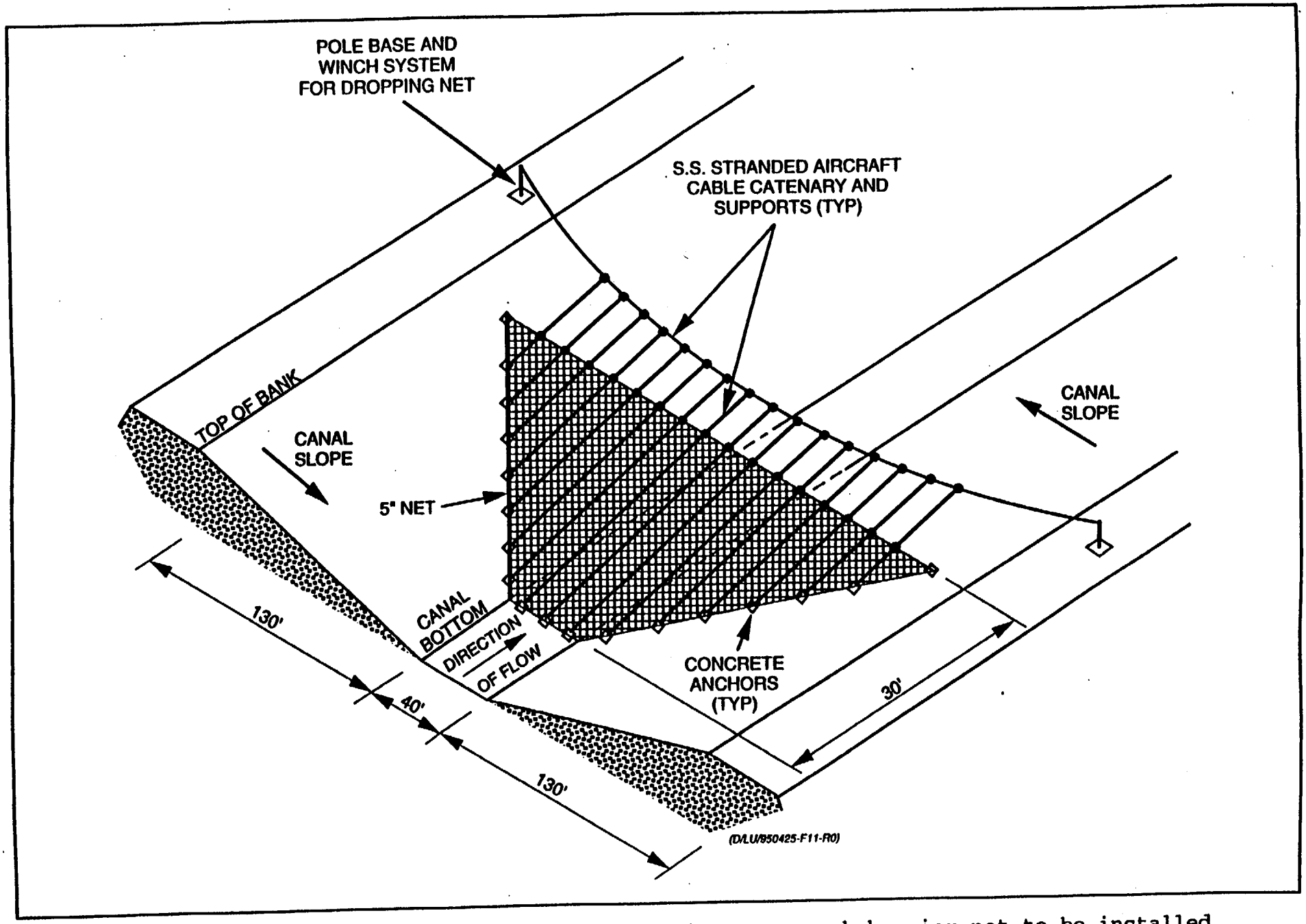


Figure 11. Conceptual design for a 5 inch (12.7 cm) square mesh barrier net to be installed in the intake canal of the St. Lucie Plant.

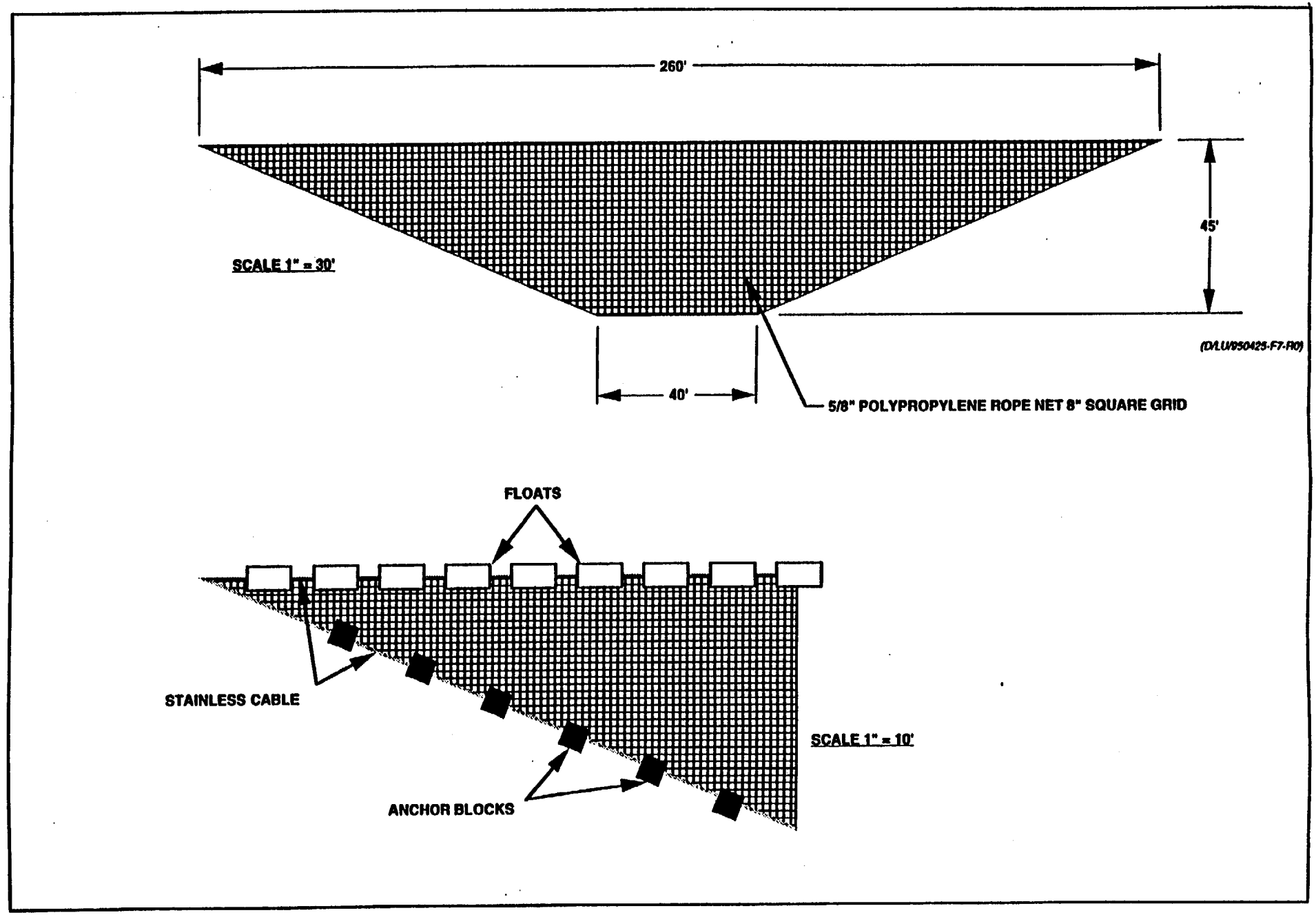


Figure 7. Diagram of the turtle barrier net used in the intake canal of the St. Lucie Plant. This net is located at the A1A bridge (see Figure 2)

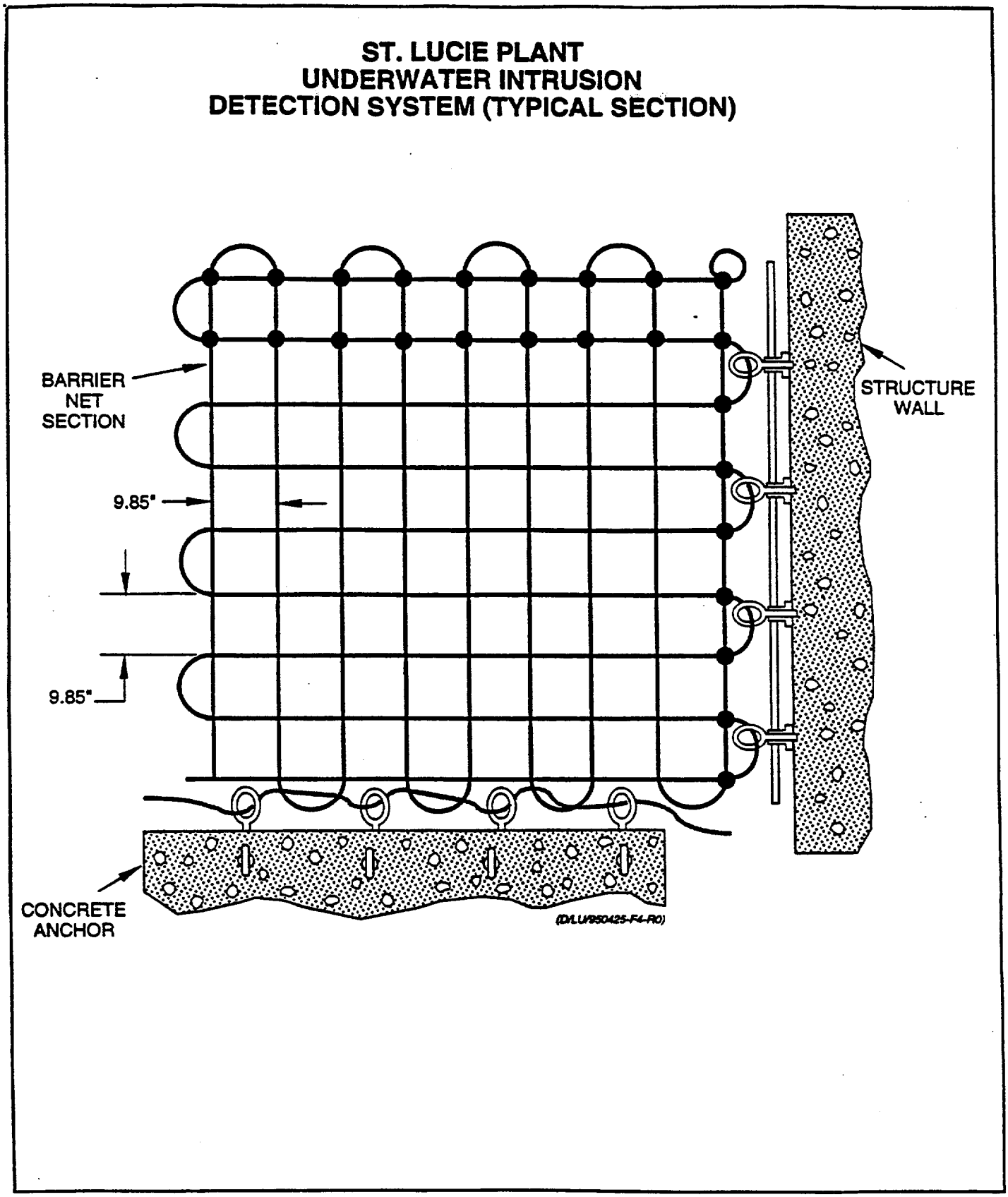


Figure 4. Diagram of the Underwater Intrusion Detection System at the St. Lucie Plant.

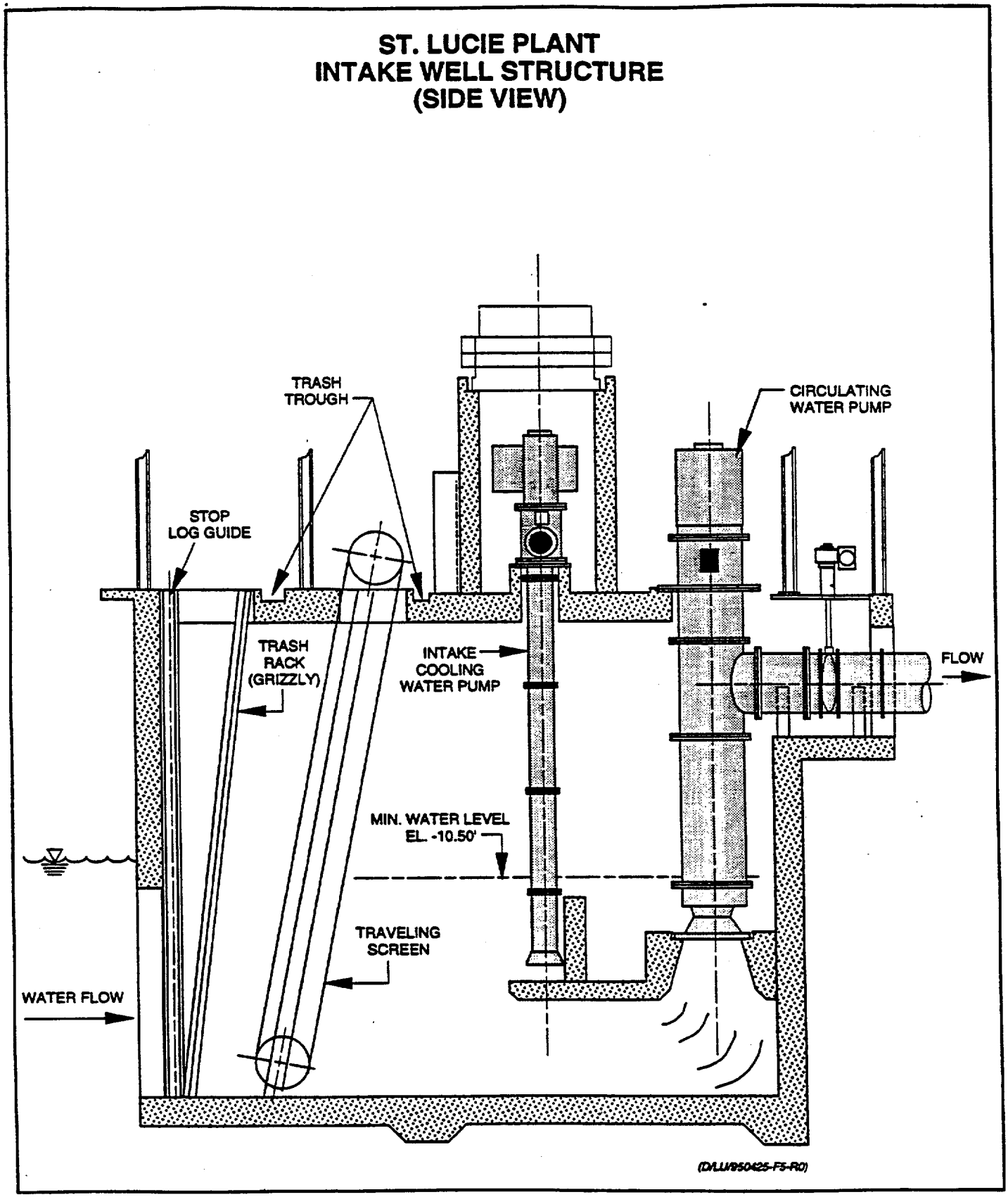
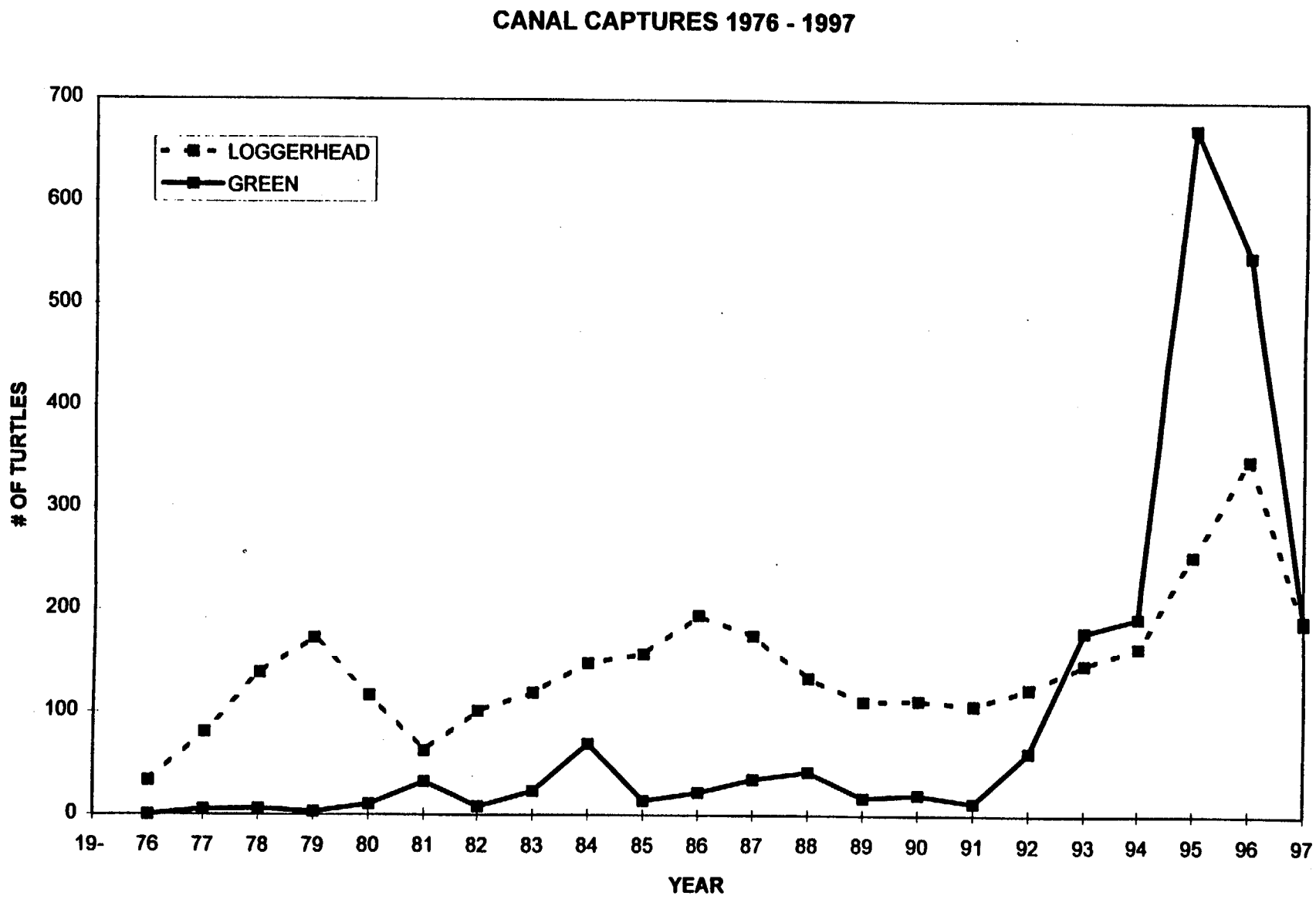


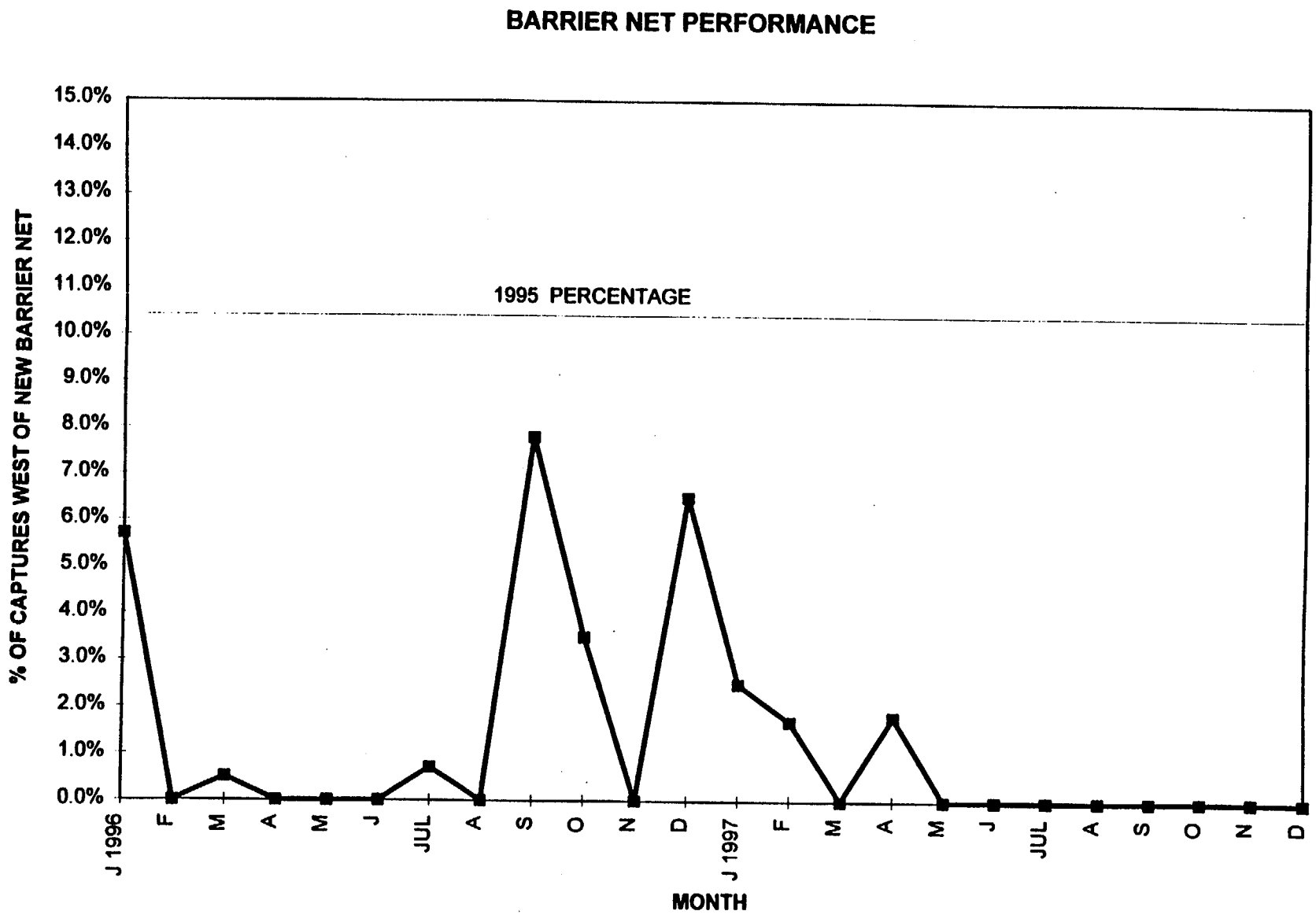
Figure 5. Diagram of an intake well at the St. Lucie Plant.

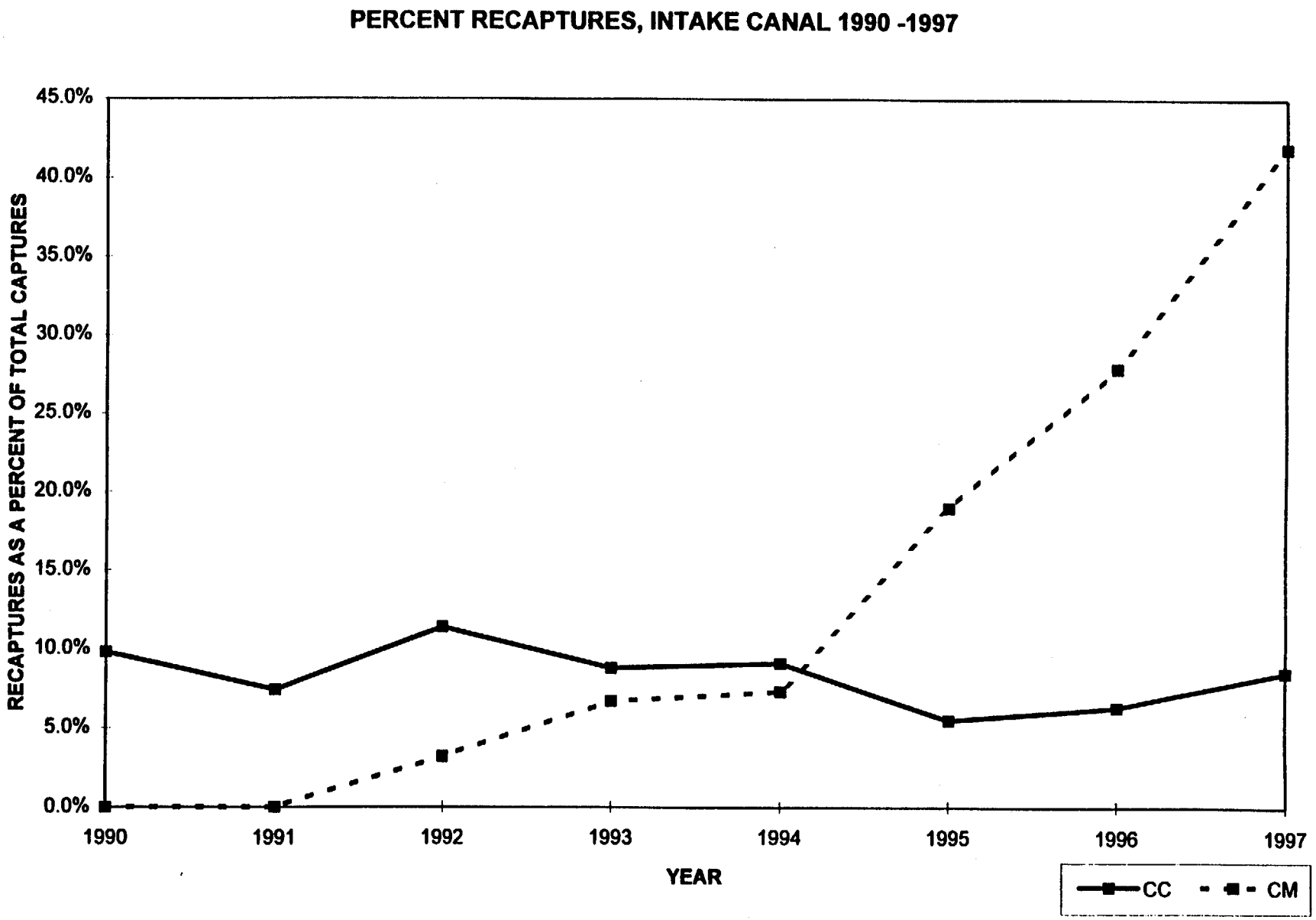

CANAL CAPTURES 1976 - 1997
LOGGERHEAD
GREEN
OF TURTLES
700
600
500
400
300
200
100
0
19-
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
YEAR

SEA TURTLES CAPTURED AT PSL - 1997

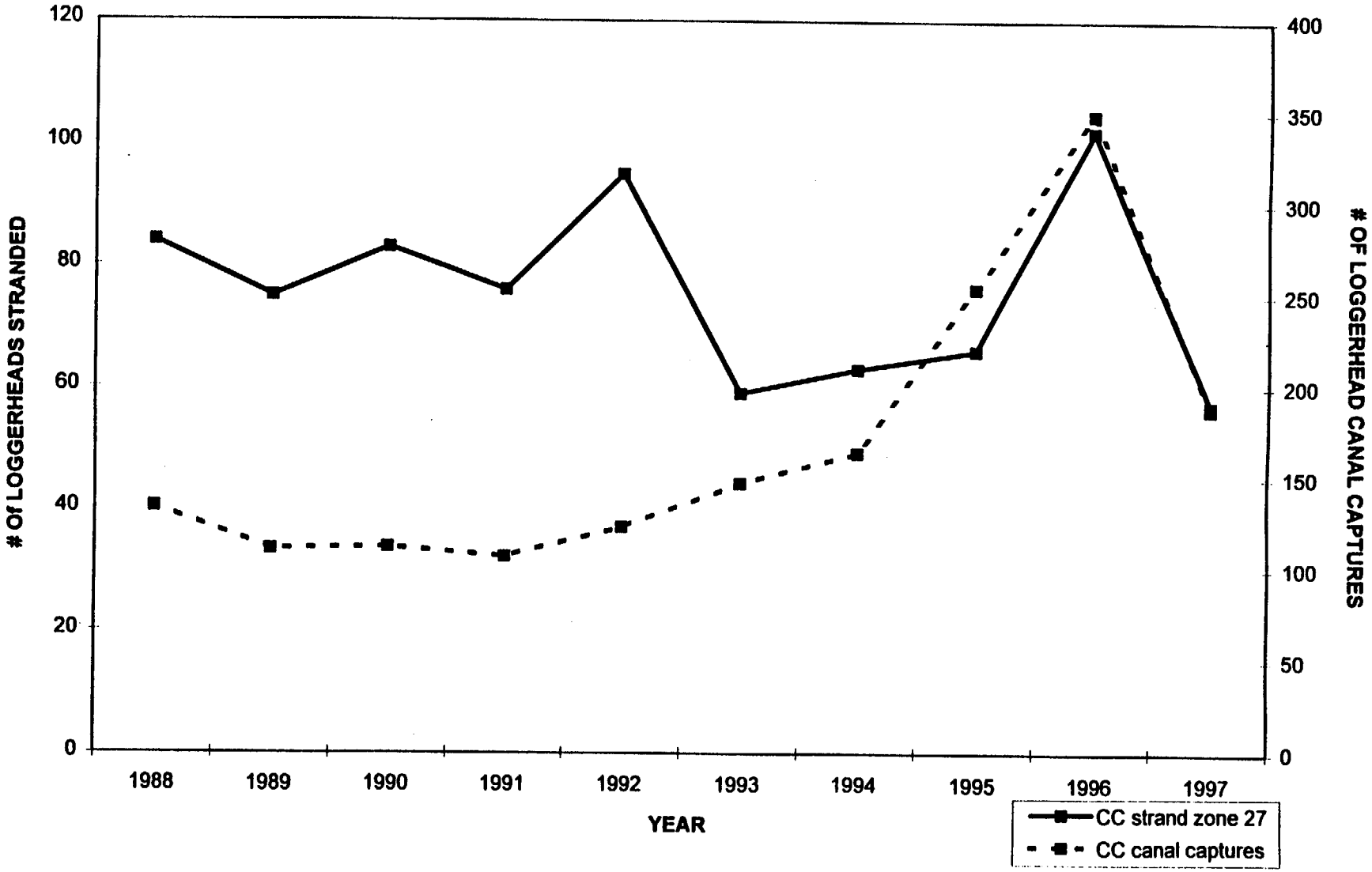
MONTH	GREEN	LOGGERHEAD	KEMPS RIDLEY	HAWKSBILL	LEATHERBACK	TOTAL
Mortality Limit as per NMFS	*6 or 1.5%, whichever is greater*	*2 or 1.5%, whichever is greater*	*1 or 1.5%, whichever is greater*	*1 or 1.5%, whichever is greater*	*1 or 1.5%, whichever is greater*	
JANUARY	25 (1)	15	0	0	0	40 (1)
FEBRUARY	26	32	0	0	1	59
MARCH	16 (1*)	23	0	0	0	39 (1*)
APRIL	29	26	0	0	0	55
MAY	12	18	0	0	0	30
JUNE	30 (2)	42	0	0	0	72 (2)
JULY	9	9	0	0	0	18
AUGUST	12	6	0	0	0	18
SEPTEMBER	8	6	0	1	1	16
OCTOBER	13 (1*)	4	0	0	0	17 (1*)
NOVEMBER	4	1	0	0	0	5
DECEMBER	7	6	0	0	0	13
TOTAL TO DATE	191 (3) (2*)	188	0	1	2	382 (3) (2*)

( ) Mortalities
(*) Probably moribund when entrained into canal


BARRIER NET PERFORMANCE
% OF CAPTURES WEST OF NEW BARRIER NET
15.0%
14.0%
13.0%
12.0%
11.0%
10.0%
9.0%
8.0%
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
1995 PERCENTAGE
J 1996
F
M
A
M
J
JUL
A
S
O
N
D
J 1997
F
M
A
M
J
JUL
A
S
O
N
D
MONTH

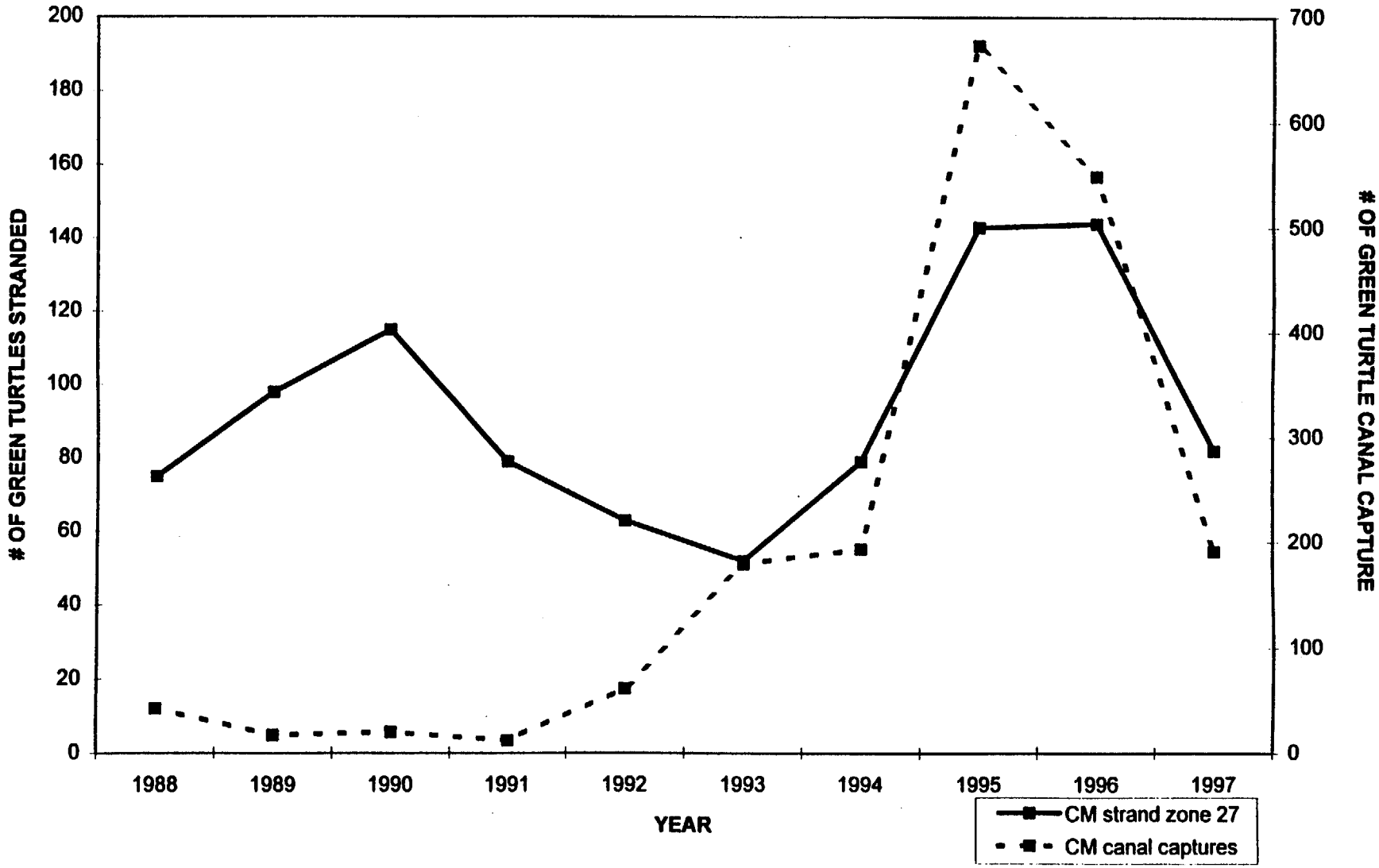

PERCENT RECAPTURES, INTAKE CANAL 1990 -1997
RECAPTURES AS A PERCENT OF TOTAL CAPTURES
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
1990
1991
1992
1993
1994
1995
1996
1997
YEAR
CC
CM

LOGGERHEAD STRANDING* AND CANAL CAPTURE DATA 1988 - 1997



* Florida Department of Environmental Protection, Florida Marine Research Institute, Sea Turtle Stranding and Salvage Network Database, January 9, 1998.

CM STRANDING* AND CANAL CAPTURE DATA 1988 - 1997



* Florida Department of Environmental Protection, Florida Marine Research Institute, Sea Turtle Stranding and Salvage Network Database, January 9, 1998.

1997 Turtle Net Inspection Activities

1. Daily
    - A. Surface Inspection and Debris Removal
    - B. 20 Holes Repaired Along Top of Net
    - C. Inspection Performed by Turtle Capture Personnel

2. Weekly
    - A. Underwater Inspection
    - B. 25 Holes Repaired
    - C. Inspection Performed by Turtle Capture Personnel

3. Monthly
    - A. Underwater Inspection
    - B. 53 Holes Repaired
    - C. Discovery of Sediment Buildup(Bottom of Net)
    - D. Algae Accumulation Discovered(Top and Middle of Net)
    - E. Land Utilization Inspection Program(LU-QI-11.0-46)
    - F. Performed by FPL Land Utilization Personnel

4. Other
    - A. Biannual Winch Inspection and Testing
    - B. Quarterly Cathodic Protection System Inspection
    - C. Sediment Dredging and Algae Removal
        - a. Required 50 Man-hours of Underwater Work
        - b. Performed by FPL Land Utilization Personnel

ON LINE

Debris Filter
Type PR-BW 800

Cleaning balls specifically selected for the condenser design and tube material insure that every tube is kept clean

ON LINE

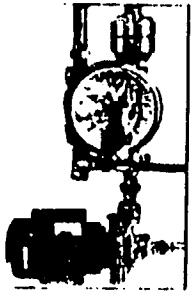
Tube Cleaning System
Type D 2

TAPROGGE
Debris Filters keep tubes and tube sheets free from clogging

TAPROGGE
Tube Cleaning Systems keep tubes free from fouling and scaling

(8) ball injection
(9) filter segment
(10) backwash rotor
(11) flexible seal strip
(13) debris discharge valve
(15) debris discharge pipe
(16) permanently lubricated bevel gear in dual housing

(1) [illegible] type D 2
(2) differential pressure measuring system
(3) ball recirculating pump
(4) ball oversize monitor, type BOM 1
(5) ball undersize monitor, type BDM 1
(6) ball collector
(7) integrated non return flap



Differential pressure monitoring
Continuous monitoring of debris load of the filter by differential pressure measuring system with automatic control and flushing device, micro switch and local indication

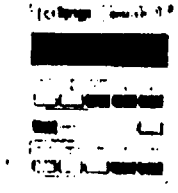
Programmable logic control
State of the art protection
Low voltage pilot lamps and control
Separate control and power sections
Detailed system mimic with component identification

Ball collector, type C 40

Ball charge and removal through quick opening port. Integrated non return flap prevents reverse flow

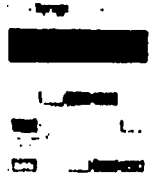
Ball recirculating pump
Mechanical seal and lubrication of friction surfaces

Monitoring of ball quantity



Continuous monitoring of the number of balls in circulation. BDM 1 indicates recirculating ball quantity and stores operational data

Monitoring of ball diameter



Continuous monitoring of ball oversize. BOM 1 indicates ball oversize and stores operational data

1996 ST. LUCIE PLANT CTCS SUMMARY

MONTH	STRAINER BACK FLUSHES UNIT 1	UNIT 2	ESTIMATED BALL LOSS UNIT 1	UNIT 2	BALLS FOUND ON BEACH
January	-	0*	-	97*	0
February	-	0	-	63	0
March	-	1	-	63	0
April	-	4	-	63	0
May	-	0	-	1268	0
June	-	0	-	126	0
July	9**	12	9	131**	0
August	0	1	0	633	0
September	0	3	179	+17***	0
October	5	10	135	423	0
November	9	12	102	63	0
December	0	7	0	35	0
Total	23	50	425	2948	0

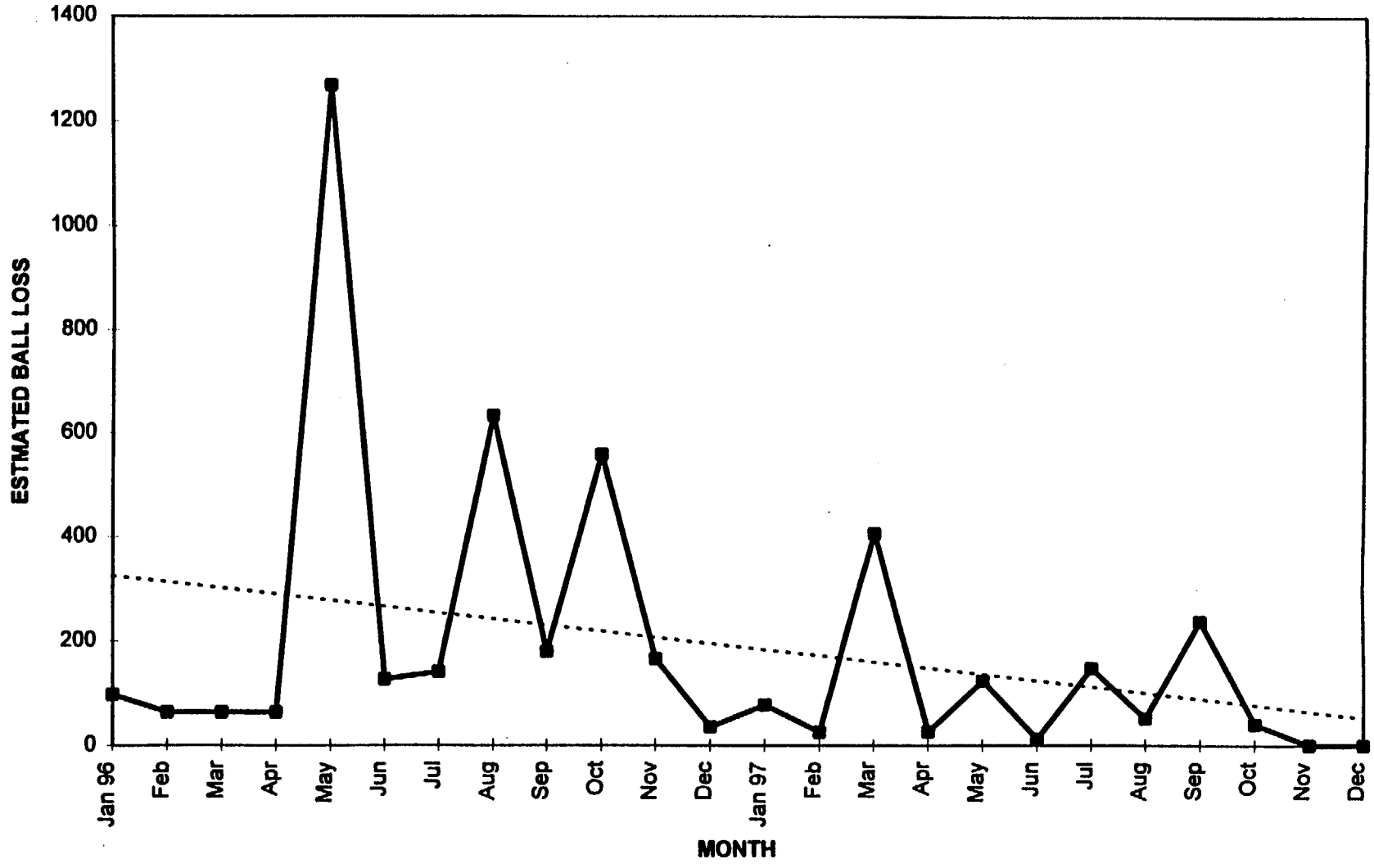
* System start-up on Unit 2.
** System start-up on Unit 1.
*** Net gain in inventory.

1997 ST. LUCIE PLANT CTCS SUMMARY

MONTH	STRAINER BACK FLUSHES UNIT 1	STRAINER BACK FLUSHES UNIT 2	ESTIMATED BALL LOSS UNIT 1	ESTIMATED BALL LOSS UNIT 2	BALLS FOUND ON BEACH
January	4	5	19	58	0
February	4	6	0	25	0
March	4	2	355	51	0
April	4	6*	23	3*	0
May	4	0	40	83	0
June	4	0	12	0	0
July	9	12	57	90	0
August	5	9	12	39	0
September	9	8	135	101	0
October	6**	8	11**	29	0
November	0	13	0	+38***	0
December	0	10	0	+63***	0
Total	53	79	664	378	0

* Unit 2 system shutdown during refueling, 4/11 - 5/28.
** Unit 1 system shutdown during refueling, 10/17 through the end of the year.
*** Net gain in inventory.

ESTIMATED TOTAL TAPROGGE BALL LOSS 1996 - 1997



PROPOSED CHANGES

TO THE

TERMS AND CONDITIONS

EPP Section 4.2.2.2(6)

Intake Well Inspection Frequency

Implements ITS Condition (6) requires visual checks of the gratings at each intake well for sea turtles at least eight times in 24-hours. This was the frequency specified in our Biological Assessment performed at the time when their were a relatively high number of mortalities found in the intake wells

The FDEP permit is renewed annually. In the 1997 and earlier FDEP Permits the inspection was required 4 times in 24-hours. The condition would also be evaluated, upon request, if after a period of six months following the installation of the new 5-inch barrier net no turtles were recovered from the intake wells. No turtles have been recovered from the intake wells since April 1997.

The application for renewal of the FDEP requests the removal of the condition for intake well inspection based on the performance of the 5-inch barrier net.

EPP Section 4.2.2.2(7)
Study at Intake Structure

ITS Condition 7 requires the video study at the Ocean Intakes. EPP Section 4.2.2.2(7) states the the study is deferred based on NRC consultation with NMFS. FPL was notified on October 6, 1997 that the proposed study requires further review by FPL, NRC, and NMFS. It will be discussed as part of the later agenda item.

EPP 4.2.2.2(8)

Causal to Plant Operation Definition

ITS Condition 8 states FPL to continue to participate in the STSSN, under proper permits and authority. This condition stated as a point of clarification that stranded sea turtles will not normally be counted against the authorized level of incidental take.

FPL proposed to clarify this Condition such that a stranding either on the beach or in the intake canal due to injury or illness not caused by plant operation is not counted against the authorized level of lethal take in Section 4.2.2.1.

A Stranding either on the beach or in the intake canal is reported to the FDEP. In addition FPL will request that FDEP concur with its determination if not causal to plant operation. The proposed rational for determining whether a sea turtle mortality in the intake canal is causal to plant operation or an intake canal stranding, will be incorporated into plant procedures.

In addition, NMFS will be receiving the monthly sea turtle report required by condition 10. This report will inform NMFS of all mortalities either casual to plant operation or a stranding in the intake canal.

PROPOSED RATIONALE FOR THE DETERMINATION OF SEA TURTLE MORTALITIES CAUSAL TO PLANT OPERATION

The following criteria are proposed to allow the differentiation of sea turtle mortalities occurring in the intake canal system into the categories of: 1) mortalities causal to plant operation, and 2) mortalities not causal to plant operation (intake canal strandings). In cases where St. Lucie plant biologists determine that a mortality is not causal to plant operation, the concurrence of FDEP sea turtle biologists will be solicited.

MORTALITIES CAUSAL TO PLANT OPERATION

In general, sea turtle mortalities occurring in the intake canal system will be deemed to be causal to plant operation if any of the following criteria are met:

1) Any turtle, regardless of condition, found dead entangled in a capture net.

2) Any turtle, regardless of condition, found dead clearly entangled below the surface of the water on the barrier nets or entangled in debris attached to the bottom of any part of the intake canal system.

3) Any fresh dead turtle not meeting the criteria below for intake canal strandings found free-floating in the canal or impinged on the barrier nets at or below the water surface.

MORTALITIES NOT CAUSAL TO PLANT OPERATION (INTAKE CANAL STRANDINGS)

In general, sea turtle mortalities occurring in the intake canal system will be deemed to be not causal to plant operation if any of the following criteria are met:

1) Any fresh dead turtle found free-floating in the intake canal or impinged upon, but not entangled in, the barrier nets with extensive injuries clearly sustained outside the intake canal system(e.g. boat collision) such that a live turtle in that condition would have been unlikely to survive and would have been euthanized at a rehabilitation facility.

2) Any fresh dead turtle found free-floating in the intake canal or impinged upon, but not entangled in, the barrier nets in such condition due to disease or other illness (e.g. fibropapilloma) that a live turtle in that condition would have been unlikely to survive and would have been euthanized at a rehabilitation facility.

3) Any extremely decomposed carcass or partial remains found free-floating in the intake canal or impinged upon the barrier nets in a location where the daily surveillance of the canal is sufficient (east of the primary barrier net) that a fresh dead or moribund turtle could not have escaped notice long enough to become severely decomposed, and it is reasonable to presume the carcass or remains were entrained into the canal in that condition.

EPP Section 4.2.2.2(10)

Changes to the Reporting Requirements

FPL proposes to revise the Reporting requirements of ITS Condition 10. FPL has been discussing the usefulness of the required report for the Taprogge condenser tube cleaning system operation and any sponge ball loss at St. Lucie to the FDEP and NMFS. In addition, the available information on the barrier net inspections and maintenance is reported monthly. The Annual Report also discusses these same issues.

These reports are a small administrative burden on FPL and limited usefulness to the FDEP. Discussions between FPL and FDEP have focussed on the type of information and frequency of submitting the reports.

FPL proposes that the reports be eliminated and the topics discussed in the Annual Report. In addition, FPL proposes that plant administrative procedures will include guidance that a significant ball loss would be considered an unusual environmental event under EPP Section 4.1. Accordingly, FPL will make a 72-hour report and a 30-day written report.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 27, 1997

LICENSEE: Florida Power and Light Company

FACILITY: St. Lucie, Units 1 and 2

SUBJECT: SUMMARY OF MEETING ON May 7, 1997, REGARDING ASSESSMENT ON IMPACTS TO SEA TURTLES AT THE ST. LUCIE SITE (TAC NOS. M92014 AND M92015)

On May 7, 1997, representatives of the Florida Power and Light Company (FPL), licensee for St. Lucie Plant, Units 1 and 2, met with members of the NRC staff and a representative of the Florida Department of Environmental Protection at the St. Lucie site to discuss a study required by a condition of the Incidental Take Statement of a Biological Opinion issued by the National Marine Fisheries Service (NMFS) concerning sea turtle entrapment in the plant's intake canal. Clarifying discussions on other conditions in the opinion were also held. A representative of NMFS was unable to attend the meeting due to an unanticipated schedule conflict. Enclosure 1 is a list of attendees. Enclosure 2 contains copies of the agenda and handouts distributed at the meeting.

The licensee presented an overview of the site cooling water layout and a description of the FPL turtle protection program. The licensee described the actions taken to protect the turtles and the positive results, in terms of increased nesting sites, of the FPL actions. A description, including a video, of the intake velocity cap and underwater environment was provided as an introduction to a discussion of the required study. FPL indicated that the study, item 7 in the Terms and Conditions of the Incidental Take Statement, proposed a video study that was not feasible. A discussion of alternatives to the proposed study was conducted. Additionally, conditions 4, 6 and 10 of the Terms and Conditions of the Incidental Take Statement were identified as needing clarification and/or changes.

The meeting concluded with the licensee assuring the attendees that, with the exception of issues discussed during the meeting, FPL had implemented the provisions of the Incidental Take Statement. A listing of the licensee's actions is included with the handouts. After the concluding remarks, the attendees toured the intake head wall area to observe the various turtle protection mechanisms and activities.

L. A. Wiens, Senior Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-335 and 50-389

Enclosures: 1. Attendance List
2. Handouts

cc: See next page

A/50

cc:
Senior Resident Inspector
St. Lucie Plant
U.S. Nuclear Regulatory Commission
7585 S. Hwy A1A
Jensen Beach, Florida 34957

Joe Myers, Director
Division of Emergency Preparedness
Department of Community Affairs
2740 Centerview Drive
Tallahassee, Florida 32399-2100

M. S. Ross, Attorney
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

John T. Butler, Esquire
Steel, Hector and Davis
4000 Southeast Financial Center
Miami, Florida 33131-2398

Mr. Thomas R.L. Kindred
County Administrator
St. Lucie County
2300 Virginia Avenue
Fort Pierce, Florida 34982

Mr. Bill Passetti
Office of Radiation Control
Department of Health and
Rehabilitative Services
1317 Winewood Blvd.
Tallahassee, Florida 32399-0700

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
61 Forsyth Street, SW., Suite 23T85
Atlanta, GA 30303-3415

H. N. Paduano, Manager
Licensing & Special Programs
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

J. A. Stall, Site Vice President
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

J. Scarola
Plant General Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. Kerry Landis
U.S. Nuclear Regulatory Commission
61 Forsyth Street, SW., Suite 23T85
Atlanta, Georgia 30303-3415

Mr. T. F. Plunkett
President - Nuclear Division
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

E. J. Weinkam
Licensing Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

MEETING ATTENDEES

MAY 7, 1997

NAME	ORGANIZATION
Jonathan Gorham	Quantum Resources, Inc.
Dennis Faddan	FPL Services, Manager
Winifred Perkins	FPL Envir. Services
Claudia Craig	NRC/NRR/PGEB
Len Wiens	NRC/NRR/PDII-3
George Madden	FPL Licensing
Mitchell Ross	FPL Law Department
Kim Svaboda	FPL/Corp. Comm.
Mike Masnik	NRC\NRR\PDND
Beth Morford	Fla. Dept. of Environ. Prot.
Nick Whiting	FPL, Plant Services
Gary Bouska	FPL, Land Utilization

ENCLOSURE 1

NRC-FPL Meeting Regarding Sea Turtle Protection

May 7, 1997

Copy of Overheads Presented by Gary Bouska on

Site Overview

History of the Biological Opinion

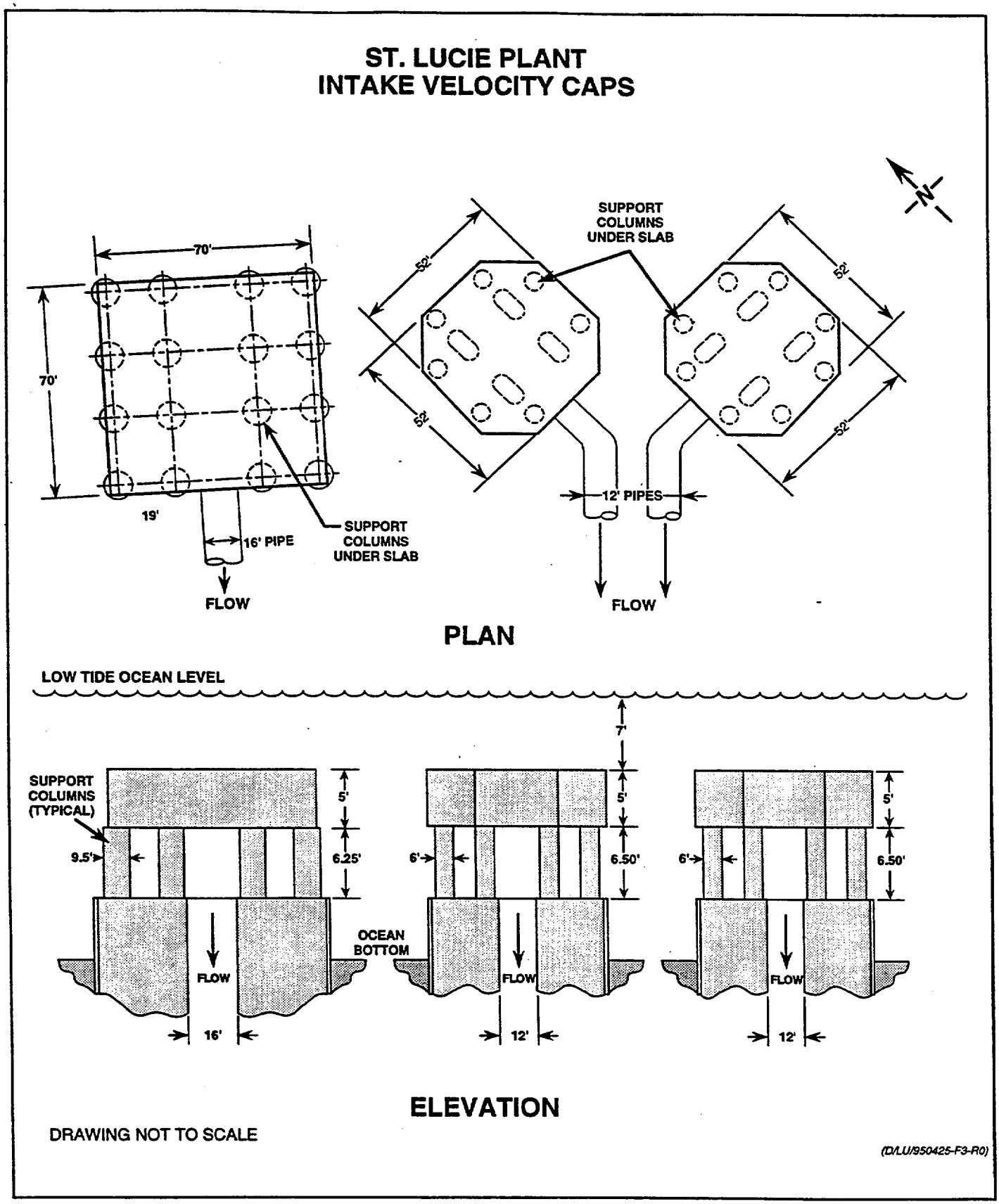


Figure 3. Diagram of the intake structures located 1200 feet (365 m) offshore of the shoreline at the St. Lucie Plant.

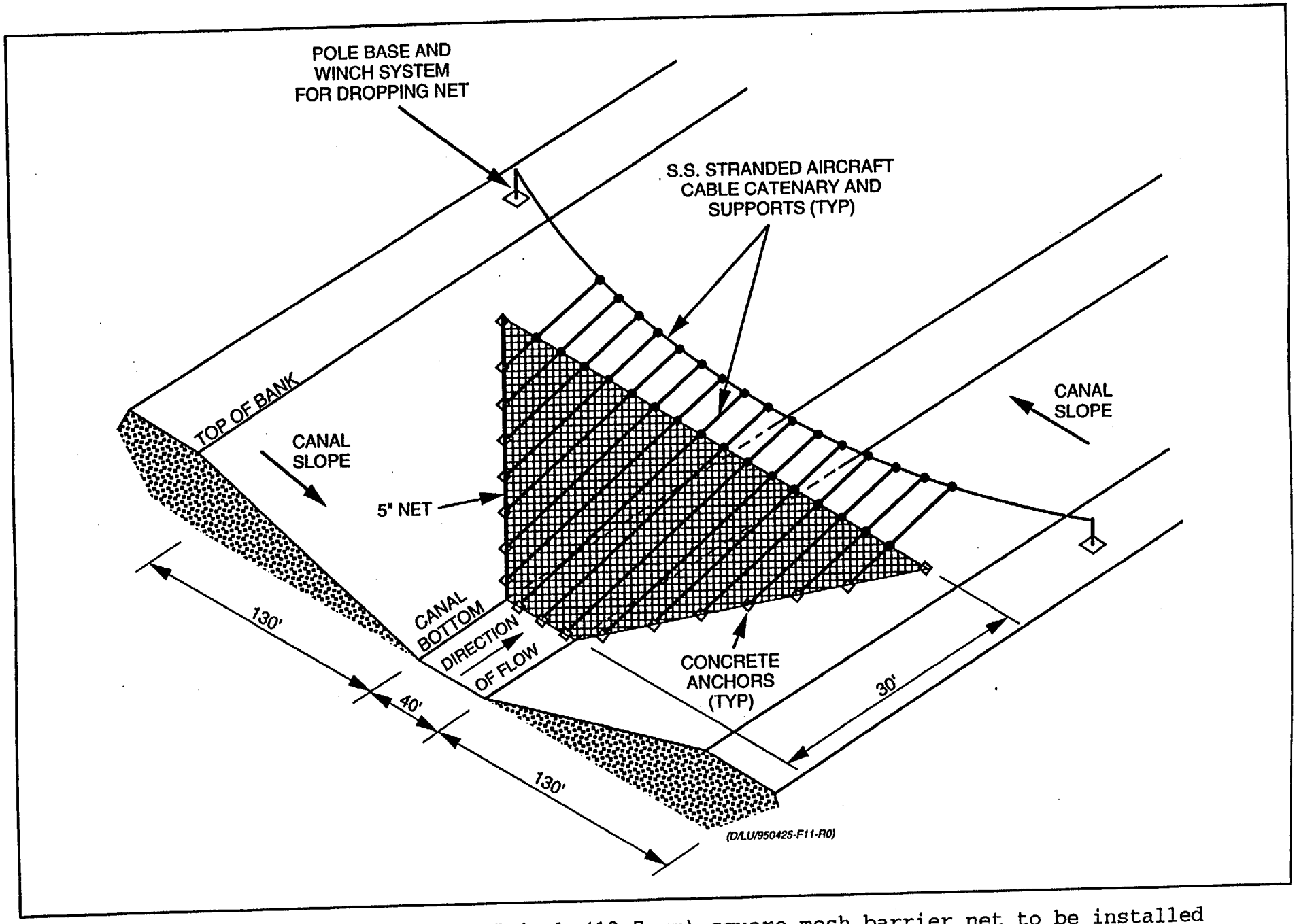


Figure 11. Conceptual design for a 5 inch (12.7 cm) square mesh barrier net to be installed in the intake canal of the St. Lucie Plant.

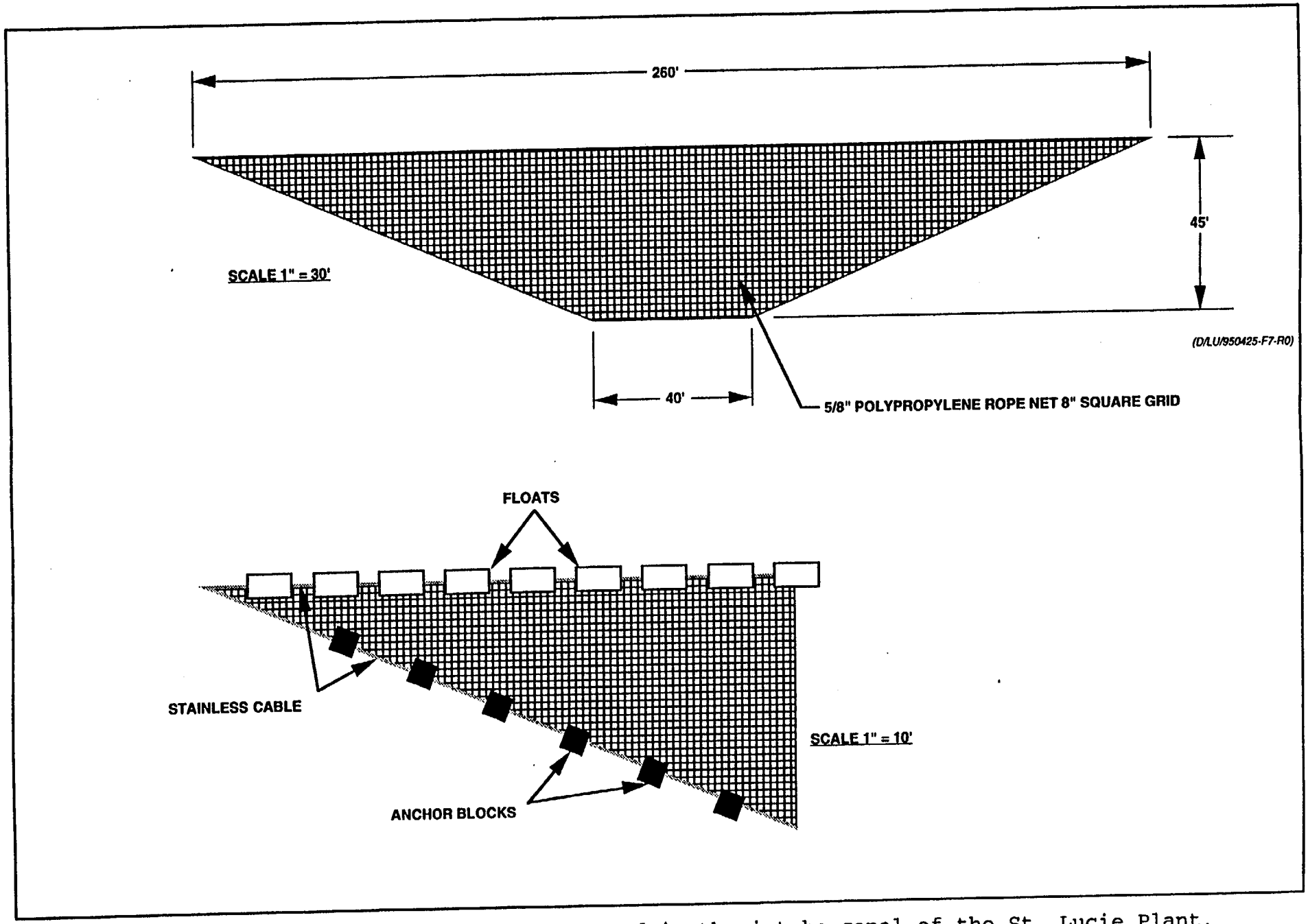


Figure 7. Diagram of the turtle barrier net used in the intake canal of the St. Lucie Plant. This net is located at the A1A bridge (see Figure 2)

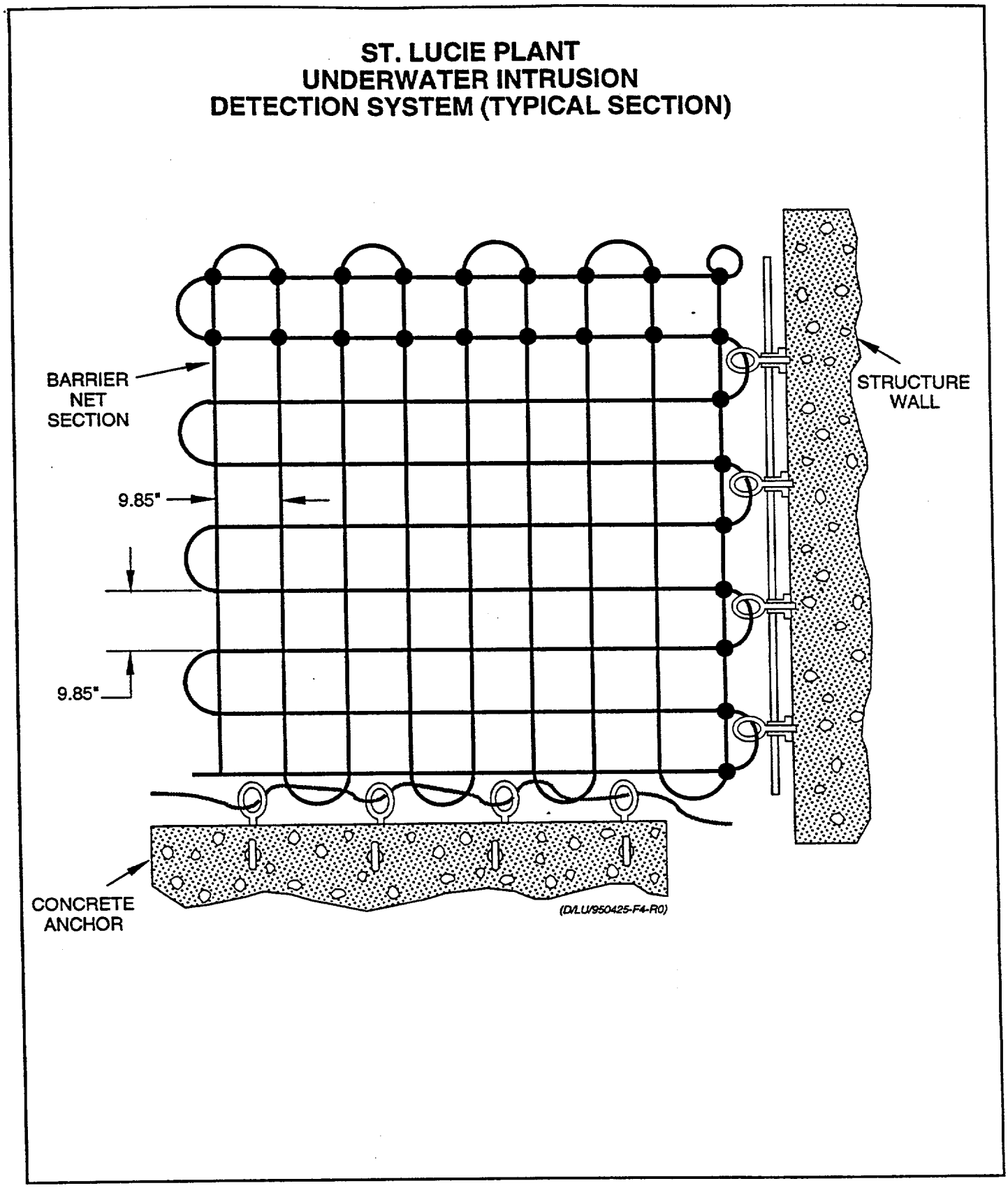


Figure 4. Diagram of the Underwater Intrusion Detection System at the St. Lucie Plant.

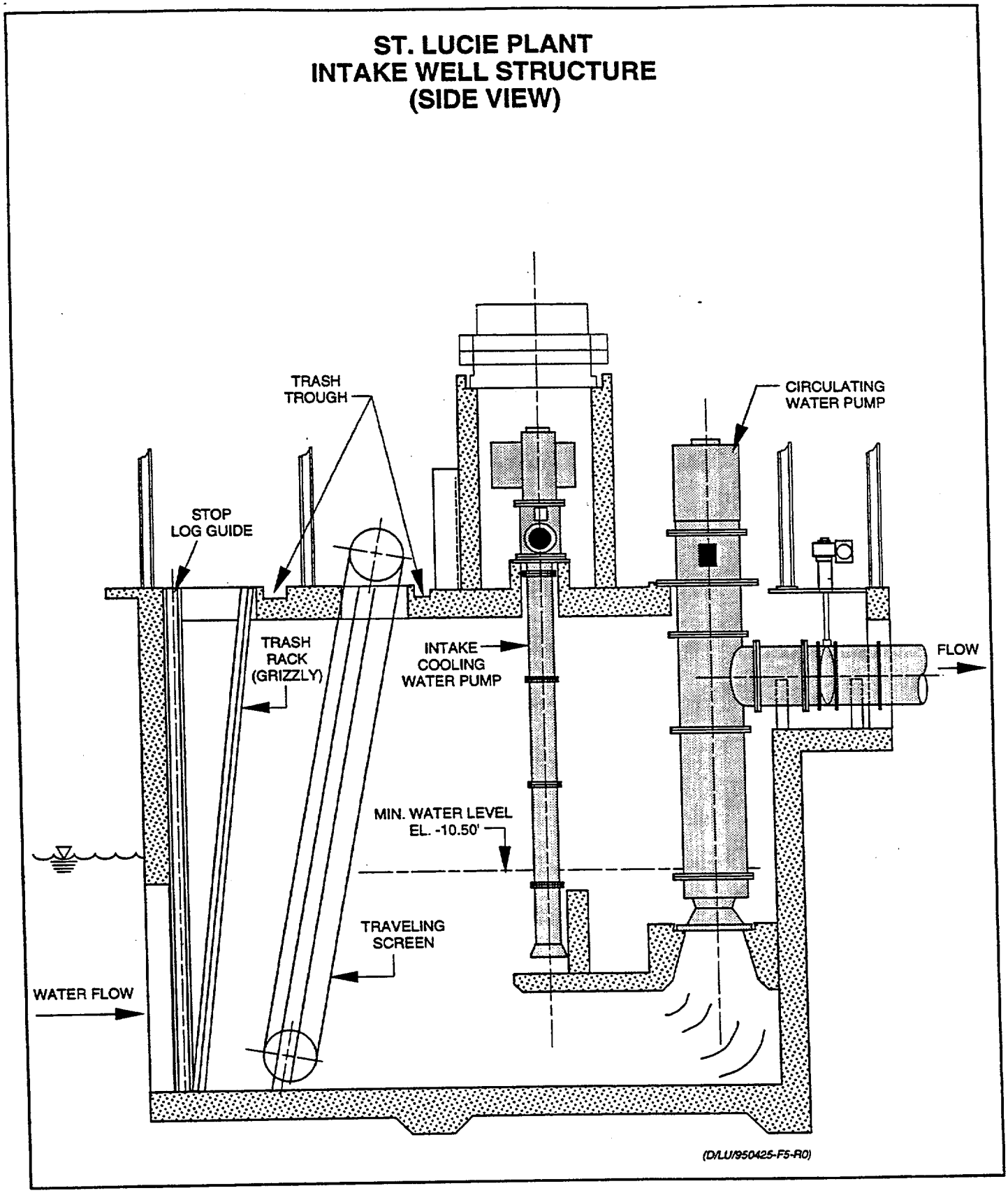


Figure 5. Diagram of an intake well at the St. Lucie Plant.

Sea Turtle Consultation
Kemps ridley, Loggerhead, Atlantic Green, and Leatherback Sea Turtles
Endangered Species Act (ESA) Section 7

Activities Leading to the Section 7 Consultation

12/20/94 to 12/25/94	The Plant experienced four small green sea turtle mortalities in the intake structures within a few days increasing the concern of the Florida Department of Environmental Protection's (FDEP) Tequesta Office that additional protective measures needed to be instituted as soon as possible.
12/29/94	After a site visit by local FDEP personnel, a letter was issued to Dr. Jonathan Gorham, FPL's turtle capture permit holder, listing several short term corrective actions that were instituted immediately.
1/95	Additional meetings and phone calls held between FPL, NMFS, and FDEP continuing to discuss solutions and alternatives to the number of smaller green turtles getting through the existing 8-inch mesh barrier net. The possibility of replacing the net with one with a 4-inch mess size is discussed and becomes the key to solving the problem.
2/8/95	Meeting held at St. Lucie Plant between FPL personnel involved in sea turtle and environmental issues. Ross Wilcox of the FPL Environmental Affairs Department states that NMFS feels the small mesh net is necessary for FPL to avoid other regulatory actions in regard to the mortalities and that the desired completion date is December 1, 1995. Preliminary plans are made regarding milestones and funding in order to support that schedule.
2/10/95	In a phone conversation with NMFS St. Petersburg office, Ross Wilcox committed to the installation of the new small mesh net by December 1, 1995. The need for a fatal take allowance was also discussed, and the possibility of a Section 7 Consultation with the NRC is discussed as the desired means of accomplishing that allowance.

Sea Turtle Consultation
Kemps ridley, Loggerhead, Atlantic Green, and Leatherback Sea Turtles
Endangered Species Act (ESA) Section 7

4/23/95	NRC Project Manager notified FPL that NRC would like to discuss preparations and plans for a meeting at FPL St. Lucie Site for an ESA Section 7 consultation for Sea Turtles.
5/10/95	NRC issued letter to FPL requesting a formal ESA Section 7 consultation regarding sea turtles at St. Lucie Units 1 and 2 with the National Marine Fisheries Service(NMFS), NRC, Florida Department of Environmental Protection(FDEP) and FPL . The request was based on the increasing number of sea turtles being removed from the St. Lucie intake canal as reported in the 1994 Annual Environmental Operating Report Volume 1, conversations with FPL Environmental Department (Dr. Ross Wilcox) and NRC (Dr. Michael Masnik), and the April 23, 1995 conference call.
5/11/95	NRC issued letter to NMFS SE Regional Office requesting a formal ESA Section 7 consultation based on the same information discussed in the letter to FPL. Requested meeting on 5/23/95 at St. Lucie.
5/23/95	Initial meeting with NRC, NMFS, FDEP, and FPL to determine the scope and schedule for the consultation. Included a plant tour of the affected areas including the intake wells and intake canal nets. FPL proposed the smaller 4x4 inch net to be placed before the8x8 inch net too keep all turtles east of the A1A bridge excluding them from the intake wells where most of the mortalities occur.
8/1/95	FPL provided draft copy of the Biological Assessment to NRC, FDEP, and NMFS for comment.
10/19/95	Meeting in St. Petersburg FL at SE Regional Office of NMFS. NMFS provided comments on the Draft Biological Assessment. FPL committed to update the information in the Biological Assessment based on comments from NRC, FDEP, and NMFS.
11/20/95	FPL submitted the Biological Assessment to the NRC for review.
2/7/96	NRC transmits the Biological Assessment to the SE Regional Director of NMFS. NRC agrees with the actions by FPL and the determinations of the Biological Assessment. NRC anticipates NMFS will render its Biological Opinion within the next several months.

JULY96	NMFS issues draft Biological Opinion for comment to FPL. Item 3 of the conservation recommendations was that FPL should reexamine engineering solutions to prevent or reduce entrainment at the ocean intake structures. Possibilities may include redesigning the intake structures or examining the potential role of the cooling water discharge in attracting turtles to the site. No requirement for the study in the draft incidental take permit requirements.
8/13/96	FPL (Gary Bouska) provided FPL comments on the draft Biological Opinion and incidental take permit. FPL recommended deletion of recommendation 3 because the recommendation is subject to broad range of interpretation and is extremely open ended. In addition, FPL examined engineering solutions during the 1991 refurbishment of the ocean intake velocity caps.
8/16/96	SE Region NMFS letter to FPL (Gary Bouska) response to FPL comments on Draft Biological Opinion. Intent of conservation recommendation is to enhance the required conservation measures with measures that allow latitude in their implementation. Although they acknowledge the positive actions by FPL, further investigation may be beneficial. Recommendation will be rewritten to clearly express wide latitude in actual implementation. NMFS cannot agree to remove conservation recommendation #3.
2/7/97	NMFS issued Biological Opinion to NRC. The opinion is based on best available information and concludes that continued operation of Plant may adversely affect, but is not likely to jeopardize, the continued existence of listed species. Conservation recommendation #3 changed to Incidental Take Statement requirement #7. Specifically FPL to design and implement a study to collect information on the behavior of turtles at the intake structures by remote videography or similarly designed methodology that will not interfere with turtle behavior. FPL submit plan by 6/30/97 and once approved complete study and submit final report by 12/31/98.

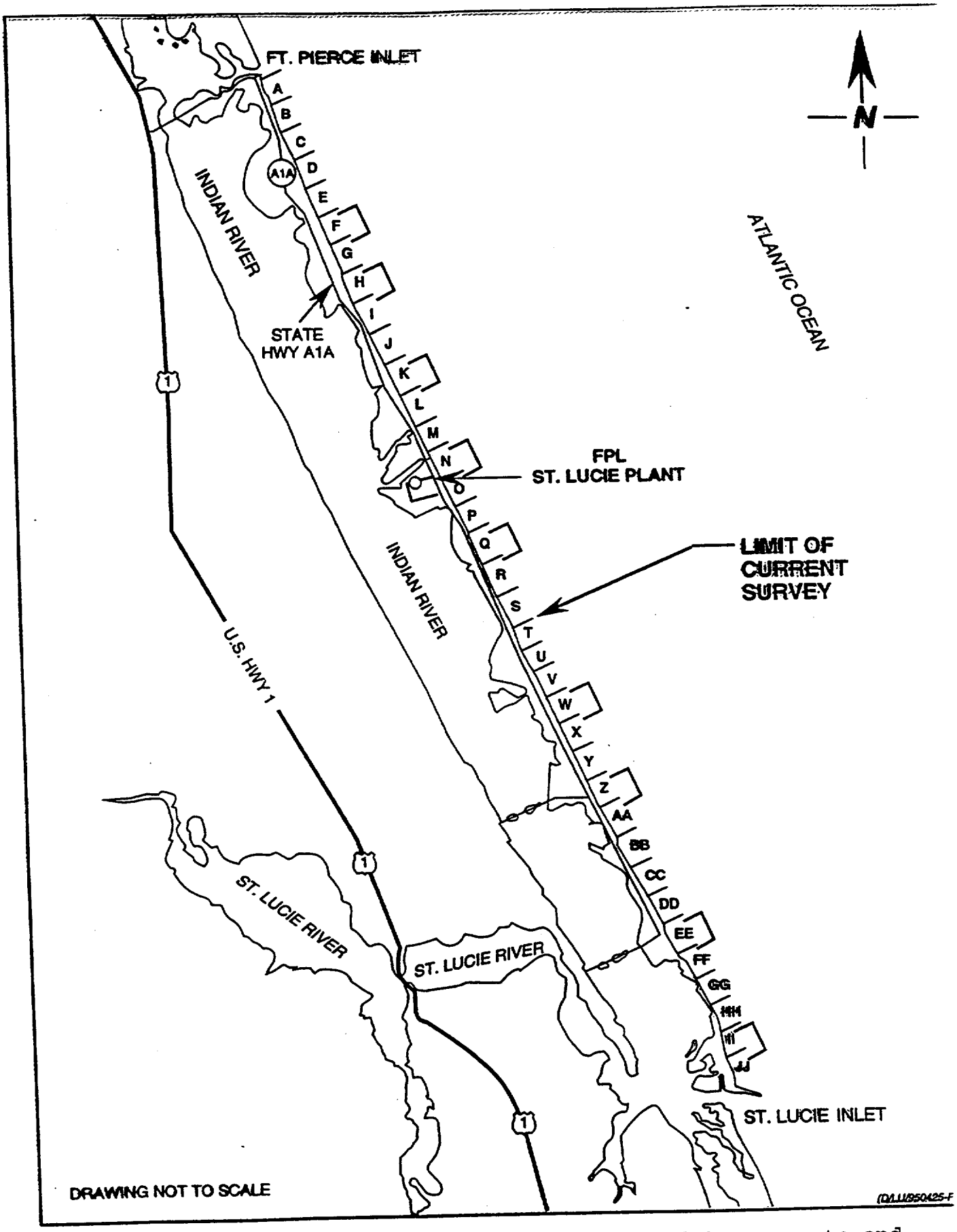


Figure 14. Designation and location of nine 1.25-km segments and 36 1-km segments surveyed for sea turtle nesting, south Hutchinson Island 1971 - 1994.

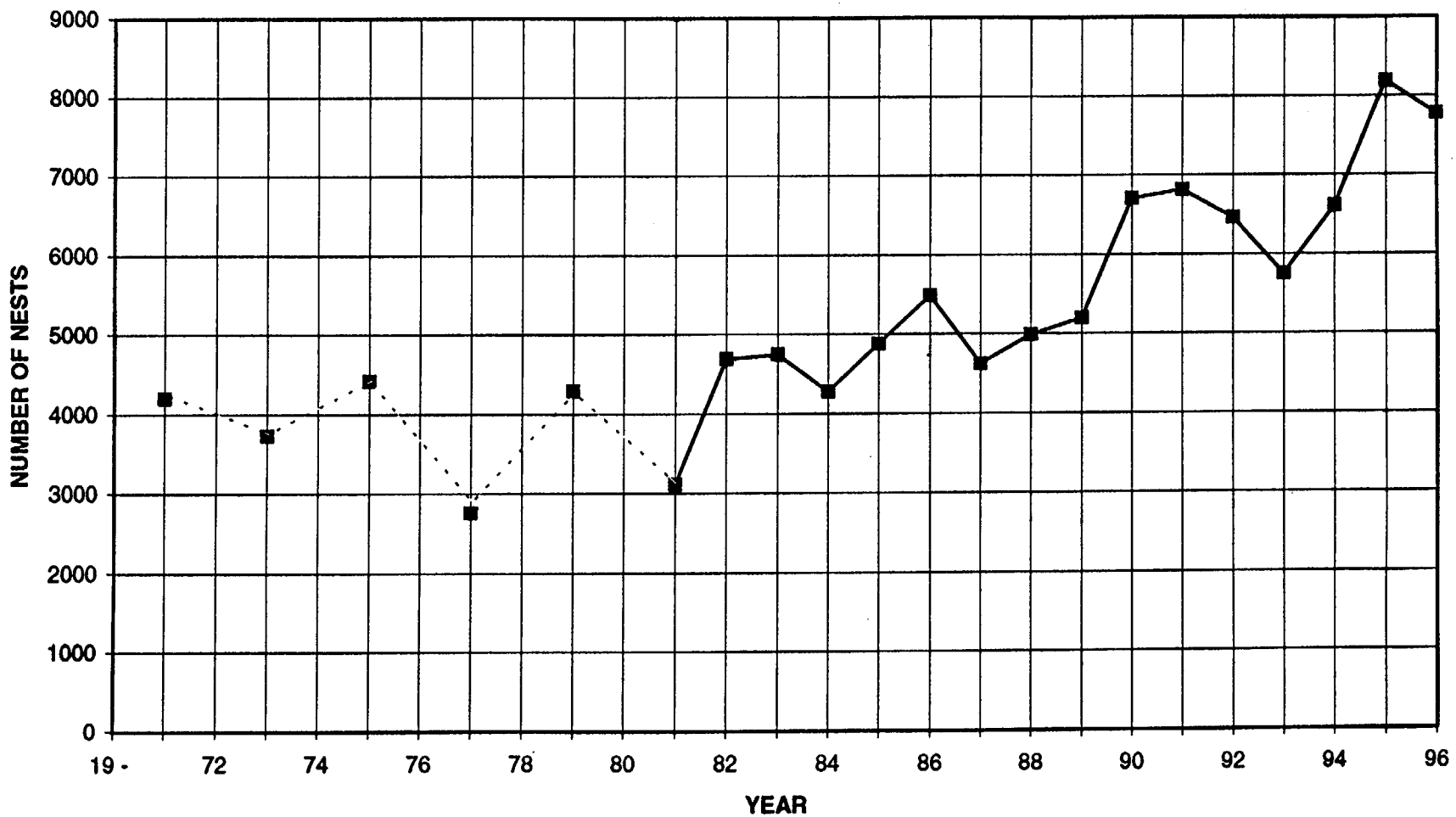


Figure 6. Number of loggerhead turtle nests, Hutchinson Island 1971 through 1996. Values for 1971 through 1979 are estimates (see text), values for 1981 through 1996 are from whole island surveys.

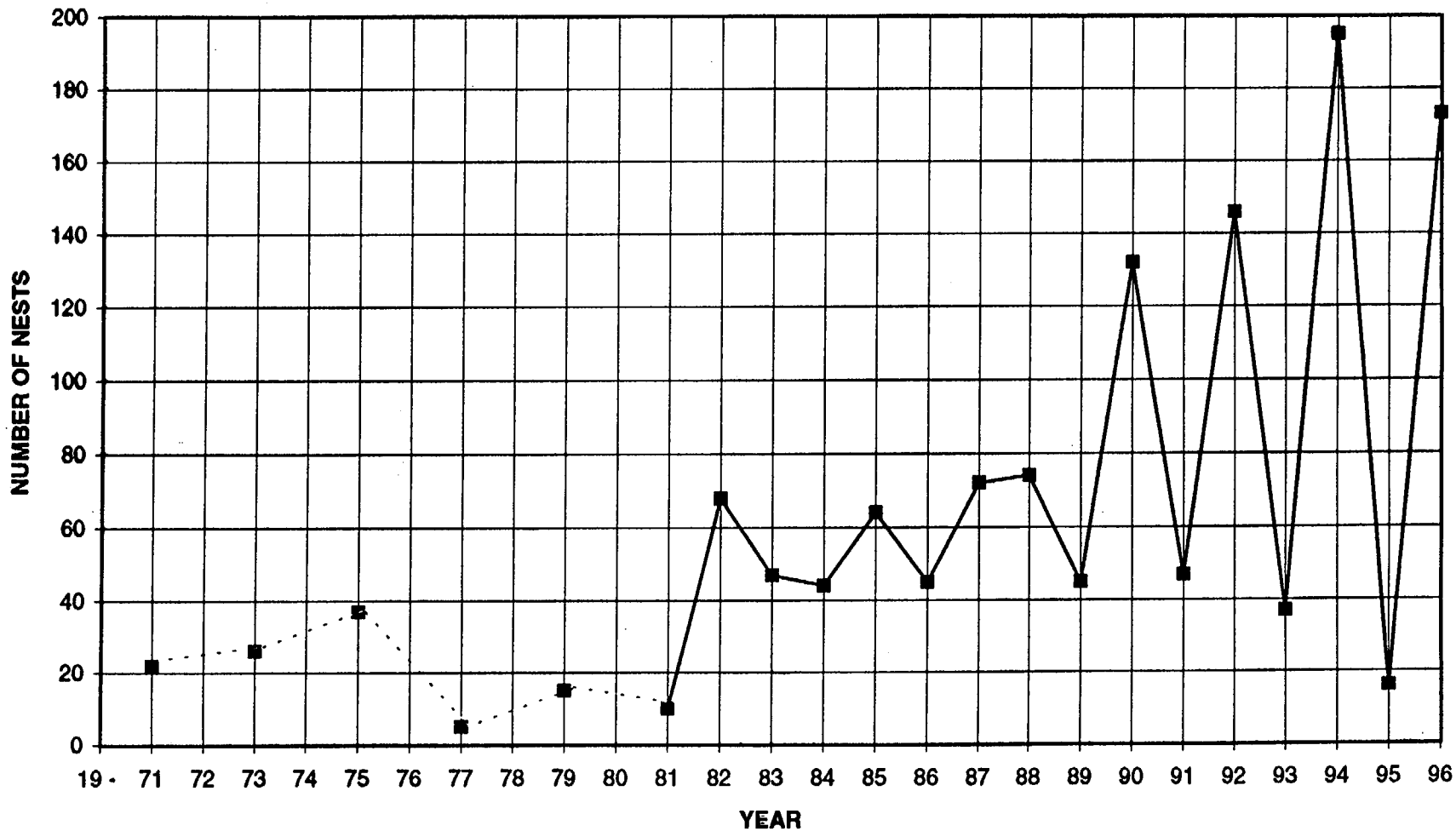


Figure 8. Number of green turtle nests, Hutchison Island, 1971 through 1996. Values for 1971 through 1979 are estimates (see text). Values for 1981 through 1996 are from whole island surveys.

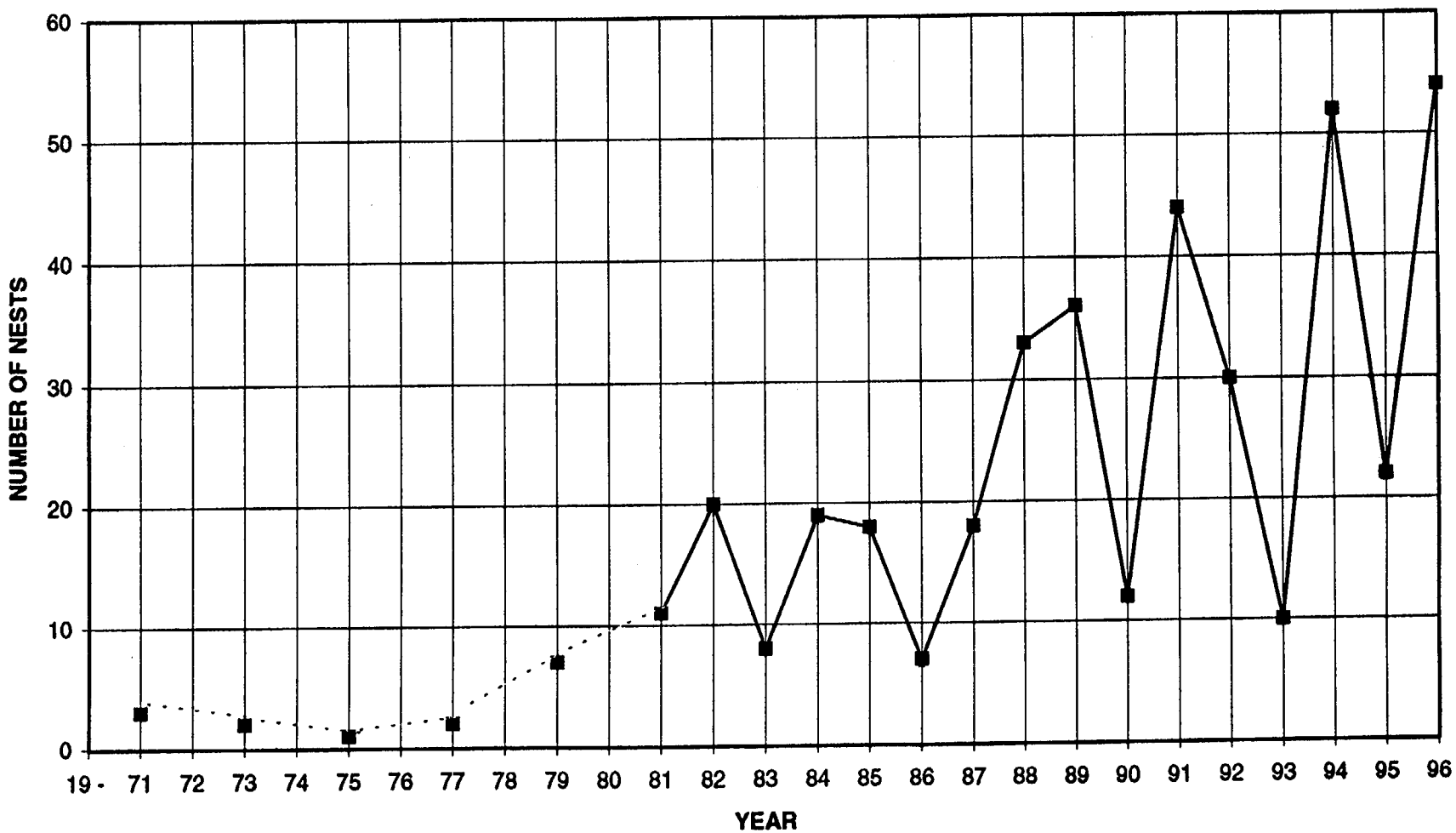


Figure 9. Number of leatherback turtle nests, Hutchinson Island, 1971 through 1996. Values for 1971 through 1979 are estimates (see text). Values for 1981 through 1996 are from whole island surveys.

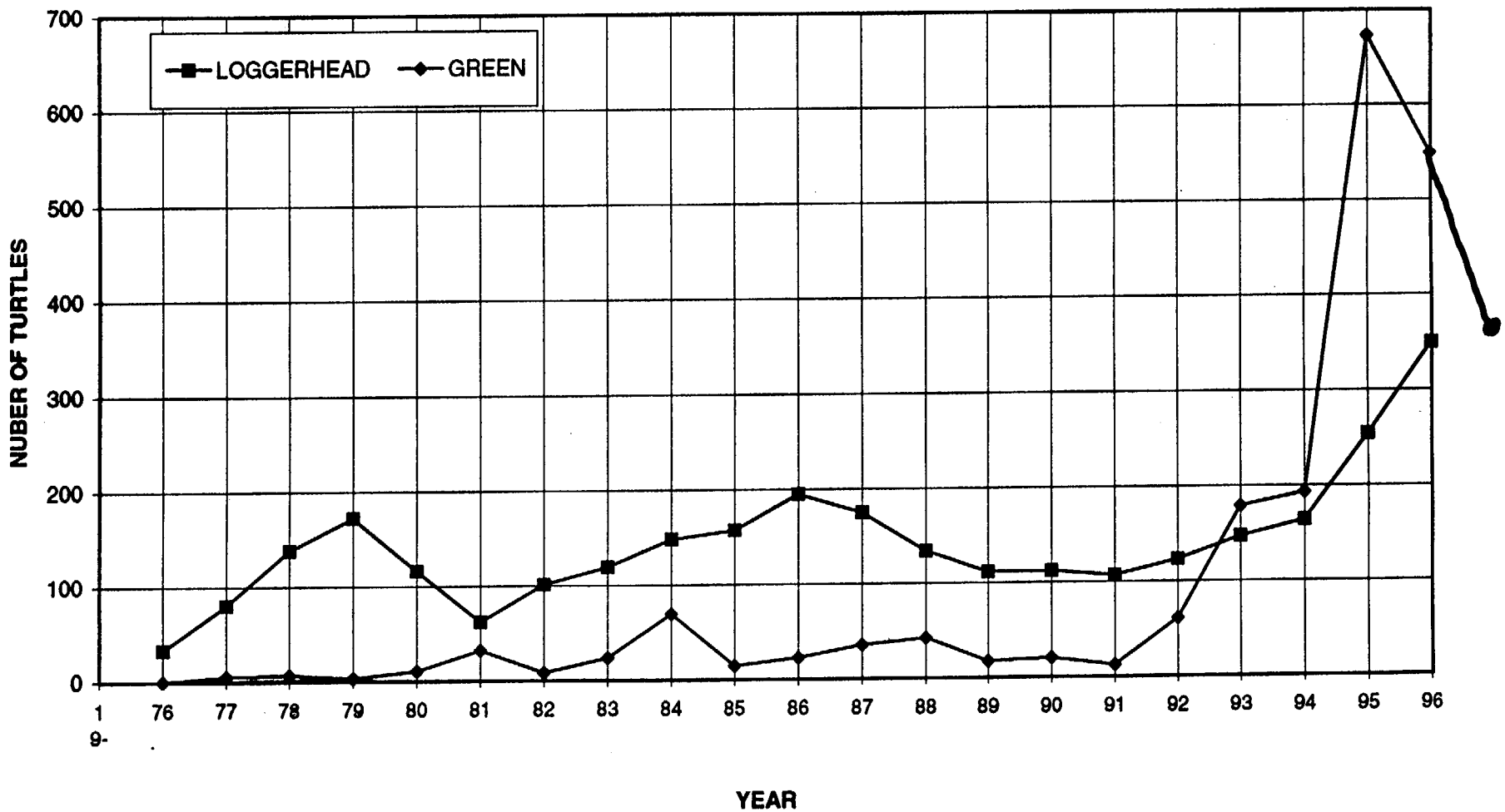
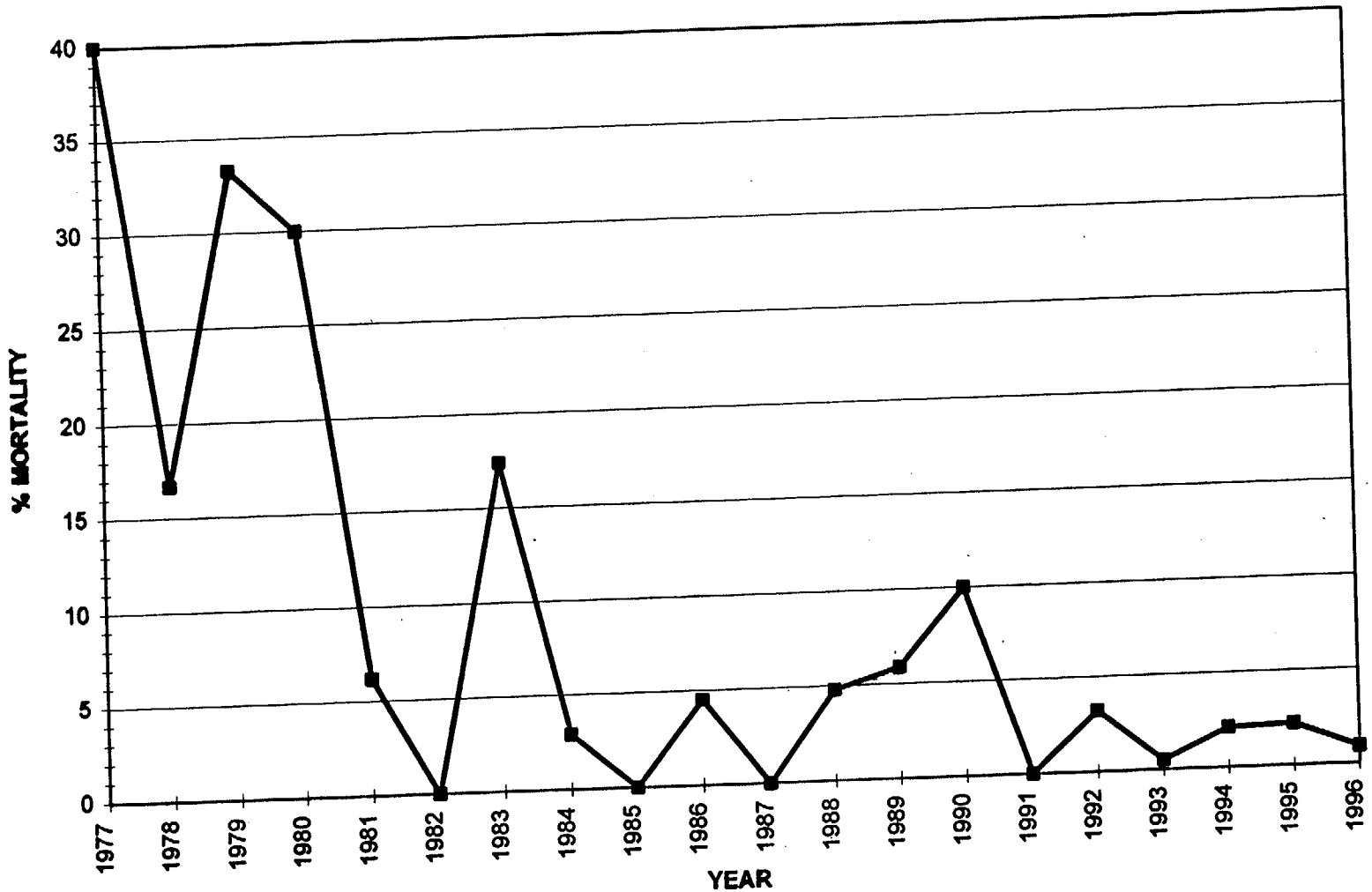


Figure 10. Number of loggerhead and green turtles removed each year from the intake canal, St. Lucie Plant, 1976 through 1996.

GREEN TURTLE MORTALITIES EXPRESSED AS A PERCENTAGE OF TOTAL CAPTURES 1977 - 1996



LOGGERHEAD MORTALITIES EXPRESSED AS A PERCENTAGE OF TOTAL CAPTURES 1976 - 1996

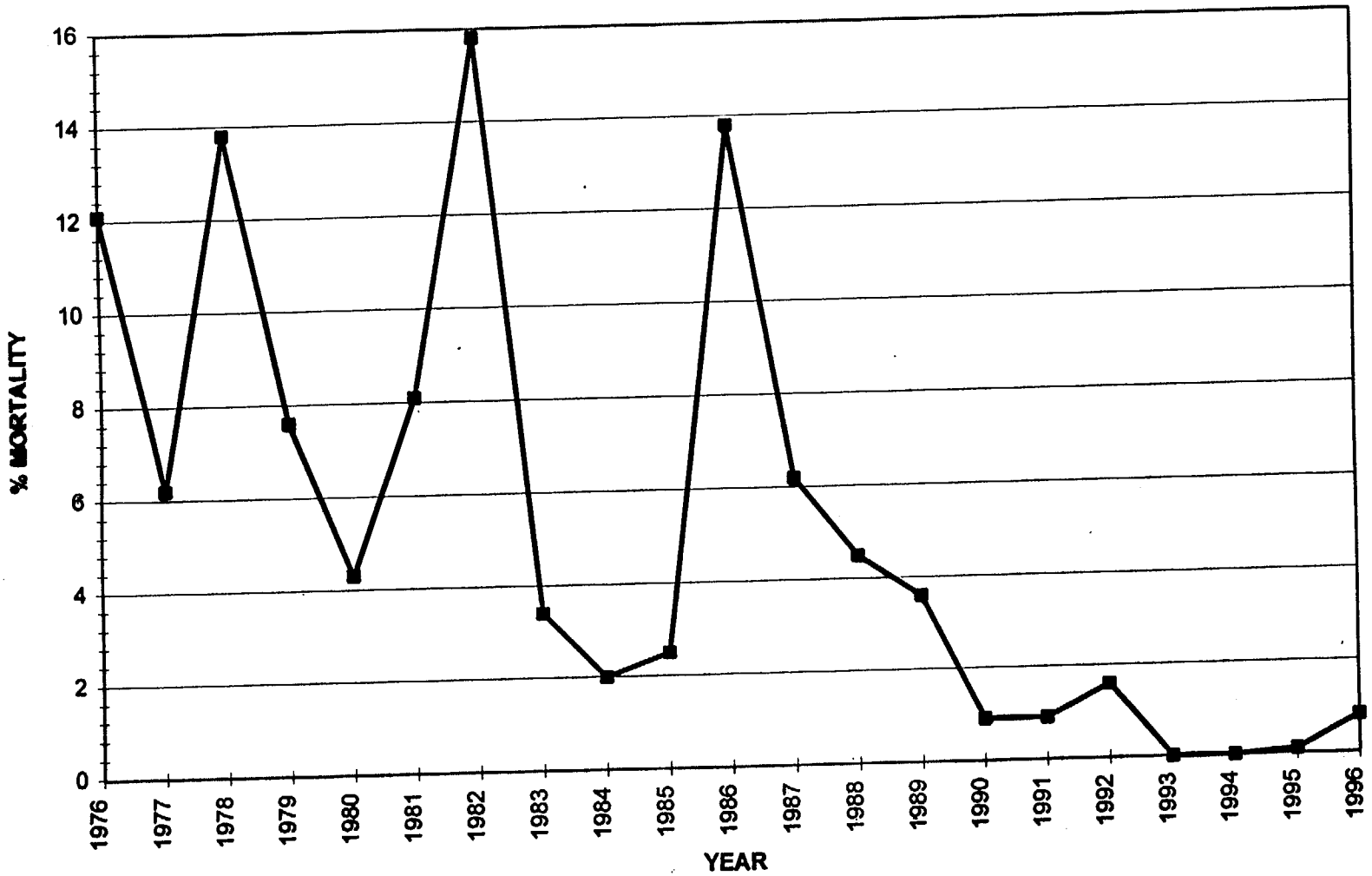


Table 5. Turtle walks conducted by FPL during the time period 1982 -1995

Year	Number of Walks	People Attending
1982	6	245
1983	5	225
1984	8	346
1985	14	684
1986	15	702
1987	13	824
1988	14	801
1989	12	600
1990	14	780
1991	15	789
1992	20	883
1993	21	975
1994	27	1184
1995	27	1030
Total	211	10,068
1996	27	1287

Actions FPL Has Taken to Date in Response to the Biological Opinion

Conservation Recommendations:

1. FPL should continue to carry out or assist in research to determine the subsequent dispersal of captured and released turtles through its tagging program and through cooperation with properly permitted scientists.

   Dr. Gorham and other personnel working in the capture program have presented poster displays on population dynamics and tag retention at the last two annual sea turtle symposiums.

   B. Several additional topics for potential future research papers are being developed.

   C. Dr. Gorham has made presentations at local colleges and universities offering our turtle capture data to students or advanced degree candidates that would like to use it for thesis material.

   D. FPL continues to provide all tagging and stranding data to the state for use in their data bases.

2. FPL should continue efforts to improve residence time estimates. These efforts may include directed studies of residence time, so long as research permits are obtained from the proper authority.

   A. With the position of the new 5-inch mesh barrier net several hundred feet east of the old net's location, the area that turtles can occupy has been cut roughly in half allowing more accurate residence time estimates since it is easier to visually locate the turtles.

   B. No directed residence time studies have been undertaken. The only logical methodology that has been thought of to date would be to recapture a tagged turtle that is released back into the canal. FPL feels this would only increase stress to the turtle, and with the smaller area they can occupy, it is also felt that residence times are no longer a problem.

Incidental Take Statement Requirements:

1. Install and maintain a 5-inch mesh barrier net. The new net must receive regular inspection, maintenance, and repairs on at least a quarterly basis. Any holes promptly repaired.

New net placed in service on January 16, 1996. Inspections have been averaging either monthly or more often. Any holes are repaired immediately.

2. Retain the existing 8-inch mesh barrier net as a back up in case the 5-inch net is lowered due to actual or potential fouling. Inspect and maintain the existing net at least quarterly. Any holes repaired promptly.

   The existing 8-inch mesh net is in place and is being inspected and maintained quarterly. The new net has not been lowered since it was placed in service due to fouling.

3. FPL must continue its current program to capture and release turtles from the intake canals through permits issued by FDEP.

   The turtle capture program continues to operate as before under FDEP permits that are renewed annually.

4. Capture netting shall be conducted with surface floating tangle nets with unweighted lead line. The nets must be inspected hourly from a boat. Netting to be conducted 8 hours a day, 5 days a week except during other specified times when it is done daylight to dark or 12 hours per day, 7 days a week.

   Netting continues to be conducted in the prescribed manner and for 12 hours a day, 7 days a week except during inclement weather.

5. If a turtle is seen west of the 8-inch barrier net directed efforts shall be undertaken to capture the turtle before it enters the plant intakes.

   Since the installation of the new barrier net, we have had very few turtles west of the 8-inch net. None of these were seen west of the net and their presence was not apparent until they were seen in the intake wells.

6. The gratings at each of the intake wells shall be visually checked for turtles at least 8 times each 24 hour period. If a turtle is sighted in the well, dip nets or other non-injurious methods should be used to remove turtles.

   A. **Both Operations and Security personnel have standing procedures to inspect the wells during their normal shift rounds which would be every 2 to 3 hours. FPL turtle capture personnel also inspect the wells as time permits.**
   B. **Dip nets and specially padded holding boxes are positioned at each intake structure with instructional signs mounted on the boxes to help people properly handle the turtles until capture personnel can come and pick them up.**

7. Since the increasing numbers of turtles entering the intake canal could become financially

burdensome to FPL and little is known about the factors causing the turtles to be attracted to our intake structures, FPL must design and implement a study to collect information on the behavior of turtles at the velocity caps. The recommended method is remote videography. Submittal of a plan required by 6/30/97. Once initiated, quarterly progress reports are required with a final report by 12/31/98.

To date some preliminary planning has been accomplished. The purpose of this meeting is to present that preliminary plan for concurrence and to provide further direction and guidance.

8. FPL must continue to participate in the STSSN under proper permits and authority in order to assess any possible delayed lethal impacts of capture as well as to provide background data on the mortality sources and health of local sea turtles.

FPL continues to be a part of the stranding and salvage network as required.

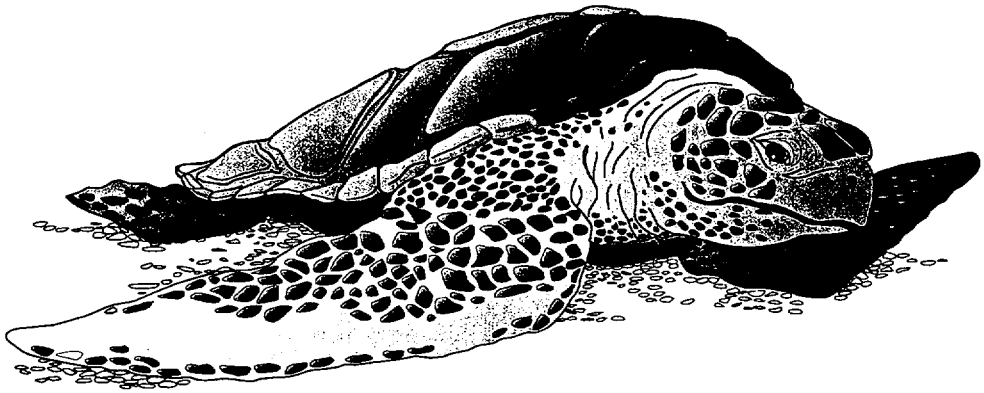
9. FPL should continue to conduct beach nesting surveys and public service turtle walks.

FPL continues to conduct these programs as before. Nesting surveys commenced on April 15 and reservations are currently being taken for this year's turtle walks.

10. Monthly reports covering sea turtle entrapment, capture efforts, turtle mortalities, available information on barrier net inspections and maintenance, and the Taprogge cleaning system operation and any sponge ball loss at St. Lucie Plant shall be furnished to NMFS. An annual report discussing these topics will be furnished to NMFS. A meeting between FPL, the NRC, and NMFS to discuss endangered and threatened species will be held approximately every two years beginning January 1998.

    A. **Monthly reports covering turtle activities and net maintenance will be provided pending transmittal of the Biological Opinion to the site by the NRC.**
    B. **Monthly reports on the Taprogge system and sponge ball loss have been provided to NMFS starting with the April, 1997 report.**
    C. **NMFS will receive a copy of the annual report for 1996 covering these topics, with the exception of net maintenance. Net maintenance will be added to next year's and subsequent reports.**
    D. **The first meeting will be scheduled as required.**

Florida Power & Light Company St. Lucie Plant Unit 2



FPL

St. Lucie Nuclear Plant
Sea Turtle Refuge

Annual Environmental Operating Report (FPL-96) April 1997

A/21

(D/LU/950169-F3)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT 2

ANNUAL ENVIRONMENTAL
OPERATING REPORT
1996

FLORIDA POWER AND LIGHT COMPANY
JUNO BEACH, FLORIDA

QUANTUM RESOURCES, INC.
PALM BEACH GARDENS, FLORIDA

ENVIRONMENTAL OPERATING REPORT

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EXECUTIVE SUMMARY

INTRODUCTION

The St. Lucie Plant is an electric generating station on Hutchinson Island in St. Lucie County, Florida. The plant consists of two nuclear-fueled 850 net MWe units; Unit 1 was placed on-line in March 1976 and Unit 2 in May 1983. This document has been prepared to satisfy the requirements contained in the United States Nuclear Regulatory Commission's Appendix B Environmental Protection Plan (EPP) to St. Lucie Unit 2 Facility Operating License No. NPF-16. This report discusses environmental protection activities related to sea turtles as required by Subsection 4.2 of the EPP. Other routine annual reporting requirements are addressed in Volume 2.

TURTLE NESTING SURVEY

Since monitoring began in 1971, there have been considerable year-to-year fluctuations in sea turtle nesting activity on Hutchinson Island. However, data collected through 1996 have shown no long-term reductions in nesting on the island. Relatively high nesting during recent years may actually reflect an increase in the number of nesting females in the study area. On a smaller scale, power plant operation has had no significant effect on nesting near the plant. Low nesting activity in 1975 and again in 1981-1983 in the vicinity of the plant was attributed to nighttime construction activities associated with installation of plant intake and discharge structures. Nesting returned to normal or above normal levels following both periods of construction. During 1991, daytime construction activities associated with velocity cap repairs had no apparent effect on nesting. Formal requirements to conduct nesting surveys expired in 1986, but this program was voluntarily continued

through 1996 with agreement from federal and state agencies.

INTAKE CANAL MONITORING

Since plant operation began in 1976, 5038 sea turtles (including recaptures) representing five different species have been removed from the intake canal. The majority of the turtles captured (59 percent) were loggerheads. Differences in the numbers of turtles found during different months and years, including dramatic increases in green turtle captures in recent years, have been attributed primarily to natural variation in the occurrences of turtles in the vicinity of the plant, rather than to operational influences of the plant itself. The majority of turtles removed from the intake canal (about 94 percent) were captured alive and released back into the ocean. Ongoing evaluations and improvements to the canal capture program have substantially reduced mortalities of entrapped sea turtles during recent years. Turtles confined between the barrier net and intake headwalls typically reside in the canal for a relatively short period prior to capture, and most are in good to excellent condition when caught. An improved design barrier net completed in January 1996 is expected to further reduce the residence times and potential for mortalities to sea turtles in the intake canal system.

INTRODUCTION

BACKGROUND

This document has been prepared to satisfy the requirements contained in the United States Nuclear Regulatory Commission's (NRC) Appendix B Environmental Protection Plan to St. Lucie Unit 2 Facility Operating License No. NPF-16.

St. Lucie Plant 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. Jurisdiction for sea turtle studies is with the NRC, which is considered to be the lead federal agency relative to consultation under the Endangered Species Act. Previous results dealing with sea turtle studies are contained in twelve annual environmental operating reports covering the period from 1983 through 1995. This report describes the 1996 environmental protection activities related to sea turtles, as required by Subsection 4.2 of the St. Lucie Plant Unit 2 Environmental Protection Plan.

AREA DESCRIPTION

The St. Lucie Plant is located on a 457-hectare site on Hutchinson Island on Florida's east coast (Figures 1 and 2). The plant is approximately midway between the Ft. Pierce and St. Lucie Inlets. It is bounded on the east side by the Atlantic Ocean and on the west side by the Indian River Lagoon. Hutchinson Island is a barrier island that extends 36 km between inlets and obtains its maximum width of 2 km at the plant site. Elevations approach 5 m atop dunes bordering the beach and decrease to sea level in the mangrove swamps that are common on much of the

western side. The Atlantic shoreline of 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 Florida Current, which flows parallel to the continental shelf margin, begins to diverge from the coastline at West Palm Beach. At Hutchinson Island, the current is approximately 33 km offshore. Oceanic water associated with the western boundary of the current periodically meanders over the inner shelf, especially during summer months.

PLANT DESCRIPTION

The St. Lucie Plant consists of two 850 net MWe nuclear-fueled electric generating units that use near shore ocean waters for the plant's once-through condenser cooling water system. Water for the plant enters through three submerged intake structures located about 365 m offshore (Figure 2). Each of the intake structures is equipped with a velocity cap to minimize fish entrainment. From the intake structures, the water passes through submerged pipes (two 3.7 m and one 4.9 m in diameter) under the beach and dunes that lead to a 1,500m long intake canal, which transports water to the plant. After passing through the plant, the heated water is discharged into a 670m long canal that leads to two buried discharge pipelines. These pass underneath the dunes and beach 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.

TURTLES

INTRODUCTION

Hutchinson Island, Florida, is an important rookery for the loggerhead turtle, Caretta caretta, and also supports some nesting of the green turtle, Chelonia mydas, and the leatherback turtle, Dermochelys coriacea. All three species are protected by state and federal statutes. The federal government has classified the loggerhead turtle as a threatened species. The leatherback turtle and the Florida nesting population of the green turtle are listed by the federal government as endangered species. It has been a prime concern of FPL that the St. Lucie Plant would not adversely affect the Hutchinson Island rookery. Because of this concern, FPL has sponsored monitoring of marine turtle nesting activity on the island since 1971.

Daytime surveys to quantify nesting, as well as 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) were pre-operational. Though the power plant was not operating during 1975, St. Lucie Plant Unit No. 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. Construction had been completed and 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. During this study, four of the previously established 1.25 km-long survey areas were monitored. Additionally, eggs from turtle nests potentially endangered by construction activities were relocated.

Every year from 1981 through 1996, 36 1km long survey areas comprising the entire island were monitored seven days a week during the nesting season (Figure 3). Beginning in 1994, the southern half of the island has been surveyed by Ecological Associates of Jensen Beach, Florida, and their data is included in this report. The St. Lucie Plant Unit 2 discharge structure was installed during the 1981 nesting season. Offshore and beach construction of the Unit 2 intake structure proceeded throughout the 1982 nesting season and was completed near the end the 1983 nesting season. Construction activities associated with installation of both structures were similar to those conducted when Unit 1 intake and discharge structures were installed. Eggs from turtle nests potentially threatened by construction activities were relocated.

During 1991, another 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. However, in contrast to previous offshore projects, 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 implemented in support of the project included caging of nests along a 1,500 m section of beach west of the platform and release of hatchlings to unaffected areas to the north and

south. This plan was intended to mitigate any negative effects potentially resulting from required safety and navigational lighting on and near the platform.

Requirement 4.2.1 of the NRC's St. Lucie Unit 2 Appendix B Environmental Protection Plan was complete with submission of the 1986 nesting survey data (ABI, 1987). The nesting survey was continued voluntarily through 1996 with agreement from federal and state agencies. Results are presented in this report and discussed in relation to previous findings.

In addition to monitoring sea turtle nesting activities and relocating nests away from plant construction areas, removal of turtles from the intake canal has been an integral part of the St. Lucie Plant environmental monitoring program. 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 entrapped in the intake canal have been systematically captured, measured, weighed, tagged and released.

Previous publications and technical reports have presented findings of the nesting surveys, nest relocation activities and canal capture program (ABI, 1994)(Quantum, 1995,1996). Results of studies to assess the effects of thermal discharges on hatchling swimming speed have also been reported (ABI, 1978). In July of 1994, responsibility for sea turtle research and conservation activities was transferred from Ecological Associates, Inc. (formerly Applied Biology, Inc.) to Quantum Resources, Inc. Methodologies employed in both the nesting surveys and canal capture operations remained essentially unchanged so that data collected in

1994 and future years are directly comparable to previous years data. The purpose of this report is to: 1) present 1996 sea turtle nesting survey data and summarize observed spatial and temporal nesting patterns since 1971, 2) document and summarize predation on turtle nests since 1971, and 3) present 1996 canal capture data and summarize comparable data collected since 1976.

MATERIALS AND METHODS

Nesting Survey

Methodologies used during previous turtle nesting surveys on Hutchinson Island were described in earlier reports (ABI 1994). Methods used during the 1996 survey were designed to allow comparisons with these previous studies.

In 1996, only areas A-S were surveyed by Quantum Resources biologists (Figure 3). Data supplied by Ecological Associates, Inc. are used to provide whole island nesting totals in Figures 6,8, and 9.

From March 29, 1996 through April 15, 1996, preliminary nest surveys were conducted along Hutchinson Island in areas A-S. Five leatherback turtle nests and seven loggerhead turtle nests were found in areas A-S prior to the beginning of formal nesting surveys on April 15, 1996. From April 15, 1996 through September 15, 1996, nest surveys were conducted on a daily basis. The last nest recorded in area A-S was on September 13, 1996. Biologists used small off-road motorcycles to survey the island each morning. New nests, non-nesting emergences (false crawls), and nests destroyed by predators were recorded for each of the 1-km-long survey areas A - S (Figure 3). The 1.25-km-long survey areas established in earlier studies also were monitored so comparisons could be made with previous studies.

Data collected from beach nesting surveys were reported to the Florida Department of Environmental Protection (DEP) as part of the DEP Index Nesting Beach Survey. In a cooperative effort, data from stranded turtles found during beach surveys were routinely provided to the Florida Department of Environmental Protection and the National Marine Fisheries Service (NMFS) through the Sea Turtle Stranding and Salvage Network.

Intake Canal Monitoring

Most turtles entrapped in the St. Lucie Plant intake canal were removed by means of large-mesh tangle nets fished between the intake headwalls and a barrier net located at the Highway A1A bridge (Figure 2). Nets used during 1996 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 unweighted lines used along the bottom. Turtles entangled in the nets generally remained at the water's surface until removed. Since its inception in 1976, the canal capture program has been under continual review and refinement in an attempt to minimize both entrapment time and injuries/mortalities to entrapped sea turtles. Prior to April 1990, turtle 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). Additionally, 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 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 from nets and provided an opportunity to improve daily assessments of turtle levels within the canal. Records of daily canal observations were compared with capture data to assess capture efficiencies.

In 1978, a barrier net at the A1A bridge 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 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 uncontained by the A1A barrier net were usually removed from the canal at the intake wells of Units 1 and 2 (Figure 2). There they were retrieved by means of large mechanical rakes or specially designed nets. Following construction of the UIDS barrier, all but the smallest individuals were unable to reach the intake wells. Improvements made to the A1A

barrier net during 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 turtles encountered in the intake canal in recent years, an improved design, small mesh barrier net was erected east of the A1A barrier net. Construction was complete in January 1996. This improved barrier net is designed to confine all turtles with a carapace width greater than 18 cm to the extreme eastern portion of the intake canal.

Formal daily inspections of the intake canal were made to determine the numbers, locations and species of turtles present. Surface observations were augmented with periodic underwater inspections, particularly in and around the barrier nets.

In addition to the use of tangle nets, dip nets and hand captures using snorkel and SCUBA are also employed. Long handled dip nets, employed from small boats, the canal banks and headwall structures are moderately effective in capturing turtles with carapace lengths of about 30 cm or less. Divers are employed to hand capture turtles whenever underwater visibility permits, and this technique has proven highly effective in the capture of turtles of all sizes, particularly less active individuals often found partially buried in the sediment in the vicinity of the A1A barrier net. Hand capture efforts have had a significant impact in reducing entrapment times for turtles in the intake canal.

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.). Beginning in July 1994, all turtles captured

have been photographed dorsally and ventrally prior to release, and the photographs retained for future reference. Healthy turtles were released into the ocean the same day of capture. Sick or injured turtles were treated and occasionally held for observation prior to release. When treatment was warranted, injections of antibiotics and vitamins were administered by permitted veterinarians.

Resuscitation techniques were used if a turtle was found that appeared to have died recently. Beginning in 1982, necropsies were conducted on dead turtles found in fresh condition.

Florida Power & Light Company and Quantum Resources, Inc., continued to assist other sea turtle researchers in 1996. Since the program began, data, specimens and/or assistance have been given to the Florida Department of Environmental Protection, National Marine Fisheries Service, US Fish and Wildlife Service, US Army Corps of Engineers, Smithsonian Institution, South Carolina Wildlife and Marine Resources Division, Center for Sea Turtle Research (University of Florida), Florida Atlantic University, University of Central Florida, Texas A & M University, University of Rhode Island, University of South Carolina, University of Illinois, University of Georgia, Virginia Institute of Marine Science, Western Atlantic Turtle Symposium, South Atlantic Fishery Management Council, Florida Marine Fisheries Commission, Harbor Branch Oceanographic Institution and the National Research Council.

RESULTS AND DISCUSSION

Nesting Survey

1996 Loggerhead Nesting Summary

In 1996, 7583 Loggerhead turtle nests were recorded in the 36 one kilometer segments comprising Hutchinson Island. This figure is in accordance with a general increase in loggerhead turtle nesting on Hutchinson Island since surveys began in 1971, although significant year to year fluctuations are evident. Loggerhead nests and emergences for survey areas A-S are presented in Figure 4.

Spatial Distribution of Loggerhead Turtle Nests

From 1981 through 1996, 36 1km long segments comprising the island's coastline have been surveyed. The distribution of nests among these 36 survey areas has shown an increase in nesting from north to south along the northern half of the island (ABI, 1987, 1994). Along the southern half of the island there has either been no gradient or a gradient of decreasing nesting from north to south. Though beach dynamics may sometimes affect the selection of nesting sites by loggerhead turtles, relationships between spatial nesting patterns and specific environmental conditions are often difficult to establish because of the interrelationship of the factors involved.

Not all ventures onto the beach by a female turtle culminate 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) suggested that relatively high percentages of false crawls may reflect disturbances

or unsatisfactory nesting beach characteristics. Therefore, certain factors may affect a turtle's preference to emerge on a beach, while other factors may affect a turtle's tendency to nest after it has emerged. An index which relates the number of nests to the number of false crawls in an area is useful in estimating the post-emergence suitability of a beach for nesting. In the present study this index is termed "nesting success" and is defined as the percentage of total emergences that result in nests. Loggerhead nesting success for areas A - S in 1996 is presented in Figure 5.

Historically, the pattern of loggerhead emergences on the island has generally paralleled the distribution of nests (ABI, 1987, 1994). In contrast, nesting success by loggerheads along the island has typically lacked gradients (ABI, 1987, 1994). Thus, the relatively high numbers of loggerhead nests observed in certain areas are usually a result of more turtles coming ashore in those areas rather than of more preferable nesting conditions being encountered by the turtles after they emerged. A variety of environmental factors (i.e., offshore bottom contours, distribution of reefs, type and extent of dune vegetation, and human activity on the beach at night) may effect loggerhead turtle emergence patterns and several have been reported to affect emergence patterns on Hutchinson Island (ABI, 1988, 1989). Undoubtedly, a combination of factors account for the overall distribution of emergences and therefore the overall nesting pattern on the island.

Nesting surveys on Hutchinson Island were initiated in response to concerns that the operation of the St. Lucie Plant might negatively impact the local sea turtle rookery. Previous analysis, using log-likelihood tests of independence (G-test; Sokal and Rohlf, 1981) 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, 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 construction. During 1991 when offshore construction was restricted almost entirely to daylight hours, nests were more abundant at the plant site than at the control site. Data collected through 1996 have shown that power plant operation exclusive of nighttime intake/discharge construction has had no apparent effect on nesting.

Long-Term Trends in Loggerhead Turtle Nesting

Various methods were used during surveys prior to 1981 to estimate the total number of loggerhead nests on Hutchinson Island based on the number of nests found in the nine 1.25km long survey areas (ABI, 1980a). Each of these methods was subsequently found to consistently overestimate island totals (ABI,1987). Since whole-island surveys began in 1981, it has been possible to determine the actual proportion of total nests deposited in the nine areas. This has allowed extrapolation from the nine survey areas to the entire island for years prior to 1981.

From 1981 through 1993 the total number of nests in the nine areas varied from 32.5 to 35.6 percent of the total number of nests on the island. This is slightly higher than the 31.3 percent which would be expected based strictly on the proportion of linear coastline comprised by the nine areas. Using the thirteen-year mean of 33.81 percent, estimates of the total number of nests on Hutchinson Island can be calculated by multiplying the number of nests in the nine areas by 2.958. This technique, when applied to the nine survey areas during the thirteen years in

which the entire island was surveyed, produced whole-island estimates within 5.3 percent of the actual number of nests counted. Because the proportion of nests recorded in the nine survey areas remained relatively constant over the last thirteen years, this extrapolation procedure provides a fairly accurate estimate of total loggerhead nesting for years prior to 1981, and is used to generate data points for 1971 through 1979 in figure 6.

It is clear that loggerhead nesting activity on Hutchinson Island fluctuates considerably from year to year (Figure 6). Annual variations in nest densities also are common at other rookeries, and may result from non-annual reproductive behavior. Nonetheless, data collected through 1996 suggest an overall increase in nesting on Hutchinson Island since surveys began in 1971. Total nesting activity was greatest during 1995 when 8184 loggerhead nests were recorded. No relationships between total nesting activity and power plant operation or intake/discharge construction were indicated by year-to-year variations in total nesting on Hutchinson Island.

Seasonal Patterns of Loggerhead Turtle Nesting

The loggerhead turtle nesting season usually begins between mid-April and early May, attains a maximum during June or July, and ends by mid-September (ABI, 1987). Nesting activity during 1996 followed this same pattern.

Cool water intrusions frequently occur over the continental shelf of southeast Florida during the summer (Smith, 1982). These intrusions may have been responsible for the temporary declines in loggerhead turtle nesting activity previously

observed on Hutchinson Island (ABI, 1994). Though natural fluctuations in temperature have been shown to affect temporal nesting patterns on Hutchinson Island, there has been no indication that power plant operation has affected these temporal patterns (ABI, 1988).

Predation on Loggerhead Turtle nests

Since nest surveys began in 1971, raccoon predation has been a major cause of turtle nest destruction on Hutchinson Island. Researchers at other locations have reported raccoon predation levels as high as 70 to nearly 100 percent (Hopkins et al., 1979). Raccoon predation of loggerhead turtle nests on Hutchinson Island has not approached this level during any study year, though levels for individual 1.25km long areas have been as high as 80 percent. Overall predation rates for survey years 1971 through 1977 were between 21 and 44 percent, with a high of 44 percent recorded in 1973. A pronounced decrease in raccoon predation occurred after 1977, and overall predation rates for the nine areas have not exceeded 10 percent since 1979. A decline in predation rates on Hutchinson Island may be attributable to trapping programs, construction activities, habitat loss and disease.

During 1996, raccoon predation levels were extremely low, with only 0.2 percent (9) of the loggerhead nests (n=3715) in areas A-S depredated by raccoons (Figure 7). As in previous years (ABI, 1994), predation of turtle nests was primarily restricted to the more undeveloped portions of the island.

Ghost crabs have been reported by numerous researchers as important predators of sea turtle nests (Hopkins et al., 1979; Stancyk, 1982). Though turtle

nests on Hutchinson Island probably have been depredated by ghost crabs since nesting surveys began in 1971, quantification of ghost crab predation did not begin until 1983.

Overall predation rates by ghost crabs have varied from 0.1 to 2.1 percent from 1983-1996. During 1996, 0.13 percent (5) of the loggerhead nests (n=3715) in areas A-S were depredated by ghost crabs (Figure 7). Nests destroyed by a combination of raccoon and ghost crab predation have been included as raccoon predations in previous discussions. When these combination predations are included as crab predations, the overall predation rates by ghost crabs range from 0.1 to 4.7 percent. During 1996, 0.16 percent (6) nests were destroyed by either ghost crabs or a combination of ghost crabs and raccoons.

1996 Green and Leatherback Nesting Summary

In 1996, 163 green turtle and 31 leatherback turtle nests were recorded in the 36 1-km-segments comprising Hutchinson Island. The green turtle total represents a substantial increase from last year's totals, while the leatherback total is essentially unchanged (Figures 8 and 9). Strong year to year fluctuations are common; however, and the general trend since 1971 may reflect an increase in the numbers of nesting females in the Hutchinson Island area.

Trends in Green and Leatherback Turtle Nesting

Green and leatherback turtles nest on Hutchinson Island, but in fewer numbers than loggerhead turtles. Prior to 1981, both survey (nine 1.25km long

sections) and inter-survey areas were monitored for the presence of green and leatherback nests. Thirty-one kilometers of beach from Area 1 south to the St. Lucie Inlet were included in that effort. During whole-island surveys from 1981 through 1993, only 2.6 percent (7) of the leatherback nests (n=266) and only 1.4 percent (12) of the green turtle nests (n=831) were recorded on the five kilometers of beach north of Area 1. Therefore previous counts of green and leatherback nests within the 21 kilometers surveyed probably were not appreciably different from total densities for the entire island. Based on this assumption, green and leatherback nest densities may be compared among all survey years, except 1980, when less than 15 kilometers of beach were surveyed.

Since surveys began in 1971, the number of nests observed on the island ranged from 5 to 195 for green turtles and from 1 to 52 for leatherbacks (Figures 8 and 9). Temporal nesting patterns for these species differ from the pattern for loggerhead turtles. Green turtles typically nest on Hutchinson Island from mid-June through the first or second week of September. Leatherback turtles usually begin nesting in March or April and continue to nest through early to mid-July. Considerable fluctuations in green turtle nesting on the island have occurred among survey years (Figure 8). This is not unusual since there are drastic year-to-year fluctuations in the numbers of green turtles nesting at other breeding grounds (Carr et al., 1982). Despite these fluctuations, data collected through 1996 suggest an overall increase in nesting since 1971 and may reflect an increase in the number of nesting females in the Hutchinson Island area. During 1996, green turtles nested most frequently along the southern half of the island. This is consistent with results of previous surveys.

Leatherback turtle nest densities have remained low on Hutchinson Island; however, increased nesting during recent years (Figure 9) may reflect an overall increase in the number of nesting females in the Hutchinson Island area.

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 (ABI, 1980b and 1986). The velocity caps 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 pipes before they encounter current velocities sufficiently strong to effect entrainment. Consequently, a turtle's entrapment relates primarily to the probability that it will detect and subsequently enter one of the intake structures.

1996 Canal Capture Summary

In 1996, 906 sea turtles were captured in the intake canal of the St. Lucie Plant. Captures included 349 loggerheads, 549 green turtles, 3 Kemp's ridleys, and 5 hawksbills (Table 1).

Relative Abundance and Temporal Distribution

Since intake canal monitoring began in May 1976, 2997 loggerhead (including 185 recaptures), 1973 green (including 298 recaptures), 18 leatherback, 31 Kemp's

ridleys and 18 hawksbill captures have taken place at the St. Lucie Plant. Annual catches for all species combined ranged from a low of 33 in 1976 (partial year of plant operation and monitoring) to 933 in 1995.

Except for 1993 through 1996 when the green turtle was the most abundant species in the canal, loggerheads have dominated annual captures. Since 1977, the first full year of plant operation, the number of loggerheads captured each year ranged from 62 in 1981 to 349 in 1996 (Figure 10). Numbers have exhibited considerable year-to-year fluctuations with no persistent trends evident, although recent years data are suggestive of a possible increasing trend.

The number of green turtles captured each year since 1977 have ranged from 3 in 1979 to a record high of 673 in 1995 (Figure 10). Increasing numbers of captures over recent years may reflect an increase in the number of turtles inhabiting the nearshore coastal area near the plant or may simply represent a natural variation. Another possibility relates to changes in the physical characteristics of the intake structures. As a result of a major reconstruction project undertaken in 1991, the structures may now be more attractive to green turtles, thereby increasing their probability of entrainment. Additional years of capture data will be required before any long-term trends can be established.

During 1996, the monthly catch of loggerheads ranged from 7 (November) to 87 (July), with a monthly mean of 29.1 (Table 2). Over the entire history of the capture program, monthly catches have ranged from 0 to 87, with the greatest number of captures occurring during July 1996.

During 1996, the monthly catch of green turtles ranged from 16 (May and June) to 147 (March), with a monthly mean of 45.7 (Table 3). The March 1996 catch of 147 green turtles is the largest number of captures for this species for any month on record. Seasonal abundance patterns of green turtles have typically been much more pronounced than for loggerheads, with over 50 percent of all captures occurring between January and March. In 1995 and 1996 however, no such seasonal pattern was evident, with captures distributed more or less evenly throughout the year.

Catches of leatherbacks, hawksbills and Kemp's ridleys have been infrequent and scattered throughout the 20 year study period. Each species has shown rather pronounced seasonal occurrences; over 60 percent of all leatherbacks were captured in March and April, over 60 percent of the hawksbills were captured between July and September, and almost 90 percent of the Kemp's ridleys were caught between December and April.

Size-Class Distributions

The size-class distribution for loggerheads removed from the intake canal in 1996 is presented in Figure 11. The size class distribution for green turtles removed from the intake canal in 1996 is presented in Figure 12. ABI(1994) presents size-class data for turtles removed from the intake canal from 1976-1993. All 3 Kemp's ridleys captured in 1996 were juveniles or subadults with a straight line carapace length (SLCL) of less than 60 cm (Hirth, 1980). Of the 5 hawksbills captured in 1996, three were juveniles or subadults (SLCL<63cm) (Witzell 1983) and two were adults.

Sex Ratios

Of the 349 loggerheads captured in 1996, 201 were juveniles with a straight line carapace length (SLCL) less than or equal to 70 cm, 111 were adults (SLCL > 85 cm) and 37 were transitional (SLCL 71-85 cm) (Hirth, 1980). The latter group probably includes both mature and immature individuals. Of the 111 individuals classified as adults for which sex was recorded, 98 were females and 6 were males, with females predominating by a ratio of 16.3:1.

Of the 549 green turtles in 1996, 541 were juveniles or sub-adults (SLCL < 83 cm) (Whitherington and Ehrhart, 1989). Of the 8 adult green turtles captured in 1996, 2 were males and 6 were females. ABI (1994) discusses sex ratio data for previous years.

Capture Efficiencies

Netting methodologies have been under continual review and refinement as net materials, configurations and placement have been varied in an effort to minimize sea turtle entrapment times. Additionally, alternative capture techniques have been evaluated, and potential deterrent systems tested in the laboratory. Current capture procedures have proven to provide a safe, efficient and cost-effective program for removing entrapped turtles from the intake canal.

Formal daily inspections of the intake canal are conducted every day that capture

nets are deployed, and the number, location and relative size of entrapped turtles are recorded on field observation forms. Better utilization of currents and eddies, adjustments to tethering lines, multi-net deployments and increased efforts to hand capture turtles have contributed to reduced entrapment times during recent years.

Entrapment times may be extended for turtles swimming past the A1A barrier net (ABI, 1987). Because capture efforts west of the A1A bridge were generally less effective than those near the intake headwalls, most turtles breaching the barrier net were not caught until they entered the intake wells of Units 1 and 2. Because of their relatively small sizes, virtually all the turtles reaching the intake wells are green turtles. During 1996, 15 of the 549 green turtle captures (2.7 percent) occurred at the intake wells. The substantial decrease in the percentage of captures at the plants intake wells compared to the 1995 figure of 14.5 percent is attributed to the effectiveness of the new small mesh barrier net installed East of AIA in January of 1996.

During 1996, 98.4 percent of all turtles entrapped in the canal were captured east of the A1A bridge, 736 by tangle nets and 155 by hand or dip net capture. The effective confinement of turtles east of A1A has been a major contributor to the high capture efficiency achieved during recent years. The installation of an improved barrier net completed in January 1996 has further increased capture efficiency by more effectively confining turtles of all sizes to a smaller area east to the A1A barrier net.

Relative Condition

Turtles captured alive in the intake canal of the St. Lucie Plant were assigned a relative condition based on weight, activity, parasite infestation, barnacle coverage, wounds, injuries and any other abnormalities which might have affected overall vitality. During 1996, 94.2 percent (329) of all loggerheads found in the canal were alive and in good condition. Only 4.8 percent (17) loggerhead captures involved individuals in fair or poor condition, and 0.8 percent (3) were dead. Of the 549 green turtles removed from the intake canal during 1996, 494 (90.0 percent) were in good condition, 55 (10.0 percent) were in fair or poor condition, and 5 (0.9 percent) were dead. The 3 Kemp's ridleys captured in 1996 were in good condition. The 5 hawksbills captured in 1996 were in good condition.

Relative condition ratings can be influenced by a number of factors, some related and others unrelated to entrainment and/or entrapment in the intake canal. A rating of good indicates that turtles have not been negatively impacted by their entrapment in the canal, at least as evidenced by physical appearance. Although ratings of fair or poor imply reduced vitality, the extent to which entrainment and entrapment is responsible is often indeterminable. In some instances, conditions responsible for lower ratings, such as boat collision or fisheries gear entanglement injuries, obviously were sustained prior to entrainment.

During 1996, 54 of the 906 turtles captured (5.9 percent) had notable injuries; such as, missing appendages, broken or missing pieces of carapace or deep lacerations. Many of these were old, well-healed wounds, and did not require veterinary attention.

Of the 899 live removals during 1996, 875 were released into the ocean the day of capture. Four small green turtles, which were very lethargic at the time of removal, were held over night for observation and released the following day. Generally, relatively low water and air temperatures at the time of capture were thought to be responsible for this condition. Nine turtles (3 loggerheads and 6 green turtles) in obvious ill health or suffering serious injuries were transported to Sea World of Florida or the Marinelife Center of Juno Beach for treatment and rehabilitation. One of the loggerheads had serious boat propeller injuries and two had fishing gear entanglement or ingestion injuries. All three injuries were almost certainly sustained outside the intake canal. One green turtle had injuries from monofilament line entanglement. One green turtle that drowned in a capture net was successfully resuscitated and transported for further rehabilitation. Four green turtles captured in lethargic and underweight to emaciated condition were also transported for rehabilitation. Forty two green turtles with fibropapilloma tumors were removed from the canal in 1996. Eleven turtles with extensive tumors were transferred to the Florida DEP for transportation to a rehabilitation facility. Thirty one turtles with minor tumors were tagged and released. Few turtles with fibropapillomas have been captured in the past at the St. Lucie Plant.

Mortalities

Sea turtle mortalities have been closely monitored throughout the life of the canal capture program in an attempt to assign probable causes and take appropriate remedial action to minimize future occurrences. Previous analyses of capture data identified drowning in nets (A1A barrier net, UIDS barrier, and tangle nets), drowning in the intake pipes during periods of reduced intake flow, injuries sustained from

dredging operations and injuries sustained from the mechanical rakes used in the intake wells as probable mortality factors (ABI,1987)(FPL, 1995). Although difficult to quantify, the entrapment and subsequent demise of injured or sick turtles has probably accounted for a portion of observed mortalities.

Over the entire 20 year monitoring period, 134 (4.5 percent) of the 2997 loggerheads and 47 (2.4 percent) of the 1973 green turtles entrapped in the canal were found dead. Mortalities spanned the range of size classes for loggerheads (SLCL = 47.5-103 cm), while all green turtle mortalities involved juveniles less than 42 cm in length. The four Kemp's ridley mortalities documented at the plant during 1987 and 1988 were the only deaths for this species to date; no dead leatherback or hawksbill turtles have been recovered at the St. Lucie Plant.

Modifications to capture procedures , improvements to the A1A barrier net and virtual elimination of low flow conditions within the canal have resulted in a substantial reduction in sea turtle mortalities over the life of the canal capture program. Mortality rate, expressed as the percentage of total captures involving dead animals, declined from 7.8 percent during the period 1976-1984 to 2.5 percent since 1984 (Table 1).

In 1996, seven turtles (4 green turtles and 3 loggerheads) were removed dead from the intake canal, for an overall mortality rate of 0.7%. One of the 4 green turtle mortalities was recovered from the plant intake wells. Three of the four green turtle mortalities were in fresh condition and one was moderately decomposed. All three of the loggerhead mortalities were recovered in the vicinity of the small mesh barrier net east of the A1A bridge. One loggerhead was fresh dead, and two were

moderately decomposed when recovered. In all cases, entanglement or impingement on the barriers was not evidently the cause of death. Four of the mortalities were held for DEP examination, and three were disposed of after consultation with DEP.

In response to the 1995 mortalities and the dramatic increase in intake canal captures in 1995, consultation was initiated with FPL, NRC, and the NMFS under Section 7 of the Endangered Species Act. As a result of that consultation, FPL has designed and constructed an improved, smaller mesh barrier net located between the A1A barrier net and the intake canal headwalls (Figure 2). Construction of the net was completed in January 1996. This barrier net prevents turtles from reaching the intake wells or UIDS barrier and should increase capture efficiency by confining turtles to a smaller area of the intake canal.

Recapture Incidents

Since the St. Lucie Plant capture program began, most turtles removed from the intake canal have been tagged and released into the ocean at various locations along 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, 483 recaptures (185 loggerheads and 298 green turtles) have occurred, and a number of turtles have been recaptured more than once. The large number of green turtles recaptured in 1996 (152) reflects the recent large increases in green turtle captures in recent years and probably also the saturation of local green turtle populations with turtles tagged at the St. Lucie Plant. Several other turtles with tag scars have also been recovered, indicating that the actual number of recaptures may be higher.

Occasionally, turtles are captured that have been tagged by other researchers. Six such captures occurred in 1996, 4 green turtles and 2 loggerheads with tags from the University of Florida, National Marine Fisheries Service, and Florida DEP. The original tagging organization was contacted and supplied with tag return data.

SUMMARY

A gradient of increasing loggerhead turtle nest densities from north to south along the northern half of Hutchinson Island has been shown during most survey years. This gradient may result from variations in beach topography, offshore depth contours, distribution of nearshore reefs, onshore artificial lighting and human activity on the beach at night. Low nesting activity in the vicinity of the power plant during 1975 and from 1981 through 1983 was attributed to nighttime construction activities associated with installation of power plant intake and discharge structures. Nesting returned to normal or above normal levels following both periods of construction. During 1991, daytime construction activities associated with velocity cap repairs had no apparent effect on nesting. Statistical analyses indicate that power plant operation, exclusive of nighttime construction, has had no significant effect on nest densities near the plant. In 1996, 7583 loggerhead turtle nests were recorded on Hutchinson Island. There have been considerable year-to-year fluctuations in loggerhead nesting activity on Hutchinson Island from 1971 through 1996. Fluctuations are common at other rookeries and may result from non-annual reproductive behavior. Despite these fluctuations, loggerhead nesting activity has remained high during recent years and may reflect an overall increase in the number of nesting females in the Hutchinson Island area. No relationship between total nesting on the island and power plant operation or intake/discharge construction was indicated.

Temporal nesting patterns of the Hutchinson Island population may be influenced by natural, large scale fluctuations in water temperature, such as those produced by the cool water intrusions that frequently occur over the continental shelf of southeast Florida during the nesting season. However, localized fluctuations in water temperature associated with power plant operation have had no apparent effect on nesting.

Since nesting surveys began in 1971, raccoon predation has been one of the major causes of turtle nest destruction on Hutchinson Island. From 1971 through 1977, overall predation rates in the nine survey areas were between 21 and 44 percent. However, a pronounced decrease in raccoon predation occurred after 1977, and overall predation rates in the nine survey areas have not exceeded ten percent since 1979. Decreased predation by raccoons probably reflects a decline in the raccoon population. More years of survey data will be required to determine if the extremely low level of raccoon predation in 1996 is an isolated occurrence or part of a continuing trend. Ghost crab predation on the turtle nests may be more significant than previously documented but remains relatively minor compared to raccoon predation.

During 1996, 163 green turtle and 31 leatherback turtle nests were recorded on Hutchinson Island. Nesting activity by these two species has exhibited considerable annual fluctuations, as has been recorded at other rookeries, but has remained relatively high during recent years. This may reflect an overall increase in the number of nesting green and leatherback turtles in the Hutchinson Island area.

During 1996, 349 loggerheads, 549 green turtles, 5 hawksbills, and 3 Kemp's

ridleys were removed from the St. Lucie Plant intake canal. Since monitoring began in May 1976, 2997 loggerhead, 1973 green, 18 leatherback, 18 hawksbill and 32 Kemp's ridley turtles have been captured and tagged. Over the life of the monitoring program, annual catches for loggerhead turtles have ranged from 33 in 1976 (partial year of plant operation and monitoring) to a high of 349 in 1996. Yearly catches of green turtles have ranged from 0 in 1976 to 673 in 1995. Differences in the number of turtles entrapped during different years and months are attributed primarily to natural variation in the occurrence of turtles in the vicinity of the offshore intake structures, rather than to plant operation characteristics.

Size-class distributions of loggerhead turtles removed each year from the canal have consistently been predominated by juveniles between 50 and 70 cm in straight line carapace length. Over 75 percent of all green turtles entrapped in the canal were juveniles 40 cm or less in length. For both species, the largest number of captures for all years combined occurred during winter, but, with the exception of 1995, and to lesser extent 1996, these seasonal peaks were much more pronounced for green turtles. Sex ratio of loggerheads caught in the canal continued to be biased towards females.

During 1996, about 94 and 90 percent, respectively, of all loggerheads and green turtles removed from the canal were categorized by physical appearance as being in good condition.

About six percent of the turtles removed from the intake canal during 1996 had substantial injuries, and many of those were apparently sustained prior to entrapment. Once in the canal, turtles confined east of A1A had very brief residency

times. Thus the relative condition of most turtles was not affected by their entrapment.

During 1996, mortalities of 4 green turtles and 3 loggerheads were recorded in the intake canal. Program modifications, including continual surveillance of tangle nets during periods of deployment, improvements to the integrity of the A1A barrier net and greater effort to hand capture turtles have contributed to a substantial decline in sea turtle mortalities during recent years. The design and construction of an improved barrier net completed in January 1996 should significantly reduce mortalities and entrapment times for turtles in the intake canal. Data for 1996 indicate that the new barrier net configuration has been highly effective in excluding turtles from the plant intake wells, and has contributed to the substantial reduction in mortality achieved in 1996.

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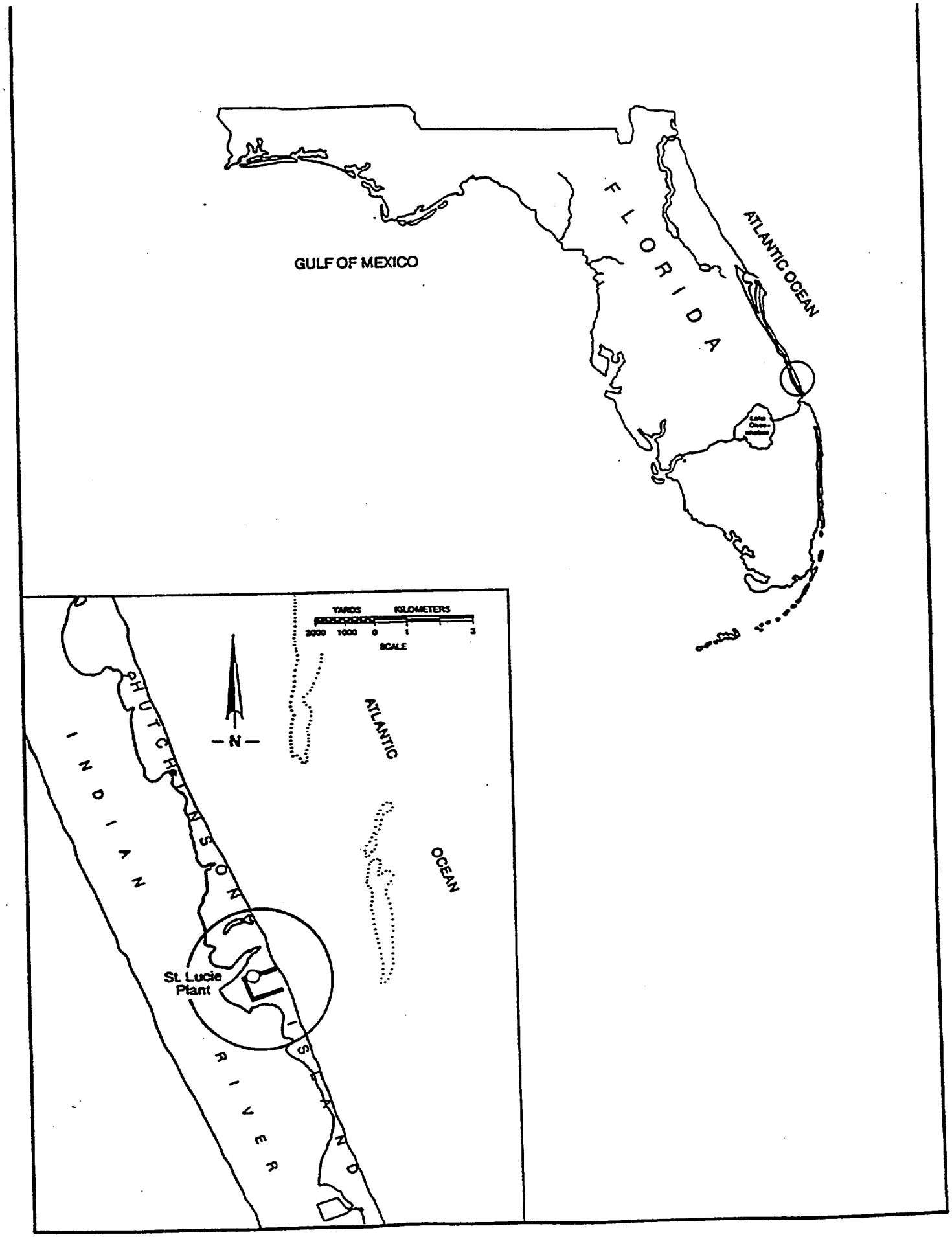

Figure 1. Location of the St. Lucie Plant.

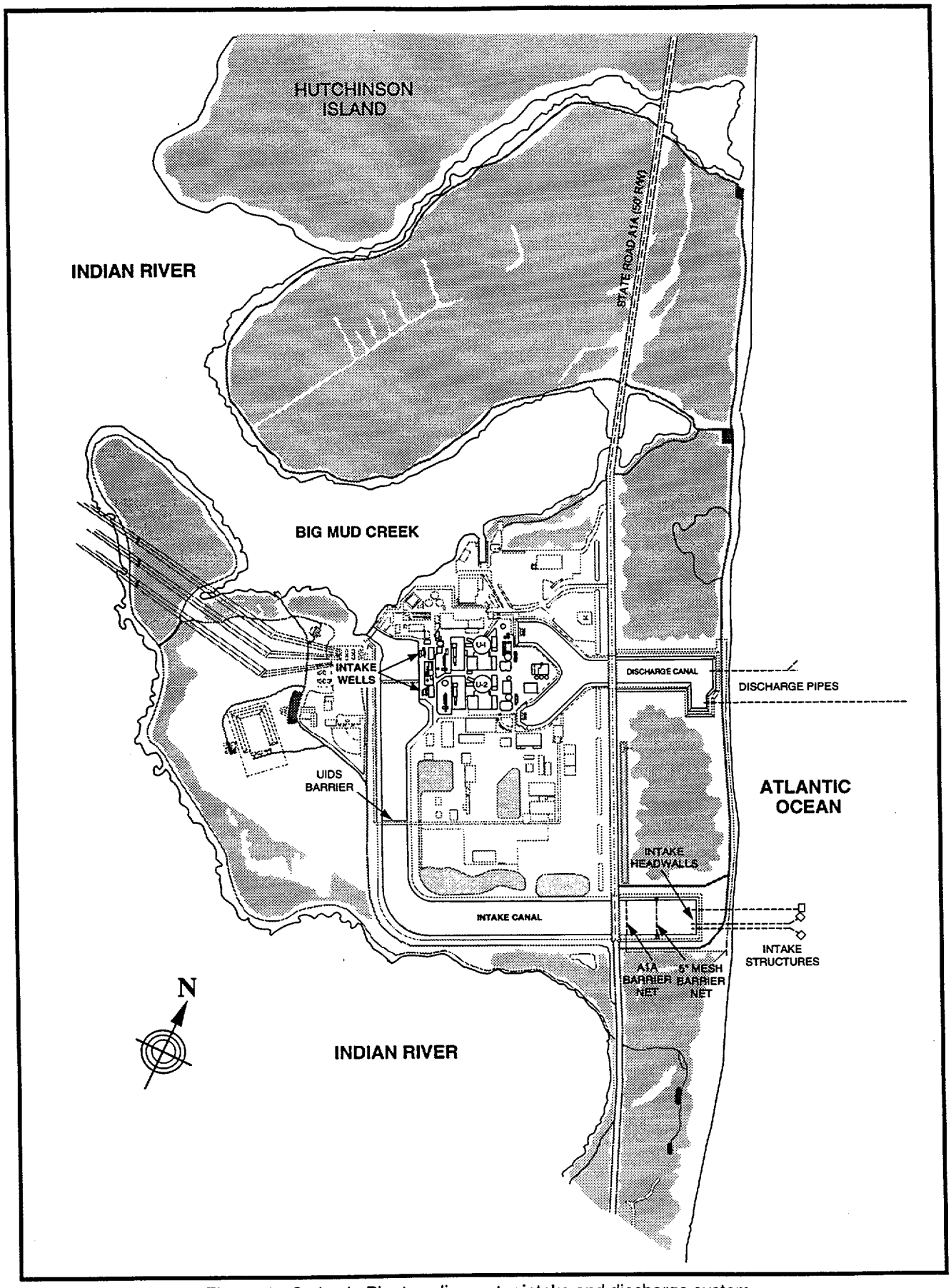

Figure 2. St. Lucie Plant cooling water intake and discharge system.

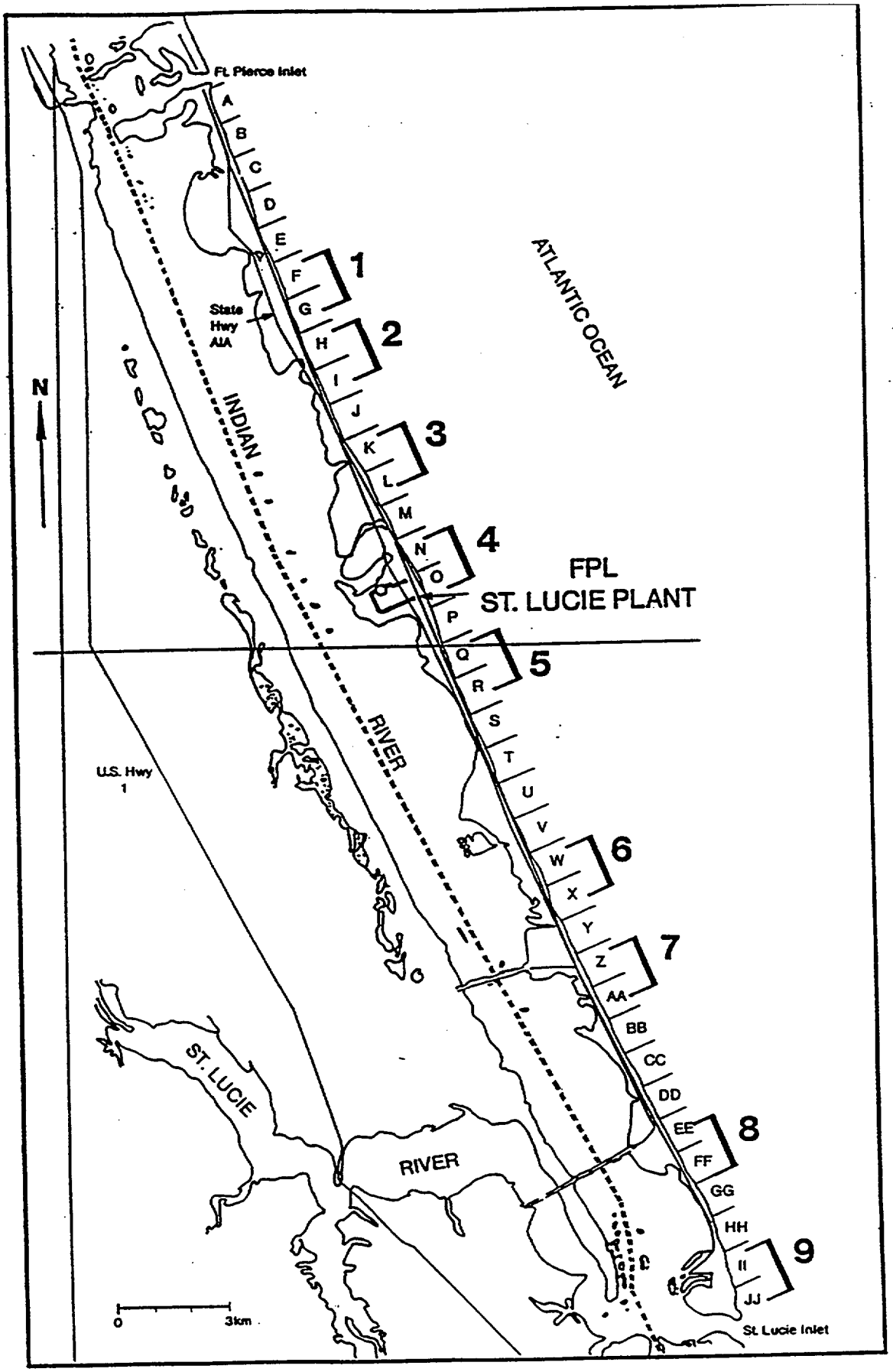

Figure 3. Designation and location of nine 1.25-km segments and thirty-six 1-km segments surveyed for sea turtle nesting, Hutchinson Island, 1971-1992.

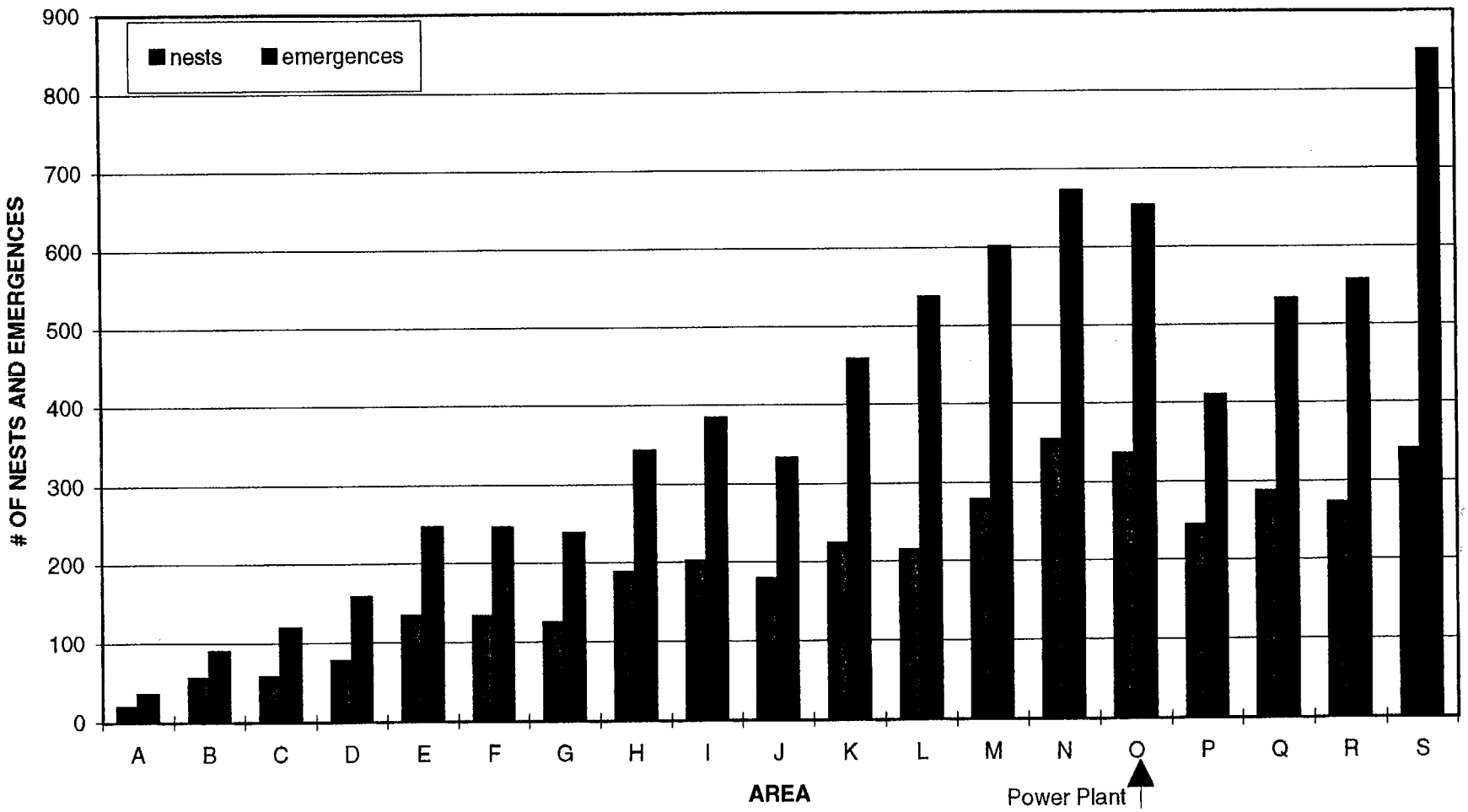

Figure 4. Number of loggerhead turtle nests and emergences for areas A through S, Hutchinson Island, April through September 1996.

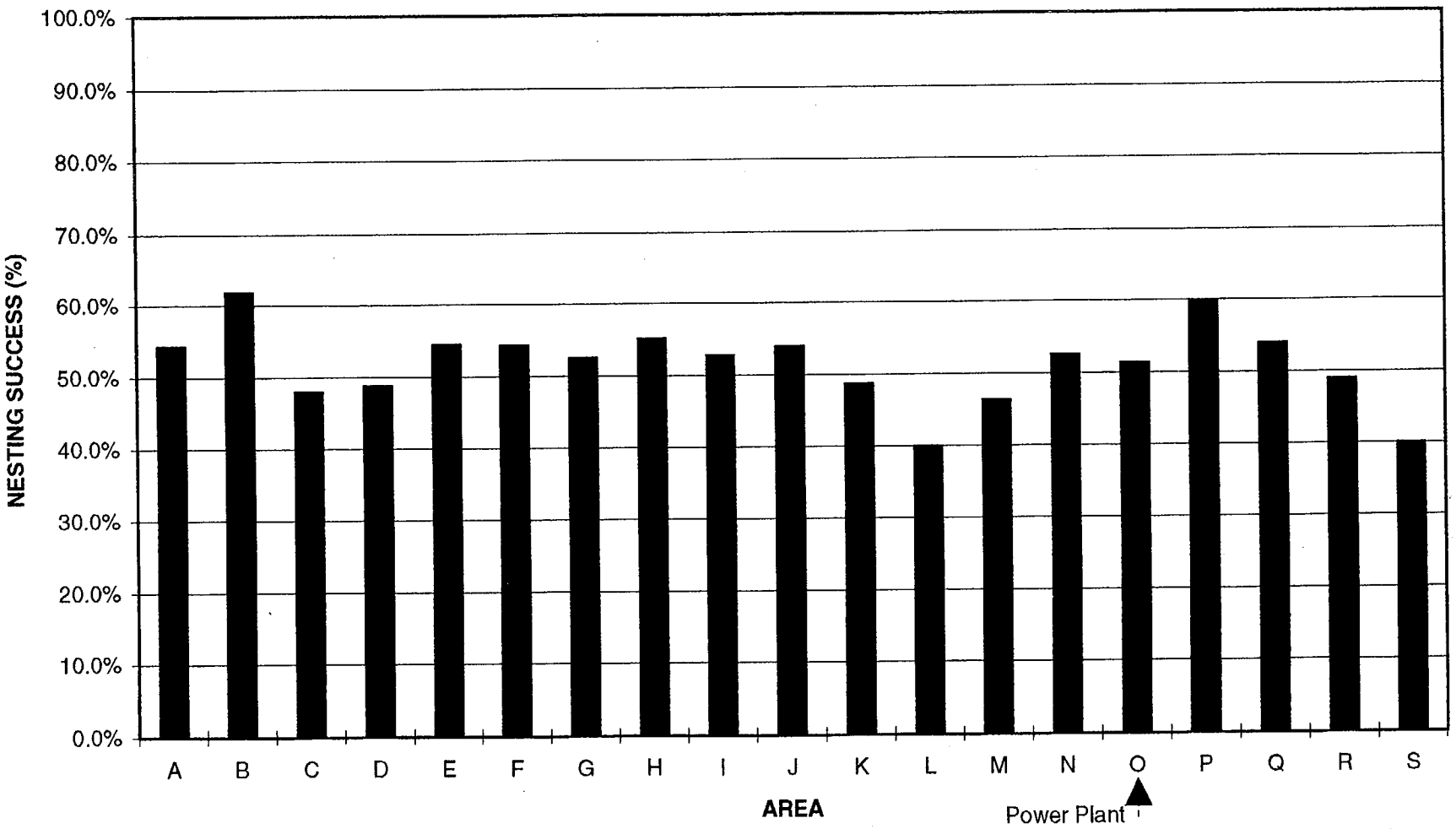

Figure 5. Loggerhead turtle nesting success (percentage of emergences resulting in nests) for areas A through S, Hutchinson Island, April through September 1996.

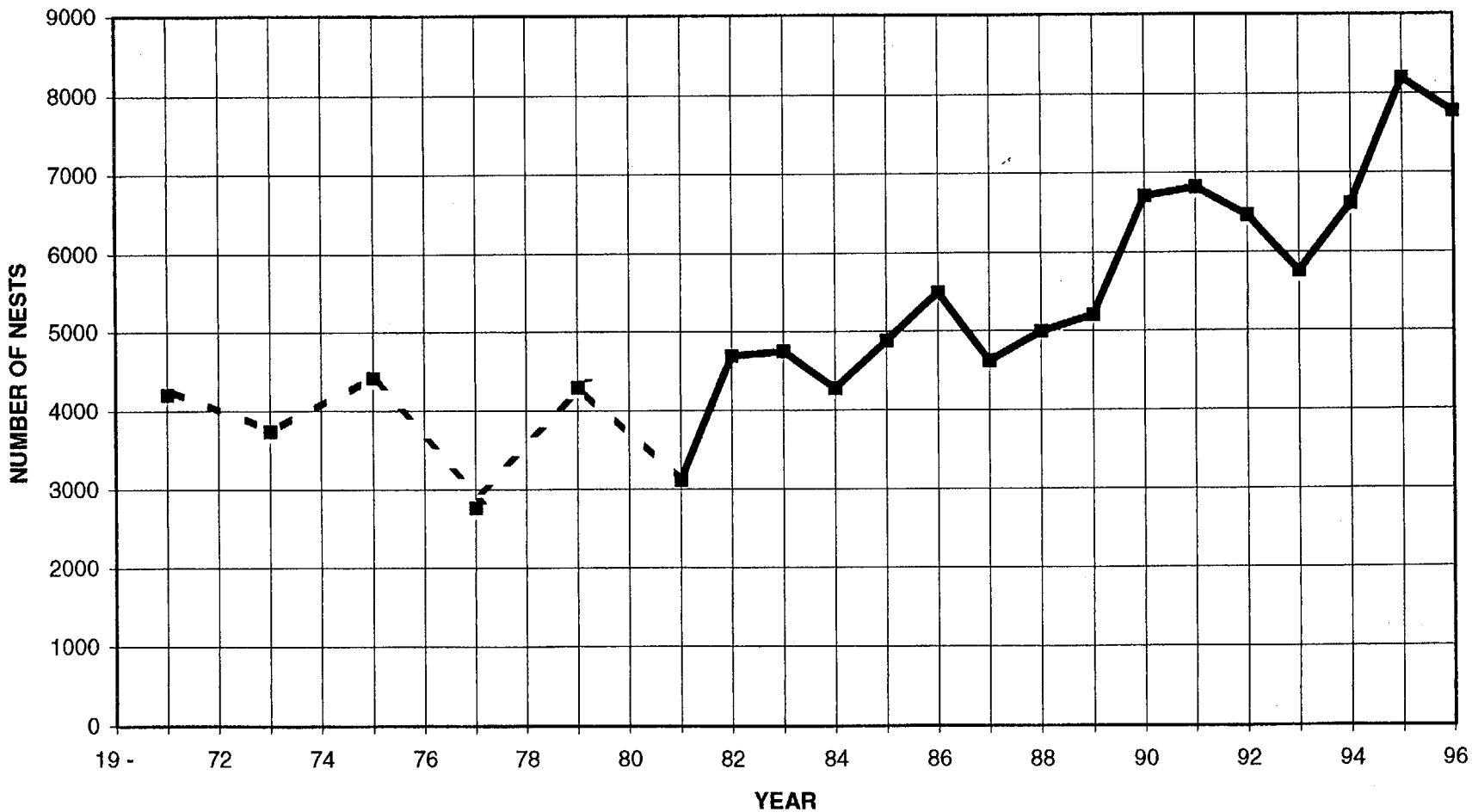

Figure 6. Number of loggerhead turtle nests, Hutchinson Island 1971 through 1996. Values for 1971 through 1979 are estimates (see text), values for 1981 through 1996 are from whole island surveys.

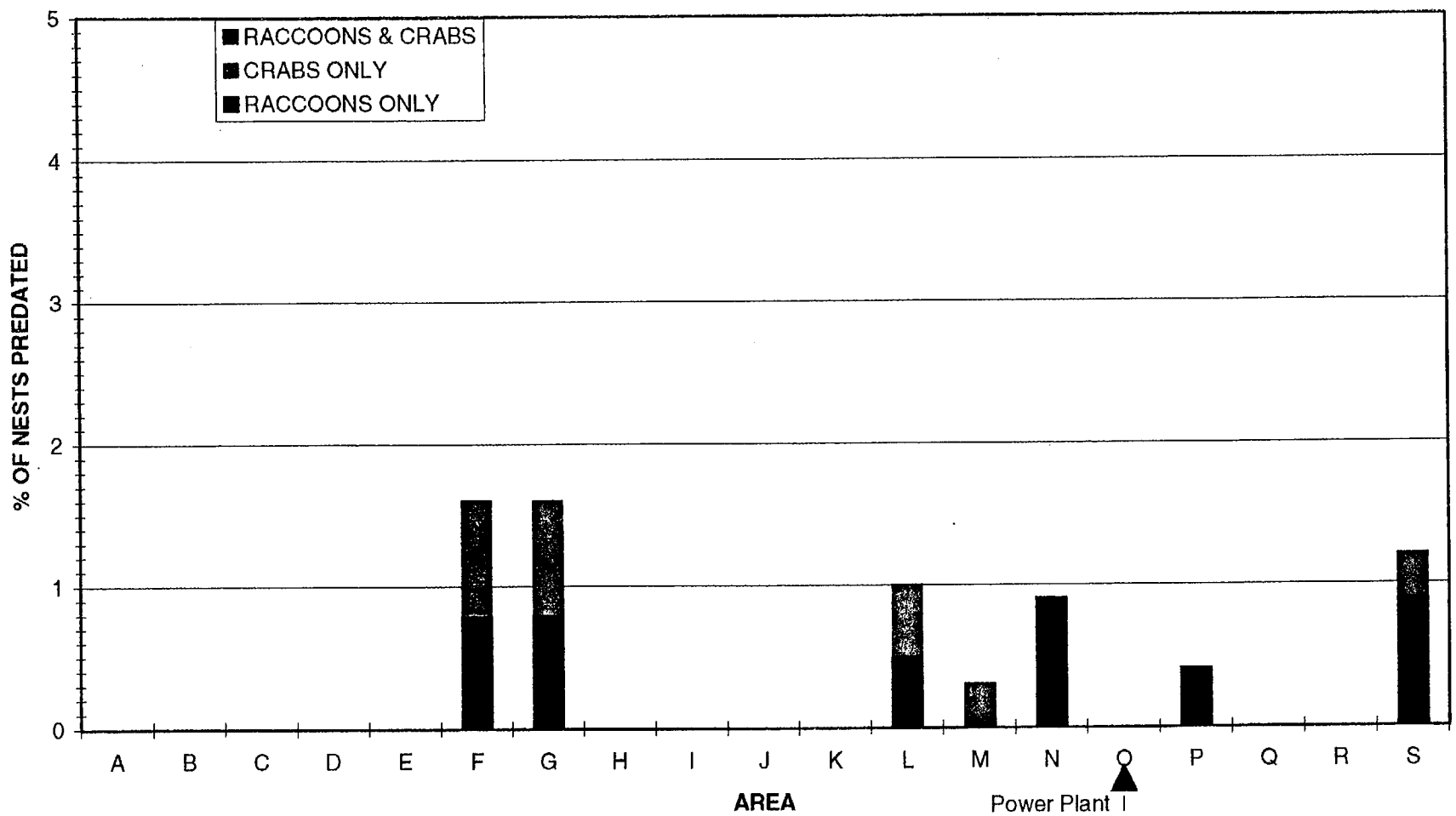

Figure 7. Percentage of loggerhead turtle nests predated by raccoons and/or ghost crabs in areas A through S, Hutchinson Island, April through September 1996.

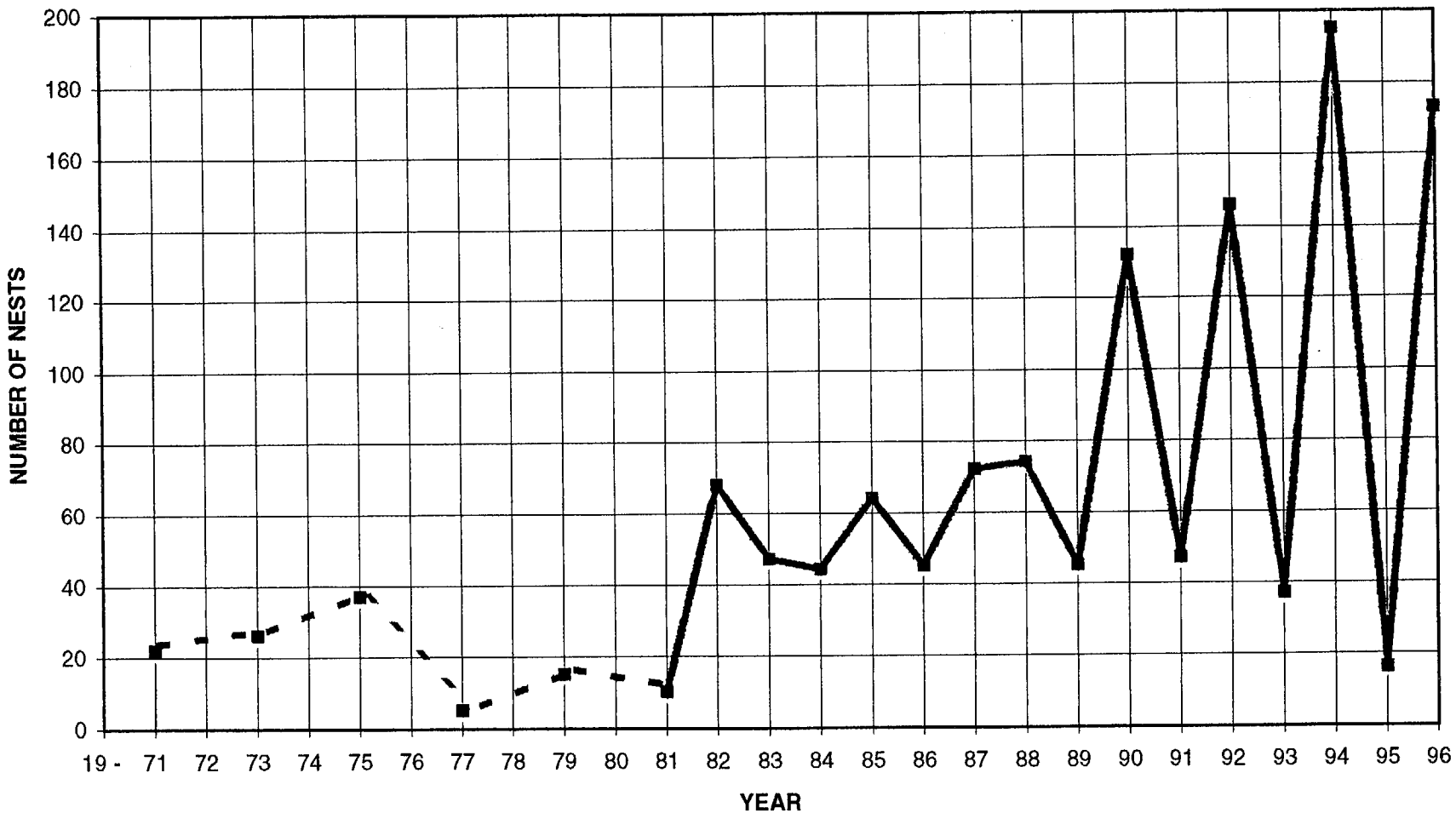

Figure 8. Number of green turtle nests, Hutchison Island, 1971 through 1996. Values for 1971 through 1979 are estimates (see text). Values for 1981 through 1996 are from whole island surveys.

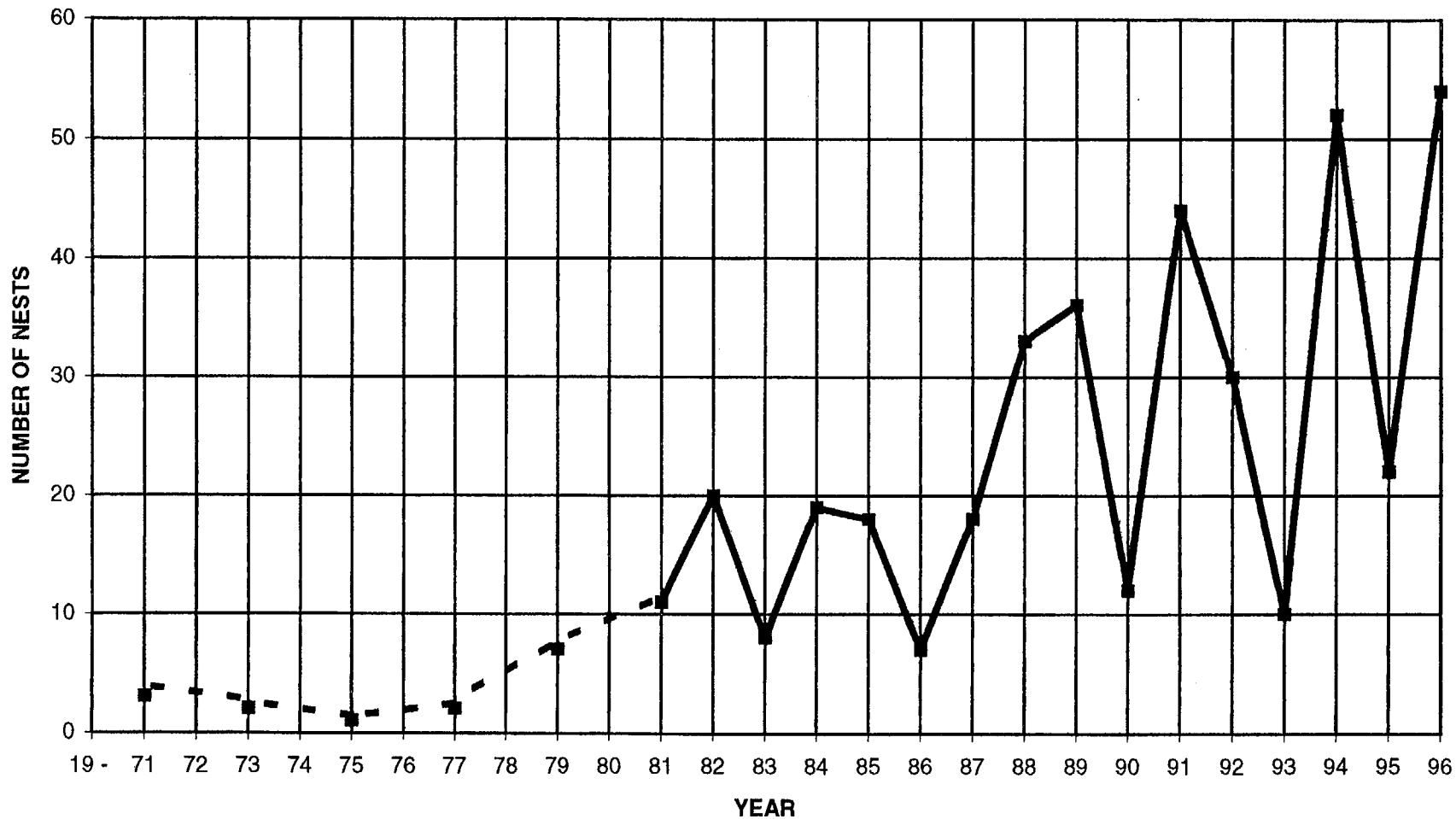

Figure 9. Number of leatherback turtle nests, Hutchinson Island, 1971 through 1996. Values for 1971 through 1979 are estimates (see text). Values for 1981 through 1996 are from whole island surveys.

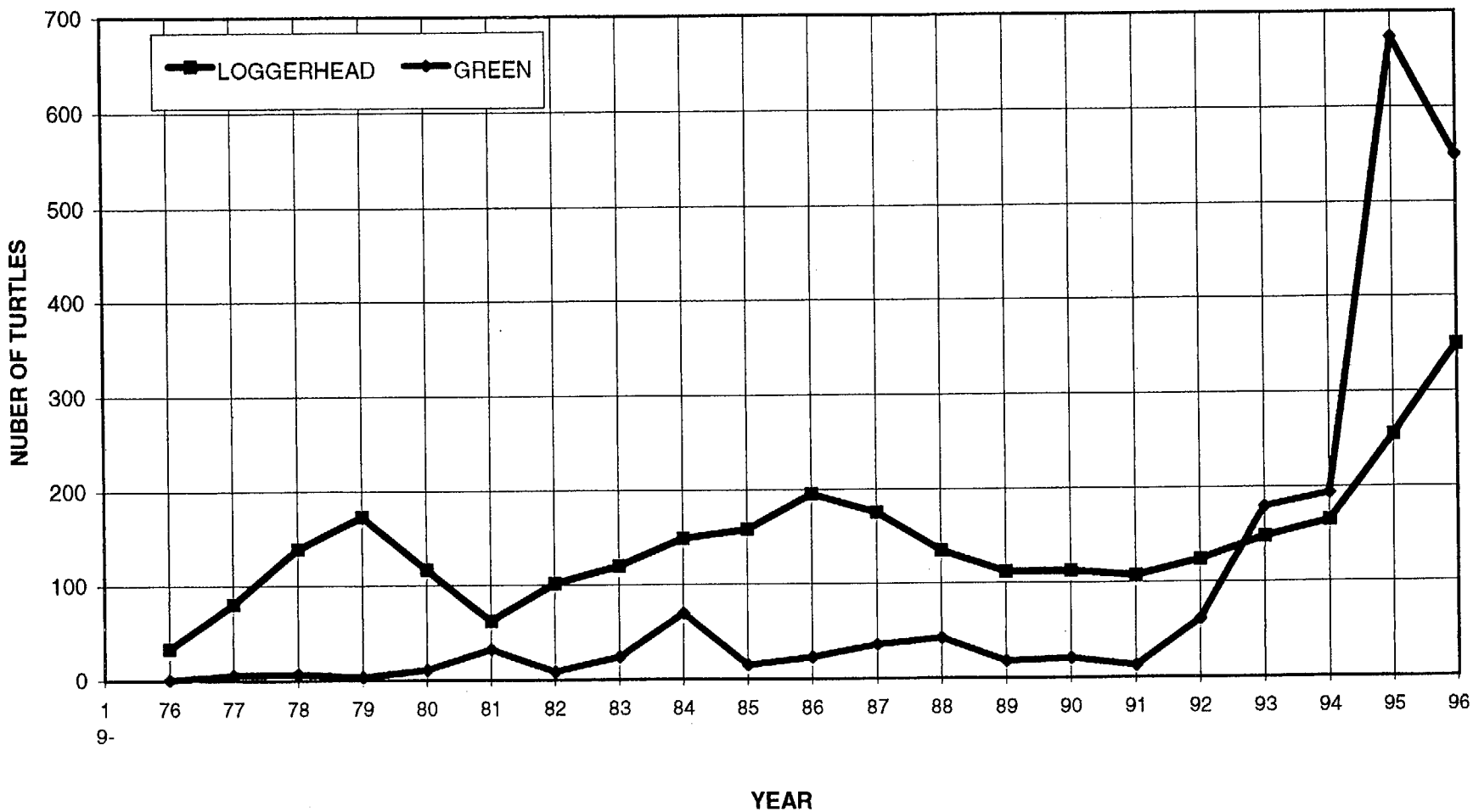

Figure 10. Number of loggerhead and green turtles removed each year from the intake canal, St. Lucie Plant, 1976 through 1996.

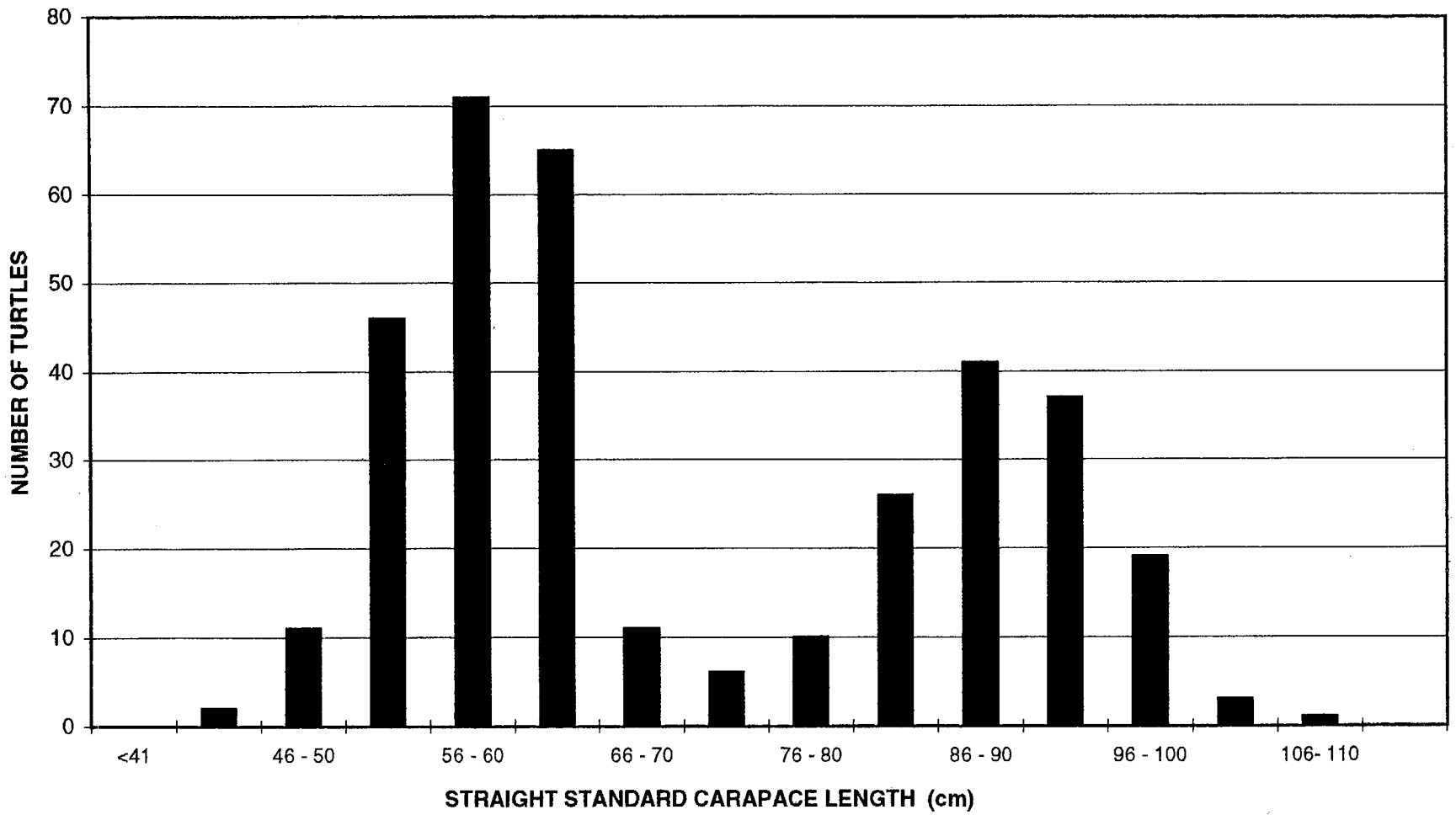

Figure 11. Length distribution (SSCL) of loggerhead turtles (N = 349) removed from the intake canal, St. Lucie Plant, 1996.

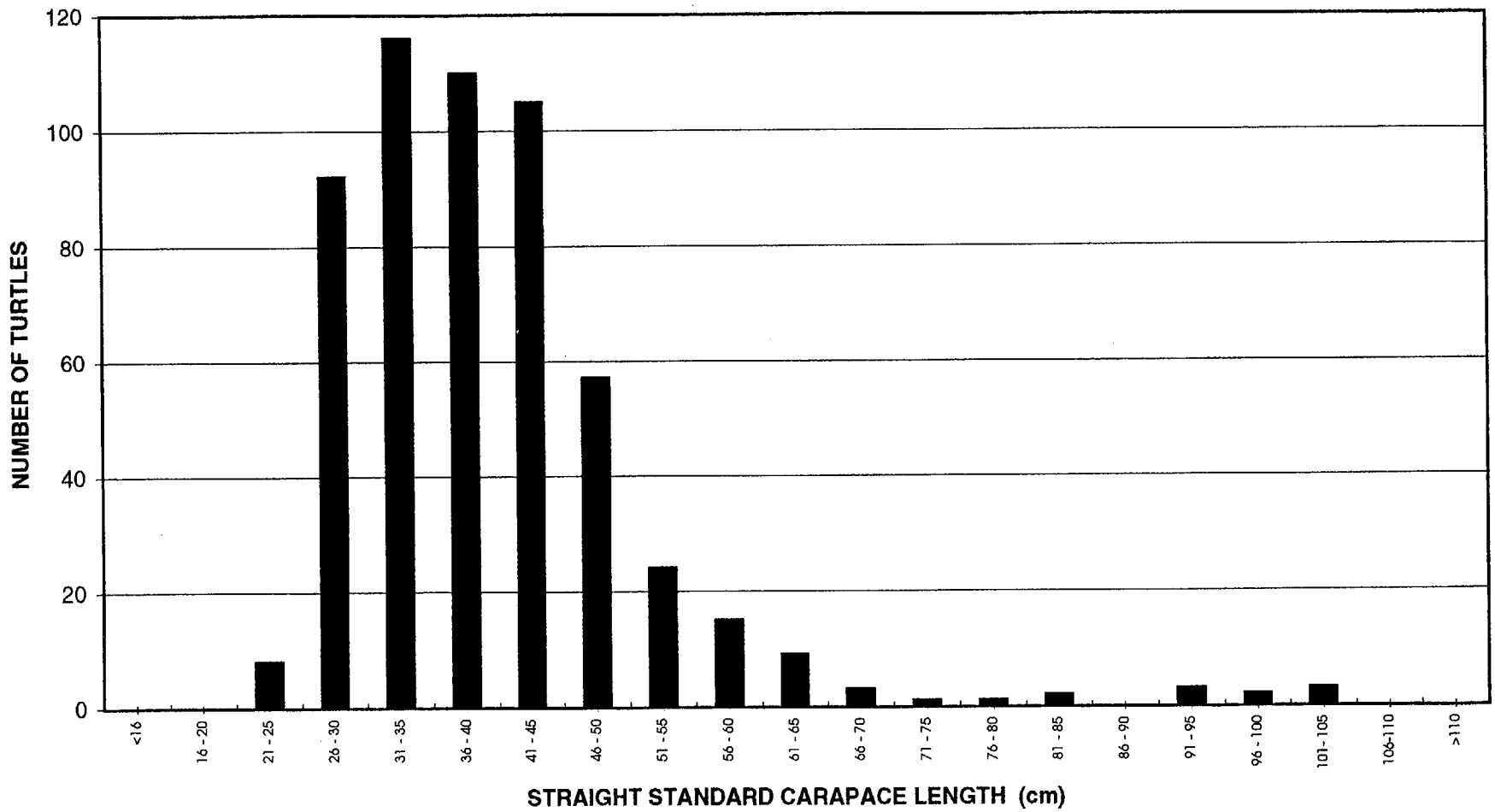

Figure 12. Length distribution (SSCL) of green turtles (N = 549) removed from the intake canal, St. Lucie Plant, 1996.

TABLE 1

TOTAL NUMBER OF CAPTURES AND (NUMBER OF DEAD) TURTLES REMOVED FROM THE INTAKE CANAL

ST. LUCIE PLANT, 1976 - 1996

YEAR	Species					Total
	loggerhead	green	leatherback	hawksbill	kemp's ridley	
1976	33 (4)					33 (4)
1977	80 (5)	5 (2)	1			86 (7)
1978	138 (19)	6 (1)	3	1		148 (20)
1979	172 (13)	3 (1)				175 (14)
1980	116 (5)	10 (3)				126 (8)
1981	62 (5)	32 (2)	2		1	97 (7)
1982	101 (16)	8	1			110 (16)
1983	119 (4)	23 (4)				142 (8)
1984	148 (3)	69 (2)		1	2	220 (5)
1985	157 (4)	14		1		172 (4)
1986	195 (27)	22 (1)	1	1	1	220 (28)
1987	175 (11)	35 (0)		2	6 (2)	218 (13)
1988	134 (6)	42 (2)			5 (2)	181 (10)
1989	111 (4)	17 (1)	1	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)
Total	**2997** (134)	**1973** (47)	**18**	**18**	**32** (4)	**5038** (185)
Annual Mean*	148.2 (6.7)	98.7 (2.4)	1.8	1.8	2.9 (0.2)	250.3 (9.8)

* Excludes 1976 (partial year of plant operation).

TABLE 2

TOTAL NUMBER OF LOGGERHEAD TURTLES REMOVED EACH MONTH FROM THE INTAKE CANAL

ST. LUCIE PLANT, 1977* - 1996

Month	Number of Captures	Percent of All Captures	Minimum	Maximum	Mean	Standard Deviation	1996
January	370	12.5%	6	39	18.5	10.0	38
February	275	9.3%	5	34	13.8	7.2	34
March	271	9.1%	1	51	13.6	11.4	51
April	291	9.8%	0	44	14.6	10.9	36
May	257	8.7%	0	40	12.9	10.3	17
June	296	10.0%	3	34	14.8	9.7	8
July	339	11.4%	0	87	17.0	19.0	87
August	275	9.3%	2	41	13.8	10.8	41
September	171	5.8%	1	19	8.6	5.1	12
October	162	5.5%	0	17	8.1	5.0	8
November	114	3.8%	0	15	5.7	3.8	7
December	143	4.8%	1	13	7.2	4.1	10
Total	2964		0	87			349
Mean	247.0				12.4		29.1
Std. Deviation	80.7				4.0		23.9

* First full year of plant operation. An additional 33 loggerheads were captured during 1976.

TABLE 3

TOTAL NUMBER OF GREEN TURTLES REMOVED EACH MONTH FROM THE INTAKE CANAL

ST. LUCIE PLANT, 1977* - 1996

Month	Number of Captures	Percent of All Captures	Minimum	Maximum	Mean	Standard Deviation	1996
January	234	11.9%	0	59	11.7	15.8	32
February	205	10.4%	0	64	10.3	15.8	32
March	324	16.4%	0	147	16.2	37.3	147
April	161	8.2%	0	64	8.1	17.4	49
May	133	6.7%	0	91	6.7	20.3	16
June	91	4.6%	0	52	4.6	11.7	16
July	109	5.5%	0	61	5.5	14.8	61
August	116	5.9%	0	64	5.8	15.5	33
September	130	6.6%	0	77	6.5	18.7	39
October	160	8.1%	0	54	8.0	15.7	47
November	136	6.9%	0	42	6.8	11.3	42
December	174	8.8%	0	68	8.7	16.6	35
Total	1973		0	147			549
Mean	118.7				8.2		45.8
Std. Deviatio	64.6				3.2		34.4

* First full year of plant operation.

ANNUAL ENVIRONMENTAL OPERATING REPORT
VOLUME II

INTRODUCTION

The St. Lucie Unit 2 Environmental Protection Plan (EPP) requires 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.

SEA TURTLE MONITORING AND ASSOCIATED ACTIVITIES

Surveillance and maintenance of the light screen to minimize sea turtle disorientation as required by Section 4.2.4 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. The vegetation line is surveyed for any gaps occurring from mortality, which would result in unacceptable light levels on the beach. Trees, vegetation or shade cloth are replaced as necessary to maintain the overall integrity of the light screen.

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(a) EPP NONCOMPLIANCES AND CORRECTIVE ACTIONS TAKEN

No noncompliances under EPP Section 5.4.1(a) were determined to have occurred during 1996.

5.4.1(b) CHANGES IN STATION DESIGN OR OPERATION, TESTS, AND EXPERIMENTS IN ACCORDANCE WITH EPP SUBSECTION 3.1

No plant site activities were determined to be reportable under Section 5.4.1.(b) during 1996.

An environmental evaluation of the construction and operation of the St. Lucie County South Hutchinson Island Water Reclamation Facility was performed by FPL in July of 1996. The facility (which is owned and will be operated by St. Lucie County) will have its own permits issued by the Florida Department of Environmental Protection for construction and operation of the facility, including the discharge of reuse quality effluent into the discharge canal of the St. Lucie Plant. This facility should be operational in mid-1997.

Since the permit applications will be reviewed and approved by the State of Florida, pursuant to EPP 3.3, the changes are not subject to the requirements of EPP 3.1. FPL's evaluation concluded that there will be no significant adverse environmental impact and that no unreviewed environmental question exists under subsection 3.1 of the EPP.

5.4.1(c) NONROUTINE REPORTS SUBMITTED TO THE NRC FOR THE YEAR 1996 IN ACCORDANCE WITH EPP SUBSECTION 5.4.2

1. Report concerning application-for-renewal of the St. Lucie site's Wastewater Permit (formerly NPDES Permit); reported to NRC by FPL letter L-96-86 on April 3, 1996.
2. Report concerning a fish kill in the plant's intake canal associated with high winds and heavy seas; reported to NRC by FPL letter L-96-89 on April 5, 1996.
3. Report concerning an exceedence of the Wastewater (formerly NPDES)

Permit minimum pH limitation for sewage treatment plant effluent; reported to the NRC by FPL letter L-96-187 on July 23, 1996.

4. Report concerning entrapment of a West Indian Manatee in the plant's intake canal; reported to NRC by FPL letter L-96-261 on October 10, 1996.