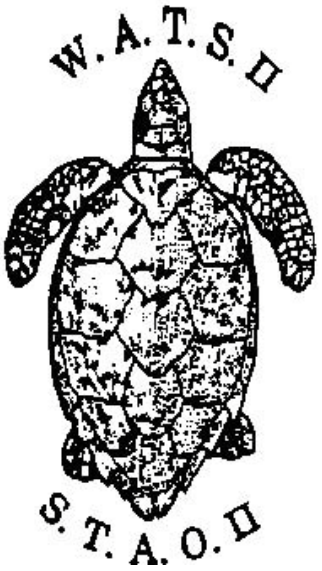
WATS II REPORT / DATA SET



National Report to WATS II for U.S. Virgin Islands

National Representative: Ralf H. Boulon, Jr.

Received: 18 September 1987

WATS2 027

WIDECAST
Wider Caribbean Sea Turtle Conservation Network

With a grant from the U.S. National Marine Fisheries Service, WIDECAST has digitized the databases and proceedings of the **Western Atlantic Turtle Symposium (WATS)** with the hope that the revitalized documents might provide a useful historical context for contemporary sea turtle management and conservation efforts in the Western Atlantic Region.

With the stated objective of serving "as a starting point for the identification of critical areas where it will be necessary to concentrate all efforts in the future", the first Western Atlantic Turtle Symposium convened in Costa Rica (17-22 July 1983), and the second in Puerto Rico four years later (12-16 October 1987). WATS I featured National Reports from 43 political jurisdictions; 37 presented at WATS II.

WATS I opened with these words: "The talks which we started today have the multiple purpose of bringing our knowledge up to date about the biological peculiarities of the marine turtle populations of the western Atlantic; to know and analyse the scope of the National Reports prepared by the scientific and technical personnel of more than thirty nations of the region; to consider options for the orderly management of marine turtle populations; and in general to provide an adequate forum for the exchange of experiences among scientists, administrators, and individuals interested in making contributions for the preservation of this important natural resource."

A quarter-century has passed, and the results of these historic meetings have been lost to science and to a new generation of managers and conservationists. Their unique importance in providing baseline data remains unrecognized, and their potential as a "starting point" is neither known nor appreciated.

The proceedings document what was known at the time concerning the status and distribution of nesting and foraging habitat, population sizes and trends, mortality factors, official statistics on exploitation and trade, estimated incidental catch, employment dependent on turtles, mariculture operations, public and private institutions concerned with conservation and use, legal aspects (e.g. regulations, enforcement, protected areas), and active research projects.

Despite the potential value of this information to agencies responsible for conducting stock assessments, monitoring recovery trends, safeguarding critical habitat, and evaluating conservation successes in the 21st century, the National Reports submitted to WATS II were not included in the published proceedings and, until now, have existed only in the private libraries of a handful of agencies and symposium participants. To help ensure the legacy of these symposia, we have digitized the entire proceedings – including National Reports, plenary presentations and panels, species synopses, and annotated bibliographies from both meetings – and posted them online at http://www.widecast.org/What/RegionalPrograms.html.

Each article has been scanned from the original document. Errors in the scan have been corrected; however, to be true to the original content (as closely as we can discern it), potential errors of content have not been corrected. This article can be cited (with the number of pages based on the layout of the original document) as:

Boulon, R.H., Jr. 1987. National Report to WATS II for the United States Virgin Islands. Prepared for the Second Western Atlantic Turtle Symposium (WATS II), 12-16 October 1987, Mayagüez, Puerto Rico. Doc. 27. 72 pages.

Karen L. Eckert
WIDECAST Executive Director
June 2009

GOVERNMENT OF THE VIRGIN ISLANDS OF THE UNITED STATES

Department of Planning and Natural Resources
DIVISION OF FISH AND WILDLIFE
101 ESTATE NAZARETH
ST. THOMAS, VIRGIN ISLANDS 00802

September 14,1987

Dr. Robert R. Lankford
Executive Secretary Wats II
Department of Marine Sciences
University of Puerto Rico
Mayaguez, P.R. 00708

Dear Bob:

Please find enclosed the National Report for the U.S. Virgin Islands. The National Report utilizes the appropriate forms from the WATS II Sea Turtle Survey Data Form packet and the format given for the written report. Included with the report is the 1986 report on the Sandy Point Leatherback turtle project.

I hope you find the report satisfactory. I'll see you in October.

Sincerely,

Ralf H. Boulon Jr.
Endangered Species Coordinator

✓ cc Fred Berry, NMFS, with copy of reports.

RHB/dmg

TABLE III. NESTING BEACH INVENTORY

List beaches in geographic sequence. Provide additional information on an attached page. Please list each species that occurs on beach on a separate line even if months of occurrence are the same.

COUNTRY: United States STATE: Virgin Islands RECORDER: R. Boulon, Jr., N.P.S.

Island: St. Croix

Name of Beach	Length in Km	Species * [1] Nesting	Months Peak Nesting	Months Recorded Nesting
1. Sandy Point	5.4	Cm (1-3) * [2]	N/A * [3]	June-August
		Dc (18-46)	April-June	February-August
		Ei (1-3)	N/A	June-August
2. White Lady Beach	0.5	Cm * [4] (Uk)	N/A	June-September
		Ei (2-4)	N/A	June-September
3. Whim Beach	0.6	Ei (1-2)	N/A	June-September
4. Carlton Beach	0.9	Ei (0-1)	N/A	June-September
5. Mannings Bay	0.7	Cm * [4] (1-2)	N/A	June-September
6. Cane Garden Bay	1.7	Ei (0-2)	N/A	June-September
7. Manchioneel Bay	2.1	Cm (1-2)	N/A	June to August
		Dc (3-8)	April-June	February-August
		Ei (1-3)	N/A	June to August
8. Longford Beach	1.0	Cm* [4] (Uk)	N/A	June-September
		Ei (1-3)	N/A	June-September
9. Castle Nugent Beach	1.0	Cm * [4] (Uk)	N/A	June-September
		Ei (1-2)	N/A	June-September
10. Great Pond Beach	2.0	Cm * [4] (0-2)	N/A	June-September
		Ei (0-2)	N/A	June-September
11. Half Penny Bay	0.8	Ei (0-2)	N/A	June-September
12. Robin Bay	1.7	Cm* [4] (2-4)	N/A	June-September
		Ei (2-4)	N/A	June-September
13. Rod Bay	0.8	Cm * [4] (0-2)	N/A	June-September
		Ei (0-2)	N/A	June-September
14. Turner Hole	1.1	Cm * [4] (1-2)	N/A	June-September
		Ei (1-2)	N/A	June-September
15. Grapetree Bay	0.2	Cm * [4] (0-2)	N/A	June-September
		Ei (0-2)	N/A	June-September
16. Jack's Bay	0.7	Cm * [4] (3-5)	N/A	June-September
		Dc (0-2)	N/A	March-June
		Ei (3-5)	N/A	June-September
17. Isaac's Bay	0.7	Cm * [4] (1-2)	N/A	June-September
		Dc (0-1)	N/A	March-June
		Ei (1-2)	N/A	June-September
18. East End Bay	0.3	Ei (0-1)	N/A	June-September
19. Teytaud's Beach	0.4	Ei (0-1)	N/A	June-September
20. Boiler Bay	0.3	Ei (0-1)	N/A	June-September
21. Knight Bay	0.4	Cm * [4] (0-2)	N/A	June-September
22. Smuggler's Cove	0.2	Cm * [4] (1-2)	N/A	June-September
		Ei (0-1)	N/A	June-September
23. Teague Bay	0.7	Ei (0-2)	N/A	June-September
24. Banana Gut Beach	0.5	Dc (0-1)	N/A	March-June
		Ei (1-2)	N/A	June-September
25. Buck Island	1.2	Cm (1-4)	July-October	January-December
		Dc (1-2)	May-June	March-June
		Ei (10-30)	July-October	January-December
26. Coakley Beach	0.6	Dc (0-3)	N/A	March-June

TABLE III. NESTING BEACH INVENTORY
List beaches in geographic sequence. Provide additional information on an attached page. Please list each species that occurs on beach on a separate line even if months of occurrence are the same.

COUNTRY: United States STATE: Virgin Islands RECORDER: R. Boulon, Jr., N.P.S.

Island: St. Croix

Name of Beach	Length in Km	Species * [1] Nesting	Months Peak Nesting	Months Recorded Nesting
		Ei (0-2)	N/A	June-September
27. Prune Beach	0.8	Dc (0-3)	N/A	March-June
		Ei (0-2)	N/A	June-September
28. Pull Point Beach	0.3	Cm * [4] (2-5)	N/A	June-September
		Dc (0-2)	N/A	March-June
		Ei (2-5)	N/A	June-September
29. Green Cay Beach	0.2	Dc (0-2)	N/A	March-June
		Ei (0-5)	N/A	June-September
30. Shoys Beach	2.1	Cm * [4] (0-1)	N/A	June-September
		Dc (0-2)	N/A	March-June
		Ei (0-1)	N/A	June-September
31. New Fort Beach	0.2	Cm * [4] (0-1)	N/A	June-September
		Dc (1-2)	N/A	March-June
32. Little Bay Beach	0.3	Dc (0-1)	N/A	March-June
33. Little Princess Beach	0.5	Ei (0-2)	N/A	June-September
34. Salt River (West)	0.2	Cm * [4] (0-1)	N/A	June-September
		Ei (0-2)	N/A	June-September
35. Rust Op Twist	0.2	Ei (0-3)	N/A	June-September
36. Cane Bay	0.9	Ei (0-2)	N/A	June-September
37. North Star Beach	0.3	Ei (0-2)	N/A	June-September
38. Davis Bay	0.3	Cm * [4] (0-1)	N/A	June-September
		Dc (0-1)	N/A	March-June
		Ei (0-2)	N/A	June-September
39. Maroon Hole	0.1	Cm * [4] (0-2)	N/A	June-September
		Ei (0-2)	N/A	June-September
40. Ham's Bay	0.3	Ei (0-1)	N/A	June-September
41. Barasford Manor Beach	0.6	Ei (0-2)	N/A	June-September
42. Butler Bay	0.2	Ei (0-2)	N/A	June-September
43. Williams Beach	0.8	Cm * [4] (2-3)	N/A	June-September
		Ei (2-3)	N/A	June-September
44. Sprat Hall	1.1	Ei (1-2)	N/A	June-September
45. La Grange	0.7	Ei (0-2)	N/A	June-September

[*1] Cc=*Caretta caretta*; Cm=*Chelonia mydas*; Dc=*Dermochelys coriacea*; Ei=*Eretmochelys imbricata*; Lk=*Lepidochelys kempi*; Lo=*Lepidochelys olivacea*; Uk=Unknown
[*2] Number in parentheses following species identification is the annual range of estimated number of turtles nesting per year 1979-1986
[*3] N/A = Information not available
[*4] Identification unreliable

TABLE III. NESTING BEACH INVENTORY

List beaches in geographic sequence. Provide additional information on an attached page. Please list each species that occurs on beach on a separate line even if months of occurrence are the same.

COUNTRY: United States STATE: Virgin Islands RECORDER: R. Boulon, Jr., N.P.S.

Island: St. John

Name of Beach	Length in Km	Species * [1] Nesting	Months Peak Nesting	Months Recorded Nesting
1. Henley Cay	0.1	Ei (0-2) * [2]	August-November	June-December
2. Caneel Hawksnest	0.2	Ei (0-1)	August-November	June-December
3. Denis Bay	0.2	Ei (0-1)	August-November	June-December
4. Jumbi Bay	0.1	Ei (0-2)	August-November	June-December
5. Trunk Bay	0.5	Dc (0-2)	April-June	March-July
		Ei (0-3)	August-November	June-December
6. Windswept Beach	0.2	Ei (0-3)	August-November	June-December
7. Peter Bay	0.3	Ei (0-1)	August-November	June-December
8. Cinnamon Bay	0.5	Dc (0-1)	April-June	March-July
		Ei (0-1)	August-November	June-December
9. Maho Bay	0.2	Ei (0-1)	August-November	June-December
10. Francis Bay	0.5	Ei (0-2)	August-November	June-December
11. Salt Pond Bay	0.2	Ei (0-5)	August-November	June-December
12. Grootpan Bay	0.1	Ei (0-1)	August-November	June-December
13. Great Lameshur Bay	0.2	Ei (0-2)	August-November	June-December
14. Yawzi Point	<0.1	Ei (0-1)	August-November	June-December
15. Little Lameshur Bay	0.2	Ei (0-2)	August-November	June-December
16. Europa Bay	<0.1	Ei (0-1)	August-November	June-December
17. Eastern Reef Bay	0.25	Ei (0-2)	August-November	June-December
18. Genti Bay	0.6	Ei (0-2)	August-November	June-December
19. Western Reef Bay	0.55	Ei (0-4)	August-November	June-December
20. Cocoloba Beach	0.1	Ei (2-6)	August-November	June-December
21. Chocolate Hole	0.2	Ei (0-1)	August-November	June-December

* 1 Cc=*Caretta caretta*; Cm=*Chelonia mydas*; Dc=*Dermochelys coriacea*; Ei=*Eretmochelys imbricata*; Lk=*Lepidochelys kempi*; Lo=*Lepidochelys olivacea*; Uk=Unknown

* 2 Number in parentheses following species identification is the annual range of estimated number of turtles nesting per year 1979-1986

* 3 N/A = Information not available

* 4 Identification unreliable

TABLE III. NESTING BEACH INVENTORY

List beaches in geographic sequence. Provide additional information on an attached page. Please list each species that occurs on beach on a separate line even if months of occurrence are the same.

COUNTRY: United States STATE: Virgin Islands RECORDER: R. Boulon, Jr., N.P.S.

Island: St. Thomas

Name of Beach	Length in Km	Species * [1] Nesting	Months Peak Nesting	Months Recorded Nesting
1. Morningstar Beach	0.50	Ei (0-1) * [2]	N/A * [3]	June
2. Dog Island	0.02	Ei (0-2)	N/A	August
3. Great St. James	0.04	Ei (0-2)	N/A	August
4. Pineapple Beach	0.04	Dc (0-1)	N/A	May
		Ei (0-1)	N/A	August
5. Coki Point Beach	0.30	Dc (0-1)	N/A	May
6. Mandahal Bay	0.07	Ei (0-1)	N/A	July
7. Coconut Bay, Hans Lollik	1.00	Ei (0-3)	N/A	June-August
8. Dry Bay, Hans Lollik	0.04	Ei (2-6)	N/A	June-September
9. Little Bay, Hans Lollik	0.04	Ei (0-1)	N/A	August
10. Little Hans Lollik	0.04	Dc (0-1)	N/A	July
		Ei (0-4)	N/A	June-August
11. Hull Bay	0.10	Ei (0-1)	N/A	July
12. Palm Bay	0.03	Ei (0-2)	N/A	July-August
13. Clucluse Bay, Inner Brass	0.04	Ei (0-2)	N/A	July-August
14. Sandy Bay, Inner Brass	0.08	Dc (0-1)	N/A	June
		Ei (2-4)	N/A	June-August
15. Neltjeberg Beach	1.20	Dc (0-1)	N/A	March
		Ei (1-2)	N/A	June-August
16. Penn Bay	0.07	Ei (1-3)	N/A	June-August
17. Caret Bay	0.08	Ei (1-4)	N/A	June-August
18. Sorgenfri Bay	0.03	Ei (0-2)	N/A	July-August
19. Santa Maria Bay	0.06	Cm (0-1) * [4]	N/A	June
		Ei (0-1)	N/A	June-July
20. Stumpy Bay	0.05	Ei (0-1)	N/A	August
21. Bordeaux Bay	0.05	Ei (2-4)	N/A	June-August
22. Botany Bay	0.06	Dc (0-1)	N/A	July
		Ei (0-1)	N/A	July
23. West Cay Bay	0.05	Ei (0-2)	N/A	June-August
24. Morningstar Beach	0.50	Ei (0-1)	N/A	June
25. Dog Island	0.02	Ei (0-2)	N/A	August
26. Great St. James	0.04	Ei (0-2)	N/A	August
27. Pineapple Beach	0.04	Dc (0-1)	N/A	May
		Ei (0-1)	N/A	August
28. Coki Point Beach	0.30	Dc (0-1)	N/A	May
29. Mandahal Bay	0.07	Ei (0-1)	N/A	July
30. Coconut Bay, Hans Lollik	1.00	Ei (0-3)	N/A	June-August
31. Dry Bay, Hans Lollik	0.04	Ei (2-6)	N/A	June-September
32. Little Bay, Hans Lollik	0.04	Ei (0-1)	N/A	August
33. Little Hans Lollik	0.04	Dc (0-1)	N/A	July
		Ei (0-4)	N/A	June-August
34. Hull Bay	0.10	Ei (0-1)	N/A	July
35. Palm Bay	0.03	Ei (0-2)	N/A	July-August
36. Clucluse Bay, Inner Brass	0.04	Ei (0-2)	N/A	July-August

TABLE III. NESTING BEACH INVENTORY

List beaches in geographic sequence. Provide additional information on an attached page. Please list each species that occurs on beach on a separate line even if months of occurrence are the same.

COUNTRY: United States STATE: Virgin Islands RECORDER: R. Boulon, Jr., N.P.S.

Island: St. Thomas

Name of Beach	Length in Km	Species * [1] Nesting	Months Peak Nesting	Months Recorded Nesting
37. Sandy Bay, Inner Brass	0.08	Dc (0-1)	N/A	June
		Ei (2-4)	N/A	June-August
38. Neltjeberg Beach	1.20	Dc (0-1)	N/A	March
		Ei (1-2)	N/A	June-August
39. Penn Bay	0.07	Ei (1-3)	N/A	June-August
40. Caret Bay	0.08	Ei (1-4)	N/A	June-August
41. Sorgenfri Bay	0.03	Ei (0-2)	N/A	July-August
42. Santa Maria Bay	0.06	Cm (0-1) * [4]	N/A	June
		Ei (0-1)	N/A	June-July
43. Stumpy Bay	0.05	Ei (0-1)	N/A	August
44. Bordeaux Bay	0.05	Ei (2-4)	N/A	June-August
45. Botany Bay	0.06	Dc (0-1)	N/A	July
		Ei (0-1)	N/A	July
46. West Cay Bay	0.05	Ei (0-2)	N/A	June-August

* 1 Cc=*Caretta caretta*; Cm=*Chelonia mydas*; Dc=*Dermochelys coriacea*; Ei=*Eretmochelys imbricata*; Lk=*Lepidochelys kempi*; Lo=*Lepidochelys olivacea*; Uk=Unknown

* 2 Number in parentheses following species identification is the annual range of estimated number of turtles nesting per year 1979-1986

* 3 N/A = Information not available

* 4 Identification unreliable

Sea Turtle Exploitation (Violations) in the U.S. Virgin Islands

1984

Twenty investigations were made pertaining to reported endangered species violations in the U.S.V.I. These activities resulted in the seizure and forfeiture to the U.S. government of: (1) stuffed green sea turtle; (7) green sea turtle shells; (2) hawksbill sea turtle shells; (2) commercial shipments of sea turtle jewelery valued at $500.00; and (8) pounds of sea turtle meat. Agents conducted five arrests for the taking and possession of endangered species parts with civil assessments totaling $9250.00

1985

Endangered species investigations conducted within U.S.V.I. territorial limits consisted of (15) activites resulting in seizure and forfeiture to the government of (3) hawksbill sea turtle shell; (4) green sea turtle shells; and a total of five arrests for taking and possessing sea turtle parts with civil assessments totaling $15,000.00.

1986

Endangered species investigations conducted within the U.S.V.I. territorial limits produced (15) civil cases comprised of (69) counts of possession, taking and import. These activities resulted in the seizure of (83) pounds of turtle meat; (4) hawksbill shells; (2) hawksbill carcasses; (9) green shells; (1) live green turtle; and (43) pieces of jewelry. Dispositions of the cases included (9) abandonments to the government, (3) forfeitures to the government, and $8750.00 in assessments.

1987

Endangered species investigations conducted within the U.S.V.I. territorial limits to date have produced (3) civil cases comprised of (5) counts of possession and taking. These activities resulted in the seizure of (5) pounds of green turtle meat and (108) green turtle eggs. Two criminal violations are being processed for (2) green turtle carcasses and (538) green turtle eggs. Dispositions of the civil cases include (1) forfeiture to the government and (1) $5,000.00 assessment. The criminal cases are pending with a November 2 court date.

WATS II SEA TURTLE DATA FORM

TABLE IV. MORTALITY

COUNTRY: United States STATE: Virgin Islands YEAR: 1982 OBSERVER: _____

Date	Species *	Sex	Length (cm)	Weight (kg)	# Eggs	Locality	Cause
05 April	Cm	Male	81.0	60 (est)	None	St. Croix	Uk; stranding
10 June	Ei	Uk	Uk	30 (est)	None	St. Thomas	In stomach of 12 ft. (3.7 m) tiger shark
16 June	Cm	Female	28.0	3.1	None	St. Croix	Tangled in fishing line on pier
22 June	Cm	Uk	26.7	2.5	None	St. Thomas (Coral World)	Uk; died in reef tank
09 August	Ei	Uk	51.2	12.5	None	St. John	Deep propeller wound on carapace

Comments:

* Cc=*Caretta caretta*; Cm=*Chelonia mydas*; Dc=*Dermochelys coriacea*; Ei=*Eretmochelys imbricata*; Lk = *Lepidochelys kempi*; Lo=*Lepidochelys olivavea*; Uk=Unknown

WATS II SEA TURTLE DATA FORM

TABLE IV. MORTALITY

COUNTRY: United States STATE: Virgin Islands YEAR: 1983 OBSERVER: _____

Date	Species *	Sex	Length (cm)	Weight (kg)	# Eggs	Locality	Cause
11 Aug-	Cm	Uk	53.3	Uk	None	St. Croix	Deep propeller wound on carapace
15 Sept	Cm	Female	27.3	3.97	None	St. John	Non-suppurative encephalitis

Comments:

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WATS II SEA TURTLE DATA FORM

TABLE IV. MORTALITY

COUNTRY: United States STATE: Virgin Islands YEAR: 1984 OBSERVER: _____

Date	Species *	Sex	Length (cm)	Weight (kg)	# Eggs	Locality	Cause
01 May	Cm	Uk	41	Uk	None	St. John	Drowned: caught in fish trap
23 May	Cm	Uk	60.1	27.5	None	St. Thomas	Fishing line around neck
27 May	Ei	Uk	100 (approx)	Uk	None	St. Croix	Found dead on beach
22 July	Ei	Uk	27.6	2	None	St. Thomas	Uk; missing right front flipper
24 Aug	Ei	Hatch-ling	4.7	0.02	None	St. Thomas	Found washed up on shore, weak but died

Comments:

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WATS II SEA TURTLE DATA FORM

TABLE IV. MORTALITY

COUNTRY: United States STATE: Virgin Islands YEAR: 1985 OBSERVER: _____

Date	Species *	Sex	Length (cm)	Weight (kg)	# Eggs	Locality	Cause
02 Feb	Cm	Uk	37.5	Uk	None	St. Thomas	Propeller wound on head
19 March	Cm	Uk	32.2	Uk	None	St. Thomas	Small wound at base of skull on back
29 July	Cm	Male	102.4	100 +	None	St. Croix	Uk; stranding
23 August	Cm	Uk	Uk	Uk	Uk	St. Croix	Uk; stranding

Comments:

* Cc=*Caretta caretta*; Cm=*Chelonia mydas*; Dc=*Dermochelys coriacea*; Ei=*Eretmochelys imbricata*; Lk=*Lepidochelys kempi*; Lo=*Lepidochelys olivacea*; Uk=Unknown

WATS II SEA TURTLE DATA FORM

TABLE IV. MORTALITY

COUNTRY: United States STATE: Virgin Islands YEAR: 1986 OBSERVER: _____

Date	Species *	Sex	Length (cm)	Weight (kg)	# Eggs	Locality	Cause

None reported or recorder

Comments:

* Cc=*Caretta* caretta; Cm=*Chelonia mydas*; Dc=*Dermochelys coriacea*; Ei=*Eretmochelys imbricata*; Lk=*Lepidochelys kempi*; Lo=*Lepidochelys olivavea*; Uk=Unknown

WATS II SEA TURTLE DATA FORM

TABLE IV. MORTALITY

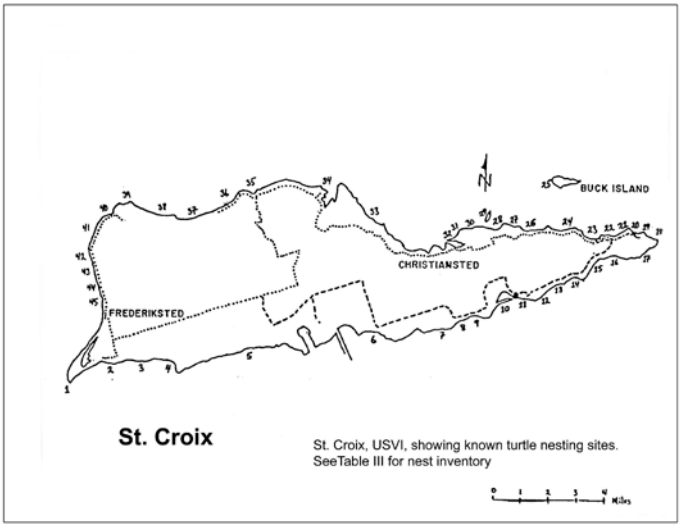
COUNTRY: United States STATE: Virgin Islands YEAR: 1987 OBSERVER: _____

Date	Species *	Sex	Length (cm)	Weight (kg)	# Eggs	Locality	Cause
09 Jan	Cm	Uk	35	Uk	None	St. Thomas	Deep gouges in carapace, probably propeller
17 Feb	Cm	Male	85.0	Uk	None	St. Croix	Uk; stranding
28 April	Cm	Uk	67.0	Uk	None	St. Thomas	Uk; stranding
02 July	Cm	Uk	81.5	38 **	None	St. Croix	Possible shark attack

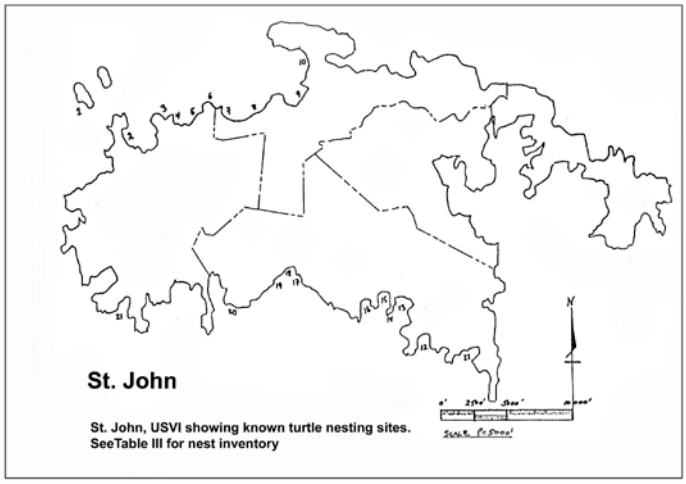
Comments:

* Cc=*Caretta caretta*; Cm=*Chelonia mydas*; Dc=*Dermochelys coriacea*; Ei=*Eretmochelys imbricata*; Lk=*Lepidochelys kempi*; Lo=*Lepidochelys olivacea*; Uk=Unknown

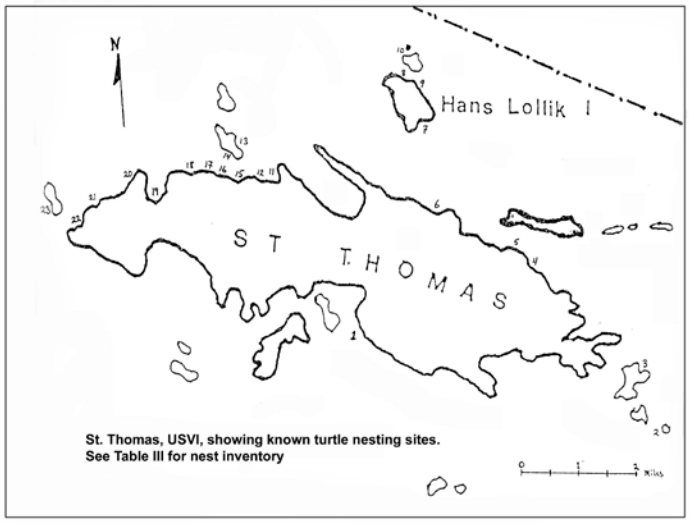
** estimated weight



St. Croix, USVI, showing known turtle nesting sites.
SeeTable III for nest inventory

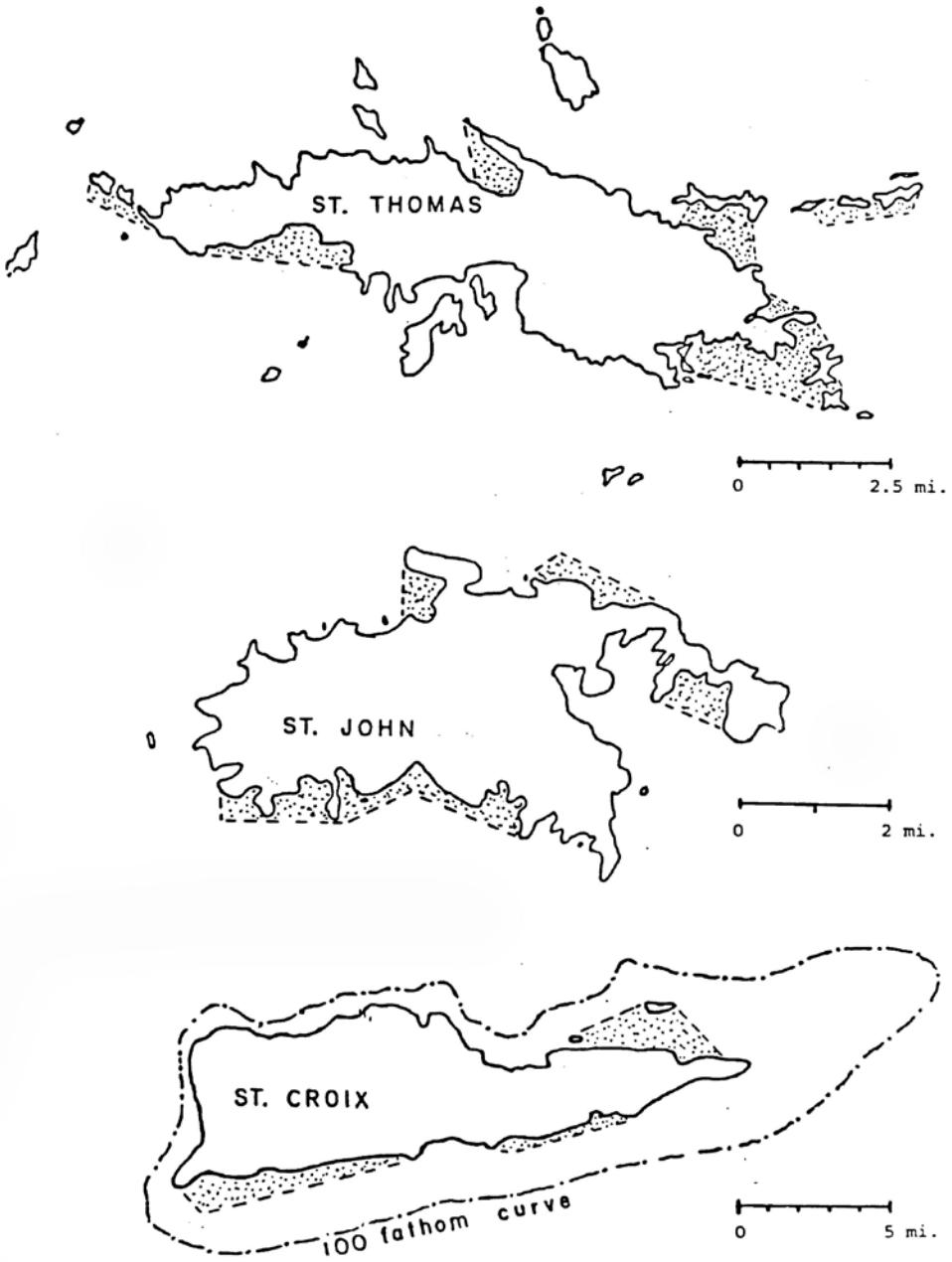


St. John, USVI showing known turtle nesting sites.
SeeTable III for nest inventory



St. Thomas, USVI, showing known turtle nesting sites.
See Table III for nest inventory

Country map showing foraging areas



Editor's note (2009): Maps and figures are reprinted exactly as they appear in the original document; we regret the poor quality exhibited in some cases.

§ 317. Fish for scientific, educational and breeding purposes

The Department, and any other person or organization with the written permission of the Commissioner, may catch or cause to be caught, for scientific or educational purposes or for fish culture, any fish or marine organism at any time, from the jurisdictional waters of the Territory, and may sell or cause to be sold when not otherwise prohibited by law, all or such part of the catch that has been taken and as may not be necessary for scientific or educational purposes or for fish culture. The proceeds, if any, from these sales shall be deposited in the Fisheries and Wildlife Fund.-Added Nov. 21, 1972, No. 3330, § 2, Sess. L. 1972, p. 497.

§ 318. Protection of marine turtles, nests and eggs; penalties

(a) It is the intent of the Legislature of the Virgin Islands to contribute to the preservation of marine turtles in the Caribbean area, said turtles now being close to extinction.

(b) It shall be unlawful for any person to take, kill, possess, mutilate or in any way destroy any loggerhead, leatherback, hawksbill, ridley or green turtle or other sea turtle, or take or possess any part thereof while such turtle is on the beaches of the Territory at any time, or to take or possess any such turtle in the Territorial waters during the months of May through September, inclusive, of each year and at such other times as the Commissioner may by rule and regulation prescribe. It shall be unlawful to import, trade, sell or in any way deal in young sea turtles of any kind; provided, however, that the Commissioner may issue written permission to any licensed or publicly owned zoo or exhibitor of marine life to capture such young turtles for purposes of live exhibition.

(c) No person may take, possess, disturb, mutilate, destroy, cause to be destroyed, sell, offer for sale, transfer, molest or harass any sea turtle nest or eggs at any time.

(d) Any person violating any provision of this section is guilty of a misdemeanor and shall, upon conviction therefore, be punished by a fine not less than one hundred ($100) dollars nor more than six hundred ($600) dollars, or by imprisonment for a period not to exceed one (1) year, or by both such fine and imprisonment.-Added Nov. 21, 1972, No. 3330, § 2, Sess. L. 1972, p. 498.

§ 319. Lobsters; regulations; penalties

(a) It is intent of the Legislature of the Virgin Islands to place restrictions upon the taking of spiny lobsters for the purpose of insuring and maintaining the highest possible production of such lobsters, for commercial purposes, consistent with sensible conservation practices.

(b) No person, firm or corporation shall take or have in his possession at any time, regardless of where taken, any spiny lobster (crawfish or crayfish) of the species *Panulirus argus* unless such spiny lobster (crawfish or crayfish) of the species *Panulirus argus* shall have a carapace measurement of more than 3 inches or shall have a tail measurement of more than five and one-half (5 ½) inches, not including any protruding muscle tissue. The carapace (head, body, front section) measurement shall be determined by beginning at the anteriormost (front) edge of the groove between the horns directly above the eyes, then proceeding along the mid-dorsal line (middle of back) to the rear edge of the top part of the carapace. The tail (segmented portion) shall be measured lengthwise along the center of the entire tail until the rearmost extremity is reached. The tail measurement shall be conducted with the tail in a flat straight position with the tip of the tail closed.

(c) Lobsters must remain in a whole condition at all times while being transferred on, above or below the waters of the Territory and the practice of wringing or separating the tail (segmented portion) from the body (carapace or head) section is prohibited on the waters of this Territory, except by special written permission issued by the Commissioner.

(d) Egg-bearing lobsters of any species shall not be taken, possessed or sold at any time, except that egg-bearing lobsters may be returned to pots or traps in which they have been captured, provided said egg-bearing lobsters are returned to such pots or traps in a live and unharmed condition and are provided with adequate food. Such egg-bearing lobsters as are returned to pots or traps as aforementioned, shall not be taken or possessed or sold until the eggs have been naturally released into the water.

(e) The practice of stripping or otherwise molesting egg-bearing lobsters in order to remove the eggs is prohibited.

VIRGIN ISLANDS SEA TURTLE RESEARCH AND SURVEY PROJECT

1. Sandy Point Leatherback Turtle Nesting Biology Project
   Ongoing: Saturation tagging/nest monitoring with relocation of nests to reduce loss due to beach erosion. Division of Fish and Wildlife, Department of Planning and Natural Resources.

2. Green/Hawksbill Population Biology Project
   Ongoing: In-water capture and tagging program. Recaptures provide information on growth rates, population sizes, movement patterns and genetic stock assessment. Division of Fish and Wildlife, Department of Planning and Natural Resources.

3. Sea Turtle Nesting Surveys
   Ongoing: Daytime nesting beach surveys on St. John and Buck Island National Monument. Park Service.

4. Assement of Anchor Damage and Carrying Capacity of Seagrass Beds in Francis and Maho Bays for Green Sea Turtles.
   Completed. Susan Williams, West Indies Lab.

RB/dmg

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TAGGING AND NESTING RESEARCH OF LEATHERBACK SEA TURTLES (*DERMOCHELYS CORIACEA*) ON SANDY POINT, ST. CROIX, U. S. VIRGIN ISLANDS, 1996

ANNUAL REPORT TO THE U. S. FISH AND WILDLIFE SERVICE

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* Pursuant to Contract # PC-CCA-146-86
Division of Fish and Wildlife
Department of Conservation and Cultural Affairs
U. S. Virgin Islands

Submitted November 1986

Table of Contents

Figures and Tables

Introduction 1

Methods 4

- Morphometric Parameters 4
- Nesting 4
- Weighing 5
- Tagging 5
- Identifying Characteristics 6
- Nesting Location 6
- Beach Erosion Profiles 6
- Hatching 6
- Nest Excavation 7

Results and Discussion 8

- Hatching 16
- Tagging and Remigration 19
- Mortality Factors 19
- Eggs 19
- Hatchlings 19

Conclusions 24

Acknowledgements 25

Literature Cited 27

Appendix I

INTRODUCTION

For the fifth season a detailed study was continued on the tagging and nesting research of the leatherback sea turtle (*Dermochelys coriacea*) on Sandy Point, St. Croix, U. S. Virgin Islands.

Largest of all turtles, it is the most morphologically divergent of the seven known species of sea turtles. Little is known of *Dermochelys* with only small glimpses of its life history being documented through observations of nesting behavior and occasional pelagic encounters. Pritchard (1971) has reviewed its biology.

Dermochelys was listed as an endangered species by the United States Department of the Interior in 1979. In 1975, it was assigned Appendix I status by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). With only 13 significant nesting sites remaining worldwide (Steinberg, 1981), six of those located in the Western Atlantic (Carr et al., 1982), and worldwide estimate of only 115,000 mature adult females (Pritchard, 1982), the species' future existence is tenuous at best. Sandy Point, St. Croix, United States Virgin Islands, supports the major concentration of nesting leatherbacks in the United States and the northern Caribbean (Eckert & Eckert, 1985) (Figure 1).

The United States Fish and Wildlife Service determined and designated Sandy Point beach area critical habitat in 1978, and in 1979, the National Marine Fisheries Service designated the surrounding waters as critical habitat. In 1984, the United States Fish and Wildlife Service purchased Sandy Point for incorporation into the Caribbean Island National Wildlife Refuge System. Further information on the development of the present study can be gleaned from Eckert and Eckert (1985).

In March of 1986, the present authors took over the duties of our predecessors, Scott and Karen Eckert, in continuing the intensive research effort commenced in 1982 under the auspices of the U.S.V.I. Division of Fish and Wildlife. Funding has continued to be provided through Section 6 of the U. S. Endangered Species Act, and by Earthwatch and the Center for Field Research of Watertown, Massachusetts. The project continued on its original design to assess the size, productivity and management priorities of the Sandy Point leatherback population.

The following is an attempt to summarize the results of the 1986 data. In an effort to continue and maintain the continuity of past reports until future data dictates, we have drawn heavily on comparisons with previous years. For further comparison, the authors advise consulting with Eckert et al. (1982, 1984) and Eckert and Eckert (1983, 1985).

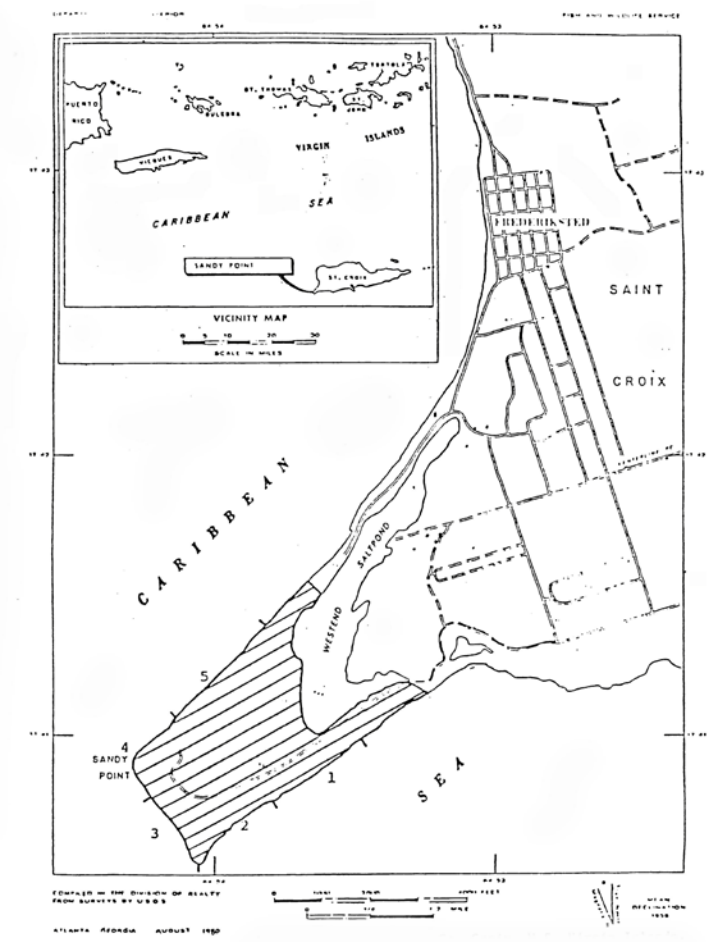

Figure 1. Sandy Point, St. Croix, U.S. Virgin Islands

METHODS

A. Study Area Coverage

Nightly, foot patrols from 19:30 h-05:00 h commenced on Sandy Point's 2.4 km nesting beach on 28 March, 1986. Starting on 06 April, eight Earthwatch teams, consisting of 6-10 volunteers, each participating for a ten-day period, started assisting the authors nightly. The teams were divided into two groups of 3-5 persons and were led by one of the authors. The groups each walk half of the study area on an hourly basis, ensuring observation of the entire study area once per hour. Previous data indicated that leatherbacks require at least one hour to complete nesting. Hourly patrols ensured that tagging and data would be collected on all turtles.

B. Morphometric Parameters

When turtles were encountered, information was recorded on data sheets (Appendix I). Time, date, location, weather and moon phase were recorded. Once the turtle started digging, over the carapace (o.c.) length (notch to tip), and width were recorded. Carapace lengths were taken, measured from the anterior notch in the carapace alongside the vertebral ridge to the posterior tip. Lengths were taken each time an individual was encountered and averaged. Straight-line measurements (s.l.) using a tree caliper were no longer taken this year as previous data has provided a regression to obtain this from over the curve measurements. The width of the carapace was measured at the widest point of the carapace, just behind the front flippers.

C. Nesting

Nest depth was recorded at the completion of the excavation. This was determined when the female had reached the maximum extension of her rear flippers and prior to egg deposition. The measurement was taken from the bottom of the nest cavity to the base of the posterior point of the carapace. Abnormalities in digging, nest cavity structure, or presence of water or foreign materials were recorded. On deposition of the eggs, yolked and yolkless eggs were counted. Yolked egg diameters were discontinued this season. On completion of deposition, the overburden (depth of sand over the eggs) was recorded by measuring from the top of the egg mass to the posterior point of the carapace. If the nest appeared threatened by imminent erosion or inundation, or if these conditions historically occurred annually at the nest site, both yolked and unyolked eggs were collected on deposition and moved to a safe zone for reburial. Duplication of the original nest site dimensions were used to insure proper incubation conditions. Both original and relocated nest dimensions were recorded.

D. Weighing Adults

The weighing of adult leatherbacks was continued during the 1986 season with fair success. Hampered by the late arrival of needed equipment, actual weighing was not begun until 27 April. The procedure was also hampered by the small amount of females using the beach this season and heavy beach erosion, and difficulty meeting the criteria (Eckert & Eckert, 1985) to accomplish the task. Ten weights were taken, involving eight females. A detailed account of the methods and techniques used can be found in Eckert and Eckert (1985).

E. Tagging

Immediately following egg deposition, each untagged turtle was tagged on the trailing edge of the left front flipper, approximately 30 cm from the body. This position was 10 cm. further from the body than in past years. The difference was made to accommodate the use of the titanium tags (Stock Brands, Australia, "V.I." prefix) for better placement and fit. It was found that the titanium tags had to be re-bent slightly prior to use for proper alignment of the locking mechanism. A titanium tag was also placed in the flesh between the left rear flipper and the tail. Although titanium tags were standardized this season, a few monel-metal cattle ear tags (National Brand and Tag, U.S.A. "AAG" prefix) were used on four specimens in the first few weeks of the study due to the late-arrival of the titanium tags.

F. Identifying Characteristics

Turtles were examined for diagnostic markings, deformities, ectobiota, and macroparasites.

Injuries and ectobiota were photographed when possible. In addition, this season the pink spot found on the head of adult leatherbacks was photographed and its characteristics catalogued in hopes that the variations will serve as a secondary means of identification. The capitulum of *Conchoderma virgatum*, a commonly occurring pendunculate barnacle was measured with calipers as in the past.

G. Nest location

Numbered stakes are placed at 20 m intervals along the vegetation line for the length of the study area. Exact locations of nest sites are determined by triangulating its location between the two nearest stakes using a 60 m tape measure. A profile of the beach was drawn from the point of emergence to show the nest's relationship to the vegetation line, high tide mark and the ambient water contour.

H. Beach Erosion Profiles

At approximately 15-day intervals throughout the season, March through September 1, horizontal beach profiles were constructed at 100 m intervals using every fifth beach stake as a standard reference point for constancy in measurement. The distance from the reference stakes to the proximal vegetation line, erosion bank (if one exists), high water and ambient water contours were recorded. These measurements were compared monthly to ascertain the fluctuation in available nesting habitat for the season.

I. Hatchlings

Term nests were discretely marked and monitored during nightly patrols starting one week prior to the expected hatch date. When emergence occurred, the time, and number of hatchlings or crawls were recorded. The emergence location was triangulated and discretely marked. Hatchlings, if observed, were guarded from possible predators and obstacles such as beach debris were removed from their path until the hatchlings entered the water.

J. Nest Excavation

Two to three hours after the emergence, the nest site was excavated to determine hatching success. All contents were removed and recorded. Unhatched eggs were opened to ascertain any development that might have occurred, deformed young and short-term embryos were recorded. Conditions of the nest cavity were also observed to determine contributing conditions; flooding, hatchlings trapped by root growth, etc. Hatchlings found in the nest were allowed to crawl to the sea unassisted.

RESULTS AND DISCUSSION

A. Nesting

Leatherback nesting activity began 22 February (W. Tobias, DFW, *pers. comm*.) and terminated 23 July 1986. Early activities were recorded as "judgment" nests during daytime weekly surveillance of the study area. Of these 14 nests, 6 produced hatchlings. The remainder showed no indication of hatching activity during the season, was presumed to be false crawls, and is not reflected in the following data.

Nightly monitoring of adult nesting behavior commenced on 26 March. A total of 139 activities were recorded, 76 (54.7) resulted in egg deposition. An additional three activities were recorded outside the perimeters of the study site. All were false crawls.

Nesting initiation and termination were comparable to prior years, with activities totalling 139, compared to 129, 158, 159, 189 and 346 in the 5 years respectively that the study has continued. Activities were lower than recent years with a higher percentage of false crawls. This was attributable to the smallest recorded population of turtles since 1981, as well as unusual weather patterns resulting in extreme erosion of the study area, coupled with continuous ground swells throughout the nesting period. Additionally, the unusually high number of turtles nesting in 1985 would typically be followed by a seasonal low the following year.

Eighteen leatherbacks nested on Sandy Point in 1986. All were observed and tagged. Of the observed nests, a mean of 3.9 nests per female was recorded (SD=1.66, range 2-7) (Figure 2). The mean inter-nesting interval was 9.7 days (SD=1.37). Calculations for this interval were made according to Eckert and Eckert (1985).

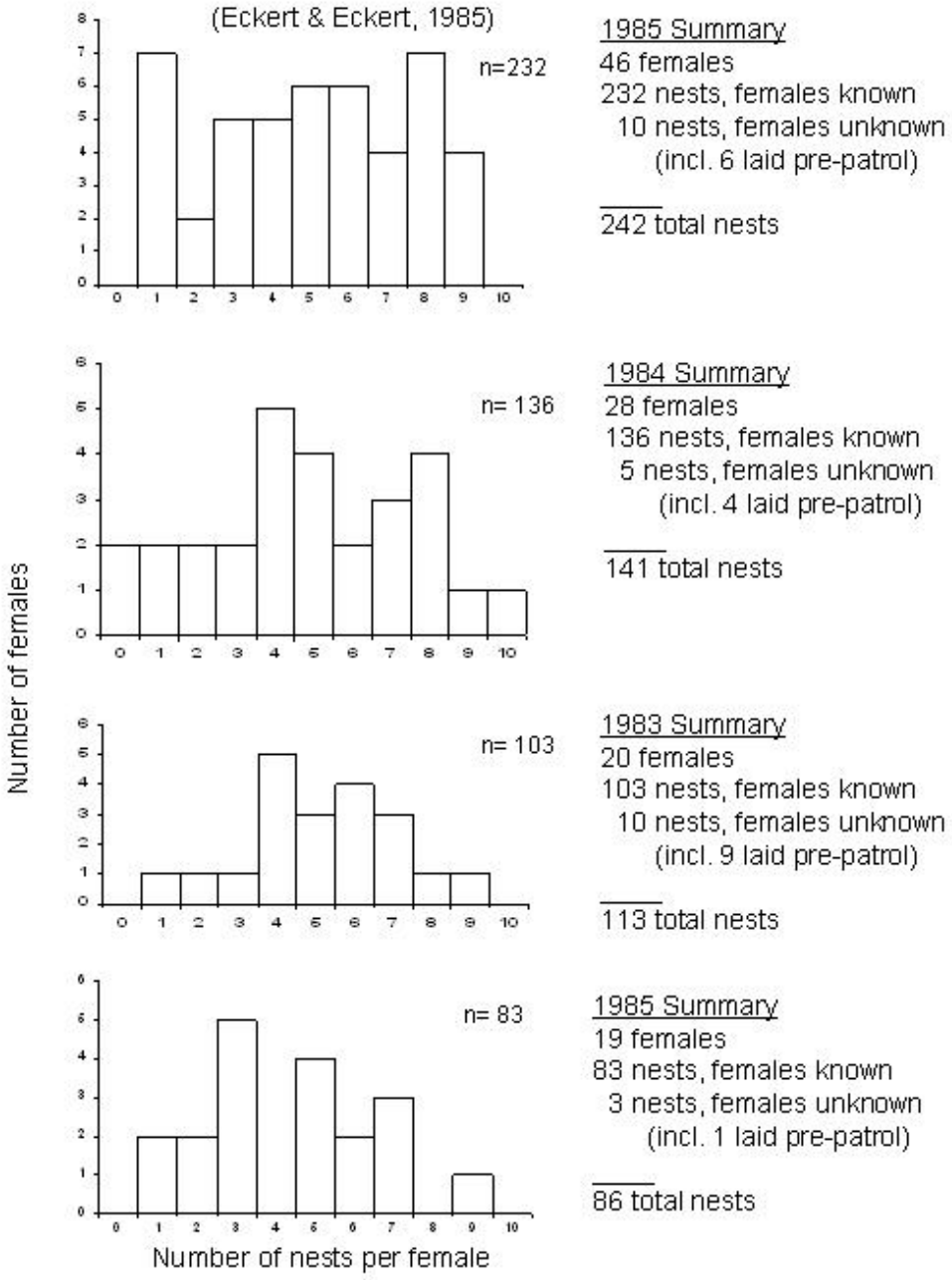

Figure 2. Nesting Frequency of Leatherbacks on Sandy Point, St. Croix, since 1982

Editor's note (2009): The figure has been redrawn from the data in the original National Report.

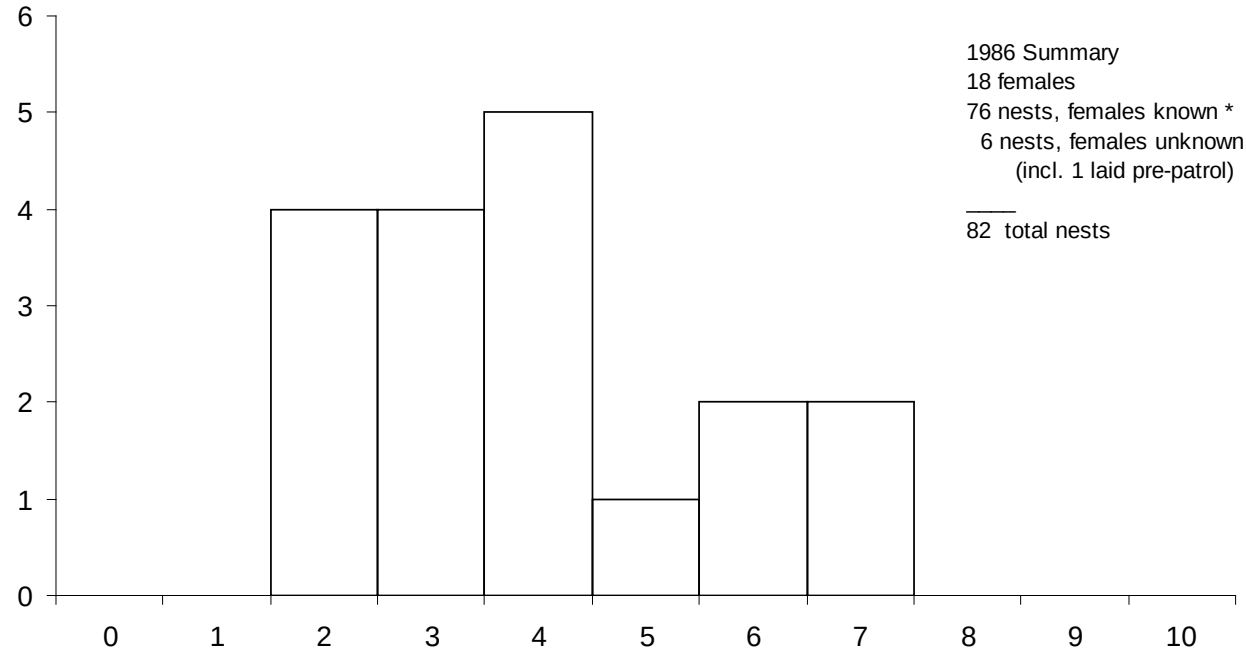

Figure 2. *continued*.

Editor's note (2009): The figure has been redrawn from the data in the original National Report.
* Value does not correspond with data in the chart.

No interbeach nesting dispersal was documented for 1986. However, a large number of gaps in the inter-nesting intervals indicates that females may have been using other areas for nesting. The high incidence of these gaps may have been caused by unusual and rapid erosion, high winds and dramatic loss of appropriate nesting habitat.

Peak activity occurred during the last two weeks of April and declined gradually to the final nesting on 23 July (Figure 3). These activities were interrupted by a hiatus from 2 through 6 of June. Investigation of the data indicated this was caused by the combination of few females and their individual nesting patterns. Of the 18 nesting females on Sandy Point, 12 had completed their nesting sequence for the season, and one had yet to begin by 2 June.

Weights of nesting females ranged front 292 kg. to 382 kg. (n=8 turtles) in 1986. Measurements ranged from 143.2 cm. to 160 cm. Individuals were divided into five size classes based on over-the-carapace length (Figure 4). Comparisons were made between size classes and clutch size and number of clutches laid (Figures 5 and 6).

Mean clutch size was 117.52 eggs (SD=19.8, range 44-152). Yolked eggs averaged 79.0 per clutch (SD=19.1, range 26-127). Yolkless eggs averaged 38.7 per clutch (SD=16.8, range 0-75). Mean nest depth was 70.2 cm. (SD=4.78). Overburden averaged 41.1 cm. (SD=8.5). Results were similar to previous years.

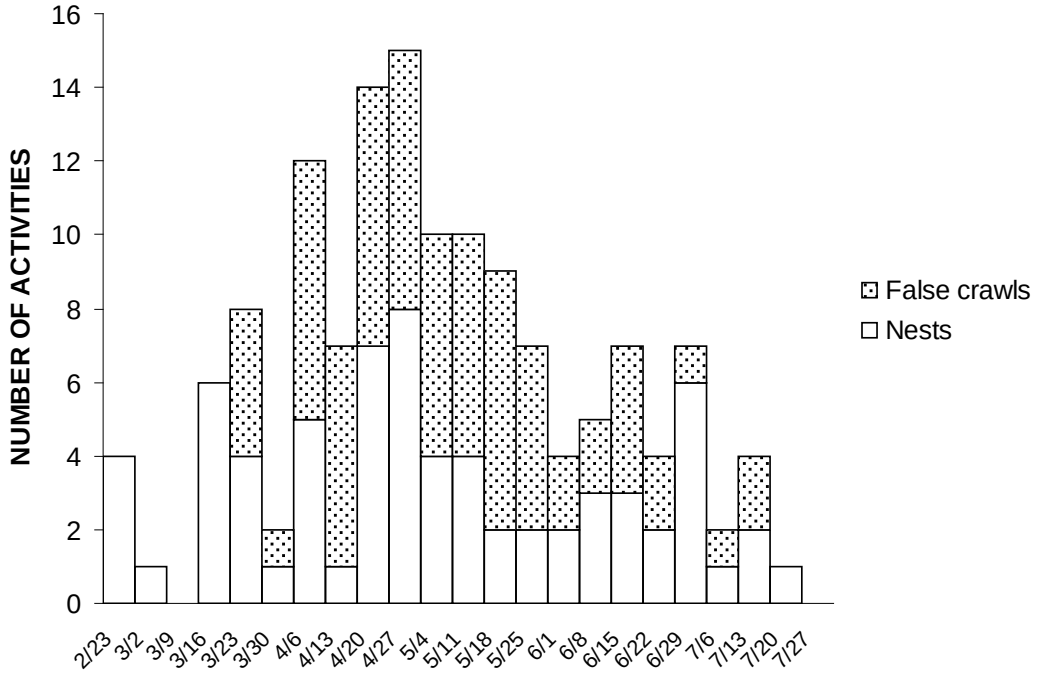

Figure 3. Total number of nests and false crawls by week on Sandy Point, St. Croix, 1986.

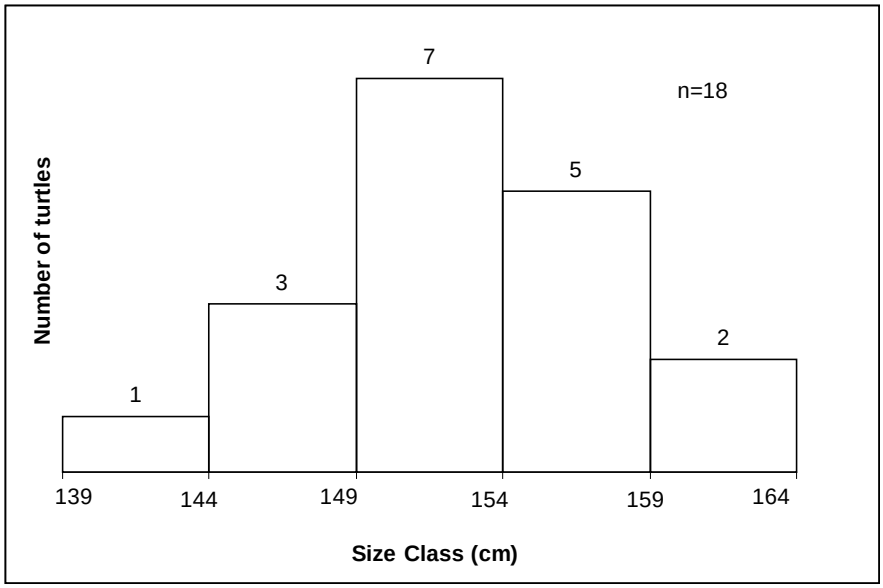

Figure 4. Size frequency distribution of *Dermochelys coriacea* nesting on Sandy Point, St. Croix, 1986. Over the carapace, notch-to-tip dimensions.

Editor's note (2009): These figures have been redrawn from the data in the original National Report.

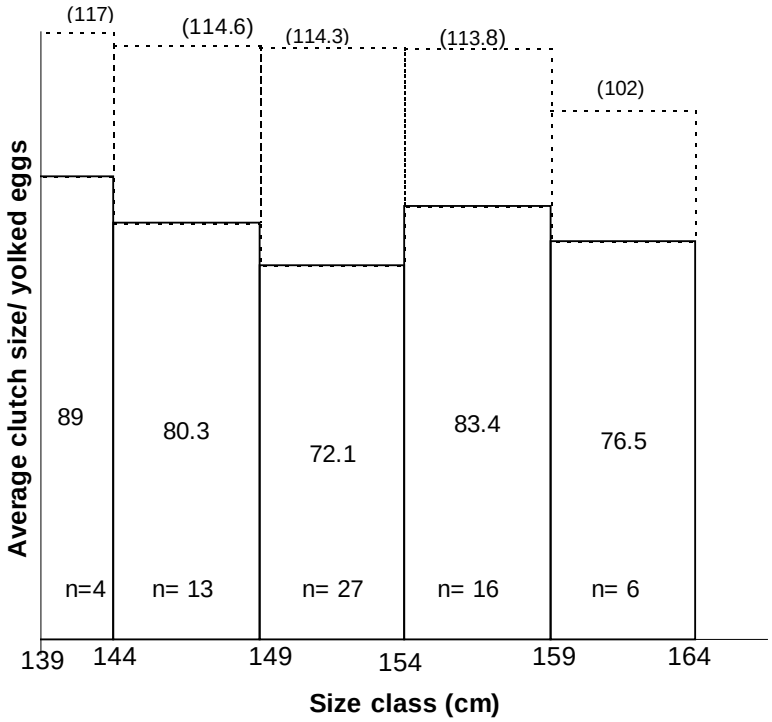

Figure 5. Average clutch size/ yolked eggs laid by size class (o.c. notch–to- tip) on Sand Point, St. Croix, 1986 clutch sized (bracketed) yolked (values in column).

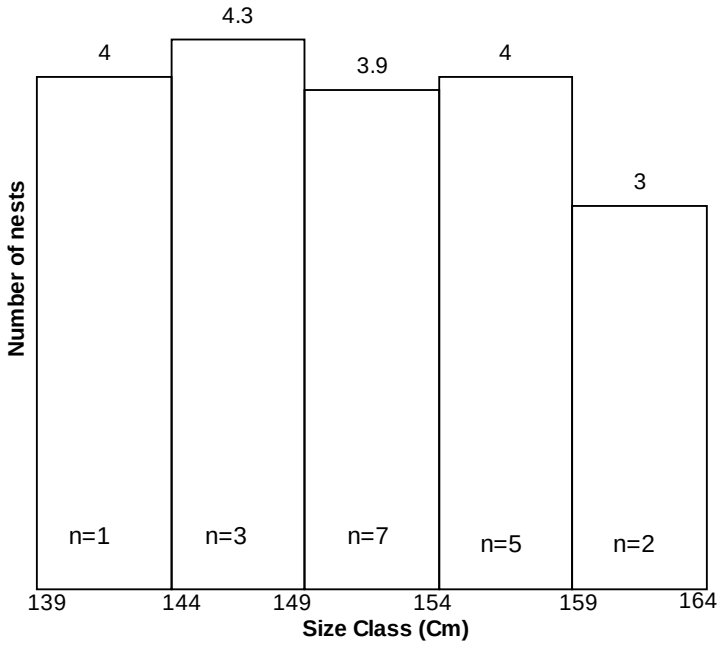

Figure 6. Average number of nests laid by size class (o.c. notch-to-tip) on Sandy Point, St. Croix, 1986. n= number of turtles on each size class

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Editor's note (2009): These figures have been redrawn from the data in the original National Report.

B. Hatching

Between 2,900-3,000 hatchlings were successfully hatched at Sandy Point in 1986. (Compare to 1985: 9,200-9,300; 1984: 5,200-5,300; 1983: 4,200-4,300; 1982: 2,200-2,300.) Average incubation period was 63.93 days (n=49, SD=3.26, range 58-72) (Figure 7). Incubation period is reduced over the course of the hatching season due to higher summer temperatures during later parts of the nesting season. The majority of emergences occurred between 18:00 h and 21:00 h. These figures are consistent with previous years. Two nests were found to have emerged prior to 18:00 h, resulting in 14 hatchlings that had died due to exposure to sun and high beach temperatures.

Nest outcomes were defined as "known" and "unknown" (Table 1). "Known" results include nests with successful emergences where nest contents were subsequently analyzed and nests known to have been lost to erosion or wave wash. "Unknown" results include 13 nests which could not be found, and the last 6 nests of the season which could not be monitored to term. There were no indications of nests being destroyed by predators or poaching in 1986.

Sixty-three of 82 nests provided known results. Mean hatching success of these nests was 66.79% (SD=17.59, range 7-95.5) excluding nests lost to erosion. Thirty-seven nests were relocated to protect them from erosion. Without this effort, we estimate that 60% of the nests would have been lost in 1986. Relocated nests showed an overall higher success ratio than *in situ* nests (68.97% as compared to 64.61%). This may be because relocated nests were located higher on the beach and were therefore less likely to be affected by this season's unusually high ground swells and wash.

Significant hatchling mortality within the nest cavity (hatched, full-term pipped, and full-term unpipped eggs) continued to be found in 1986. Forty-seven nests (85%) were found to show this phenomena. 13.9% of hatchlings were found dead within the nest at excavation. As of yet, no hypothesis has been formed to account for this phenomena.

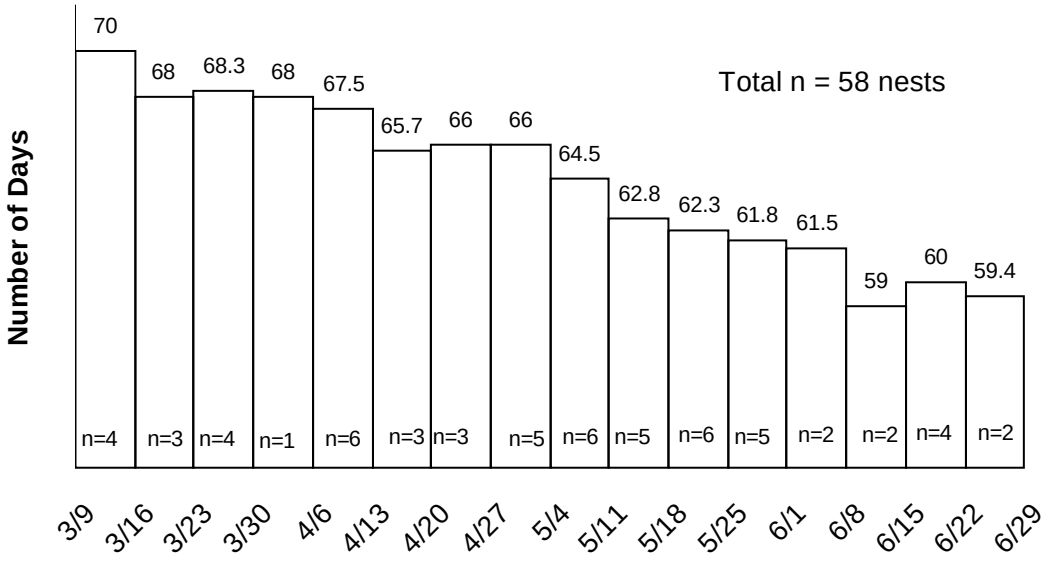

Figure 7. Average incubation periods of *Dermochelys coriacea* nests on sandy Point, St. Croix, 1986.

Editor's note (2009): This figure has been redrawn from the data in the original National Report.

TABLE 1. NEST OUTCOMES
(Eckert and Eckert, 1985)

Date and disposition	Known Results				Unknown Results	Total
	Surviving to Term		Lost Prior to Term			
		% Success	Erosion	Poaching		
	N	X	N	N	N	N
1986						
Relocated	30	68.97%	2	0	5	37
In Situ	25	64.61%	6	0	14	45
Total	55	66.79%	8 (9.8%)	0	19 (23.1%)	82
1985						
Relocated	110	53.2%	1	1	8	120
In Situ	90	62.8%	16	2	14	122
Total	200	57.6%	17(7.0%)	3 (1.2%)	22 (9.1%)	242
1984						
Relocated	82	54.8%	0	0	6	88
In Situ	41	67.7%	7	1	4	53
Total	123	59.1%	7 (4.9%)	1 (0.7%)	10 (7.1%)	141
1983						
Relocated	69	50.5%	3	0	5	77
In Situ	28	64.4%	6	2	0	36
Total	97	54.5%	9 (7.9%)	2 (1.8%)	5 (4.4%)	113
1982						
Relocated	23	64.4%	1	0	3	27
In Situ	22	61.4%	25	0	12	59
Total	45	62.9%	26 (30.2%)	0	15 (17.4%)	86

C. Tagging and Remigration

For a full review of tagging history, see Eckert and Eckert (1985) (Table 2). In 1986, there were three remigrants, one from 1983 with no tags which was identified by characteristic diagnostic markings, a second from 1983, with one remaining monel tag, and one from 1984, with one titanium tag. All turtles, remigrants and neophytes, were double tagged with titanium tags.

TABLE 2. TAGGING HISTORY
(Eckert and Eckert, 1985)

Season	Total Turtles Encountered	Period of Absence 1 Year (%)	2 Years (%)	3 Years (%)	Tag Scarred %	Total Remigrants %
1977	10 * [1]	0	0	0	0	0
1978	Population not monitored					
1979	6 * [1]	0	0	0	0	0
1980	Population not monitored					
1981	20 * [2]	0	3 (15.0%)	0	0	3 (15.0%) [3]
1982	19	0	0	0	1 (5.3%)	1 (5.3%) [3]
1983	20	0	7 (35.0%)	0	2 (10.0%)	9 (45.0%)
1984	28	0	4 (14.3%)	0	0	4 (14.3%)
1985	46	1 (2.2%)	10 (21.7%)	3 (6.5%)	2 (4.3%)	16 (34.8%)
1986	18	0	1 (5.6%)	2 (11.1%)	0	3 (16.7%)
		1 (2.8%)	25 (69.4%)	5 (13.9%)	5 (13.9%)	

*1 Does not represent total number of turtles nesting.
*2 May or may not represent total number of turtles nesting.
*3 Does not represent accurate measure as a consequence of incomplete tagging in previous years; proportions in later years are more accurate but still not complete.

D. Mortality Factors

Females

There has been no known mortality in nesting females in 1986.

Eggs

Erosion is the most significant natural threat to leatherback eggs on Sandy Point. History has shown that 50-60% of nests laid on Sandy Point would be lost to erosion without a relocation effort. Only 4.9-7.9% of the nests are currently lost due to this effort. In 1986, 9.8% nests were lost, most likely due to extreme erosion that took place this year.

Due to Earthwatch patrols and the randomly scheduled presence of Enforcement officers, egg poaching has been almost nonexistent for the past few seasons. There was no evidence of poaching in 1986.

Hatchlings

No depredation of hatchlings prior to emergence was observed in 1986, as consistent with the observations of Eckert and Eckert (1985). No dog or mongoose predation was evident during the 1986 season.

Both yellow-crowned night herons (*Nyctanassa violacea*) and ghost crabs (*Ocypode quadratus*) continue to prey upon hatchlings making their way to the sea. Earthwatch volunteers' presence keeps this predation to a minimum, consistent with 0.5% of hatchlings reported in previous years.

Earthwatch volunteers cleared paths through high water debris prior to nest hatching to reduce possibility of entanglement. The result showed no evidence of loss of hatchlings due to entanglement in beach debris and resultant exposure to morning sun or predation.

Roots of common beach vines (*Ipomea* and *Canavalia*) continue to endanger both eggs and hatchlings by entanglement in the nest cavity. Upon excavation, some nests showed full-term hatchlings encapsulated in roots of these vines.

A single incidence of vehicular traffic on the beach left deep ruts close to the high water mark. As documented in past reports, hatchlings dropping into these tire impressions were unable to

continue their path to the water and followed the ruts. Without assistance, these hatchlings would have fallen prey to predators or died of exposure in the morning.

Factors threatening the survival of nesting sea turtles, eggs, and hatchlings on Sandy Point, as well as recommended mitigating solutions are summarized in Table 3 (Eckert and Eckert, 1985).

TABLE 3. A SUMMARY OF FACTORS THREATENING THE SURVIVAL OF NESTING SEA TURTLES, EGGS AND HATCHLINGS ON SANDY POINT, ST. CROIX, AND RECOMMENDED SOLUTIONS. (from Eckert et al., 1984)

Problem	Solution
A. Nesting sea turtles	
1. Slaughter	- Nocturnal beach surveillance [1] - Restricted beach access - Alternative: increased enforcement presence
2. Harassment	- Same as above
a. Lighting/noise	- Visitor supervision
b. Physical contact	- Camping restrictions
3. Disorientation	- Observer restraint re: cameras strobes, flashlights - Restricted camp lighting / fires - Minimal artificial lighting (visible particularly in zones 4, 5) [2] in future development
B. Eggs	
1.Erosion	- Nocturnal beach surveillance in tandem with nest in tandem with nest relocation (upon deposition) - Alternative: nocturnal beach surveillance during nesting peak (May) only - Alternative: nest relocation out of zone 3 [2] only
2.Poaching	- Nocturnal beach surveillance - Obliteration of nesting / crawl site - Alternative: increased enforcement presence
3.Vehicle traffic a.Substrate compaction b.Potential acceleration of erosion c.Transport of poachers	- Prohibit seaward of the vegetation
4.Predators	
a.Stray dogs	- Removal
5.Beach fires	
a.Potential thermal damage	- Prohibit seaward of the vegetation
6.Horse traffic	
a.Potential substrate compaction	- Monitor closely
b.Potential acceleration of erosion c.Transport of poachers	- Alternative: prohibit seaward of the vegetation

TABLE 3. A SUMMARY OF FACTORS THREATENING THE SURVIVAL OF NESTING SEA TURTLES, EGGS AND HATCHLINGS ON SANDY POINT, ST. CROIX, AND RECOMMENDED SOLUTIONS. (from Eckert et al., 1984)

Problem	Solution
C. Hatchlings	
1. Disorientation	- Nocturnal beach surveillance (18:00-23:00 h) - Observer restraint re: cameras strobes, flashlights - Restricted camp lighting / fires - Restricted softball fields and tennis court illumination (19:00-21:00 h) - Minimal artificial lighting (visible particularly in zones 4, 5) [(2)] in future development
2. Entanglement a. *Ipomea* vine	- Vines cut as necessary from areas of nest relocation
3. Harassment a. Physical contact	- Minimal handling - Visitor supervision
4. Predators a. Night heron b. Stray dogs c. Mongoose d. Ghost crabs	- Nocturnal beach surveillance (18:00-23:00 h)
5. Vehicle traffic a. Substrate compaction, pre-emergence	- Prohibit seaward of the vegetation
6. Horse traffic a. Potential substrate compaction, pre-emergence	- Monitor closely - Alternative: prohibit seaward of the vegetation

[1] Unless otherwise noted, nocturnal surveillance implies hourly foot patrol between 19:30-05:00 h by research staff
[2] Refer to Figure 1 for zoning

CONCLUSIONS

Sandy Point, St. Croix, presently supports the largest and most studied population of nesting leatherback sea turtles in the U. S., as well as in the northern Caribbean (Eckert and Eckert, 1985). With the addition of 15 new animals in 1986, a total of 130-136 individuals have been identified on Sandy Point since 1977. The typical nesting season extends from early March through mid-July, with a peak in late April/early May.

An average of 80 yolked eggs are laid per clutch, with each female producing an average of 5 nests per season with an inter-nesting interval of 9-10 nights. Remigration intervals have been documented at 2-3 years, with 1 animal showing a 1-year interval. Mean hatching success was 66.79% in 1986.

Consistent nightly patrols have reduced the historical problems of nest loss due to erosion and poaching. Natural erosion is the most significant danger, and one that we are unable to control. A strong relocation program has offset this inherent danger. At the same time, constant

presence of Earthwatch volunteers and staff during nesting sequences combined with relocation procedures has drastically reduced, if not completely, the poaching threat. The slaughter of gravid females has also been eliminated due to the presence of research personnel.

This kind of protection over the past 5 years would have been impossible without the dedicated help of 356 Earthwatch member-volunteers that have contributed more than 28,100 hours diligently patrolling over 22,200 miles of beach. This kind of commitment by Earthwatch, the Cent for Field Research (Watertown, Ma.), and particularly by the U.S.V.I. Division of Fish and Wildlife, is essential in order to evaluate the reproductive biology and survival status of the Sandy Point leatherback population in years to come.

ACKNOWLEDGEMENTS

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Personal as well as community gratitude is due the officers of the U.S.V.I. Bureau of Environmental Enforcement (DCCA): Otto Tranberg, Bradford Thomas, Carlos Farchette, Jay Watson, and Edwin Rosario. Their tireless dedication to fieldwork and efforts to increase public awareness toward the plight of the sea turtles has added greatly to their conservation.

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Tom Adams (Cruzan Rum Distillery) has provided much information regarding *Dermochelys* on St. Croix, and whose help on two occasions in patrolling Sandy Point, added in the continuity of data collection.

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APPENDIX I

DATA COLLECTION PROCEDURE FOR LEATHERBACK SEA TURTLE, *DERMOCHELYS CORIACEA* SANDY POINT, ST. CROIX EARTHWATCH -- 1985

When the leatherback sea turtle is encountered on the beach during patrol, the following steps should be taken:

1. Extinguish all lights immediately! Sea turtles are very sensitive to light.

2. Record time and date on data form. Always use a pencil. Approach turtle discreetly (from behind) without lights or talking, and determine her actions -- record this.

3. If she has not yet begun the digging sequence, take time to fill in the misc. data such as weather, location, observers, etc.

4. Once the turtle has begun digging, record the time. Approach carefully and obtain carapace measurements. Use a minimal amount of light -- being especially careful not to shine light directly into her eyes.

5. When she finishes digging, record the time. Prepare the equipment for nest depth, egg counts, and egg sizes.

6. Once she has begun laying, record the time. Obtain nest and egg data. If the nest is judged to be in danger of inundation, carefully and gently remove the eggs for relocation.

7. When laying is complete, record the time. Check for tags and tag scars along the trailing edges of her front flippers, as well as on the rear flippers. Tag as needed. If she arrives carrying tags, record the numbers -- read the tags twice to double-check the numbers. This is of UTMOST importance. Remove any unreadable tags. Do not add tags if she arrives carrying three good tags.

8. Examine the turtle with soft lights -- list all diagnostic markings, deformities, and ecto-parasites.

9. Record nest location measurements and beach profile.

10. Keep an eye on the turtle so that a covering completion time is noted.

11. When she enters the surf, record the time so that a crawl rate can be calculated.

Double check all data entries for consistency and accuracy.

DATA INSTRUCTIONS

i. Original tag: To be filled in by project leader at a later date.

ii. Map/page: All data sheets must be numbered sequentially from beginning to end of the season. Data sheets for a given night are organized and numbered the following day. Crawl number on map corresponds to page number.

Date: Use a split date to define a given night. Thus, a turtle may crawl before or after midnight, but the split date stays the same. For example, April 15 at 2200 and April 16 at 0100 would both be recorded as "4/15-16" since both crawls occurred on the same night.

1. Old tags: All tags on a turtle when she emerges this visit are considered "old tag(s)". This includes tags put on the same night (during an earlier visit), on a previous night's visit, and tags from previous years. ALL tags on a turtle must be read, verified and recorded on every visit regardless of the number of visits made by an individual turtle. Do not goof on reading tag numbers! If a turtle has already departed when the crawl is discovered, mark "999" on this line.

2. New tags: All tags placed on the turtle on this visit are recorded as new tags. Be definition, a given tag will never be recorded new except once, on the visit during which it was applied to the turtle. DOUBLE TAG OR TRIPLE TAG ALL TURTLES! Ideally, one tag should be applied to the trailing edge of each front flipper, and one tag to the soft tissue connecting a rear flipper with the tail. The single rear tag will not be as readily seen by a fisherman, for instance, sighting the animal off a distant continent, so be careful to place tags on the front flippers as a priority.

3. Removed tag(s): If a tag is removed on this visit, it should be recorded here and saved in an envelope for future reference. Any tag that is hard to read, broken, eroded or deformed, shows evidence that it may fall off, has caused discomfort to the turtle (e.g. infection, carapace abrasion), or appears to be from some distant tagging location should be removed for the record. If the tag hole is clean and not swollen, a new tag should be placed in the hole. The following day, on an index card, reference each removed tag to another tag number currently on the turtle and save the old tag in an envelope properly identified.

4. Tagged before: In terms of population ecology, this may be the most important observation you make, so BE CAREFUL! If a turtle emerges from the ocean without a tag (or with a tag which is broken, eroded or otherwise unreadable), inspect the animal for evidence of previous tagging. If there are no tag fragments, tag holes, characteristic swellings on the trailing edge of flipper (calluses) or other diagnostic marks which would indicate a history of previous tagging, circle "NO" at this point. If the turtle has such marks, circle "YES" at this point. Ask you Team Leader for instruction on how to identify tag scars, and have each member of the team verify your observation (conclusion) on this matter. Make the best decision you can, even if you are not sure. If impossible to determine, so indicate on the data sheet. If the turtle is carrying a readable tag, do not mark anything in this space.

5. Action: This refers to what the turtle is doing when she is discovered. The computer will calculate estimated time of emergence by comparing the action entree to the time entree. If the turtle has already departed, write "Gone" in this space.

6. Time: This refers to the exact time that the turtle is discovered on the beach, regardless of what she is doing when discovered. If she has already departed, estimate when you think she arrived on the, beach, and write "ETA" after your estimate. Always use a 2400-hour clock.

ETA: "Estimated Time of Arrival". Fill this out to the best of your ability. Use an hour interval, e.g. 1900-2000, 0100-0200, or whatever. If you can be more precise, e.g. 1900-1919 (having found her body pitting at 1919), do so. Your estimate will help to verify the computer estimate -- which is based upon calculated mean (average) times required for a turtle to complete sequential stages of the nesting process.

7. Crawl: Every crawl should be assigned a number on the following day, based upon its position in the sequence of activities on the entire beach the night before.

FALSE

8. Result: LAY CRAWL: Circle the appropriate entry. If the turtle should cease laying and depart without covering the nest, this is called an "Abort lay" and should be written in above the word "LAY".

   Reason: Try to give the best reason why the turtle false crawled, or did an abort lay. Discuss possible reasons with your Team Leader. Reasons can include human or predator disturbance, a high erosion bank, excessive debris on the beach, heavy rain, a continually collapsing nest cavity, water in the nest cavity, etc. If there is no "logical" reason in your mind, write "no reason".

9. Carapace measurements: If you think the carapace is broken, notched or otherwise misshapen so as to cause an aberrant measurement, circle "BAD" where you see "Condition of carapace"; otherwise circle "GOOD". Check posterior point of carapace for integrity and circle "BAD" if it looks broken or shortened.

   "o.c." refers to over-the curve" measurement, while "s.l." refers to straight-line. o.c. measurements are taken with a tape measure; s.l. measurements are taken with calipers. An o.c. carapace length is taken with tape lying adjacent to central carapace ridge and not on top of it. Front of carapace is either its most anterior (shoulder) point ("TIP") lateral to midline, or the exact midline ("NOTCH"). Carapace width is defined as the widest point, wherever that point may be located. Generally, this measure is taken immediately behind the front flippers.

   NOTE: Measure a turtle every time you see her. Multiple measurements of the same turtle provide valuable information on the variance of the measurement. Do not copy measurements from one data sheet to another.

10. Weight: A tripod with block and tackle apparatus will be available for the weighing of the nesting females after the deposition of eggs. Demonstrations will be provided.

11. Nest and Crawl Diagram: This is a diagrammatic vertical relief (profile) of the beach at the point of the crawl. The diagram must be carefully structured and consistent from observer to observer to be useful for computer coding. Work carefully with your Team Leader and check your art work with other team members for accuracy.

    a) - water level marked with double slash (//)
       - high water mark (HWM) located with a single slash (/)
       - landward extent of crawl, curved arrow (⮌)
       - body pit with NO attempt at nest cavity marked (◌)
       - nest hole marked with open circle (C)
       - clutch of eggs marked with circled cross (⦸)

    b) indicate beach relief, including hollows, dunes, escarpments, erosion banks, etc. Carefully indicate location of abandoned nest holes (C) and successful nests (⦸) relative to this relief.

c) indicate vegetation and its proximity to the nest. Establish unique symbols to identify principle types of vegetation (grass, vines, shrubs, trees).

d) add whatever additional marks you think appropriate to define nest environment. For instance, wrack lines or beach trash can be so indicated if you think its presence is noticeable or affects either the turtle or the eggs.

12. Beach ascent: There is speculation that leatherbacks choose their nest sites rather randomly. We can more fully address this question if we begin to analyze patterns of movement, distance traveled from the water, etc. To explore ambient gradients and micro-habitat preferences (if any exist), temperature (T), moisture (H_20), and pH probes will be inserted just beneath the surface of the beach paralleling (to the outside) her ascent crawl. These readings will be taken while the animal is still on the beach and will not be taken if, for instance, a heavy rain occurs after the turtle has chosen the nest site but before you have a chance to take the readings.

13. Observations on the nest: Observations might include shape of nest, beach material, presence of moisture, standing water, roots or trash in the nest hole, ants or crabs or other predators in vicinity, unusual amounts of organics or dirt in sand, etc. If the nest is "normal" and uncontaminated, write "clean and dry" in this space.

14. Yolked eggs laid: This entry is only possible if the eggs are removed to the hatchery or if an observer has carefully counted each egg as it drops into the nest cavity. Do not guess and do not excavate nests if they are to be left *in situ*. Do not count yolkless eggs here; they usually are identified as being 1.5" in diameter or less.

    Yolkless eggs laid: Count the number of small, yolkless eggs and indicate the number here.

    Yolked eggs reburied: If the nest is relocated or placed in a hatchery, one or more of the eggs may break in handling. Sometimes the turtle lays "dumb-bells" that break upon deposition. Indicate the final number of eggs buried here, even if it is the same as the number of yolked eggs laid.

    Yolkless eggs reburied: Indicate the number of yolkless eggs reburied here. Sometimes you will return to the nest site and find that the turtle "dribbled" a few yolkless eggs on her way back to the sea. These are counted as yolkless eggs laid, but not as yolkless eggs reburied.

15. Nest depth: Measure the distance from surface of beach to bottom of cavity of the natural nest. If a natural nest is relocated, duplicate this depth in the relocated cavity. Depth influences temperature of incubation which influences the sex ratio of the hatchlings.

    Overburden: Measure the distance from surface of beach to estimated location of the top egg of the natural nest. If the nest is to be relocated, this measure will not be possible in the original cavity as the eggs will have been removed upon deposition.

16. Yolked egg diameters: Use Vernier (or dial) calipers to measure a sample of 10 yolked eggs. Be careful not to dent the eggs or measure an excessive amount of sand on the surface of the eggs.

17. Crawl location: Every 20 m around the vegetative periphery of the beach are placed numbered stakes. Triangulate from the nearest two stakes for an accurate location of the nest cavity. Always record your measurement in meters. If the eggs are relocated, mark only the stake numbers on the “original” line and then triangulate for exact egg location on the “relocated” line.

18. Observers: Indicate all people in the party, particularly the Team Leader and the person responsible for the data sheet. This is useful if a Staff member has to go back and check discrepancies with particular team members during the following days.

19. Timed laying sequence: Six prominent “stages” comprise a successful nesting bout. Each stage should be timed from start to finish; the same watch should be used throughout. Do not estimate times. Use 2400 hour time. Rates are recorded in "m/min" and are calculated by following her exact ascent (or descent) crawl from the HWM to the nest site. (Place a flexible tape in the tail drag). Divide this distance by the time it took her to complete the approach (or departure).

20. Relocation: There are many reasons why a nest may have an unusually low success (hatchlings/eggs). These reasons include the digging up of eggs several hours following their deposition, rough handling of the eggs, and/or leaving eggs above ground for several hours before reburial (especially if they are allowed to get wet in an unexpected tropical storm). Thus, it is important that the timing of relocation be documented. Eggs should be removed upon deposition, and thus laying (completion) time and removal time are identical. They should be reburied as soon as possible, preferably within the hour.

21. Site selection parameters: Using a flexible 50 m tape, record the linear distance from the water's edge to the HWM, from the HWM to the natural nest site (even if you remove the eggs for reburial elsewhere) and from the nest to the vegetation.

22. Orientation circling: Record the number of full (360 °) circles the turtle makes in her approach (ascent) or departure (descent) crawls.

23. Turtle observations: Record behavioral idiosyncrasies (e.g. motor coordination difficulties, appears ill or emaciated, unusual sensitivity to lights or noise, excessive wandering, very slow). Diagnostic markings are physical characteristics that would assist researchers in future years in the identification of an animal that has apparently lost her tags. Record such things as missing or partially missing flippers, notched or tattered flippers, obvious holes or scars (pink tissue) on the flippers, carapace deformities (large creases, dents, swellings, shortened posterior point, scratches, holes or scars), bulbous fleshy "warts" on the shoulders or flanks, head scratches or scarring, jaw deformities, etc. Ectobiota can include remora, shark-suckers, or pendunculate or encrusting barnacles. Record type, location, quantity and size of parasites.

24. Weather:
    Sky: Use aeronautical terminology. CLEAR is what it says. SCATTERED is clouds covering less than 50% of the sky. BROKEN is clouds covering greater than 50% of the sky, but less than 100%. OVERCAST is 100% cloud cover. Augment as necessary with fog, distant lightning, etc.

    Wind direction: Use a compass.

    Wind velocity: Use a wind gauge (MPH) or Beaufort scale, but be consistent.

    Air temperature: Use a thermometer.

    Precipitation: This refers to immediate time of crawl. If rain occurred earlier in the evening, indicate this in "previous weather".

    Seas: Develop a relative index of surf. For instance, CALM, LIGHT, MODERATE, HEAVY, VERY HEAVY.

Previous weather: Weather during the previous day and early evening. Note particularly heavy rains.

Moon phase: Full, 3/4, 1/2, 1/4, New. Visible?

PRIORITIES: If a turtle is carrying tag(s), make every effort to read it (them). NEVER send a turtle back to the surf with an unreadable tag; take it off and replace it with a new tag. If a turtle has no tag, GET ONE ON HER. Add more if time permits, up to three if she carries no old tags. All other measurements or entries on the data sheet are secondary to the above.

Double-check all entries for accuracy!

1986 St. Croix Leatherback Project

Date:_____/ _____/86

i. Original tag: _____ ii. _____

1. Old tags: _____

2. New tags: _____ _____

3. Removed (or destroyed) tags: _____

4. Tagged before? YES NO (untagged turtles only)

   Tag scars _____

5. Action: _____ 6. Time: _____ 7. Departure: _____

8. Result: LAY FALSE Reason: _____
   CRAWL _____

9. Carapace measurements:
   Length o.c. notch/tip _____ cm Width o.c. max. _____ cm

10. Weight: _____ kg 11. Elapsed time on beach:
_____min.

12. Nest and crawl diagram, comments:

13. Observations on nest: _____
_____

14. Yolked eggs laid _____ Yolked eggs reburied _____
    Yolkless eggs laid _____ Yolkless eggs reburied _____

15. Nest depth: Orig. _____ cm Relocated _____ cm
    Overburden: Orig. _____ cm Relocated _____ cm

16. Crawl location: Orig.

_____

Relocated

_____

17. Yolked egg diameters:

_____ _____ _____ _____ _____ _____ _____ _____ _____

18. Relocation:
Time laid (completion) _____ Time removed _____ Time reburied _____

19. Site selection parameters:
Water's edge to HWM: orig. _____ m Relocated _____ m

HWM to nest: orig. _____ m Relocated _____ m

Nest to vegetation: orig. _____ m Relocated _____ m

20. Turtle observations:

Behavioral: _____

_____

Ectobiota: _____

_____

Diagnostic markings: _____

_____

21. Weather:
Sky: _____ Wind direction: _____ Seas: _____

Precipitation: _____ Previous weather: _____

22. Moon phase: _____ Visible? YES NO

Moon not risen: _____ Already set: _____ Behind clouds: _____

23: Observers: _____

1986

HATCHING DATA

26. Females' original tag: Original tag _____ Date laid _____
    Nest type: IN SITU Relocated Location: _____
    Yolked eggs buried: _____ Yolkless eggs buried _____

27. Weather at emergence:
    Sky: _____ Wind direction _____ Wind velocity: _____
    Air temperature: _____ Precipitation: _____ Seas: _____
    Previous weather: _____

28. Nesting results: Date emerged: _____ Incubation _____Days
    Time(s) Emerged: _____ Date cleaned: _____
    Hatchlings releases: _____ Nest success _____%

29. Nest contents:
    Live hatchlings: _____ Embryos (mid-term) _____
    Dead hatchlings: _____ Embryos (full-term pipped) _____
    Hatched deformed: _____ Embryos (full-term unpipped) _____
    Unhatched deformed: _____ Hatched shells _____
    Rotten/undeveloped: _____ Yolkless recovered: _____

30. Predation:
    Eggs: _____
    Hatchlings: _____

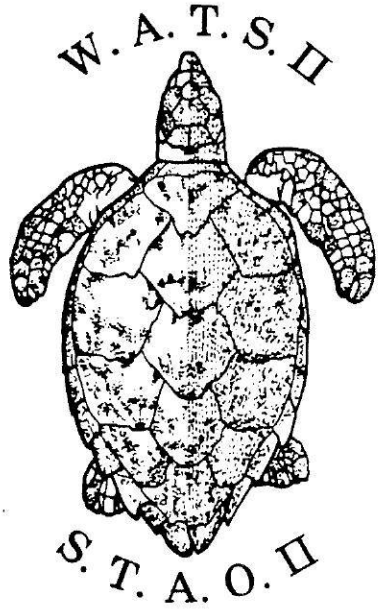
31. Comments / causes for poor hatch: _____

32. Hatchling measurements;

Height (mm):	_____	_____	_____	_____	_____	_____	_____
Notch / tip (mm):	_____	_____	_____	_____	_____	_____	_____
Width (mm):	_____	_____	_____	_____	_____	_____	_____
Weight (kg):	_____	_____	_____	_____	_____	_____	_____

33. Notes and observations: _____
_____

WATS II REPORT/DATA SET



National Report to Wats II for U.S. Virgin Islands

National Representative: Ralf H. Boulon Jr.

Recieved: 18 September 1987

WATS2 027

GOVERNMENT OF THE VIRGIN ISLANDS OF THE UNITED STATES

Department of Planning and Natural Resources
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September 14,1987

Dr. Robert R. Lankford
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Mayaguez, P.R. 00708

Dear Bob:

Please find enclosed the National Report for the U.S. Virgin Islands. The National Report utilizes the appropriate forms from the WATS II Sea Turtle Survey Data Form packet and the format given for the written report. Included with the report is the 1986 report on the Sandy Point Leatherback turtle project.

I hope you find the report satisfactory. I'll see you in October.

Sincerely,

Ralf H. Boulon Jr.
Endangered Species Coordinator

✓ cc Fred Berry, NMFS, with copy of reports.

RHB/dmg

TABLE III. NESTING BEACH INVENTORY

List Beaches in geographic sequence. Provide additional information on an attached page. Please list each species that occurs on beach on a separate line even if months of occurence are the same.

COUNTRY United States STATE Virgin Islands RECORDER R. Boulon, Jr.

NAME OF BEACH	LENGTH IN KM	(Annual Range)$^{\Delta}$ SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
1. Sandy Point, ST. Croix	5.4	(18-46) Dc	April to June	February to August
		(1-3) Cm	N/A†	June to August
		(1-3) Ei	N/A	June to August
2. White Lady Beach, ST. Croix	0.5	(UK) Cm*	N/A	June to September
		(2-4) Ei	N/A	" " "
3. Whim Beach, ST. Croix	0.6	(1-2) Ei	N/A	" " "
4. Carlton Beach, ST. Croix	0.9	(0-1) Ei	N/A	" " "
5. Mannings Bay, ST. Croix	0.7	(1-2) Cm*	N/A	" " "
6. Canegarden Bay, ST. Croix	1.7	(0-2) Ei	N/A	" " "
7. Manchioneel Bay, ST. Croix	2.1	(3-8) Dc	April to June	February to August

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; = Lepidochelys olivacea = Uk = Unknown

Δ - Est. No. turtles nesting per year (1979 to 1986)
* - Id Unreliable.
† - Information not available.

WATS II SEA TURTLE SURVEY DATA FORM

TABLE III. NESTING BEACH INVENTORY

List Beaches in geographic sequence. Provide additional information on an attached page. Please list each species that occurs on beach on a separate line even if months of occurence are the same.

COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr.

NAME OF BEACH	LENGTH IN KM	(Annual Range) SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
7. Manchioneel Bay, ST. Croix		(1-2) Cm	N/A	June to August
		(1-3) Ei	"	" " "
8. Longford Beach, ST. Croix	1.0	(UK) Cm *	"	" " September
		(1-4) Ei	"	" " "
9. Castle Nugent Beach, ST. Croix	1.0	(UK) Cm *	"	" " "
		(1-2) Ei	"	" " "
10. Great Pond Beach, ST. Croix	2.0	(0-2) Cm *	"	" " "
		(0-2) Ei	"	" " "
11. Half penny Bay, ST. Croix	0.8	(0-2) Ei	"	" " "
12. Robin Bay, ST. Croix	1.7	(2-4) Cm*	"	" " "

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; = Lepidochelys olivacea = Uk = Unknown

WATS II SEA TURTLE SURVEY DATA FORM

TABLE III. NESTING BEACH INVENTORY

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COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr.

NAME OF BEACH	LENGTH IN KM	(Annual Range)* SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
12. Robin Bay, ST. Croix		(2-4) Ei	N/A	June to Septembe
13. Rod Bay, ST. Croix	0.8	(0-2) Cm*	"	" " "
"		(0-2) Ei	"	" " "
14. Turner Hole, ST. Croix	1.1	(1-2) Cm*	"	" " "
		(1-2) Ei	"	" " "
15. Grapetree Bay	0.2	(0-2) Cm*	"	" " "
		(0-2) Ei	"	" " "
16. Jacks Bay	0.7	(0-2) Dc	"	March to June
		(3-5) Cm*	"	June to Septembe
		(3-5) Ei	"	" " "

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; = Lepidochelys olivacea = Uk = Unknown

WATS II SEA TURTLE SURVEY DATA FORM

TABLE III. NESTING BEACH INVENTORY

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COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr.

NAME OF BEACH	LENGTH IN KM	(Annual Range)$^{\Delta}$ SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
17. Isaac's Bay, ST. Croix	0.7	(0-1) Dc	N/A	March to June
		(1-2) Cm*	"	June to September
		(1-2) Ei	"	" " "
18. East End Bay, ST. Croix	0.3	(0-1) Ei	"	" " "
19. Teytaud's Beach, ST. Croix	0.4	(0-1) Ei	"	" " "
20. Boiler Bay, ST. Croix	0.3	(0-1) Ei	"	" " "
21. Knight Bay, ST. Croix	0.4	(0-2) Cm*	"	" " "
22. Smuggler's Cove, ST. Croix	0.2	(1-2) Cm*	"	" " "
		(1-2) Ei	"	" " "
23. Teague Bay, ST. Croix	0.7	(0-2) Ei	"	" " "

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WATS II SEA TURTLE SURVEY DATA FORM

TABLE III. NESTING BEACH INVENTORY

List Beaches in geographic sequence. Provide additional information on an attached page. Please list each species that occurs on beach on a separate line even if months of occurence are the same.

COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr.

NAME OF BEACH	LENGTH IN KM	(Annual Range)$^{\Delta}$ SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
24. Banana Cut Beach, ST. Croix	0.5	(0-1) Dc	N/A	March to June
		(1-2) Ei	"	June to September
25. Buck Island, ST. Croix	1.2	(1-2) Dc	May to June	March to June
		(1-4) Cm	July to October	January to December
		(10-30) Ei	July to October	" " "
26. Coakley Beach, ST. Croix	0.6	(0-3) Dc	N/A	March to June
		(0-2) Ei	"	June to September
27. Prune Beach, ST. Croix	0.8	(0-3) Dc	"	March to June
		(0-2) Ei	"	June to September
28. Pull Point Beach, ST. Croix	0.3	(0-2) Dc	"	March to June

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; = Lepidochelys olivacea = Uk = Unknown

TABLE III. NESTING BEACH INVENTORY

List Beaches in geographic sequence. Provide additional information on an attached page. Please list each species that occurs on beach on a separate line even if months of occurence are the same.

COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr.

NAME OF BEACH	LENGTH IN KM	(Annual Range) Δ SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
28. Pull Point Beach, ST. Croix		(2-5) Cm*	N/A	June to September
		(2-5) Ei	"	" " "
29. Green Cay Beach, ST. Croix	0.2	(0-2) Dc	"	March to June
		(0-5) Ei	"	June to September
30. Shoy's Beach, ST. Croix	2.1	(0-2) Dc	"	March to June
		(0-1) Cm*	"	June to September
		(0-1) Ei	"	" " "
31. New Fort Beach, ST. Croix	0.2	(1-2) Dc	"	March to June
		(0-1) Cm*	"	June to September
32. Little Bay Beach, ST. Croix	0.3	0-1 Dc	"	March to June

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; = Lepidochelys olivacea = Uk = Unknown

WATS II SEA TURTLE SURVEY DATA FORM

TABLE III. NESTING BEACH INVENTORY

List Beaches in geographic sequence. Provide additional information on an attached page. Please list each species that occurs on beach on a separate line even if months of occurence are the same.

COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr.

NAME OF BEACH	LENGTH IN KM	(Annual Range)$^{\Delta}$ SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
33. Little Princess Beach, ST. Croix	0.5	(0-2) Ei	N/A	June to September
34. Salt River (west), ST. Croix	0.2	(0-1) Cm*	"	" " "
		(0-2) Ei	"	" " "
35. Rust Op Twist, ST. Croix	0.2	(0-3) Ei	"	" " "
36. Cane Bay, ST. Croix	0.9	(0-2) Ei	"	" " "
37. North Star Beach, ST. Croix	0.3	(0-2) Ei	"	" " "
38. Davis Bay, ST. Croix	0.3	(0-1) Dc	"	March to June
		(0-1) Cm*	"	June to September
		(0-2) Ei	"	" " "
39. Maroon Hole, ST. Croix	0.1	(0-2) Cm*	"	" " "

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WATS II SEA TURTLE SURVEY DATA FORM

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COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr.

NAME OF BEACH	LENGTH IN KM	(Annual Range) SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
39. Maroon Hole, ST. Croix		(0-2) Ei	N/A	June to September
40. Ham's Bay, ST. Croix	0.3	(0-1) Ei	"	" " "
41. Barasford Manor Beach, ST. Croix	0.6	(0-2) Ei	"	" " "
42. Butler Bay, ST. Croix	0.2	(0-2) Ei	"	" " "
43. Williams Beach, ST. Croix	0.8	(2-3) Cm*	"	" " "
		(2-3) Ei	"	" " "
44. Sprat Hall, ST. Croix	1.1	(1-2) Ei	"	" " "
45. LA Grange, ST. Croix	0.7	(0-2) Ei	"	" " "

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WATS II SEA TURTLE SURVEY DATA FORM

TABLE III. NESTING BEACH INVENTORY

List Beaches in geographic sequence. Provide additional information on an attached page. Please list each species that occurs on beach on a separate line even if months of occurence are the same.

COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr.; NPS

NAME OF BEACH	LENGTH IN KM	(Annual Range)Δ SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
1. Henley Cay, ST. John	0.1	(0-2) Ei	August to November	June to December
2. Caneel Hawksnest, ST. John	0.2	(0-1) Ei	" " "	" " "
3. Denis Bay, ST. John	0.2	(0-1) Ei	" " "	" " "
4. Jumbi Bay, ST. John	0.1	(0-2) Ei	" " "	" " "
5. Trunk Bay, ST. John	0.5	(0-3) Ei	" " "	" " "
		(0-2) Dc	April to June	March to July
6. Windswept Beach, ST. John	0.2	(0-3) Ei	August to November	June to December
7. Peter Bay, ST. John	0.3	(0-1) Ei	" " "	" " "
8. Cinnamon Bay, ST. John	0.5	(0-1) Ei	" " "	" " "
		(0-1) Dc	April to June	March to July

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; = Lepidochelys olivacea = Uk = Unknown

WATS II SEA TURTLE SURVEY DATA FORM

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COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr., NPS

NAME OF BEACH	LENGTH IN KM	(Annual Range)$^{\Delta}$ SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
9. Maho Bay, ST. John	0.2	(0-1) Ei	August to November	June to December
10. Francis Bay, ST. John	0.5	(0-2) Ei	" " "	" " "
11. Saltpond Bay, ST. John	0.2	(0-5) Ei	" " "	" " "
12. Grootpan Bay, ST. John	0.1	(0-1) Ei	" " "	" " "
13. Gt. Lameshur Bay, ST. John	0.2	(0-2) Ei	" " "	" " "
14. Yawzi Pt., ST. John	< 0.1	(0-1) Ei	" " "	" " "
15. Lt. Lameshur Bay, ST. John	0.2	(0-2) Ei	" " "	" " "
16. Europa Bay, ST. John	< 0.1	(0-1) Ei	" " "	" " "
17. Eastern Reef Bay, ST. John	0.25	(0-2) Ei	" " "	" " "
18. Genti Bay, ST. John	0.6	(0-2) Ei	" " "	" " "

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COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr., NPS

NAME OF BEACH	LENGTH IN KM	(Annual Range) SPECIES NESTING*	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
19. Western Reef Bay, ST. John	0.55	(0-4) Ei	August to November	June to December
20. Coccoloba Beach, ST. John	0.1	(2-6) Ei	" " "	" " "
21. Chocolate Hole, ST. John	0.2	(0-1) Ei	" " "	" " "

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WATS II SEA TURTLE SURVEY DATA FORM

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COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon Jr., J.A. LaPlace

NAME OF BEACH	LENGTH IN KM	(Annual Range) SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
1. Morningstar Beach, ST. Thomas	0.50	(0-1) Ei	N/A	June
2. Dog Island, ST. Thomas	0.02	(0-2) Ei	"	August
3. Great ST. James, ST. Thomas	0.04	(0-2) Ei	"	August
4. Pineapple Beach, ST. Thomas	0.40	(0-1) Ei	"	August
		(0-1) Dc	"	May
5. Coki Pt. Beach, ST. Thomas	0.30	(0-1) Dc	"	May
6. Mandahl Bay, ST. Thomas	0.07	(0-1) Ei	"	July
7. Coconut Bay, Hans Lolik, ST. Thomas	1.00	(0-3) Ei	"	June to August
8. Dry Bay, Hans Lolik, ST. Thomas	0.04	(2-6) Ei	"	June to September
9. Little Bay, Hans Lolik, ST. Thomas	0.04	(0-1) Ei	"	August

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COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr., J. A. LaPlace

NAME OF BEACH	LENGTH IN KM	(Annual Range) Δ SPECIES NESTING		MONTHS PEAK NESTING	MONTHS RECORDED NESTING
10. Little Hans Lolik, ST. Thomas	0.04	(0-4)	Ei	N/A	June to August
		(0-1)	Dc	"	July
11. Hull Bay, ST. Thomas	0.10	(0-1)	Ei	"	July
12. Palm Bay, ST. Thomas	0.03	(0-2)	Ei	"	July to August
13. Clucluse Bay, Inner Brass, ST. Thomas	0.04	(0-2)	Ei	"	July to August
14. Sandy Bay, Inner Brass, ST. Thomas	0.08	(2-4)	Ei	"	June to August
		(0-1)	Dc	"	June
15. Neltjeburg Beach, ST. Thomas	1.20	(1-2)	Ei	"	June to August
		(0-1)	Dc	"	March
16. Penn Bay, ST. Thomas	0.07	(1-3)	Ei	"	June to August

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; = Lepidochelys olivacea = Uk = Unknown

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COUNTRY U.S. STATE Virgin Islands RECORDER R. Boulon, Jr., J.A. LaPlace

NAME OF BEACH	LENGTH IN KM	(Annual Range) SPECIES NESTING	MONTHS PEAK NESTING	MONTHS RECORDED NESTING
17. Caret Bay, ST. Thomas	0.08	(1-4) Ei	N/A	June to August
18. Sorgenfri Bay, ST. Thomas	0.03	(0-2) Ei	"	July to August
19. Santa Maria Bay, ST. Thomas	0.06	(0-1) Ei	"	June to July
		(0-1) Cm*	"	June
20. STumpy Bay, ST. Thomas	0.05	(0-1) Ei	"	August
21. Bordeaux Bay, ST. Thomas	0.05	(2-4) Ei	"	June to August
22. Botany Bay, ST. Thomas	0.06	(0-1) Ei	"	July
		(0-1) Dc	"	July
23. West Cay Bay, ST. Thomas	0.05	(0-2) Ei	"	June to August

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; = Lepidochelys olivacea = Uk = Unknown

Sea Turtle Exploitation (violations) in the U.S. Virgin Islands.

1984:

Twenty investigations were made pertaining to reported endangered species violations in the U.S.V.I. These activities resulted in the seizure and forfeiture to the U.S. government of: (1) stuffed green sea turtle; (7) green sea turtle shells; (2) hawksbill sea turtle shells; two commercial shipments of sea turtle jewelery valued at $500.00; and (8) pounds of sea turtle meat. Agents conducted five arrests for the taking and possession of endangered species parts with civil assessments totaling $9250.00

1985 Endangered species investigations conducted within U.S.V.I. territorial limits consisted of (15) activites resulting in seizure and forfeiture to the government of (3) hawksbill sea turtle shell (4) green sea turtle shells; and a total of five arrests for taking and possessing sea turtle parts with civil assessments totaling $15,000.00.

1986 Endangered species investigations conducted within the U.S.V.I. territorial limits produced (15) civil cases comprised of (69) counts of possession, taking and import. These activities resulted in the seizure of (83) pounds of turtle meat, (4) hawksbill shells, (2) hawksbill carcasses, (9) green shells, (1) live green turtle, and (43) pieces of jewelry. Dispositions of the cases included (9) abandonments to the government, (3) forfeitures to the government, and $8750.00 in assessments.

1987 Endangered species investigations conducted within the U.S.V.I. territorial limits to date have produced (3) civil cases comprised of (5) counts of possession and taking. These activities resulted in the seizure of (5) pounds of green turtle meat and (108) green turtle eggs. Two criminal violations are being processed for (2) green turtle carcasses and (538) green turtle eggs. Dispositions of the civil cases include (1) forfeiture to the government and one $5000.00 assessment. The criminal cases are pending with a November 2 court date.

TABLE IV. MORTALITY

COUNTRY U.S. STATE Virgin Islands YEAR 82 OBSERVER

Date	*Species	Sex	Length	Weight	# Eggs	Locality	Cause
4/5	Cm	♂	81.0cm	60 kg (est.)	none	ST. Croix	Uk - stranding
6/10	Ei	Uk	Uk	30 kg (est.)	none	ST. Thomas	In stomach of 12 foot tiger shark.
6/16	Cm	♀	28.0cm	3.1 kg	none	ST. Croix	Tangled in fishing line on pier.
6/22	Cm	Uk	26.7cm	2.5 kg	none	ST. Thomas (Coral World)	Uk - died in reef tank.
8/9	Ei	Uk	51.2 cm	12.5 kg	none	ST. John	Deep propeller wound on carapace.

Comments:

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; Lo = Lepidochelys olivacea; Uk = Unknown

TABLE IV. MORTALITY

COUNTRY U.S. STATE Virgin Islands YEAR 83 OBSERVER

Date	*Species	Sex	Length	Weight	# Eggs	Locality	Cause
9/11	Cm	Uk	53.3cm	Uk	none	ST. Croix	Deep propeller wound on carapace.
9/15	Cm	♀	27.3 cm	3.97 Kg	none	ST. John	Non-suppurative encephalitis

Comments:

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; Lo = Lepidochelys olivacea; Uk = Unknown

TABLE IV. MORTALITY

COUNTRY U.S. STATE Virgin Islands YEAR 84 OBSERVER

Date	*Species	Sex	Length	Weight	# Eggs	Locality	Cause
5/1	Cm	Uk	41cm	UK	none	ST. John	Drowned - caught in fish trap.
5/23	Cm	Uk	60.1cm	27.5kg	none	ST. Thomas	Fishing line around neck.
5/27	Ei	Uk	approx. 100 cm	Uk	none	ST. Croix	Found dead on beach.
7/22	Ei	Uk	27.6cm	2kg	none	ST. Thomas	Uk - missing right front flipper.
8/24	Ei	hatchling	4.7cm	.02kg	none	ST. Thomas	Found washed up on shore - weak but died.

Comments:

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; Lo = Lepidochelys olivacea; Uk = Unknown

TABLE IV. MORTALITY

COUNTRY U.S. STATE Virgin Islands YEAR 85 OBSERVER

Date	*Species	Sex	Length	Weight	# Eggs	Locality	Cause
2/2	Cm	Uk	37.5cm	Uk	none	ST. Thomas	Propeller wound on head.
3/19	Cm	Uk	32.2cm	Uk	none	ST. Thomas	Small wound at base of skull on back.
7/29	Cm	♂	102.4cm	100+ kg	none	ST. Croix	Uk - stranding
8/23	Cm	Uk	Uk	Uk	Uk	ST. Croix	Uk - stranding

Comments:

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; Lo = Lepidochelys olivacea; Uk = Unknown

TABLE IV. MORTALITY

COUNTRY U.S. STATE Virgin Islands YEAR 86 OBSERVER

Date	*Species	Sex	Length	Weight	# Eggs	Locality	Cause
	None reported or recorded						

Comments:

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; Lo = Lepidochelys olivacea; Uk = Unknown

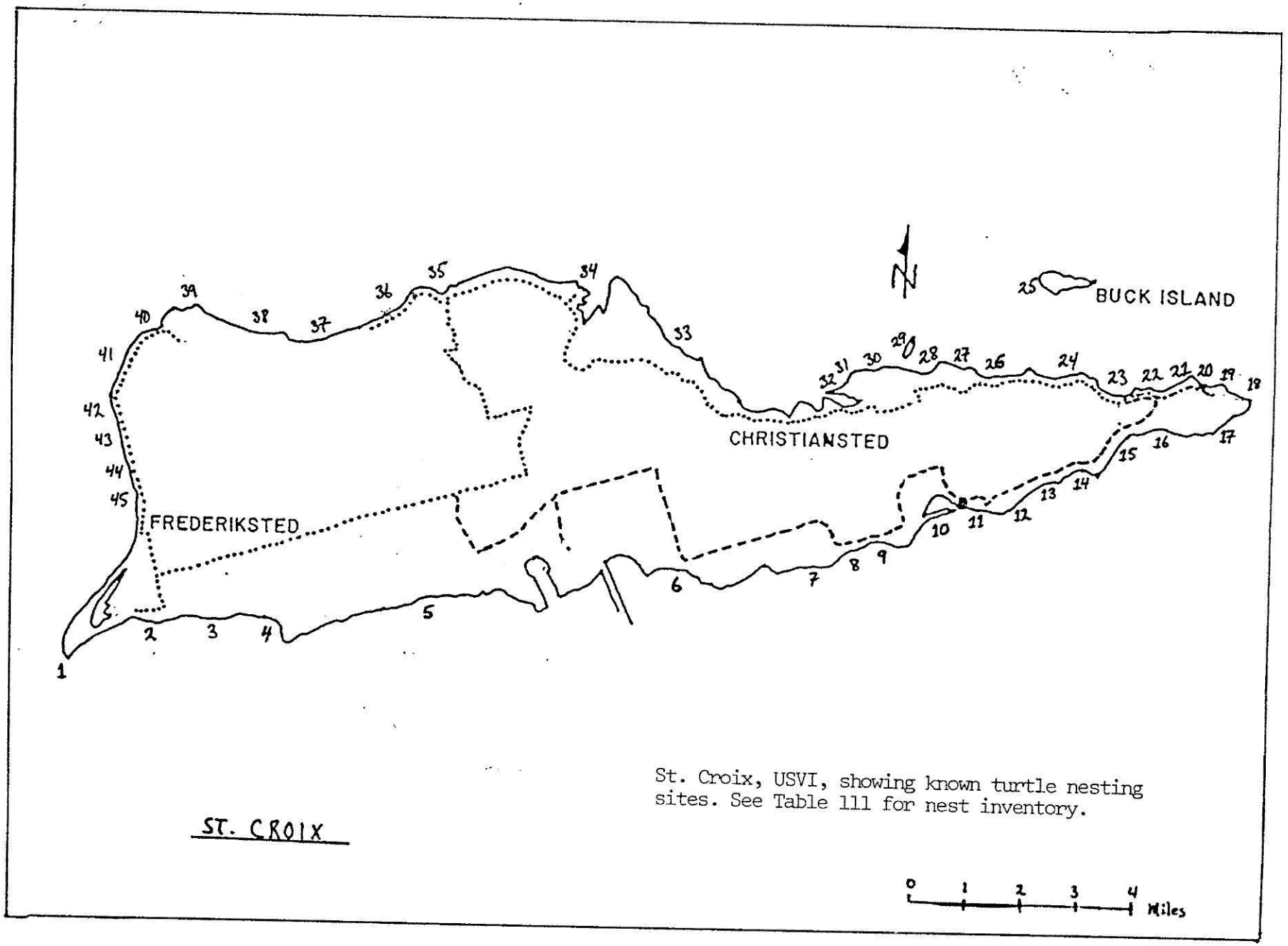
TABLE IV. MORTALITY

COUNTRY U.S. STATE Virgin Islands YEAR 87 OBSERVER

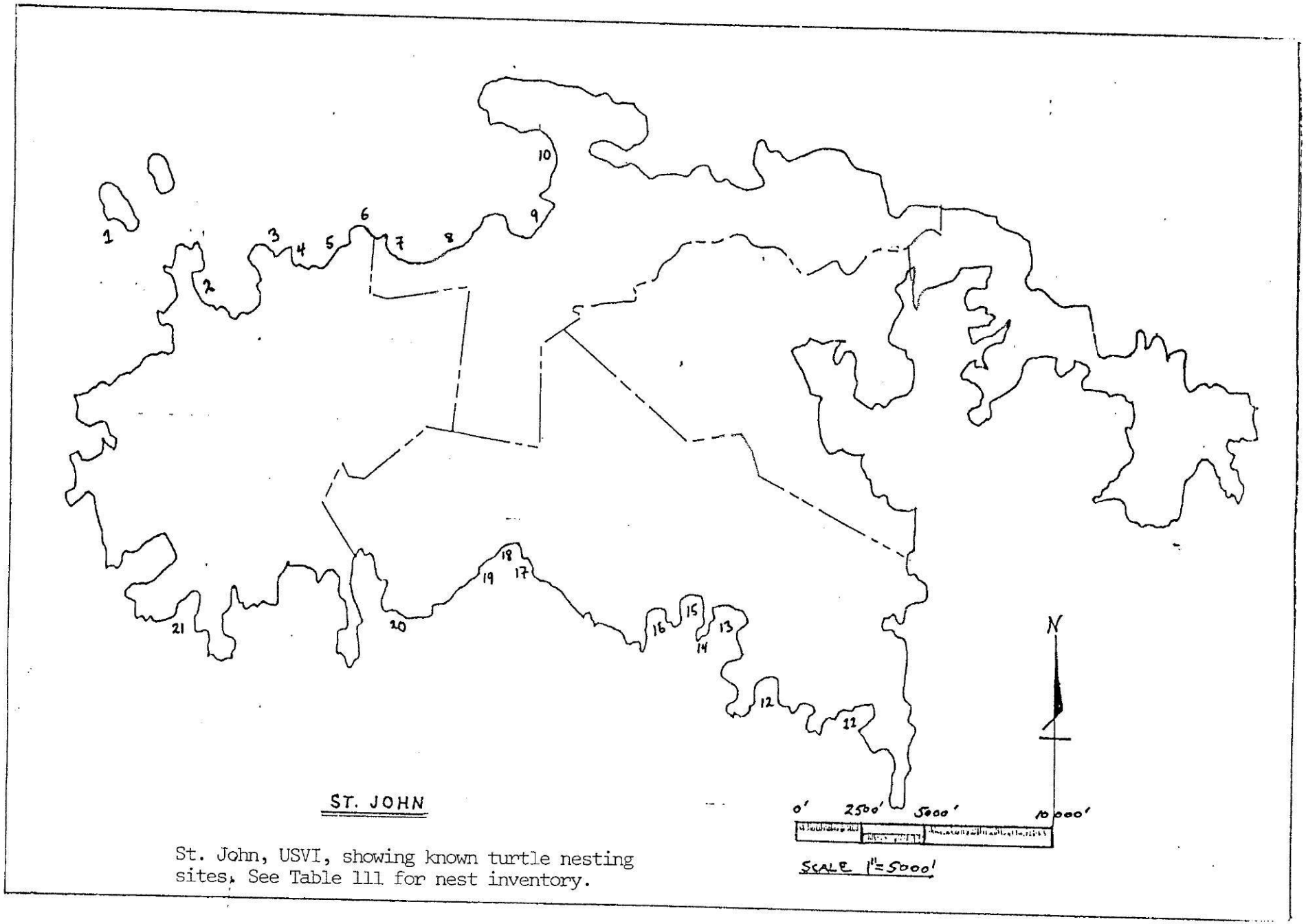
Date	*Species	Sex	Length	Weight	# Eggs	Locality	Cause
1/9	Cm	Uk	35 cm	Uk	none	ST. Thomas	Deep gouges in carapace - probably propeller.
2/17	Cm	♂	85.0cm	Uk	none	ST. Croix	Uk - stranding
4/28	Cm	Uk	67.0cm	Uk	none	ST. Thomas	Uk - stranding
7/2	Cm	Uk	81.5cm	38kg (est)	none	ST. Croix	Possible shark attack.

Comments:

*Cc = Caretta caretta; Cm = Chelonia mydas; Dc = Dermochelys coriacea; Ei = Eretmochelys imbricata; Lk = Lepidochelys kempi; Lo = Lepidochelys olivacea; Uk = Unknown

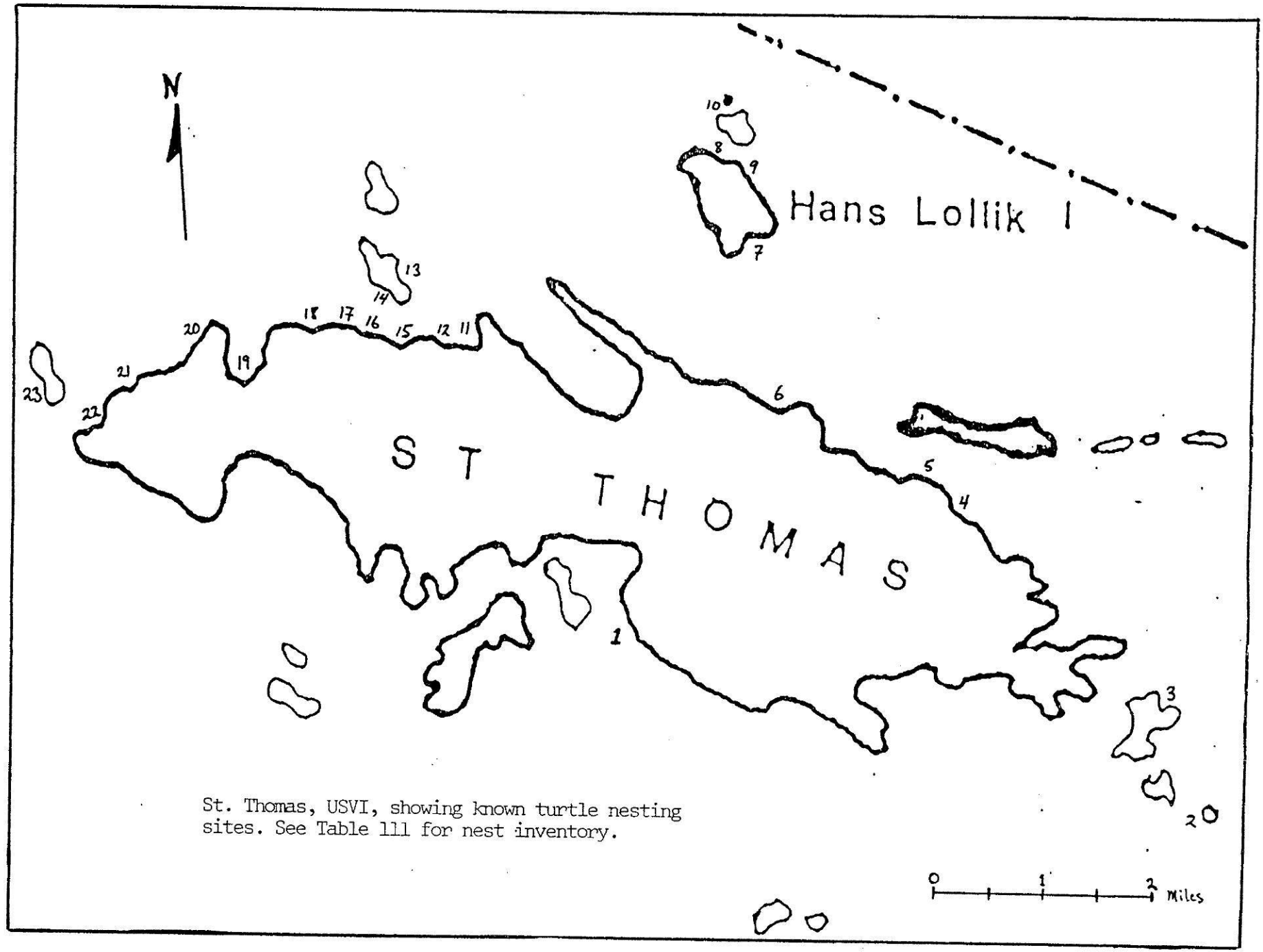


St. Croix, USVI, showing known turtle nesting sites. See Table 111 for nest inventory.



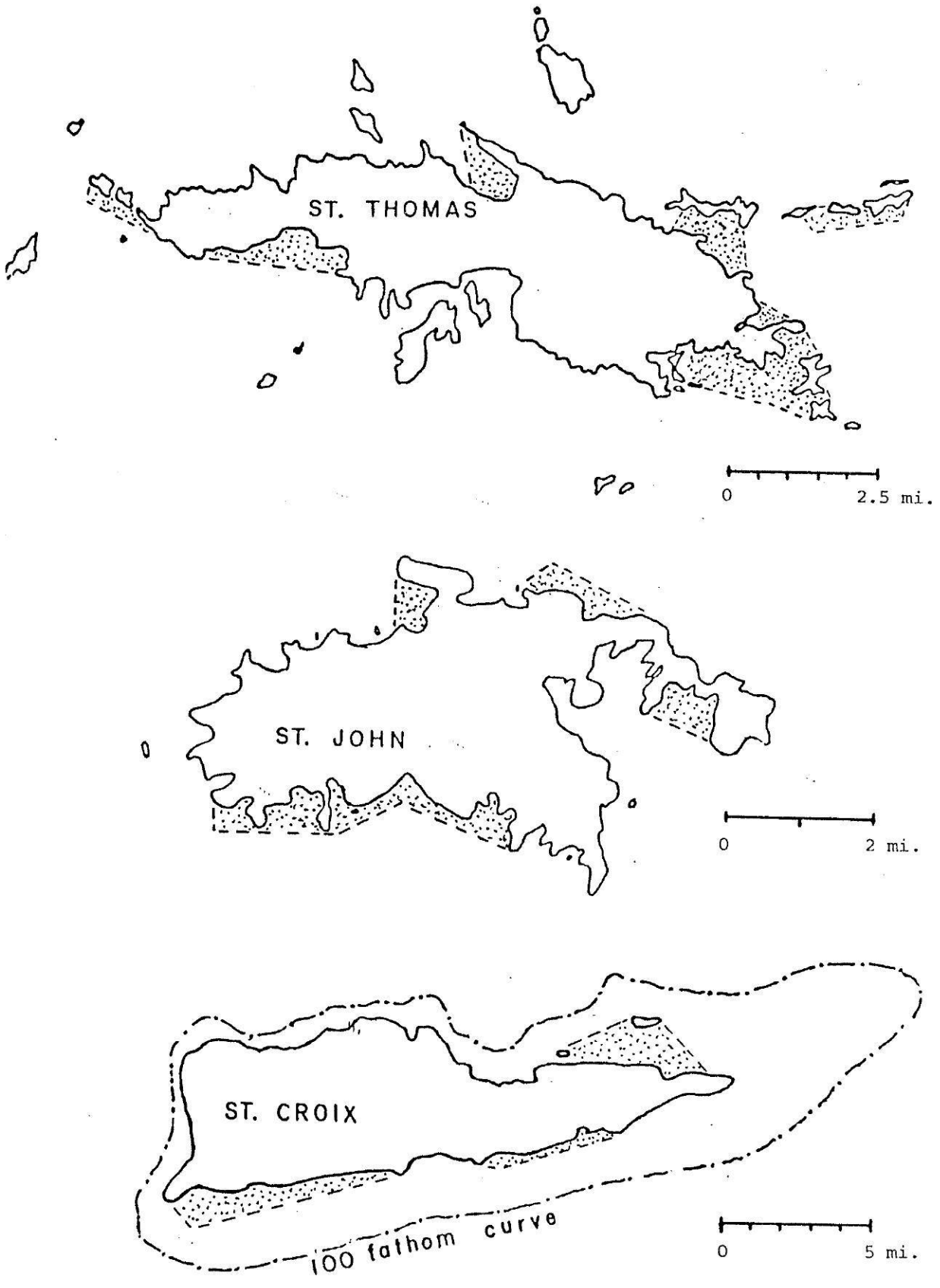
ST. JOHN

St. John, USVI, showing known turtle nesting sites. See Table 111 for nest inventory.



St. Thomas, USVI, showing known turtle nesting sites. See Table lll for nest inventory.

Country map showing foraging areas



preserved species which have been caught before the beginning of the respective closed seasons is also permitted.—Added Nov. 21, 1972, No. 3330, § 2, Sess. L. 1972, p. 497.

§ 317. Fish for scientific, educational and breeding purposes

The Department, and any other person or organization with the written permission of the Commissioner, may catch or cause to be caught, for scientific or educational purposes or for fish culture, any fish or marine organism at any time, from the jurisdictional waters of the Territory, and may sell or cause to be sold when not otherwise prohibited by law, all or such part of the catch that has been taken and as may not be necessary for scientific or educational purposes or for fish culture. The proceeds, if any, from these sales shall be deposited in the Fisheries and Wildlife Fund.—Added Nov. 21, 1972, No. 3330, § 2, Sess. L. 1972, p. 497.

§ 318. Protection of marine turtles, nests and eggs; penalties

(a) It is the intent of the Legislature of the Virgin Islands to contribute to the preservation of marine turtles in the Caribbean area, said turtles now being close to extinction.

(b) It shall be unlawful for any person to take, kill, possess, mutilate or in any way destroy any loggerhead, leatherback, hawksbill, ridley or green turtle or other sea turtle, or take or possess any part thereof while such turtle is on the beaches of the Territory at any time, or to take or possess any such turtle in the Territorial waters during the months of May through September, inclusive, of each year and at such other times as the Commissioner may by rule and regulation prescribe. It shall be unlawful to import, trade, sell or in any way deal in young sea turtles of any kind; Provided, however, That the Commissioner may issue written permission to any licensed or publicly owned zoo or exhibitor of marine life to capture such young turtles for purposes of live exhibition.

(c) No person may take, possess, disturb, mutilate, destroy, cause to be destroyed, sell, offer for sale, transfer, molest or harass any sea turtle nest or eggs at any time.

(d) Any person violating any provision of this section is guilty of a misdemeanor and shall, upon conviction therefor, be punished by a fine not less than one hundred ($100) dollars nor more than six hundred ($600) dollars, or by imprisonment for a period not to exceed one (1) year, or by both such fine and imprisonment.—Added Nov. 21, 1972, No. 3330, § 2, Sess. L. 1972, p. 498.

1972 Amendment

§ 319. Lobsters; regulations; penalties

(a) It is intent of the Legislature of the Virgin Islands to place restrictions upon the taking of spiny lobsters for the purpose of insuring and maintaining the highest possible production of such lobsters, for commercial purposes, consistent with sensible conservation practices.

(b) No person, firm or corporation shall take or have in his possession at any time, regardless of where taken, any spiny lobster (crawfish or crayfish) of the species Panulirus Argus unless such spiny lobster (crawfish or crayfish) of the species Panulirus Argus shall have a carapace measurement of more than 3 inches or shall have a tail measurement of more than five and one-half (5½) inches, not including any protruding muscle tissue. The carapace (head, body, front section) measurement shall be determined by beginning at the anteriormost (front) edge of the groove between the horns directly above the eyes, then proceeding along the mid-dorsal line (middle of back) to the rear edge of the top part of the carapace. The tail (segmented portion) shall be measured lengthwise along the center of the entire tail until the rearmost extremity is reached. The tail measurement shall be conducted with the tail in a flat straight position with the tip of the tail closed.

(c) Lobsters must remain in a whole condition at all times while being transferred on, above or below the waters of the Territory and the practice of wringing or separating the tail (segmented portion) from the body (carapace or head) section is prohibited on the waters of this Territory, except by special written permission issued by the Commissioner.

(d) Egg-bearing lobsters of any species shall not be taken, possessed or sold at any time, except that egg-bearing lobsters may be returned to pots or traps in which they have been captured, provided said egg-bearing lobsters are returned to such pots or traps in a live and unharmed condition and are provided with adequate food. Such egg-bearing lobsters as are returned to pots or traps as aforementioned, shall not be taken or possessed or sold until the eggs have been naturally released into the water.

(e) The practice of stripping or otherwise molesting egg-bearing lobsters in order to remove the eggs is prohibited.

Virgin Islands Sea Turtle research and Survey Project:

1. Sandy Point Leatherback Turtle Nesting Biology Project - Ongoing.
   Saturation tagging/nest monitoring with relocation of nests to reduce loss due to beach erosion. Division of Fish and Wildlife, Department of Planning and Natural Resources.

2. Green/Hawksbill Population Biology Project - Ongoing.
   In-water capture and tagging program. Recaptures provide information on growth rates, population sizes, movement patterns and genetic stock assessment. Division of Fish and Wildlife, Department of Planning and Natural Resources.

3. Sea Turtle Nesting Surveys - Ongoing.
   Daytime nesting beach surveys on St. John and Buck Island National Monument. National Park Service.

4. Assement of anchor damage and carrying capacity of seagrass beds in Francis and Maho Bays for green sea turtles. Susan Williams, West Indies Lab. Completed.

RB/dmg

Person/offices responsible for sea turtle conservation/management in the USVI.

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   St. Thomas, USVI 00801 809-774-3320

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Tagging and Nesting Research of Leatherback Sea Turtles (Dermochelys coriacea) on Sandy Point, St. Croix, U. S. Virgin Islands, 1986

ANNUAL REPORT TO THE U. S. FISH AND WILDLIFE SERVICE

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*Pursuant to Contract #PC-CCA-146-86
Division of Fish and Wildlife
Department of Conservation and Cultural Affairs
U. S. Virgin Islands

Submitted November 1986

TABLE OF CONTENTS

Figures and Tables

Introduction.....1

Methods.....4

Morphometric Parameters.....4

Nesting.....4

Weighing.....5

Tagging.....5

Identifying Characteristics.....6

Nesting Location.....6

Beach Erosion Profiles.....6

Hatching.....6

Nest Excavation.....7

Results and Discussion.....8

Hatching.....16

Tagging and Remigration.....19

Mortality Factors.....19

Eggs.....19

Hatchlings.....19

Conclusions.....24

Acknowledgements.....25

Literature Cited.....27

Appendix I

INTRODUCTION

For the fifth season a detailed study was continued on the tagging and nesting research of the leatherback sea turtle (Dermochelys coriacea) on Sandy Point, St. Croix, U. S. Virgin Islands.

Largest of all turtles, it is the most morphologically divergent of the seven known species of sea turtles. Little is known of Dermochelys with only small glimpses of its life history being documented through observations of nesting behavior and occasional pelagic encounters. Its biology has been reviewed by Pritchard (1971).

Dermochelys was listed as an endangered species by the United States Department of the Interior in 1979. In 1975, it was assigned Appendix I status by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). With only 13 significant nesting sites remaining worldwide (Sternberg, 1981), six of those located in the Western Atlantic (Carr et al, 1982), and worldwide estimate of only 115,000 mature adult females (Pritchard, 1982), the species' future existence is tenuous at best. Sandy Point, St. Croix, United States Virgin Islands, supports the major concentration of nesting leatherbacks in the United States and the Northern Caribbean (Eckert & Eckert, 1985) (Figure 1).

The United States Fish and Wildlife Service determined and designated Sandy Point beach area critical habitat in 1978, and in 1979, the National Marine Fisheries Service designated the surrounding waters as critical habitat. In 1984, the United States Fish and Wildlife Service purchased Sandy Point for incorporation into the Caribbean Island National Wildlife Refuge System. Further information on the development of the present study can be gleaned from Eckert and Eckert (1985).

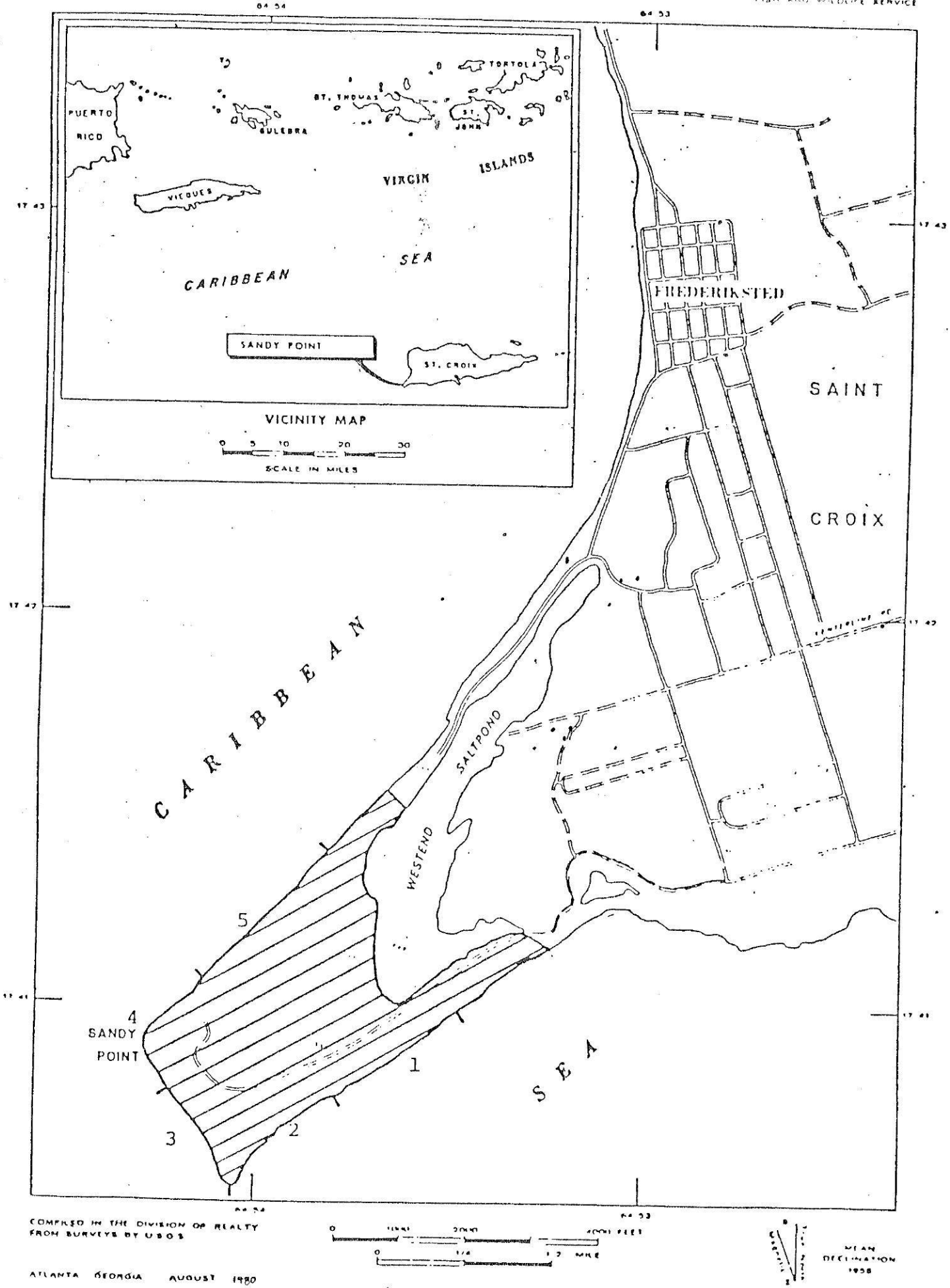


Figure 1. Sandy Point, St. Croix, U.S. Virgin Islands.

In March of 1986, the present authors took over the duties of our predecessors, Scott and Karen Eckert, in continuing the intensive research effort commenced in 1982 under the auspices of the U.S.V.I. Division of Fish and Wildlife. Funding has continued to be provided through Section 6 of the U. S. Endangered Species Act, and by Earthwatch and the Center for Field Research of Watertown, Massachusetts. The project continued on its original design to assess the size, productivity and management priorities of the Sandy Point leatherback population.

The following is an attempt to summarize the results of the 1986 data. In an effort to continue and maintain the continuity of past reports until future data dictates, we have drawn heavily on comparisons with previous years. For further comparison, the authors advise consulting with Eckert et al (1982, 1984) and Eckert and Eckert (1983, 1985).

METHODS

A. Study Area Coverage

Nightly, foot patrols from 1930 h -0500 h commenced on Sandy Point's 2.4 km nesting beach on 28 March, 1986. Starting on 6 April, eight Earthwatch teams, consisting of 6 - 10 volunteers, each participating for a ten-day period, started assisting the authors nightly. The teams were divided into two groups of 3 - 5 persons and were led by one of the authors. The groups each walk half of the study area on an hourly basis, ensuring observation of the entire study area once per hour. Previous data indicated that leatherbacks require at least one hour to complete nesting. Hourly patrols ensured that tagging and data would be collected on all turtles.

B. Morphometric Parameters

When turtles were encountered, information was recorded on data sheets (Appendix I). Time, date, location, weather and moon phase were recorded.

Once the turtle started digging, over the carapace (o.c.) length (notch to tip), and width were recorded. Carapace lengths were taken, measured from the anterior notch in the carapace alongside the vertebral ridge to the posterior tip. Lengths were taken each time an individual was encountered and averaged. Straight-line measurements (s.l.) using a tree caliper were no longer taken this year as previous data has provided a regression to obtain this from over the curve measurements. The width of the carapace was measured at the widest point of the carapace, just behind the front flippers.

C. Nesting

Nest depth was recorded at the completion of the excavation. This was determined when the female had reached the maximum

extension of her rear flippers and prior to egg deposition. The measurement was taken from the bottom of the nest cavity to the base of the posterior point of the carapace. Abnormalities in digging, nest cavity structure, or presence of water or foreign materials were recorded.

On deposition of the eggs, yolked and yolkless eggs were counted. Yolked egg diameters were discontinued this season. On completion of deposition, the overburden (depth of sand over the eggs) was recorded by measuring from the top of the egg mass to the posterior point of the carapace.

If the nest appeared threatened by imminent erosion or inundation, or if these conditions historically occurred annually at the nest site, both yolked and unyolked eggs were collected on deposition and moved to a safe zone for reburial. Duplication of the original nest site dimensions were used to insure proper incubation conditions. Both original and relocated nest dimensions were recorded.

D. Weighing adults

The weighing of adult leatherbacks was continued during the 1986 season with fair success. Hampered by the late arrival of needed equipment, actual weighing was not begun until 27 April. The procedure was also hampered by the small amount of females using the beach this season and heavy beach erosion, and difficulty meeting the criteria (Eckert & Eckert, 1985) to accomplish the task.

A total of ten weights were taken, involving eight females. A detailed account of the methods and techniques used can be found in Eckert and Eckert (1985).

E. Tagging

Immediately following egg deposition, each untagged turtle was tagged on the trailing edge of the left front flipper, approximately 30 cm. from the body. This position was 10 cm. further from the body than in past years. The difference was made to accommodate the use of the titanium tags (Stock Brands, Australia, "V.I." prefix) for better placement and fit.

It was found that the titanium tags had to be rebent slightly prior to use for proper alignment of the locking mechanism. A titanium tag was also placed in the flesh between the left rear flipper and the tail. Although titanium tags were standardized this season, a few monel-metal cattle ear tags (National Brand and Tag, U.S.A. "AAG" prefix) were used on four specimens in the first few weeks of the study due to the late arrival of the titanium tags.

F. Identifying characteristics

Turtles were examined for diagnostic markings, deformities, ectobiota, and macroparasites. Injuries and ectobiota were photographed when possible. In addition, this season the pink spot found on the head of adult leatherbacks was photographed and its characteristics catalogued in hopes that the variations will serve as a secondary means of identification. The capitulum of Conchoderma virgatum, a commonly occurring pendunculate barnacle was measured with calipers as in the past.

G. Nest location

Numbered stakes are placed at 20 m intervals along the vegetation line for the length of the study area. Exact locations of nest sites are determined by triangulating its location between the two nearest stakes using a 60 m tape measure. A profile of the beach was

drawn from the point of emergence to show the nest's relationship to the vegetation line, high tide mark and the ambient water contour.

H. Beach erosion profiles

At approximately 15-day intervals throughout the season, March through September 1, horizontal beach profiles were constructed at 100 m intervals using every fifth beach stake as a standard reference point for constancy in measurement. The distance from the reference stakes to the proximal vegetation line, erosion bank (if one exists), high water and ambient water contours were recorded. These measurements were compared monthly to ascertain the fluctuation in available nesting habitat for the season.

I. Hatchlings

Term nests were discretely marked and monitored during nightly patrols starting one week prior to the expected hatch date. When emergence occurred, the time, number of hatchlings or crawls were recorded. The emergence location was triangulated and discretely marked. Hatchlings, if observed, were guarded from possible predators and obstacles such as beach debris was removed from their path until the hatchlings entered the water.

J. Nest excavation

Two to three hours after the emergence, the nest site was excavated to determine hatching success. All contents were removed and recorded. Unhatched eggs were opened to ascertain any development that might have occurred, deformed young and short-term embryos were recorded. Conditions of the nest cavity were also observed to determine contributing conditions; flooding, hatchlings trapped by root growth, etc. Hatchlings found in the nest were allowed to crawl to the sea unassisted.

RESULTS AND DISCUSSION

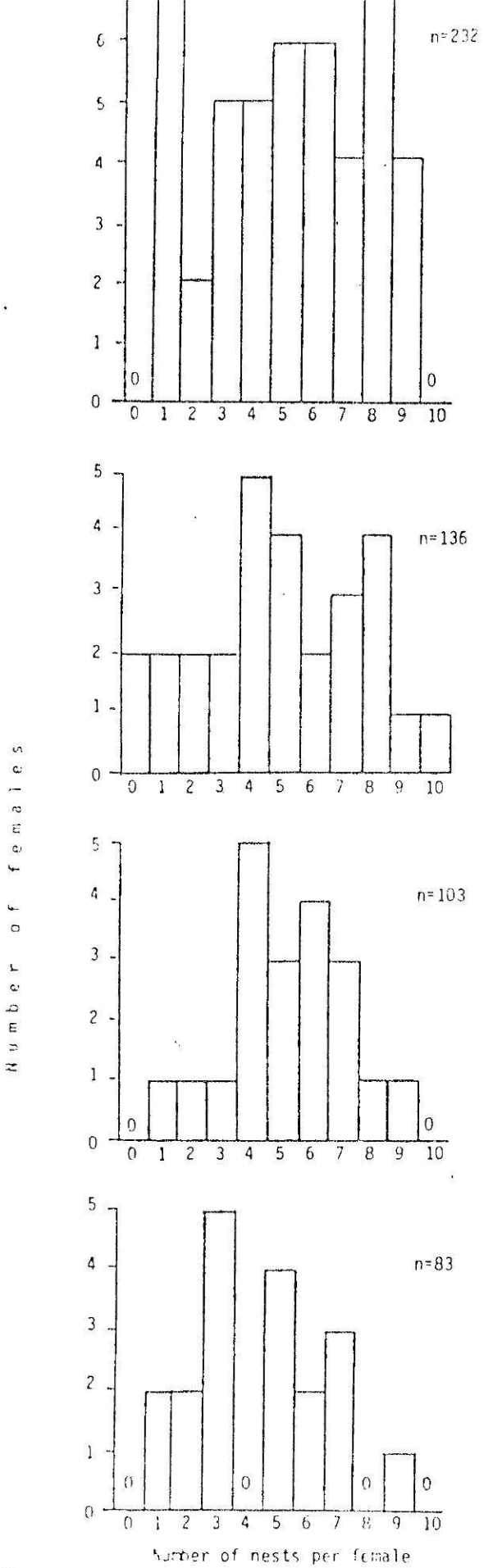
A. Nesting

Leatherback nesting activity began 22 February (W. Tobias, DFW, pers. comm.) and terminated 23 July, 1986. Early activities were recorded as "judgement" nests during daytime weekly surveillance of the study area. Of these 14 nests, 6 produced hatchlings. The remainder showed no indication of hatching activity during the season and were presumed to be false crawls and are not reflected in the following data.

Nightly monitoring of adult nesting behavior commenced on 26 March. A total of 139 activities were recorded, 76 (54.7%) resulted in egg deposition. An additional 3 activities were recorded outside the perimeters of the study site. All were false crawls.

Nesting initiation and termination were comparable to prior years, with activities totalling 139, compared to 129, 158, 159, 189 and 346 in the 5 years respectively that the study has continued. Activities were lower than recent years with a higher percentage of false crawls. This was attributable to the smallest recorded population of turtles since 1981, as well as unusual weather patterns resulting in extreme erosion of the study area, coupled with continuous ground swells throughout the nesting period. Additionally, the unusually high number of turtles nesting in 1985 would typically be followed by a seasonal low the following year.

Eighteen leatherbacks nested on Sandy Point in 1986. All were observed and tagged. Of the observed nests, a mean of 3.9 nests per female was recorded (SD=1.66, range 2-7) (Figure 2). The mean internesting interval was 9.7 days (SD=1.37). Calculations for this interval were made according to Eckert and Eckert (1985).



(Eckert & Eckert, 1985)

1985 SUMMARY

46 females

232 nests, females known
10 nests, females unknown
(incl. 6 laid pre-patrol)

242 total nests

1984 SUMMARY

28 females

136 nests, females known
5 nests, females unknown
(incl. 4 laid pre-patrol)

141 total nests

1983 SUMMARY

20 females

103 nests, females known
10 nests, females unknown
(incl. 9 laid pre-patrol)

113 total nests

1982 SUMMARY

19 females

83 nests, females known
3 nests, females unknown
(incl. 1 laid pre-patrol)

86 total nests

Figure 2. Nesting frequency of leatherbacks on Sandy Point, St. Croix, since 1982.

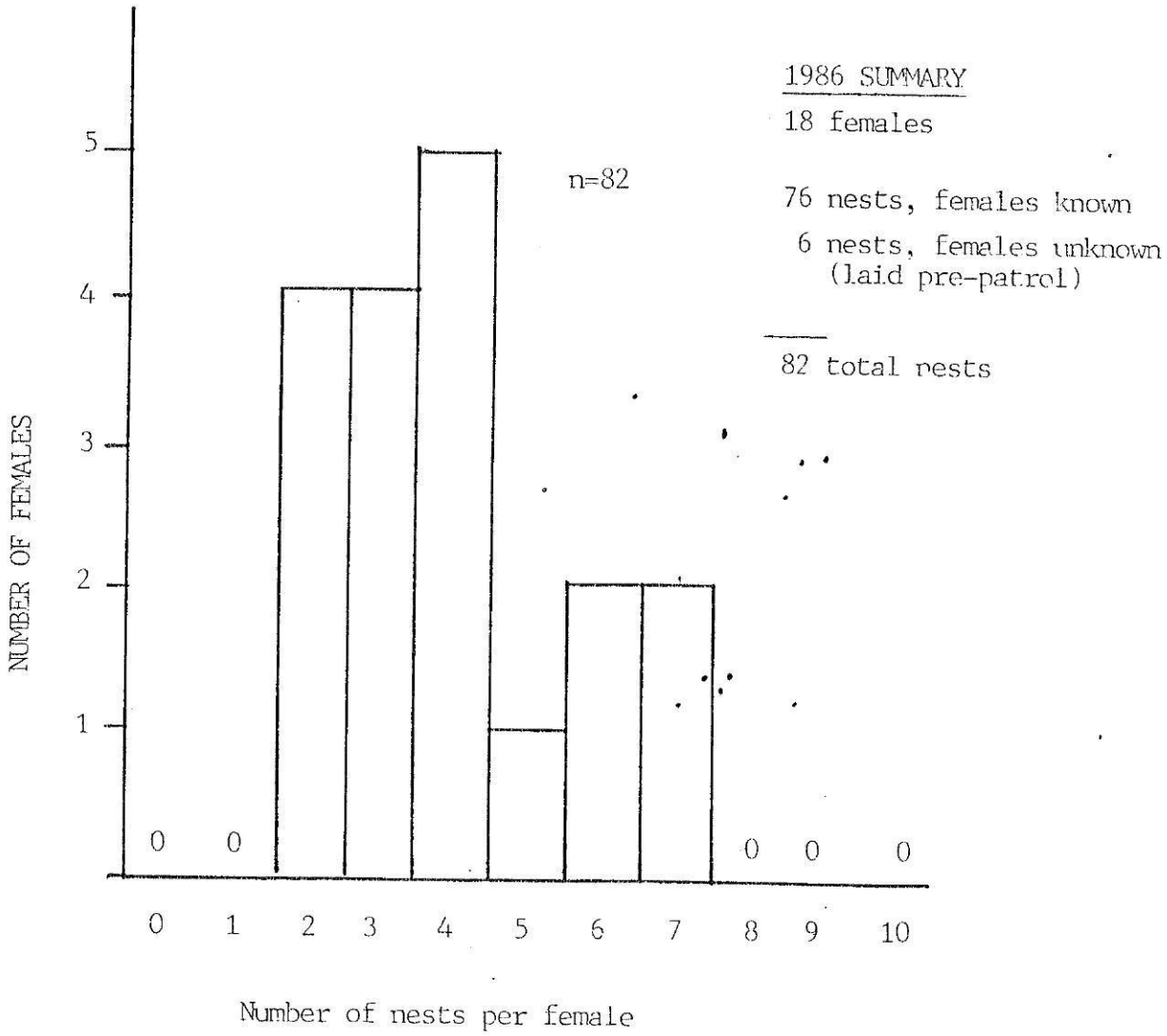


Fig. 2 continued

No interbeach nesting dispersal was documented for 1986. However, a large number of gaps in the internesting intervals indicates that females may have been using other areas for nesting. The high incidence of these gaps may have been caused by unusual and rapid erosion, high winds and dramatic loss of appropriate nesting habitat.

Peak activity occurred during the last two weeks of April and declined gradually to the final nesting on 23 July (Figure 3). These activities were interrupted by a hiatus from 2 through 6 of June. Investigation of the data indicated this was caused by the combination of few females and their individual nesting patterns. Of the 18 nesting females on Sandy Point, 12 had completed their nesting sequence for the season, and one had yet to begin by 2 June.

Weights of nesting females ranged from 292 kg. to 382 kg. (n=8 turtles) in 1986.

Measurements ranged from 143.2 cm. to 160 cm. Individuals were divided into five size classes based on over the carapace length (Figure 4). Comparisons were made between size classes and clutch size and number of clutches laid (Figures 5 and 6).

Mean clutch size was 117.52 eggs (SD=19.8, range 44-152). Yolked eggs averaged 79.0 per clutch (SD=19.1, range 26-127). Yolkless eggs averaged 38.7 per clutch (SD=16.8, range 0-75). Mean nest depth was 70.2 cm. (SD=4.78). Overburden averaged 41.1 cm. (SD=8.5). Results were similar to previous years.

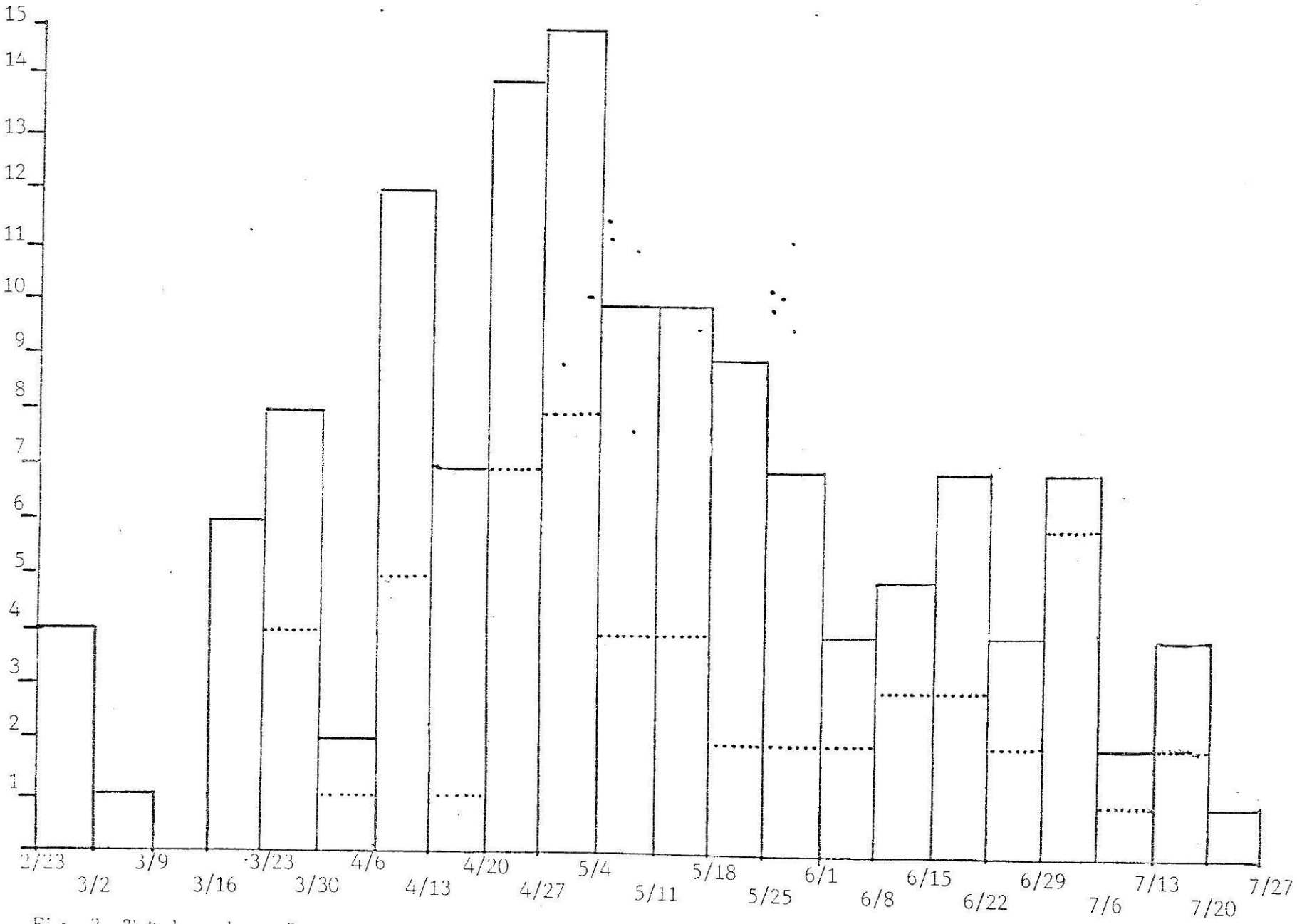


Fig. 3 Total number of nests and false crawls by week on Sandy Point, St. Croix - 1986.

(....) resulting in false crawls

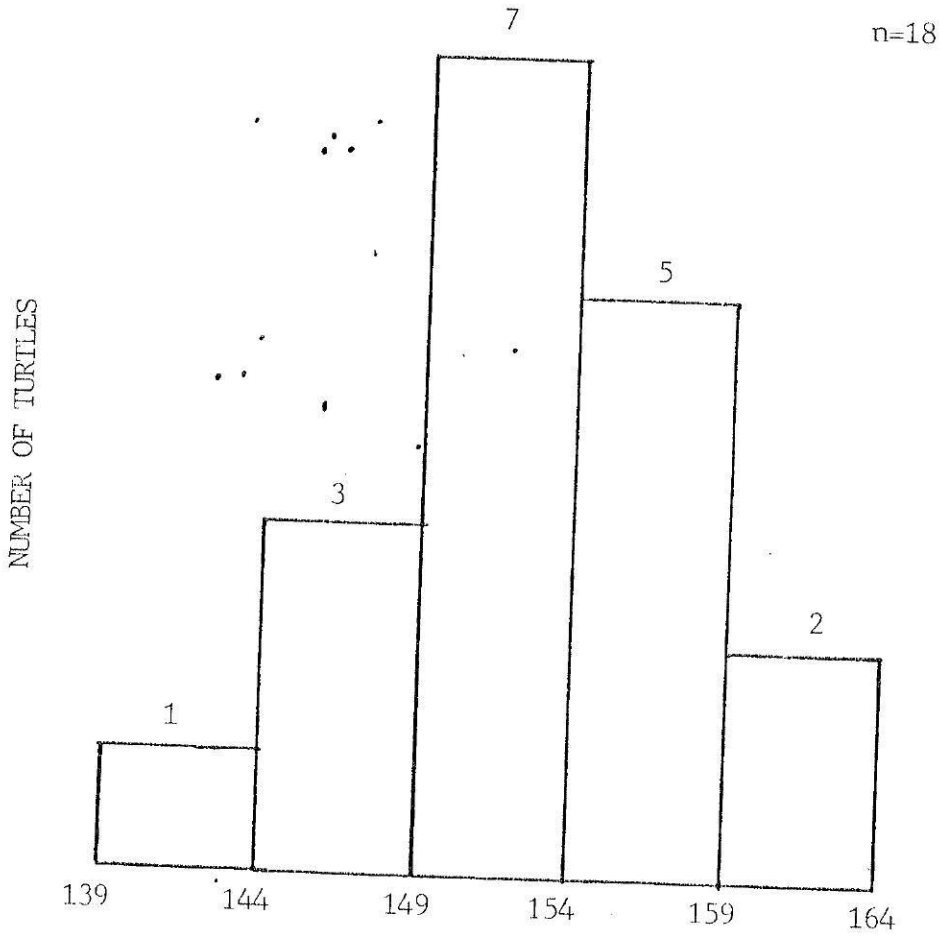


Fig. 4 Size frequency distribution of Dermochelys coriacea nesting on Sandy Point, 1986. Over the carapace, notch-to-tip dimensions.

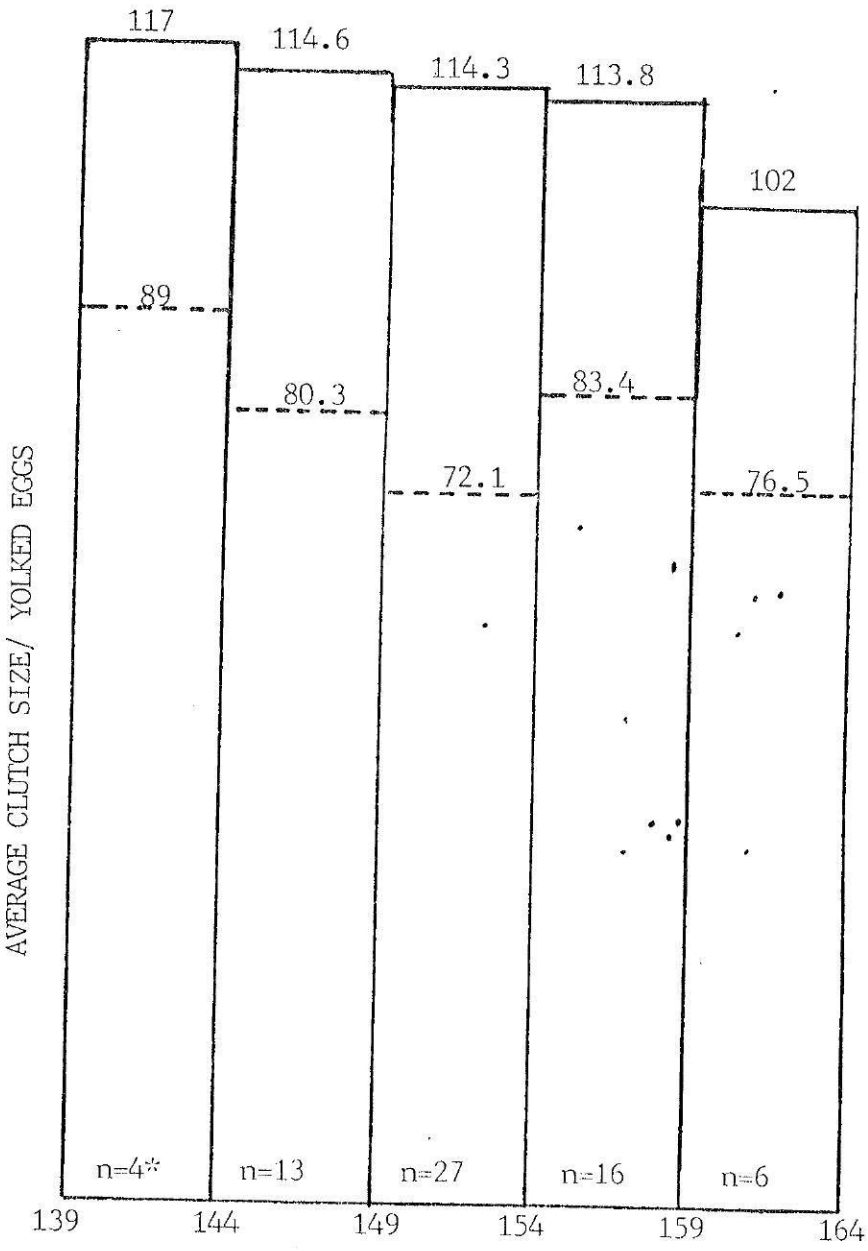


Fig. 5 - Average clutch size/ yolked eggs laid by size class (o.c. notch-to-tip) on Sandy Point, St. Croix -1986 clutch size (--) yolked (··).

* number of clutches (total n=76)

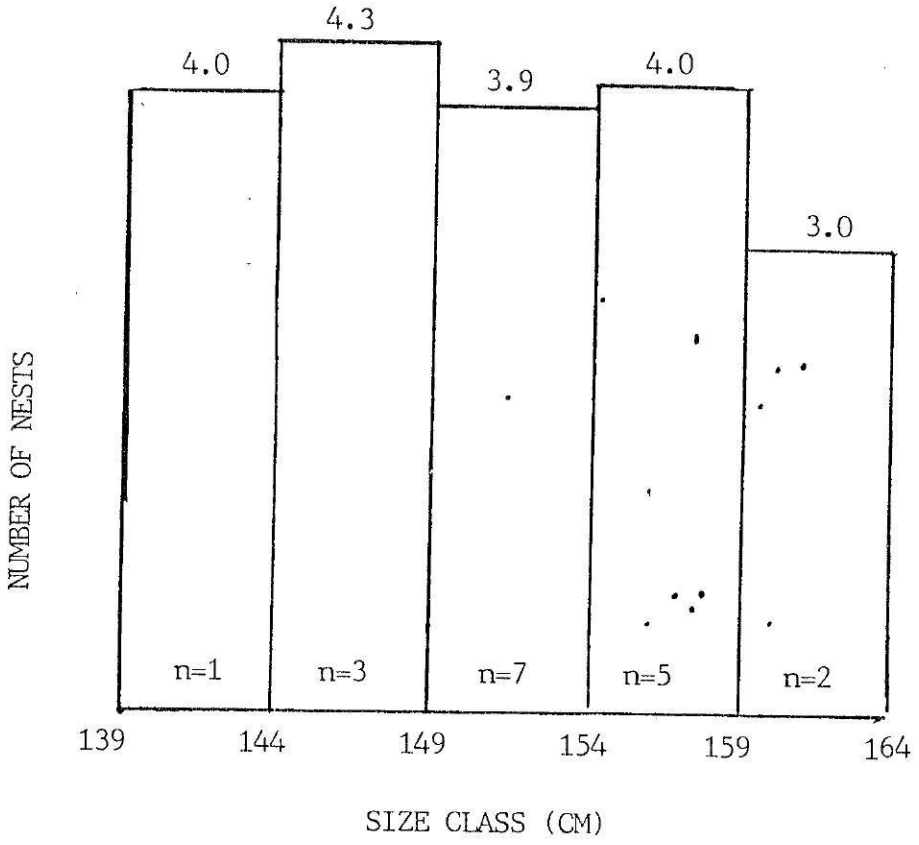


Fig. 6 Average number of nests laid by size class (o.c. notch-to-tip) on Sandy Point, St. Croix -1986. n= number of turtles in each size class

B. Hatching

Between 2900-3000 hatchlings were successfully hatched at Sandy Point in 1986. (Compare to 1985: 9200-9300, 1984: 5200-5300, 1983: 4200-4300, 1982: 2200-2300.) Average incubation period was 63.93 days (n=49, SD=3.26, range 58-72) (Figure 7). Incubation period is reduced over the course of the hatching season due to higher summer temperatures during later parts of the nesting season. The majority of emergences occurred between 1800 h and 2100 h. These figures are consistent with previous years. Two nests were found to have emerged prior to 1800 h, resulting in 14 hatchlings that had died due to exposure to sun and high beach temperatures.

Nest outcomes were defined as "known" and "unknown" (Table 1). "Known" results include nests with successful emergences where nest contents were subsequently analyzed and nests known to have been lost to erosion or wave wash. "Unknown" results include 13 nests which could not be found, and the last 6 nests of the season which could not be monitored to term. There were no indications of nests being destroyed by predators or poaching in 1986.

Sixty-three of 82 nests provided known results. Mean hatching success of these nests was 66.79% (SD=17.59, range 7-95.5) excluding nests lost to erosion. Thirty-seven nests were relocated to protect them from erosion. Without this effort, we estimate that 60% of the nests would have been lost in 1986. Relocated nests showed an overall higher success ratio than in situ nests (68.97% as compared to 64.61%). This may be due to the fact that relocated nests were located higher on the beach and were therefore less likely to be affected by this season's unusually high ground swells and wash.

Significant hatchling mortality within the nest cavity (hatched, full-term pipped, and full-term unpipped eggs) continued to be found in 1986. Forty-seven nests (85%) were found to show this phenomena. 13.9% of hatchlings were found dead within the nest at excavation. As of yet, no hypothesis has been formed to account for this phenomena.

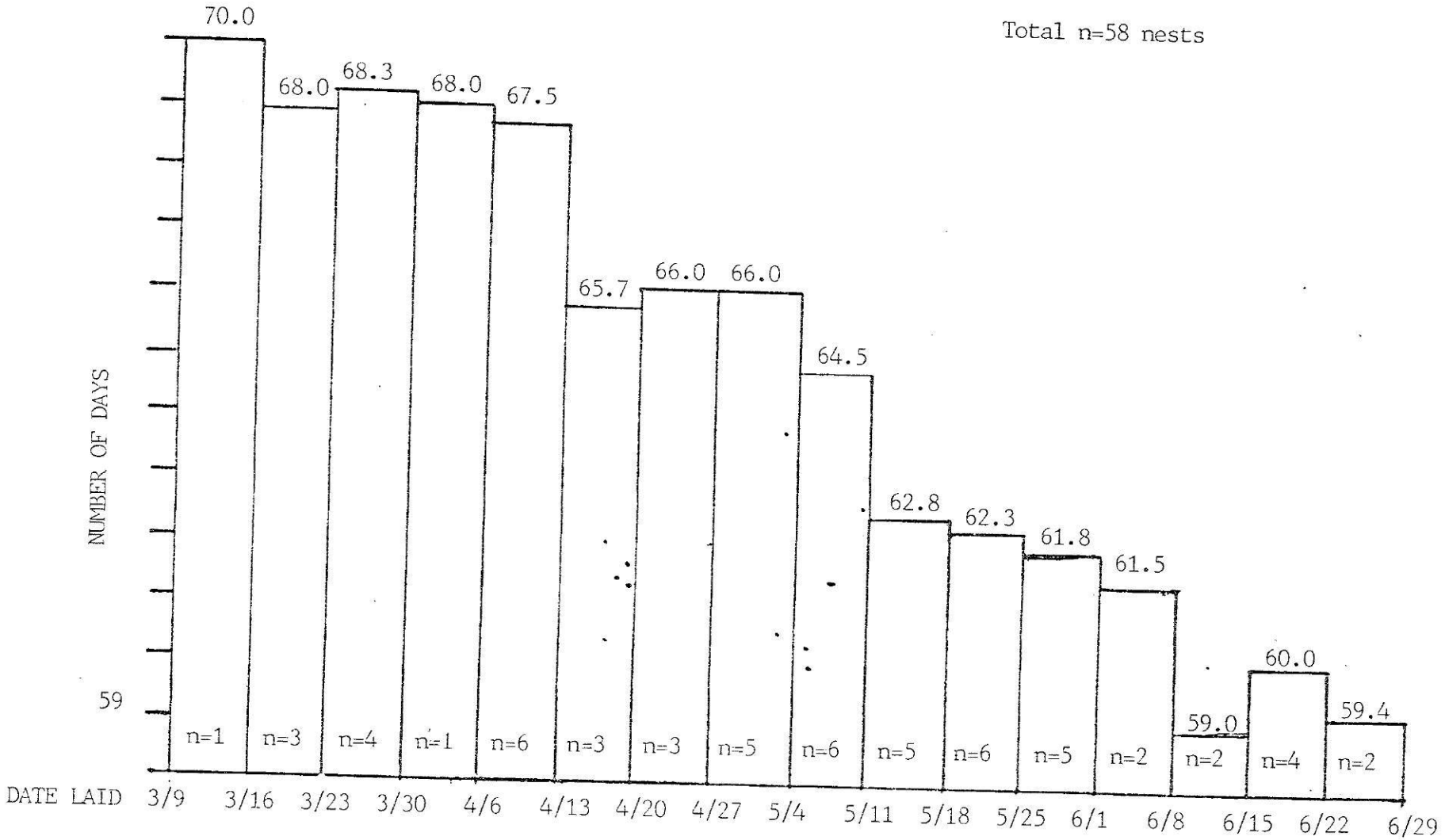


Fig. 7 Average incubation periods of Dermochelys coriacea nests on Sandy Point, St. Croix- 1986

	KNOWN RESULTS				UNKNOWN RESULTS	TOTAL
	SURVIVING TO TERM		LOST PRIOR TO TERM			
	% Success		Erosion	Poaching		
	N	X	N	N	N	N
1986						
Relocated	30	68.97%	2	0	5	37
In situ	25	64.61%	6	0	14	45
Total	55	66.79%	8 (9.8%)	0	19 (23.1%)	82
1985						
Relocated	110	53.2%	1	1	8	120
In situ	90	62.8%	16	2	14	122
Total	200	57.6%	17 (7.0%)	3 (1.2%)	22 (9.1%)	242
1984						
Relocated	82	54.8%	0	0	6	88
In situ	41	67.7%	7	1	4	53
Total	123	59.1%	7 (4.9%)	1 (0.7%)	10 (7.1%)	141
1983						
Relocated	69	50.5%	3	0	5	77
In situ	28	64.4%	6	2	0	36
Total	97	54.5%	9 (7.9%)	2 (1.8%)	5 (4.4%)	113
1982						
Relocated	23	64.4%	1	0	3	27
In situ	22	61.4%	25	0	12	59
Total	45	62.9%	26 (30.2%)	0	15 (17.4%)	86

TABLE 1 Eckert and Eckert 1985

C. Tagging and Remigration

For a full review of tagging history, see Eckert and Eckert (1985) (Table 2).

In 1986, there were three remigrants, one from 1983 with no tags which was identified by characteristic diagnostic markings, a second from 1983, with one remaining monel tag, and one from 1984, with one titanium tag. All turtles, remigrants and neophytes, were double tagged with titanium tags.

D. Mortality factors

Females

There has been no known mortality in nesting females in 1986.

Eggs

Erosion is the most significant natural threat to leatherback eggs on Sandy Point. Past history has shown that 50-60% of nests laid on Sandy Point would be lost to erosion without a relocation effort. Only 4.9-7.9% of the nests are currently lost due to this effort. In 1986, 9.8% nests were lost, most likely due to extreme erosion which took place this year.

Due to Earthwatch patrols and the randomly-scheduled presence of Enforcement officers, egg poaching has been almost nonexistent for the past few seasons. There was no evidence of poaching in 1986.

Hatchlings

No depredation of hatchlings prior to emergence was observed in 1986, as consistent with the observations of Eckert and Eckert (1985). No dog or mongoose predation was evident during the 1986 season.

SEASON	Total Turtles Encountered	Period of Absence			Tag Scarred (%)	Total Remigrants (%)
		1 year(%)	2 years(%)	3 years(%)		
1977	$(10)_1$	0	0	0	0	0
1978	population not monitored					
1979	$(6)_1$	0	0	0	0	0
1980	population not monitored					
1981	$(20)_2$	0	3 (15.0)	0	0	3 $(15.0)_3$
1982	19	0	0	0	1 (5.3)	1 $(5.3)_3$
1983	20	0	7 (35.0)	0	2 (10.0)	9 (45.0)
1984	28	0	4 (14.3)	0	0	4 (14.3)
1985	46	1 (2.2)	10 (21.7)	3 (6.5)	2 (4.3)	16 (34.8)
1986	18	0	1 (5.6)	2 (11.1)	0	3 (16.7)
		1 (2.8)	25 (69.4)	5 (13.9)	5 (13.9)	

1. Does not represent total number of turtles nesting.

2. May or may not represent total number of turtles nesting.

3. Does not represent accurate measure as a consequence of incomplete tagging in previous years; proportions in later years are more accurate but still not complete.

TABLE 2

Both yellow-crowned night herons, Nyctanassa violacea, and ghost crabs, Ocypode quadratus, continue to prey upon hatchlings making their way to the sea. Earthwatch volunteers' presence keeps this predation to a minimum, consistent with 0.5% of hatchlings reported in previous years.

Earthwatch volunteers cleared paths through high water debris prior to nest hatching to reduce possibility of entanglement. The result showed no evidence of loss of hatchlings due to entanglement in beach debris and resultant exposure to morning sun or predation.

Roots of common beach vines (Ipomea and Canavalia) continue to endanger both eggs and hatchlings by entanglement in the nest cavity. Upon excavation, some nests showed full-term hatchlings encapsulated in roots of these vines.

A single incidence of vehicular traffic on the beach left deep ruts close to the high water mark. As documented in past reports, hatchlings dropping into these tire impressions were unable to continue their path to the water and followed the ruts. Without assistance, these hatchlings would have fallen prey to predators or died of exposure in the morning.

Factors threatening the survival of nesting sea turtles, eggs, and hatchlings on Sandy Point, as well as recommended mitigating solutions are summarized in Table 3 (Eckert and Eckert, 1985).

TABLE 3 A summary of factors threatening the survival of nesting sea turtles, eggs and hatchlings on Sandy Point, St. Croix, and recommended solutions (from Eckert et al. 1984).

Problem	Solution
A. Nesting sea turtles	
1. Slaughter	- nocturnal beach surveillance* - restricted beach access - alternative: increased Enforcement presence
2. Harassment a. lightning/noise b. physical contact	- same as above - visitor supervision - camping restrictions
3. Disorientation	- observer restraint re: camera strobes, flashlights - restricted camp lighting/fires - minimal artificial lighting (visible particularly in Zones 4, 5**) in future development
B. Eggs	
1. Erosion	- nocturnal beach surveillance in tandem with nest relocation (upon deposition) - alternative: nocturnal beach surveillance during nesting peak (May) only - alternative: nest relocation out of Zone 3** only
2. Poaching	- nocturnal beach surveillance - obliteration of nesting crawl/site - alternative: increased Enforcement presence
3. Vehicle traffic a. substrate compaction b. potential acceleration of erosion c. transport of poachers	- prohibit seaward of the vegetation
4. Predators a. stray dogs	- removal
5. Beach fires a. potential thermal damage	- prohibit seaward of the vegetation

TABLE 3 Continued:

Problem	Solution
6. Horse traffic a. potential substrate compaction b. potential acceleration of erosion c. transport of poachers	- monitor closely - alternative: prohibit seaward of the vegetation
C. Hatchlings	
1. Disorientation	- nocturnal beach surveillance (1800-2300 h) - observer restraint re: camera strobes, flashlights - restrict camp lighting/ fires - restrict softball field and tennis court illumination (1900-2100 h) - minimal artificial lighting (visible particularly in Zones 4, 5) in future area development
2. Entanglement a. Ipomea vines	- vines cut as necessary from areas of nest relocation
3. Harassment a. physical contact	- minimal handling - visitor supervision
4. Predators a. night heron b. stray dogs c. mongoose d. ghost crabs	- nocturnal beach surveillance (1800-2300 h)
5. Vehicle traffic a. substrate compaction, pre-emergence	- prohibit seaward of the vegetation
6. Horse traffic a. potential substrate compaction, pre-emergence	- monitor closely - alternative: prohibit seaward of the vegetation

* unless otherwise noted, nocturnal beach surveillance implies hourly foot patrol between 1930-0500 h by research staff

** refer Figure 1 for zoning

CONCLUSIONS

Sandy Point, St. Croix, presently supports the largest and most studied population of nesting leatherback sea turtles in the U. S., as well as in the northern Caribbean (Eckert and Eckert, 1985). With the addition of 15 new animals in 1986, a total of 130-136 individuals have been identified on Sandy Point since 1977. The typical nesting season extends from early March through mid-July, with a peak in late April/early May.

An average of 80 yolked eggs are laid per clutch, with each female producing an average of 5 nests per season with an internesting interval of 9-10 nights. Remigration intervals have been documented at 2-3 years, with 1 animal showing a 1-year interval. Mean hatching success was 66.79% in 1986.

Consistent nightly patrols have reduced the historical problems of nest loss due to erosion and poaching. Natural erosion is the most significant danger, and one that we are unable to control. A strong relocation program has offset this inherent danger. At the same time, constant presence of Earthwatch volunteers and staff during nesting sequences combined with relocation procedures has drastically, if not completely, reduced the poaching threat. The slaughter of gravid females has also been eliminated due to the presence of research personnel.

This kind of protection over the past 5 years would have been impossible without the dedicated help of 356 Earthwatch member-volunteers that have contributed more than 28,100 hours diligently patrolling over 22,200 miles of beach. This kind of commitment by Earthwatch, the Cent for Field Research (Watertown, Ma.), and particularly by the U.S.V.I. Division of Fish and Wildlife, is essential in order to evaluate the reproductive biology and survival status of the Sandy Point leatherback population in years to come.

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APPENDIX I

i. original tag _____ ii. page _____

1986 St. Croix Leatherback Project

Date ___/___-___/ 86

1. Old tags _____
2. New tags _____
3. Removed (or destroyed) tags _____
4. Tagged before? YES NO (untagged turtles only)

   Tag scars? _____
5. Action _____ 6. Time _____ 7. Departure _____
8. Result: LAY FALSE CRAWL Reason: _____

   _____
9. Carapace measurements:

   length o.c. notch/tip _____cm width o.c. max _____cm
10. Weight _____kg 11. Elapsed time on beach _____min
12. Nest and crawl diagram, comments:

13. Observations on nest: _____

    _____
14. Yolked eggs laid _____ Yolked eggs reburied _____

    Yolkless eggs laid _____ Yolkless eggs reburied _____
15. Nest depth: orig. _____cm relocated: _____cm

    Overburden: orig. _____cm relocated: _____cm
16. Crawl location: orig. _____

    relocated _____

17. Yolked egg diameters:

_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

18. Relocation:

Time laid (completion): _____ Time removed: _____ Time reburied: _____

19. Site selection parameters:

Water's edge to HWM: orig. _____m relocated _____m

HWM to nest: orig. _____m relocated _____m

Nest to vegetation: orig. _____m relocated _____m

20. Turtle observations:

Behavioral: _____

_____

Ectobiota: _____

_____

Diagnostic markings: _____

_____

_____

21. Weather:

Sky _____ Wind direction _____ Seas _____

Precipitation: _____ Previous weather: _____

22. Moon phase: _____ Visible? YES NO

Moon not risen: _____ already set _____ behind clouds _____

23. Observers: _____

1986

HATCHING DATA

26. Females' original tag _____ Date laid _____

Nest type: IN SITU RELOCATED Location _____

Yolked eggs buried _____ Yolkless eggs buried _____

27. Weather at emergence:

Sky _____ Wind direction _____ Wind velocity _____

Air Temperature _____ Precipitation _____ Seas _____

Previous weather: _____

28. Nesting results: Date emerged _____ Incubation _____ days

Time(s) emerged _____ Date cleaned _____

Hatchlings released _____ Nesting success _____ %

29. Nest contents:

live hatchlings _____ embryos (midterm) _____

dead hatchlings _____ embryos (fullterm pipped) _____

hatched deformed _____ (fullterm unpipped) _____

unhatched deformed _____ hatched shells _____

rotten/undeveloped _____ yolkless recovered _____

30. Predation: eggs _____

hatchlings _____

31. Comments/causes for poor hatch: _____

32. Hatchling measurements:

height (mm) _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

notch/tip (mm) _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

width (mm) _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

weight (g) _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

33. Notes and observations:

DATA COLLECTION PROCEDURE FOR LEATHERBACK SEA TURTLE -- DERMOCHELYS CORIACEA SANDY POINT, ST. CROIX EARTHWATCH -- 1985

When the leatherback sea turtle is encountered on the beach during patrol, the following steps should be taken --

1. Extinguish all lights immediately! Sea turtles are very sensitive to light.
2. Record time and date on data form. Always use a pencil.
3. Approach turtle discreetly (from behind) without lights or talking, and determine her actions -- record this.
4. If she has not yet begun the digging sequence, take time to fill in the misc. data such as weather, location, observers, etc.
5. Once the turtle has begun digging, record the time. Approach carefully and obtain carapace measurements. Use a minimal amount of light -- being especially careful not to shine light directly into her eyes.
6. When she finishes digging, record the time. Prepare the equipment for nest depth, egg counts, egg sizes.
7. Once she has begun laying, record the time. Obtain nest and egg data. If the nest is judged to be in danger of inundation, carefully and gently remove the eggs for relocation.
8. When laying is complete, record the time. Check for tags and tag scars along the trailing edges of her front flippers, as well as on the rear flippers. Tag as needed. If she arrives carrying tags, record the numbers -- read the tags twice to doublecheck the numbers. This is of UTMOST importance. Remove any unreadable tags. Do not add tags if she arrives carrying three good tags.
9. Examine the turtle with soft lights -- list all diagnostic markings, deformities, and ectoparasites.
10. Record nest location measurements and beach profile.
11. Keep an eye on the turtle so that a covering completion time is noted.
12. When she enters the surf, record the time so that a crawl rate can be calculated.

Double check all data entries for consistency and accuracy.

DATA [illegible]T INSTRUCTIONS:

i. Original tag: To be filled in by project leader at a later date.

ii. Map/page: All data sheets must be sequentially numbered from beginning to end of the season. Data sheets for a given night are organized and numbered the following day. Crawl number on map corresponds to page number.

Date: Use a split date to define a given night. Thus, a turtle may crawl before or after midnight, but the split date stays the same. For example, April 15 at 2200 and April 16 at 0100 would both be recorded as "4/15-16" since both crawls occurred on the same night.

1. Old tags: All tags on a turtle when she emerges this visit are considered "old tag(s)". This includes tags put on the same night (during an earlier visit), on a previous night's visit, and tags from previous years. ALL tags on a turtle must be read, verified and recorded on every visit, regardless of the number of visits made by an individual turtle. Don't goof on reading tag numbers! If a turtle has already departed when the crawl is discovered, mark "999" on this line.

2. New tags: All tags placed on the turtle on this visit are recorded as new tags. Be definition, a given tag will never be recorded new except once, on the visit during which it was applied to the turtle. DOUBLE TAG OR TRIPLE TAG ALL TURTLES! Ideally, one tag should be applied to the trailing edge of each front flipper, and one tag to the soft tissue connecting a rear flipper with the tail. The single rear tag will not be as readily seen by a fisherman, for instance, sighting the animal off a distant continent, so be careful to place tags on the front flippers as a priority.

3. Removed tag(s): If a tag is removed on this visit, it should be recorded here and saved in an envelope for future reference. Any tag that is hard to read, broken, eroded or deformed, shows evidence that it may fall off, has caused discomfort to the turtle (e.g. infection, carapace abrasion), or appears to be from some distant tagging location should be removed for the record. If the tag hole is clean and not swollen, a new tag should be placed in the hole. The following day, on an index card, reference each removed tag to another tag number currently on the turtle and save the old tag in an envelope properly indentified.

4. Tagged before: In terms of population ecology, this may be the most important observation you make, so BE CAREFUL! If a turtle emerges from the ocean without a tag

(or with a tag which is broken, eroded or otherwise unreadable), inspect the animal for evidence of previous tagging. If there are no tag fragments, tag holes, characteristic swellings on the trailing edge of flipper (callouses) or other diagnostic marks which would indicate a history of previous tagging, circle "NO" at this point. If the turtle has such marks, circle "YES" at this point. Ask you Team Leader for instruction on how to identify tag scars, and have each member of the team verify your observation (conclusion) on this matter. Make the best decision you can, even if you are not absolutely sure. If impossible to determine, so indicate on the data sheet. If the turtle is carrying a readable tag, do not mark anything in this space.

5. Action: This refers to what the turtle is doing when she is discovered. The computer will calculate estimated time of emergence by comparing the action entree to the time entree. If the turtle has already departed, write "Gone" in this space.

6. Time: This refers to the exact time that the turtle is discovered on the beach, regardless of what she is doing when discovered. If she has already departed, estimate when you think she arrived on the beach, and write "ETA" after your estimate. Always use a 2400 hour clock.

   ETA: "Estimated Time of Arrival". Fill this out to the best of your ability. Use an hour interval, e.g. 1900 - 2000, 0100 - 0200, or whatever. If you can be more precise, e.g. 1900 - 1919 (having found her bodypitting at 1919), do so. Your estimate will help to verify the computer estimate -- which is based upon calculated mean (average) times required for a turtle to complete sequential stages of the nesting process.

7. Crawl: Every crawl should be assigned a number on the following day, based upon its position in the sequence of activities on the entire beach the night before.

8. Result: LAY FALSE CRAWL : Circle the appropriate entry. If the turtle should cease laying and depart without covering the nest, this is called an "Abort lay" and should be written in above the word "LAY".

   Reason: Try to give the best reason why the turtle false crawled, or did an abort lay. Discuss possible reasons with your Team Leader. Reasons can include human or predator disturbance, a high erosion bank, excessive debris on the beach, heavy rain, a continually collapsing nest cavity, water in the nest cavity, etc. If there is no "logical" reason in your mind, write "no reason".

9. Carapace measurements: If you think the carapace is broken, notched or otherwise mis-shapened so as to cause an aberrant measurement, circle "BAD" where you see "Condition of carapace"; otherwise circle "GOOD". Check posterior point of carapace for integrity and circle "BAD" if it looks broken or shortened.

"o.c." refers to over-the curve" measurement, while "s.l." refers to straight-line. o.c. measurements are taken with a tape measure; s.l. measurements are taken with calipers. An o.c. carapace length is taken with tape lying adjacent to central carapace ridge and not on top of it. Front of carapace is either its most anterior (shoulder) point ("TIP") lateral to midline, or the exact midline ("NOTCH"). Carapace width is defined as the widest point, wherever that point may be located. Generally this measure is taken immediately behind the front flippers.

NOTE: Measure a turtle every time you see her. Multiple measurments of the same turtle provide valuable information on the variance of the measurement. Do not copy measurements from one data sheet to another.

10. Weight: A tripod with block and tackle apparatus will be available for the weighing of the nesting females after the deposition of eggs. Demonstrations will be provided.

11. Nest and Crawl Diagram: This is a diagrammatic vertical relief (profile) of the beach at the point of the crawl. The diagram must be carefully structured and consistent from observer to observer to be useful for computer coding. Work carefully with your Team Leader and check your art work with other team members for accuracy.

a) - water level marked with double slash (//)
- high water mark (HWM) located with a single slash (/)
- landward extent of crawl, curved arrow (⟵)
- bodypit with NO attempt at nest cavity marked (◌)
- nest hole marked with open circle (○)
- clutch of eggs marked with circled cross (⊗)

b) - indicate beach relief, including hollows, dunes, escarpments, erosion banks, etc. Carefully indicate location of abandoned nest holes (○) and successful nests (⊗) relative to this relief.

c) - indicate vegetation and its proximity to the nest. Establish unique symbols to identify principle types of vegetation (grass, vines, shrubs, trees).

d) - add whatever additional marks you think appropriate to define nest environment. For instance, wrack lines or beach trash can be so indicated if you think its presence is noticeable or affects either the turtle or the eggs.

12. Beach ascent: There is speculation that leatherbacks choose their nest sites rather randomly. We can more fully address this question if we begin to analyze patterns of movement, distance traveled from the water, etc. To explore ambient gradients and micro-habitat preferences (if any exist), temperature (T), moisture (H_2O), and pH probes will be inserted just beneath the surface of the beach paralleling (to the outside) her ascent crawl. These readings will be taken while the animal is still on the beach and will not be taken if, for instance, a heavy rain occurs after the nest site has been chosen (by the turtle) but before you have a chance to take the readings.

13. Observations on the nest: Observations might include shape of nest, beach material, presence of moisture, standing water, roots or trash in the nest hole, ants or crabs or other predators in vicinity, unusual amounts of organics or dirt in sand, etc. If the nest is "normal" and uncontaminated, write "clean and dry" in this space.

14. Yolked eggs laid: This entry is only possible if the eggs are removed to the hatchery or if an observer has carefully counted each egg as it drops into the nest cavity. Don't guess and don't excavate nests if they are to be left in situ. Don't count yolkless eggs here; they are usually identified as being 1.5" in diameter or less.

    Yolkless eggs laid: Count the number of small, yolkless eggs and indicate the number here.

    Yolked eggs reburied: If the nest is relocated or placed in a hatchery, one or more of the eggs may break in handling. Sometimes the turtle lays "dumb-bells" that break upon deposition. Indicate the final number of eggs buried here, even if it is the same as the number of yolked eggs laid.

    Yolkless eggs reburied: Indicate the number of yolkless eggs reburied here. Sometimes you will return to the nest site and find that the turtle "dribbled" a few yolkless eggs on her way back to the sea. These are counted as yolkless eggs laid, but not as yolkless eggs reburied.

15. Nest depth: Measure the distance from surface of beach to bottom of cavity of the natural nest. If a natural nest is relocated, duplicate this depth in the relocated cavity. Depth influences temperature of incubation which influences the sex ratio of the hatchlings.

    Overburden: Measure distance from surface of beach to estimated location of top egg of the natural nest. If the nest is to be relocated, this measure will not be

23. Turtle observations: Record behavioral idiocyncrasies (e.g. motor coordination difficulties, appears ill or ematiated, unusual sensitivity to lights or noise, excessive wandering, very slow). Diagnostic markings are physical characteristics that would assist researchers in future years in the identification of an animal who has apparently lost her tags. Record such things as missing or partially missing flippers, notched or tattered flippers, obvious holes or scars (pink tissue) on the flippers, carapace deformities (large creases, dents, swellings, shortened posterior point, scratches, holes or scars), bulbous fleshy "warts" on the shoulders or flanks, head scratches or scarring, jaw deformities, etc. Ectobiota can include remora, shark-suckers, or pendunculate or encrusting barnacles. Record type, location, quantity and size of parasites.

24. Weather:

Sky: Use aeronautical terminology. CLEAR is what it says. SCATTERED is clouds covering less than 50% of the sky. BROKEN is clouds covering greater than 50% of the sky, but less than 100%. OVERCAST is 100% cloud cover. Augment as necessary with FOG, DISTANT LIGHTNING, etc.

Wind direction: Use a compass.

Wind velocity: Use a wind gauge (MPH) or Beaufort scale, but be consistent.

Air temperature: Use a thermometer.

Precipitation: This refers to immediate time of crawl. If rain occurred earlier in the evening, indicate this in "previous weather".

Seas: Develope a relative index of surf. For instance, CALM, LIGHT, MODERATE, HEAVY, VERY HEAVY.

Previous weather: Weather during the previous day and early evening. Note particularly heavy rains.

Moon phase: Full, 3/4, 1/2, 1/4, New. Visible?

* * *

PRIORITIES: If a turtle is carrying tag(s), make every effort to read it (them). NEVER send a turtle back to the surf with an unreadable tag; take it off and replace it with a new tag. If a turtle has no tag, GET ONE ON HER. Add more if time permits, up to three if she carries no old tags. All other measurements or entries on the data sheet are secondary to the above.

Double check all entries for accuracy!

possible in the original cavity as the eggs will have been removed upon deposition.

16. Yolked egg diameters: Use Vernier (or dial) calipers to measure a sample of 10 yolked eggs. Be careful not to dent the eggs or measure an excessive amount of sand on the surface of the eggs.

17. Crawl location: Every 20m around the vegetative perifery of the beach are placed numbered stakes. Triangulate from the two nearest stakes for an accurate location of the nest cavity. Always record your meaurement in meters. If the eggs are relocated, mark only the stake numbers themselves on the "original" line and then triangulate for exact egg location on the "relocated" line.

18. Observers: Indicate all people in the party, particularly the Team Leader and the person responsible for the data sheet. This is useful if a Staff member has to go back and check discrepancies with particular team members during the following days.

19. Timed laying sequence: There are six prominent "stages" that comprise a successful nesting bout. Each stage should be timed from start to finish; the same watch should be used throughout. Do not estimate times. Use 2400 hour time. Rates are recorded in "m/min" and are calculated by following her exact ascent (or descent) crawl (place a flexible tape in the tail drag) from the HWM to the nest site. Divide this distance by the time it took her to complete the approach (or departure).

20. Relocation: There are many reasons why a nest may have an unusually low success (hatchlings/eggs). These reasons include the digging up of eggs several hours following their deposition, rough handling of the eggs, and/or leaving eggs above ground for several hours (especially if they are allowed to get wet in an unexpected tropical storm) before reburial. Thus it is important that the timing of relocation be documented. Eggs should be removed upon deposition, and thus laying (completion) time and removal time are identical. They should be reburied as soon as possible, preferably within the hour.

21. Site selection parameters: Using a flexible 50 m tape, record the linear distance from the water's edge to the HWM, from the HWM to the natural nest site (even if you remove the eggs for reburial elsewhere) and from the nest to the vegetation.

22. Orientation circling: Record the number of full (360°) circles the turtle makes in her approach (ascent) or departure (descent) crawls.