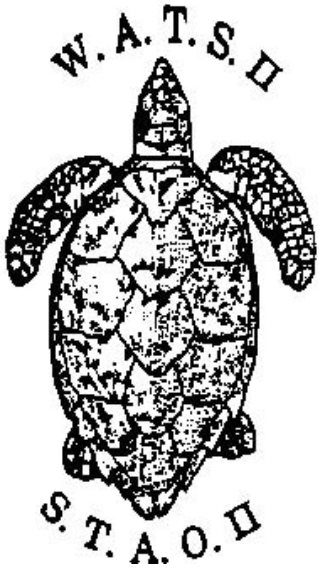
WATS II REPORT / DATA SET



Ad Hoc National Report to WATS II for Haiti

Jose A. Ottenwalder

10 October 1987

WATS2 044

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:

Ottenwalder, J.A. 1987. Ad Hoc National Report to WATS II for Haiti. Prepared for the Second Western Atlantic Turtle Symposium (WATS II), 12-16 October 1987, Mayagüez, Puerto Rico. Doc. 044. 29 pages.

Karen L. Eckert
WIDECAST Executive Director
June 2009

SECOND WESTERN ATLANTIC TURTLE SYMPOSIUM

WATS II

Mayagüez, Puerto Rico 11 - 16 October 1987

NATIONAL REPORT FOR THE COUNTRY OF

HAITI

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September 1987

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THE STATUS OF SEA TURTLES IN HAITI

1. INTRODUCTION

Very little is known about the status of sea turtles in Haiti. According to Carr et al. (1982), information on marine turtles from the area is among the poorest for the whole western Atlantic. We discuss here previous available data, as well as the results of recent aerial (Ottenwalder, 1983) and ground truth surveys (Kavanaght, 1984) conducted in Haiti on behalf of the Western Atlantic Turtle Symposium (WATS).

2. METHODS

Aerial surveys for sea turtle nesting activity and habitat were conducted in the mornings (between 6:00- 9:00 AM) of November 14, 1982 and 5-7 May 1983. Additional sea turtle observations were obtained during aerial surveys conducted on 10-13th May 1982 to investigate the status of the West Indian manatee *Trichechus manatus* in Haiti (Rathbun et al., 1985). All flights were flown in a clockwise direction following the contour of the shoreline, including bays, river mouths, inlets, and offshore island. At least two observers were present on all flights. Single engine, four set aircraft with the wing above the cockpit were used on all flights. Numbers and location of sea turtles, nesting crawls on beaches, and observations of the human use of coastal habitats were recorded on 1:250,000 scale topographical charts. Sea turtle surveys were flown at a speed of 130-170 km/hr., an altitude of 50 -1,125 m, and a distance of 20-50 m offshore. During West Indian manatee surveys, the aircraft was flown at a speed of 120-200 km/hr., an altitude of 150-300 m, and distance of 500 m offshore. Survey duration and coverage was as follows:

- 10-13 May 1982 (12.5 hr), entire coast
- 14 November 1982 (3 hr) southwestern Tiburon Peninsula, from Côte de Fer to Jeremie
- 5-7 May 1983 (13.5 hr) entire coastline, with the exception of the Northeastern coastal section between Cap-Haitien and the mouth pf the Massacre River (Fig. 1)

To facilitate data recording and analysis, the coastline was arbitrarily subdivided into sections, using the major towns and relevant shoreline contours as landmarks (Fig. 2). The selected reference locations and unit numbers used were:

1. Anse à Pitres
2. Belle-Anse
3. Marigot
4. Jacmel
5. Bainet
6. Aquin
7. Île à Vache
8. Les Caves
9. Roche a Bateuu
10. Chardonnieres
11. Les Irois
12. Dame Marie
13. Jérémie
14. Roseaux
15. Petit Trou de Nippes
16. Miragoane
17. Petit Goâve
18. Port-au-Prince
19. Archaie
20. Île de la Gâve
21. Montrouis
22. St. Marc
23. Grand Salina
24. Gonaïves
25. Anse Rouge
26. Mole St. Nicolas
27. Baie du Port à l'Écu
28. Ile de la Tortue
29. Anse à Foleur
30. Cap-Haitien
31. Caracol
32. Manzanilla

Data on nesting season, distribution, relative abundance and exploitation of sea turtles in Haiti were recorded at every opportunity during our visits in Haiti.

3. PAST AND PRESENT STATUS

3.1 Historical

According to the earlier chroniclers, sea turtles once abounded in the costs of Haiti. During Columbus's first historic voyage, he named the Ile de la Tortue to commemorate the taking of a giant turtle there (Parsons, 1962). A.O. Oexmelin (often anglicized as John Esquemeling) included detailed accounts on sea turtles from Hispaniola and some of the offshore islands in his memoirs about the activities of the buccaneers in the area during the second half of the seventeenth century. His descriptions included aspects of the anatomy, harvest methods and exploitation of turtles by the European settlers, particularly the French and Spaniards. The eggs of sea turtles were harvested on beaches and turtles were taken there and at sea. Except for Ile de la Tortue and Île Grande Cayemite there is little historical information about specific nesting localities along the Haitian coast.

Oexmelin (1967) gave an excellent description of the different turtles found in Hispaniola, including remarks about their eggs and the names given by both French and Spaniard to them. From his accounts, it is probably safe to state that hawksbill, green, loggerhead, and leatherback turtles nested in Haiti in the past, with green and hawksbills being inferred as the two most common species.

3.2 Present status

The information obtained during our surveys, including interviews and examination of carapaces, indicate that *Chelonia* and *Eretmochelys* are the most frequent species of marine turtles in Haitian waters today. We have examined only several medium to large *Caretta* carapaces. Apparently, *Dermochelys* is poorly known and we were unsuccessful in obtaining relevant information about this species in Haiti. Except for single *Lepidochelys* carapace for sale in the local market, further information about the status of Ridleys is lacking. Green and hawksbill are the most consistently reported species and some information is also available for nesting loggerheads. Estimation of the amount of turtles harvested, and size of the nesting population is prevented by the lack of adequate data. This quantification is further complicated by the fact that locally all turtle species are generally referred to as "caret' and "tortue".

Available data suggest that all four species of sea turtles found in Haitian waters still nest in the country. Nesting activity by green and hawksbill turtles is possibly low to moderate, whereas nesting by loggerhead and leatherback turtles might occur only sporadically. During the aerial survey of 5-7 May 1983 throughout the entire coast of Haiti, Ottenwalder (1983) recorded 10 nesting crawls (Table 1). All observed tracks but one were recorded on beaches of the Tiburon Peninsula, Department du Sud (Figure 3). Interestingly 50 % of the turtles observed at the water surface during all three aerial surveys were recorded in the same coastal area (Table 2, Fig. 5). No nesting crawls were found during our aerial surveys of May and November 1982. So far, there is no evidence to support the idea that concentrated nesting might still occur at any Haitian locality, but rather, nesting activity is characterized by low densities and scattered patterns.

Available information on population and nesting trends per species is given below:

Eretmochelys imbricata

- Local name: Caret

- Nesting sites: The following nesting beaches were identified during the aerial surveys (Ottenwalder, 1983); (See Fig. 3, Table 1):

- between Laborieux and Poine des Trois Lataniers
- Île à Vache at Pointe de L'Est
- near Anse d'Azur
- Nesting sites have also been reported (Kavanaght, 1984) at unspecified beaches within the following costal sections (See Fig. 4):
- Anse à Pitres to Belle Anse
- Maveile to Côte de Fer
- Les Cayes to St. Jean
- Pointe à Gravois to Port Salut
- Anse à Chou Chou (Fig. 4).

- Trend in nesting numbers: The accounts by Oexmelin (1967) suggest that hawksbill turtles were probably the second most abundant species in the coastal waters of Haiti. Today numbers have declined drastically and nesting is apparently uncommon throughout most of coastal Haiti.

- Nesting seasons: May to August (Kavanaght, 1984) with the peak time in June-July and perhaps extending up to November (Ottenwalder, 1983).

Chelonia mydas

- Local name: Tortue

- Nesting sites: Ottenwalder (1983) identified nesting crawls during their aerial surveys of the following beaches; (See Fig. 3, Table 1):
  - between Laborieux and Poitn der Trois Lantaniers
  - Île à Vache at Pointe Diamani
  - most of Jeremie and Freycinau
  - west of St. Marc

- Based on ground-truth surveys Kavanaght (1984) reported nesting at unspecified beaches within the following coastal sections:
  - Anse à Pitres to Belle Anse
  - Cayes-Jacmel to Raymond
  - Mayette to Côtes de Fer
  - Côtes de Fer to Moillage
  - Baie de Caracol
  - Petit Anse
  - Anse à Chou Chou
  - Fond Larange

- Nesting numbers: Unknown, but presumably low, based on data gathered during interviews (Ottenwalder, 1983). Bullis (1984) estimated moderate levels of nesting activity.

- Trends in nesting numbers: The accounts by Oexmelin (1967) suggest that green turtles were probably the most abundant species in the coastal waters of Haiti. Today, nesting populations appear to be seriously depleted throughout their former range, and are probably still declining.

- Nesting seasons: May, July, and August (Kavanaght, 1984). It may extend from May to October (Ottenwalder, 1983).

Caretta caretta

- Local name: Cohanne / caret

- Nesting sites: According to Kavanaght (1984) nesting sites were reported from the following coastal areas:
  - Cayes-Jacmel to Raymond
  - Côtes de Fer to Mouillage
  - Les Cayes to St. Jean
  - Anse du Diable
  - Pointe a Gravois to Port Salut
  - Petite Anse
  - Fond Larange
  - Nesting numbers: Unknown, but presumably low, according to data gathered during interviews (Ottenwalder, 1983)
  - Trends in nesting numbers: According to Oexmelin (1967), sea turtles once abounded in the waters around Haiti. Today nesting populations seem to be depleted and presumably locally extirpated from some coastal areas
  - Nesting season: Kavanaght (1984) reported Nesting from May to September.

Dermochelys coriacea

- Nesting sites: A nesting crawl was identified by Ottenwalder (1983) near Tiburon on the southwestern corner of the Tiburon Peninsula during the aerial survey of May 1983

- Nesting numbers: Unknown, but apparently very low based on the data gathered during interviews (Ottenwalder, 1983)

- Trends in nesting numbers: Sea turtles were once abundant in the waters around Haiti Today, population seems seriously depleted

- Nesting season: The only nesting observed was recorded in May (Ottenwalder, 1983), but nestling season probably extends from late march to May as reported from the Dominican Republic (Ottenwalder, 1981).

Lepidochelys olivacea

- A single carapace of Olive Ridley was found in a market gift shop in Port-au-Prince (J. Thorbjanarson, pers. Comm..; JAO, pers. obser.). We were unable to determine the coastal locality from where the animal was obtained. Ridleys in Haitian waters are probably migrating individuals.

3.3 Nesting habitat assessment (the extent of beaches, and problems related with nesting access and success)

Haiti, located on the western portion of the island of Hispaniola, has a highly variable relief in its coastline (about 1,533 km) which is in part determined by the mountainous topography of the country. As a result, steep cliffs rise abruptly, exposing a rocky coastal structure frequently seen throughout the Caribbean, Golfe de la Gonave, and Atlantic coasts of the country. Extensive mangrove communities, coastal lagoons and sandy stretches interrupt this main coastal structure. The total shelf area (about 5,000 km^2) is very narrow, with the water depth frequently reaching 100 fathoms not too far of the coastal cliffs.

South Coast

From Anse-à-Pitres to Côte de Fer, the shoreline is predominantly rocky with intermittent pocket beaches. Gravel beaches are the most common, but small sandy beaches can be found dispersed throughout. Only isolated patches of reefs and grass flats were observed. From Côtes de Fer to Pointe L'Abacou, extensive stretches of suitable sandy beaches for nesting are found, adjacent to excellent feeding and growing habitats. Relatively large mangrove communities and tidal swamps exist on the mainland shore. Extensive grass flats are common on the bottom of the tidal creeks and shallow waters between Pointe Morne Rouge and Pointe L'Abacou. Patch reefs are frequent and the one around Île à Vache, particularly the formation in the channel, may be the richest in the south coast. The topography from Pointe L'Abacou through Chardonniers is again mostly rocky. Other than a few gravel beaches, there is also a fairly good stretch of sandy beaches between Port Salut and Côteaux. Unfortunately, these are invariably associated with relatively large towns, tourist development or small coastal villages. Approximately 12 km of gray to fine brown sand extend between La Cahoune and Tiburon. Although the sand seems compact and narrow in some stretches, a large percentage of it has a fairly high profile, is backed by dunes and dry forest, and is open to strong surf. The area is remote and human presence is relatively low.

At the tip of the Peninsula, between Tiburon and Jeremy, pocket sandy beaches are frequent within the dominant rocky coast, and an extensive offshore shelf (20 fathoms) extends to the west for several kilometers. The area though, seems to be the scenario of an active fishery as suggested by the number of villages observed and the great concentration of boats (90% dugout canoes). Grass flats and reef patches might be extensive, although a pelagic survey of this area was not possible.

East of Jeremie, there are some fairly good stretches of several kilometers of grey sand suitable for nesting. Unfortunately, these high-energy beaches are also fairly occupied by houses.

Golfe de Gonâve

After Pointe de la Patte, large extensive foraging and developmental habitat are found along the coast until Petit Trou de Nippes. Here, abundant patches of shallow reefs, and vast communities of grass beds and mangrove, extend through the channel of Grande Cayemite Island and inside Baie des Baraderes, where long tidal creeks are also found. From Petit Trou de Nippes east to Port-au-Prince, there is a marked alteration in the topography of the coast, between steep low cliffs with the more common gravel beach, some sandy beaches, and mangrove communities in a few places. Reef patches and grass beds were impressive in the Baie de Miragoane. Here we examined the polished backs of three large greens and one loggerhead caught offshore Miragoane a few years before 1982. From Miragoane to Port–au-Prince, human population density increases steadily, particularly after Baie de Petit Goave. Most beaches here were associated with tourist development, beach houses, fishing villages, and some major towns.

Île de la Gonâve

The southwestern shore of Île de la Gonâve showed a low profile coast with some long stretches of sandy beaches that might receive some nesting. These low energy beaches are backed by mangrove swamps, small lagoons, or even some dry forests, and invariably occupied by small villages or dispersed houses. The north-western end is rocky, and the northern coast is predominantly mangrove swamps, with the sandy stretches used for human habitation. Gonaïves, which is quite populated, is surrounded by a shallow fringing reefs, and fairly vast grass flats.

Between Port–au-Prince and St. Marc

Tourist resorts and private beach houses occupy most suitable nesting habitats. Other forms of human impact on this heavily exploited coastline section includes extensive plantations, factories, free roaming livestock, rock walls and numerous private docks. Vessel and boat traffic is quite heavy on this coast. Mangrove and rocky cliffs are also observed in relevant proportions.

St. Marc to Gonaïves

Extensive mangrove habitat is predominant, with numerous tidal flats and long tidal creeks. A fringing reef extends along the shore from St. Marc to Grande Saline. Some long but narrow sandy stretches run backed by mangroves on this shore.

Between Gonaïves and Mole St. Nicolas

The coastline is mainly rocky with steep low to high cliffs, with a few dispersed pocket beaches. From Mole St. Nicolas to Fort de Paix some good stretches of sandy beaches, particularly pocket beaches are found alternated with the dominant rocky coast.

Ile de la Tortue

Suitable nesting beaches are only found in the south shore, facing the mainland. An excellent beach of white sand and wide steep profile is found in the western tip near Gros Raisinier. A great part of this south shore consists of sandy beaches; however it is fairly populated, and movement from one end to the other of the island is mostly done on the beach. A fringing reef extends all along the south shore.

Between Port de Paix and Cap-Hatien

Beaches consist mostly of sandy riverbanks, with the exception of several pocket beaches between La Borgne and Baie Lacul. Reef patches arise from the bottom outside of the bay and a small but suitable isolated sandy beach surrounds Rat Is., a tiny cay offshore Lacul bay. From Cap-Haitien, the remaining coast is characterized by extensive mangrove areas in the Bays of Cap-Haitien and Caracol, as well as some sandy stretches some of which are suitable or nesting, while others are too narrow. An almost continuous fringing reef extends from Cap-Hatien Bay to the mouth of the Massacre River on the border with the Dominican Republic. The bottom is extensively vegetated in this area.

The magnitude of human impact on sea turtle populations and habitat in Haiti is great. High human population densities doubtless represent the major problem. People are practically everywhere, even in the most isolated coastal areas where human presence might not be usually expected because of their remoteness from towns, and lack of transportation, supplies and other services infrastructures. Diversity and amount of food are seemingly scarce, and any source of protein is in high demand. Therefore, isolated villages on the coast are expected to depend to an important extent on marine resources. The frequency of human settlements (from single huts to small villages, on beaches is very high and an almost invariable association. Under these circumstances, it seems likely that the chances for a nesting female, or their nests to be overlooked, are very low.

Tourism has been an important income to the weak local economy. Resorts, beach houses and recreational developments have already eaten away many kilometers of excellent nesting habitat (Fig. 6). Other forms of human use are equally important. Sand removal for construction is a common practice. Haitians frequently develop on beaches the only activities they know to survive: agriculture and domestic livestock (Fig. 6) because of the scarcity of lowlands and fertile valleys inland.

3.4 Exploitation

3.4.1 Local

Sea turtle meat and eggs are highly appreciated by the Haitians. When available, turtle meat and eggs can be obtained at seafood shops in Port-au-Prince. The data obtained during interviews indicates that most of the captures consist of juvenile turtles caught in the water by divers. Official statistics on the amount of turtles and turtle products harvested for human consumption and other uses do not exist. Small to large carapaces of hawksbills and green turtle are readily available in markets and tourist shops (Table 3). Reportedly, a good proportion of the large carapaces have been on display and for sale in these establishments for a number of years. One should be cautious if an attempt is made to use this type of data as the only population sample available to make suggestions about the age structure and size classes being harvested. Very often, many of the small to medium carapaces in stock are stored in crates and only a portion of them is displayed in the store. We have found this to be a frequent case in our surveys in the Dominican Republic (Ottenwalder, 1987). Rather, most carapaces form turtles caught in recent years belong to the small and medium size classes. Small to medium sizes are sold also most frequently because of their lower prices, greater availability and convenience for air transportation.

In November 1982, JAO recorded the following turtle products in the deposit of a major local dealer in Port-au-Prince: one crate containing 20 hawksbills unpolished carapaces ranging from dinner plate to medium size (at US $25-40 each), and 13 large bags of tortoiseshell with an approximate weight of 600 kg (at US $180/kg). Reportedly, all turtles and tortoiseshell came from the southern Tiburon Peninsula. A wooden crate (approximately 3 x 2 x 2 feet) full of medium sized hawksbill carapaces was found in the Iron Market (Port-au-Prince) during a survey of sea turtle products conducted in November 1983 (T. Tucker and E. Roet, pers. comm.).

No information about the hunting intensity is available from Haiti. However, if we consider that between 1959 and 1986 Japan imported at least 32, 567 kg of tortoiseshell from Haiti, it might be possible that about 20, 876 hawksbill turtles could have been taken during that period in Haitian waters for trade with Japan alone. Kavanaght (1984) reported the localities of Côtes de Fer, Raymond les Bains, Port Slut, and Conidon as landing sites for turtles and turtle product availability. Hunting methods include the use of ordinary trammel nets, “folles” or turtle nets, harpoons and spear guns.

3.4.2 International trade

The Caribbean island accounted of about 25 percent of all tortoiseshell imported by Japan in the 1970s (Mack, 1983) and this amount rose to almost 40 percent in 1980 and 1981 (Meylan and Mack, 1983). Together with Cuba and the Cayman Islands, Haiti is among the main exporters in the region (Barber, 1980). Haiti has maintained an average supply of 1.3 tons/year and their exports represent around 10% of all the bekko and other tortoiseshell imported by Japan from the West Indies (Table 4). From 1970 to 1986, Haiti has supplied Japan with 24,793 kg of bekko, accounting for almost 4% of Japan’s total bekko imports. From 1976 to 1986 as CITES controls gradually reduced trade from other traditional sources of bekko in the region, imports from Haiti, a non-party country increased by 12% (Milliken and Tokunaga, 1987).

CITES annual reports between 1977 and 1985 also show exports of sea turtle products from Haiti to France (65 kg) and the United States (19 shells), and import to Haiti from the United States (100 carvings). The imports to Haiti of 8,405 kg of shell from the Cayman Islands, later re-exported (from Haiti) to F.R. Germany is a reflection of the unquantified inter-island trade of tortoise shell reported for the Caribbean (Meylan, 1984).

Carr et al. (1982) considered unlikely that anything but the vestigial stocks of sea turtles would be found in the country today. Additionally, Japan imported large quantities of tortoiseshell from here and this quantity has increased steadily since 1981, reaching the highest volume of 2, 767 kg in 1986. These facts suggests that Haiti either provides a route through which Caribbean turtle products are exported to the rest of the world or that Haiti has increased exploitation of her own hawksbill resources (Groombridge and Luxmore, 1987; Milliken and Tokunaga, 1987).

Only two local dealers are importing most tortoiseshell to Japan: CHABACO, Rue Magasin de 1Elat 128, P.O. Box 1763, Port-au-Prince; and Desgrottes ETIENNE, P. O. Box 1072, Port-au-Prince.

3.5 Fisheries infrastructure

3.5.1 Socioeconomic aspects

Between 11,000 (C.N.B.S., 1985) and 15,000 (Weil et al., 1973) individuals, largely working independently, are estimated to be engaged in fishing. Only about one-third of these are full-time fishermen. Most fishermen remain close to shore, with few venturing into deeper waters. Fishing practices are archaic. Fishermen are essentially found at an economically subsistence level for various reasons with the principal ones being: limited productivity of the waters, low efficiency of traditional fishing techniques, lack of equipment, and weakness of the inland market.

Part-time fishermen (nearly two-thirds) are actually agriculturalists from the coastal zone. Both professional and part-time fishermen are very poor, and the purchase of a simple tool or equipment is a major challenge. They frequently group themselves to rent a boat by giving up a portion of the fish they harvest. A great number of the full-time fishermen are grouped together in teams by fishing patrons. These groups displace themselves like nomads, along the coastline fishing offshore the different beaches.

3.5.2 Fishing fleet and equipment

The nearly constant easterly trade winds greatly affect fishing activities since there are very few motorized boats. As a result, the frequency rate the fishermen are actually fishing is fairly low (150- 200 days/year).

The traditional boats of the Haitian coast have sails, oars or both. The canoes with oars are units of 2, 5, or 10 meters. About 80 percent are between 3.5 to 5 m. There are three other types of boats, the bois fouille, the pris-pris and the corallaire. The bois fouille is a dugout trunk of a tree. The pris-pris are made from assembled bamboo and are maneuvered with a till or sail; they are very common on the north coast, measuring 2.5 to 3 meters. The corallaire is a little boat with the shape of a canoe having a flat bottom and a very square back end and measures 2.5 to 3 meters; it is used to work the coastal reefs. The fishing patrons own motorized boats. There are not too many of them and the usually only have 6 to 25 horsepower motors attached.

Current figures of the total number of fishing boats in Haiti were not available. A 1956 estimate indicated about 1,744 boats as follow: 1,454 canoes, 50 bois fouille, 1,200 pris-pris, and 40 corallaires. Estimates that are more recent are 3,000 boats, of which 2,000 are canoes and 1,000 are other types (C.N.R.S. 1985).

3.6 Important sea turtle foraging areas

Important sea turtle foraging and developmental habitat for sea turtles in Haiti were identified during aerial surveys and describes in section 3.3 of this report. Relevant foraging areas for sea turtles along the Haitian coast are: Anse à Pitres to Côtes de Fer (only isolated patches of reefs and grass flats); Côtes de Fer to Pointe L'Abacou (excellent feeding and development habitat); Pointe Morne Rouge to Pointe L'Abacou, including Baie des Cayes (extensive grass flats, reef communities and shallow waters); Tiburon to Jeremie (excellent); Pointe de la Patte Large to Petit Trou de Nippes (abundant patches of shallow reefs and vast communities of grass beds through the channel of Grande Cayemite Island and inside Baie des Baraderes); Baie de Miragoana (less impressive, but some scattered patches of suitable habitat); Ile de la Gonave (surrounded by shallow fringing reefs and fairly vast grass flats); St. Marc to Gonaïves, Canal de la Tortue, and from here to the mouth of the Massacre River, particularly between Cap-Haitien and Baie de Mancenille on the border with the Dominican Republic (see Figure 7 for the location of these areas).

3.7 Review of sea turtle surveys & research projects in Haiti: past, present and planned

3.7.1 Previous surveys and research

Haiti was not formally covered during the field surveys conducted from May 1978 to August 1981 to assess populations and identify critical habitats of sea turtle in the whole Western Atlantic (Carr et al., 1982). At that time, Anne and Peter Meylan gathered the only information available to the Windward Islands when in transit and by Diderot Gicca, incidental to other work (Carr et al., 1982).

J.A. Ottenwalder, G.B. Rathbun and C.A. Woods while conducting surveys for the West Indian manatee in Haiti (Rathbun et al., 1985) made observations on sea turtle distribution and habitat on 10-13 May 1982. Aerial surveys to assess nesting activity, critical habitat and exploitation of sea turtles in Haiti were conducted by J.A. Ottenwalder and C.A. Woods on 14 November 1982 and 5-7th May 1983 (Otenwalder, 1983), under contracts with the National Marine Fisheries Service and the Caribbean Corporation on behalf of the Western Atlantic Turtle Symposium (WATS).

Ground truth surveys throughout the Tiburon Peninsula were conducted during the first half of 1983 by the staff of the Services des Peches of the Department of Agriculture (DARNDP) with the support and assistance of WATS (Kavanaght, 1984).

3.7.2 Present and planned research

None in progress or in perspective. Comprehensive ground-truth surveys are needed.

3.9 Managing/ conservation agency

The government agency responsible for the conservation and management of sea turtles is the:

Service des Peches
Direction des Ressources Naturelles
Ministere de L'Agriculture, des Ressources Naturelles et du Developpement Rural
DARNDR, DAMIEN
Port-au-Prince
Haiti

3.10 Legislation

Current regulations concerning sea turtles in Haiti are quoted (below) from the Fisheries Law of October 27, 1978. The government agency responsible for the enforcement of these regulations is the Service des Peches, of the Ministry of Agriculture. Reportedly (R. Kavanaght, pers. comm.). There are 17 fisheries inspectors assigned throughout the Haitian coasts for this task (Aquin 1; Les Cayes 1; Tiburon to Jeremy 3; Miragoane 1; Arcahaei 1; St. Marc 1; and Gonaïves to Port de Paix 9). As far as we know, the regulations are virtually ignored.

Article 97: It is formally prohibited:

a) to fish "the tortue", "the caret" during the months of May to October (laying season);

b) to collect the eggs of turtles of all species in the territorial waters, specially those of "caret" and of "tortue"

c) to capture the "sea turtles", "the carets" on the beach;

Article 122: It is prohibited:

2) the exportation of "caret" and "turtle" meat, and their shells without an authorization from the Service of Fisheries.

3.11 Comments concerning the status of sea turtles in Haiti

Compared with the eastern half of Hispaniola (occupied by the Dominican Republic) Haiti is characterized by a much more mountainous topography. This is reflected in the frequent steep cliff type of the coast, and consequently, extensive kilometers of abrupt slope of the shelf. Long stretches of high-energy sandy beaches are not as frequent in Haiti as in the Dominican Republic. Today, the most potential nesting habitat available is represented by the numerous pocket beaches found along the Haitian coasts. As a result, current nesting activity is more likely characterized by a dispersed pattern. This factor makes it more difficult to obtain reasonable population estimates and to evaluate the status of sea turtle populations.

As reported for the Dominican Republic (Ottenwalder 1981, 1987) it should be expected that the nesting season for all sea turtles might extend from late March to November, with peak seasons varying with species. May to August are reported by local fishermen as the most important nesting months (Ottenwalder, 1983) with peaks in June and July. We feel that very little nesting activity took place during the time of our surveys (early May). More data that is comprehensive is needed on the seasonality of nesting before we can make predictions about the size of the nesting populations based on the number of nests and extent of the nesting season. It might also be possible that the number of tracks recorded during our aerial surveys of May 1983 might reflect the current trends in nesting activity per season during the past few years, but it might be premature to make that assumption based on a single survey.

Considering the information available at this time about the status of the sea turtles in Haiti, it is concluded that 1) nesting populations and nesting sites have been seriously reduced since historical times, 2) the situation of the remaining nesting

population is critical, and 3) that the perspectives for sea turtle conservation in Haiti are not encouraging.

The following recommendations for further sea turtle research and management programs are made:

A) Research:

1) Ground-truth surveys through the country, particularly on selected coastal areas were nesting sites have been recorded, to compile data on nesting numbers and season.

2) Aerial surveys to be conducted regularly along the southeastern region of the Tiburon Peninsula, particularly between Côtes de Fer and Point Morne Rouge, to record data on nesting activity.

B) Management

A total ban on all forms of exploitation of sea turtles in Haiti is badly needed. Since this proposal is probably unrealistic considering the socio-economic problems faced by the Haitian people today, an alternative would be to ban all forms of commercialization of sea turtle products. Only subsistence hunting should be allowed, and only during the non-nesting season. The current regulations must be reviewed and updated. The survival of any vestigial nesting population in Haiti will depend on the enforcement of such regulations. Steps to promote the accession of Haiti to CITES should be taken in the very near future.

LITERATURE CITED

Barber, J. 1980. Survey of Caribbean wildlife products. Traffic-International Bulletin 2(2):13-14.

Bullis, H.R. 1984. Proceedings of the Western Atlantic Turtle Symposium, July 1983. Costa Rica. RSMAS Printing, Miami.

Carr, A., A. Meylan, J. Mortimer, K. Bjorndal and T. Carr. 1982. Survey of sea turtle populations and habitats in the Western Atlantic. NOAA Technical Memorandum NMFS-SEFC-19, 47 pp.

Centre d'Etudes de Geographie Tropicale (CEGET-CNRS). 1985. Atlas d'Haiti. Universite de Bordeaux 3. 146 pp.

Groombridge, B. and R. Luxmore. 1987. The Green turtle and Hawksbill (Reptilia: Chelonidae): World status, exploitation and trade. A draft report to the CITES Secretariat. IUCN Conservation Monitoring Centre.

Kavanaght, R. 1984. National Report for Haiti. Proceedings of the Western Atlantic Turtle Symposium (WATS), July 1983. Costa Rica. RSMAS Printing, Miami.

Luxmore, R. and J. Canin. 1985. International trade in raw sea turtle shell. IUCN/WTMU, Traffic Bulletin 7(2):30-39.

Mack, D., N. Duplaix and S. Wells. 1979. The sea turtle: an animal of divisible parts. International trade in sea turtle products. TRAFFIC (USA) Special Report I. Washington D.C. 86 pp.

Meylan, A. and D. Mack. 1983. Sea turtles of the West Indies: A vanishing resource. Trinidad Naturalist Magazine 4(9):5-6.

Meylan, A. 1984. A study of the Caribbean Hawksbill Turtle. WWF Monthly Report (October): 269-275.

Milliken, T. and H. Tokunaga. 1987. The Japanese sea turtle trade 1970-1986. TRAFFIC (JAPAN) Special Report. Washington D.C. 171 pp.

Dexmelin, A.O. 1967. Histoire des aventuriers flibustiers et boucaniers, Tome III. Librairie Commerciale & Artistique. Paris. 269 pp.

Ottenwalder, J.A. 1981. Estudio preliminar sobre el status distribucion y biologia reproductiva de las tortugas marinas en la Republica Dominicana. Tesis Licenciado, Univ. Aut. Santo Domingo. Santo Domingo, Republica Dominicana. 112 pp.

Ottenwalder, J.A. 1983. Status of sea turtles nesting in Haiti: preliminary results of the 1982-1983 aerial surveys. Unpublished report prepared for the Western Atlantic Turtle Symposium (WATS), and the National Marine Fisheries Service (NMFS/NOAA). 14 pp.

Parsons, J.J. 1962. The green turtle and man. Univ. of Fla. Press. Gainsville.

Rathbun G.B., C.A. Woods, and J.A. Ottenwalder. 1985. The manatee in Haiti. Oryx, Vol XIX: 234-236.

Weil, T.E., J.K. Black, H.I. Blutstein, K.T. Johnston, D.S. McMorris, F.P. Munson. 1973. Area handbook for Haiti. U.S. Government Printing Office. Washington D.C. 189 pp.

TABLE 1. SEA TURTLE NESTING CRAWLS RECORDED DURING THE AERIAL SURVEY OF MAY 1983 (See Fig. 3 for location of nesting sites)

Obs. No	Coastal Sec. No.	No. of Nests Fresh	No. of Nests Old	Turtle Species	Beach	Beach Description
1	5	1	0	Eret	Between Laborieux & P.des Lataniers	Sandy tan, some stretches backed by dunes, with open surf or fringed by reef
2	5	0	3	Che	Between Laborieux P.des Lataniers	Sandy tan, some stretches backed by dunes, with open surf or fringed by reef
3	7	0	1	Eret	Île à Vache, at Point de L'Est	Fringed by reef, backed by mangrove and lagoon
4	7	1	0	Che	Île à Vache, at Point Diamant	Open surf, backed by mangrove and lagoon
5	10	1	0	Der	Near Tiburon	High energy, gray sand backed by dunes and scrubby vegetation
6	12	0	1	Eret	Near Anse d'Azur	Pocket beach, white
7	13	0	1	?	East of Jeremie	Gray sand, extensive beach
8	21	0	1	Che	Near Freycinau, west of St. Marc	Pocket beach, white

TABLE 2. OBSERVATIONS OF SEA TURTLES IN THE WATER SURFACE DURING AERIAL SURVEYS IN HAITI (See Fig. 5 for locations)

Obs. No	Survey Sec. No.	Survey Date	Turtle Species	Turtle Size Class	Habitat Type	Location
1	7	07-05-1983	Eret	Juv	Patch reef	N. of Île à Vache
2	7	07-05-1983	Che	Juv	Grass flat	E. of Île à Vache
3	12	07-05-1983	Che	Juv	Grass flat	Baie de Dame Marie
4	14	07-05-1983	Che	Juv	Shallow reef	Baie de Grande Cayemite
5	9	14-11-1982	Che	Adult	Grass flat	Near Port-a-Piment beach
6	9	14-11-1982	Che	Adult	Deep water reef	0.7 km S Chardonnieres
7	10	14-11-1982	Che	Adult	Grass flat	Between Chardonnieres and Les Anglais
8	10	14-11-1982	Eret	Juv	Patch reef	1 Km SW Anse du Milieu
9	11	14-11-1982	Che	Adult	Grass flat	0.4 km W from coast of Baie des Irois
10	30	12-05-1982	?	Juv	Patch reef	0.5 km N Bord de Mer

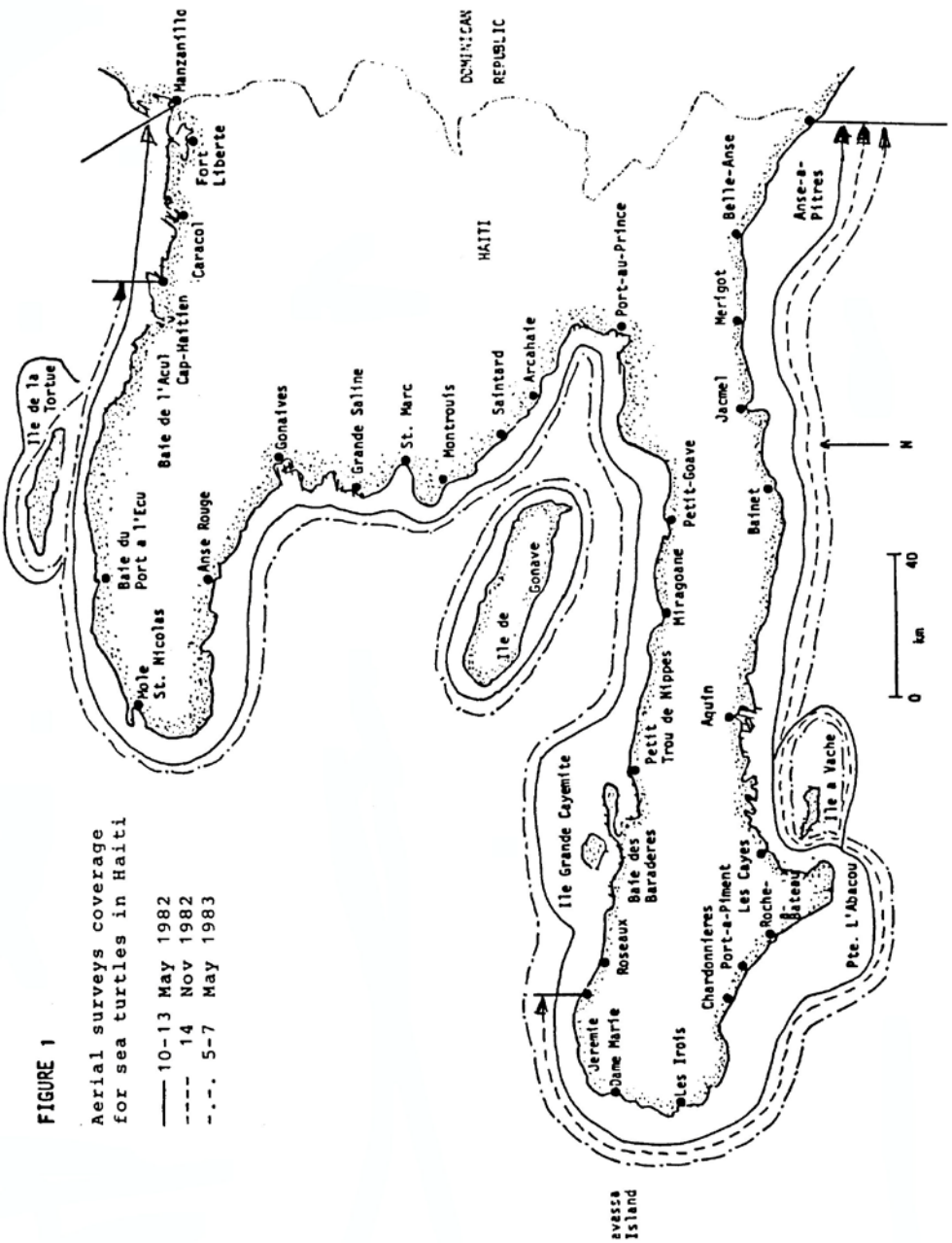
TABLE 3. SURVEY OF SEA TURTLE CARAPACES AND SHELL PRODUCTS RECORDED IN MARKETS, HOTELS AND TOURIST SHOPS OF PORT-AU-PRINCE, PETIONVILLE AND CAP-HAITIEN DURING NOVEMBER 1983 (TONY TUCKER AND EMILY ROET, PERS. COMM.)

Size Class	Number of Carapaces			Total	Percentage
(cm)	*Eretmochelys*	*Chelonia*	*Caretta*		(%)
20	0	0	0	0	0
20-30	35	0	0	35	13.3
30-50	74	16		92	34.9
50-70	8	54	0	62	23.5
70-90	7	66	0	73	27.7
90	1	1	0	2	0.76
Total	125	137	2	264	
Percent	47.4	51.2	0.8		

TABLE 4. INTERNATIONAL TRADE OF BEKKO AND OTHER TORTOISESHELL (KG) TO AND FROM HAITI BETWEEN 1959 AND 1986

Year	Exports to		Imports	
	Japan [a]	Other Countries	Amount	Country
1959	311			
1960	0			
1961	827			
1962	2090			
1963	899			
1964	944			
1965	687			
1966	820			
1967	1016			
1968	1468			
1969	1490			
1970	1497			
1971	1983			
1972	1954			
1973	2390			
1974	678			
1975	831			
1976	1094	90 [b]		
1977	1173			
1978	959			
1979	1689			
1980	1020		8,404.6 [c]	Cayman Is.
1981	892	8,413 [d]		
1982	1188			
1983	1768			
1984	1988			
1985	2203			
1986	2767			

Sources: a: Groombridge and Luxmore (1987)
b: to Italy; (Mack, Duplaix and Wells, 1979)
c: Luxmore and Canin (1985)
d: Re-exported from Haiti (origin Cayman Is.) to F.R. Germany (Luxmore and Canin, 1985)



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.

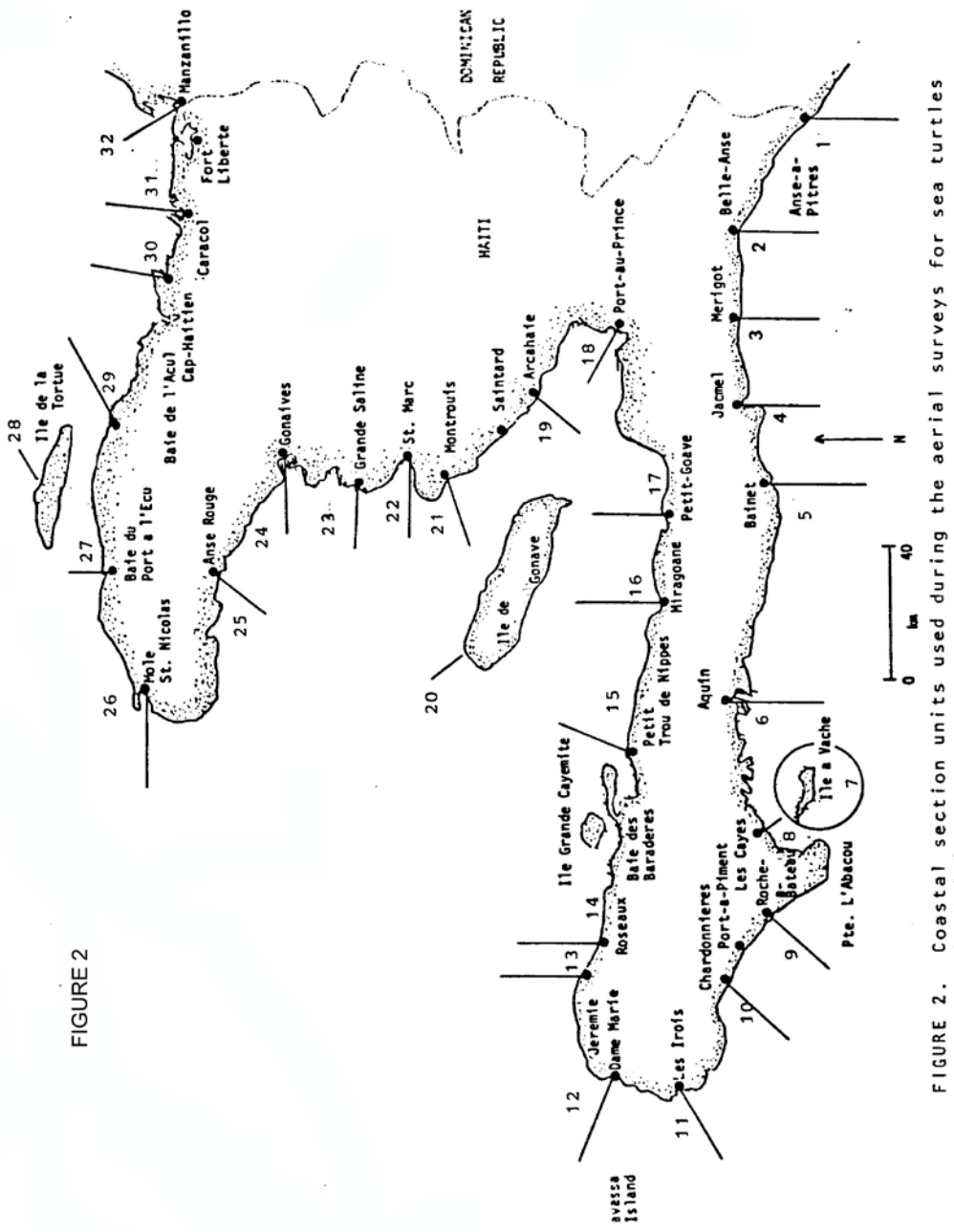


FIGURE 2. Coastal section units used during the aerial surveys for sea turtles in Haiti.

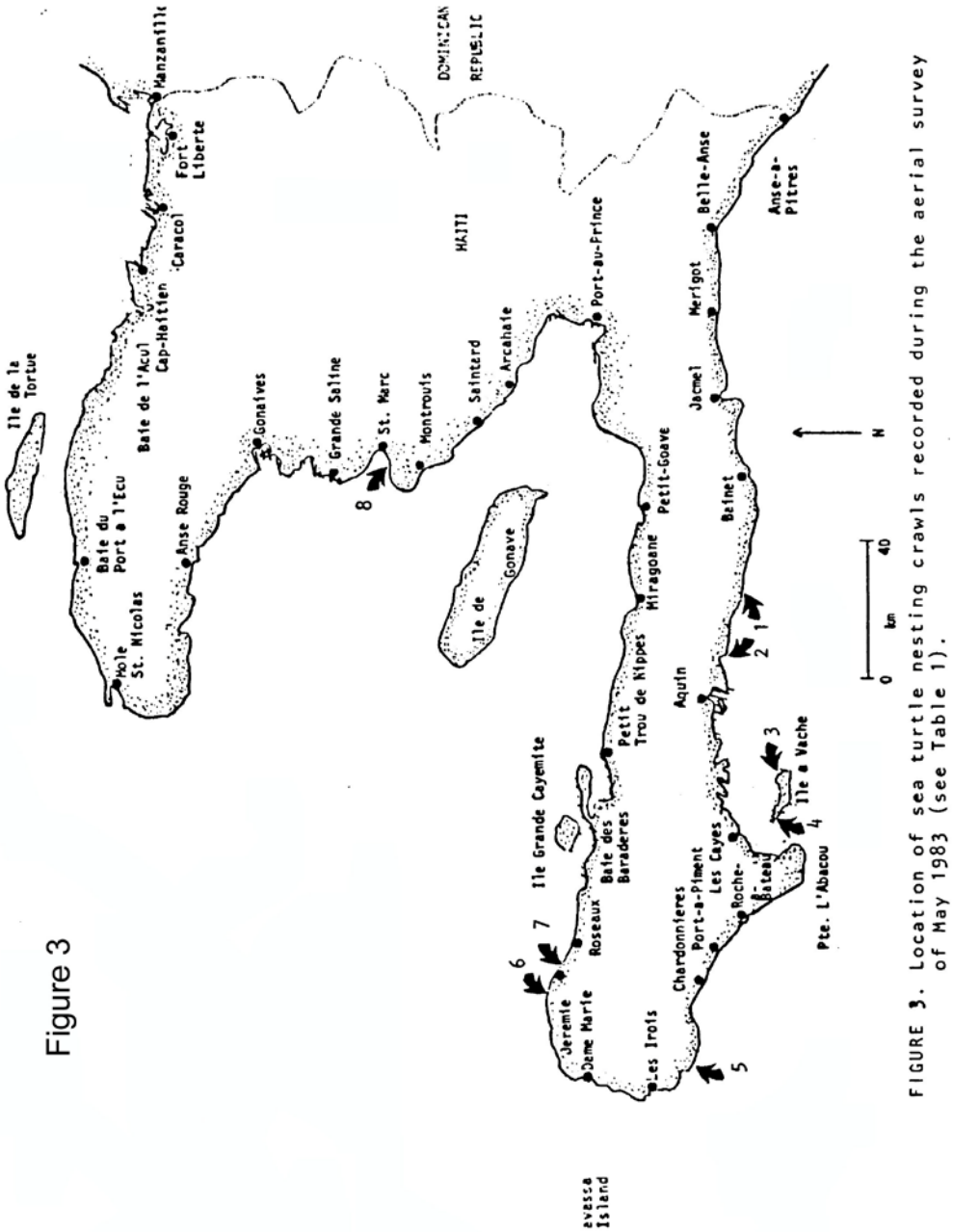


FIGURE 3. Location of sea turtle nesting crawls recorded during the aerial survey of May 1983 (see Table 1).

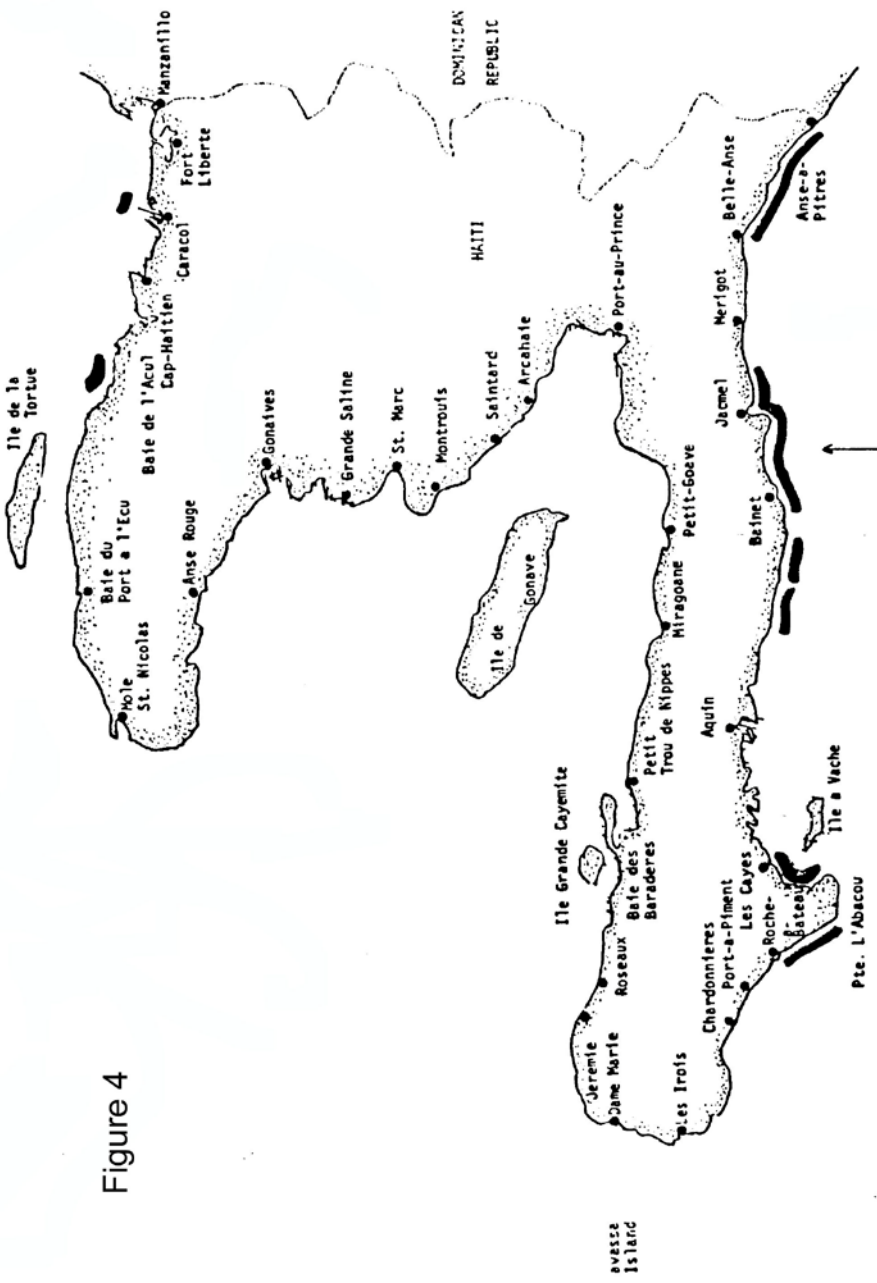


FIGURE 4. Sea turtle nesting sites recorded during ground-truth surveys (see Kavanaght 1984).

Figure 4

Figure 5

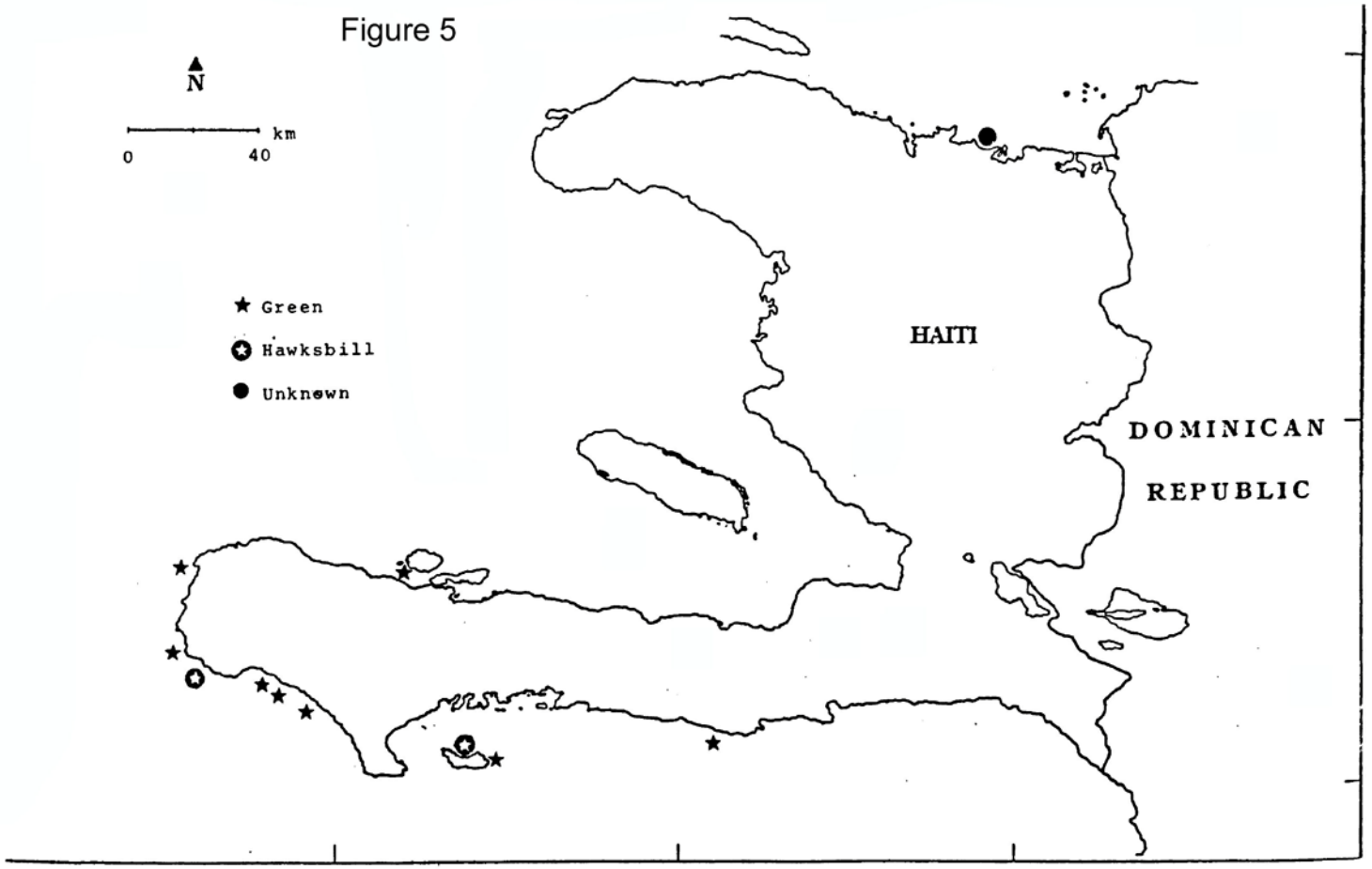


FIGURE 5.- Observations of sea turtles on the water surface recorded during aerial surveys in Haiti (see Table 2)

Figure 6

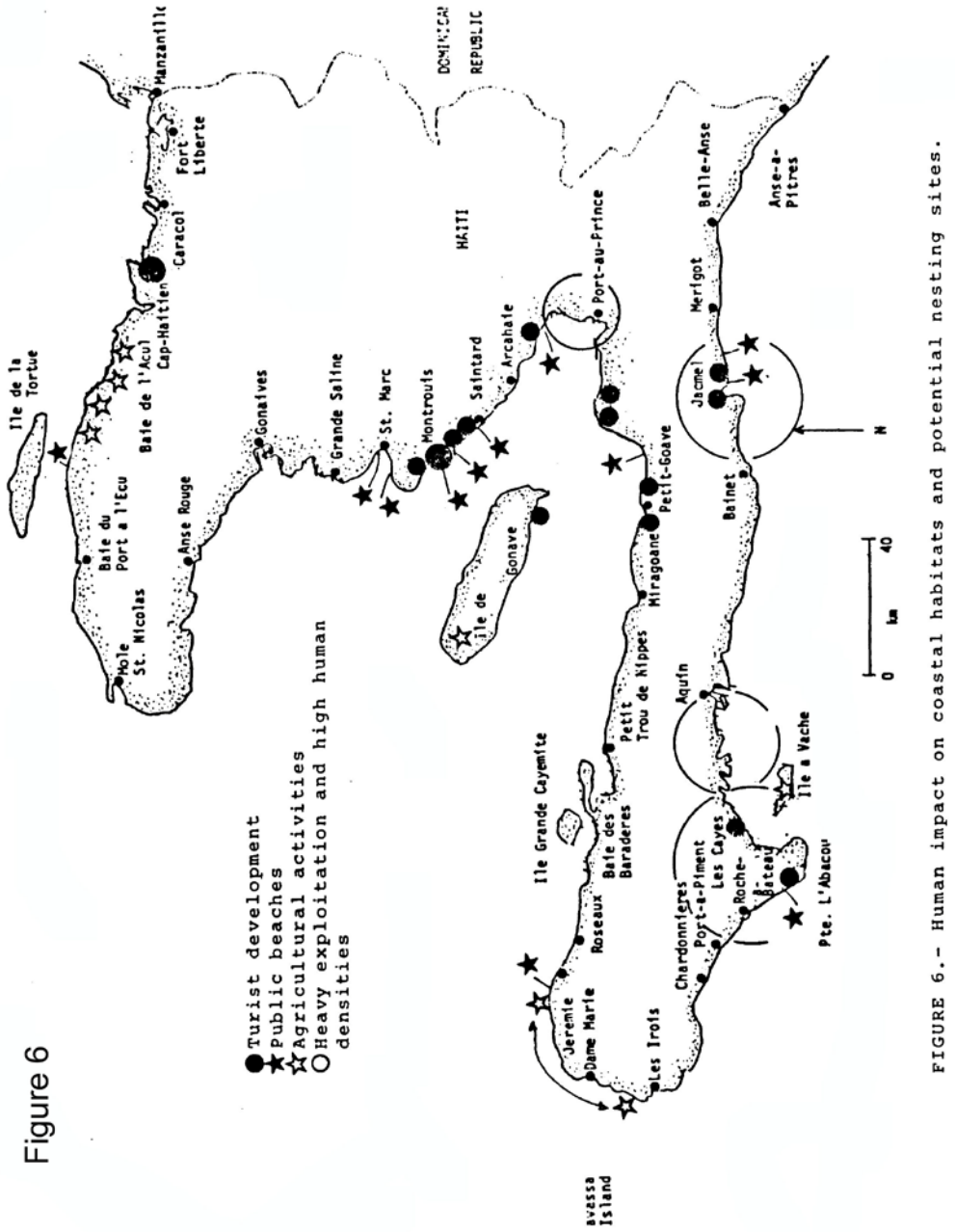


FIGURE 6.- Human impact on coastal habitats and potential nesting sites.

Figure 7

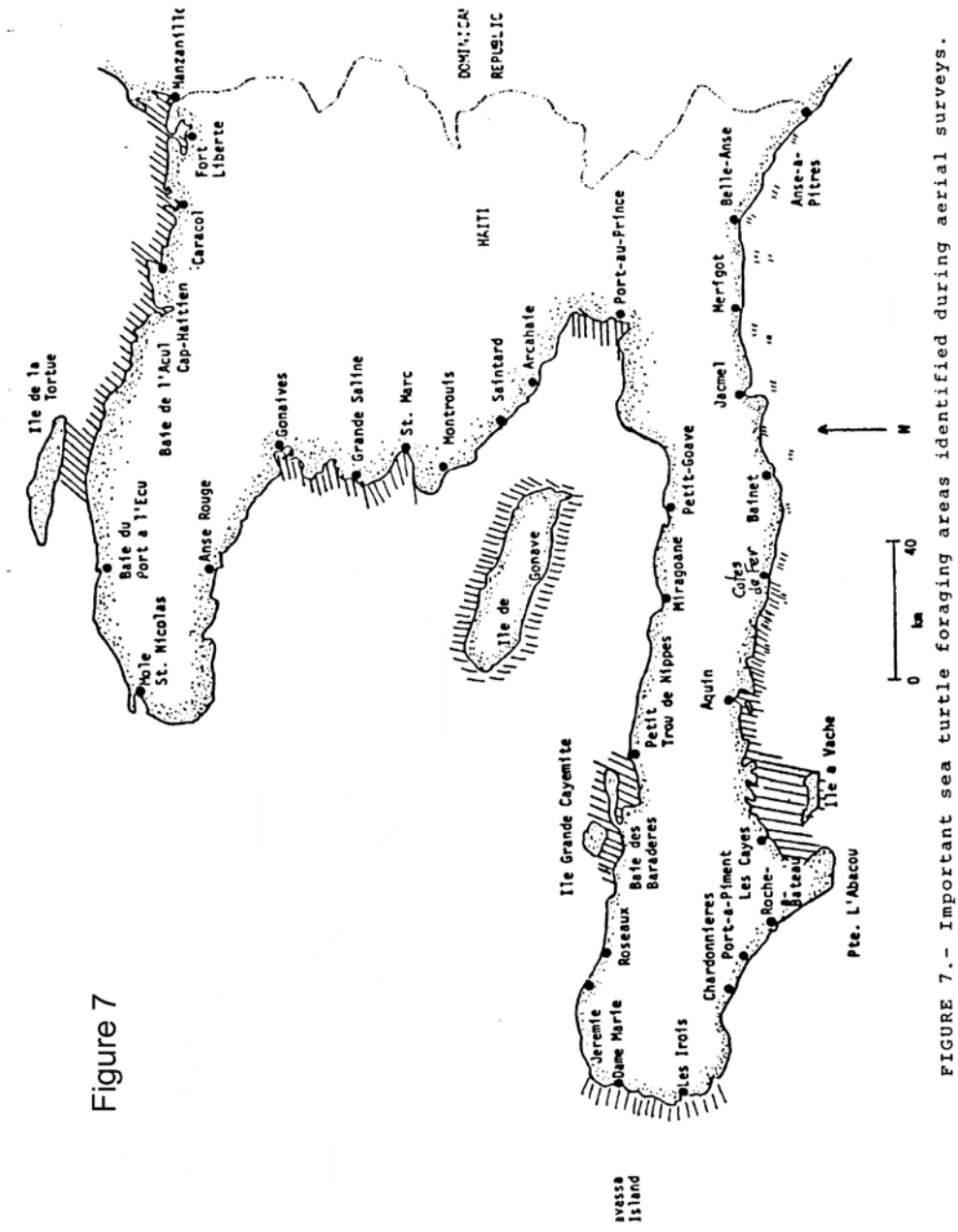
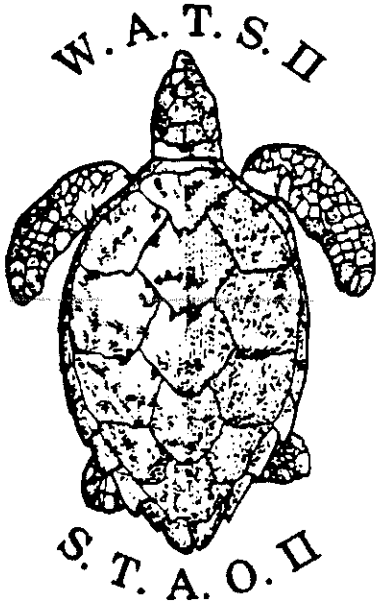


FIGURE 7.- Important sea turtle foraging areas identified during aerial surveys.

WATS II REPORT/DATA SET



Ad Hoc National Report to WATS II for Haiti.

Jose A Ottenwalder

10 October 1987

SECOND WESTERN ATLANTIC TURTLE SYMPOSIUM

WATS II

Mayaguez, Puerto Rico 11 - 16 October 1987

NATIONAL REPORT FOR THE COUNTRY OF HAITI

Prepared by

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September 1987

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THE STATUS OF SEA TURTLES IN HAITI

1. INTRODUCTION

Very little is known about the status of sea turtles in Haiti. According to Carr et al. (1982), information on marine turtles from the area is among the poorest for the whole Western Atlantic. We discuss here previous available data, as well as the results of recent aerial (Ottenwalder 1983) and ground-truth surveys (Kavanaght 1984) conducted in Haiti on behalf of the Western Atlantic Turtle Symposium (WATS).

2. METHODS

Aerial surveys for sea turtle nesting activity and habitat were conducted in the mornings (between 6:00-9:00 AM) of the 14th November 1982 and 5-7th May 1983. Additional sea turtle observations were obtained during aerial surveys conducted on 10-13th May 1982 to investigate the status of the West Indian manatee Trichechus manatus in Haiti (Rathbun et al.1985). All flights were flown in a clockwise direction following the contour of the shoreline, including bays, river mouths, inlets, and offshore islands. At least two observers were present on all flights, three observers were present on most flights. Single engine, four seat Aircraft with the wing above the cockpit were used on all flights. Numbers and location of sea turtles, nesting crawls on beaches, and observations on the human use of coastal habitats were recorded on 1:250,000 scale topographic charts. Sea turtle surveys were flown at a speed of 130-170 km/hr, an altitude of 50-125 m, and a distance of 20-50 m offshore. During West Indian manatee surveys the aircraft was flown at a speed of 120-200 km/hr, an altitude of 150-300 m, and a distance about 500 m offshore. Surveys duration and coverage was as follows: 10-13 May 1982 (12.5 hr), entire coast; 14 November 1982 (3 hr) southwestern Tiburon Peninsula, from Cote de Fer to Jeremie; 5-7 May 1983 (13.5 hr) entire coastline, with the exception of the northeastern coastal section between Cap-Haitien and the mouth of the Massacre River (Fig. 1).

To facilitate data recording and analysis, the coastline was arbitrarily subdivided into sections, using major towns and relevant shoreline contours as landmarks (Fig.2). The selected reference locations and unit numbers used were: Anse a Pitres (1), Belle-Anse (2), Marigot (3), Jacmel (4), Bainet (5), Aquin (6), Ile-a-Vache (7), Les Caves (8), Roche a Bateau (9), Chardonnieres (10), Les Irois (11), Dame Marie (12), Jeremie (13), Roseaux (14), Petit Trou de Nippes (15), Miragoane (16), Petit Goave (17),

Port-au-Prince (18), Arcahaie (19), Ile de la Gonave (20), Montrouis (21), St. Marc (22), Grand Saline (23), Gonaives (24), Anse Rouge (25), Mole St. Nicolas (26), Baie du Port a LEcu (27), Ile de la Tortue (28), Anse a Foleur (29), Cap-Haitien (30), Carerol (31), Manzanillo (32).

Data on nesting season, distribution, relative abundance and exploitation of sea turtles in Haiti were recorded at every opportunity during our visits in Haiti.

3. PAST AND PRESENT STATUS

3.1 Historical

According to the earlier chroniclers, sea turtles once abounded on the coasts of Haiti. During Columbus' first historic voyage, he named Ile de la Tortue to commemorate the taking of a giant turtle there (Parsons 1962). A.O.Oexmelin (often anglicized as John Esquemeling), included detailed accounts on sea turtles from Hispaniola and some of its offshore islands in his memoirs about the activities of buccaneers in the area during the second half of the seventeenth century. His descriptions included aspects of the anatomy, harvest methods and exploitation of turtles by the european settlers, particularly the French and Spaniards. The eggs of sea turtles were harvested on beaches and turtles were taken there and at sea. Except for Ile de la Tortue and Ile Grand Cayemite there is little historical information about specific nesting localities along the Haitian coast.

Oexmelin (1967) gave excellent descriptions of the different turtles found in Hispaniola, including remarks about their eggs and the names given by both French and Spaniards to them. From his accounts it is probably safe to state that hawksbill, green, loggerhead, and leatherback turtles nested in Haiti in the past, with greens and hawksbills being inferred as the two most common species.

3.2 Present status

The information obtained during our surveys, including interviews and examination of carapaces, indicate that Chelonia and Eretmochelys are the most frequent species of marine turtles in Haitian waters today. We have examined only several (medium to large) Caretta carapaces. Dermochelys is apparently poorly known and we were unsuccessful in obtaining relevant information about this species in Haiti. Except for a single Lepidochelys carapace for sale in the local market, further information about the

status of Ridleys is lacking. Green and hawksbill are the most consistently reported nesting species, and some information is also available for nesting loggerheads. Estimation of the amount of turtles harvested, and size of the nesting population is prevented by the lack of adequate data. This quantification is further complicated by the fact that locally all turtle species are generally referred to as "caret" and "tortue".

Available data suggest that all four species of sea turtles found in Haitian coastal waters still nest in the country. Nesting activity by green and hawksbill turtles is possibly low to moderate, whereas nesting by loggerhead and leatherback turtles might occur only sporadically. During the aerial survey of 5-7 May 1983 throughout the entire coast of Haiti, Ottenwalder (1983) recorded a total of 10 nesting crawls (Table 1). All observed tracks but one were recorded on beaches of the Tiburon Peninsula, Departement du Sud (Fig. 3). Interestingly, 90% of the turtles observed at the water surface during all three aerial surveys were recorded in the same coastal area (Table 2,Fig.5). No nesting crawls were found during our aerial surveys of May and November 1982. So far there is no evidence to support the idea that concentrated nesting might still occur at any Haitian locality, but rather, nesting activity is characterized by low densities and scattered patterns.

Available information on population and nesting trends per species is given below:

Eretmochelys imbricata Local name: Caret

Nesting sites: The following nesting beaches were identified during aerial surveys (Ottenwalder 1983): between Laborieux and Pointe des Trois Latanier, Ile a Vache at Pointe de LEst, and near Anse dAzur (Fig.3, Table 1). Nesting sites have also been reported (Kavanaght 1984) at unspecified beaches within the following coastal sections: Anse a Pitres to Belle Anse, Mavette to Cotes de Fer, Les Cayes to St. Jean, Pointe a Gravois to Port Salut, and Anse a chou chou (Fig.4).
Nesting numbers: Unknown, but presumably low, based on data gathered during interviews (Ottenwalder 1983). Numbers were estimated by Bullis (1984) as possibly low to moderate.

Trends in nesting numbers: The accounts by Oexmelin (1967) suggest that hawksbill turtles were probably the second most abundant species in the coastal waters of Haiti. Today, numbers have declined drastically and nesting is apparently uncommon throughout most of coastal Haiti.

Nesting season: May to August (Kavanaght 1984) with the peak time in June-July, and perhaps extending up to November (Ottenwalder 1983).

Chelonia mydas — Local name: Tortue

Nesting sites: Ottenwalder (1983) identified nesting crawls during their aerial surveys of the following beaches: between Laborieux and Pointe des Trois Lataniers, Ile a Vache at Pointe Diamant, east of Jeremie, and Freycinau, west of St.Marc (Fig.3, Table 1). Based on ground-truth surveys Kavanaght (1984) reported nesting at unspecified beaches within the following coastal sections: Anse a Pitre to Belle Anse, Cayes-Jacmel to Raymond, Mayette to Cotes de Fer, Cotes de Fer to Mouillage, Bein de Caracol, Petit Anse, Anse a chou chou, and Fond Larange.

Nesting numbers: Unknown, but presumably low based on data gathered during interviews (Ottenwalder 1983). Bullis (1984) estimated moderate levels of nesting activity.

Trends in nesting numbers: The accounts by Oexmelin (1967) suggest that green turtles were probably the most abundant species in the coastal waters of Haiti. Today, nesting populations appear to be seriously depleted throughout their former range, and are probably still declining.

Nesting season: May, July and August (Kavanaught 1984). It may extend from May to October (Ottenwalder 1983).

Caretta caretta — Local name: Cohanne/caret

Nesting sites: According to Kavanaught (1984) nesting sites were reported from the following coastal areas: Anse a Pitre to Belle Anse, Cayes-Jacmel to Raymond, Cotes de Fer to Mouillage, Les Cayes to St.Jean, Anse du Diable, Pointe a Gravois to Port Salut, Petite Anse and Fond Larange.

Nesting numbers: Unknown, but presumably low according to data gathered during interviews (Ottenwalder 1983).

Trends in nesting numbers: According to Oexmelin (1967) sea turtles once abounded in the waters around Haiti. Today nesting populations seem to be depleted and presumably locally extirpated from some coastal areas.

Nesting season: Nesting from May to September was reported by Kavanaught (1984).

Dermochelys coriacea

Nesting sites: A nesting crawl was identified by Ottenwalder (1983) near Tiburon, on the southwestern corner of the Tiburon Peninsula, during the aerial survey of May 1983.

Nesting numbers: Unknown, but apparently very low based on data gathered during interviews (Ottenwalder 1983)

Trends in nesting numbers: Sea turtles were once abundant in the waters around Haiti. Today, population seems seriously depleted.

Nesting season: The only nesting observed was recorded in May (Ottenwalder 1983), but nesting season probably extends from late March to May as reported from Dominican Republic (Ottenwalder 1981).

Lepidochelys olivacea

A single carapace of olive ridley was found in a market gift shop in Port-au-Prince (J.Thorbjarnarson,pers.comm.,JAO pers.obser.). We were unable to determine the coastal locality from where the turtle was obtained. Ridleys in Haitian waters are probably migrating individuals.

3.3 Nesting Habitat Assessment: the extent of beaches, and problems related with nesting access and success

Haiti, located on the western portion of the island of Hispaniola, has a highly variable relief in its coastline (about 1,535 km) which is, in part, determined by the mountainous topography of the country. As a result steep cliffs rise abruptly, exposing a rocky coastal structure frequently seen throughout the Caribbean. Golfe de la Gonave and Atlantic coasts of the country. This main coastal structure is interrupted by extensive mangrove communities, coastal lagoons and sandy stretches. The total shelf area (about 5000 km^2) is very narrow, with the water depth frequently reaching 100 fathoms not too far off the coastal cliffs.

South Coast. From Anse-a-Pitres to Cotes de Fer the shoreline is predominantly rocky with intermittant pocket beaches. Gravel beaches are the most common, but small sandy beaches can be found dispersed throughout. Only isolated patches of reefs and grass flats were observed. From Cotes de Fer to Pointe l'Abacou, extensive stretches of suitable sandy beaches for nesting are found, adjacent to excellent feeding and growing habitats. Relatively large

mangrove communities and tidal swamps exist on the mainland shore. Extensive grass flats are common on the bottom of the tidal creeks and shallow waters between Pointe Horne Rouge and Pointe LAbacou. Patch reefs are frequent and the one around Ile-a-Vache, particularly the formation in the channel, may be the richest of the south coast. The topography from Pointe LAbacou through to Chardonnieres is again mostly rocky. Other than a few gravel beaches, there is also a fairly good stretch of sandy beaches between Port Salut and Coteaux. Unfortunately, these are invariably associated with relatively large towns, tourist development or small coastal villages. Approximately 12 km of gray to fine brown sand extends between La Cahoune and Tiburon. Although the sand seems compact and narrow in some stretches, a large percentage of it has a fairly high profile, is backed by dunes and dry forest and is open to strong surf. The area is remote and human presence is relatively low. At the tip of the Peninsula, between Tiburon and Jeremy, pocket sandy beaches are frequent within the dominant rocky coast, and an extensive offshore shelf (20 fathoms) extends to the west for several kilometers. The area though, seems to be the scenario of an active fishery as suggested by the number of villages observed and the great concentration of boats (90% dugout canoes). Grass flats and reef patches might be extensive, although a pelagic survey over this area was not possible.

East of Jeremie, there are some fairly good stretches of several kilometers of gray sand suitable for nesting. Unfortunately, these high energy beaches are also fairly occupied by houses.

Golfe de la Gonave. After Pointe de la Patte Large, extensive foraging and developmental habitats are found along the coast until Petit Trou de Nippes. Here, abundant patches of shallow reefs, and vast communities of grass beds and mangrove, extend through the channel of Grande Cayemite Island and inside Baie des Baraderes, where long tidal creeks are also found. From Petit Trou de Nippes east to Port-au-Prince, there is a marked alternation in the topography of the coast between the steep low cliffs with the more common gravel beach, some sandy beaches, and mangrove communities in a few places. Reef patches and grass beds were less impressive in Baie de Miragoane. Here we examined the polished backs of three large greens and one loggerhead caught off-shore Miragoane a few years before 1982. From Miragoane to Port-au-Prince human population density increases steadily, particularly after Baie de Petit Goave. Most beaches here were associated with tourist development, beach houses, fishing villages, and some major towns.

Ile de la Gonave. The southwestern shore of Ile de la Gonave showed a low profile coast with some long stretches

of sandy beaches that might receive some nesting. These low energy beaches are backed by mangrove swamps, small lagoons, or even some dry forests, and invariably occupied by small villages or dispersed houses. The northwestern end is rocky, and the northern coast is predominantly mangrove swamps, with the sandy stretches being used for human habitation. Gonave, which is quite populated, is surrounded by a shallow fringing reef, and fairly vast grass flats.

Between Port-au-Prince and St.Marc, tourist resorts and private beach houses occupy most suitable nesting habitats. Other forms of human impact on this heavily exploited coastline section include: extensive plantations, factories, free roaming livestock, rock walls and numerous private docks. Vessel and boat traffic is quite heavy on this coast. Mangrove and rocky cliffs are also observed in relevant proportions.

St. Marc to Gonaives. Extensive mangrove habitat is predominant, with numerous tidal flats and long tidal creeks. A fringing reef extends along the shore from St. Marc to Grand Saline. Some long but narrow sandy stretches run backed by mangrove on this shore.

Between Gonaives and the Mole St. Nicolas the coastline is mainly rocky with steep low to high cliffs, with a few dispersed pocket beaches. From Mole St. Nicolas to Port de Paix some good stretches of sandy beaches, particularly pocket beaches, are found alternated with the dominant rocky coast.

Ile de la Tortue. Suitable nesting beaches are only found in the south shore, facing the mainland. An excellent beach of white sand and wide steep profile is found in the western tip near Gros Raisinier. A great part of this south shore consists of sandy beaches but is fairly populated, and movement from one end to the other of the island is mostly done on the beach. A fringing reef extends all along the south shore.

Between Port de Paix and Cap-Haitien, beaches consist mostly of sandy river banks, with the exception of several pocket beaches between Le Borgne and Baie LAcul. Reef patches arise from the bottom outside the bay and a small but suitable isolated sandy beach surrounds Rat Is., a tiny cay offshore LAcul Bay. From Cap Haitien, the remaining coast is characterized by extensive mangrove areas in the Bays of Cap-Haitien and Caracol, as well as some sandy stretches some of which are suitable for nesting, while others are too narrow. An almost continuous fringing reef extends from Cap-Haitien Bay to the mouth of the Massacre River on the border with the Dominican Republic. The bottom is extensively vegetated in this area.

The magnitude of human impact on sea turtle populations and habitat in Haiti is great. High human population densities doubtlessly represent the major problem. People are practically everywhere, even in the most isolated coastal areas where human presence might not be usually expected because of their remoteness from towns, and lack of transportation, supplies and other service infrastructures. Diversity and amount of food items are seemingly scarce, and any source of protein is in high demand. Therefore, isolated villages on the coast are expected to depend to an important extent on marine resources. The frequency of human settlements (from single huts to small villages) on beaches is very high and an almost invariable association. Under these circumstances, it seems likely that the chances for a nesting female, or their nests to be overlooked are very low.

Tourism has been an important income to the weak local economy. Resorts, beach houses and other recreative developments have already eaten away many kilometers of excellent nesting habitat (Fig.6). Other forms of human use are not less important. Sand removal for construction is a common practice. Haitians frequently develop on beaches the only activities they know to survive; agriculture and domestic livestock (Fig.6) because of the scarcity of lowlands and fertile valleys inland.

3.4 EXPLOITATION

3.4.1. Local

Sea turtle meat and eggs are highly appreciated by the haitians. When available, turtle meat and eggs can be obtained at seafood shops in Port-au-Prince. The data obtained during interviews indicates that most of the capture consists of juvenile turtles caught in the water by divers. Official statistics on the amount of turtles and turtle products harvested for human consumption and other uses does not exist.

Small to large carapaces of hawksbill and green turtles are readily available in markets and tourist shops (Table 3). Reportedly a good proportion of the large carapaces have been on display and for sale in these establishments for a number of years. One should be cautious if an attempt is made to use this type of data as the only population sample available to make suggestions about the age structure and size classes being harvested. Very often, many of the small to medium size carapaces in stock are stored in crates, and only a portion of them are displayed in the store. We have found this to be a frequent case in our surveys in the Dominican Republic (Ottenwalder 1987). Rather, most carapaces from turtles caught in recent

years belong to the small and medium size classes. Small to medium sizes are also the most frequently sold because of their lower prices, greater availability, and convenience for air transportation.

In November 1982 JAO recorded the following turtle products in the deposit of a major local dealer in Port-au-Prince: one crate containing 20 hawksbill unpolished carapaces ranging from dinnerplate to medium size (at US$ 25-40 each), and 18 large bags of tortoiseshell with an approximate weight of 600 kg (at US$ 180/kg). Reportedly, all turtles and tortoiseshell came from the southern Tiburon Peninsula. A wooden crate (aprox. 3x2x2 feet) full of medium size hawksbill carapaces was found in the Iron Market (P-au-P) during a survey of sea turtle products conducted in November 1983 (T.Tucker and E. Real, pers.comm.).

No information about hunting intensity is available from Haiti. However, if we consider that between 1959 and 1986 Japan imported at least 32,367 kg of tortoiseshell from Haiti, it might be possible that about 20,876 hawksbill turtles could have been taken during that period in Haitian waters for trade with Japan alone. Kavanaght (1984) reported the localities of Cotes de Fer, Raymond les Bains,Port Salut, and Conidon as landing sites for turtles and turtle product availability. Hunting methods include the use of ordinary trammel nets, "folles" or turtle nets, harpoons and spearguns.

3.4.2 International Trade

The Caribbean islands accounted for about 25 percent of all tortoiseshell imported by Japan in the 1970s (Mack 1983),and this amount rose to almost 40 percent in 1980 and 1981 (Meylan and Mack 1983). Together with Cuba and the Ceyman Islands, Haiti is among the main exporters in the region (Barber 1980). Haiti has maintained an average supply of 1.3 tons/year and their exports represent around 10 percent of all the bekko and other tortoiseshell imported by Japan from the West Indies (Table 4). From 1970 to 1986, Haiti has supplied Japan with 24,793 kg of bekko, accounting for almost 4% of Japan's total bekko imports. From 1976 to 1986, as CITES controls gradually reduced trade from other traditional sources of bekko in the region, imports from Haiti, a non-party country, increased by about 12 percent (Milliken and Tokunaga 1987).

CITES annual reports between 1977 and 1985 also show exports of sea turtle products from Haiti to France (65 kg) and United States (19 shells), and import to Haiti from the United States (100 carvings). The imports to Haiti of 8,405 kg of shell from the Ceyman Islands, later re-exported (from Haiti) to F.R.Germany is a reflection of the unquantified

inter-island trade of tortoiseshell reported for the Carribbean (Meylan 1984). Since Carr et al. (1982) considered unlikely that anything but the most vestigial stocks of sea turtles would be found in the country today, and in view of the large quantities of tortoiseshell imported from there by Japan (steadily increasing since 1981, to the highest volume today of 2,767 kg in 1986), it has been suggested that Haiti either provides a route through which Caribbean turtle products are exported to the rest of the world or that Haiti has increased exploitation of her own hawksbill resources (Groombridge and Luxmore 1987, Milliken and Tokunaga 1987).

Most tortoiseshell is being exported to Japan by only two local dealers (1) CHABACO, Rue Magasin de lEtat 128, P.O.Box 1763, Port-au-Prince; and 2) Desgrottes ETIENNE, P.O.Box 1072, Port-au-Prince).

3.5 FISHERIES INFRASTRUCTURE

3.5.1 Socioeconomic aspects

Between 11,000 (C.N.D.S. 1985) to 15,000 (Weil et al. 1973) individuals, largely working independantly, are estimated to be engaged in fishing. Only about one-third of these are full time fishermen. Most fishermen remain close to shore, with few venturing into deeper waters. Fishing practices are archaic. Fishermen are essentially found at an economically subsistent level for various reasons, from which the principal ones are: the limited productivity of the waters, the low efficiency of traditional fishing techniques, the lack of equipment, and the weakness of the inland market.

Part-time fishermen (nearly two-thirds) are actually agriculturalists from the coastal zone. Both professional and part-time fishermen are very poor, and the buying of a simple tool or equipment poses them with a big problem. They frequently group themselves to rent a boat by giving up part of what they fish. A great number of the full time fishermen are grouped together in teams by fishing patrons. These groups displace themselves, like nomads, along the coastline fishing offshore the different beaches.

3.5.2 Fishing Fleet and Equipment

The nearly constant easterly tradewinds greatly affects fishing activities since there are very few motorized boats. As a result, the frequency rate the fishermen are actually fishing is fairly low (150-200 days/year).

The traditional boats of the Haitian coast has sails, oars or both. The canoes with oars are units of 2, 5, or 10 meters. About 80 percent are between 3.5 to 5 m. There are three other types of boats: 1) bois fouille, which is a dugout trunk of a tree; 2) pris-pris, which are made from assembled bamboo and maneuvered with a sill or sail. They are very common on the North coast, measuring 2.5 to 3 meters; 3) corallaire, a little boat with the shape of a canoe having a flat bottom and very square back end measuring 2.5 to 3 meters, which is used to work on the coastal reefs. Motorized boats are owned by fishing patrons. There are not too many of them and usually only have 6 to 25 horsepower motors attached.

Current figures of the total number of fishing boats in Haiti were not available. A 1956 estimate gave about 1,744 boats as follows: 1,454 canoes, 50 bois fouille, 1,200 pris-pris, and 40 corallaires. More recent estimates are of3,000 boats, of which 2,000 are canoes and 1,000 are of the other three types (C.N.R.S. 1985).

3.6 IMPORTANT SEA TURTLE FORAGING AREAS

Important sea turtle foraging and developmental habitat for sea turtles in Haiti were identified during aerial surveys and described in section 3.3 of this report. Relevant foraging areas for sea turtles along the Haitian coasts are: Anse a Pitres to Cotes de Fer (only isolated patches of reefs and grass flats), Cotes de Fer to Pointe LAbarou (excellent feeding and developmental habitat), Pointe Morne Rouge to Pointe LAhacou, including Baie des Cayes (extensive grass flats, reef communities and shallow waters), Tiburon to Jeremy (excellent), Pointe de la Patte Large to Petit Trou de Nippes (abundant patches of shallow reefs and vast communities of grass beds, thru the Channel of Grande Cayemite Is. and inside Baie des Baraderes), Baie de Miragoane (less impressive but some scattered patches of suitable habitat), Ile de la Gonave (surrounded by shallow fringing reefs and fairly vast grass flats), St.Marc to Gonaives, Canal de la Tortue, and from here up to the mouth of the Massacre River, Particularly between Cap Haitien and Baie de Mancenille on the border with the Dominican Republic (see Fig. 7 for location of these areas).

3.7 REVIEW OF SEA TURTLE SURVEYS AND RESEARCH PROJECTS IN HAITI: PAST, PRESENT AND PLANNED

3.7.1 Previous surveys and research

Haiti was not formally covered during the field surveys conducted from May 1978 to August 1981 to assess populations and identify critical habitats of sea turtles in the whole Western Atlantic (Carr et al. 1982). At that time the only information available was gathered by Anne and Peter Meylan when in transit to the Windward Islands; and by Diderot Gicca as incidental to other work (Carr et al. 1982).

Observations on sea turtle distribution and habitat were made on 10-13 May 1982 by J.A.Ottenwalder, G.B.Rabbun, and C.A.Woods, while conducting aerial surveys for the West Indian manatee in Haiti (Rabbun et al. 1985). Aerial surveys to assess nesting activity, critical habitat and exploitation of sea turtles in Haiti were conducted by J.A.Ottenwalder and C.A.Woods, on 14 November 1982 and 5-7th May 1983 (Ottenwalder 1983), under contracts with the National Marine Fisheries Service and the Caribbean Conservation Corporation on behalf of the Western Atlantic Turtle Symposium (WATS).

Ground-truth surveys throughout the Tiburon Peninsula were conducted during the first half of 1983 by the staff of the Service des Peches of the Department of Agriculture (DARNDP) with the support and assistance of WATS (Kavanaght 1984)

3.7.2 Present and Planned Surveys and Research

None in progress nor in perspertive. Comprehensive ground-truth surveys are needed.

3.8 Managing/Conservation agency

The government agency responsible for conservation and management of sea turtles in Haiti is the:

Service des Peches
Direction des ressources Naturelles
Ministere de L'Agriculture, des
Ressources Naturelles et du Developpement Rural
DARNDR, DAMIEN
Port-au-Prince, HAITI

3.10 Legislation

Current regulations concerning sea turtles in Haiti are quoted (below) from the Fisheries Law of October 27, 1978. The goverment agency responsible for the enforcement of these regulations is the Service des Peches, of the Ministry of Agriculture. Reportedly (R. Kavanaght, pers. comm.), there are 17 fisheries inspectors assigned throughout the Haitian coasts (Aquin 1, Les Cayes 1, Tiburon to Jeremy 3, Miragoane 1, Arcahaei 1, St. Marc 1, and Gonaives to Port de Paix 9) for this task. As far as we know the regulations are virtually ignored.

Article 97.- It is formally prohibited:

b) to fish "the tortue", "the caret" during the months of May to October (laying season);

c) to collect the egges of turtles of all species in the territorial waters, specially those of "caret: and of "tortue"

c) to capture the "sea turtles", "the carets" on the beach;

Article 122.- It is prohibited:

2) the exportation of "caret" and "turtle" meat, and their shells without an authorization from the Service of Fisheries.

3.11 Comments concerning the status of sea turtles in Haiti

Compared with the eastern half of Hispaniola (occupied by the Dominican Republic) Haiti is better characterized by a much more mountainous topography. This is reflected in the frequent steep cliff type of the coast, and consequently, extensive kilometers of abrupt slope of the shelf. Long stretches of high energy sandy beaches are not as frequent in Haiti as in the Dominican Republic. Today, the most potential nesting habitat available is represented by the numerous pocket beaches found along the Haitian coasts. As a result, current nesting activity is more likely characterized by a dispersed pattern. This factor makes more difficult the obtention of reasonable population estimates and the evaluation of the status of sea turtle populations-

As reported for the Dominican Republic (Ottenwalder 1981, 1987) it should be expected that nesting season for all se turtles might extend from late March to November, with peak seasons varying with species. May to August are reported by local fishermen as the most important nesting months (Ottenwalder 1983) with peaks in June and July. We feel that very little nesting activity took place during the time of our surveys (early May). More comprehensive data is needed on the seasonality of nesting before we can make predictions about the size of the nesting populations based on the number of nests and extent of the nesting season. It might also be possible that the number of turtles tracks recorded during our aerial surveys of May 1983 might reflect the current trends in nesting activity per season during the past few years but it might be premature to make that assumption based on a single survey.

Considering the information available at this time concerning the status of the sea turtles in Haiti it is concluded that 1) nesting populations and nesting sites have been seriously reduced since historical times, 2) the situation of the remaining nesting population is critical, and that 3) the perspectives for sea turtle conservation in Haiti are not encouraging.

The following recomendations for further sea turtle research and management programs are made.

A) Research.- 1) Ground-truth surveys through the country, particulary on selected coastal areas were nesting sites have been recorded, to compile data on nesting numbers and season. 2) Aerial surveys to be conducted regularly along the south east of the Tiburon Peninsula, particularly between Cotes de Fer and Point Morne Rouge, to record data on nesting activity.

B) Management.- A total ban on all forms of exploitation of sea turtles in Haiti is badly needed. Since this proposal is probably unrealistic considering the socio-economic problems faced by the Haitian people today, an alternative would be to ban all forms of commercialization of sea turtle products. Only subsistence hunting should be allowed, and only during non-nesting season. The current regulations must be reviewed and updated. The survival of any vestigial nesting population in Haiti will depend on the enforcement of such regulations. Steps to promote the accession of Haiti to CITES should be taken in the very near future.

LITERATURE CITED

Barber, J. 1980. Survey of Caribbean wildlife products. Traffic (Int) bulletin 2(2): 13-14.

Bullis, H.R. 1984. Proceedings of the Western Atlantic Turtle Symposium, July 1983. Costa Rica. RSMAS Printing, Miami.

Carr, A., A. Meylan, J. Mortimer, K. Bjorndal and T. Carr. 1982. Survey of sea turtle populations and habitats in the Western Atlantic. NOAA Technical Memorandum NMFS-SEFC-19, 47 pp.

Centre d'Etudes de Geographie Tropicale (CEGET-CNRS). 1985. Atlas d'Haiti. Universite de Bordeaux 3. 146 pp.

Groombridge B. and R. Luxmore. 1987. The Green turtle and Hawksbill (Reptilia: Chelonidae): World status, exploitation and trade. A draft report to the CITES Secretariat. IUCN Conservation Monitoring Centre.

Kavanaght, R. 1984. National report for Haiti. Proceedings of the Western Atlantic Turtle Symposium (WATS), July 1983. Costa Rica. RSMAS Printing, Miami.

Luxmore, R. and J. Canin. 1985. International trade in raw sea turtle shell. IUCN/WTMU, Traffic Bulletin 7(2): 30-39.

Mack, D., N. Duplaix and S. Wells. 1979. The sea turtle: an animal of divisible parts. International trade in sea turtle products. TRAFFIC (USA) Special Report I. Wash. D.C. 86 pp.

Meylan, A. and D. Mack. 1983. Sea turtles of the West Indies: A vanishing resource. Trinidad Naturalist Magazine, Vol.4(9): 5-6.

Meylan, A. 1984. A study of the Caribbean Hawksbill Turtle. WWF Monthly Report (October): 269-275.

Milliken, T. and H. Tokunaga. 1987. The Japanese sea turtle trade 1970-1986. TRAFFIC (JAPAN) Special Report. Wash. D.C. 171 pp.

Dexmelin, A.O. 1967. Histoire des aventuriers flibustiers et boucaniers, Tome III. Librairie Commerciale & Artistique. Paris. 269 pp.

Ottenwalder, J.A. 1981. Estudio preliminar sobre el status distribucion y biologia reproductiva de las tortugas marinas en la Republica Dominicana. Tesis Licenciado, Univ. Aut. Santo Domingo. Santo Domingo, Republica Dominicana. 112 pp.

Ottenwalder, J.A. 1983. Status of sea turtles nesting in Haiti: preliminary results of the 1982-1983 aerial surveys. Unpublished report prepared for the Western Atlantic Turtle Symposium (WATS), and the National Marine Fisheries Service (NMFS/NOAA). 14 pp.

Parsons, J.J. 1962. The green turtle and man. Univ. of Fla. Press. Gainsville.

Rathbun G.B., C.A. Woods, and J.A. Ottenwalder. 1985. The manatee in Haiti. Oryx, Vol XIX: 234-236.

Weil, T.E., J.K. Black, H.I. Blutstein, K.T. Johnston, D.S. McMorris, F.P. Munson. 1973. Area handbook for Haiti. U.S.Government Printing Office. Wash. D.C. 189 pp.

Table 1. Sea turtle nesting crawls recorded during the aerial survey of May 1983 (see Fig.3 for location of nesting sites).

OBS. NO.	COASTAL SEC. NO.	NO. OF NESTS fresh	old	TURTLE SPECIES	BEACH	BEACH DESCRIPTION
1	5	1	0	Eret	between Laborieux & P.des Lataniers	sandy tan, some stretches backed by dunes, with open surf or fringed by reef
2	5	0	3	Che	between Laborieux & P.des Lataniers	" " "
3	7	0	1	Eret	Ile-a-Vache, at Point de L'Est	fringed by reef, backed by mangrove
4	7	1	0	Che	Ile-a-Vache, at Pointe Diamant	open surf, backed by mangrove and lagoon
5	10	1	0	Der	near Tiburon	high energy,gray sand backed by dunes and scrubby vegetation
6	12	0	1	Eret	near Anse d'Azur	pocket beach, white
7	13	0	1	?	east of Jeremy	gray sand, extensive beach
8	21	0	1	Che	near Freycinau, west of St.Marc	pocket beach

Table 2. Observations of sea turtles in the water surface during aerial surveys in Haiti (see Fig. 5 for locations).

OBS. NO.	SURVEY		TURTLE		HABITAT TYPE	LOCATION
	SEC.NO.	DATE	SPECIES	SIZE CLASS		
1	7	7/5/83	Eret	juv	Patch reef	N. of Ile-a-Vache
2	7	7/5/83	Che	juv	Grass flat	E. of Ile-a-Vache
3	12	7/5/83	Che	juv	Grass flat	Baie de Dame Marie
4	14	7/5/83	Che	juv	Shallow reef	Baie de Grande Cayemite
5	9	14/11/82	Che	adult	Grass flat	near Port-a-Piment beach
6	9	14/11/82	Che	adult	Deep water reef	0.7 km S Chardonnieres
7	10	14/11/82	Che	adult	Grass flat	between Chardonnieres and Les Anglais
8	10	14/11/82	Eret	juv	Patch reef	1 Km SW Anse du Milieu
9	11	14/11/82	Che	adult	Grass flat	0.4 km W from coast of Baie des Irois
10	30	12/5/82	?	juv	Patch reef	0.5 km N Bord de Mer

Table 3. Survey of sea turtle carapaces and shell products recorded in markets, hotels and tourist shops of Port-au-Prince, Petionville and Cap-Haitien during November 1983 (Tony Tucker and Emily Roet, pers. comm.).

SIZE CLASS (cm)	NO. OF CARAPACES			TOTAL	PERCENT (%)
	Eretmochelys	Chelonia	Caretta		
20	0	0	0	0	0
20-30	35	0	0	35	13.3
30-50	74	16	2	92	34.9
50-70	8	54	0	62	23.5
70-90	7	66	0	73	27.7
90	1	1	0	2	0.76
TOTAL	125	137	2	264	
%	47.4	51.2	0.8		

TABLE 4. International trade of bekko and other tortoiseshell (kg) to and from Haiti between 1959 and 1986.

YEAR	EXPORTS TO		IMPORTS	
	Japan[a]	other countries	amount	country
1959	311			
1960	0			
1961	827			
1962	2,090			
1963	899			
1964	944			
1965	687			
1966	820			
1967	1,016			
1968	1,468			
1969	1,490			
1970	1,497			
1971	1,983			
1972	1,954			
1973	2,390			
1974	678			
1975	831			
1976	1,094	90[b]		
1977	1,173			
1978	959			
1979	1,689			
1980	1,020		8,404.6[c]	Cayman Is.
1981	892	8,413[d]		
1982	1,188			
1983	1,788			
1984	1,988			
1985	2,203			
1986	2,767			

SOURCE: a) Groombridge and Luxmore (1987)
b) to Italy! (Mack, Duplaix and Wells, 1979)
c) Luxmore and Canin (1985)
d) Re-exported from Haiti (origin Cayman Is.) to F.R. Germany (Luxmore and Canin, 1985)

FIGURE 1

Aerial surveys coverage for sea turtles in Haiti

——— 10-13 May 1982
---- 14 Nov 1982
-.-. 5-7 May 1983

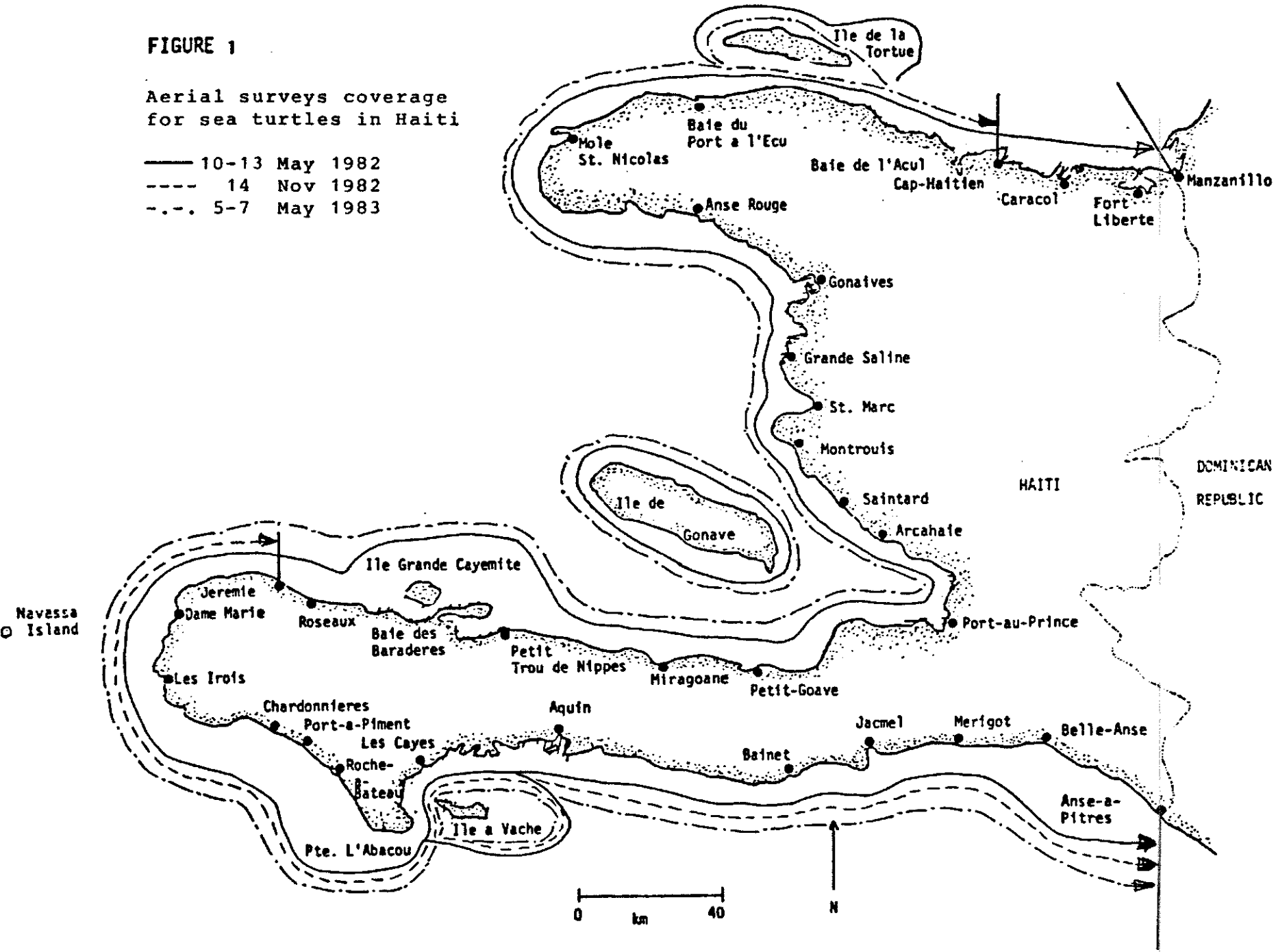

FIGURE 2

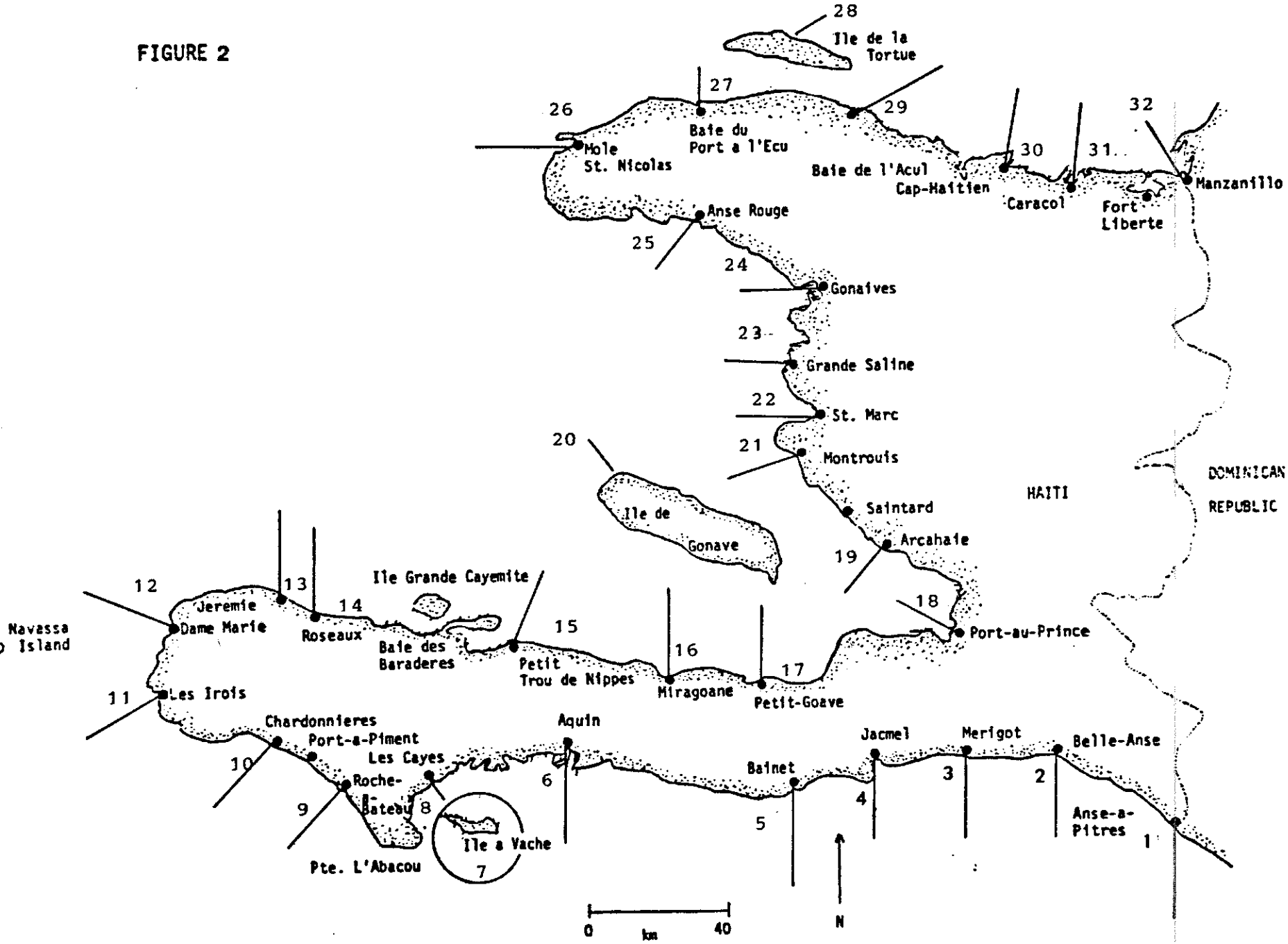

FIGURE 2. Coastal section units used during the aerial surveys for sea turtles in Haiti.

FIGURE 3

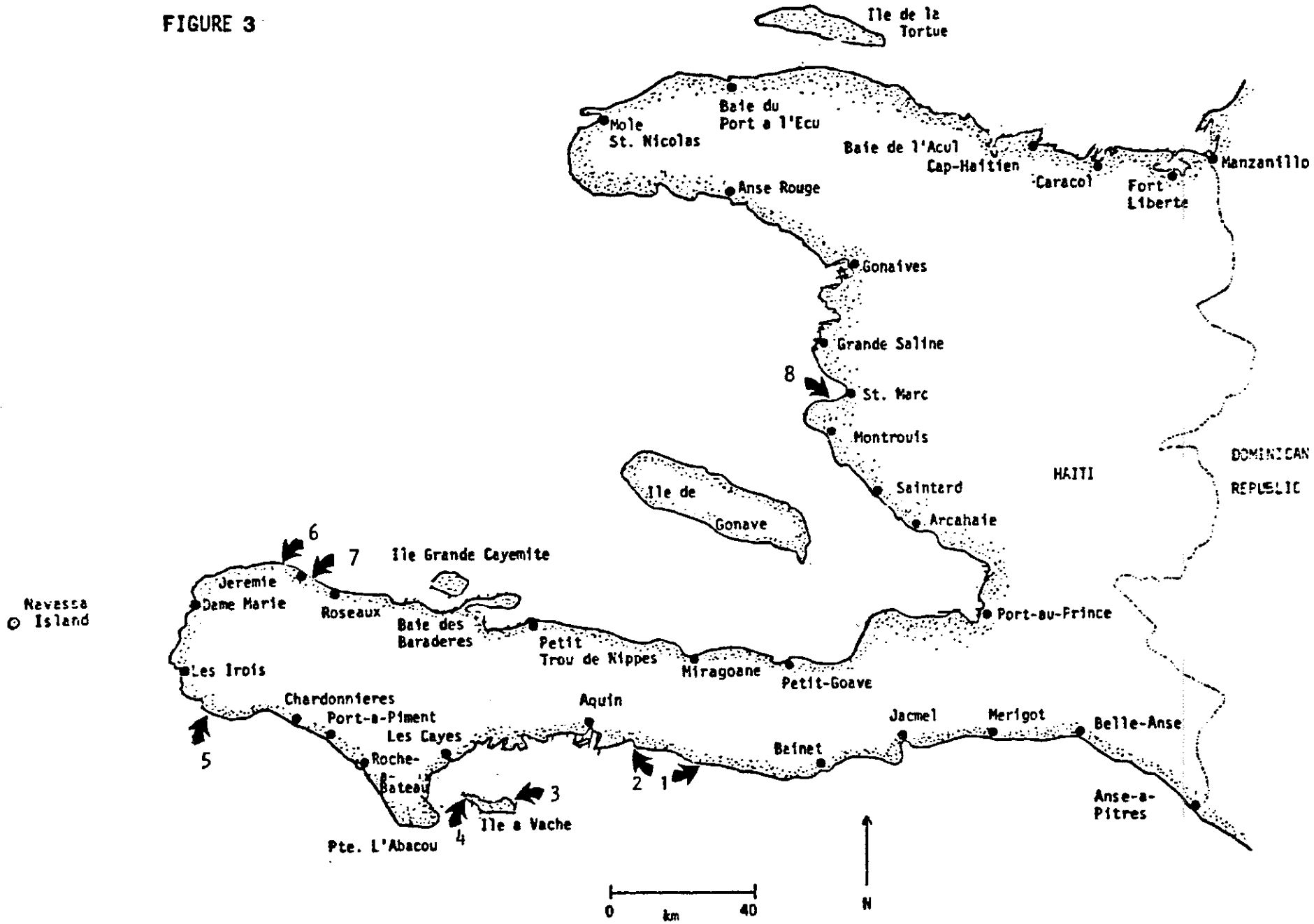

FIGURE 3. Location of sea turtle nesting crawls recorded during the aerial survey of May 1983 (see Table 1).

FIGURE 4

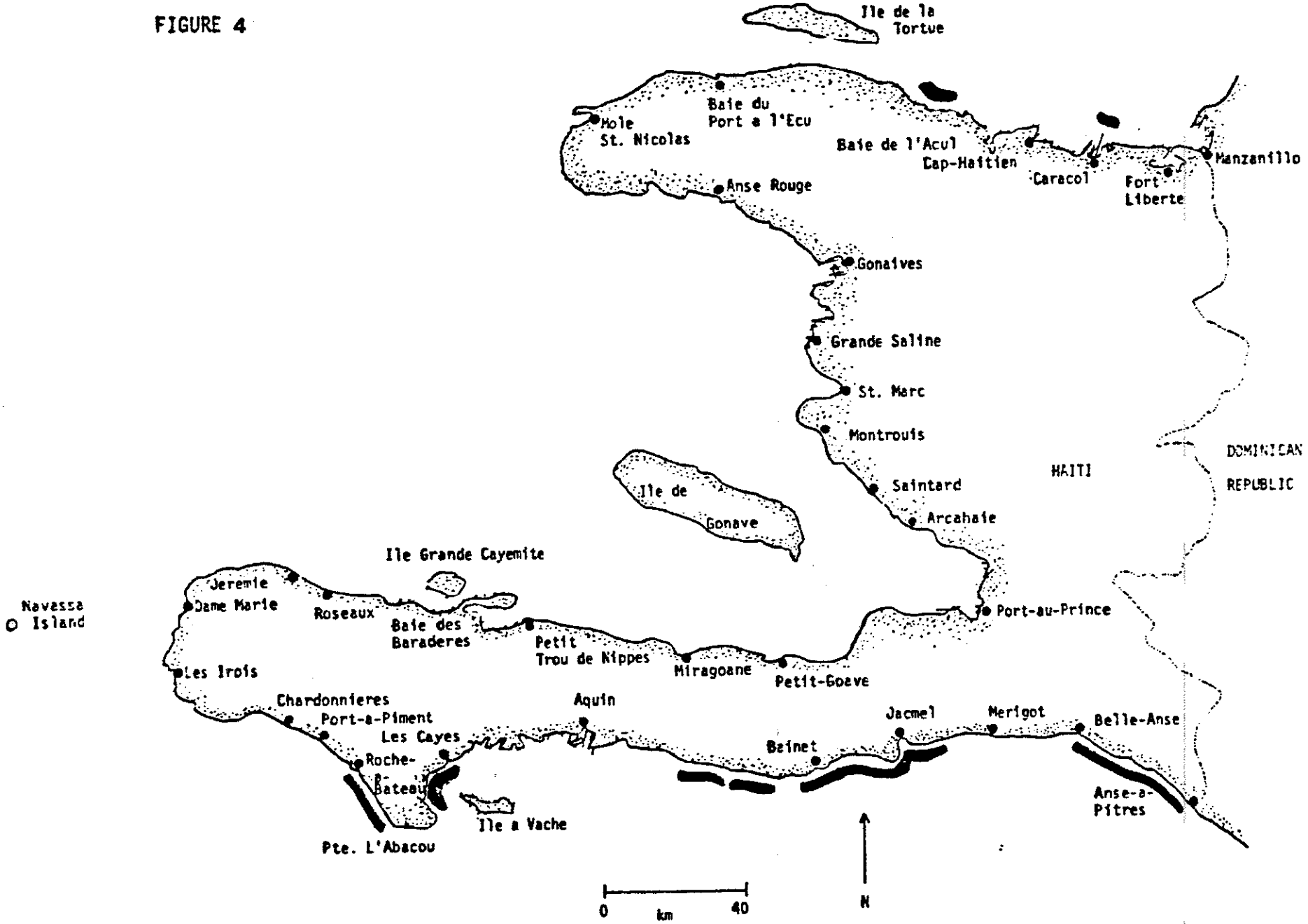

FIGURE 4. Sea turtle nesting sites recorded during ground-truth surveys (see Kavanaght 1984).

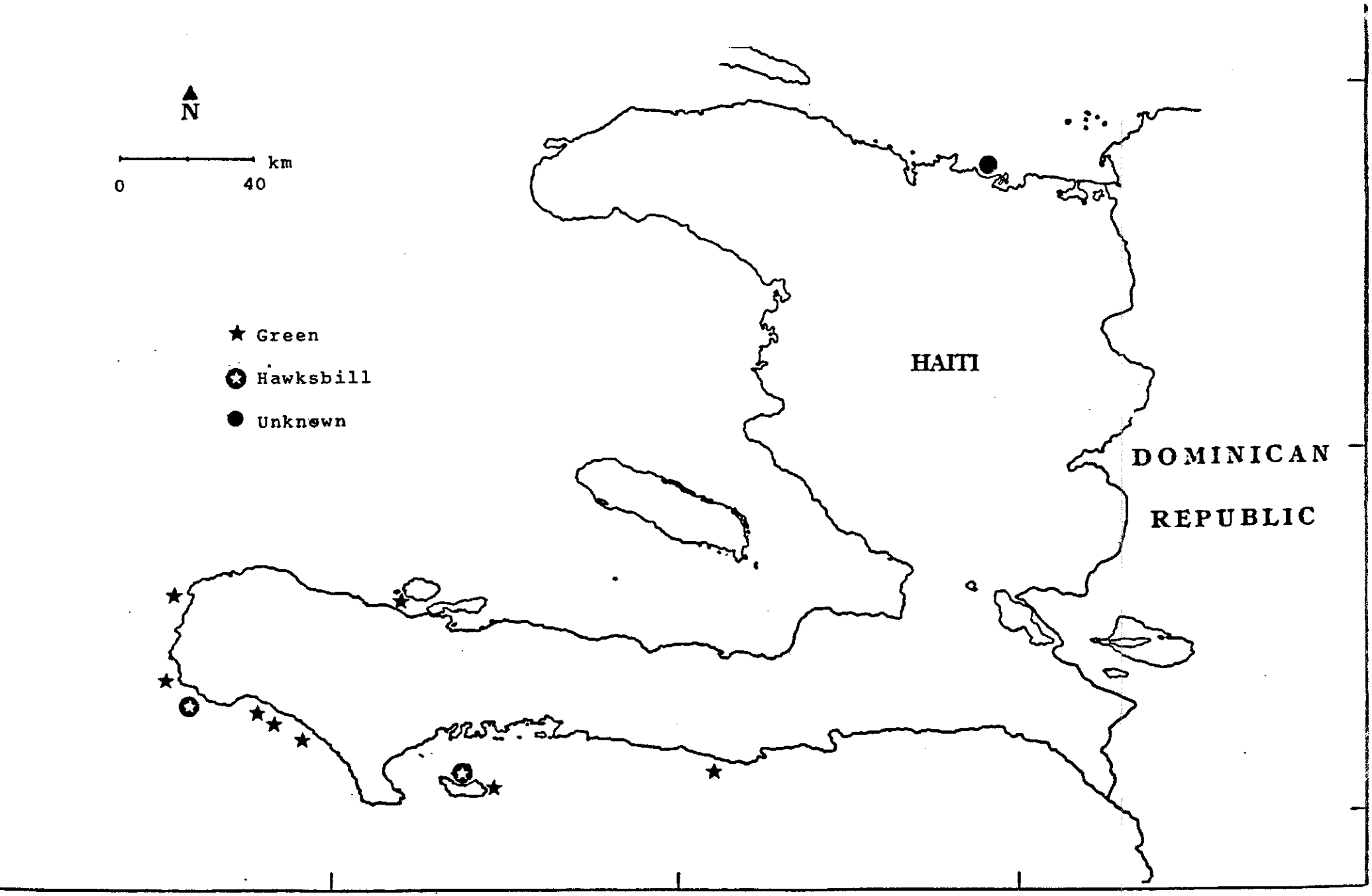

FIGURE 5.- Observations of sea turtles on the water surface recorded during aerial surveys in Haiti (see Table 2)

FIGURE 6

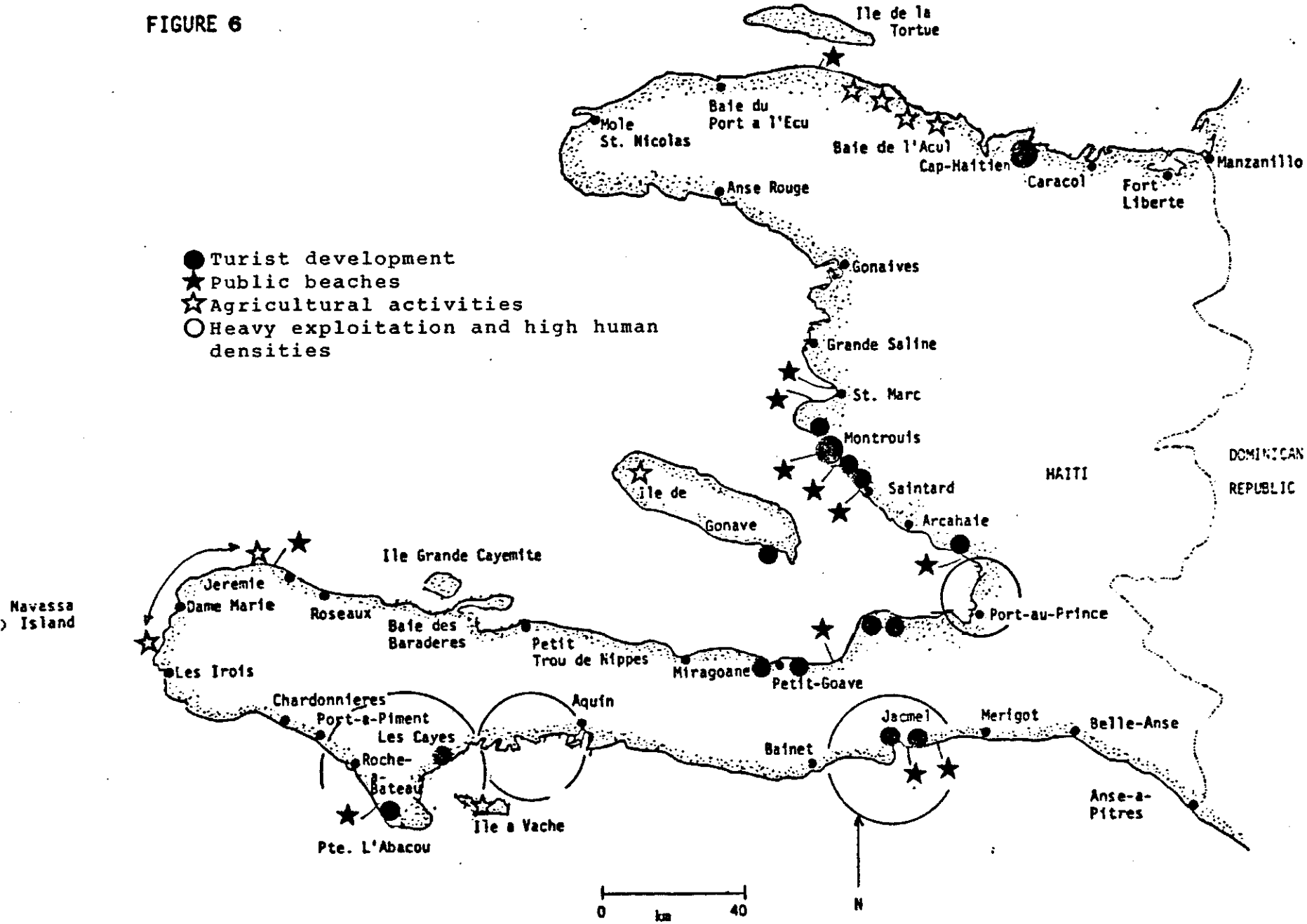

FIGURE 6.- Human impact on coastal habitats and potential nesting sites.

FIGURE 7.

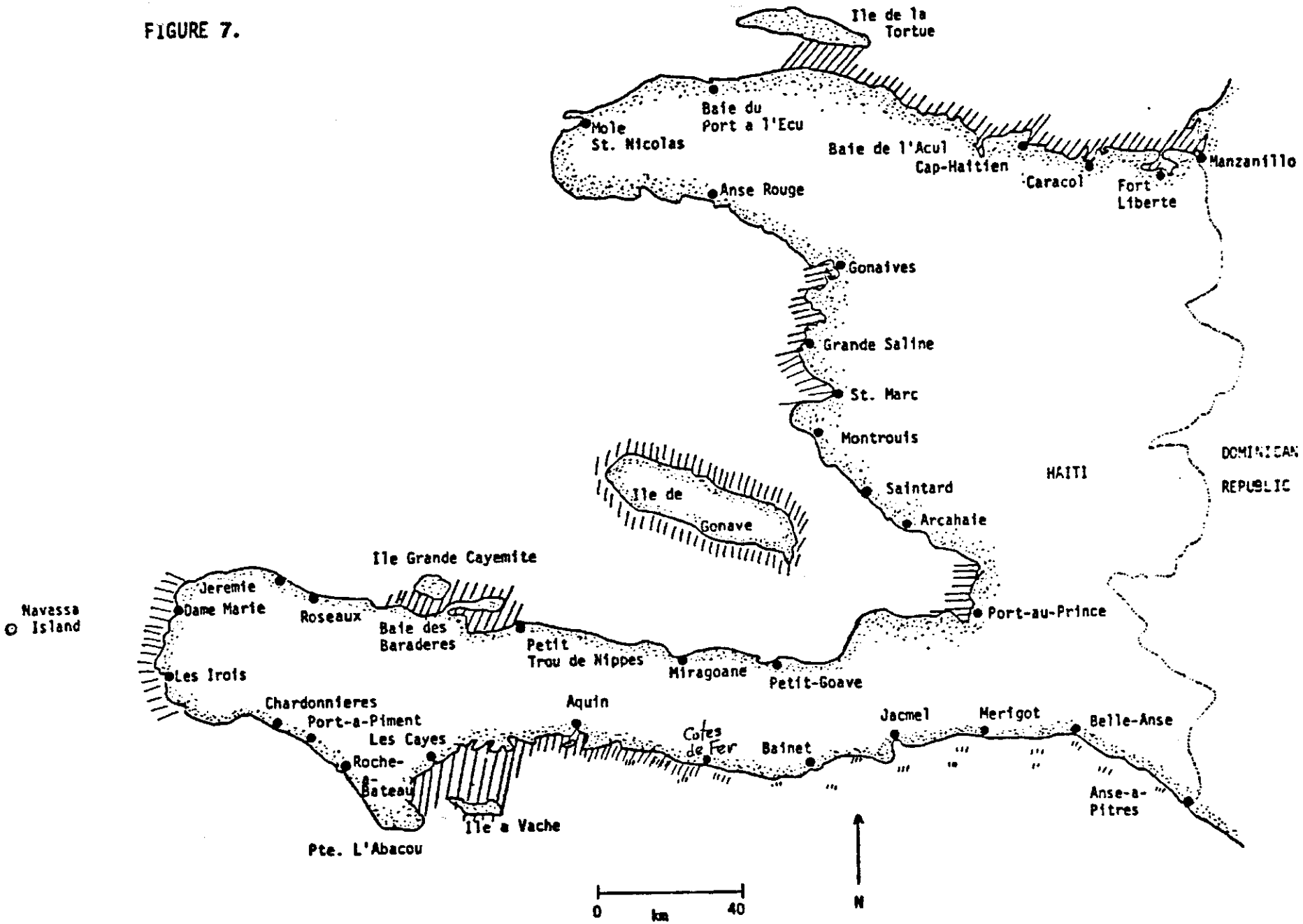

FIGURE 7.- Important sea turtle foraging areas identified during aerial surveys.