

# Technical Report

BROWARD COUNTY  
DEPARTMENT OF  
NATURAL RESOURCE  
PROTECTION

TECHNICAL REPORT  
95-05

SEA TURTLE  
CONSERVATION  
PROGRAM

BROWARD COUNTY,  
FLORIDA

1995 REPORT

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**SEA TURTLE CONSERVATION PROGRAM  
BROWARD COUNTY, FLORIDA  
1995 REPORT**

Submitted by:

**Curtis Burney  
Principal Investigator  
and  
William Margolis  
Project Manager**

**Nova Southeastern University  
Oceanographic Center  
8000 North Ocean Drive  
Dania, Florida 33004**

For the:

**BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS  
DEPARTMENT OF NATURAL RESOURCE PROTECTION  
BIOLOGICAL RESOURCES DIVISION  
218 SW First Avenue  
Fort Lauderdale, Florida 33301**

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## INTRODUCTION

Since 1978, the Broward County Department of Natural Resource Protection (DNRP) has provided for the conservation of endangered and threatened sea turtle species within its area of responsibility. Broward County is within the normal nesting areas of three species of sea turtles: *Caretta caretta* (the loggerhead sea turtle), *Chelonia mydas* (the green sea turtle) and *Dermochelys coriacea* (the leatherback sea turtle). *C. caretta* is listed as a threatened species, while *C. mydas* and *D. coriacea* are listed as endangered under the U.S. Endangered Species Act, 1973, and Chapter 370, F.S.

Since these statutes strictly forbid any disturbance of sea turtles and their nests, conservation activities involving the relocation of nests from hazardous locations (especially necessary along heavily developed coasts) require permitting by the U.S. Fish and Wildlife Service (USFWS). In Florida, this permit is issued to the Florida Department of Environmental Protection (FDEP), which subsequently issues permits to individuals, universities and local government agencies. This project was administered by the DNRP and conducted by the Nova Southeastern University Oceanographic Center under Marine Turtle Permit #108, issued to the DNRP by the FDEP Institute of Marine Research, St. Petersburg, Florida. The DNRP is especially concerned with any environmental effects of intermittent beach renourishment projects on shorelines and the offshore reefs. As part of this concern, the DNRP has maintained the sea turtle conservation program in non-renourishment years to provide a continuous data base.



Operation of the program is competitively bid, and a contract award is issued based on a review of submitted bids. Nova Southeastern University was awarded the contract to conduct the 1995 program.

In addition to fulfilling statutory requirements, the purposes of the project were:

- 1) to relocate eggs from nests deposited in sites threatened by natural processes or human activities and thus maximize hatchling recruitment,
- 2) to accurately survey sea turtle nesting patterns to determine any historical trends and assess natural and anthropogenic factors affecting nesting patterns and densities,
- 3) to assess the success of sea turtle recruitment and of hatchery operations in terms of nesting success, hatching success and total hatchlings released,
- 4) to dispose of turtle carcasses, respond to strandings and other emergencies and maintain a hot-line for reporting of turtle incidents, and
- 5) to inform and educate the public about sea turtles and their conservation.

As in 1994, the project was modified to accommodate a Florida Atlantic University experiment (M. Salmon and J. Wyneken) to assess the possible impact of mass relocation sites on hatchling predation by fish. An expanded version of the 1994 hatchling orientation study was also conducted (by Nova Southeastern University) on a section of Fort Lauderdale beach, where 89 nests were intentionally left *in situ* in order to assess the influence of coastal lighting on the orientation of hatchlings after emergence from their nests. In addition, 50 sea turtle nests were transferred to the Dade County Department of Environmental Resources Management (DERM), for a study on the effect of imported aragonite sand on hatching success and hatchling sex ratios.

## MATERIALS AND METHODS

### Beach Survey

Daily beach surveys commenced at sunrise or 6:00 AM (whichever came first), except at Fort Lauderdale where early beach cleaning required a slightly earlier start. For survey purposes the County was divided as follows:

<u>BEACH</u>	<u>LENGTH (km)</u>	<u>BOUNDARIES</u>	<u>DEP SURVEY MARKER #</u>
Hillsboro- Deerfield	7.0	Palm Beach Co. line to Hillsboro Inlet	1-24
Pompano	7.7	Hillsboro Inlet to Commercial Blvd.	25-50
Ft.Lauderdale	10.6	Commercial Blvd to Port Everglades Inlet	51-84
Lloyd Park	3.9	Port Everglades Inlet to Dania Beach fence	86-97
Hollywood- Hallandale	9.4	Dania Beach fence to Dade Co. Line	98-128

Daily surveys of Pompano, Fort Lauderdale and Hollywood-Hallandale beaches commenced on April 6th. Regular patrols of Hillsboro Beach and Deerfield beach were initiated on April 18th. Prior to the beginning of regular beach patrols, project personnel marked or relocated four leatherback nests reported by beach cleaners or local residents in Hillsboro Beach, Hollywood and Pompano Beach. All surveys continued through September 15th. Nest locations were referenced to FDEP beach survey bench marks numbered

consecutively from 1 to 128 (N to S). Marker numbers corresponding to each beach area are listed above. Each nest was initially located relative to the nearest building, street, or other land mark. These locations were later cross referenced to the nearest survey marker.

The beach at John U. Lloyd State Recreation Area was surveyed by park personnel, who provided the data for that area. Due to the relative lack of land marks in the park, four 1 km zones (zone 1 farthest north) were used for recording nest locations. This was also done to provide continuity with the data collected in Lloyd Park during the previous three years, to assess the effects of a completed beach renourishment project on nesting patterns.

Surveyors used four-wheeled all-terrain vehicles which can carry up to five turtle nests in plastic buckets per trip. The usual method was to mark and record nests and false crawls on the first pass along the beach and then dig and transport nests in danger of negative impacts on the return pass. Due to early beach cleaning in Fort Lauderdale, two workers picked up the nests on the first pass. Nests were transferred, at prearranged meeting sites, to a third person who transported them to Hillsboro Beach by car. When there were many nests requiring relocation, and no road support, additional trips were occasionally necessary. After measuring the flipper-to-flipper track width (as an index of turtle size), crawl marks were obliterated to avoid duplication.

Nests in danger of negative impacts were defined as follows:

- 1) a nest located within 20 feet of the mean high water line,
- 2) a nest located in an area with a high level of pedestrian traffic,
- 3) a nest located near a highway or artificially lighted area defined as a beach area where a worker can see his shadow on a clear night,
- 4) a nest located in an area subject to beach renourishment,
- 5) a nest deposited directly in existing, dense vegetation where roots might interfere with successful emergence of the hatchlings.

Especially due to definition 3, all of the discovered nests at Pompano and Hollywood-Hallandale, and all but 89 nests on Fort Lauderdale beach were considered to be in danger of negative impact and therefore were relocated to hatcheries or to one of three open beach locations at Hillsboro Beach. These open beach hatcheries were located at the Hillsboro Club which is immediately north of the Hillsboro Inlet (designated HB1), near the Mc Millan property at 1125 A1A (HB2), and adjacent to the Ocean Crest (HB3) condominiums at 1189 A1A. The use of three hatchery areas was designed to accommodate a hatchling predation study (M. Salmon and J. Wyneken, Florida Atlantic Univ.). Nests deposited in Hillsboro Beach, which were in danger of negative impacts, were relocated to less hazardous nearby locations on that beach (HB), not to the three hatchery areas listed above. The nests intentionally left *in situ* on Fort Lauderdale beach were part of the hatchling orientation study which will be reported separately.

Nests to be relocated were carefully dug by hand, and transported in buckets containing sand from the natural nest chamber. The depths of the natural egg chambers were measured. The eggs were then transferred to hand-dug artificial egg chambers of similar dimensions, which were lined with sand from the natural nest. Care was taken to maintain the natural orientation of each egg.

Those nests not in danger on Hillsboro Beach, Lloyd Park and Fort Lauderdale beaches, were marked and left *in situ*. After hatching, 250 of these nests were excavated for post emergence examination. An additional 169 *in situ* nests from Lloyd Park were evaluated by Park personnel and are included in this report. Hatching (actual emergence) success was defined as the total number of shells minus the number of hatchlings found dead in the nest (DIN), pipped eggs (PIP), and eggs with visible (VD) or no visible development (NVD).

### Hatchery Operations

As in previous years, eggs were transferred to one of three chain-link fenced hatcheries located at Pompano beach near Atlantic Blvd., at the South Beach municipal parking lot in Fort Lauderdale, or at North Beach Park in Hollywood. The 4 relocated nests at Lloyd Park were moved to safer areas of the open beach. After hatching, all hatchery nests were dug, and counts of spent shells, dead hatchlings, pipped eggs and eggs with arrested or no visible development were made.

Hatchery nests displaying a depression over the egg chamber, indicating eminent hatchling emergence, were covered with a bottomless plastic bucket to retain hatchlings, although the turtles sometimes escaped these enclosures by digging around them. Hatching success was defined as the percentage of relocated eggs resulting in live released turtles. After hatching commenced, the hatcheries were checked each night between 9:00 PM and midnight. Hatchlings were released that same night in dark sections of Fort Lauderdale, Hillsboro Beach, Hollywood or Lloyd Park beaches by allowing them to crawl through the intertidal zone into the surf. Hatchlings discovered at dawn in the hatcheries were collected and held indoors in dry styrofoam boxes in a cool, dark place until that night, when they were released as above.

Because of the high nesting density early in the season and the high percentage of relocated nests, the Pompano and Fort Lauderdale hatcheries quickly filled. After May 16, nests from Fort Lauderdale and Pompano were relocated to Hillsboro Beach, for the remainder of the season. Hatched nests in the hatcheries were completely dug out along with the surrounding sand and replaced with fresh sand. The sand from the old nests was spread outside the hatchery. Fresh sand was obtained from elsewhere on the beach.

### Data analysis

The data was compiled, analyzed and plotted primarily with Quattro Pro,

version 5 (Borland International Inc.) and Statistica, release 4.2 (StatSoft, Inc.) software for Windows. County-wide yearly nesting densities from 1981 to 1995 for *C. caretta*, *C. mydas*, and *D. coriacea* were plotted and trends were assessed by linear regression and correlation analyses. Seasonal nesting patterns for *C. caretta* and *C. mydas* were plotted for each of the five beaches. Nesting densities were calculated for each beach (nests per km) and the data (except for *D. coriacea*) were compared using 1-way repeated measures analysis of variance (ANOVA) and Newman-Keuls (NK) tests (at the .05 significance level). The total number of nests deposited by each species in the beach segments corresponding to each FDEP survey marker was tabulated and plotted. Total nesting success (nests/total crawls) for each species at each beach was computed and the mean daily nesting successes of *C. caretta* and *C. mydas* at each beach was compared by repeated measures ANOVA and NK analyses. The total nesting success in each beach segment for each species, was plotted versus its FDEP survey number.

The total numbers of eggs for each species which were relocated or left *in situ* at each beach or relocation site were tabulated, as well as the overall hatching successes of relocated and evaluated *in situ* eggs of all species. The overall hatching success of all eggs from relocated and *in situ* nests were plotted from 1981 thru 1995. Hatching successes of *C. caretta* and *C. mydas* nests were plotted versus deposition date, and the patterns were analyzed with linear regression and correlation analyses. The mean emergence percentages and proportions of the post-hatching egg categories (DIN, PIP, VD and NVD) were tabulated from nests of each species deposited or relocated at each of the individual beaches or relocation sites. The emergence success of *in situ* and relocated *C. caretta* nests at Hillsboro Beach were compared by one way ANOVA and NK analyses. The proportions of all post-hatching nest evaluation categories from *in situ* and relocated *C. caretta* nests at Hillsboro Beach were com-

pared using a large-sample hypothesis test of population proportions (percent test) (Weiss and Hassett, 1991).

## RESULTS

Figure 1 shows the historical trend in the total number of sea turtle nests deposited in Broward County since 1981. A total of 2634 nests were counted in 1995, exceeding the previous 1990 record by more than ten percent. The mean nest count of 2315 for the last six years remains very significantly greater than the average of 1412 nests for the first nine years of the project (t test;  $t = 8.2$ ,  $p < .0001$ ). Figure 2 shows the yearly nesting trends from the three species. This years *C. caretta* count was significantly above the average from 1990 thru 1994 (t test;  $t = 8.6$ ,  $p = .0005$ ). The historical trend in loggerhead nesting remains strongly positive. This years value continued the positive trend, which was stagnant for the previous five years. *C. mydas* nesting continued the alternate high-low pattern of the last six years, but this years count was more than double the previous low year in 1993. *D. coriacea* nesting remained at about twice the historical average, with some suggestion of a positive trend since 1988, but their numbers are still very low.

Figure 3 shows the seasonal pattern of daily *C. caretta* nesting. Table 1 and Figure 4 give the total *C. caretta* nesting densities and seasonal patterns for the five beaches, respectively. A Newman-Keuls test showed significant differences between all the beaches, except between Lloyd Park and Fort Lauderdale.

The County-wide seasonal nesting patterns of *C. mydas* and *D. coriacea* are shown in Figure 5 and for the individual beaches in Figure 6. The first *C. mydas* nest was deposited on May 19th. The first *D. coriacea* nest was deposit-

## SEA TURTLE NESTING HISTORY ALL SPECIES COMBINED

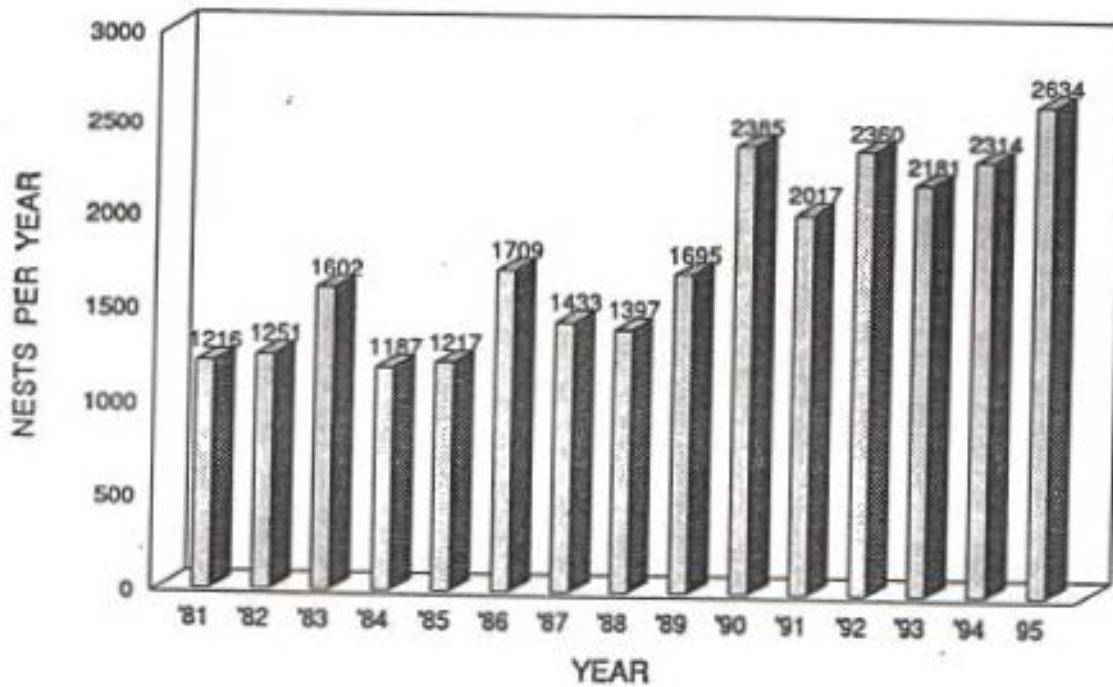
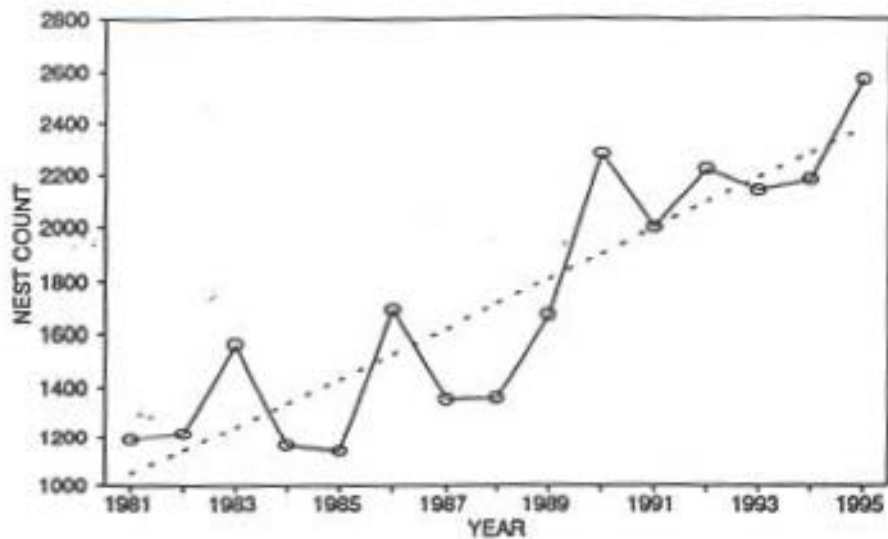


Figure 1: The historical pattern of total sea turtle nesting in Broward County since full surveys commenced in 1981.



## BROWARD LOGGERHEAD NESTS

$r = .886$   $P < .0001$



## TOTAL BROWARD NESTS

GREENS AND LEATHERBACKS

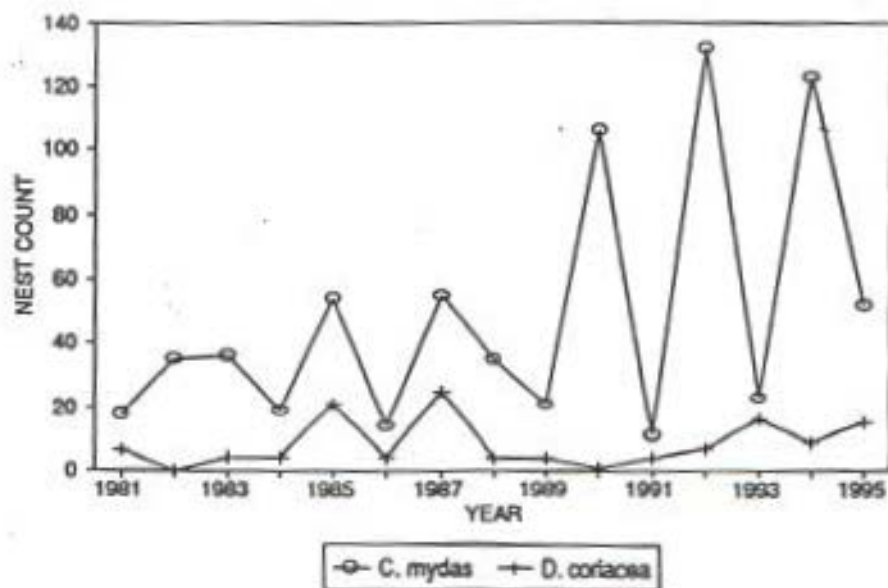


Figure 2: Historical nesting patterns of loggerhead, green and leatherback sea turtles in Broward County since 1981.

## BROWARD COUNTY LOGGERHEAD NESTS

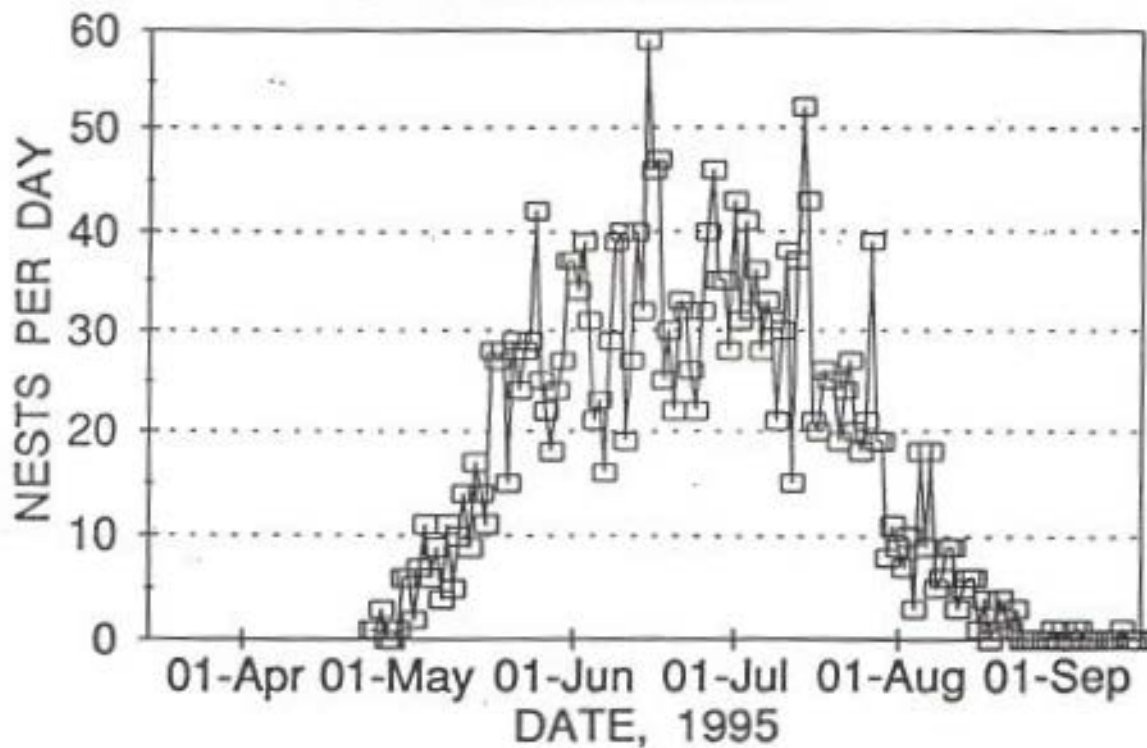


Figure 3: The seasonal pattern of daily loggerhead nesting in Broward County, 1995.

Table 1: Total *C.caretta* nests and nesting densities expressed as nests-per-kilometer for the 1995 season. Vertical lines at the right overlap groups where means were not distinguishable in a Newman-Keuls test ( $\alpha = .05$ ) of mean daily nesting per km.

BEACH	TOTAL NESTS	BEACH LENGTH (km)	NESTS per km	MEAN DAILY NESTS /km
Hollywood-Hall.	139	9.4	14.8	.100
Lloyd Park	248	3.9	63.6	.421
Ft. Laud.	744	10.6	70.2	.472
Hillsboro Beach	633	7.0	90.4	.597
Pompano	803	7.7	104.2	.697
OVERALL	2567	38.6	66.5	.449

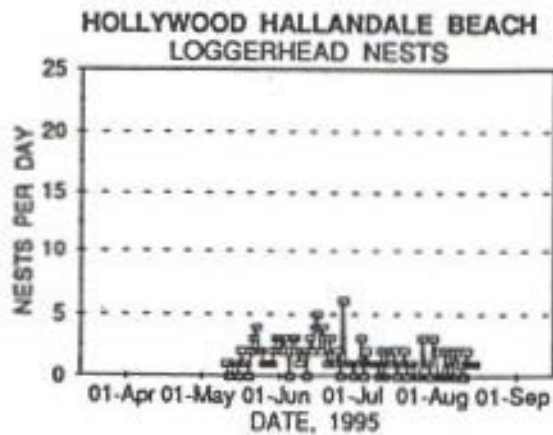
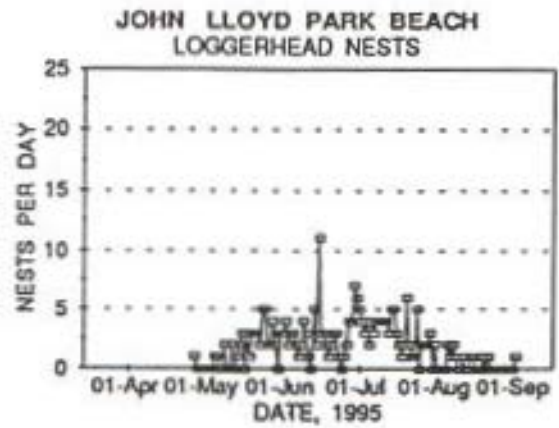
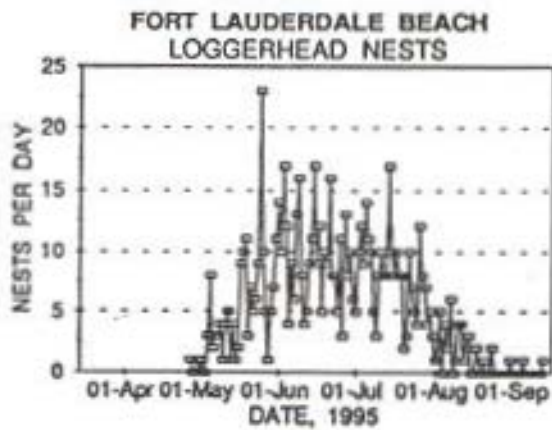
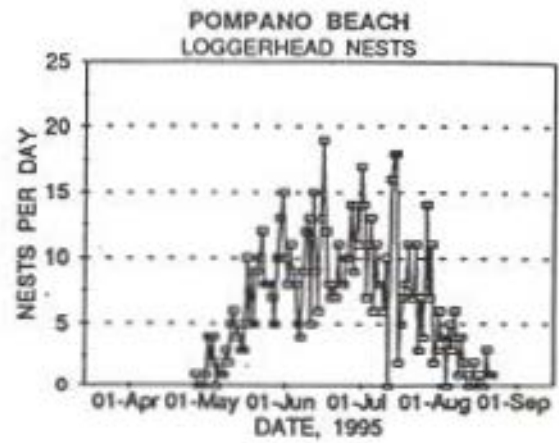
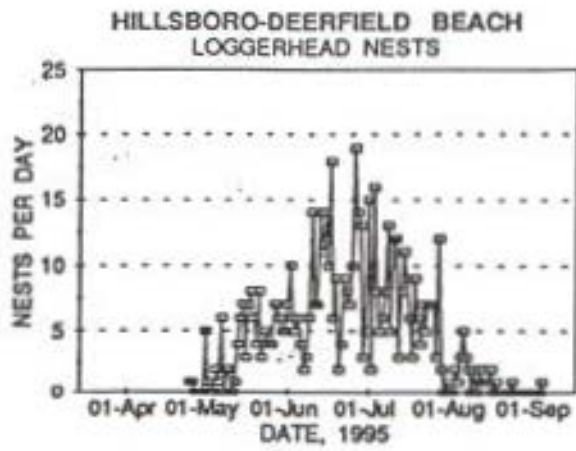


Figure 4: Comparison of the daily loggerhead nesting patterns on the five Broward County beaches in 1995.

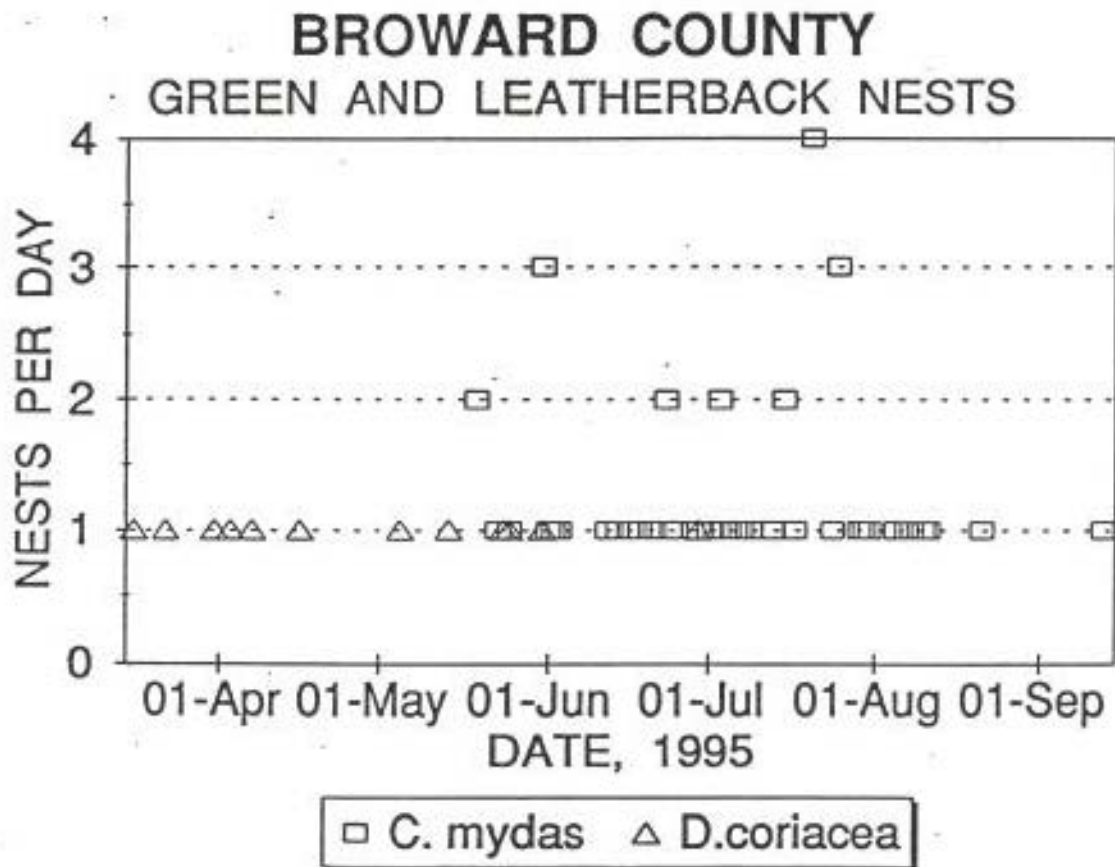


Figure 5: The seasonal pattern of daily green and leatherback nesting in Broward County, 1995.

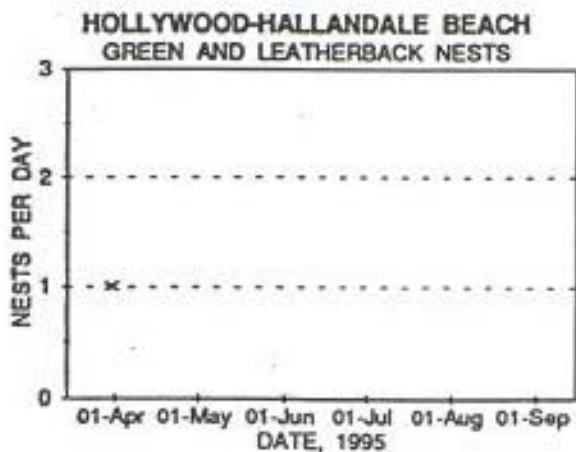
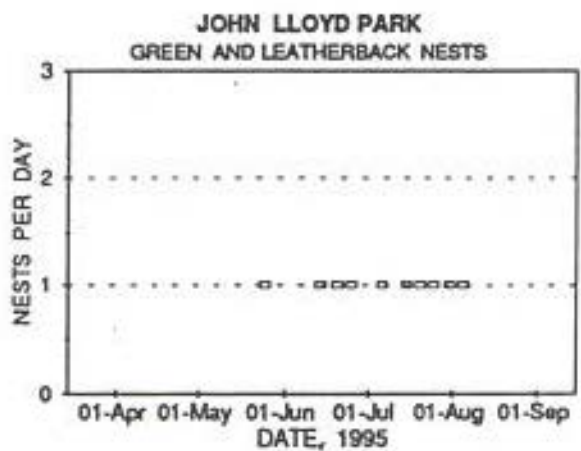
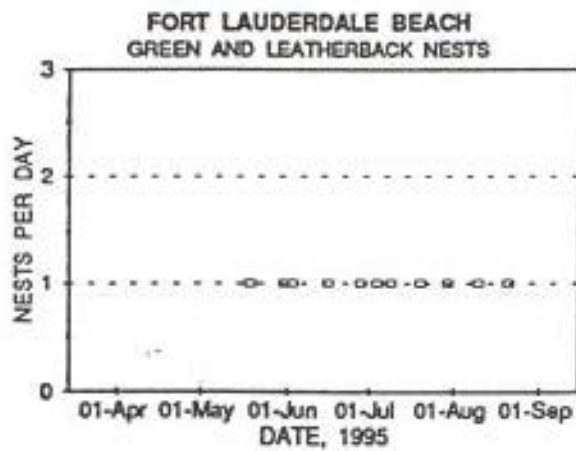
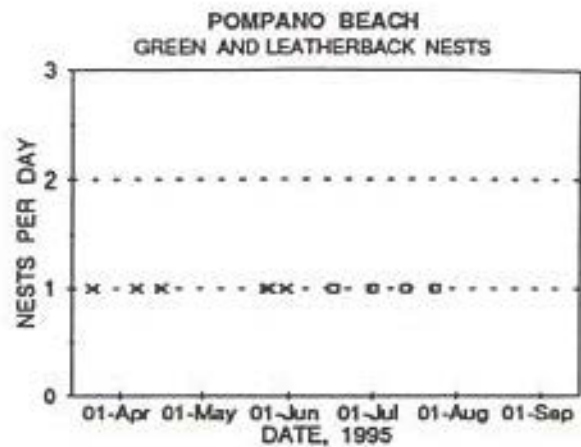
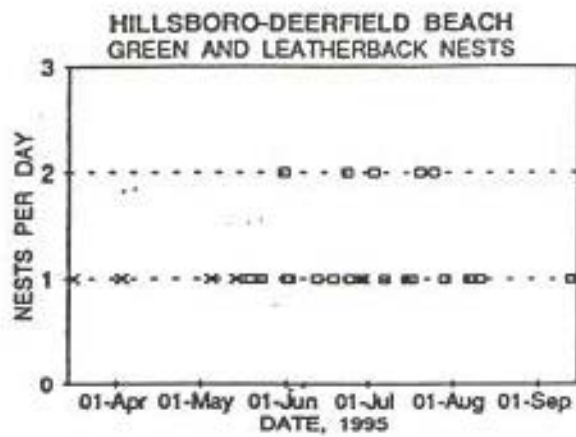


Figure 6: Comparison of the daily nesting patterns of green and leatherback sea turtles on the five Broward County Beaches in 1995.

□ C. mydas    × D. coriacea

ed on March 16th. Nesting counts and densities for *C. mydas* are shown in Table 2. As in past years, Hillsboro Beach and Lloyd Park beaches had the highest nesting densities. The rank order of the beaches by nesting density was the same as last year. Hollywood-Hallandale beach received no *C. mydas* nests in 1995. Table 3 gives the nesting densities of *D. coriacea* on the five beaches. As in past years, nesting was heaviest in Hillsboro Beach, but this year it was unusually high on Pompano beach.

Figure 7 shows the distribution of *C. caretta*, *C. mydas* and *D. coriacea* nesting in each 1000 foot zone of Broward County beach (1 km zones in Lloyd Park) during 1995. The general features of this pattern have remained constant for at least the last seven years, however the proportion of nests has declined at Hillsboro Beach in recent years. As usual, no *C. caretta* or *C. mydas* nested in zone #6, near the rock outcropping at the Deerfield Beach town line, but one *D. coriacea* did nest in this area.

Figure 8 and Table 4 present the County-wide distribution of nesting success for the three species. As in 1994, the nesting success of *C. caretta* at Lloyd Park was significantly lower than all of the other beaches. The other beaches were not statistically different from each other. This has been the pattern since 1993. The nesting success of *C. mydas* was not significantly different throughout the County, and the data for *D. coriacea* was too low for reliable analysis.

Table 5 gives the total number of nests for each species that were relocated to Hillsboro Beach or to fenced hatcheries, as well as the numbers and locations of nests left *in situ*. Table 6 lists the total number of eggs and emerged hatchlings from evaluated *in situ* and relocated nests. The numbers of predated nests and nests which were unevaluated due to stake removal are also listed. The hatching success of relocated *C. caretta* nests was improved by 10.4 percentage points from the 1994 level. The *in situ* *C. caretta* hatching

Table 2: Total *C.mydas* nests and nesting densities expressed as nests-per-kilometer for the 1995 season. Vertical lines at the right overlap groups where means were not distinguishable in a Newman-Keuls test ( $\alpha = .05$ ) of mean daily nesting per km, omitting Hollywood-Hallandale.

BEACH	TOTAL NESTS	BEACH LENGTH (km)	NESTS per km	MEAN DAILY NESTS/km
Hollywood-Hall	0	9.4	0.0	.000
Pompano	4	7.7	0.5	.004
Ft. Laud.	11	10.6	1.0	.007
Lloyd Park	10	3.9	2.6	.017
Hillsboro Beach	27	7.0	3.9	.026
OVERALL	52	38.6	1.3	.009



Table 3: Total *D. coriacea* nests and nesting densities expressed as nests-per-kilometer for the 1995 season. Data were too few for reliable statistical comparison of mean daily nesting densities.

BEACH	TOTAL NESTS	BEACH LENGTH (km)	NESTS per km
Lloyd Park	0	3.9	0
Ft. Laud.	0	10.6	0
Hollywood-Hall	1	9.4	.11
Pompano	7	7.7	.91
Hillsboro Beach	7	7.0	1.0
<b>OVERALL</b>	<b>15</b>	<b>38.6</b>	<b>0.39</b>

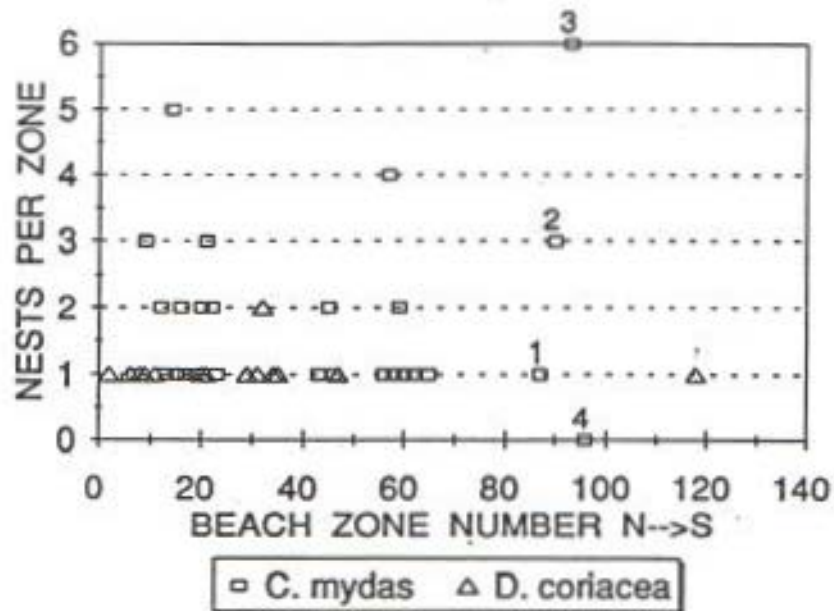
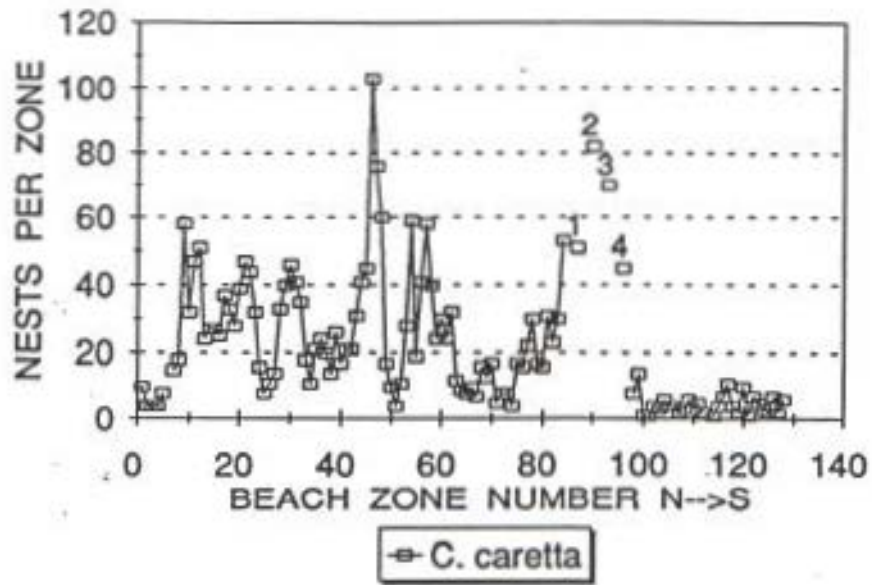


Figure 7: Locations of loggerhead, green and leatherback nests in Broward County, 1995. Numbers 1-4 indicate the four beach zones of John Lloyd State Park

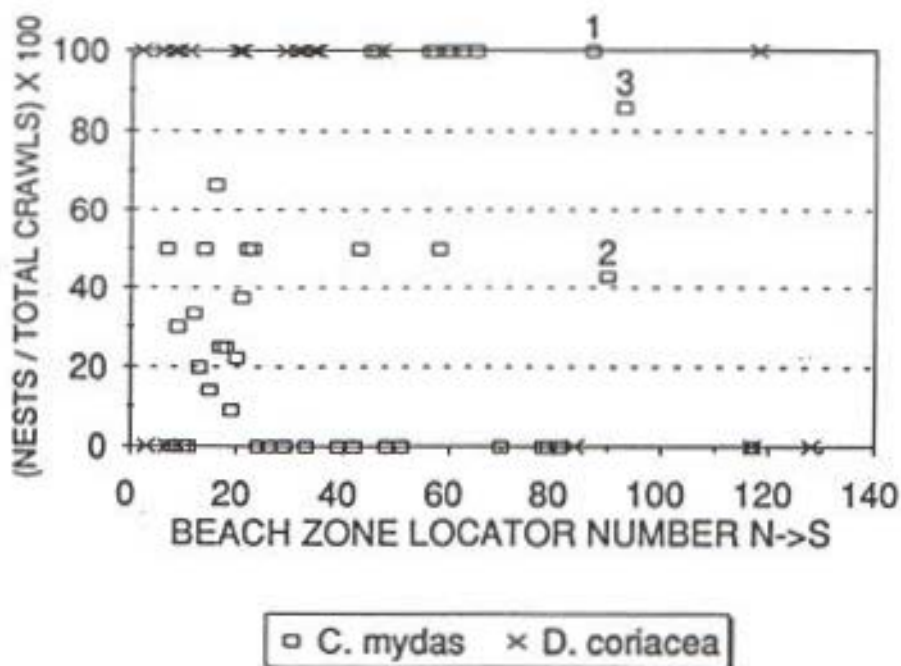
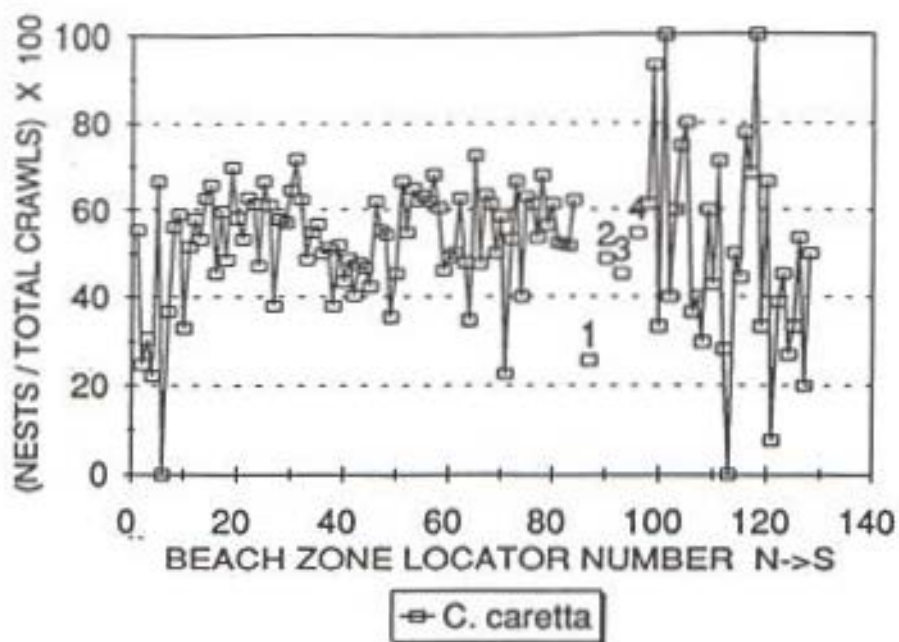


Figure 8: The horizontal distribution of the nesting success of loggerhead, green and leatherback sea turtles in Broward County during 1995.

Table 4: Total nests, false crawls (FC) and percent nesting success (NS) for three sea turtle species in each of five Broward County beaches during 1995. Vertical lines for *C. caretta* overlap beaches where mean daily nesting successes were not distinguishable in a Newman-Keuls test. ANOVA showed no significant differences in *C. mydas* nesting success. *D. coriacea* nesting was too sparse for reliable statistical comparisons.

BEACH	NESTS	<i>C.caretta</i>		NESTS	<i>C.mydas</i>		NESTS	<i>D.coriacea</i>	
		FC	NS		FC	NS		FC	NS
Lloyd Park	248	352	43.1	10	5	66.7	0	0	-
Hillsboro	633	569	52.7	27	77	26.0	7	2	77.8
Holly-Hall.	139	135	50.1	0	1	0	1	2	33.3
Pompano	803	719	52.8	4	7	36.4	7	0	100
Ft.Laud.	744	555	57.3	11	7	61.1	0	1	0
OVERALL	2567	2330	52.4	52	97	34.9	15	5	75.0

Table 5: Total Number of *C.caretta*, *C. mydas* and *D. coriacea* nests relocated to Hillsboro beach or fenced hatcheries, or left *in situ*.

	<i>C. caretta</i>	<i>C. mydas</i>	<i>D. coriacea</i>
<b>RELOCATED</b>			
<u>Open Beach</u>			
Hillsboro Beach <sup>#</sup>			
HB	209	2	1
HB1	378	3	0
HB2	632	1	3
HB3	309	8	0
Lloyd Park	4	0	0
<u>Hatcheries</u>			
Pompano	46	0	3
Ft.Lauderdale	36	0	1
Hollywood	139	0	0
Dade-DERM	49	1	0
Discovery Ctr.	1	0	0
Totals	1803	15	8
<b>IN SITU</b>			
<u>Open Beach</u>			
Hillsboro Beach	424	25	5
Pompano	9	0	2
Fort Lauderdale	87	2	0
Lloyd Park	244	10	0
Totals	764	37	7
Grand Totals	2567	52	15

- <sup>#</sup> HB - Hillsboro Beach nests relocated to safer nearby beach locations  
 HB1- Hillsboro Club hatchery site  
 HB2- McMillan property  
 HB3- Ocean Crest hatchery site

Table 6: Total egg counts, released hatchlings and overall hatching successes for *in situ* and relocated nests of *C.caretta*, *C.mydas* and *D.coriacea* in 1995.

Species	NUMBER OF EGGS	n*	NUMBER TURTLES RELEASED	HATCH SUCCESS PERCENT
<b>In Situ Nests</b>				
<i>C. caretta</i>	42017	397	32266	76.8
<i>C. mydas</i>	1798	17	1368	76.1
<i>D. coriacea</i>	407	5	246	60.4
Total	44222	419	33880	76.6
<b>Relocated Nests<sup>#</sup></b>				
<i>C. caretta</i>	179815	1665	130028	72.3
<i>C. mydas</i>	1747	14	971	55.6
<i>D. coriacea</i>	752	8	342	45.5
Total	182314	1687	131341	72.0
<b>Overall</b>				
<i>C. caretta</i>	221832	2062	162294	73.2
<i>C. mydas</i>	3545	31	2339	66.0
<i>D. coriacea</i>	1159	13	588	50.7

\* n = The number of nests actually investigated for hatching success percent.

<sup>#</sup> There were 4912 eggs from 43 partially predated *C. caretta* nests which were not included in the totals. In addition, there were 15906 eggs from 150 *C. caretta* nests and 266 eggs from 2 *C. mydas* nests which were not evaluated due to marker removal.

success rate also improved by 5.1 percentage points. The difference between the hatching rates of *in situ* and relocated *C. caretta* declined from 9.8 percent in 1994 to 4.5 percent in 1995. Both relocated *C. mydas* and *D. coriacea* nests hatched at lower rates than in 1994, showing 2.6 and 13.0 percentage point declines, respectively. For *in situ* nests, the hatching success of *C. mydas* increased by 6.9 percent and *D. coriacea* declined by 17 percent from 1994.

Figure 9 illustrates the seasonal patterns of the hatching success of *in situ* and relocated *C. caretta* nests. As observed in past years (except 1994) there was a slight, but significant ( $r = .132$ ,  $p < .0001$ ) decline in hatching success for relocated *C. caretta* nests over the course of the season. This was not observed for *in situ* nests. Figure 10 shows the same information for relocated and *in situ* *C. mydas* nests. Although there appears to be a decline in hatching success for relocated nests, the slope is not significantly different from zero. No hatching success trend was detectable for *in situ* *C. mydas* nests. Figure 11 illustrates the hatching success distributions for *in situ* and relocated *C. caretta* nests. Figure 12 shows the historical patterns of the yearly hatching success of all species combined, since 1981.

Table 7 gives the post-hatching nest evaluation data for all *in situ* and relocated *C. caretta* nests for all beaches. Table 8 and 9 show the same data for *C. mydas* and *D. coriacea*, respectively. Table 10 compares the means of all the individual hatching success rates for all *C. caretta* nests either laid or relocated in Hillsboro Beach. Mean hatching success varied between the relocation sites and overlapped the hatching success of the *in situ* Hillsboro Beach nests. As in 1994, the HB3 relocation site had the highest hatching success, which was significantly greater than for nests left *in situ*. Hatching success at the HB1 site was not distinguishable from the *in situ* nests or from the relocated Hillsboro Beach nests which were distributed along the beach (not at hatchery sites). The lowest hatching success at Hillsboro Beach occurred at the HB2 site

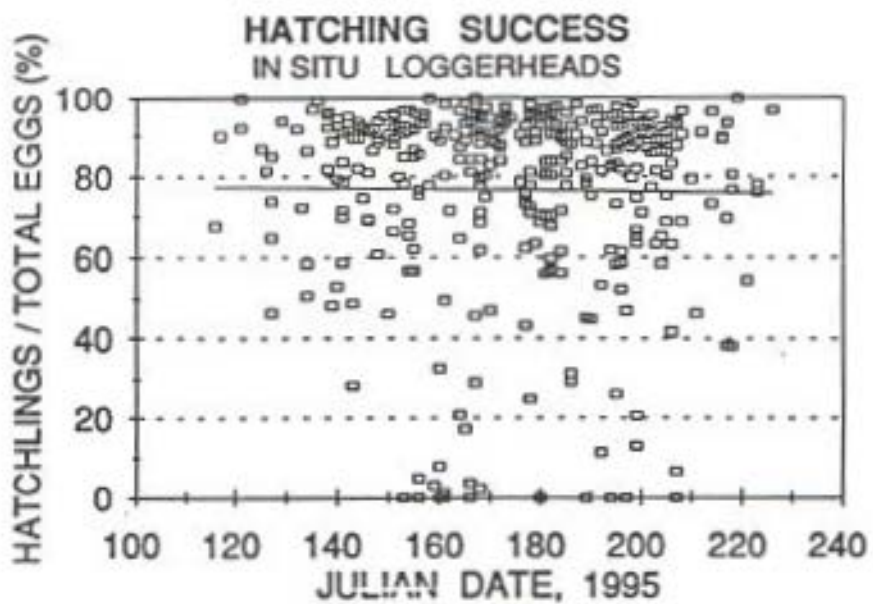
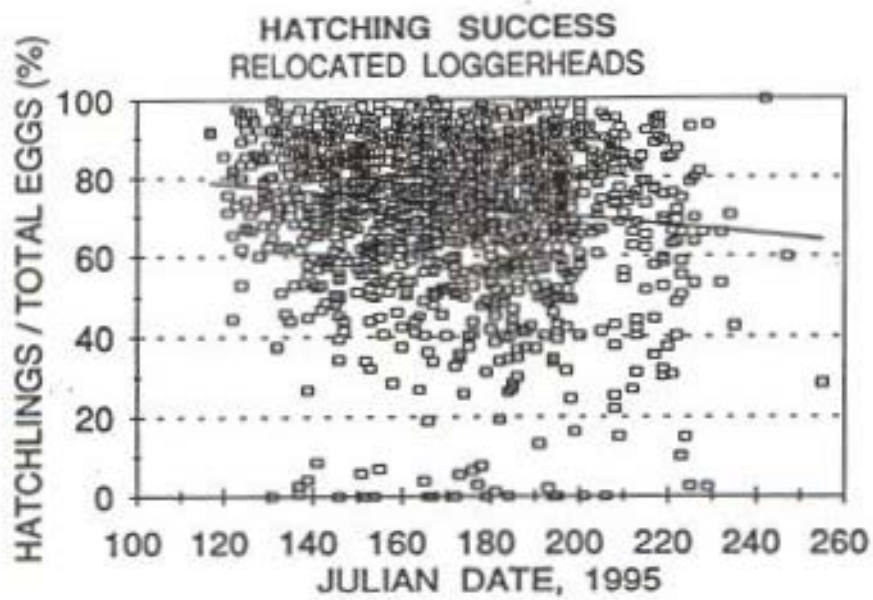


Figure 9: Comparison of the seasonal patterns of the hatching success of relocated and in situ loggerhead nests during 1995.



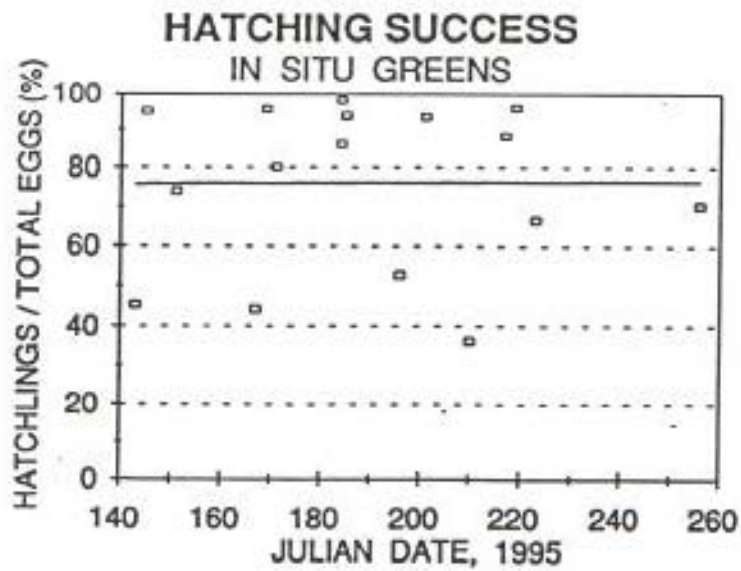
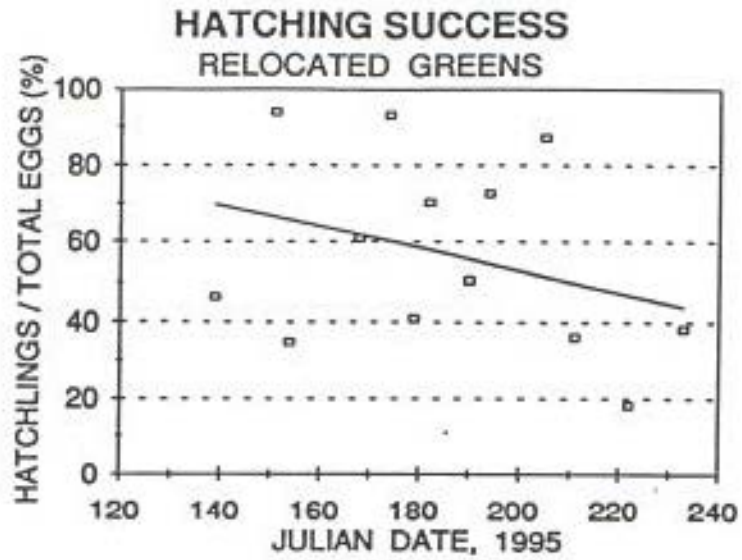


Figure 10: Comparison of the seasonal patterns of the hatching success of relocated and in situ green turtle nests during 1995.

## HATCHING PERCENT DISTRIBUTIONS

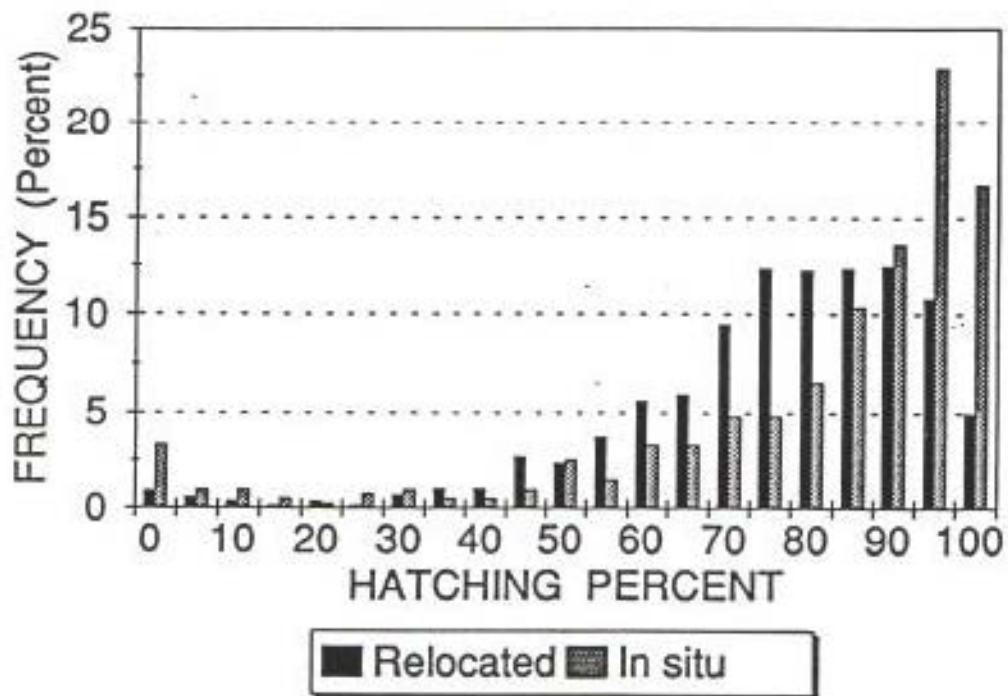


Figure 11: Hatching success frequencies for in situ and relocated loggerhead nests.

## HATCHING SUCCESS HISTORICAL PATTERN

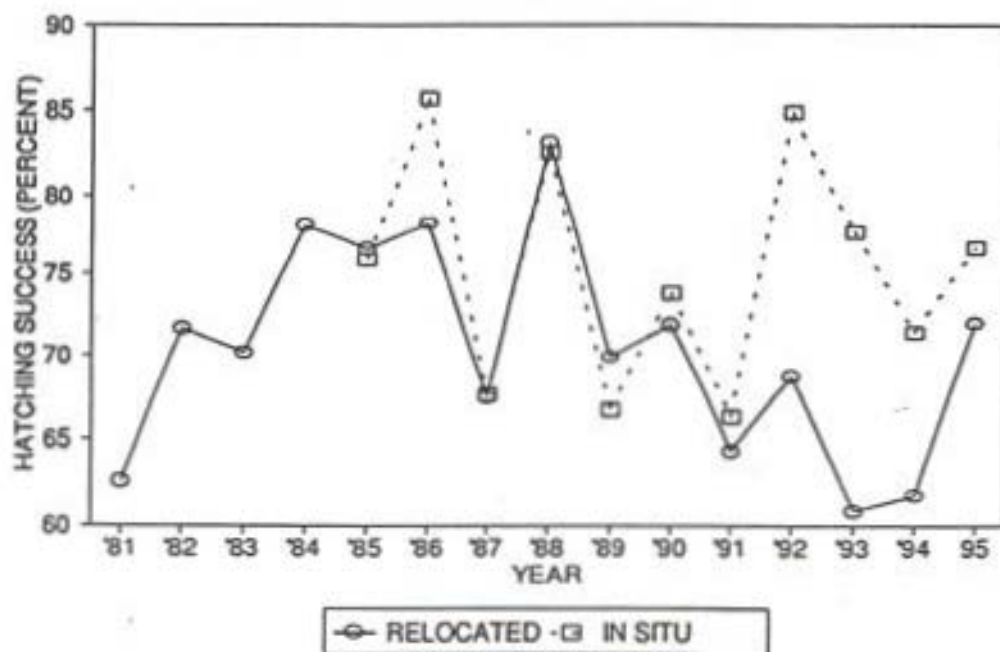


Figure 12: The historical patterns of yearly hatching success for all evaluated relocated and in situ nests, since 1981.

Table 7: Accounting of the status of all hatched and unhatched eggs in investigated in situ and relocated *C. caretta* nests during 1995.

Location	Total Eggs	Live Hatch %	DIN %	PIP %	VD %	NVD %
<b>In Situ Nests</b>						
Hillsboro Beach	18040	73.3	1.3	2.3	4.2	18.9
Pompano	872	84.5	10.2	1.3	2.4	1.6
Fort Lauder.	4556	82.4	2.7	1.0	4.3	9.6
Lloyd Park	18549	78.5	2.5	2.2	*	16.8
<b>Relocated Nests</b>						
Hillsboro Beach						
HB	16001	69.4	1.9	6.4	4.2	18.1
HB1	40117	73.1	1.7	8.0	2.7	14.4
HB2	62579	68.6	2.3	11.0	4.0	14.2
HB3	31991	76.9	1.8	6.2	2.6	12.4
Pompano	5251	76.7	1.9	10.9	2.2	8.3
Ft. Lauderdale	4156	81.9	0.5	2.6	0.7	14.3
Lloyd Park	455	83.1	1.8	2.6	*	12.5
Hollywood	14418	71.0	1.2	8.7	1.2	17.9
Dade Co.-DERM#	4887	82.2	1.0	5.0	2.0	10.0

**Live Hatch** - All eggs which produced live hatchlings, including hatchlings found live in nest and live piped which were freed and released

**DIN** - Hatchlings found dead in the nest when it was excavated

**PIP** - Dead hatchlings which only partially succeeded in emerging from their eggs

**VD** - Unhatched eggs with signs of visible embryo development

**NVD** - Unhatched eggs with no signs of visible embryo development

**HL** - Eggs accidentally lost during relocation

\* - Unreported category; all unhatched eggs listed as NVD

# - An additional 357 eggs were apparently hatched in incubators.

Table 8: Accounting of the status of all hatched and unhatched eggs in investigated *in situ* and relocated *C. mydas* nests during 1995. Notes and abbreviations as in Table 7.

Location	Total Eggs	Live Hatch %	DIN %	PIP %	VD %	NVD %
<b><i>In Situ</i> Nests</b>						
Hillsboro Beach	1124	71.6	1.0	2.6	2.3	22.5
Fort Lauder.	203	71.9	0.0	0.0	8.4	19.7
Lloyd Park	471	88.5	1.5	0.4	*	9.6
<b>Relocated Nests</b>						
Hillsboro Beach						
HB	114	93.0	0.0	0.0	0.0	7.0
HB1	410	42.7	1.0	14.9	4.4	37.1
HB2	252	53.6	3.2	7.9	7.1	28.2
HB3	971	57.2	1.0	4.4	8.4	28.9

Table 9: Accounting of the status of all hatched and unhatched eggs in investigated *in situ* and relocated *D. coriacea* nests during 1995. Notes and abbreviations as in Table 7.

Location	Total Eggs	Live Hatch %	DIN %	PIP %	VD %	NVD %
<b>In Situ Nests</b>						
Hillsboro Beach	398	60.8	1.5	3.3	6.3	28.1
<b>Relocated Nests</b>						
Hillsboro Beach						
HB	144	93.8	1.4	2.8	0.0	2.1
HB2	246	35.8	4.5	4.5	9.8	45.5
Pompano	283	38.5	6.0	15.2	23.0	17.3
Ft.Lauderdale	79	12.7	0.0	2.5	6.3	78.5

Table 10: Comparison of the mean hatching successes of relocated and *in-situ* *C. caretta* nests on Hillsboro Beach. Vertical lines at right overlap groups where means were not distinguishable in a Newman-Keuls test (alpha=.05). Percentages are slightly different than in Table 7 due to round-off error.

LOCATION	NESTS EVAL.*	MEAN HATCHING SUCCESS (%)
HB2	632	70.3
HB-Reloc <sup>1</sup>	209	70.3
HB- <i>in situ</i> <sup>2</sup>	424	74.9
HB1	378	74.9
HB3	309	78.5

\* Number of nests dug for evaluation

<sup>1</sup> Nests relocated to other areas of Hillsboro beach; not hatcheries

<sup>2</sup> Hillsboro nests left *in situ*

Other designations as in Table 5.

which was over washed by waves from Hurricane Erin. Seventy six stakes were washed away, but 55 of these nests hatched, with an average hatching success of 66.6 percent.

Table 11 compares hatching success and the post-hatching nest evaluation categories for relocated and *in situ* *C. caretta* nests at Hillsboro Beach. As in 1994, there was a slight, but significant reduction in hatching success for the relocated eggs. The proportions of eggs in DIN and VD was slightly higher in relocated nests. The greatest differences between *in situ* and relocated nests was in the PIP category, which was much higher in relocated nests, and in NVD, which was much higher in *in situ* nests.

## DISCUSSION

This is the sixth consecutive year that total sea turtle and *C. caretta* nest counts have remained significantly above the average during the 1980's (Figs 1 and 2). This continues to suggest that the female population has increased or that individual loggerheads are nesting more frequently. The consistently higher nest counts continue to argue against the hypothesis that increased nesting has resulted from a chance coincidental nesting of an unusually large proportion of the female population in the same year. If this were true, there should also be years when an unusually large proportion of the females refrain from nesting. Because at least one non nesting year usually follows a nesting year for each female (Ehrhart, 1981), such synchronized nesting would cause large variations in nest counts, which has not been observed for *C. caretta*. It is also encouraging that this year's loggerhead count has apparently broken the flat nesting trend from 1990 thru 1994, falling significantly above the mean for this period.



Table 11: Comparison of hatching and all categories of egg failure results for investigated *in situ* and relocated nests at Hillsboro Beach, using the large-sample hypothesis test for two population proportions (percent test). Percentages for each category are given in parentheses. Abbreviations as in Table 7.

	IN SITU	RELOCATED	Z	P
Eggs	18040	150678		
Live Hatch	13218 (73.3)	107992 (71.7)	4.5	<.0001
DIN	242 (1.3)	2982 (2.0)	5.9	<.0001
PIP	411 (2.3)	13093 (8.7)	30.0	<<.0001
VD	756 (4.2)	5102 (3.4)	5.6	<.0001
NVD	3413 (18.9)	21509 (14.3)	16.6	<<.0001

*C. mydas* continued its trend of alternating high and low nesting years. This year completed at least the third such cycle (Fig 2). This pattern is consistent with a synchronized two year nesting interval. If 1995 was an interesting year, it is encouraging that this years count was the highest of all the low-nested years. This may be a tenuous indication that there has been recruitment to the nesting population, or that the nesting synchrony is breaking.

While *D. coriacea* nesting (Fig. 2) remained low, this was the third consecutive above-average year. Whether this indicates a trend remains to be seen.

The seasonal *C. caretta* nesting patterns (Figs. 3-4) returned to normal after the previous anomalous year when nesting increased unusually rapidly during the early season. Nesting densities were unusually high, but the seasonal patterns (except for Hollywood-Hallandale) were generally symmetrical, with the mid points in late June, which is consistent with our previous experience.

*C. caretta* nesting densities on the five beaches (Table 1) retained the same rank order as in 1994 (Burney and Margolis, 1994). Compared to 1994, nest counts increased from 11.4 percent at Fort Lauderdale to 43.3 percent at Hollywood-Hallandale. Lloyd Park experienced a 30.5 percent increase over last year. The proportion of the total number of *C. caretta* nests deposited in Hillsboro Beach has been low for the last two years, accounting for an average of 25.0 percent for 1994 and 1995, compared to a mean of 32.8 percent for 1989 thru 1993. This significant decline (t test;  $t = 9.0$ ,  $p = .0003$ ) may be due to the eroded condition of parts of this beach.

The seasonal patterns of *C. mydas* and *D. coriacea* nesting were normal for Broward County, with beginnings and endings within historical limits (Meylan, Schroeder and Mosier, 1995). *C. mydas* continued to prefer Hillsboro

Beach and Lloyd Park beaches over other areas (Table 2; Figs. 6 and 7), probably because of their seclusion and relative lack of nocturnal illumination. As usual, *D. coriacea* nested most densely in Hillsboro Beach (Table 3; Fig. 6). Its almost equal nesting density on Pompano beach was unusual.

The distribution of *C. caretta* nesting along the Broward County coast (Fig. 7) retains features which have been identifiable since the projects inception. As in the past, beaches near piers, inlets, the Fort Lauderdale strip and throughout Dania, Hollywood and Hallandale were lightly nested. This pattern and its apparent causes have been discussed (Burney and Mattison, 1992; Mattison, Burney and Fisher, 1993). The nesting patterns for 1994 and 1995 differ from past years because of the recent reduction in nesting densities at Hillsboro Beach, discussed above. As seen in past years, the nesting density pattern showed no correlation with the nesting success pattern (Fig. 8). This suggests that the factors which cause false crawls (disturbance, unfavorable sand conditions, etc.) do not primarily control the nesting distribution throughout the County.

As in 1994, the County-wide pattern of *C. caretta* nesting success (Fig. 8; Table 4) was statistically uniform, except at Lloyd Park where it was lower than the rest of the County. This difference this year was due to the low nesting success at the north end of Lloyd Park, (Fig. 8, zone 1) which experiences severe beach erosion. Despite this erosion, the nesting success of both *C. caretta* and *C. mydas* increased significantly from last year, improving from 36.5 to 41.3 ( $p < .0001$ ) and 36.8 to 66.7 ( $p = .025$ ) percent, respectively. Compared to last year, the nesting success of *C. caretta* at Hillsboro Beach also improved significantly ( $p = .0005$ ) from 45.9 to 52.7 percent. The nesting success of *C. mydas* at Hillsboro Beach in 1994 and 1995 was not significantly different.

Compared to last year, the hatching success of relocated *C. caretta* nests increased significantly ( $p < .0001$ ) from 61.9 to 72.3 percent. The success of *in*

*situ C. caretta* also increased significantly ( $p < .0001$ ) but by a smaller margin (71.7 to 76.8 percent). This caused a narrowing of the gap between the success of relocated and *in situ* nests (Fig. 12) and indicates that while overall hatching conditions (egg viability, sand temperature, moisture, etc.) were improved in 1995, the success of the relocation effort also improved. The hatching success of *C. mydas* and *D. coriacea* decreased from last year, but the numbers involved were small and comparisons have lower statistical validity.

Figure 11 shows that the difference in the overall success of relocated and *in situ C. caretta* nests is in the higher proportion of nests with intermediate hatching successes (ca. 45 to 85 percent) in the relocated group and higher proportions of high-success nests (ca. 90 to 100 percent) in the *in situ* group. Relocation did not increase the proportion of nests hatching below 40 percent. These differences were not as evident for *C. mydas* (Fig. 10) which had lower hatching success in relocated nests which hatched later in the season.

The differences in hatching success of relocated and *in situ* nests may be partially related to differences in the suitability of the relocation sites. Table 7 shows that relocated nests at Fort Lauderdale and Pompano had higher hatching success than those relocated to Hillsboro Beach. This is because the relocations to the Fort Lauderdale and Pompano hatchery were early season nests, which have a higher hatching success (Fig. 9). For nests relocated to Hillsboro Beach, site HB3 had the highest hatching success, with the lowest at HB2. This same order was observed in 1994. The consistency in the hatch success ranking of the three sites suggests that nests at these areas may have been affected by site specific differences in incubation conditions rather than differences in relocation technique, since substantially different personnel conducted the relocations in 1994 and 1995.

Limiting the comparison of *in situ* and relocated *C. caretta* nests to Hills-

boro Beach, where such other variables can be minimized (Table 10) shows significant differences in mean hatching success (average of the hatch success of each nest) at the different locations. Nests at the northern (HB3) beach hatchery hatched with significantly higher success than relocated or *in situ* nests at the other areas. Last year, hatching success at BH3 was also higher than the other relocation areas. The success of nests at HB2 and HB1 were not statistically different from *in situ* nests or the relocated nests distributed along Hillsboro Beach. This year, broad stretches of Hillsboro Beach were overwashed by waves from Hurricanes Erin and Luis and other storms. This was especially severe at the HB2 site, where 76 marker stakes were washed away. Fifty five of these nests hatched with an average hatch success of 66.6 percent. This overwash could have also affected the *in situ* and relocated nests distributed along the beach. No stakes were washed away at the HB1 and HB3 relocation sites so these nests may not have been as severely affected by the overwash. Comparison of hatching success and the proportions of the post-hatching nest evaluation categories (Table 11) for all *in situ* and relocated nests at Hillsboro Beach shows small, but significant differences in all categories except PIP and NVD. There was a very significantly higher proportion of eggs with no visible development in the *in situ* nests. It seems unlikely that this indicates that a disproportionate number of infertile or nonviable eggs were deposited in *in situ* by random chance, since the same disproportion was observed in 1994. It may be that for *in situ* nests, the lower proportions of eggs in the PIP and DIN categories increases the proportion of unhatched eggs (VD and NVD). The larger proportion of pipped eggs (PIP) in relocated nests (also observed in 1994) is impossible to explain, but speculation suggests that conditions within the artificial egg chambers somehow affect the ability of some hatchlings to emerge from the eggs. Unnaturally tight packing of sand around the eggs is a possibility, but it seems that this should also strongly increase there percentage of DIN.

Although the percent DIN was significantly higher in relocated nests, the difference was small (0.7 percentage points).

The use of mass egg relocation as a sea turtle management tool is far from a perfect conservation technique. Such an invasive procedure employed on such a large scale may inherently result in slightly reduced hatching success due to handling and human error, in spite of the care taken by the workers. The difference may be becoming more apparent in recent years because of the increasing scale of the project and the increased number of *in situ* nests investigated for comparison. There are also questions and speculations of reduced survivability of hatchlings from relocated nests once they have entered the sea. Clearly, it would be preferable, and much less costly, to leave far more nests *in situ*, but we are forced to relocate most nests primarily to avoid hatchling take due to misorientation by coastal artificial lighting. The nests left *in situ* in the primarily residential section of Fort Lauderdale beach were part of a study to survey the effects of direct beach illumination and the glow of the urban sky on post-emergent hatchling orientation. Of the 38 emergences which left visible hatchling tracks for hatchling orientation determination, 26 showed little or no misorientation. This result suggests that if direct illumination of our beaches could be controlled, the number of nest relocations in future projects could be significantly reduced.

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APPENDIX 1: SUMMARY OF SEA TURTLE HOT-LINE, BEEPER & NOVA  
CALLS

SUBJECT	HOT-LINE	NOVA
EMERGENCIES:		
Nesting	8	
Hatchlings	40	1
NEST LOCATIONS	40	3
STRANDINGS	25	
POACHING	0	
VOLUNTEERS	20	10
OTHER **	many	30
OVERALL	>133	44

\*\* Including calls from the media, residents concerned about land turtles in pools, all-terrain vehicle breakdowns and repairs, and all other unclassified, requests for information, and multi reason calls.



## **APPENDIX 2: Summary of Educational/Public Information Activities**

Flyers were distributed along the beach, mostly to people who approached workers with questions and at the night turtle releases at Pompano and Fort Lauderdale, which usually attracted crowds. Flyers were also placed in beach-front business establishments and some were distributed to people touring the Oceanographic Center or requesting information by phone or mail.

Public education talks with hatchling releases were conducted each Sunday evening between July 9 thru September 10 at Hollywood North Beach Park. The events were well attended. An additional session was conducted for Cooper City High School students on the evening of September 22 at the same location. Sea turtle talks were also presented at the Hillsboro Beach and Yacht Club for Hillsboro Christian Academy and at Bonnet House for the Bonnet House Lecture Series.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION  
NESTING SURVEY REPORTING FORM FOR 1995

Principal Permit Holder: <u>LOW FISHER</u>		Permit Number: <u>103</u>	
Beach Name: <u>ARROWD CO BCHS</u>			
	<i>C. caretta</i> (Loggerhead)	<i>C. mydas</i> (Green Turtle)	<i>D. coriacea</i> (Leatherback)
Total # of Nests	2319	42	15
Total # of Non-Nesting Emergences (False Crawls)	1978	92	5
Date (month and day) of First Documented Nest	4/25	5/19	3/16
Date (month and day) of Last Documented Nest	9/12	9/13	6/29
<p><b><i>In situ</i> Nest Data:</b> <i>In situ</i> nests are those left where the turtle deposited the clutch. <i>In situ</i> nests may be left without additional protection, screened with a self-releasing flat screen, or covered with self-releasing or restraining above-ground cages. Record the number of nests by category and species. For each species, rows a + b + c + d should equal the total # of nests left <i>in situ</i>. Please check to make sure this is the case.</p>			
Total # of Nests Left <i>in situ</i> (a + b + c + d)	520	27	7
(a) # of <i>in situ</i> Nests without Additional Protection	520	27	7
(b) # of <i>in situ</i> Nests with Self-Releasing Flat Screen	0	0	0
(c) # of <i>in situ</i> Nests with Self-Releasing Cage	0	0	0
(d) # of <i>in situ</i> Nests with Restraining Cage	0	0	0
<p><b>Relocated Nest Data:</b> Relocated nests are those where the clutch is removed from its original site of deposition and reburied at another site. These nests may be relocated to individual sites or as a group to a hatchery (a permanent or semi-permanent fenced or caged area where many nests are re-buried as a group). As with <i>in situ</i> nests, relocated nests may be left without additional protection, covered with a self-releasing flat screen, or covered with self-releasing or restraining above-ground cages. Hatcheries may be self-releasing (hatchlings escape unaided) or restraining (hatchlings cannot escape unaided). Record the number of nests by category and species. For each species, rows a + b + c + d + e + f should equal the total # of relocated nests. Please check to make sure this is the case.</p>			
Total # of Relocated Nests (a + b + c + d + e + f)	1799	15	8
(a) # of Relocated Nests without Additional Protection	1528	14	4
(b) # of Relocated Nests with Self-Releasing Flat Screen	0	0	0
(c) # of Relocated Nests with Self-Releasing Cage	0	0	0
(d) # of Relocated Nests with Restraining Cage	0	0	0
(e) # of Relocated to Self-Releasing Hatchery	0	0	0
(f) # of Relocated to Restraining Hatchery	271	1	4

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION - NEST SUCCESS REPORTING FORM FOR 1995  
 SPECIES: *Caretta caretta* (loggerhead)

INCUBATOR HOLDER:	BEACH NAME:	PROJECT NUMBER:										
LOW FISHER	REYNARD CO. FLA'S	1578										
SITUATION ADDITIONAL SECTION	TOTAL # OF NESTS	# OF NESTS MARKED TO EVALUATE	# OF MARKED NESTS DENEGATED	# OF MARKED NESTS ACTUALLY EVALUATED	# OF EGGS IN EVALUATED NESTS	# OF HATCHLINGS EMERGED	# OF LIVE HATCHLINGS IN NEST	# OF DEAD HATCHLINGS IN NEST	# OF PIPED LIVE	# OF PIPED DEAD	# OF UNHATCHED EGGS	# OF DEPRICATED EGGS
SITUATION SCREEN	764	764	53	397	42017	32266	0	919	0	878	7954	-
SITUATION STRAINING CAGE												
SITUATION RELEASE AGE												
LOCATION ADDITIONAL SECTION	1532	1532	43	1437	15605	108370	0	2990	0	13105	26668	4912
LOCATION FLAT SCREEN 21 IN A HATCHERY												
LOCATION NEST STRAINING OR NOT IN A HATCHERY												
LOCATION RELEASED OR NOT IN A HATCHERY												
LOCATION DAILY RELEASED												
LOCATION NEST STRAINING	220	220	0	221	23795	17642	0	299	0	1931	3923	0
HEX ISOLATION	51	50	0	50	4887	3840	136	47	40	242	582	0
* USE ONLY												

DEFINITION OF TERMS:

RELOCATED: CLUTCH WAS NOT RELOCATED FROM THE ORIGINAL SITE OF DEPOSITION  
 RELOCATED: CLUTCH WAS RELOCATED FROM THE ORIGINAL SITE OF DEPOSITION  
 SELF-RELEASING: A SCREEN, CAGE, OR HATCHERY THROUGH WHICH HATCHLINGS ESCAPE UNAIDED  
 RESTRAINING: A SCREEN, CAGE, OR HATCHERY THAT DOES NOT ALLOW HATCHLINGS TO ESCAPE UNAIDED  
 HATCHERY: A FEDDED OR CAGED AREA WHERE MANY NESTS ARE REQUIRED  
 OPEN: HATCHLING BROKEN THROUGH EGGSHELL BUT NOT COMPLETELY FREE OF EGGSHELL, NOT A HATCHED EGG

ADDITIONAL INFORMATION FOR SOME COLUMN HEADINGS:  
 # OF MARKED NESTS DEPRICATED: COUNT ONLY THOSE DEPRICATED BY NON-HUMAN PREDATORS  
 # OF EGGS IN EVALUATED NESTS: DIRECT COUNT IN RELCATED NESTS, COUNT EGGSHELLS OF IN SITU NESTS  
 # OF HATCHLINGS EMERGED: COUNT ONLY THOSE EMERGED UNAIDED FROM TO NEST EVALUATION  
 # OF UNHATCHED EGGS: COUNT ONLY WHOLE, UNPIPED EGGS  
 # OF DEPRICATED EGGS: IT IS IMPORTANT TO INCLUDE DATA FROM AS MANY NESTS THAT WERE ORIGINALLY MARKED FOR NEST SUCCESS EVALUATIONS AS POSSIBLE, EVEN IF A MARKED NEST IS PARTIALLY OR COMPLETELY DEPRICATED. # A REASONABLY ACCURATE COUNT OF DEPRICATED EGGS CAN BE MADE FROM PHYSICALLY DEPRICATED NESTS ONLY, PLEASE INCLUDE THAT DATA IN THIS NEST SUCCESS REPORTING FORM.

TRANK: THE # OF HATCHLINGS EMERGED + # OF LIVE HATCHLINGS IN NEST + # OF DEAD HATCHLINGS IN NEST + # OF PIPED LIVE + # OF PIPED DEAD + # OF UNHATCHED EGGS + # OF DEPRICATED EGGS SHOULD EQUAL THE # OF EGGS ALIQUATED NESTS. PLEASE CHECK TO MAKE SURE THIS IS THE CASE.  
 OTHER: 50 nests to Dede-DESH & 1 (unevaluated) to Discovery Center  
 An additional 357 eggs were transferred to incubators and are not included.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION - NEST SUCCESS REPORTING FORM FOR 1995  
SPECIES: Chelonia mydas (Green Turtle)

PRINCIPAL NEST HOLDER	LOT NUMBER	BATCH NAME	PRINCIPAL NEST NUMBER
LOU FISHER	108	BROOKER CO BAYS	108
# SITUATION ADDITIONAL PROTECTION	37	# OF NESTS MARKED TO EVALUATE	37
# SITUATION SCREEN		# OF MARKED NESTS DEPRECIATED	5
# SITUATION RESTRAINING CAGE		# OF NESTS ACTUALLY EVALUATED	17
# SITUATION SELF-RELEASING AGE		# OF EGGS IN NESTS	1747
ELOCATED ADDITIONAL PROTECTION	14	# OF EGGS EMERGED	971
ELOCATED VET SCREEN NOT IN A HATCHERY		# OF LIVE HATCHLINGS IN NEST	0
ELOCATED RESTRAINING AGE (NOT IN A HATCHERY)		# OF DEAD HATCHLINGS IN NEST	18
ELOCATED SELF-RELEASING AGE (NOT IN A HATCHERY)		# OF PEPPED LIVE	0
ELOCATED VET SCREEN		# OF PEPPED DEAD	31
ELOCATED RESTRAINING AGE (NOT IN A HATCHERY)		# OF UNHATCHED EGGS	391
ELOCATED SELF-RELEASING AGE (NOT IN A HATCHERY)		# OF DEPRECIATED EGGS	0
ELOCATED RESTRAINING VET SCREEN			
ELOCATED RESTRAINING OTHER (EXPLAIN)			
# USE ONLY			

DEFINITION OF TERMS:  
IN SITU: CLUTCH WAS NOT RELOCATED FROM THE ORIGINAL SITE OF DEPOSITION  
RELOCATED: CLUTCH WAS RELOCATED FROM THE ORIGINAL SITE OF DEPOSITION  
SELF-RELEASING: A SCREEN, CAGE, OR HATCHERY THROUGH WHICH HATCHLINGS ESCAPE UNAIDED  
RESTRAINING: A SCREEN, CAGE, OR HATCHERY THAT DOES NOT ALLOW HATCHLINGS TO ESCAPE UNAIDED  
HATCHERY: A FENCED OR CAGED AREA WHERE MANY NESTS ARE REQUIRED  
PEPPED: HATCHLING BROKEN THROUGH EGGSHELL BUT NOT COMPLETELY FREE OF EGGSHELL, NOT A HATCHLING EGG

ADDITIONAL INFORMATION FOR SCORE COLUMN HEADINGS:  
# OF MARKED NESTS DEPRECIATED: COUNT ONLY THOSE DEPRECIATED BY NON-HUMAN PREDATORS  
# OF EGGS IN EVALUATED NESTS: DIRECT COUNT IN RELOCATED NESTS, COUNT EGGSHELLS OF IN SITU NESTS  
# OF HATCHLINGS EMERGED: COUNT ONLY THOSE EMERGED UNAIDED PRIOR TO NEST EVALUATION  
# OF UNHATCHED EGGS: COUNT ONLY WHOLE, UNPEPPED EGGS  
# OF DEPRECIATED EGGS: IT IS IMPORTANT TO INCLUDE DATA FROM AS MANY NESTS THAT WERE ORIGINALLY MARKED FOR NEST SUCCESS EVALUATIONS AS POSSIBLE, EVEN IF A MARKED NEST IS PARTIALLY OR COMPLETELY DEPRECIATED. IF A REASONABLY ACCURATE COUNT OF DEPRECIATED EGGS CAN BE MADE (FROM FRESHLY DEPRECIATED NESTS ONLY), PLEASE INCLUDE THAT DATA IN THIS NEST SUCCESS REPORTING FORM.

ATTENT: THE # OF HATCHLINGS EMERGED + # OF LIVE HATCHLINGS IN NEST + # OF DEAD HATCHLINGS IN NEST + # OF PEPPED LIVE + # OF PEPPED DEAD + # OF UNHATCHED EGGS + # OF DEPRECIATED EGGS SHOULD EQUAL THE # OF EGGS EVALUATED NESTS. PLEASE CHECK TO MAKE SURE THIS IS THE CASE

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION - NEST SUCCESS REPORTING FORM FOR 1985  
 SPECIES: *Dermochelys coriacea* (Leatherback)

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ORIGINAL NEST HOLDER	TOO FISHER	NEST NAME	BROWARD CO RCHS	PIPING NUMBER:	102							
	TOTAL # OF NESTS	# OF NESTS MARKED TO EVALUATE	# OF MARKED NESTS DEPRECIATED	# OF NESTS ACTUALLY EVALUATED	# OF EGGS IN EVALUATED NESTS	# OF HATCHLINGS EMERGED	# OF LIVE HATCHLINGS IN NEST	# OF DEAD HATCHLINGS IN NEST	# OF PIPED LIVE PERIOD DEAD	# OF UNHATCHED EGGS	# OF DEPRECIATED EGGS	
# SITUING ADDITIONAL ROTECTION	7	7	0	5	407	246	0	6	0	13	142	-
# SITUING L1 AT SCREEN												
# SITUING STRAINING CAGE												
# SITUING SELF-RELEASING AGE												
ELOCATEDING ADDITIONAL ROTECTION	4	4	0	4	390	223	0	13	0	15	139	0
ELOCATEDING L1 AT SCREEN NOT IN A HATCHERY												
ELOCATEDING STRAINING AGE END IN A HATCHERY												
ELOCATEDING SELF-RELEASING AGE NOT IN A HATCHERY												
ELOCATEDING SELF-RELEASING LATCHERY												
ELOCATEDING STRAINING LATCHERY	4	4	0	4	362	119	0	17	0	45	181	0
OTHER (EXPLAIN)												
REP USE ONLY												

DEFINITION OF TERMS: ADDITIONAL INFORMATION FOR SOME COLUMN HEADINGS:

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 RESTRAINING: A SCREEN, CAGE, OR HATCHERY THAT DOES NOT ALLOW HATCHLINGS TO ESCAPE UNAIDED  
 HATCHERY: A FINCED OR CAGED AREA WHERE MANY NESTS ARE REQUIRED  
 PIPED: HATCHING BROKEN THROUGH EGGSHELL BUT NOT COMPLETELY FREE OF EGGSHELL, NOT A HATCHED EGG  
 DEPRECIATED: # OF UNHATCHED EGGS + # OF LIVE HATCHLINGS IN NEST + # OF DEAD HATCHLINGS IN NEST + # OF PIPED LIVE + # OF PIPED DEAD + # OF UNHATCHED EGGS + # OF DEPRECIATED EGGS SHOULD EQUAL THE # OF EGGS EVALUATED NESTS. PLEASE CHECK TO MAKE SURE THIS IS THE CASE

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**Department of Natural Resource Protection**

Biological Resources Division  
218 S.W. 1st Avenue • Fort Lauderdale 33301  
(954) 519-1230 • Fax (954) 519-1412



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