Swimming Against the Tide: Recent Surveys of Exploitation, Trade, And Management of Marine Turtles In the Northern Caribbean

By Elizabeth H. Fleming

This prepublication copy contains the full final text of the report. The final publication will contain additional maps and photographs.

TRAFFIC North America

April 2001

Published by TRAFFIC North America
Washington, D.C., USA

ISBN 0-89164-161-0

Cover photograph by Ursula Keuper-Bennett and Peter Bennett
Design by Williams Production Group

Printed on recycled paper.

CONTENTS

TABLES

FOREWORD

Marine turtle conservation efforts in recent decades seem to have attracted more than their fair share of charismatic, dedicated champions. Tragically, the completion of this report on marine turtle exploitation in the Northern Caribbean coincided with the premature loss of one of the most courageous and determined of them all.

Elvira Carrillo Cardenas (1941-2001) spent the last 20 years of her life striving to deal with science, conservation, history, and the economic hardship faced by the people of her country in order to manage marine turtle fisheries in Cuba. Her leadership of Cuba's efforts to gain CITES approval of limited hawksbill turtle shell exports in 1997 and 2000 was a relatively small part of this work, but it was doubtless among the most stressful tasks of her career. Elvira went to extraordinary lengths to engage anyone who was motivated to learn more about Cuba's marine turtle management program. She was determined to understand the perspectives and reasoning of those who questioned the approaches she believed so strongly to be right. In doing so, she gained respect from people across the wide spectrum of opinion. Her sense of humor, honesty, and friendship will be widely missed.

When Elvira first heard about TRAFFIC's research for this report, she understandably suspected yet another attempt to undermine Cuba's position in CITES. Eventually, though, she became a key contributor to our understanding of marine turtle management in Cuba and its place in the context of the surprisingly active legal and illegal fisheries and domestic markets we found elsewhere in the Northern Caribbean. It is in recognition of her trust that we dedicate this report to her memory. We hope that the light it sheds on the nature and dynamics of marine turtle exploitation in the Caribbean region will play some part in informing more effective conservation and management efforts for the future.

Steven Broad
Executive Director, TRAFFIC International

ACKNOWLEDGMENTS

Many people provided support to the Northern Caribbean marine turtle project over the course of the last two years. Andrea Gaski (former Director of Research, TRAFFIC North America and now Chief of CITES Operations, Division of Management Authority, U.S. Fish and Wildlife Service) proposed and initiated the project. Nancy Daves (CITES Coordinator, U.S. National Marine Fisheries Service), Marydele Donnelly (Program Officer, IUCN/SSC Marine Turtle Specialist Group), and Miguel Jorge (Regional Marine and Freshwater Coordinator, WWF Latin America and Caribbean Program) provided useful suggestions and contact information, particularly during the project design phase. Patrick Opay (Consultant) helped gather and analyze information from the Dominican Republic, Jamaica, Mexico, and Puerto Rico. Marcus Phipps (Deputy Director, TRAFFIC East Asia), Jorge Picón (Senior Resident Agent, Division of Law Enforcement, U.S. Fish and Wildlife Service), and Adrian Reuter (National Representative, TRAFFIC North America, Mexico office) clarified information about international trade in turtle products, legislation, and enforcement.

Alberto Abreu Grobois (Chair, IUCN/SSC Marine Turtle Specialist Group), Steven Broad (Executive Director, TRAFFIC International), Tom De Meulenaer (Director, TRAFFIC Europe), Jack Frazier (Research Associate, Conservation and Research Center, Smithsonian Institution), and Karen Eckert (Executive Director, WIDECAST) reviewed the draft report and provided technical input and additional information that enhanced the final product.

TRAFFIC North America is grateful to all the marine turtle specialists, resource managers, fishers, traders, and numerous others in the Northern Caribbean who contributed vital information to this study; they are listed as personal contacts in the national review sections of this report. Special thanks are owed to Eleanor Phillips (Bahamas); Mervin Hastings (British Virgin Islands); Gina Ebanks-Petrie (Cayman Islands); Elvira Carrillo and Charlie Manolis (Cuba); Cecilia Hernández, Yolanda León, Matilde Mota, and José Ottenwalder (Dominican Republic); Rhema Kerr Bjorkland, Andrea Donaldson, and Charles Moodie (Jamaica); Juan Carlos Cantú, Lilia Estrada, Cristina García-Angel, Mauricio Garduño-Andrade, Vicente Guzmán-Hernández, René Márquez Millan, Roberto Herrera Pavón, and María Elena Sánchez (Mexico); Carlos Diez and Marelisa Rivera (Puerto Rico); Michele Taylor (Turks and Caicos Islands); and Ralf Boulon and Zandy-Marie Hillis-Starr (U.S. Virgin Islands).

The author is indebted to her colleagues at TRAFFIC North America for their advice, review comments, administrative back stopping, patience, and moral support throughout the life of the project; particular thanks are owed to Simon Habel, Craig Hoover, and Holly Reed. Thanks also go to Alice Taylor of WWF-US for her fortitude in editing a rather unwieldy final draft.

The work was made possible through funding provided by The Rufford Foundation, the WWF-US Species Action Fund, the WWF Latin America and Caribbean Program, and TRAFFIC North America. Technical and logistical assistance was provided by the IUCN/SSC Marine Turtle Specialist Group and the Wider Caribbean Sea Turtle Conservation Network (WIDECAST).

EXECUTIVE SUMMARY

Marine turtles have been exploited in the Caribbean for centuries. Caribbean peoples are thought to have used turtles for thousands of years without overexploiting the resource, which according to historical accounts was extremely abundant prior to European colonization in the region. Turtle eggs and most turtle body parts--meat, shell, skin, and viscera--have been valued for one attribute or another, and they have provided everything from basic sustenance to luxury items.

Direct exploitation has had a particularly strong impact on marine turtle populations in the Caribbean. Six species of marine turtles occur in the region: the loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), Kemp's ridley turtle (*Lepidochelys kempii*), olive ridley turtle (*Lepidochelys olivacea*), and leatherback turtle (*Dermochelys coriacea*). Each of these species is classified by the World Conservation Union (IUCN) as either critically endangered (hawksbill, Kemp's ridley, and leatherback turtles) or endangered (green, loggerhead, and olive ridley turtles).

The once vast green turtle rookery in the Cayman Islands was rendered virtually extinct by the late 1700s after a century of intensive exploitation of nesting turtles, which were traded mostly for their meat. This population remains on the verge of extinction. The more recent exploitation of hawksbill turtle shell saw huge quantities exported to Japan up until the early 1990s.

In 1999, TRAFFIC North America initiated a review of the exploitation, trade, and management of marine turtles in 11 countries and territories in the Northern Caribbean. This review, which combined desk research and field surveys, was undertaken to gather and synthesize information about harvest of marine turtles, use of and trade in their products, and the effects these activities may be having on marine turtle populations. Updated information of this nature had been lacking, and it was felt that an overview of current exploitation of marine turtles would be essential to the success of ongoing efforts to manage and conserve marine turtles in the region.

The overall picture revealed by TRAFFIC's study is one of extremes and contrasts that coincide roughly with the levels of development that separate the countries. Some countries have allocated significant resources to manage and conserve marine turtles, while next to nothing has been done in others. Marine turtle populations have stabilized or increased in some parts of the Caribbean, while virtual extirpation and catastrophic declines have occurred in others. A few countries/territories have made enforcement of relevant regulations an important part of their conservation efforts; in others, enforcement is virtually absent. Legislation is comprehensive in some countries while incomplete and outdated in others. Marine turtles are afforded complete protection in some countries, and there are conscious policies to regulate fisheries in others; at the same time, all countries are confronted with a latent market for marine turtle meat and eggs, and opportunistic take is reported throughout the region.

Exploitation and trade of marine turtles and their products appear to be in decline throughout the Northern Caribbean, perhaps due largely to the fact that past overharvesting reduced some populations to the point where their exploitation was no longer profitable. In addition, improved legal protection and law enforcement, education, decreased national and international demand, and changing cultural values are all thought to have contributed to a reduction in the use of marine turtles in the region. Most current exploitation of marine turtles appears to have become opportunistic rather than targeted.

Nevertheless, many populations have not yet rebounded from past exploitation, and they continue to be affected by current levels of exploitation. Though several range states in the region are apparently experiencing increases in nesting of certain marine turtles at some important nesting sites, most of these increases appear to be directly related to increased monitoring and enforcement, rather than a reduction in demand for meat and eggs.

All of the countries and territories reviewed have enacted legislation to regulate the harvest and trade of marine turtles; however, these have been national in scope, and vary widely in terms of the protection afforded various species, penalties set for infractions, and enforcement thereof. Research, management, and protection are not, in most cases, coordinated among countries, despite the existence of shared turtle populations; bilateral and multilateral cooperation would be an enormous step forward. It is widely acknowledged that cooperation among range states is critical to ensure the conservation of marine turtles in the Caribbean region.

TRAFFIC's general conclusion from this research is that eight major areas of action need to be addressed by the countries/territories surveyed and the Wider Caribbean region. These are (1) filling information gaps and increasing information exchange; (2) expanding public education and awareness; (3) building national and regional cooperation; (4) increasing participation in international and regional conventions; (5) strengthening national legislation; (6) supporting training and capacity building; (7) enforcing laws that affect local and tourist markets; and (8) documenting and monitoring existing stocks of marine turtle products in the region.

Marine turtles feature among the priority species and taxonomic groups on which the international TRAFFIC Network will focus its efforts in the coming years. WWF's Latin America and Caribbean Program recently identified marine turtles as a flagship species group and will focus greater efforts on their conservation. With this report, TRAFFIC North America offers an informational foundation and a set of recommended actions that can help support the in-depth work that must be done to rebuild and conserve Northern Caribbean marine turtle populations.

I. INTRODUCTION

Marine turtles in the Caribbean have been exploited for many centuries. These ancient reptiles have provided everything from basic sustenance to luxury items, and nearly all of their body parts have been used for specific purposes. Marine turtle meat and eggs have long provided a supplemental source of protein for coastal communities in the Caribbean, and the eggs are often sought today for their supposed aphrodisiac qualities. Other turtle products include oil, calipee (cartilage), skin, viscera, shell, and curios. Caribbean peoples may have used turtles for thousands of years without overexploiting the resource, which, according to historical accounts, was extremely abundant prior to European colonization in the region.

But indigenous subsistence use of marine turtles was outpaced by the intensive capture of the turtles begun by Europeans to feed their sailors, colonists, and slaves (Nietschmann, 1979). Transported to Europe on board ships, green turtle meat became relished in soup on the continent, particularly in Britain. Other markets opened in Europe and Asia, and Caribbean marine turtles and their eggs became heavily exploited. The once abundant green turtle stocks around the Cayman Islands had been depleted by the late 1700s and have yet to recover.

In the 1950s and 1960s, international markets for shell from hawksbill turtles expanded, and markets developed and grew for green and olive ridley turtle shell and leather. The United States, Europe, and Japan were major markets until domestic legislation and international regulations closed the legal trade to the United States and Europe.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), a global treaty regulating the trade in wildlife and wildlife products, entered into force in 1975 and prohibited commercial international trade in all Caribbean marine turtles and their products by 1977. Japan acceded to CITES in 1980, but at the time entered a reservation (legal objection) to the protective Appendix I listing of hawksbills (withdrawn in 1994), greens (withdrawn in 1988), and olive ridleys (withdrawn in 1992).

In the 1970s and 1980s, Japan imported hundreds of metric tons of hawksbill turtle shell (known as *bekko* in Japan), approximately half of which originated in the Caribbean, to supply its domestic carving industry (Milliken and Tokunaga, 1987). However, legal international trade in hawksbill turtles on a commercial scale effectively ended when Japan withdrew its reservation to the Appendix I listing of the hawksbill turtle in July 1994.

Irrespective of the prohibition of international trade on a commercial scale, marine turtles continue to be taken incidentally or opportunistically throughout the Caribbean; domestic use remains widespread; and turtle products continue to be traded illegally within the region and exported illegally from the region.

In September 1999, TRAFFIC North America initiated a review of the current exploitation, trade, and management of marine turtles in the Northern Caribbean. The only review of its kind in more than a decade, it was undertaken to address the need for updated information for natural resource managers and policy makers, including CITES Parties.

The main object of this review has been to compile and summarize information regarding legal and illegal markets for marine turtles and their products; the extent to which turtles and eggs are harvested; and management initiatives and challenges in the northern Caribbean. This report summarizes information obtained from the Bahamas, British Virgin Islands, Cayman Islands,

Cuba, Dominican Republic, Haiti, Jamaica, eastern Mexico, Puerto Rico, the Turks and Caicos Islands, and the U.S. Virgin Islands. The findings offer a snapshot of marine turtle exploitation and trade issues in the Northern Caribbean--and that snapshot is meant to be a catalyst for change.

References

Milliken, T. and H. Tokunaga. 1987. *The Japanese sea turtle trade, 1970-1986*. TRAFFIC Japan. Prepared for the Center for Environmental Education. Washington, D.C. 171 pp.

Nietschmann, B. 1979. The cultural context of sea turtle subsistence hunting in the Caribbean and problems caused by commercial exploitation. Pages 439-445 in Bjorndal, K. A., editor. 1982. *Biology and Conservation of Sea Turtles*. Smithsonian Institution Press. Washington, D.C. 569 pp.

II. METHODS

From September 1999 through December 2000, TRAFFIC North America gathered and analyzed information on the exploitation, trade, and management of marine turtles in 11 nations and territories in the Northern Caribbean (table 1). This report is the result of an analysis of literature, statistical data, interviews, and market surveys.

Research was initiated with literature and Internet searches, which included the *Sea Turtle Online Bibliography*, maintained by the Archie Carr Center for Sea Turtle Research at the University of Florida (http://accstr.ufl.edu/biblio.html). Prior to conducting field visits, TRAFFIC analyzed international trade data; collected statistics on seizures and prosecutions; and consulted with a variety of knowledgeable individuals in government agencies, nongovernmental organizations, research institutions, and universities. Once in the Caribbean, researchers from TRAFFIC met with government officials, marine turtle scientists, fishers, traders, and others with knowledge on the subject. The field visit to Cuba was undertaken by a staff member of TRAFFIC International on invitation by the Cuban government. Information sought included the following:

- ♣ harvest of marine turtles in directed or opportunistic fisheries, as well as any information on the collection of eggs from beaches and on the scale and use of bycatch;
- ♣ subsistence use and other domestic markets, and their impacts on the status, management, and conservation of marine turtles;
- ♣ harvesting seasons and regions, as well as the destination, use, and value of marine turtle products;
- ♣ the sources of raw materials for turtle products, the types of fisheries in which they originate, the scale of the industry and trade, and the destination of the products;
- ♣ any information on the status and management of marine turtles.

Whenever possible, TRAFFIC researchers visited and surveyed important turtle landing/harvesting sites and marketplaces for turtles and their products. Finally, turtle researchers, resource managers,

Table 1. TRAFFIC Field Visits in the Northern Caribbean

Country/Territory	Date
Bahamas	29 November - 5 December 2000
British Virgin Islands	27 - 30 January 2000
Cayman Islands	7 - 12 October 2000
Cuba	12 – 14/17 January 2000
Dominican Republic	1 - 11 November 1999
Haiti	Not visited
Jamaica	4 - 12 January 2000
Mexico (Atlantic coast)	28 November - 9 December 1999
Puerto Rico	4 - 11 October 1999
Turks and Caicos Islands	12-18 October 2000
U.S. Virgin Islands	22 – 26/31 January - 1 February 2000

enforcement officers, fishers, and other stakeholders were queried on their suggestions for improving the management and conservation of marine turtles in the particular nation or territory.

Metric or imperial measurements are given according to the system used by the country being discussed, or as they were reported to researchers, with the equivalent measurement in parentheses.

Note: Some of the international trade data analyzed in this report is taken from CITES Annual Reports and compiled by the World Trade Monitoring Centre. On the one hand, these data are useful in showing the types and levels of reported trade in marine turtle products. On the other hand, they have numerous limitations, such as the fact that CITES Parties often fail to use standard terms or units for reporting trade in wildlife products, which makes comparison of these terms impossible. For example, the term "specimen" is used by Parties to describe anything from a vial of blood to a whole animal and it is often difficult to understand what is being reported.

III. REGIONAL OVERVIEW

A. Conservation Status of and Threats to Marine Turtles in the Northern Caribbean

Six species of marine turtles occur in the Caribbean: the loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), Kemp's ridley turtle (*Lepidochelys kempii*), olive ridley turtle (*Lepidochelys olivacea*), and leatherback turtle (*Dermochelys coriacea*). Each of these species is classified by the World Conservation Union (IUCN) as either critically endangered (hawksbill, Kemp's ridley, and leatherback turtles) or endangered (green, loggerhead, and olive ridley turtles). The status assessments of hawksbill, green, and olive ridley turtles, however, have been challenged by certain experts (Hilton-Taylor, 2000). All of these species are listed on CITES Appendix I, which prohibits international commercial trade.

Marine turtle populations are affected by a wide variety of threats including loss or degradation of nesting beaches and marine habitats, capture as bycatch in net and line fisheries, and exploitation for subsistence and commercial use. Direct exploitation, especially of gravid (egg bearing) females, has had a particularly strong impact on many marine turtle populations in the Caribbean. Egg collection by coastal inhabitants is widespread, while subsistence and opportunistic fisheries are often not selective about the size of the turtles they catch.

Several life history characteristics make it difficult for heavily exploited marine turtle populations to rebound, and cause uncertainties in management. Female turtles generally do not reproduce until they are at least 15 to 20 years of age in some species, and up to 50 years in others. Turtles in exploited populations are often caught as juvenile or subadult turtles--before they are able to reproduce. Eggs, hatchlings, and juveniles suffer heavy natural mortality, so additional human-caused mortality further reduces the number that will mature and produce the next generation of turtles. Estimates of local population size and composition, and population-level impacts of harvest, are difficult to determine because the highly migratory turtles move in and out of national jurisdictions as they grow, feed, and reproduce.

Furthermore, laws and regulations pertaining to marine turtles often do not reflect these realities of marine turtle biology. For example, biologists recommend that marine turtles be managed like other long-lived species--with the focus on protecting breeding-age adults. Instead, however, traditional management has focused on protecting eggs and small turtles and permitting harvest only after the turtles have reached a minimum size or weight. This results in subadult and breeding-age turtles being targeted by the legal fishery. In contrast to the high natural mortality suffered by the youngest age classes, annual natural survivorship in adult marine turtles is significant (adult turtles are well armored and have few natural predators). In the absence of human intervention, adults are expected to live a long time and produce thousands of eggs. Laws that protect the smallest marine turtles but allow the harvest of the older/larger size classes can have a devastating effect on marine turtle populations (Crouse, 1999; Crouse et al., 1987; Eckert, 1995; Frazer, 1989; Frazier, 2001).

Note: The reader is directed to reports summarizing threats to Caribbean marine turtles (e.g., Eckert, 1995; Ogren, 1989) for more comprehensive imformation.

B. Regulation of Marine Turtle Exploitation and Trade in the Caribbean

1. CITES and Regional Conventions

A number of international and regional treaties have the potential to assist efforts to conserve marine turtles in the Caribbean. As far as exploitation, trade, and management are concerned, some of the most relevant include CITES, the Cartagena Convention and its SPAW Protocol, and the Inter-American Convention for the Protection and Conservation of Sea Turtles. Table 2 (page 12) provides a rundown of treaty participation by the countries and territories surveyed in the Northern Caribbean.

a) CITES

With the exception of Haiti, all the nations surveyed for this report are Parties to CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). This conservation treaty regulates international trade in over 30,000 species of wild plants and animals and their products to prevent such trade from threatening the species concerned. CITES was established in 1973 and entered into force on 1 July 1975. The Convention currently has over 150 Parties, including most countries in the Caribbean region.

CITES established an international system for regulating trade in plant and animal species that are or may become threatened with extinction as a result of commercial trade practices. Regulated species are listed on one of three appendices to the Convention, and trade in these species is prohibited or strictly controlled in accordance with the terms of the Convention.

Appendix I includes over 820 plant and animal species, including all seven marine turtle species, that are threatened with extinction and are or may be affected by trade (CITES, 2000). International trade in these species is subject to particularly strict regulation in order to avoid further endangering their survival. International commercial trade in Appendix I species and products is prohibited. Noncommercial trade may be authorized in exceptional circumstances, such as for specimens acquired before the Convention entered into force, for personal or household effects, or for specimens bred in captivity, according to definitions adopted by the Conference of the Parties. Each shipment must be authorized and accompanied by an export permit from the country of origin, or a reexport certificate from the country of reexport, as well as an import permit issued by the importing country.

Appendix II includes nearly 29,000 species (nearly 25,000 plant species) that are not necessarily threatened with extinction but may become so unless their trade is carefully regulated (CITES, 2000). Appendix II species may be traded commercially under certain conditions and each shipment must be authorized and accompanied by an export permit issued by the country of origin or a reexport certificate issued by the country of reexport.

Appendix III includes 230 species that are legally protected within the borders of a CITES member nation because that nation has determined that the species needs international trade control (CITES, 2000). Each shipment must be accompanied by an export permit, if exported from the country that listed the species, or a certificate of origin if exported or reexported from any other country.

Upon joining CITES, each member state is required to designate its own Management and Scientific Authorities to implement the provisions of the Convention. Their principal task is to determine when CITES-listed specimens may be traded to or from their country.

CITES Parties may enter reservations (legal objections) with respect to species listed in the CITES Appendices at the time that they accede to the Convention, or during the 90 days after the adoption of an amendment to the appendices. States entering a reservation are treated as a non-party to the Convention with respect to trade in the species, part, or derivative in question, until the reservation is withdrawn. Parties having entered reservations are requested to maintain statistical records on trade in the species in question and to include these statistics in their annual reports.

CITES is not a self-executing treaty. It contains no internal implementation or enforcement mechanism automatically establishing infrastructures or penalties within the countries that have acceded to the treaty (de Klemm, 1993). Instead, the Convention requires that Parties take "appropriate measures" to enforce its provisions; member states must enact domestic legislation to accomplish this and establish penalties for violations. In most Party countries, customs and/or national police authorities are given responsibility for enforcing national CITES-implementing legislation. CITES can be effective only to the extent that member countries enact and enforce specific measures implementing its provisions (de Klemm, 1993).

Our research found that the majority of nations surveyed need to enact or improve domestic legislation to enable application of penalties for CITES infractions and confiscation of CITES specimens acquired or traded in contravention of CITES.

b) Cartagena Convention

The Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, 1983 (the Cartagena Convention) is the only legally binding environmental treaty for the region. The Convention and its protocols constitute a legal commitment by the countries of the region to protect, develop, and manage their coastal and marine resources individually and jointly. Article 10 of the Convention addresses the responsibilities of Parties to "individually or jointly, take all appropriate measures to protect and preserve rare or fragile ecosystems, as well as the habitat of depleted, threatened, or endangered species in the Convention area."

The Convention entered into force on 11 October 1986 after having been ratified by the requisite 9 governments. To date, 20 states have ratified the Convention, and The Netherlands and United Kingdom have ratified on behalf of 8 overseas territories. The signatory countries included 9 of the 11 countries/territories surveyed for this report. The Convention area includes the Gulf of Mexico, the Caribbean Sea, and the adjacent areas of the Atlantic Ocean. It stretches from Florida and the Bahamas west to Mexico, south to Colombia, Venezuela, and Suriname, and through the Eastern Caribbean (CEP, 2000).

(1) SPAW Protocol

The Protocol to the Cartagena Convention Concerning Specially Protected Areas and Wildlife (SPAW) highlights the region's growing recognition of the need to conserve threatened, endangered, and depleted fauna and flora and encourages the sustainable management of the region's coastal and ocean resources. It took nearly a decade to become international law, after its adoption in 1990 by the 28 Parties to the Cartagena Convention. It is one of three protocols to the

Convention--the other two deal with cooperation to combat oil spills, adopted in 1983, and land-based marine pollution, adopted in October 1999. The SPAW Protocol was adopted in two stages: its text on 18 January 1990 and its annexes on 11 June 1991. It entered into force on 18 June 2000, after St. Lucia became the ninth of the 13 signatory countries to ratify. The signatory countries included Cuba and the Dominican Republic from among the 11 countries/territories surveyed for this report (CEP, 2000).

The objective of the SPAW Protocol is to protect rare and fragile ecosystems and habitats, and thereby protect the endangered and threatened species that inhabit them. It provides a mechanism to do so on a regional scale. It affords different levels of protection to species listed in its three annexes. Annex I includes threatened, endangered, and endemic species of flora that are exempt from all forms of destruction or disturbance. Annex II includes threatened, endangered, and endemic species of fauna and provides for total protection and recovery of the listed species, with few exceptions. Annex III includes species of marine and coastal flora and fauna that may be used on a rational and sustainable basis and that require certain protection measures.

All six species of marine turtles that occur in the Caribbean are included in Annex II of the protocol. Article 10 stipulates national measures for the protection of wild flora and fauna that should be adopted by the contracting Parties. Parties must identify endangered or threatened species within their national territories and accord them protected status, as well as regulate or prohibit any activities that might adversely affect them or their habitats, and carry out species recovery, management, planning, and other measures to assist the survival of such species.

For species in Annex II, Article 11(1)(b) of the protocol stipulates that each Party shall ensure total protection and recovery of the species by prohibiting (i) the taking, possession, or killing (including, to the extent possible, incidental take, possession, or killing) or commercial trade in such species, their eggs, parts, or products, and (ii) to the extent possible, the disturbance of such species, particularly during periods of breeding, incubation, aestivation, or migration, as well as other periods of biological stress.

Article 11(2) states that "Parties may adopt exemptions to the prohibitions for the protection and recovery of the species …for scientific, educational or management purposes necessary to ensure survival of the species…." Article 14 provides an exemption "to meet the traditional subsistence and cultural needs of its local populations." Article 25 states "nothing in this Protocol shall be interpreted in a way that may affect the right and obligations of the Parties under the Convention on International Trade in Endangered Species of Wild Fauna and Flora and the Convention of Migratory Species of Wild Animals (Bonn Convention)."

c) IAC

Concluded in 1996 and scheduled to enter into force on 2 May 2001, the IAC (Inter-American Convention for the Protection and Conservation of Sea Turtles, 2001) is the only international treaty created specifically to conserve marine turtles and their habitats. As of March 2001, only three of the nations/territories surveyed for this report had signed on to the IAC (see table 2). The treaty's primary objective is "to promote the protection, conservation, and recovery of sea turtle populations and of the habitats on which they depend, based on the best available scientific evidence, taking into account the environmental, socioeconomic, and cultural characteristics of the Parties." The six species of marine turtles that inhabit the Americas are the focus of this Convention.

The Convention area "comprises the land territory of the Americas of each of the Parties, as well as the maritime areas of the Atlantic Ocean, the Caribbean Sea, and the Pacific Ocean, with respect to

which each of the Parties exercises sovereignty, sovereign rights or jurisdiction over living marine resources in accordance with international law, as reflected in the United Nations Convention on the Law and the Sea."

Article IV prescribes that "each Party shall take appropriate and necessary measures…for the protection, conservation, and recovery of sea turtle populations and their habitat." Paragraph 2(a) states "such measures shall include the prohibition of the intentional capture, retention, or killing of, and domestic trade in, sea turtles, their eggs, parts, or products; compliance with the obligations established under the Convention on International Trade in Endangered Species of Wild Fauna and Flora relating to sea turtles, their eggs, parts, or products…."

According to Paragraph 3(a), "each Party may allow exceptions to Paragraph 2(a) to satisfy economic subsistence needs of traditional communities.…"

The treaty was open for signing until 31 December 1998 by "all States of North, South, and Central America, and the Caribbean Sea, as well as other States that have continental or insular territories in the region (France, the Netherlands, and United Kingdom)." Twelve countries have signed the IAC (Belize, Brazil, Costa Rica, Ecuador, Honduras, Mexico, the Netherlands, Nicaragua, Peru, the United States, Uruguay, and Venezuela) and nine have ratified the IAC and deposited their instruments of ratification (Brazil, Costa Rica, Ecuador, Honduras, Mexico, the Netherlands, Peru, the United States, and Venezuela).

d) Other Legal Instruments

Various other legal instruments are relevant, directly or indirectly, to the conservation of marine turtles in the Wider Caribbean region, including the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (Western Hemisphere Convention), the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), the International Convention for the Prevention of Pollution from Ships (MARPOL), the U.N. Convention on the Law of the Sea (UNCLOS), and the Convention on Biological Diversity (CBD).

2. National Regulations Governing Exploitation and Trade

Each of the 11 nations and territories surveyed legislate complete protection of marine turtle eggs, nests, and turtles on beaches (nesting turtles). Five countries/territories legislate complete protection of all life stages of marine turtles, prohibiting take and trade: the Dominican Republic, Jamaica, Mexico, Puerto Rico, and the U.S. Virgin Islands. The remaining six permit some form of legal take: the Bahamas, British Virgin Islands, Cayman Islands, Cuba, Haiti, and the Turks and Caicos Islands. Of these six, all but the Turks and Caicos Islands have closed seasons for harvesting marine turtles (generally established to avoid the nesting season). Five nations/ territories (the Bahamas, British Virgin Islands, Cayman Islands, Cuba, and the Turks and Caicos Islands) establish minimum harvestable size limits for turtles (see table 3); none currently uses maximum size limits. Only the Cayman Islands and Cuba set annual catch quotas for marine turtles.

Domestic use and trade are regulated to varying degrees by these nations/territories. International trade in marine turtles and products is prohibited, for the most part, in each of the 11 nations/territories by virtue of their membership in CITES and/or enactment of domestic legislation prohibiting import and export. The harvest and trade regulations are described in detail in the national review sections that follow.

Enforcement of the applicable harvest and trade controls varies widely throughout the region. For the TRAFFIC survey, the Bahamas, British Virgin Islands, Cayman Islands, Cuba, Dominican Republic, Jamaica, Mexico, Puerto Rico, and U.S. Virgin Islands reported cases in which marine turtle products had been confiscated and/or persons charged with violations related to the take, possession, and/or trade of marine turtles.

Tables 4-7 provide "facts at a glance" regarding the exploitation of hawksbill, green, loggerhead, and leatherback turtles, the turtles most commonly used in the Northern Caribbean. Detailed information on exploitation and trade in these species is found in the national review sections.

Table 2. Membership of Surveyed Nations/Territories in Conventions Pertaining to the Conservation of Marine Turtles, as of March 2001

Nation/territory	**CITES**	**Cartagena Convention**		**SPAW Protocol**		**IAC** (will enter into force 2 May 2001)	
	Party	**Signed**	**Ratified/ Acceded**	**Signed**	**Ratified/ Acceded**	**Signed**	**Ratified**
Bahamas	Yes	No	No	No	No	No	No
BVI (UK)	Yes	Yes	Yes	Yes	No	No	No
Cayman Islands (UK)	Yes	Yes	Yes	Yes	No	No	No
Cuba	Yes, with reservations for hawksbill and green turtles	No	Yes	Yes	Yes	No	No
Dominican Republic	Yes	No	Yes	No	Yes	No	No
Haiti	No	No	No	No	No	No	No
Jamaica	Yes	Yes	Yes	Yes	No	No	No
Mexico	Yes	Yes	Yes	Yes	No	Yes	Yes
Puerto Rico (USA)	Yes	Yes	Yes	Yes	No	Yes	Yes
Turks and Caicos Islands (UK)	UK yes, TCI no	Yes	Yes	Yes	No	No	No
U.S. Virgin Islands **(USA)**	Yes	Yes	Yes	Yes	No	Yes	Yes

Table 3. Minimum Size Limits for Legal Harvest of Marine Turtles

Nation/territory	Size limits per species			
	Hawksbill	**Green**	**Loggerhead**	**Leatherback**
Bahamas	fully protected	24 in. (61 cm) "back length"	30 in. (76 cm) "back length"	not specified
British Virgin Islands	20 lb (9 kg)	20 lb (9 kg)	20 lb (any other turtle)	20 lb (any other turtle)
Cayman Islands	80 lb (36 kg)	120 lb (54 kg)	80 lb (36 kg)	not specified
Cuba	65 cm (25.35 in.) SCL*	65 cm (25.35 in.) SCL	65 cm (25.35 in.) SCL	all other turtles protected
Turks and Caicos	20 in. length (51 cm) neck scales to tail pieces and weight of 20 lb (9 kg)	20 in. length (51 cm) neck scales to tail pieces and weight of 20 lb (9 kg)	20 lb (any other turtle)	20 lb (any other turtle)

***** SCL = straight line carapace length

Table 4. Exploitation of Hawksbill Turtles in the Northern Caribbean: Facts at a Glance

Nation/ Territory	Are hawksbill turtles legally harvested?	Are hawksbill eggs legally harvested or sold?	Is domestic sale of hawksbill turtles/ products allowed?	Are hawksbill products available domestically?	Which products are available?	Are the products widespread?	Is there a known stock of hawksbill turtle shell?
Bahamas	No	No	No	Yes	Eggs, meat, carapace, stuffed curios	Extent unknown but has decreased in recent years	Yes (size unknown)
BVI	Yes	No	Yes	Yes	Eggs, meat, carapace	Extent unknown but decreased in recent yrs.	No
Caymans	Yes	No	Yes	Yes	Meat	No	No
Cuba	Yes	No	No	Unknown	Possibly eggs	No	Yes, 6,900 kg (15,180 lb) in April 2000
Dominican Republic	No	No	No	Yes	Eggs, meat, carapace, stuffed curios, shell items, oil, cream, penis	Yes, openly and in large quantities	No
Haiti	Yes	No	Yes	Yes	Eggs, meat, carapace, stuffed curios, penis	Reportedly	No
Jamaica	No	No	No	Yes	Eggs, meat, carapace, stuffed curios, shell items, penis	Yes, openly	Yes, two of unconfirmed sizes: (1) 3,000-3,500 lb (1,365-1,590 kg) reported in 2000, and (2) 6,000 lb (2,727 kg) reported in 1990
Mexico	No	No	No	Yes	Eggs, meat, shell items	Extent unknown, but decreased in recent yrs.	No
Turks / Caicos	Yes	No	Yes	Yes	Meat	No	No
Puerto Rico	No	No	No	Yes	Eggs, meat	Yes, but not openly	No

USVI	No	No	No	Yes	Eggs, meat	No	No

Table 5. Exploitation of Green Turtles in the Northern Caribbean: Facts at a Glance

Nation/ Territory	Are green turtles legally harvested?	Are green turtle eggs legally harvested or sold?	Is domestic sale of green turtles/ products allowed?	Are green turtle products available domestically?	Which products are available?	Are the products widespread?
Bahamas	Yes	No	Yes	Yes	Eggs, meat, carapace, stuffed specimens	Extent unknown but has decreased in recent years
BVI	Yes	No	Yes	Yes	Eggs, meat, carapace	Extent unknown but has decreased in recent years
Caymans	Yes	No	Yes	Yes	Meat from local harvest and turtle farm, and shell from farm	Meat is widely available
Cuba	Yes	No	No	Unknown	Possibly eggs	No
Dominican Republic	No	No	No	Yes	Carapace, stuffed curios, eggs, meat	Yes
Haiti	Yes	No	Yes	Yes	Eggs, meat, carapace	Reportedly
Jamaica	No	No	No	Yes	Meat	No
Mexico	No	No	No	Yes	Eggs, meat	No; extent has decreased in recent years
Puerto Rico	No	No	No	Yes	Eggs, meat	Yes, although not openly
Turks and Caicos	Yes	No	Yes	Yes	Meat	Extent unknown
USVI	No	No	No	Yes	Eggs, meat	Extent unknown

Table 6. Exploitation of Loggerhead Turtles in the Northern Caribbean: Facts at a Glance

Nation/ Territory	Are loggerhead turtles legally harvested?	Are loggerhead turtle eggs legally harvested or sold?	Is domestic sale of loggerhead turtles/ products allowed?	Are loggerhead turtle products available domestically?	Which products are available?	Are the products widespread?
Bahamas	Yes	No	Yes	Yes	Eggs, meat, carapace, stuffed specimens	Extent unknown
BVI	Yes	No	Yes	Unknown	Unknown	No
Caymans	Yes	No	Yes	Yes	Meat from local harvest	Unknown
Cuba	Yes	No	No	Unknown	Possibly eggs	No
Dominican Republic	No	No	No	Yes	Carapace, stuffed curios, eggs, meat	Yes
Haiti	Yes	No	Yes	Yes	Eggs, meat, carapace	Apparently
Jamaica	No	No	No	Unknown	Meat	No
Mexico	No	No	No	Yes	Eggs, meat	Apparently not
Puerto Rico	No	No	No	Yes	Eggs, meat	Yes, although not openly
Turks and Caicos	Yes	No	Yes	Yes	Meat	Extent unknown
USVI	No	No	No	Yes	Eggs, meat	Extent unknown

Table 7. Exploitation of Leatherback Turtles in the Northern Caribbean: Facts at a Glance

Nation/ Territory	Are leatherback turtles legally harvested?	Are leatherback turtle eggs legally harvested or sold?	Is domestic sale of leatherback turtles/ products allowed?	Are leatherback products available domestically?	Which products are available?	Are the products widespread?
Bahamas	Unclear	No	No	Unknown	Possibly eggs	No
BVI	Unclear	No	No	Occasionally	Oil, meat, eggs	No
Caymans	No	No	No	No	None	No
Cuba	Yes	No	No	No	None	No
Dominican Republic	No	No	No	Yes	eggs, meat	No
Haiti	Unclear	No	Unclear	Unknown	Unknown	No
Jamaica	No	No	No	No	Meat, eggs	No
Mexico	No	No	No	Not on Atlantic coast	None	No
Puerto Rico	No	No	No	Occasionally	Eggs, meat	No
Turks and Caicos	Yes	No	Yes	No	None	No
USVI	No	No	No	Occasionally	Eggs, meat	No

References

CEP. 2000. United Nations Caribbean Environment Programme Web site, http://www.cep.unep.org

CITES. 2000. CITES Secretariat Web site. http://www.cites.org

Crouse, D. 1999. The Consequences of Delayed Maturity in a Human-Dominated World. *American Fisheries Society Symposium* 23:195-202.

Crouse, D. T., L. B. Crowder, and H. Caswell. 1987. A stage-based population model for loggerhead sea turtles and implications for conservation. *Ecology* 68(5): 1,412-1,423.

de Klemm, C. 1993. *Guidelines for legislation to implement CITES*. IUCN Environmental Policy and Law Paper No. 26. World Conservation Union, Gland, Switzerland and Cambridge, UK. 107 pp.

Eckert, K. L 1995. *Draft General Guidelines and Criteria for Management of Threatened and Endangered Marine Turtles in the Wider Caribbean Region*. UNEP(OCA)/CAR WG.19/ INF.7. Prepared by WIDECAST for the 3rd Meeting of the Interim Scientific and Technical Advisory Committee to the SPAW Protocol. Kingston, 11-13 October 1995. United Nations Environment Programme, Kingston, Jamaica. 95 pp.

Frazer, N. 1989. A philosophical approach to population models. Pages 189-207 in L. Ogren, editor in chief. 1989. *Proceedings of the Second Western Atlantic Turtle Symposium*. NOAA Technical Memorandum NMFS-SEFC-226. U.S. Department of Commerce, Washington, D.C.

Frazier, J. 2001. *Science, conservation and sea turtles: what's the connection*? Paper presented during the 21st Annual Symposium on Sea Turtle Biology and Conservation, 24-28 February 2001. Philadelphia, Pennsylvania. 4 pp.

Hilton-Taylor, C., compiler. 2000. *2000 IUCN red list of threatened species*. World Conservation Union/Species Survival Commission (IUCN/SSC), Gland, Switzerland and Cambridge, UK.

Milliken, T. and H. Tokunaga. 1987. *The Japanese sea turtle trade, 1970-1986*. TRAFFIC Japan. Prepared for the Center for Environmental Education. Washington, D.C. 171 pp.

Ogren, L., editor in chief. 1989. *Proceedings of the Second Western Atlantic Turtle Symposium*. NOAA Technical Memorandum NMFS-SEFC-226. U.S. Department of Commerce, Washington, D.C.

IV. NATIONAL REVIEWS

A. The Commonwealth of the Bahamas

1. Introduction

The Bahamas is an independent state within the British Commonwealth. The coral archipelago consists of some 700 low-lying limestone islands and over 2,000 sand cays sprawled across roughly 259,000 square kilometers (100,000 square miles) of ocean. The total land area is 13,988 square kilometers (5,380 square miles) with a 3,542-kilometer (2,214-mile) coastline.

The Bahamian region is separated from neighboring Florida (USA), Cuba, and Haiti by deep oceanic channels and basins. Geographically, the Bahamas is north of the Caribbean region--part of the North American plate bordered to the east by the Atlantic Ocean and to the west by the Gulf Stream. Politically and culturally, however, the Bahamas is considered part of the Wider Caribbean. Nassau, on New Providence Island, is the capital.

About 15 island areas have been developed. They have a total population of about 298,340; about 66 percent live in New Providence and 16 percent in Grand Bahama. Most of the smaller cays are uninhabited. The other islands, known as the "Family Islands," or "Out Islands," include Bimini, the Berry Islands, the Abacos, Eleuthera, the Exumas, Andros, Cat Island, Long Island, San Salvador, Rum Cay, Inagua, Acklins, and Crooked Island.

Since becoming independent from the UK in 1973, the Bahamas has prospered through tourism and international banking and investment. With a per capita gross domestic product (GDP) of US$20,000 in 1998, the Bahamas is one of the wealthiest countries in the region. The Bahamian dollar (BSD) is held on par with the U.S. dollar and both currencies can be used throughout the country.

2. Marine Turtle Species in the Bahamas

The four species of marine turtles that occur in the Bahamas are known locally as green, hawksbill, loggerhead, and leatherback turtles. The first three are found commonly throughout the region where they feed in shallow waters including bays, creeks, coral reefs, and coral heads (Franz et al., 1996). Green turtles feed on the widespread sea grass pastures, hawksbills on the extensive coral reefs, and loggerheads over rocky and sandy areas of archipelago. Greens, hawksbills, and loggerheads nest in low densities on beaches throughout the country (Franz et al., 1996), and leatherback nesting has been reported on Abaco (Laing, pers. comm., 1999). One unconfirmed siting of a Kemp's ridley turtle has also been reported (Bjorndal, pers. comm., 2000).

3. Overview of Marine Turtle Management and Conservation

Marine turtle conservation efforts in the Bahamas include long-term field research in a few locations, education, legal protection, and law enforcement. Habitat conservation has only recently become a priority for the conservation of marine turtles and other wildlife in the country (Larson, pers. comm., 1999).

a) Regulatory Framework

(1) Legislation and regulations

Collection of marine turtle eggs has been prohibited in the Bahamas since 1954 (The Marine Products [Fisheries] Rules, 23 September 1954). Since 1986, the hawksbill turtle has been fully protected, and green and loggerhead turtles have been taken legally during an open season (as long as they are of the established minimum sizes). Turtles of any species are fully protected on beaches and possession of and trade in hawksbill turtles and products, and eggs of all species, are prohibited (Fisheries Resources [Jurisdiction and Conservation] Regulations, 3 March 1986).

Between 1954 and 1986, the rules stipulated that the sale of turtles or turtle shells was subject to examination of the animal or shell by an authorized fisheries officer. Minimum harvestable size limits ("neck scales to tail pieces, or back length") were set for the hawksbill turtle at 17 inches (43 centimeters) and for the green turtle at 15 inches (38 centimeters). The rules set a closed season for the loggerhead turtle from 1 April to 30 June (The Marine Products [Fisheries] Rules, 23 September 1954). These rules were superseded by the Fisheries Resources Regulations of 3 March 1986.

Fisheries Resources (Jurisdiction and Conservation) Act of 1977/Fisheries Resources (Jurisdiction and Conservation) Regulations, 3 March 1986. The regulations created the framework for the management and conservation of fisheries resources in the Bahamas. The turtle regulations (Part IV, Sections 29-33) stipulate the following: an annual closed season for all turtle species from 1 April through 31 July; minimum harvestable size limits ("back length") of 24 inches (60 centimeters) for green turtle and 30 inches (75 centimeters) for loggerhead turtle; the taking or possession of hawksbill turtle is prohibited; all turtles captured must be landed whole and made available for inspection by a fisheries officer if requested; the capture of any turtle on any beach is prohibited; the taking, possession, purchase, or sale of turtle eggs is prohibited; the taking or possession of any live or fresh turtle is prohibited during the closed season without the written permission of the Minister or unless the turtle is purchased from the holder of such a permit. Sport fishing regulations (Part X, Section 47) require all foreign vessels to obtain a permit to engage in sports fishing in the Bahamas and prohibit the take of turtles by non-Bahamian vessels. All permits issued to sport fishers on foreign vessels state that taking turtles is prohibited (Phillips, in litt., 2000).

Although the regulations do not mention the leatherback turtle, Department of Fisheries officials interpret them to at least partially protect the species in the Bahamas, as leatherback turtles and eggs on beaches are protected under current legislation (Delevaux, pers. comm., 1999).

Any person who contravenes these regulations is liable upon summary conviction to a fine of BSD3,000 or to imprisonment for a term of one year, or both. Where a person is found guilty of an offense against the above provisions, the court may order the confiscation of any trap, net, seine, or other device used to commit the offense (Part XIV, Section 68). All fisheries resources may be confiscated (Part XV, Section 69).

A revised Fisheries Act and accompanying regulations are under review. When enacted, these will extend greater protection to local turtle populations, including leatherbacks, in the Bahamas. In addition, Fisheries Department officials could limit the Bahamian harvest of marine turtles to subsistence purposes (prohibiting harvest for commercial purposes, such as for restaurants), should it be deemed necessary in the future (Phillips, in litt., 2000).

(2) Membership in international and regional treaties

CITES. CITES entered into force in the Bahamas on 18 September 1979. The country lacks specific CITES implementing legislation and officials use a variety of legal instruments to regulate international trade in wildlife (Chapter 225 of the Fisheries Resources [Jurisdiction and Conservation] Act; Chapter 227 of the Animal [Contagious Diseases] Act; Chapter 231 of the Plants Protection Act; Chapter 229 of the Wild Animals Protection Act; Chapter 230 of the Wild Birds Protection Act). Officials from the Ministry of Agriculture and Fisheries have prepared draft CITES legislation and are working with the Attorney General's Office to finalize the text (Phillips, in litt., 2001).

SPAW Protocol to the Cartagena Convention. The Bahamas has neither signed nor ratified the Cartagena Convention nor the SPAW Protocol.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). The Bahamas has neither signed nor ratified the IAC.

(3) Responsible agencies

The Ministry of Agriculture and Fisheries regulates the exploitation and trade of marine turtles in the Bahamas. The Fisheries Department is responsible for enforcing the regulations governing the harvest and possession of marine turtles, while the CITES Management Authority in the Department of Agriculture is responsible for enforcing regulations on international trade.

The Fisheries Department records commercial marine turtle landings in Nassau, Freeport, Little Abaco, and some other areas, but the level of overall take throughout the Bahamas is largely unknown (Bjorndal and Bolten, pers. comm., 2000). Fisheries Department officials report that the recorded landings are thought to constitute the majority of turtles caught on a commercial scale, most of which are taken around the northern islands (Phillips, in litt., 2000).

b) Conservation Initiatives

(1) Habitat conservation/protected areas

The national park system in the Bahamas is managed by the Bahamas National Trust (BNT), a statutory, nonprofit, nongovernmental organization. The BNT manages 12 national parks and reserves and has proposed expanding the park system to include 52 additional sites of natural significance (Larson, pers. comm., 1999). Activities within the protected areas are subject to certain bylaws. All wildlife is completely protected within the boundaries of these areas at all times (BNT, 1998).

Some of the protected areas managed by the BNT contain important habitat for marine turtles. Established in 1958, the Exuma Cays Land and Sea Park was the first recognized marine protected area in the world. It covers 176 square miles (440 square kilometers). Since 1986, the park has been a "no take" zone for harvesting marine life. Conception Island National Park is an important foraging site and sanctuary for the green turtle. Union Creek Reserve, located within Inagua National Park on Great Inagua Island, includes 4,940 acres (2,000 hectares) of enclosed tidal creek and serves as an important green turtle research facility (BNT, 1998).

(2) Species research and conservation activities

The majority of the research on marine turtles undertaken in the Bahamas has been carried out by the Archie Carr Center for Sea Turtle Research at the University of Florida. In particular, the center initiated a long-term research project in 1973 at Great Inagua and another in 1989 at Conception Island (Bjorndal and Bolten, pers. comm., 2000).

Table 8. Main Projects Assessing Marine Turtle Activities in the Bahamas

Species Projects	Location
Tagging of immature green and hawksbill turtles (1973 - present) (1978-present)	Union Creek, Great Inagua Countrywide
Growth rates of juvenile green, hawksbill, and loggerhead turtles (1978-present)	Union Creek, Great Inagua, and countrywide
Nesting survey of loggerhead turtles (June 1995; June 1996)	Cay Sal Bank
Satellite tracking of nesting loggerhead turtles (1999)	Cay Sal Bank
Tagging of juvenile green, hawksbill, and occasionally loggerhead turtles (1987-present)	Countrywide

Sources: Addison and Morford, 1996; Addison, 1997; Bjorndal and Bolten, 1988a, 1988b, 1996, and 1998; Bjorndal and Bolten, pers. comm., 2000; Connett, pers. comm., 1999.

(3) Enforcement and education

Fisheries officers enforce fisheries regulations and may inspect landing sites as well as vessels at sea (Laing, pers. comm., 1999).

The Fisheries Department has prepared and circulated summaries of the fisheries regulations to fishers and members of the general public, and is developing materials for adults and children explaining the threats faced by marine turtles and why they need to be managed and conserved.

The Bahamas National Trust also plays an important role in public education and environmental advocacy. It has developed posters, leaflets, and a variety of other materials to educate children and adults about nationally protected areas and species, including marine turtles, as well as the relevant conservation laws.

4. Conservation Status and Trends

Very little life history information is available on marine turtles in the Bahamas. The apparent large numbers of juvenile and subadult marine turtles in the waters suggests that the shallow banks constitute important feeding and developmental habitats for these species (Franz et al., 1996). Reports of marine turtle nesting in the Bahamas are scattered and incomplete (Addison and Morford, 1996).

a) Hawksbill Turtle

While they do not nest in any one area in great numbers, hawksbills nest year-round on suitable beaches throughout the Bahamas archipelago. Nesting is scattered; however, the large territory provides such extensive nesting habitat for the species that the sum total of hawksbill nesting in the Bahamas is likely quite significant (Bolten, pers. comm., 2000).

From 1975 to 1998, researchers at Union Creek, Great Inagua, tagged 46 immature hawksbills. Of these, only two turtles have been reported as recaptured: in 1983, a hawksbill was caught off Providenciales, Turks and Caicos, and in 1997, a Cuban fisher caught a hawksbill (tagged in 1992) about one kilometer (0.62 miles) offshore from Banes, Cuba (Bjorndal and Bolten, 1998).

Several individuals reported frequent observations of juvenile hawksbill turtles on the reefs, far more than in past years, and thought that this might be attributed, at least partially, to enforcement of and compliance with the 1986 provision prohibiting the exploitation of hawksbills. Many noted, however, that large adult hawksbill turtles are seen rarely (Bjorndal, Connett, Laing, Phillips, pers. comm., 1999). It should also be noted that reports of population increases are based on anecdotal data only; no population census has been undertaken.

b) Green Turtle

The most important green turtle nesting areas in the Bahamas are on Great and Little Inagua. The species forages on sea grass beds throughout the archipelago. Conception Island Creek in the central Bahamas also supports a population of immature green turtles that is being studied. Conception Island is an uninhabited wildlife sanctuary managed by the BNT (Bjorndal and Bolten, 1996).

"Creeks" or tidal bays throughout the Bahamas are important habitat for immature green turtles. A long-term tagging study in Union Creek, Great Inagua, has provided information on the movements of immature green turtles throughout the Caribbean. As green turtles grow, they migrate from their shallow feeding grounds in the Bahamas to deeper waters throughout the Caribbean. Tags placed on green turtles in Union Creek have been returned from the northern Bahamas, Colombia, Cuba, Dominican Republic, Haiti, Nicaragua, Panama, and Venezuela. Mitrochondrial DNA sequence analyses have demonstrated that green turtles in Union Creek arrive from nesting beaches throughout the Atlantic (Bjorndal and Bolten, 1996).

c) Loggerhead Turtle

Loggerhead turtles nest sporadically throughout the Bahamas, with concentrated nesting reported only at Cay Sal (Bjorndal, pers. comm., 2000). Nesting surveys conducted on islands of the Cay Sal Bank in June 1995 and June 1996 revealed that loggerhead turtles nest in significant numbers on several of these islands. The authors estimate that 500 to 600 loggerhead nests are laid during the 90-day nesting season in the Cay Sal Bank (Addison and Morford, 1996; Addison, 1997).

The proximity of the Cay Sal Bank to Florida raises the question of whether or not the turtles that nest in Cay Sal Bank are a satellite nesting group of the large population in Florida (Addison and Morford, 1996). Addison and Morford (1996) report that some may also come from Cuban waters.

Researchers report that loggerheads once nested on the northern islands in greater numbers than today (Bjorndal, pers. comm., 2000).

d) Leatherback Turtle

Leatherback turtles reportedly nest in Abaco, and there have been a few recent sightings in the waters south of Inagua (Delevaux and Laing, pers. comm., 1999). Studies are needed to determine nesting sites and habitat requirements in the Bahamas.

5. Exploitation and Trade of Marine Turtles and Products in the Bahamas

a) History of Exploitation and Trade

Very little has been documented on the historical exploitation of marine turtles in the Bahamas. Archeological references suggest that the seasonal aggregations of green turtles at Inagua would have provided an abundant and easily harvested food source for pre-Columbian settlers (Keegan, 1993; 1997).

Individuals interviewed by a TRAFFIC researcher in November and December 1999 reported that the consumption of marine turtle meat is traditional and that eggs had been harvested throughout the country prior to the enactment of legislation outlawing their collection in 1954. Until about 10 years ago, there were vendors in public fish markets who specialized in marine turtle meat (Higgs, pers. comm., 1999).

Turtle fishers used to target green turtles with four-inch mesh tangle nets and other large nets placed along the feeding grounds (Higgs and Laing, pers. comm., 1999). A retired fisher in Green Turtle Cay, Abaco, reported catching thousands of green turtles from the 1960s until 1975 for shipment to Nassau for restaurants. During this time, he would fish for turtles during the summer, after the lobster season had closed, and earn US$10/day. He reported catching 50 to 80 turtles per week (Sawyer, pers. comm., 1999).

Before CITES entered into force in 1975, the United States had been the main market for Bahamian hawksbill shell items. Shortly thereafter, the USA stopped importing hawksbill items and U.S. tourists in the Bahamas ceased buying hawksbill jewelry.

When harvesting hawksbill turtles was prohibited in 1986, one main factory in Nassau that had been producing hawksbill shell jewelry for domestic sale and export retained a large quantity of shell. Authorities allowed the factory to process the shell until it closed down in 1987. The Bahamian government also allowed hawksbill shell artisans and vendors approximately 18 months in which to sell or otherwise dispose of their shell stocks. Items apparently did not sell very well as most U.S. tourists were aware of the restrictions in place. During TRAFFIC's most recent survey, Fisheries Department and CITES Management Authority officials reported their intentions to quantify the amount of this shell currently remaining in the country (Phillips and Isaacs, pers. comm., 1999).

It used to be quite common for fishers and others to display marine turtle carapaces in their homes, but this practice is reported to have become less widespread in recent years (Connett, Higgs, and Phillips, pers. comm., 1999).

b) Recent Harvest and Use of Marine Turtles

Green and loggerhead turtles may be harvested, landed, and sold, as long as these activities take place outside of the closed season (1 April through 31 July), and the turtles are of the approved minimum sizes. The Fisheries Department in Nassau collects harvest statistics from landing sites in Nassau, Freeport, and several other locations throughout the country (tables 9 and 10); however, these are known to represent only a fraction of turtles actually harvested in the country (Bjorndal and Bolten, pers. comm., 2000).

Table 9. Recorded Landings of Marine Turtles (including hawksbills until 1986) in the Bahamas (predominantly Nassau), 1980-1998 (in pounds/kilograms)

Year	Weight	
	pounds	kilograms
1980	50,646	23,021
1982	66,187	30,085
1984	98,230	44,650
1986	47,191	21,450
1988	30,759	13,981
1990	25,939	11,790
1992	13,097	5,953
1994	5,198	2,363
1996	5,600	2,545
1998	7,124	3,238
Total	**349,971**	**159,076**

Source: Department of Fisheries unpublished data, 1999.

Table 10. Recorded Landings of Marine Turtles in the Bahamas by Species, 1993-1998 (in pounds/kilograms)

Year	Green turtle		Loggerhead turtle	
	pounds	kilograms	pounds	kilograms
1993	5,229	2,337	3,132	1,424
1994	1,556	707	3,138	1,426
1995	1,568	713	3,826	1,739
1996	3,600	1,636	2,000	909
1997	5,328	2,422	1,690	768
1998	5,072	2,305	2,052	933
Total	**22,353**	**10,120**	**15,838**	**7,199**

Source: Department of Fisheries unpublished data, 1999.

In Man-O-War Cay (Abaco), two or three fishers are reported to target green turtles with nets. Green turtles are moderately prevalent in the area; fishers report seeing 15-20 turtles on some evenings in 1-7 feet (.33-2.33 meters) of water (Laing, pers. comm., 1999).

Tidal bays or creeks in the Bahamas, which are natural funnel traps, are visited by turtle hunters every few weeks or months. Hunters easily capture immature green and hawksbill turtles that

have accumulated (Bjorndal and Bolten, 1996). According to researchers, green turtle populations at any one time in some of these areas, such as Conception Island, Crooked Island, Aklins, and Rum Cay, have been completely fished out or greatly reduced by hunters (Bjorndal, Bolten, and Connett, pers. comm., 1999). A number of fishers interviewed reported that many fishers will take turtles of any size and species opportunistically.

An enforcement officer in Abaco reported that some individuals continue to raid nests for eggs on beaches in the Bahamas. He also stated that Cubans residing in Florida have traveled to Abaco and purchased eggs for US$5-6 each (Laing, pers. comm., 1999). A fisher who has dug many nests in the past reported that some Bahamians continue to take the eggs of all species found.

Poaching of marine turtles and other marine species in Bahamian waters by foreign vessels has been documented. Fishers from the Dominican Republic and Cuba are reported to have been caught with marine turtles onboard their vessels in recent years (Delevaux, pers. comm., 1999). Cuban fishers have been reported to take turtles illegally on the Great Bahama Bank (Franz et al., 1996). Apparently, however, there is some disagreement between the two nations regarding national fishing zones.

Meat constitutes the major marine turtle commodity used and traded domestically in the Bahamas. Meat is traded for subsistence and to restaurants (Phillips and Pinder, pers. comm., 1999). Several people reported that subsistence use is more widespread in the Family Islands than in Nassau and Freeport, where eating habits have been influenced by the proximity to the United States and the ease with which chicken and other foods are imported (Phillips, pers. comm., 1999). On the commercial level, marine turtle meat is offered on menus of some restaurants catering to Bahamians in New Providence and Grand Bahama, and restaurants catering to tourists and locals in Abaco, Eleuthera, and many other areas throughout the country (Laing, pers. comm., 1999, pers. obs., 1999). All fishers interviewed stressed that marine turtles constitute a low-value fishery in the Bahamas, and that higher-priced species, such as lobster and conch, are targeted instead.

Green turtles have been the most sought after species, but loggerheads are also taken for their meat, particularly off of Andros and in the southern islands (Higgs, pers. comm., 1999; Laing, pers. comm., 1999). A retired fisher who now runs a restaurant in Green Turtle Cay, Abaco, buys green turtle from local fishers. He buys live turtles for US$1.25/pound (US$2.75/kilogram), and offers turtle steak plates for US$15 and stews for US$14 (Sawyer, pers. comm., 1999). Department of Fisheries personnel reported that landing sites and tourist markets in Nassau and Freeport occasionally offer marine turtle products for sale (Phillips, pers. comm., 1999).

Despite their legal protection since 1986, hawksbill turtles are still killed for their meat in the Bahamas, and some Bahamians, particularly in the outer islands, reportedly prefer hawksbill over green turtle meat (Bjorndal and Connett, pers. comm., 1999). Shells and scutes are occasionally found discarded, with the meat removed (Bjorndal, pers. comm., 1999). Turtle carapaces are occasionally sold in outdoor markets in various parts of the country. In February 1999 in Harbour Island, Eleuthera, a researcher noted at least 25 mostly juvenile hawksbill and green turtle carapaces being offered for sale in an outdoor straw market (Bolten, pers. comm., 1999).

(1) TRAFFIC surveys

A TRAFFIC researcher noted the availability of marine turtle on the menus of several restaurants in the Abacos and Eleuthera in November 1999 (during the open season for green and loggerhead). Two restaurants in Marsh Harbour, Abaco, offered turtle steak for US$20-22.50.

Two restaurants in Spanish Wells, Eleuthera, also offered turtle on their menus in November 1999. Owing to bad weather, however, they were out of stock, but had standing orders with local fishers. Restaurant owners buy green turtle meat for US$4-5/pound (US$8.80-11/kilogram) and serve various turtle meals, including turtle and fries for US$10, turtle steak for US$14, and turtle burger for US$5.

The TRAFFIC researcher also visited several markets in Nassau to check availability of marine turtle products on 3 and 4 December 1999. Vendors in the Montague market did not have any turtle meat, which they attributed to fewer boats going out in bad weather. One vendor in Potters Cay had two fresh loggerhead turtle heads and bagged meat for sale. An outdoor market that caters to cruise ship passengers offered two large preserved loggerhead heads for US$200 and US$235.

c) Recent International Trade in Marine Turtles and Products

CITES entered into force in the Bahamas in 1979. Between 1970 and 1986, Japanese customs data indicated that a total of 8,839 kilograms (19,446 pounds) of hawksbill shell had been received from the Bahamas, making the country an important source in the region. Fluctuating import levels characterized this trade, which ranged from a low of 29 kilograms (64 pounds) in 1981 to a high of 1,886 kilograms (4,149 pounds) in 1979. There was no documented trade from 1983 through 1986, which probably reflected the implementation of CITES controls in the Bahamas. Minor imports in 1970 and 1971 of green turtle shell, totaling 49 kilograms (108 pounds), were reported in Japanese customs statistics as originating in the Bahamas (Milliken and Tokunaga, 1987).

CITES Annual Reports for the period 1980-1998 record exports from the Bahamas of the following species and specimens: loggerhead - 1 shell and 17 units of meat; green - 2 bodies, 11 shells, 2 skulls, and 712 specimens; *Cheloniidae* spp. - 1 body, 27 units of meat, 1 shell, and 57 specimens; and hawksbill - 6 bodies, 11 shells, and 89 specimens. During this period, three unspecified imports of green turtle were also recorded.

International trade in marine turtles and products is occasionally allowed from the Bahamas for scientific specimens, such as blood samples (Isaacs, pers. comm., 1999). Passengers bound for the United States occasionally attempt to leave the Bahamas with marine turtle products.

d) Enforcement Efforts

U.S. Department of Agriculture (USDA) and Customs officers working at pre-clearance facilities at airports in Nassau and Freeport have seized numerous turtle products being carried by persons seeking to enter the USA. These items are usually turned over to the Department of Fisheries. No statistics are available on these seizures (Phillips, in litt., 2000).

(1) New Providence

In 1998, fisheries inspectors discovered hawksbill turtle meat on board a Cuban vessel that had been detained for poaching in Bahamian waters; the meat was confiscated and destroyed (Delevaux, pers. comm., 1999). From 1997 through 1999, three persons were arrested for marine turtle possession violations in New Providence. On 20 February 1997, a person was charged with possession of a juvenile green turtle; on 4 March 1998, the charge was possession of a green turtle during the closed season and on 23 February 1999, an individual was charged with

possession of a hawksbill turtle. All three persons received warnings (Department of Fisheries, unpublished data, 1999).

(2) Grand Bahama

On 22 June 1998, two individuals were charged with possession of a green turtle during the closed season; one of these persons was convicted and sentenced to US$3,000 or six months in prison. On 10 September 1998, another person was charged with possession of a hawksbill turtle and given a warning. On 6 September 1999, two persons were charged with possession of an undersized green turtle; the matter is pending (Department of Fisheries, unpublished data, 1999).

(3) Abaco

On 1 August 1999, a fisheries inspector in Abaco caught a lobster fisher with a 20-30 pound (9-14 kilogram) hawksbill turtle in his boat; the turtle had been speared through the head. The fisher was arrested and fined US$3,000 for possession of prohibited marine resources (Laing, pers. comm., 1999).

In 1998, an inspector in Abaco discovered eight live hawksbill turtles on board the vessels of three individuals; these individuals were released with warnings. According to the inspector, in cases in which illegally taken turtles are discovered alive, he will warn the offenders and release the animals; offenders who kill marine turtles illegally are arrested on the spot (Laing, pers. comm., 1999).

6. Summary and Recommendations

A traditional marine turtle harvest is ongoing in the Bahamas; however, it is extremely difficult to estimate the levels of exploitation throughout the archipelago. It is also difficult to enforce laws from Nassau across a country of widely scattered islands. Reports indicate that laws are enforced fairly well in the northern areas, such as Nassau and Freeport, and that fishers in Eleuthera and Abaco are well versed in the legislation and are for the most part compliant. A number of officials, fishers, and researchers remarked that most people appear to have complied with the 1986 provision to protect hawksbills. As population censuses have not been undertaken, little is known about the status of the turtle populations in the islands.

TRAFFIC offers the following recommendations:

- The Bahamian government is urged to adopt new turtle regulations that include provisions to protect all life stages of leatherback turtles.

- The marine turtle research community is encouraged to support expansion of research on marine turtle distribution and status, including identification of index beaches, in the Bahamas. Research findings should be factored into regional and national conservation and management plans.

- The Bahamian government and Bahamas National Trust are urged to enact and implement conservation measures to protect juvenile marine turtles in their tidal bay habitats, where they are extremely vulnerable to poaching.

- Bahamian authorities are encouraged to quantify the amount of hawksbill shell stored in the private stock in Nassau and seek ways to prevent shell from being sold to tourists or otherwise exported from the island.

- Authorities should discourage the sale of loggerhead or other marine turtle curios to tourists (for example, near the cruise ship docks in Nassau).

- Fisheries officials are encouraged to circulate information about fisheries regulations throughout the Family Islands, and establish a mechanism to facilitate inter-island exchange on fisheries regulations and enforcement activities.

- The Bahamian CITES Management Authority should consider submitting a copy of the draft CITES legislation to the CITES Secretariat, which can provide technical assistance and advice.

- The Bahamas is encouraged to accede to the Cartagena Convention (and its SPAW Protocol) and the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC).

- Bahamian officials may wish to consider participating in the Wider Caribbean Sea Turtle Conservation Network (WIDECAST), which provides assistance in the development of national marine turtle management plans.

Personal Contacts

A researcher from TRAFFIC North America visited the Bahamas from 29 November until 5 December 1999 and met with the following individuals: Edison Delevaux (Deputy Director of Fisheries, Department of Fisheries, Ministry of Agriculture and Fisheries, Nassau, New Providence), Eleanor Phillips (Fisheries Officer, Department of Fisheries, Nassau), Maurice Isaacs (CITES Management Authority, Department of Agriculture, Ministry of Agriculture and Fisheries, Nassau), Colin Higgs (Undersecretary, The Bahamas Environment, Science and Technology Commission, Nassau), Susan Larson (Deputy Director, Bahamas National Trust, Nassau), Sir Nicholas Nuttall (The Bahamas Reef Environment Educational Foundation, Nassau), Carrol Laing (Fisheries Inspector, Department of Fisheries, Marsh Harbour, Great Abaco), Stephen Connett (Captain, *Geronimo*, St. George's School, Newport, Rhode Island); P. Sawyer (retired turtle fisher, Green Turtle Cay, Abaco); Vander Pinder (retired turtle fisher, Spanish Wells, Eleuthera); fishers in Nassau (New Providence); fishers in Treasure Island, Green Turtle Cay, and Marsh Harbour (Great Abaco); and fishers in Spanish Wells (Eleuthera). In addition, the researcher met with Karen Bjorndal and Alan Bolten (Archie Carr Center for Sea Turtle Research, University of Florida) on 1 March 2000, during the 20th Annual Symposium on Sea Turtle Biology and Conservation in Orlando, Florida.

References

Addison, D. S. 1997. Sea turtle nesting on Cay Sal. *Bahamas Journal of Science* 5(1):34-35.

Addison, D. S. and B. Morford. 1996. Sea turtle activity on the Cay Sal Bank. *Bahamas Journal of Science* 3(3):31-36.

Bjorndal, K. A. and A. B. Bolten, 1988a. Growth rates of immature green turtles *Chelonia mydas* on feeding grounds in the southern Bahamas. *Copeia* 1988:555-564.

Bjorndal, K. A. and A. B. Bolten, 1988b. Growth rates of immature loggerheads *Caretta caretta* in the southern Bahamas. *Journal of Herpetology* 22:480-482.

Bjorndal, K. A. and A. B. Bolten, 1996. Developmental migrations of juvenile green turtles in the Bahamas. Pages 38-39 in J. A. Keinath, D. E. Barnard, J. A. Musick, and B. A. Bell, compilers. *Proceedings of the Fifteenth Annual Symposium on Sea Turtle Biology and Conservation*, February 1995, Hilton Head, South Carolina. NOAA Technical Memorandum NMFS-SEFSC-387.

Bjorndal, K. A. and A. B. Bolten, 1998. Hawksbill tagged in the Bahamas recaptured in Cuba. *Marine Turtle Newsletter* 79:18-19.

BNT. 1998. *Summaries of legislation affecting wildlife and national parks in the Bahamas*. The Bahamas National Trust, Nassau, New Providence. 19 pp.

Franz, R., C. K. Dodd, Jr., and S. D. Buckner. 1996. A review of herpetology of the Bahamian archipelago. *Bahamas Journal of Science* 3(3):23-30.

Keegan, W. F. 1993. *Inagua archeology*. Miscellaneous project report number 51. Department of Anthropology, Florida Museum of Natural History. Web site of the Caribbean Archeology Program (http://www.flmnh.ufl.edu/anthro/caribarch/).

Keegan, W. F. 1997. *Life in the Bahamas and Turks and Caicos before Columbus*. Bahamian Archeology. Media Publishing, Nassau, The Bahamas. 104 pp.

Milliken, T. and H. Tokunaga. 1987. *The Japanese sea turtle trade, 1970-1986*. TRAFFIC Japan. Prepared for the Center for Environmental Education. Washington, D.C. 171 pp.

Note: *All above-listed proceedings of annual symposia on sea turtle biology and conservation are published by the National Marine Fisheries Service (NMFS), Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149.*

B. The British Virgin Islands

1. Introduction

The British Virgin Islands (BVI) is one of five overseas territories of the United Kingdom (UK) in the Caribbean. It includes some 60 islands, cays, islets, and rocks, only 16 of which are inhabited. Grouped around Sir Francis Drake Channel, they lie approximately 96 kilometers (60 miles) east of Puerto Rico, and just east of the United States Virgin Islands (Overing, 1995).

The BVI archipelago has a total land area of 153 square kilometers (59 square miles) and an 80 kilometer (50 mile) coastline. Its territorial sea area encompasses 1,489 square kilometers (573 square miles). Road Town on the island of Tortola is the capital.

The islands were annexed by the English from the Dutch in 1672. The Bahamas administered affairs from 1965 to 1973, when the BVI received a separate governor. A policy to receive independence was reversed in 1982 when the islands opted to remain a British overseas territory.

In the last 10 years, the population of the British Virgin Islands has increased from 10,000 to nearly 20,000, which has increased the pressure to use coastal areas for development markedly. The two major islands, Tortola and Virgin Gorda, along with the groups of Anegada and Jost Van Dyke, contain most of the population.

Heavily dependent on tourism, the BVI's economy is one of the most prosperous in the Caribbean. An estimated 350,00 tourists, mainly from the United States, visited the islands in 1997. The per capita GDP is estimated at US$15,000 and the U.S. dollar is the legal currency.

2. Marine Turtle Species in the British Virgin Islands

Three species of marine turtles nest in the BVI: leatherback, hawksbill, and green turtles (Eckert et al., 1992; Overing, 1995). The leatherback is a seasonal visitor when females arrive to nest between March and July; foraging has not been observed. Foraging hawksbill and green turtles of varying sizes are present throughout the year. The loggerhead is occasionally caught in nets offshore, particularly around Anegada, by local fishers (Eckert et al., 1992).

Table 11. Marine Turtles Occurring in the British Virgin Islands

Common name	Scientific name	Local name(s)
Hawksbill turtle	*Eretmochelys imbricata*	hawksbill tur'le
Green turtle	*Chelonia mydas*	green tur'le
Loggerhead turtle	*Caretta caretta*	loggerhead
Leatherback turtle	*Dermochelys coriacea*	trunk tur'le, trunkback
All marine turtles		tur'le

Sources: Eckert et al., 1992; Overing, 1995; Lettsome, pers. comm., 2000.

3. Overview of Marine Turtle Management and Conservation

Marine turtle conservation efforts in the BVI have included intermittent surveys on nesting turtles in several locations, education in schools, community outreach, legal protection, and law enforcement. Habitat conservation has recently become a priority in the territory (Hastings, pers. comm., 2000; Lettsome, pers. comm., 2000).

a) Regulatory Framework

(1) Legislation and regulations

The harvest and trade of marine turtles have been regulated in the British Virgin Islands since 1959. Turtles under 20 pounds (9 kilograms) were protected at all times, and all marine turtles except leatherbacks were protected during a closed season from 1 July through 31 August. Marine turtle eggs of all species were protected during the same closed season.

In 1987, the closed season was extended from two to eight months (1 April-30 November). Today, turtles over 20 pounds (9 kilograms) may be harvested for four months of the year (1 December through 31 March). No marine turtles or meat may be possessed or traded during the closed season. The leatherback receives protection during its nesting season, because it coincides with the closed season, and an administrative agreement arranged in 1996 established a voluntary moratorium on the taking of leatherbacks. Collection, possession, and trade of turtle eggs are prohibited at all times, as are taking or disturbing nests and turtles on beaches. International trade in marine turtles and products has been prohibited since 1976.

Endangered Animals and Plants Ordinance Cap. 89 of 1976/January 1987 amendment. All seven species of marine turtles are listed as "endangered" under the First Schedule of the ordinance; the importation and exportation of endangered species is prohibited. The Customs Ordinance covers enforcement whereby customs officers may seize any specimens that are not permitted correctly. Penalties for violation include a fine of up to US$1,000 or imprisonment of up to 12 months.

Turtles Ordinance Cap. 87 of October 1987. Section 2 defines "turtle" as sea or river turtle. Section 3 prohibits the following: a) the catch or take or attempt to catch or take, any turtle during the closed season; b) the catch or take, or attempt to catch or take, any turtle that is under "20 pounds" (9 kilograms) in weight; c) the slaughter of any turtle, or buying, selling, exposing for sale, or possessing any turtle or any portion of the meat of a turtle, during the closed season; d) the take, capture, disturbance, or attempt to take, capture, or disturb any turtle or turtle eggs found on the shores of the Territory or within 100 yards of the shore; and e) the buying, selling, offering, exposing for sale, or possession of turtle eggs. Section 3 of Subsidiary Legislation, SI 13/1986 of the 1987 Turtles Ordinance (.. Turtles (Protection) Notice 1986) establishes the closed season as 1 April through 30 November, during which time it is prohibited to catch or take, or attempt to catch or take, any turtle; to slaughter any turtle; or to buy, sell, offer, display for sale, or possess a turtle or any portion of its meat. Sections 4-6 allow the police to arrest persons violating the ordinance, and seize any turtle, part, or eggs found in his/her possession during the closed season, as well as any nets or instruments used to commit the offense. Persons who commit an offense against this ordinance, upon summary conviction, can be fined up to US$1,000.

Fisheries Act Cap. 4 of 25 September 1997. The act revises the Fisheries Ordinance (Cap. 84) and its provisions for the promotion, management, and conservation of fisheries and fisheries resources in the BVI. Draft regulations to implement the Fisheries Act include measures to regulate the turtle fishery. They establish indefinite moratoria on harvesting leatherback,

hawksbill, and loggerhead turtles, as well as a closed season (1 April through 30 November) when it is prohibited to fish for, remove from the fishery waters, or possess, display for sale, sell, or purchase any turtle or any part of a turtle. A maximum size limit (during open season) is established for green turtles of 24 inches (60 centimeters) shell length. The collection, sale, purchase, and possession of eggs are prohibited at all times, as is setting a net to catch a marine turtle within 100 yards (100 meters) of shore. The draft regulations are under review by the Attorney General (March 2001); the Conservation and Fisheries Department (CFD) reports their adoption is imminent (Hastings, in litt., 2001).

(2) Membership in international and regional treaties

U.K. overseas territories are not automatically included as parties under the UK's ratification of international treaties. Individual territories are asked whether they want to have ratification of the conventions extended to them.

CITES. CITES entered into force in the UK on 31 October 1976. The BVI accepted ratification of CITES in 1987 with the Virgin Islands Endangered Animals and Plants Ordinance Cap. 89 of 1976/January 1987 amendment (Allan, 1998). Draft legislation revising this ordinance, including the ability to penalize offenders for CITES infractions, is being developed (Penn, pers. comm., 2000).

SPAW Protocol to the Cartagena Convention. The United Kingdom ratified the Cartagena Convention on 28 February 1986, and ratified the Convention on behalf of the British Virgin Islands on 21 November 1987. The UK signed the SPAW Protocol on 18 January 1990 but has yet to ratify it.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). The United Kingdom has neither signed nor ratified the IAC.

(3) Responsible agencies

The Conservation and Fisheries Department (CFD) of the Ministry of Natural Resources and Labour (MNRL) has several major responsibilities that fall under the main headings of environmental planning and development monitoring, coastal zone and beach management, environmental education, fisheries management, and surveillance and enforcement. CFD has primary responsibility for marine turtle conservation in the BVI and for enforcing fisheries legislation that regulates harvest and possession of marine turtles. Until very recently, CFD's capacity to address these conservation needs was limited by personnel and monetary shortages; personnel has increased from one in 1985 to 18 in 2000 (CFD, 1997; Lettsome, pers. comm., 2000). MNRL is designated as the CITES Management Authority; a Scientific Authority has not been designated.

b) Conservation Initiatives

(1) Habitat conservation/protected areas

The National Parks Trust was established in 1961 as a quasi-governmental organization to manage, preserve, and promote areas that have been designated as national parks. It operates under the National Parks Ordinance, which allows the Trust to enact bylaws regulating access to and use of parks. Established in 1990, Horseshoe Reef Protected Area on the southeastern end of Anegada is currently the only protected area in the British Virgin Islands that contains important

marine turtle habitat (Lettsome, pers. comm., 2000). No turtles or any wildlife may be taken at any time within the park (CFD, 1997).

(2) Species research and conservation activities

Surveys in the BVI to identify turtle nesting beaches (potential and actual) were initiated in the 1980s. A volunteer network of coastal residents, scuba divers, fishers, boat operators, government personnel, and interested citizens helped collect data and monitor populations for the BVI marine turtle survey (Eckert et al., 1992). CFD first undertook leatherback nesting surveys (ground and boat) in 1986 on Tortola and from Guana Island to Scrub Island. Since 1988, CFD staff and volunteers have collaborated to record information on nesting beaches on Tortola and Peter Island. CFD conducted leatherback surveys by air from 1990 through 1993, and completed three aerial assessments in 1994 (Freeman et al., 1998).

Hawksbill and green nesting surveys were coordinated by CFD on Tortola, Jost Van Dyke, Anegada, Green Cay, Sandy Spit, Scrub Island, and Guana Island in 1990 and 1991 (September-December) (Eckert et al., 1992).

CFD officials are interested in expanding the breadth and sophistication of their marine turtle research, and in collaborating on regional studies. They are particularly interested in collaborating with other researchers, such as those involved in leatherback satellite tagging programs in the U.S. Virgin Islands (Lettsome, pers. comm., 2000). CFD began tagging leatherbacks on Tortola in 2000 and would like to initiate surveys on Anegada (Hastings, pers. comm., 2001).

(3) Enforcement and education

Four CFD Surveillance and Enforcement officers are responsible for enforcing regulations addressing environmental protection, fisheries, beach development, boater registration, and other issues. One enforcement action to date has involved the arrest of an individual for poaching marine turtles (Lettsome, pers. comm., 2000; Lima, pers. comm., 2000). CFD's capacity to enforce the regulations is limited by inadequate legislation and staffing levels (CFD, 1997).

CFD's environmental awareness program works to educate the public about marine turtles and their conservation requirements through talks in primary schools, brochures, press releases, slide shows, public talks, and plays (Overing, 1995). The National Parks Trust conducts public awareness programs and distributes information about conservation.

A CITES training seminar, sponsored by the U.K. Foreign and Commonwealth Office, was held for CITES Management Authorities in the U.K. overseas territories (Anguilla, British Virgin Islands, Cayman Islands, Montserrat, Turks and Caicos Islands), and Bermuda on 1-5 June 1998.

4. Conservation Status and Trends

Leatherback, hawksbill, and green turtles are reported to have been common in the BVI in the early 1900s (Overing, 1995). Fishers report that there was a sizable nesting population of leatherback turtles and that the bays were swarming with hawksbill and green turtles in the 1920s. According to Overing (1995), the significant decline in marine turtle numbers has resulted from two major causes: harvest for economic and cultural reasons and coastal development to support a rapidly growing tourism industry. Sand mining has destroyed or altered several turtle nesting

beaches. Charter boats traveling and anchoring in the inshore waters have contributed to a decline in the health of coral reefs and sea grass beds (Overing, 1995). Boat strikes are an increasing threat to hawksbill and green turtles on their foraging grounds. In February 2000, a leatherback was released after becoming entangled in a fish pot line near Tortola (Hastings, pers. comm., 2000).

Surveys have shown that marine turtles nest throughout the BVI, but nowhere in great numbers (Overing, 1995). Several important nesting areas have been identified for leatherback, hawksbill, and green turtles on Tortola, on the northern cays, and on Anegada, but little is known of the timing and nesting in Virgin Gorda, Jost Van Dyke, or the southern cays (Norman, Peter, Dead Chest, Salt, Cooper, and Ginger Islands). Even less is known of the residency, range, or behavior patterns of juvenile hawksbills and greens foraging in BVI waters (Eckert et al., 1992).

a) Leatherback Turtle

Researchers estimate the total leatherback nesting population in the BVI to be only two to six turtles per year, down from nine in 1987 (Freeman et al., 1998), and a far cry from historical levels. According to Eckert et. al., fishers interviewed in 1987 reported up to six leatherbacks per night per nesting beach on Tortola in the 1920s. Since 1986, a maximum of four nesting crawls were reported on known nesting beaches (at Trunk Bay in 1994 and Josiah's Bay in 1995). The species no longer nests on at least 12 former nesting beaches such as Big Trunk Bay, Little Trunk Bay, and Valley Trunk Bay on Virgin Gorda; Cane Garden Bay on Tortola; and White Bay on Guana Island. In 1991, two females of the estimated total nesting population of up to six were killed illegally (Eckert et al., 1992; Freeman et al., 1998).

On Tortola, most nesting occurs on the northeast coast from Trunk Bay east to Long Bay on Beef Island (just off Tortola). Leatherbacks also nest on the northwest coast at Long Bay Belmont, Cappon's Bay (or Little Apple Bay), and Brewers Bay. Freeman et al. report there are many suitable nesting beaches located throughout the territory that have yet to be surveyed, and aerial surveys in the early 1990s confirmed nest crawls on Peter Island, Jost Van Dyke, and Anegada.

Diurnal surveys and analysis of turtle crawls have generated most of the information about leatherback nesting in the BVI. The combination of limited staffing and difficult access to the nesting beaches has resulted in infrequent night patrols. From 1990 through 1996, the surveys documented a total of 58 leatherback turtle nests on Tortola, which corresponded to 58 leatherback crawls. From 1994 through 1996 only three females were actually observed nesting on Tortola, one by researchers and two by tourists and residents (Freeman et al., 1998). In 2000, a female tagged at Culebra (Puerto Rico) in 1998 nested four times on Lambert Bay beach, Tortola (Hastings, pers. comm., 2001), which suggests that the BVI population may belong to the larger population that nests on St. Croix (U.S. Virgin Islands) and Puerto Rico.

b) Hawksbill Turtle

The hawksbill is the most common nesting turtle in the BVI and several important nesting areas have been identified in the cays north of Tortola (Scrub Island, Great and Little Camanoe Islands, and Guana Island) and on Anegada. Repeated sightings of hawksbills in the following areas suggest these are important feeding areas: Eustatia Reef (North Sound), Guana Island, Marina Cay, Great Camanoe, the channel between Thatch Island and Jost Van Dyke, around the southern islands of Cooper, Salt and Ginger, and in selected areas of the southern coast of Tortola (Eckert et al., 1992).

c) Green Turtle

Annual surveys (September-December, 1991-1993) demonstrated that green turtles continue to nest in the BVI in small numbers. Anegada is likely to include the last important nesting beaches for green turtles in the territory (only five crawls were reported elsewhere during the three years), and 23 potential nest sites were discovered on the northern coast in 1992 (Eckert et al., 1992). Foraging green turtles are seen predictably in a number of sites, including Norman Island, Frenchman's Cay, Great Harbour (Jost Van Dyke), western Anegada, the channel between Marina Cay and Great Camanoe, and the channel between Beef Island and Guana Island (Eckert et al., 1992). In 2000, divers reported seeing relatively large numbers of juvenile green turtles in local waters on a regular basis, but that sightings of large turtles are infrequent.

5. Exploitation and Trade of Marine Turtles and Products in the BVI

a) History of Exploitation and Trade

Two separate turtle fisheries have operated in the BVI: one for leatherbacks and one for green and hawksbill turtles. The leatherback fishery targeted turtles for their oil, which was valued as a treatment for respiratory ailments, and to a lesser extent as an aphrodisiac. Meat and eggs were consumed as byproducts of the fishery for oil (Eckert et al., 1992; Freeman et al., 1998).

Leatherback fishers, called "trunkers," hunted mature females at night on nesting beaches. The fishery has dwindled from previous levels; only a few trunkers, most of whom are elderly, remain, and few young men are interested in perpetuating the tradition (Lettsome, pers. comm., 2000). In the past, leatherbacks were harvested on Tortola and Virgin Gorda, but by 1986 the harvest had been reduced to Tortola's northeast coast (Cambers and Lima, 1990; Eckert et al., 1992).

Apparently, the leatherback fishery was never as important economically as the hawksbill/green turtle fishery, but it is entwined with local tradition and mysticism. Some trace its origins to the days of slavery, while others believe the tradition was brought over from Africa (Eckert at al., 1992; Freeman et al., 1998). Fishers waited for the leatherback to crawl up the beach to lay its eggs, then flipped it over, and tied its flippers over the plastron. The turtle was left until morning when the entire community arrived to partake in the harvest. The turtle was killed, women gathered the meat, and men boiled the head, back, plastron, flippers, and internal fat in a cauldron. The oil was siphoned off and bottled. Some oil was shared with villagers and the rest sold locally. According to Lettsome (pers. comm., 2000), oil was also sent to the USVI, where it garnered higher prices than in the BVI.

The hawksbill/green turtle fishery was widespread; nets were set throughout the territory from Anegada to Jost Van Dyke. Turtles were targeted for meat, which was an important source of protein and income. Eggs were also consumed. The removal of eggs was reported to approach 100 percent in some areas; the target was primarily hawksbill eggs (Eckert et al., 1992). In the 1940s, fishers sold turtle shell to local artisans and to buyers from the Lesser Antilles who traveled to Tortola. The handicraft industry which once manufactured jewelry and other items from hawksbill shell declined noticeably in the 1980s, as demand decreased (Eckert et al., 1992).

b) Recent Harvest and Use of Marine Turtles

While there has been a significant decline in marine turtle fisheries in the BVI, they continue today and remain family or community oriented. The green/hawksbill turtle fishery is based in Anegada, which is thought to supply at least half of the annual catch. While there have never been formal records kept on the number of hawksbill and green turtles taken annually during the open season, an estimated total annual catch of green turtles declined from 700 in 1981 to 71 in 1991, and the estimated total annual catch of hawksbills declined from 400 in 1981 to 32 in 1991. Hawksbills make up an estimated 30 to 50 percent of the catch (Eckert et al., 1992). CFD officials believe the number of animals harvested is much less today than it was a decade ago (Lettsome and Penn, pers. comm., 2000).

In the British Virgin Islands, turtle meat is consumed almost exclusively by indigenous people. The meat is from the local harvest during the open season; green turtle is the preferred species (Lettsome, pers. comm., 2000). Turtle dishes had been common in restaurants before the open season was shortened in 1986. Today, turtle is found on a few menus for US$12-15 per dish. Turtles not sold to local restaurants are traded to friends and family.

Green and hawksbill shells are sold locally, given away, or kept by fishers for display in homes, bars, restaurants, and hotels. Marine turtle penis steeped in rum is purported to be an aphrodisiac by older generations in the BVI (Hastings and Lettsome, pers. comm, 2000).

Demand persists for leatherback oil, which has been available for sale on an occasional and informal basis in the BVI since 1986. In 1992, it sold for US$30 for a small bottle (187.5 milliliters) and up to US$200 for a larger bottle (750 milliliters) (Eckert et al., 1992). A leatherback can yield 5 to 10 gallons (19 to 38 liters) of oil (Lettsome and Penn, pers. comm., 2000). According to CFD officials, fishers request an exemption each year to harvest one leatherback per season; CFD has denied such requests. Some fishers still watch for females and egg poaching occurs sporadically. A nesting leatherback was killed in 1987, and two nesting turtles were taken in April 1991, during the closed season (one at Trunk Bay and one at Lambert Bay). Two nests were robbed in the years 1994 through 1996 (Freeman et al., 1998). There was also an unconfirmed report of a leatherback turtle taken from the beach at Trunk Bay in 1997 (Penn, pers. comm., 2000).

(1) TRAFFIC surveys

As part of a 1998 TRAFFIC study to review the trade in CITES-listed species in the U.K. overseas territories in the Caribbean, a researcher noted the availability of green turtle meat in a few restaurants and food stores in Tortola and Virgin Gorda (26-31 March 1998, during the open season). In January 2000 (open season), turtle meat was on the menus of a couple of Tortola restaurants catering to local patrons.

On 30 January 2000, a researcher surveyed several tourist shops in Road Town and Cane Garden Bay, Tortola. One hawkbill shell jewelry box (US$22.50) was found in a shop in Cane Garden Bay. When asked about the origin of the box, the shop owner explained it had been purchased along with a number of boxes and other items (which she had sold in the shop), in Santo Domingo (Dominican Republic) while on a cruise in 1998; she returned with the items on the ship. The individual appeared not to realize that the export from the Dominican Republic and the import into the BVI of the shell items were illegal. She stated her intention to return to Santo

Domingo and purchase more items for sale in the shop. The TRAFFIC researcher advised against this and explained the illegality involved.

c) Recent International Trade in Marine Turtles and Products

CFD officials report that there was never any large-scale commercial export of marine turtles or marine turtle products from the BVI (Lettsome, pers. comm., 2000). International trade in marine turtles and products has been prohibited since 1976. CITES Annual Reports for the period 1980-1998 record several marine turtle exports, including hawksbill products (1 hawksbill body in 1982, 182 kilograms (400 pounds) of hawksbill shell in 1986, 53 hawksbill leather items in 1990, and 1 hawksbill carapace in 1997) and green turtle items (1 green carapace in 1985, 1 carapace in 1986, 1 body in 1987, and 1 carapace in 1992).

Leatherback turtle oil is exported irregularly via ferries and fishing boats for local medicinal use in the U.S. Virgin Islands (Allan, 1998; Boulon and Evans, pers. comm., 2000). BVI fishers have been caught taking marine turtles illegally in the USVI and returning with them by boat to Tortola, and fishers from St. Thomas (USVI) have been known to take turtles in BVI waters (Boulon, pers. comm., 2000).

As noted by the TRAFFIC researcher, imported hawksbill shell items are sold in small quantities in the BVI. In 1987, shell jewelry was available in Road Town, Tortola; by 1992, one shop had only three pairs of hawksbill earrings in stock (Eckert et al., 1992).

d) Enforcement Efforts

CFD officials have undertaken a few enforcement actions for illegal take or sale of marine turtles. Most of these have involved local restaurants selling turtle meat out of season; owners received warnings and have not repeated the offense (Penn, pers. comm., 2000).

On 16 April 1996, witnesses reported an incident in which three men speared a hawksbill turtle and took it on board a boat near the north shore of the Bight on Norman Island. CFD officials, who estimated that up to five turtles may have been taken, searched the boat and found no trace of turtles. Upon resuming the search the following day on Norman Island, however, they found a small (5.75 pound/2.6 kilogram) dead hawksbill turtle that had been placed under a rock, as well as tracks from a turtle that escaped during the night (CFD, 1996).

One of the men involved in this incident was arrested and fined a small sum by the magistrate, even though the turtles had been taken illegally (during the closed season and by speargun, with one turtle weighing nearly 15 pounds [6.8 kilograms] under the legal weight limit) (Lima, pers. comm., 2000).

6. Summary and Recommendations

Years of intensive, subsistence exploitation have had a heavy impact on marine turtle populations in the BVI. The leatherback is on the verge of being extirpated from the territory, while little information is available on the status of hawksbills and greens. Fishers have been confused about the protection status of marine turtles in the BVI, which has complicated efforts to conserve them. Authorities have expressed interest in collaborating with neighboring areas on research projects and stated their intention to seek assistance in training researchers, using tagging equipment, establishing consistent monitoring programs, and other activities.

The BVI archipelago includes a large territory in which to monitor marine turtle nesting and foraging activities. Shortages of staff and funds have resulted in limited research, inconsistent monitoring efforts, and limited enforcement of the regulations. The proximity of the BVI, which maintains an open season on marine turtles, to the USVI, which does not, results in fishers from both territories taking turtles illegally in each other's waters.

TRAFFIC offers the following recommendations:

- BVI researchers are encouraged to intensify their collaboration with the leatherback monitoring projects on St. Croix (USVI) and Culebra (Puerto Rico), which are excellent sources of information and expertise. Researchers in all three sites are encouraged to consistently exchange information on leatherback nesting activities and tag returns and enter this information into a common database.

- BVI authorities are encouraged to submit a review copy of their draft CITES legislation to the CITES Secretariat and the U.K. CITES Management Authority for technical assistance and advice.

- The CITES Secretariat and U.K. authorities are encouraged to review the draft CITES legislation and provide input to the BVI as soon as possible.

- CFD officials are encouraged to contact the Cayman Islands Department of Environment, which has recently drafted comprehensive CITES implementing legislation. The Caymans' legislation might be an excellent model that could be adapted for use in the BVI. Authorities in the Cayman Islands have already received feedback from the UK, so working with the Caymans could save time and effort on the part of CFD.

- The U.K. CITES Management Authority and U.K. Foreign and Commonwealth Office should assist the BVI by ensuring that authorities have the resources and capacity to implement and enforce CITES. These offices should assist in refining BVI legislation, and provide reference tools, materials, and training opportunities to CFD officials.

- The UK is encouraged to ratify the SPAW Protocol, accede to the IAC, and extend ratification of these agreements to the BVI. The UK needs to assist the territory in ensuring it is able to meet its obligations under these agreements.

- The BVI government is urged to enact its revised turtle regulations as soon as possible and provide the resources necessary to enforce their provisions.

Personal Contacts

A TRAFFIC researcher visited the British Virgin Islands from 27 through 30 January 2000 and met with the following individuals in Tortola: Bertrand Lettsome (Chief Conservation and Fisheries Officer, Conservation and Fisheries Department-CFD, Ministry of Natural Resources and Labour), Kelvin Penn (Environmental Officer, CFD), Mervin Hastings (Marine Biologist, CFD), Cassander O'Neal (Marine Biologist, CFD), and Halstead Lima (Surveillance Officer, CFD). Ralf Boulon (Chief, Resources Management, Virgin Islands National Park, U.S. National

Park Service, St. John, USVI), Karen Eckert (Executive Director, WIDECAST, San Diego, USA), and Michael Evans (Refuge Manager, Sandy Point National Wildlife Refuge, USFWS, St. Croix, USVI) provided additional information. The researcher also met with Mervin Hastings on 3 March 2000, during the 20th Annual Symposium on Sea Turtle Biology and Conservation in Orlando, Florida, and on 26 February 2001, during the 21st Annual Symposium in Philadelphia, Pennsylvania, to verify information.

References

Allan, C. J. 1998. *Conched out: A review of the trade in CITES-listed species in the United Kingdom overseas territories in the Caribbean*. WWF-United Kingdom. Godalming, UK. 87 pp.

Cambers, G. and H. Lima. 1990. Leatherback turtles disappearing from the BVI. *Marine Turtle Newsletter* 49:4-7.

CFD. 1996. Conservation and Fisheries Department surveillance and enforcement report, 17 April 1996. Road Town, BVI.

CFD. 1997. *The state of the environment in the British Virgin Islands: Emerging issues*. A technical report for the Global Domestic Sub-committee. Project BVI/95/001. Conservation and Fisheries Department of the Ministry of Natural Resources and Labour. Road Town, BVI. 75 pp.

Eckert, K. L., J. A. Overing, and B. B. Lettsome. 1992. WIDECAST sea turtle recovery and action plan for the British Virgin Islands. CEP Technical Report No. 15. UNEP Caribbean Environment Programme, Kingston, Jamaica. 116 pp.

Freeman A., K. Penn, O. Phillip, and A. Penn. 1998. Trunk (leatherback) turtle nesting in the British Virgin Islands, 1990-1996. Conservation and Fisheries Department Technical Report No. 26. October 1998. Ministry of Natural Resources and Labour. Road Town, BVI. 18 pp.

Overing, J. 1995. The status of sea turtle conservation in the British Virgin Islands. Pages 88-89 in J. I. Richardson and T. H. Richardson, compilers. *Proceedings of the Twelfth Annual Workshop on Sea Turtle Biology and Conservation*, February 1992, Jekyll Island, Georgia. NOAA Technical Memorandum NMFS-SEFSC-361.

Note: *All above-listed proceedings of annual symposia on sea turtle biology and conservation are published by the National Marine Fisheries Service (NMFS), Southeast Fisheries Science Center, 75*
Virginia Beach Drive, Miami, FL 33149.

C. The Cayman Islands

1. Introduction

The Cayman Islands is an overseas territory of the United Kingdom. It includes Grand Cayman and the "Sister Islands" Cayman Brac and Little Cayman, and covers a total area of 259 square kilometers (100 square miles) with a 204 kilometer (128 mile) coastline. Surrounded by some of the deepest waters in the Caribbean, the islands are pinnacles of a range of submarine mountains. They lie south of Cuba and northwest of Jamaica and the capital is George Town on Grand Cayman.

The Cayman Islands is thought to have been uninhabited until the mid-1600s when turtle fishers dispatched from Jamaica began to settle there. In 1655, the British captured Jamaica from Spain and administered the Cayman Islands as part of Jamaica. In 1670, Spain ceded the Cayman Islands and Jamaica to the British. In 1862, the Caymans became a British crown colony, ruled by the British Governor of Jamaica. When Jamaica became independent in 1962, the Cayman Islands opted to remain a British territory.

In the last 30 years, the Cayman Islands has grown from a relatively isolated, undeveloped territory into one of the world's leading financial centers and a holiday destination for an estimated 1 million tourists per year. Between 1970 and 1998, the combined population of the Cayman Islands increased from about 10,250 to 35,000. Caymanians enjoy one of the highest standards of living in the world; the per capita GDP is estimated at US$24,500. The exchange rate for the Cayman Islands dollar (KYD) to the U.S. dollar is fixed at KYD1.00 = US$1.25 (October 2000) and both currencies are used in the territory.

2. Marine Turtle Species in the Cayman Islands

Four marine turtle species occur in the Cayman Islands: greens, hawksbills, loggerheads, and leatherbacks (Wood and Wood, 1994). The first three are found commonly while the leatherback is a rare visitor (Aiken, 2000a and 2000b).

Green, hawksbill, and loggerhead turtles nest in small numbers throughout the islands. According to Wood and Wood (1994), the nestings may be new recruits to the islands, a remnant of the centuries old rookery, or itinerant females from other breeding colonies. The numbers are so small that the Caymanian breeding populations of marine turtles are on the verge of extinction (Aiken, 2000a).

Suitable marine turtle nesting beaches were identified recently around Grand Cayman (on 32 kilometers/20 miles of the 129 kilometer/81 mile coastline) and Little Cayman (on 21 kilometers/13 miles of the 37 kilometer/23 mile coastline) (Aiken et al., 2000a; 2000b). Suitable areas for marine turtle feeding exist in the extensive areas of sea grass prevalent in the sounds surrounding Grand Cayman, Cayman Brac, and Little Cayman and in a variety of coral reef systems (Wood and Wood, 1994). A small feeding population of green, hawksbill, and possibly loggerhead turtles exists around the Cayman Islands (Aiken, 2000a). The limited shelf area around the islands would limit large feeding populations and support the historical accounts of large nesting populations rather than resident foraging populations (Wood and Wood, 1994).

Table 12. Marine Turtles Occurring in the Cayman Islands

Common name	Scientific name	Local names
Hawksbill turtle	**Eretmochelys imbricata**	Hawksbill turtle
Green turtle	*Chelonia mydas*	Green turtle
Loggerhead turtle	*Caretta caretta*	Loggerhead turtle, mulato (no longer in common use)
Leatherback turtle	*Dermochelys coriacea*	Leatherback turtle, trunkback turtle (no longer in common use)

Sources: Aiken et al., 2000a and 2000b; Watler, pers. comm., 2000.

3. Overview of Marine Turtle Management and Conservation

Marine turtle conservation efforts in the Cayman Islands include revision of marine conservation and wildlife trade legislation, recently initiated field research in Grand Cayman and Little Cayman, marine and coastal habitat conservation, educational outreach for children and adults, legal protection, law enforcement, and relocation and release of wild hatchlings.

While the focus of this review has been on exploitation, trade, and management of marine turtles in the wild, a review of the Cayman Islands would not be complete without some discussion of the Cayman Turtle Farm, a commercial green turtle breeding facility that has operated on Grand Cayman since 1968. Information about the farm is included in the relevant sections that follow.

a) Regulatory Framework

(1) Legislation and regulations

Collection of marine turtle eggs in the Cayman Islands has been prohibited since 1978 (The Marine Conservation [Turtle Protection] Regulations). Between 1978 and 1996, it was unlawful to take or disturb female turtles from May through September. Since 1996, it has been prohibited to take or disturb any marine turtle from May through September.

There is a seven-month open season (October through April) for harvesting green, hawksbill, and loggerhead turtles of established minimum sizes. Turtles may be taken only with nets by licensed, traditional fishers for consumption within the Cayman Islands. Up to 26 individuals may apply for a license to fish marine turtles; in 2000, the Marine Conservation Board issued 16 licenses for this purpose (8 to fishers in Grand Cayman and 8 to fishers in Cayman Brac) (Bush, pers. comm., 2000).

The Marine Conservation Law, 1978 (1995 Revision to Law 19 of 1978)/The Marine Conservation (Turtle Protection) Regulations (1996 Revision). This law created the framework for marine conservation in the Cayman Islands. In these regulations, "turtle" means green, hawksbill, loggerhead, leatherback, flatback, olive ridley, Kemp's ridley, and any hybrids between these species (Article 2). Taking, disturbing, or molesting of any marine turtle during the months of May through September is prohibited (Article 4). The possession of any turtle (Article 5) or turtle egg (Article 3) is prohibited, unless it is (from) a turtle bred in captivity (Article 3a), or the holder has a license (Article 3b).

The Marine Conservation Board may grant licenses to fishers who have traditionally taken turtles within the Cayman Fisheries Zone by traditional methods for consumption within the islands (Article 6.1) by persons normally resident in the islands (Article 6.2). Licensed fishers must attach a tag accompanied with the license to any turtle caught; anyone possessing an untagged turtle is guilty of an offense (Article 7). Anyone who slaughters or injures a turtle before it has been inspected by a fisheries officer and before the fisheries officer has checked and recorded the details of the license under which the turtle has been taken (weight and sex, area and date of capture, and tag number) is guilty of an offense (Article 8). License holders must return the tag to a fisheries officer afterwards (Article 9).

In 2000, individual licenses, valid through 30 April 2000, stipulated the following: a maximum of six turtles shall be caught per licensed person from November through April; turtles weighing less than the established minimum sizes may not be taken (green turtles must weigh at least 120 pounds/54.4 kilograms; hawksbill and loggerhead turtles must weigh at least 80 pounds/36.4 kilograms); turtles may not be taken along West Bay Beach or in George Town Harbour (Grand Cayman), or in any of the bays or sounds within the reef crest. Turtles may be taken only with nets.

In 1993 the penalties for violating the Marine Conservation Law and its regulations were increased. Section 25 of the law provides for the following penalties: a fine of up to KYD500,000, imprisonment of up to one year, and the confiscation of all equipment and vessels used to commit the offense.

Endangered Species Protection and Propagation Law (21 of 1978/1999 Revision). This law functions as the CITES implementing legislation in the Cayman Islands. It applies to species listed in Parts I and II of its Schedule, which correspond to CITES Appendix I and II species, as originally listed in 1975. The import and export of live or dead species on the Schedule is prohibited without a license from the governor (includes parts and derivatives) (Article 3.1). This excludes the bringing into the islands of marine turtles taken within the fishery limits of the islands, if taking such turtles is customary and traditional, and the turtles are intended only for consumption by people within the islands (Article 4.1). Whoever contravenes Article 3 is guilty of an offense and liable on summary conviction to a fine of KYD800 and to imprisonment for two years (Article 9).

Part I of the Schedule includes "Hawksbill Turtle (*Eretmochelys imbricata imbricata*) and Atlantic (Kemp's) Ridley Turtle (*Lepidochelys kempii*)." Part II of the Schedule includes "Loggerhead Turtle (*Caretta caretta*), Green Turtle (*Chelonia mydas*), Flatback Turtle (*C. depressa*), Pacific Hawksbill Turtle (*E. imbricata bissa*), (Olive) Ridley Turtle (*L. olivacea*), and Leatherback Turtle (*Dermochelys coriacea*)."

The Department of the Environment (DoE) has drafted comprehensive legislation which has been submitted to the U.K. CITES Management Authority and the CITES Secretariat for technical review (Ebanks-Petrie, pers. comm., 2001). The draft legislation (Endangered Species [Trade and Transport] Law) appears to conform to the requirements and provisions of CITES, but is not limited to them.

(2) Membership in international and regional treaties

U.K. overseas territories are not automatically included as parties under the UK's ratification of international treaties. Individual territories are asked whether they want to have ratification of the conventions extended to them.

CITES. CITES entered into force in the UK on 31 October 1976 and the Cayman Islands signed on to the treaty on 14 September 1978 through the Endangered Species Protection and Propagation Law (Law 21 of 1978). CITES is implemented through this law (Law 21 of 1978/1999 Revision); however, its Schedule includes listings of species as they appeared in the original Appendices of CITES when it entered into force in 1975. Revised legislation has been drafted to address shortcomings in the current law.

SPAW Protocol to the Cartagena Convention. The UK's ratification of the Cartagena Convention on 28 February 1986 was also on behalf of the Cayman Islands. The UK signed the SPAW Protocol on 18 January 1990 but has yet to ratify it.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). The UK has neither signed nor ratified the IAC.

(3) Responsible agencies

Responsibility for environmental matters is assigned to the Ministry of Tourism, Environment, and Transport. Within this ministry, the DoE plays the central role in the management and conservation of the environment, including the conservation of marine turtles. The DoE is also responsible for the administration of the Marine Conservation Board, a statutory board created under the Marine Conservation Law and responsible for that law's general administration. The DoE also functions as the local CITES Scientific Authority. The Ministry of Agriculture is designated as the Management Authority (Ebanks-Petrie, 1995; Ebanks and Bush, 1990; and Ebanks-Petrie, in litt., 2000).

DoE personnel are satisfied with their current administrative infrastructure, which includes knowledgeable staff and ample equipment, capacity, and funding to undertake their work. The main institutional constraints to conserving marine turtles and other wildlife stem from (1) outdated fisheries and wildlife trade legislation that lacks provisions to address current realities, and (2) limited awareness of CITES by customs officers.

To address these deficiencies, the DoE submitted revised draft legislation to the U.K. CITES Management Authority and the CITES Secretariat for review. Since receiving feedback from the UK, the DoE is redrafting the legislation. The DoE is also planning to revise it fisheries regulations, and is considering a number of modifications. For example, mature breeders enter Cayman waters in March and April and authorities are considering extending the closed season to include these months. A multi-agency CITES implementation committee was established in March 1999 to improve communication and cooperation among the DoE, Ministry of Agriculture, Customs, and the Cayman Turtle Farm.

b) Conservation Initiatives

(1) Habitat conservation/protected areas

The Marine Parks Regulations of 1986 established marine parks in the three Cayman islands under the Marine Conservation Law. The Cayman Islands Marine Parks system uses a zoning technique in order to allow for traditional activities while attempting to reduce user conflicts. The three types of zones are Marine Park Zones, Replenishment Zones, and Environmental Zones (Ebanks-Petrie, 1995).

Marine Park Zones were created to protect the coral reefs and associated marine life in the most heavily used diving areas. Taking of marine life, alive or dead, is prohibited. Four Marine Parks Zones have been established on Grand Cayman, two on Little Cayman, and three on Cayman Brac.

Replenishment Zones were established in an attempt to protect breeding and nursery areas for marine life. Nine Replenishment Zones are designated around Grand Cayman, two around Little Cayman, and two around Cayman Brac.

A single Environmental Zone was established to protect a portion of undisturbed, mangrove-fringed sound environment on Grand Cayman. All fishing, anchoring, and in-water activities are prohibited there (Ebanks-Petrie, 1995).

(2) Species research and conservation activities

In 1998, the DoE initiated the first comprehensive study of nesting activity in the territory on Little Cayman. In 1999, surveys were undertaken on Grand Cayman, and in 2000, Little Cayman and Grand Cayman were surveyed (Aiken et al., 2000a and 2000b; Bell, 2000). These assessments have aimed to identify turtle nesting beaches, the species nesting, and the levels of nesting. They have also aimed to aid in the development of recommendations for the management of marine turtles (Ebanks-Petrie, 2000).

The Cayman Turtle Farm has supported many scientific studies over the years; more than 30 publications have resulted from this research. These have included works on diet, breeding, turtle pathogens, physiology, artificial insemination, anesthesiology, social behavior, genetic diversity, population dynamics, and aging (Allan, 1998; CTF, 2000a).

The farm also maintains a release program for wild hatchling turtles and captive-born yearling green turtles. The wild hatchlings originate from Cayman beaches: marine turtle nests of any species that are threatened by inundation, depredation, and other disturbances are transferred to the farm's hatchery, and later released at their original nesting site (Parsons, pers. comm., 2000). The captive-born yearlings are descended from green turtles and eggs taken from the wild prior to 1978 in Suriname, Nicaragua, Costa Rica, Ascension, Guyana, and the United States (Wood and Wood, 1994). Once the number of hatchlings required to satisfy the annual production target is achieved (8,000 hatchlings in 2000), excess hatchlings are designated for release as yearlings. Over 30,000 marine turtles have been released from Grand Cayman since 1980 (CTF, 2000b).

A lesser-known activity of the farm is the rehabilitation and release of marine turtles that have ingested debris or been entangled in fishing gear, struck by boats, or otherwise injured (Hydes, pers. comm., 2001).

(3) Enforcement and education

Since 1986, the DoE has employed marine enforcement officers, with full powers of arrest, to patrol marine parks and enforce the regulations. Prior to this, volunteer fisheries officers (all

constables and game wardens as *ex officio* fisheries officers) enforced the Marine Conservation Law and Regulations. In 2000, two new enforcement officers were hired in Grand Cayman, bringing the total to seven in the Cayman Islands (5 on Grand Cayman, and 1 each on Little Cayman and Cayman Brac) (Ebanks-Petrie, pers. comm., 2000).

The DoE has taken a number of measures to increase the public's awareness of marine conservation laws in the Cayman Islands, to promote an appreciation for the local environment, and to stress the importance of conservation. The marine park boundaries have been marked, and signs summarizing marine conservation laws have been posted around the three islands. Maps and brochures showing the locations of the parks and detailing the rules that apply are widely available. Summaries of the marine conservation laws--including the prohibitions on molesting or taking marine turtles, possession of turtle eggs, and applicable penalties--are widely available. A brochure describing the turtle nesting surveys and the precarious conservation status of the nesters has been distributed to shops and hotels around the islands. DoE staff are active in collecting video and other footage to document infractions, and regularly appear in television, radio, and newspaper reports to increase awareness. They also give presentations and staff information booths at local fairs, as well as in schools and youth camps, to disseminate information to the public.

To help ensure that data are collected in a uniform manner at all beaches, the DoE recently developed a marine turtle beach monitoring manual for volunteer coordinators (Aiken, 2000b).

The National Trust plays an extensive role in public education and environmental advocacy, although its predominant focus is the conservation of terrestrial wildlife and ecosystems.

The Cayman Turtle Farm provides an educational experience to the many thousands of visitors who come to learn about marine turtles and the facility. Educational displays on the premises are informative and visitors can observe various size classes of green turtles swimming and feeding. Since July 1999, the farm has maintained a Web site with information about marine turtles, the history of the fishery, cultivation of turtles at the facility, research initiatives, and the release program. The annual yearling release program attracts the participation of residents and visitors alike, and is broadcast live on the Web site (CTF, 2000a; Turnbull, 2000).

4. Conservation Status and Trends

By the 1900s, the Caymanian breeding populations of green and hawksbill turtles had been rendered virtually extinct. Between 1971 and 1991, Wood and Wood (1994) verified the existence of 78 marine turtle nests on Grand Cayman, and one nest each on Little Cayman and Cayman Brac. They found evidence of green, hawksbill, loggerhead, and leatherback nesting.

Recent surveys have shown that marine turtle breeding populations remain on the verge of extinction in the Cayman Islands (Aiken, 2000a). The main threats have been identified as poaching, coastal development, artificial lighting, and depredation by feral cats and magnificent frigatebirds (*Fregata magnificens*) (Aiken, 2000a; Aiken et al., 1999, 2000a, and 2000b).

Surveys conducted by the DoE in 1998 (between 23 May and 20 October) and 1999 (between 26 April and 14 October) found 38 marine turtle nests on 22 beaches scattered throughout the islands. Based on track symmetry, body pit depth, and verification with live or dead hatchlings, the department estimated that these nests resulted from the efforts of 5-10 green, 2-4 hawksbill, and 8-18 loggerhead turtles (Aiken, 2000a; Aiken et al., 1999, 2000a, and 2000b). In 1998, 15

nests were identified on Little Cayman (2 hawksbill, 9 green, and 4 unidentified). In 1999, 23 nests were documented on Grand Cayman (18 loggerhead, 2 hawksbill, 1 green, and 2 unidentified) (Aiken et al., 1999).

Forty-five marine turtle nests (27 loggerhead, 17 green, and 1 unidentified) laid by an estimated 24 females (15 loggerhead and 9green) were recorded on Grand and Little Cayman in 2000. Two of these nests (1 loggerhead and 1 green) were robbed (Bell, 2000; Bell, in litt., 2001).

Sightings of green turtles in local waters by divers and fishers have become more frequent since the release program was initiated by the Cayman Turtle Farm in 1980. It is possible, however, that some of these sightings, most of which occur over reefs, are actually of hawksbill turtles (Ebanks-Petrie, in litt., 2001).

5. Exploitation and Trade of Marine Turtles and Products in the Cayman Islands

a) History of Exploitation and Trade

(1) The turtle fishery

The Cayman Islands once supported one of the largest marine turtle rookeries in the Caribbean (Aiken, 2000a; King, 1982). Green turtles were the primary turtle, but historical accounts report the occurrence and breeding of leatherbacks, loggerheads, and hawksbills also (Wood and Wood, 1994). According to Aiken (2000a), one estimate, which was based on catch statistics between 1688 and 1730, placed the Caymanian breeding population of marine turtles at 6.5 million.

Christopher Columbus discovered the Cayman Islands in 1503 and named them "Las Tortugas" for the "prodigious multitudes" of marine turtles observed on land and in the water. Spanish, French, and English sailors began to visit the islands to capture turtles, which could be kept alive onboard ships and provide fresh meat for weeks at sea. By the early 1600s, the islands were becoming a regular stop for sailors passing through the area to provision their ships with food and water, and by the mid-1600s, the rookery was exploited systematically and permanent settlements began developing in the Cayman Islands. In 1655, the British colony in Jamaica needed meat and the British fleet stepped up efforts to fish turtles and collect eggs in the Caymans. By 1688, 40 vessels dispatched from Jamaica were engaged full time, year-round, in bringing turtles from the Caymans to Jamaica. After they were brought to Britain, green turtles became relished in soup and the demand for their flesh increased further. During the nesting season, marine turtles were taken from Cayman Islands beaches, and during the rest of the year foraging turtles were captured from their feeding grounds along Cuba's south shore (Aiken, 2000a; King, 1982; Lewis, 1940; Webb, 2000a).

By 1711, turtles had become sufficiently scarce in the islands that a law was enacted prohibiting the "destruction of turtle eggs upon any island or quays belonging to Jamaica." Although at this time the Cayman Islands was legally under Jamaican administration, the new law was never enforced there (Haynes-Sutton et al., 1995; King, 1982). In 1730, green turtles were reported to be the principal source of meat eaten in Jamaica. By the 1800s, a large percentage of Caymanian men worked as sailors on turtling boats, as turtling had become an important means of income and a local source of food for them (Aiken, 2000a; Webb, 2000a). Turtlers from Grand Cayman traditionally fished green turtles, while Cayman Brac fishers targeted hawksbills, which they actually called green turtle. Hawksbills were processed, and the shells exported to the United States and Jamaica; the meat was consumed in Cayman Brac. Dried loggerhead meat was also

eaten and the eggs of all marine turtle species were collected for food by the islanders (Lewis, 1940).

Turtle stocks around the Cayman Islands had been depleted by the late 1700s, and the turtling industry, with its many Caymanian sailors and fishers, moved to Cuban waters. By 1840, the industry had moved on to the Miskito Cays off Nicaragua, Honduras, and Costa Rica (Wood and Wood, 1994). The fleet produced an annual catch of 2,000-3,000 Nicaraguan green turtles, more of which were exported, for meat products, to the United States than to Jamaica. By the 1900s, the nesting populations of green and hawksbill turtles were all but extinct in the Cayman Islands; only immature turtles were found feeding in the shallow waters around the islands (King, 1982). Turtling in the Miskito Cays remained a major source of income for Caymanians up until the 1960s, when it was replaced by tourism (Aiken, 2000a).

(2) The Cayman Turtle Farm

The Cayman Turtle Farm was established in 1968. It obtained approximately 460,000 eggs from the wild for the hatchery. Eggs, and to a lesser extent mature breeders, were acquired from Suriname, Costa Rica, Nicaragua, and other areas. By 1975, the farm stocked 100,000 green turtles. A total of 163 wild-caught turtles formed the breeding colony, along with 52 turtles hatched from wild-collected eggs and 115 turtles from eggs laid at the farm. The original market for the farm's turtle products was the United States, which once imported over 80 percent of the farm's output (Allan, 1998; Donnelly, 1994). The farm went bankrupt in 1975 when the United States closed its market. Then the green turtle was included on CITES Appendix I in 1977.

In 1983, after changes in management and downsizing to become more economical, the farm was purchased by the Cayman Islands government. The farm eventually became self sufficient as its purpose shifted from being an exporter of turtle products to being a tourist attraction, a supplier of local meat, and a scientific institution for the study of turtle reproduction. No wild turtles or eggs have been collected by the farm since 1978; it currently stocks 22,600 turtles, which include 354 breeders that produce 45,000 eggs per year (Parsons, pers. comm., 2000; Hydes, pers. comm., 2001).

b) Recent Harvest and Use of Marine Turtles

Some turtle meat is supplied by the small domestic catch allowed for licensed fishers, but much more is supplied by the Cayman Turtle Farm. While locals have traditionally consumed turtle, the surge in tourism has created an additional market for farmed meat in restaurants. Tourism also generates a substantial income for the farm through entrance fees and sales in its restaurant and gift shop--the number of visitors to the farm exceeded 334,000 in 2000 (Hydes, pers. comm., 2001).

Over 2,100 turtles, which produced nearly 51,000 kilograms of meat and other edible products, were processed by the farm in 1997 (Allan, 1998). In 2000, production was scaled down to 1,800 green turtles (Parsons, pers. comm., 2000).

The farm produces steaks for tourist restaurants and steak pieces, fin, liver, lung, calipee, and fat for local consumption in a traditional stew (Allan, 1998). Local opinions differ about whether the farm can satisfy indigenous demand. Most people interviewed reported a preference for the taste of wild over farmed turtle; others had become accustomed to the taste. One traditional fisher reported that illegal take of turtles occurs partly because some people simply do not like the taste of the farmed meat. Others resent the farm because Caymanians can no longer fish for or import

turtles; one man indicated that some perceive the farm as having monopolized the turtle trade. This individual claimed that wild turtle meat can fetch up to KYD7-10 (US$8.75-12.50) per pound (US$19.25-US$27.50/kilogram), while meat from the Cayman Turtle Farm is sold for KYD5 (US$6) per pound (US$13.20/kilogram).

Estimates by marine enforcement officers and turtle fishers suggest that approximately 10 adult turtles are taken legally, and more than 10 turtles may be taken illegally, each year in the Cayman Islands (Aiken et al., 2000b).

In 2000, the DoE received reports of five marine turtles taken at sea, and one of those was taken illegally. However, DoE staff believe that this number is underrepresentative of the total number of turtles taken in 2000. The department is aware of two incidents of egg poaching during the 2000 nesting season--a nest was robbed at Half Moon Bay and another at Boatswains Bay--as well as one incident of turtle poaching (of a mature hawksbill as she came ashore to lay eggs at Boatswains Bay). There was also an unconfirmed report of a green turtle taken from the beach at East End (Bell, 2000; Bell, pers. comm., 2000).

(1) TRAFFIC surveys

In 1998, TRAFFIC reviewed the trade in CITES-listed species in the British territories in the Caribbean (Allan, 1998). In April 1998, during a visit to the Cayman Turtle Farm, Allan described a variety of green turtle products derived from the farm and offered for sale in the gift shop. These included polished carapaces, scutes, jewelry, and oil. A sign posted in the shop stated "Shells are prohibited in the United States and many other countries." Eight polished carapaces were priced at US$165-US$220 each. In a display cabinet, approximately 100 shell articles, including hair bands, bracelets, and earrings, were priced from US$7.50 to US$10. He also saw approximately 20 bottles of turtle oil. The restaurant offered turtle sandwiches and soup.

A sales assistant stated that if a polished carapace were purchased by a tourist, it would likely be detected by customs officials in the United States and other countries; she suggested instead that a tourist consider purchasing small items such as bracelets. She offered advice on smuggling such small items out of the Cayman Islands, including that they be wrapped in tissue paper and transported in checked baggage (Allan, 1998).

In October 2000, during the open season for fishing marine turtles, another TRAFFIC researcher surveyed the availability of marine turtle products on Grand Cayman. Marine turtle was commonly available in about half of the restaurants visited; these restaurants catered to tourists as well as local patrons. A sample of offerings in 13 restaurants included appetizers (KYD5.95/US$7.45), soup (KYD6.00/US$7.50), steak (KYD16.00-27.00/US$20-34), stew (KYD9-11/US$11.25-13.75), sandwiches (KYD9.95/US$12.45), and burgers (KYD10.95/US$13.70), all reported to originate from the Cayman Turtle Farm. Green turtle carapaces were displayed in some of the restaurants catering to a local clientele; these were reported to have been acquired from family members long ago or purchased at the farm.

In 2000, the gift shop at the Cayman Turtle Farm displayed several green turtle carapaces for US$175-265. The jewelry case described by Allan in 1998 had been removed and no turtle jewelry was displayed. A few bottles of turtle oil, used by locals who mix it with skin cream, were offered for sale.

A different sign prominently posted next to the exit of the gift shop stated, "All sea turtle products are illegal to export from the Cayman Islands"--a step in the right direction to deter tourists from purchasing marine turtle products. However, in a booklet about the Cayman Turtle Farm for sale in the shop, the first page contained a photograph of green turtle carapaces and jewelry under which it was written "the Farm's shop carries an assortment of island and turtle souvenirs. Turtle shell jewelry and polished back shells are on display…Visitors may choose from a variety of souvenirs to remember their visit to the Turtle Farm and the Cayman Islands" (CTF, 1994).

When the farm's general manager was asked about whether the sales people would sell a carapace to a tourist, he responded that they try to dissuade this. He added that many foreigners live on Grand Cayman, some of whom purchase carapaces to display in their homes. The manager also mentioned that he has reprimanded staff in the gift shop for selling marine turtle products to tourists and that the management is currently trying to establish policies to prevent this (Hydes, pers. comm., 2000). He added that local jewelers occasionally offer to purchase shells or scutes; however, the farm's policy has been to destroy all shell, except small quantities sold in the gift shop.

c) Recent International Trade in Marine Turtles and Products

The Cayman Islands was ranked worldwide as the sixth largest supplier of hawksbill shell to Japan between 1970 and 1986. Japanese customs data indicated that a total of 30,350 kilograms (66,770 pounds) of hawksbill shell was received from the Cayman Islands during that period, representing almost 5 percent of Japan's total imports of hawksbill shell during those years. The Cayman Islands was also the major supplier of green turtle shell from the Caribbean to Japan (7,149 kilograms/15,728 pounds) during the period. Most trade occurred between 1976 and 1982 and is believed to have originated from the Cayman Turtle Farm (Milliken and Tokunaga, 1987).

In 1983, at the Fourth Meeting of the Conference of the Parties to CITES (COP 4 in Gaborone), the United Kingdom submitted a proposal requesting a limited trade in captive-bred specimens of species which take longer than three years to reach maturity, to allow the Cayman Islands Farm to export captive-born, first-generation turtle products, instead of the required second-generation products, which take many years to produce. The proposal was met with strong opposition and withdrawn. In 1985, at COP 5 in Buenos Aires, the UK presented a proposal requesting that the turtle population at the Cayman Turtle Farm be considered for down-listing from CITES Appendix I to Appendix II as a ranched population under the terms of Resolution Conf. 3.15; this was rejected on the grounds that Resolution Conf. 3.15 should apply to wild populations only. The UK then submitted a resolution to allow trade in turtle products from the farm, but this was also rejected (Groombridge and Luxmoore, 1989).

The farm is not registered by the CITES Secretariat as a breeding center for Appendix I species, so it cannot legally export turtle products. After these unsuccessful attempts to legalize such trade, the farm continued to export turtle meat to soup manufacturers in the UK, which U.K. authorities defended as domestic trade, until the early 1990s. The Cayman Islands, however, are not part of the European Union, and this trade has been in violation of EU wildlife trade regulations. There were exports of farmed green turtle products up until 1997, when the farm and government imposed an export ban (Allan, 1998).

A review of CITES-listed trade between 1992 and 1996 showed that the Cayman Islands exported the following marine turtle products (all green turtle): 4 leather items; 7 carapaces; 1 kilogram and 13 pounds (6.9 kilograms/15.2 pounds) of scales; 2 kilograms (4.4 pounds) of meat; 78 specimens, a 3 pound (1.36 kilogram) specimen, and a 24-ounce (686 gram) specimen; and one

live turtle. Many of these were recorded as being for personal use or from a captive-bred source (Allan, 1998).

d) Enforcement Efforts

A database of the Cayman Islands Department of the Environment (DoE) provides a picture of DoE enforcement efforts in 2000. On 24 March, a DoE officer confiscated an illegally set turtle net. On 28 March, a DoE officer removed three illegal turtle nets from the Replenishment Zone in East End, Grand Cayman. On 24 May, police confiscated a turtle net set in the water during the closed season.

DoE officials said they are often not informed of the outcome once the case is handed over to the judiciary. Nevertheless, Chief Marine Enforcement Officer Ladner Watler (pers. comm., 2000) was aware of several cases in the last few years in which fishers had been fined, imprisoned, or had their boats confiscated for taking turtles illegally.

6. Summary and Recommendations

The conservation of marine turtles is a particularly sensitive issue in the Cayman Islands. On the one hand, the turtle resource is what originally attracted settlers to the islands and it subsequently played an important role in the social and economic development of the islands. On the other hand, the once abundant rookery was rendered virtually extinct by the late 1700s by a century of intensive exploitation, and has yet to recover. Remnant turtle populations remain endangered, but the islands' traditional culture is still entwined with the turtle fishery, and a traditional harvest is permitted.

The government-owned Cayman Turtle Farm purports to have contributed to the conservation of green turtles in the territory, by virtue of the fact that it has introduced thousands of young turtles into local waters. Questions have been raised, however, as to what may become of the yearling turtles that originate genetically from Suriname and other areas. Will they survive until they nest, and if so, where will they nest? There is also currently no way to track the released turtles or to identify a released turtle if it is encountered in the future, in a net or on a nesting beach, for example. The sale of turtle products in the gift shop casts a shadow on the farm's efforts to establish itself as a conservation and research oriented facility.

TRAFFIC offers the following recommendations:

- The DoE is urged to complete its revision of the CITES legislation and consult the recommendations received from U.K. authorities. Once completed, the legislation could provide a useful model for other U.K. territories in the region; the U.K. and Cayman Islands authorities are encouraged to make this legislation available to interested Parties in the Caribbean.

- The DoE is encouraged to proceed with revising the fisheries regulations and to extend the closed season to include the months when mature females enter Cayman waters. The department is also encouraged to consult with marine turtle specialists during this undertaking.

- The UK is encouraged to ratify the SPAW Protocol, accede to the IAC, and extend ratification to the Cayman Islands. The UK should assist the Cayman Islands in ensuring it is able to meet its obligations under these agreements.

- The DoE and Cayman Turtle Farm are encouraged to evaluate the problem of potential laundering of illegally taken wild turtles into the system of domestic meat sales, and establish a policy to close any loopholes. To this end, personnel at the farm are encouraged to work with forensic experts to investigate whether farm-reared turtle meat could be differentiated from wild turtle meat.

- The Cayman Turtle Farm is urged to establish a system to ensure that turtle products such as polished carapaces are not sold to tourists in its shop. The farm is urged to remove from its 1994 booklet the reference to turtle shell souvenirs being a way to remember a visit to the Cayman Islands.

- The Cayman Turtle Farm is encouraged to undertake more applied research to advance the conservation of marine turtles in the wild. It is also urged to collaborate with and make its facilities available to scientists to study marine turtles in captivity.

Personal Contacts

A TRAFFIC researcher visited the Cayman Islands from 7 through 12 October 2000 and met with the following individuals on Grand Cayman: Gina Ebanks-Petrie (Director, Cayman Islands Department of the Environment/DoE), Timothy Austin (Assistant Director, Research and Assessment, DoE), John Bothwell (Research Officer, DoE), Phil Bush (Research Officer, DoE; Secretary to the Marine Conservation Board), Catherine Bell (Research Officer, DoE), Ladner Watler (Chief Marine Enforcement Officer, DoE), Frederic Burton (Environmental Programs Director, National Trust for the Cayman Islands), Joseph Parsons (Research Manager, Cayman Turtle Farm), Dale Dacres (licensed turtle fisher), and Ducan Stanford Rankin (former licensed turtle fisher).

Discussions were held with Jonathan Aiken (Research Officer, Cayman Islands DoE) on 1 March 2000, during the 20th Annual Symposium on Sea Turtle Biology and Conservation in Orlando, Florida, and with Kenneth Hydes (General Manager, Cayman Turtle Farm) on 27 February 2001, during the 21st Annual Symposium in Philadelphia, Pennsylvania.

References

Aiken, J. 2000a. The original Caymanian. *What's Hot Cayman* 9(8): 38-39.

Aiken, 2000b. *Volunteer co-ordinators' marine turtle beach monitoring manual*. Cayman Islands Department of Environment. George Town, Grand Cayman.

Aiken, J., T. Austin, A. Broderick, B. Godley, and G. Ebanks-Petrie. 1999. *Biology and status of marine turtles nesting in 1998 on Little Cayman, Cayman Islands, BWI*. Cayman Islands Department of Environment. Grand Cayman, Cayman Islands. 12 pp + 5 pp appendices.

Aiken, J., T. Austin, A. Broderick, B. Godley, and G. Ebanks-Petrie. 2000a. Marine turtles in the Cayman Islands, British West Indies. Poster presented at the 20th Annual Symposium on Sea Turtle Biology and Conservation in Orlando, Florida (29 February-4 March 2000).

Aiken, J. J., B. J. Godley, A. C. Broderick, T. Austin, G. Ebanks-Petrie, and G. C. Hays. 2000b. Two hundred years after a marine turtle fishery: the current status of marine turtles nesting in the Cayman Islands. Unpublished. 13 pp. (Submitted to *Oryx*.)

Allan, C. J. 1998. *Conched out: A review of the trade in CITES-listed species in the United Kingdom overseas territories in the Caribbean*. WWF-United Kingdom. Godalming, UK. 87 pp.

Bell, C. 2000. *Preliminary assessment of 2000 nesting season data*. Cayman Islands Department of the Environment. George Town, Grand Cayman. 8 pp.

CTF. 1994. *Cayman Turtle Farm*. Cayman Turtle Farm (1983) Ltd., Grand Cayman. 25 pp.

CTF. 2000a. Cayman Turtle Farm (1983) Ltd. Web site. http://www.turtle.ky.

CTF. 2000b. Cayman Turtle Farm (1983) Ltd. Release me Cayman-style! *What's Hot Cayman* 9(10):23-24.

Donnelly, M. 1994. *Sea turtle mariculture: A review of relevant information for conservation and commerce*. Center for Marine Conservation, Washington, D.C. 113 pp.

Ebanks-Petrie, G. 1995. *Overview of current activities and priorities for the conservation and sustainable use of coral reefs and associated ecosystems in the Cayman Islands*. Prepared for the UNEP Regional Coordinating Unit of the Caribbean Environment Programme, Kingston, Jamaica. 8 pp.

Ebanks-Petrie. 2000. *Briefing paper on environmental protection and conservation in the Cayman Islands*. Department of Environment, Cayman Islands. George Town, Grand Cayman. 10 pp.

Ebanks, G. C. and P. G. Bush. 1990. The Cayman Islands: a case study for the establishment of marine conservation legislation in small island countries. Pages 197-203 in M. L. Miller and J. Auyong, editors. *Proceedings of the 1990 Congress on Coastal and Marine Tourism: A Symposium and Workshop Balancing Conservation and Economic Development*. National Coastal Resources Research and Development Institute, Oregon, 552 pp.

Groombridge, B. and R. Luxmoore. 1989. *The green turtle and hawksbill (Reptilia: Cheloniidae): World status, exploitation and trade*. CITES Secretariat, Lausanne, Switzerland. 601 pp.

King, F. W. 1982. Historical review of the decline of the green turtle and the hawksbill. Pages 183-188 in K. Bjorndal, editor. 1982. *Biology and conservation of sea turtles*. Smithsonian Institution Press, Washington, D.C. 569 pp.

Lewis, C. B. 1940. The Cayman Islands and marine turtle. Pages 56-65 in Grant, C. 1940. *The Herpetology of the Cayman Islands*. Bulletin of the Institute of Jamaica Science Series, No. 2.

Milliken, T. and H. Tokunaga. 1987. *The Japanese sea turtle trade, 1970-1986*. TRAFFIC Japan. Prepared for the Center for Environmental Education. Washington, D.C. 171 pp.

Turnbull, L. 2000. Turtles on the net. *Key to Cayman* 11(2):62.

Webb, C. 2000a. A brief history. *Key to Cayman* 11(2):20-21.

Webb, C. 2000b. Endangered sea turtles - a story of success. *Key to Cayman* 11(2):60-61.

Wood, F. E. and J. R. Wood. 1994. Sea turtles of the Cayman Islands. Pages 229-236 in Brunt, M. A. and J. E. Davies (eds). 1994. *The Cayman Islands: Natural History and Biogeography*. Kluwer Academic Publishers. Dorrecht, Netherlands.

D. The Republic of Cuba (República de Cuba)

1. Introduction

Cuba comprises the largest island complex in the Caribbean. The main island is about 1,250 kilometers (781 miles) long by 100 kilometers (62 miles) wide and is associated with an archipelago of 2,128 islands and keys with a total land area of 110,860 square kilometers (42,638 square miles). The coastline spans 3,735 kilometers (2,334 miles). The population approaches 12 million (Carrillo et al., 1999). Havana is the capital.

Cuba's neighbors include the Bahamas, the Cayman Islands, Florida, Jamaica, Haiti, and Mexico. Cuba is part of North America geologically; the boundary between the North American and Caribbean plates runs east to west underwater to the south of the island. A deep underwater rift valley runs along the plate margin between Cuba and Jamaica. The valley is quite close to the Cuban coast to the south of the Sierra Maestra, with water 6,000 meters (19,680 feet) deep only a few kilometers offshore.

Much of Cuba's northern coast, which borders the Atlantic, consists of coral limestone cliffs and sandy beaches, while the southern coast, on the Caribbean, is characterized by wetlands and mangroves, with fewer sandy beaches. Cuban waters encompass approximately 30 percent of the shallow coral reefs in the Caribbean Sea, in addition to extensive sea grass beds (ROC, 2000a).

Cuba has a centrally planned economy, with tourism currently the most important source of foreign exchange (approximately 1.7 million tourists visited Cuba in 2000), followed by sugar production. Cuba is characterized as a "lower middle income, severely indebted" nation (World Bank, 2000). The per capita GDP is US$1,700. The currency is the Cuban peso.

2. Marine Turtle Species in Cuba

Hawksbill, green, and loggerhead turtles commonly nest and feed in Cuba. Leatherback turtles nest rarely on Cuban beaches; two nests have been reported (Carrillo and Moncada, 1998). Individuals have been caught in fisheries for other turtle species (Moncada and Rodriguez, 1995). There are four records of olive ridley turtles in Cuban waters, the most recent of which is the capture of a female at Cayo Guajaba, Nuevitas, on 29 April 1997, in fishing nets set for marine turtles (Moncada et al., 2000). The Kemp's ridley turtle has not been reported in Cuba.

Table 13. Marine Turtles Occurring in Cuba

Common name	Scientific name	Local name(s)
Hawksbill turtle	*Eretmochelys imbricata*	carey
Green turtle	*Chelonia mydas*	tortuga, tortuga verde
Loggerhead turtle	*Caretta caretta*	caguama
Olive ridley turtle	*Lepidochelys olivacea*	golfina, bastarda, caguama
Leatherback turtle	*Dermochelys coriacea*	tinglado
All marine turtles		tortuga

Sources: Carrillo and Moncada, 1998; Nodarse, pers. comm., 2000.

3. Overview of Marine Turtle Management and Conservation

Marine turtle management and conservation efforts in Cuba have involved long-term regulation of fisheries and fisheries management research for hawksbill, green, and loggerhead turtles. Research has been concentrated in a few locations, with nest protection, habitat conservation, public education, and law enforcement as important components of the management program.

a) Regulatory Framework

(1) Legislation and regulations

Marine turtles have long been regulated as a fisheries resource in Cuba. Since 1995, it has been legal to fish hawksbill, loggerhead, and green turtles from only two locations. The taking of eggs, nesting turtles, and hatchlings of any marine turtle are prohibited. Possession of, use of, and trade in marine turtles and products are prohibited.

The following information has been adapted from Carrillo et al., 1998a and Carrillo et al., 1999.

A 1936 law first established a closed season on taking marine turtles during their reproductive period (Decree-Law No. 704, General Law of Fisheries, 1936). Regulations for the use of marine resources, including turtles, were enacted in 1956 (Decree-Law No. 2724, 1956). The closed season for harvesting marine turtles was changed in 1960 to 15 June-10 August (MIP Resolution 31-V, 1960). The taking and consumption of marine turtle eggs and the disturbance of nesting females were prohibited in 1961 (MIP Resolution 16-VI, 1961).

In 1968, the marine turtle fishery became subject to all management measures applicable to other Cuban fisheries, and the state established control over the taking of marine turtles and the accumulation and distribution of turtle products (MIP Resolution 117, 1968). Since then, the Ministry of Fishing Industries (MIP) has promulgated resolutions establishing closed seasons, minimum sizes, and quotas for marine turtles in four established fishing zones (A-southeastern shelf; B-southwestern shelf; C-northwestern shelf; and D-northeastern shelf), as well as several permanent restrictions.

The taking of marine turtles by members of the general public was prohibited in 1973. In 1975, a closed season of 1 June-31 August, which aimed to stop the catching of turtles during their nesting season, was established for loggerhead, green, and hawksbill turtles. In 1976, the capture of marine turtles for research purposes was authorized (MIP Resolution 34, 1976). In 1977, the MIP prohibited the destruction of turtle nests (MIP Resolution 317, 1977), and in 1978 it prohibited the capture of female marine turtles right before nesting (MIP Resolution 134, 1978).

In 1982, the taking of marine turtles by noncommercial interests was prohibited (exceptions were made only for state organizations and cooperatives), as well as the possession or capture of females on nesting beaches, destruction of nests and juveniles, and collection, commercialization, and consumption of turtle eggs. Collection and keeping of marine turtles for research purposes required a permit issued by the MIP's Fisheries Regulation Directorate (Decree No. 103, 1982).

In 1983, the MIP set a minimum size of 50-centimeter (19.5-inch) straight carapace length (SCL) and required that undersized turtles be released (MIP Resolution 109, 1983). In 1987, the MIP again modified the closed season to take account of the main nesting months of each species in

each fishing zone. In 1994, the MIP established a permanent closed season for harvesting marine turtles in Cuba.

The following measures are in force today:

MIP Resolutions 16-VI (1961) and 317 (1977). These resolutions established total bans on the collection of marine turtle eggs, hatchlings, and the destruction of nests.

MIP Resolution 298 (1994). This resolution established a permanent closed season for taking marine turtles.

MIP Resolutions 300 (1994) and 3 (1995). These resolutions establish regulations for harvesting hawksbill, green, and loggerhead turtles at Cocodrilo, the traditional harvest site on the Isle of Pines (Isla de la Juventud), and four sites at Nuevitas (Los Pinos, Cayo Guajaba, Cayo Romano, and Punta de Ganado).

Decree Law 164 (1996). The decree consolidates provisions of Decree Law 704 (1936), Decree No. 2724 (1956), and Decree No. 103 (1982). It updates fisheries legislation, creates an advisory commission for fisheries, and further strengthens restrictions on the taking of all species of marine turtles and their eggs by unauthorized persons by establishing severe penalties for those violators. Penalties include fines, confiscation of fishing gear and boats, suspension of licenses, and other penalties.

MIP Resolution 561 (1996). This measure establishes a minimum size of 65 SCL. Live turtles under this size must be released, but dead turtles may be used.

MIP Resolution 83 (1997). This resolution establishes the closed season from 1 May through 31 July, and the numbers of boats and catch quotas for each species. Numbers are allocated to specific harvest sites based on previous capture data. The fishery is closed once the targets are met. In 2000, catch quotas included up to 500 hawksbills, 280 greens, and 90 loggerheads.

(2) Membership in international and regional treaties

CITES. CITES entered into force in Cuba on 19 July 1990. Upon acceding to the treaty, Cuba entered reservations for hawksbill and green turtles, which currently remain in effect. The Ministry of Science, Technology and Environment Resolution 87 of 1996 established regulations to enable Cuba to comply with its obligations under CITES (Carrillo et al., 1998a).

Cartagena Convention/SPAW Protocol. Cuba ratified the Cartagena Convention on 15 September 1988 and ratified the SPAW Protocol to the Cartagena Convention on 4 August 1998.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). Cuba has neither signed nor ratified the IAC.

(3) Responsible agencies

The Ministry of Fishing Industries (MIP) is responsible for regulating all Cuban fisheries, all of which are open only to MIP-managed cooperative fisheries centers (not the general public). The marine turtle resource falls under the regulation of four MIP directorates:

- ♣ The Center for Fisheries Research (Centro Investigaciónes Pesqueras – CIP) is responsible for fisheries research and makes recommendations to MIP on fisheries regulations. These may include fishing quotas, closed seasons, net types and sizes, and bans to achieve conservation and sustainable use of the resource.
- ♣ The Directorate of Fisheries Regulation (Dirección de Regulaciónes Pesqueras - DRP) is responsible for providing advice on MIP regulations and policies.

- ♣ The Branch Directorate of Fishing Enterprises (Dirección Ramal de Impresas Extractivas) oversees the government fisheries centers and harvest plans.

- ♣ The National Office for Fishing Inspections (Oficina Nacional Inspecciónes Pesqueras-ONIP) monitors compliance with fisheries regulations.

The Consultative Commission (previously known as the Fisheries Management Committee) was established in 1984. Its members include the Minister of Fishing Industries; CIP directors of fisheries regulation, inspection, planning, and operations; and representatives of the Ministry of Tourism and the Ministry of Science, Technology and Environment. It reviews the Cuban marine turtle fishery annually. The goal has been to sustain the harvest indefinitely and not simply to maximize the catch in any one year (Carrillo et al., 1999). Based on this annual review, the committee has fine-tuned quotas, size limits, and seasons. Over the years, the regulations governing the harvest have reflected these commission consultations (Carrillo, in litt., 2000).

In 1990, when Cuba acceded to CITES, the MIP was designated as the CITES Management Authority and the Institute of Oceanography as the Scientific Authority. In 1996, the Ministry of Science, Technology and the Environment was designated as the CITES Management Authority. Within this ministry, the Center for Inspections and Environmental Control (Centro de Inspección y Control Ambiental - CICA) is directly responsible for CITES matters (Carrillo, in litt., 2000).

b) Conservation Initiatives

(1) Habitat conservation/protected areas

The National System of Protected Areas (El Sistema Nacional de Areas Protegidas) includes 14 national parks, 22 ecological reserves, and 4 biosphere reserves. All known nesting and foraging areas for marine turtles in Cuba are afforded some degree of protection.

In 1996, the Doce Leguas Keys, among the most important hawksbill nesting areas in Cuba, were declared as a special use and protected area (MIP Resolution 562, 1996). This resolution made commercial fishing in the area subject to consent by the Directorate of Fishing Regulations and prohibited sport and recreational fishing unless authorized by a special permit (Carrillo et al., 1999). Doce Leguas is part of the Archipelago de Jardines de la Reina, which is a national park.

In 1987, the Guanahacabibes Peninsula was declared a UNESCO Biosphere Reserve. Located in the western part of the country, and encompassing 1,015 square kilometers (396 square miles), the reserve provides nesting habitat for green and loggerhead turtles (Ibarra Martin et al., 2000).

Other special use and protected areas (marine reserves) include Cabo Cruz, Cayo Largo del Sur, Punta Frances, Cabo de San Antonio, and Cienaga de Zapata. The southern part of the Isle of Pines is a protected area for resource management, and the keys to the east of the Isle of Pines are designated as fauna refuges.

(2) Species research and conservation activities

Cuba's national research program on marine turtles was developed by the Fisheries Research Center (CIP) in collaboration with other national and international agencies. Until the late 1980s, much of the marine turtle work in Cuba was focused on managing marine turtles as a fisheries resource. Since that time, Cuba has undertaken tagging and satellite tracking studies, and has expanded its research activities to include identifying new nesting areas and investigating turtle growth, reproduction, nutrition, and genetics (ROC, 1998, 2000a, and 2000b) (table 14). Over the last decade, Cuban authorities and researchers have focused their efforts on studying and managing hawksbills, with a view to providing data to ensure that the harvest is sustainable, and being able to export to Japan hawksbill shell accumulated during the harvest for meat.

Management of green and loggerhead turtles on the nesting beaches at Playa Larga on the southern coast of the Isle of Pines has included patrols by frontier guards and the presence of researchers since 1982. Active measures were taken to reduce the numbers of feral pigs, which were a major predator of the eggs in the 1980s and early 1990s (Nodarse et al., 2000a and 2000b).

From 1998 through 2000, the University of Havana and MIP collaborated on a project to study green and loggerhead nesting at Guanahacabibes (Ibarra Martin et al., 1999 and 2000).

(3) Enforcement and education

The Directorate of Fisheries Regulation provides advice on MIP regulations and policies, issues fishing permits and licenses, and proposes new regulations as agreed by the Consultative Commission.

Created in 1996 (by Agreement 2994 of the Executive Committee of the Cuban Council of Ministers), the National Office for Fishing Inspections (ONIP) is responsible for monitoring and enforcing compliance with all regulations pertaining to the conservation, development, and sustainable use of aquatic resources in Cuba's interior and territorial waters, and within its economic zone. This includes all fisheries regulations. It has 15 offices throughout the country and a total of 181 inspectors. The police, coast guard, and national guard support ONIP's enforcement efforts.

The Center for Marine Research at the University of Havana began a three-year project in 1998 in the Guanahacabibes Peninsula Biosphere Reserve; two of the project's objectives have been to generate interest in conservation of marine turtles and their habitat in university students and to develop and improve environmental education in local communities (Ibarra Martin et al., 1999 and 2000).

The Center for Fisheries Research of the Ministry of Fishing Industries (CIP) has developed educational programs that include games; interactive activities; presentations in schools; and visits by primary and secondary school students to the traditional harvest sites, such as Cocodrilo on the Isle of Pines.

Cuba continues to promote regional cooperation in the conservation and sustainable use of marine turtles, and has hosted various workshops and meetings with relevance to marine turtle bycatch in shrimp fisheries (1992), DNA (1994, 1995), and management (1994, 1995, 1996, 1997, 1999) (ROC 2000a). Cuba and Mexico have cooperated on management and training initiatives since the 1970s, and a formal agreement was reached in 1999 to undertake joint research and training

programs. In September 1999, a training course in marine turtle management was held in Cuba, with participants from Cuba and 12 nations in the region. More recently (13-18 June 2000), CIP and Empressa Nacional para la Proteccion de la Flora and Fauna held a workshop on marine turtle nesting in Cuba. The workshop aimed to promote

Table 14. Main Projects Assessing Marine Turtle Activities in Cuba

Species Projects	Location
Hawksbill growth (1991-present)	Isle of Pines and Doce Leguas Keys
Hawksbill DNA (1995-present)	Doce Leguas Keys, Nuevitas, Isle of Pines
Green DNA (1995-present)	Doce Leguas Keys, Nuevitas, Isle of Pines
Loggerhead stomach contents (1978-1980)	Cayo Largo
Hawksbill stomach contents (1992-1998)	Nuevitas, Isle of Pines, Doce Leguas Keys
Green turtle ranching (1968-present)	Isle of Pines, Cayo Largo
Hawksbill turtle ranching (1968-present)	Boca Rica, Isle of Pines
Hawksbill nesting surveys (1982-present)	Isle of Pines
Hawksbill nesting surveys (1988-present)	Doce Leguas Keys
Loggerhead nesting surveys (1982-present)	Playa el Guanal (Isle of Pines)
Green nesting surveys (1982-present) (1996-present) (June-August 1998-2000) (1968-1972/1981-present)	Playa el Guanal (Isle of Pines) San Felipe Keys Guanahacabibes Peninsula (Playa Antonio and Caleta del Piojo) Cayo Largo
Hawksbill, green, and loggerhead nesting surveys (1996-present)	Archipielago de los Canarreos Archipielago de Sabana-Camaguey Casilda
Hawksbill, green, and loggerhead migration (1989-present)	Nuevitas, Isle of Pines, Doce Leguas Keys
Hawksbill aging (1994-present)	Throughout Cuba
Hawksbill shell polymorphism (1980)	Throughout Cuba
Chemical studies of hawksbill shell (1994-present)	Throughout Cuba
Nutritional aspects/artificial diet of hawksbills (1990-present)	Isle of Pines, CIP (Havana)
Nutritional aspects/artificial diet of greens (1990-present)	Isle of Pines, CIP (Havana)
Fisheries studies (characterization, standardization of gear) for hawksbill, green, and loggerhead turtles (1980-present)	Throughout Cuba
Sexual maturation of hawksbills (1992-present Greens (1989-1992) Loggerheads (1989-1992)	Doce Leguas Nuevitas Isle of Pines

Sources: Acevedo et al., 1984; Anderes and Uchida, 1994; Diaz-Fernandez et al., 1999; Espinosa et al., 1999; Ibarra Martin et al., 1999 and 2000; Moncada, 1993; Moncada and Nodarse, 1994; Moncada et al., 1995; Nodarse et al., 2000a and 2000b; Pelegrín et al., 1994; ROC, 1998, 2000a, and 2000b; Carrillo, in litt., 2000.

cooperation throughout the Cuban archipelago on marine turtle conservation activities, and encourage the collection of information on marine turtle nesting as part of the management of protected areas (Moncada, 2000a).

4. Conservation Status and Trends

Despite all the projects reported, there is little specific information about nesting sites of marine turtles in Cuba. In general terms, the most important hawksbill nesting beaches are found on the small islands and keys, most of which are off the southern coast of Cuba. Hawksbill, green, and loggerhead turtles nest along most of the Cuban coast. The dominant nesting species per fishing zone are hawksbills in zone A (southeastern shelf), green turtles in zone B (southwestern shelf), and loggerheads in zone C (northwestern shelf) (Moncada, 2000b).

Important feeding and development areas for marine turtles are found in the Batabano Gulf and Ensenada de la Broa (southwestern shelf), Gulfs of Ana Maria and Guacanayabo (southeastern shelf), and the Sabana-Camaguey Archipelago (northeastern shelf) (Moncada, pers. comm., 2000).

Feral pigs had been a major threat to turtle eggs on the south coast of the Isle of Pines until 1994. Some predation of hatchling hawksbills at Doce Leguas has been observed over the last 15 years. Hatchling success has been reduced in years with severe hurricanes and tornadoes, which cause extensive flooding of nests (Carrillo, in litt., 2000).

Little of Cuba's insular coastline, where the majority of marine turtle nesting occurs, has been developed (Carrillo and Contreras, 1998). Some bycatch of marine turtles has been associated with the fishery for spotted eagle rays that takes place during the turtle nesting season (ROC, 2000a).

a) Hawksbill Turtle

The main nesting areas of the hawksbill turtle in Cuba are located in several archipelagos and numerous cays off the southeast coast. Surveys have confirmed that the Doce Leguas Keys, a chain of 45 islands and cays within the Archipielago de los Jardines de la Reina, 60 kilometers (38 miles) off the southern coast of Camaguey Province, is probably the most significant nesting area for the species in Cuba. Most survey work has been concentrated in this region. Additional nesting areas are found on the keys and islands in the Canarreos Archipelago (San Felipe Keys, Cayo Campo, Cayo Rosario, Cayo Largo) and the Isle of Pines. The species also nests on the mainland at La Furnia near Cabo Frances and in Cabo Corrientes (Moncada et al., 1999).

According to Moncada et al. (1999), there is no reliable way at present to estimate the full extent of hawksbill nesting in Cuba. However, the authors estimate that 1,700 to 3,400 hawksbill nests may be produced annually in Cuba, based on a series of extrapolations from surveys undertaken during the 1990s (chiefly from 1994 onwards), principally in the Doce Leguas Keys. Historical nesting levels are largely unknown.

The main foraging areas for hawksbills are the extensive coral reefs in the southern part of the country, which support high densities of turtles (ROC, 1998; 2000a). Mitochondrial DNA analysis of a relatively small sample (55) of hawksbills taken from the Cuban foraging grounds (Moncada et al., 1998), indicates that perhaps 50 to 70 percent originate in the Cuban nesting population (Bass, 1999). Haplotypes (distinctive genetic variants) associated with nesting

populations in Belize, Mexico, Puerto Rico, the U.S. Virgin Islands, and Antigua contributed the remainder. Many more samples from hawksbill turtles in nesting and foraging areas in Cuba (218), were analyzed by Diaz-Fernandez et al. (1999). These data indicate that foraging hawksbill turtles that did not hatch from nests in the Doce Leguas region could have originated from a variety of locations. It is likely that hawksbills nesting in other areas in Cuba may also contribute to the Cuban foraging population (Manolis, in litt., 2000).

A few hawksbills tagged elsewhere have been recaptured in Cuba. In 1980 two animals tagged in Mexico were recaptured at the Isle of Pines, and in 1994 one animal tagged in Mexico was caught at Mariel (northwest coast). A subadult hawksbill tagged at Great Inagua, Bahamas, in 1992 was captured off Banes in northwestern Cuba in 1997 (Bjorndal and Bolten, 1998). A hawksbill tagged at Buck Island (U.S. Virgin Islands) was caught at Cayo Guajaba, Nuevitas, in 1998, and three animals tagged in Mexico were caught in 1999 (Isle of Pines and Doce Leguas). Of the more than 900 hawksbill turtles tagged in Cuba, none have been reported as having been recovered elsewhere.

Annual tagging of hawksbill turtles is carried out at Nuevitas (Punta de Ganado) during the closed season and at Doce Leguas Keys during nesting activities. The tagging program previously included other areas at Nuevitas and Las Tunas, but this was discontinued when the countrywide harvest was limited to the two traditional harvest sites. Hawksbills are tagged on an opportunistic basis in other areas.

b) Green Turtle

Green turtles nest in the greatest concentration on beaches off the southeast coast on the Doce Leguas Keys (Archipielago de los Jardines de la Reina), Archipielago de los Canarreos, the Isle of Pines and associated keys, San Felipe Keys, and Guanahacabibes Peninsula; the species also nests on beaches associated with the Sabana-Camaguey Archipelago, in the central north of the country (Carrillo, in litt., 2000).

Researchers have monitored green turtle nesting on El Guanal Beach on the southern coast of the Isle of Pines since 1982. From 1993 through 1996, a 4-kilometer (2.5 mile) section of Playa Larga (Punta el Guanal to La Canoa) was monitored annually, mainly between May and August. Researchers patrolled the beach from 2100 to 0400 hours (9 p.m. to 4 a.m.) (Nodarse et al., 2000b).

The nesting period extends from the last week in May through the first half of September, with a peak in July. Numbers of nests documented ranged from a low of 8 in 1985 to a high of 177 in 1990; survey effort was minimal in 1985 and 1995, so results for these years were not included in analysis of trends. Until 1994, researchers relocated nests to protect them from feral pigs (27 to 63 percent of the relocated nests produced hatchlings). From 1994 onward, following pig reduction efforts, nests were left in situ and hatching rates increased to 91 to 92 percent. Researchers tagged 98 adult female green turtles during the survey period (Nodarse et al., 2000a).

Green turtles were also tagged at Nuevitas and Las Tunas in the past, but now they are tagged at one traditional harvest site during the closed season, as authorized by a special permit for this purpose.

Surveys undertaken since 1996 have not been as intensive as in the past, and are not directly comparable to previous years (Carrillo, in litt., 2000). This is largely because nest depredation

was essentially eliminated, and hatching success is generally high. Nodarse et al. (2000a) report that beach protection efforts will continue, with comparable surveys undertaken every few years.

Greens forage on sea grass beds mainly throughout the southern, shallow marine areas of the country, including waters around Dos Leguas and its inner keys, the Isle of Pines, and the Archipielago de Canerreos. They also forage off the northern keys (Carrillo, in litt., 2000).

c) Loggerhead Turtle

Loggerheads nest mainly in the southwestern area of Cuba, in the San Felipe Keys, Playa Larga on the Isle of Pines, Cayo Rosario, Cayo Largo, several keys east of the Isle of Pines, and along the Guanahacabibes Peninsula. In the southeast region, loggerheads nest on the Doce Leguas Keys. Nesting also occurs in the north, in the Archipelago Sabana-Camaguey, mainly on Cayo Cruz, and on the northwest coast of Pinar del Rio from Punta Cajon to Mariel west from Havana, including the Los Colorados Archipelago (Carrillo, in litt., 2000).

Researchers have monitored loggerhead nesting on El Guanal Beach on the southern coast of the Isle of Pines since 1983. From 1993 through 1996, a 4-kilometer (2.5-mile) section of Playa Larga (Punta el Guanal to La Canoa) was monitored annually, mainly between May and August. Researchers carried out beach patrols from 2100 to 0400 hours (9 p.m. to 4 a.m.) (Nodarse et al., 2000b).

The nesting period lasts from the beginning of May until the end of August, with a peak in June. Numbers of documented loggerhead nests ranged from a low of 0 in 1985 to a high of 174 in 1989; survey effort was minimal in 1985 and 1995, so results for these years were not included in the analysis of trends. Researchers relocated nests until 1994 to avoid depredation by feral pigs, but from 1994 onward, following pig reduction efforts, nests were left in situ and hatching success exceeded 90 percent in the last three years of the survey. Researchers tagged 92 loggerhead adult females between 1990 and 1996 (Nodarse et al., 2000b).

Although survey effort increased over time, the data indicate that loggerhead nesting remained stable at this site throughout the survey period (1983-1996) (Nodarse et al., 2000b). Surveys have been undertaken since 1996, but they have been less intensive than in the past, and are not directly comparable to previous years (Carrillo, in litt., 2000). Nodarse et al. (2000b) report that beach protection efforts will continue, with comparable surveys undertaken every few years.

Loggerhead turtles were also tagged at Nuevitas and Las Tunas in the past. Under the current restricted harvest, loggerheads are tagged at one traditional harvest site during the closed season, as authorized by special permission for this specific purpose (Carrillo, in litt., 2000).

The species nests in Cuba and then leaves for foraging areas elsewhere. Therefore, few juveniles are sighted in the shallow habitats in which green and hawksbill turtles are found. Pinar del Rio (northwest, zone C) may be a feeding area for loggerheads (Carrillo, in litt., 2000).

d) Leatherback Turtle

The leatherback is found infrequently in Cuban waters (Moncada and Rodriguez, 1995). When the marine turtle fishery operated throughout the Cuban shelf (until 1994), leatherbacks were occasionally caught; since the fishery has been restricted to the traditional harvest areas no captures of leatherbacks have been reported. Moncada and Rodriguez (1995) analyzed data on the capture of leatherback turtles for the period 1980 to 1993. During this period, considerably

higher numbers of leatherbacks were taken off the north coast (fishing zones C and D) than off the south coast (fishing zones A and B); 63 percent of the captures were in zone C (northwest), which indicates that this zone has the highest occurrence of leatherbacks on the Cuban shelf. Leatherbacks were caught throughout the year, but with peaks in December and January. Annual catches varied between 4.1 and 78 tons (Moncada and Rodriguez, 1995).

The species rarely nests in Cuba. Surveys have indicated that leatherbacks may nest along the Guanahacabibes Peninsula in the southwest, and Cayo Blanco and Cayo Caguama in the southeastern region of the country (Moncada and Rodriguez, 1995).

5. Exploitation and Trade of Marine Turtles and Products in Cuba

a) History of Exploitation and Trade

Carrillo et al. (1999) summarize accounts describing the importance of southern Cuba's marine turtle resources in the early 1500s, particularly to the south of the island. When the Spanish first settled Cuba in the 1500s, the indigenous inhabitants had well-developed methods for harvesting green, hawksbill, and loggerhead turtles for meat, which included nets and tethered remora fish (Carrillo et al., 1999). Marine turtle eggs were also used by indigenous peoples (Carrillo et al., 1998), as was hawksbill shell. It is likely that shell was exported in the 1700s, and probably earlier; Carrillo (in litt., 2000) cites a reference from 1635 in which logbooks on ships sunken en route to Europe contained records of hawksbill shell cargo originating from Cuba.

In the 1700s and 1800s, marine turtles were reportedly a source of food for the poor, especially slaves, in Cuba (Carrillo et al., 1998). European demand for hawksbill shell increased during this period and prompted an expansion of the hawksbill harvest in Cuba. The Doce Leguas Keys were identified as one of the earliest commercial harvest areas (Carrillo et al., 1999). Coastal ships transported live turtles from northwestern Cuba to Havana for food; shells were exported or used locally (Carrillo et al., 1998).

One of the current traditional harvest sites, Cocodrilo township (formerly Jacksonville) was founded by turtle fishers from the Cayman Islands in 1885; since then, the central economic activity of the community has been turtle fishing (ROC, 1998 and 2000a). On the basis of export data for shells for the period 1935-1967 and on official catch statistics for 1968-1994, it is estimated that between 1935 and 1994 around 170,000 hawksbill turtles were harvested in Cuba (Carrillo et al., 1999).

From 1968 to 1992, hawksbill, green, and loggerhead fisheries were managed and regulated as commercial fisheries in four fishing zones (A-D) with annual catch targets set each year per species.

b) Recent Harvest and Use of Marine Turtles

Moncada (2000b) analyzed total catches per species (green, loggerhead, and hawksbill) from 1968 through 1996, at the national level and per fishing ground. He noted that the marine turtle fishery has had four well-defined stages with respect to catch trends, and that these trends have happened largely in response to the introduction and adjustment of the closed seasons over the period.

The highest annual catches for the entire period analyzed (1968-1996) occurred during the first stage (1968-1975), before the introduction of regulations specific to marine turtles. Catches demonstrated an increasing trend and reached 1,300 metric tons (2.86 million pounds) in 1975. The average annual total was 1,164 metric tons (2.56 million pounds), with loggerheads (42%) and greens (37%) making up the majority of the harvest, and hawksbills a lesser proportion (21%) (Moncada, 2000b).

The second stage spans 1976 to 1987, when a closed season of 1 June-31 August was established for loggerhead, green, and hawksbill turtles. Total catches were reduced by approximately 40 percent as a result of this regulation. Catches increased following the introduction of bottom nets to the fishery in 1983 (Moncada, 2000b).

In the third stage (1988-1994), the closed season was modified to take account of the main egg-laying months for each species in each fishing zone. The new regulation established 1 May-31 July as the closed season in fishing zones B (southwest), C (northwest), and D (northeast), and 1 September-30 November in zone A (southeast). Catches were reduced by 150-200 metric tons. It was during this period that Cuba voluntarily phased down its turtle fishery, so that fishing effort could be diverted to primarily export fisheries (ROC, 1998).

During the period 1968 to 1990, an average annual harvest of at least 4,744 hawksbill turtles was officially recorded, with a minimum of 3,198 in 1970 and a maximum of 6,445 in 1985 (ROC, 1998).

At the beginning of the current stage (1995-present), the fishery was limited to two traditional sites (Cocodrilo on the Isle of Pines in zone B-southwest and Nuevitas in zone D-northeast). The closed season has remained 1 May-31 July at both sites, and annual catch quotas are set for each species (Moncada, 2000b). The hawksbill fishery was phased down to its current level of no more than 500 animals a year.

The current marine turtle fishery uses 48-centimeter (19 inch) mesh nets. There is a closed season of three months (1 May-31 July), which coincides with reported nesting of hawksbills on the Isle of Pines (in zone B), and greens and loggerheads (in zones B and D). The peak nesting period for hawksbills in Doce Leguas, which is no longer a fishing zone for marine turtles, occurs in October and November (Carrillo, in litt., 2000).

If the annual catch limits for the marine turtle fishery (500 hawksbills, 280 greens, 90 loggerheads) are met, the harvest at the two sites is closed until the following season. Annual catch quotas for greens and loggerheads may be adjusted from year to year. Most green nesting is in zone B (hawksbill fishing zone), and while the closed season encompasses the closed season for greens, the harvest at Cocodrilo may not commence if nesting in the area has not finished by 31 July (Carrillo, in litt., 2000).

There is some incidental catch of hawksbill turtles at the two harvest sites (around 20 animals per year, mostly juveniles). Live animals are released, regardless of size; dead animals are used and the totals are added to the total directed catch in measuring whether the quota has been met. Hawksbills less than 65 centimeters SCL taken during the harvest are also released if alive; dead specimens are used and added to the catch quota. Data presented in Cuba's CITES proposal (ROC, 2000a) indicate that of 817 hawksbills taken at the two sites (including incidental catch) in 1997 and 1998, around 10 percent were under 60 centimeters SCL.

Illegal subsistence use of marine turtles is reported to occur occasionally at low levels. Hawksbill eggs are poached on offshore islands (ROC, 2000a). Researchers recorded some illegal collection of green and loggerhead eggs at some sites in the Guanahacabibes Peninsula Biosphere Reserve during fieldwork in the summer of 1998. They reported the incidents to authorities, who vowed to increase surveillance in the area (Ibarra Martin et al., 1999).

The primary motivation for the turtle fishery in Cuba is for the production of meat for domestic consumption (Carrillo et al., 2000). Broad (2000) was informed that a small amount is retained at the fishery sites for local consumption, while the majority is distributed through the state fishery enterprise in each of two fishing districts. The primary destination is hospitals and nursing homes, where the meat is used in the diet supplied to pregnant women and the elderly (ROC, 2000a). Food allocations are part of planned diets developed by government health departments. Small amounts of meat are provided to two small restaurants (one in Nuevitas and one in Santa Cruz del Sur, in Camaguey Province), both reported to be frequented only by local Cubans (Broad, 2000). A fishery manager provided S. Broad (2000) with meat production data for the Isle of Pines fishery (table 15).

Table 15. Marine Turtle Meat Production at the Isle of Pines, 1990-1998 (in kilograms)

Year	Hawksbill	Green	Loggerhead	Total
1990	3,894.5	10,355	1,819	1,6068.5
1991	3,559.5	6,319.5	2,030.5	11,909.5
1992	3,660	9,716	1,680	15,056
1993	3,391	5,495	1,267	10,153
1994	1,415	3,069	1,066	5,550
1995	3,105	4,766	1,564.5	9,435.5
1996	2,510	2,548	1,329	6,387
1997	2,565	227	474	3,266
1998	1,539	1,341	569	3,449
TOTAL	**25,639**	**43,836.5**	**11,799**	**81,274.5**

Source: Broad, 2000.

The Cuban government continues to prohibit wider retail sale of turtle meat to what could be a lucrative hard currency market. Broad (2000) was informed that sale in tourist restaurants could achieve prices of as much as US$20/kilogram (US$9.10/pound), but it could also bring risks of encouraging illegal off-take from outside the two permitted fishery areas.

With the exception of samples for research purposes, none of the hawksbill shell produced through the traditional harvest program has been exported since December 1992 (ROC, 2000a). While some shell has been used domestically and for research, the majority has been stored with the hope that Cuba may be allowed to export it to Japan or other countries with appropriate domestic controls. As of April 2000, Cuba had accumulated approximately 6,900 kilograms (15,180 pounds) of shell, held at the government store at Cojimar, Havana (ROC, 2000a).

Broad (2000) described the management of the hawksbill shell stock in Cuba, from the point of catch through marking and storage. He concluded that the control systems and wider economic factors are such that there seems to be little incentive or opportunity for those involved in the fishery or the regulation of trade in its products to try to infiltrate illegally fished turtle shell into

the legal stock. Fishers are paid a fixed wage and there is a series of cross-checks among MIP, the Cojimar store, and the fishery managers that allows verification of the stock controls at all levels.

Research was undertaken in the 1980s and 1990s to examine the feasibility of using marine turtle oil in the manufacture of perfume and soap, but this never progressed beyond the research stage. Turtle fat is used at the traditional harvest sites for cooking (Carrillo, in litt., 2000). In the past, turtle skins were tanned and processed as leather and green turtle shell was used for marquetry (Groombridge and Luxmoore, 1989).

c) Recent International Trade in Marine Turtles and Products

From 1970 to 1986, Cuba was the world's third largest supplier of hawksbill shell to Japan, exporting 97,852 kilograms (21,527 pounds) or 15 percent of the total trade (Milliken and Tokunaga, 1987). Recorded international trade volumes in hawksbill shell remained high until 1992, largely because considerable volumes were imported by Japan, which acceded to CITES in 1980 but took a reservation on the Appendix I listing of hawksbill. Cuba acceded to CITES in 1990 but also lodged a reservation on the Appendix I listing of hawksbill. Japan ceased large-scale legal commercial imports of hawksbill shell in 1992. Commercial exports from Cuba ceased at the end of 1992 (IUCN/SSC and TRAFFIC, 1997).

CITES Annual Reports for the period 1980-1998 record exports from Cuba of the following species and specimens: loggerhead - 2 bodies; green - 9 bodies, 11 boxes of scales, 2 shells, 6 skulls, 2 trophies, and 1 unspecified item; Cheloniidae spp. - 6 bodies, 8 carvings, and 23 eggs; hawksbill - 35 bodies, 1 carving, 1 leather item, 807 kilograms (1,775 pounds) of scales, 10,306 kilograms (22,673 pounds) of shell, and 523 shells, three skulls, 360 specimens, 2 trophies, and several unspecified items.

It has been alleged in the Bahamas that Cuban vessels have taken marine turtles from the Great Bahama Bank and returned with them to Cuba (Franz et al., 1996). Others report that the issue of economic fishing zones has not been resolved between the two. According to Cuban authorities, if such cases were found to occur the crew would be prosecuted under Cuban law, as legal harvesting by Cuban nationals occurs at two locations in Cuba only (Carrillo, in litt., 2000).

Cuba submitted proposals to transfer the population of hawksbill turtles in Cuban waters from Appendix I to Appendix II at the Tenth (COP 10) and Eleventh (COP 11) Meetings of the Conference of the Parties to CITES. At COP 10 (9-20 June1997, Harare, Zimbabwe), Cuba sought approval to export a single shipment of 5,441 kilograms (1,197 pounds) of registered stocks of hawksbill shell to Japan, and to export to Japan single annual shipments of shell from up to 500 hawksbills accumulated in the traditional fishery, plus a limited number of shells from an experimental ranching program. Cuba failed to receive the requisite two-thirds majority in favor of its proposal; however, the simple majority voted in its favor, which demonstrated support for Cuba's efforts to manage the hawksbill turtle. Cuba amended the proposal, setting the export quota for shell obtained from the traditional fishery and ranching program at zero, but this also failed to receive the two-thirds majority.

At COP11 (10-20 April 2000, Nairobi, Kenya), Cuba submitted two proposals to transfer the population of hawksbill turtles foraging in Cuban waters from Appendix I to Appendix II. Cuba withdrew the first, a proposal to trade its stockpile of nearly 7 metric tons (15,400 pounds) of shell and an annual quota of up to 500 hawksbill shells, but continued to advocate its second proposal for a single shipment of its stockpile of hawksbill shell to Japan. After a lengthy debate,

the proposal was defeated by a narrow margin. Cuba amended its proposal to state that trade would not take place until the control systems in Japan had been reviewed by the CITES Standing Committee. The amended proposal was again defeated by a narrow margin.

d) Enforcement Efforts

Both CIP and CITES Management Authority staff reported a low and declining level of illegal take, but explained they had easy access only to statistics collected within their own ministerial jurisdiction. Nodarse (pers. comm., 2000) stated there have been some seizures of illegally fished turtles--and resulting prosecutions--in Cuba; however, there are no comprehensive centralized records of seizures and prosecutions related to illegal turtle fishing and trade. Other information was reported to be held with police or other government enforcement authorities (Broad, 2000).

On 22 January 1992, Cuban authorities seized 1,033 kilograms (2,273 pounds) of hawksbill turtle shell arriving in Cuba from Mexico, inside unaccompanied baggage. The flight had landed in Cuba while in transit to Japan. The shell was seized from a Costa Rican citizen as he attempted to collect the shipment, which consisted of 67 parcels declared as "ornamentals." The CITES Management Authority of Cuba believed that the person who attempted to receive the shipment had tried to take advantage of Cuba's reservation on the hawksbill turtle, in order to obtain an export permit that would have indicated Cuba as the country of origin. Cuban authorities expelled the Costa Rican, whose visa had expired, and reported the incident to the CITES Secretariat (CITES Secretariat, 1996).

6. Summary and Recommendations

Cuba has managed the marine turtle as a fisheries resource for many years. Unlike in many other areas of the Caribbean, important nesting beaches remain relatively undeveloped and vast areas of coral reef and sea grass habitat are intact.

Cuba's efforts to manage marine turtles in its national territory are unique in the region, and commendable, given current economic conditions. Marine turtle fisheries and trade controls appear to offer a high degree of security against infiltration of illegally fished turtle shell into the legal shell stock.

TRAFFIC offers the following recommendations:

- Useful information could be provided through compilation of a centralized register of seizures and prosecutions related to illegal fishing of or trade in marine turtles.
- Increased law enforcement and environmental education could be instrumental in curtailing egg poaching by local residents in areas such as the Guanahacabibes Peninsula Biosphere Reserve.
- The marine turtle research community is encouraged to collaborate with Cuba on marine turtle research and management programs.
- As a Party to the SPAW Protocol to the Cartagena Convention, Cuba is urged to resolve the differences between their domestic policies on the use of marine turtles and the provisions of the protocol.

- Cuba is encouraged to accede to the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC).

Personal Contacts

By invitation of the Cuban government, a TRAFFIC International staff member visited Cuba to learn about the marine turtle management program on 12-14 and 17 January 2000. The TRAFFIC representative also collected information on historical and current exploitation of marine turtles during the visit. Meetings were held with the following individuals: Elvira Carrillo Cardenas (Coordinator, Marine Turtle Project, Center for Fisheries Research [Centro Investigaciones Pesqueras - CIP] of the Ministry of Fishing Industries [Ministerio de la Industria Pesqueras-MIP]); Adela Prieto Trujillo (Director, CIP); Felix Moncada Gavilan (Researcher, CIP); Rogelio Diaz Fernandez (University of Havana); Servando Valle (stock assessment specialist, CIP-interpreter); Alexis Meneses (Fishery Manager, Cocodrilo); Jorge Rodriguez (Technician, Cocodrilo Experimental Turtle Ranch); Henry Jackson (retired turtle fisher); Pedro Coffigny, Alexis Maliua, Jose Sanchez, and Loreto Pimental (Cojimar storage facility); Aymee Bulart Soto (Database Manager, Cojimar storage facility); Jose Alberto Alvarez Lemus (Center for Inspection and Environmental Control - CICA); Silvia Alvarez Rossel (CICA); and Grahame Webb (advisor to MIP Marine Turtle Project). There was no opportunity for the TRAFFIC representative to conduct market surveys.

In addition, researchers from TRAFFIC North America met with Elvira Carrillo, Adela Prieto Trujillo, Gonzalo Nodarse (Marine Turtle Project, CIP), and Charlie Manolis (advisor to MIP Marine Turtle Project) on 2 March 2000, during the 20th Annual Symposium on Sea Turtle Biology and Conservation in Orlando, Florida, and followed up with Elvira Carrillo and Charlie Manolis by e-mail. A researcher also met with Charlie Manolis and Felix Moncada on 26 February 2001, during the 21st Annual Symposium in Philadelphia, Pennsylvania.

References

Acevedo, M., O. Gómez, and V. Berovides. 1984. Alimentación de tres especies de quelonios marinos en la plataforma suroccidental de Cuba. *Revista de Investigaciones Marinas* 5(3).

Anderes, B. and I. Uchida. 1994. Study of Hawksbill turtle (*Eretmochelys imbricata*) stomach content in Cuba waters. Pages 27-40 in *Study of the Hawksbill Turtle in Cuba (I*). Ministry of Fishing Industries, Havana.

Bass, A. 1999. Genetic analysis to elucidate the natural history and behaviour of hawksbill turtles (*Eretmochelys imbricata*) in the wider Caribbean: a review and re-analysis. *Chelonian Conservation and Biology* 3(2):195-199.

Bjorndal, K. A. and A. B. Bolten. 1998. Hawksbill tagged in the Bahamas recaptured in Cuba. *Marine Turtle Newsletter* 79:18-19.

Broad, S. 2000. Marine turtle trade issues in Cuba. Trip Report, 12-14 and 17 January 2000. TRAFFIC International. Cambridge, UK. 10 pp.

Carrillo, E. C. and Contreras, J. 1998. Annex 2. Cuba and its marine environments. *Revista Cubana de Investigaciones Pesqueras*. 22(1):61-71.

Carrillo, E. C. and F. Moncada G. 1998. Annex 1. Cuban sea turtles. *Revista Cubana de Investigaciones Pesqueras*. 22(1):60.

Carrillo, E. C., J. Machado, and P. Sanchez. 1998a. Annex 3. Regulation of *E. imbricata* use in Cuba. *Revista Cubana de Investigaciones Pesqueras*. 22(1):72-74.

Carrillo, E. C., F. G. Moncada, S. Elizalde, G. Nodarse, C. Perez, and A. M. Rodriguez. 1998b. Annex 4. Historical harvest, trade and sampling data. *Revista Cubana de Investigaciones Pesqueras*. 22(1):82-88.

Carrillo, E. C., C. Perez, F. Moncada, G. Nodarse, and A. M. Rodriguez, A. Meneses, and S. C. Manolis1998c. Annex 9. Management programs and procedures - traditional wild harvest. *Revista Cubana de Investigaciones Pesqueras*. 22(1):154-156.

Carrillo, E. C., G. J. W. Webb, and S. C. Manolis. 1999. Hawksbill turtles (*Eretmochelys imbricata*) in Cuba: An assessment of the historical harvest and its impacts. *Chelonian Conservation and Biology* 3(2):264-280.

CITES Secretariat. 1996. Review of alleged infractions and other problems of implementation of the Convention (Doc. 9.22 [Rev.]). Pages 509-564 in *Proceedings of the Ninth Meeting of the Conference of the Parties to CITES*, 7-18 November 1994, Fort Lauderdale, Florida, USA.

Diaz-Fernandez, R., H. Koike, T. Okayama, T. Uchiyama, E. Carrillo, G. Espinosa, R. Marquez, C. Diez and H. Koike. 1999. Genetic sourcing for the hawksbill turtle, *Eretmochelys imbricata*, in the northern Caribbean region. *Chelonian Conservation and Biology* 3(2):296-300.

Espinosa, G., G. Hernádez, G. Bordón, M. Rodriguez, R. Díaz, H. Sasaki and F. Moncada. 1999. Estudio del polimorfismo proteico y del DNA mitocondrial en la tortuga carey *Eretmochelys imbricata*. *Investigaciones Marinas* 20(1):59-67.

Franz, R., C. K. Dodd, Jr. and S. D. Buckner. 1996. A review of herpetology of the Bahamian archipelago. *Bahamas Journal of Science* 3(3):23-30.

Groombridge, B. and R. Luxmoore. 1989. *The green turtle and hawksbill (Reptilia: Cheloniidae): World status, exploitation and trade*. CITES Secretariat. 601 pp.

Ibarra Martin, M. E., J. Angulo Valdes, G. Espinosa Lopez, J. Pacheco Roberto, F. Moncada G., G. Nodarse Andreu, and E. E. Gonzalez. 1999. University project on the study and conservation of Cuban sea turtles. *Marine Turtle Newsletter* 84:11-12.

Ibarra Martin, M. E., G. Espinosa Lopez, F. Moncada G., J. Angulo Valdes, G. Nodarse Andreu, G. Hernandez Agilera, and J. Pacheco Roberto. 2000. University project on the study of Cuban sea turtles. Pages 16-18 in F. A. Abreu-Grobois, R. Briseño-Dueñas, R. Márquez, and L. Sarti, compilers. *Proceedings of the Eighteenth International Symposium on Sea Turtle Biology and Conservation*, 3-7 March 1998, Mazatlán, Sinaloa, Mexico. NOAA Technical Memorandum NMFS-SEFSC-436. 293 pp.

IUCN/SSC and TRAFFIC Network 1997. *IUCN Analysis of Proposals to Amend the CITES Appendices*. IUCN-the World Conservation Union, Gland, Switzerland.

Milliken, T. and H. Tokunaga. 1987. *The Japanese sea turtle trade, 1970-1986*. TRAFFIC Japan. Prepared for the Center for Environmental Education. Washington, D.C. 171 pp.

Moncada, F. 1993. Migraciones de las tortugas marinas en la plataforma cubana. Resultados prelimineres. *Revista Cubana de Investigaciones Pesquera* 18(2):12-15.

Moncada, F. 2000a. Workshop on marine turtles nesting in Cuba. *Marine Turtle Newsletter*. 90:17.

Moncada, F. 2000b. Impact of regulatory measures on Cuban marine turtle fisheries. Pages 108-109 in F. A. Abreu-Grobois, R. Briseño-Dueñas, R. Márquez, and L. Sarti, compilers. *Proceedings of the Eighteenth International Symposium on Sea Turtle Biology and Conservation*, 3-7 March 1998, Mazatlán, Sinaloa, Mexico. NOAA Technical Memorandum NMFS-SEFSC-436. 293 pp.

Moncada, F. and G. Nodarse. 1990. Composición por largo y talla de madurez sexual en las tortugas marinas en Cuba. Memorias MARCUBA '90.

Moncada F. and G. Nodarse. 1994. Length composition and size of sexual maturity of hawksbill turtle in the Cuban platform. Pages 1-8 in *Study of the Hawksbill Turtle in Cuba (1*). Ministry of Fishing Industries, Havana.

Moncada F. and O. Rodriguez. 1995. Captura incidental y algunos aspectos biológico del tinglado *Dermochelys coriacea* (Linnaeus, 1758). In J. A. Keinath, D. E. Barnard, J. A. Musick, and B. A. Bell, compilers. 1996. *Proceedings of the Fifteenth Annual Symposium on Sea Turtle Biology and Conservation*, 20-25 February 1995, Hilton Head, South Carolina, USA. NOAA Technical Memorandum NMFS-SEFSC-387.

Moncada F., E. Carrillo, S. Elizalde, G. Nodarse, B. Anderes, C. Scantelbury, A. Alvarez, and A. Rodríguez. 1995. Migración de las tortugas marinas en la plataforma cubana. In J. A. Keinath, D. E. Barnard, J. A. Musick, and B. A. Bell, compilers. 1996. *Proceedings of the Fifteenth Annual Symposium on Sea Turtle Biology and Conservation*, 20-25 February 1995, Hilton Head, South Carolina, USA. NOAA Technical Memorandum NMFS-SEFSC-387.

Moncada, F. G., H. Koike, G. Espinosa, S. C. Manolis, C. Perez, G. A. Nodarse, S. Tanabe, H. Sakai, G. J. W. Webb, E. C. Carrillo, R. Diaz, and T. Tsubouchi. 1998. Annex 8. Movement and population integrity. *Revista Cubana de Investigaciones Pesqueras*. 22(1):135-150.

Moncada, F., E. Carrillo, A. Saenz, and G. Nodarse. 1999. Reproduction and nesting of the hawksbill turtle *Eretmochelys imbricata* in the Cuban archipelago. *Chelonian Conservation and Biology* 3(2):257-263.

Moncada, F., A. M. Rodriguez, R. Marquez-M., and E. Carrillo. 2000. Report of the olive ridley turtle (*Lepidochelys olivacea*) in Cuban waters. *Marine Turtle Newsletter*. 90:13-15.

Nodarse, G., F. Moncada, A. Meneses, and C. Rodriguez. 2000a. Long-term monitoring of nesting of the green sea turtle (*Chelonia mydas*) in the southwest platform of Cuba. Pages 67-68 in F. A. Abreu-Grobois, R. Briseño-Dueñas, R. Márquez, and L. Sarti, compilers. 2000.

Proceedings of the Eighteenth International Symposium on Sea Turtle Biology and Conservation, 3-7 March 1998, Mazatlán, Sinaloa, Mexico. NOAA Technical Memorandum NMFS-SEFSC-436. 293 pp.

Nodarse, G., F. Moncada, A. Meneses, and C. Rodriguez. 2000b. Monitoring of loggerhead turtle (*Caretta caretta*) nesting on the south coast of the Isla de la Juventud, Cuba. In press. *Proceedings of the Twentieth Annual Symposium on Sea Turtle Biology and Conservation*, 29 February-3 March 2000, Orlando, Florida.

Pelegrín, E., I. Fraga, and J. A. Varea. 1994. Artificial feeding as an alternative in hawksbill turtle (*Eretmochelys imbricata*) rearing. Pages 41-47 in *Study of the Hawksbill Turtle in Cuba (I)*. Ministry of Fishing Industry. Havana, Cuba.

ROC, 1998. Republic of Cuba. An annotated transfer of the Cuban population of hawksbill turtles (*Eretmochelys imbricata*) from Appendix I to Appendix II of CITES. *Revista Cubana de Investigaciones Pesquera* 22(1):1-58.

ROC, 2000a. Republic of Cuba. Prop. 11.40. Transfer from Appendix I to Appendix II that part of the Caribbean population of *Eretmochelys imbricata* inhabiting Cuban waters, pursuant to Resolution Conf. 9.24, for the exclusive purposes of allowing: 1. the export in one shipment of all existing registered management stocks of shell accumulated from Cuba's management program between 1993 and March 2000 (up to 6,900 kilograms) to Japan for total consumption within Japan with no re-export: and 2. the export each year thereafter, to Japan or other Parties with equivalent controls, which will not re-export, not more that 500 specimens.

ROC, 2000b. Republic of Cuba. Prop. 11.41. Transfer from Appendix I to Appendix II that part of the Caribbean population of *Eretmochelys imbricata* inhabiting Cuban waters, pursuant to Resolution Conf. 9.24, for the exclusive purposes of allowing the export in one shipment of all registered management stocks of shell accumulated legally from a national management program between 1993 and March 2000 (up to 6,900 kilograms) to Japan for total consumption within Japan with no re-export. No further annual export from the traditional harvest is sought and all other specimens of *E. imbricata*, including wild stocks in Cuban waters, will be treated as specimens of species in Appendix I and international trade in them shall be regulated accordingly [Cuba].

World Bank. 2000. World development indicators database. http://www.worldbank.org/data/wdi2000/

Note: *All above-listed proceedings of annual symposia on sea turtle biology and conservation are published by the National Marine Fisheries Service (NMFS), Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149.*

E. The Dominican Republic (República Dominicana)

1. Introduction

The Dominican Republic occupies the central and eastern two-thirds of the island of Hispañola, the second largest island in the Caribbean. The country has a total land area of 48,442 square kilometers (18,632 square miles) and a 1,288-kilometer (805-mile) coastline. The Dominican Republic shares a 275-kilometer (172-mile) border with Haiti and lies west of Puerto Rico. It has a population of 8.49 million people and Santo Domingo is the capital.

The Dominican Republic gained independence from Haiti in 1844. The economy grew in the 1990s with tourism, mining, agriculture, construction, and telecommunications as important industries. The Dominican Republic has a per capita GDP of US$5,400 and is classified as a "lower middle income" nation (World Bank, 2000). The exchange rate used with respect to TRAFFIC's surveys is 15.5 Dominican pesos (DOP15.5) = US$1 (November 1999).

2. Marine Turtle Species in the Dominican Republic

Four species of marine turtle nest in the country: leatherbacks, hawksbills, greens, and loggerheads. Leatherbacks occur in coastal waters during the breeding season, hawksbills and greens are present throughout the year, and loggerheads are occasional visitors. Available information indicates that historically abundant populations of marine turtles in the Dominican Republic have been reduced to a remnant of their former size, and that no concentrated nesting occurs today (Ottenwalder, 1996).

Relatively widespread areas of sea grass beds and coral reefs likely provide significant foraging habitat for the numerous juvenile and subadult hawksbills, greens, and loggerheads in these waters (Groombridge and Luxmoore, 1989; Ottenwalder, 1981). Kemp's and olive ridley turtles are not known to occur in the Dominican Republic, although CITES Annual Report data contain records of specimens of these species exported from 1987 to 1994.

Table 16. Marine Turtles Occurring in the Dominican Republic

Common name	Scientific name	Local names
Hawksbill turtle	*Eretmochelys imbricata*	carey, carey de concha, tortuga carey
Green turtle	*Chelonia mydas*	tortuga verde, tortuga
Loggerhead turtle	*Caretta caretta*	caguamo, caguama, gatuano, morrocoy, carey de pico corto, cabezona
Leatherback turtle	*Dermochelys coriacea*	tinglar
All marine turtles		carey, tortuga

Sources: León and Diez, 1997; Ottenwalder, 1996; Ramírez and Silva, 1994.

3. Overview of Marine Turtle Management and Conservation

Marine turtle conservation efforts in the Dominican Republic include field research on marine turtles in Jaragua National Park, national park management, marine turtle rescue and rehabilitation, public education, and legal protection.

a) Regulatory Framework

(1) Legislation and regulations

Exploitation and trade of marine turtles have been regulated since the 1960s. In 1962, the capture or killing of any marine turtle on a beach (nesting or preparing to nest) was prohibited (Article 6h of the Fisheries Law [Ley de Pesca No. 5914 of 22 May 1962]). Taking marine turtle eggs in protected areas of the country has been prohibited since 1974 (Article 13 of the Parks Law No. 67 of 1974). In 1967, the export of whole or unworked hawksbill turtle shell was prohibited (Law No. 95 of 1967). In 1975, the capture within territorial waters of any marine turtle with a carapace length of less than 50 centimeters (19.5 inches) was prohibited (Decree No. 600, 26 February 1975). A 1977 decree prohibited the collection and sale of turtle eggs at all times; prohibited the capture or possession of hawksbill turtles during the months of May, July, September, and October; and required a permit to export turtle products (Decree No. 1580, 20 August 1977).

Decree No. 314 (14 October 1986) prohibited the capture and trade of marine turtles with a carapace measuring less than the following minimum sizes: green turtle (90 centimeters/35 inches), hawksbill turtle (71 centimeters/28 inches), loggerhead turtle (152 centimeters/59 inches), and leatherback turtle (152 centimeters/59 inches). The capture of female turtles from beaches was prohibited. Decree No. 317-89 (21 August 1989) established a two-year ban on the capture, killing, collection, and commerce of green, hawksbill, loggerhead, and leatherback turtles, their eggs, and parts. The decree expired in 1991 and there was apparently no measure regulating the harvest, sale, or trade of marine turtles, other than existing regulations protecting nesting females and eggs, until 1996, when the ban was reinstated for five years (Decree No. 34 of 1996).

Violation of these decrees is punishable by penalties provided for in Article 47c of the Fisheries Law No. 5914, 22 May 1962 (a fine of 6 to 100 pesos (DOP6-100) or imprisonment from six days to three months).

Framework Law for Environment and Natural Resources, Law No. 64-00 of 18 August 2000 (Ley General Sobre Medio Ambiente y Recursos Naturales, No. 64-00). This law created a new Ministry of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales) and generally overhauled the regulatory framework governing wildlife conservation, use, and trade. Authorities responsible for implementing the law are in the process of settling in to new agencies and developing implementing regulations (Hernández, in litt., 2000; León, pers. comm., 2001).

Decree No. 34-96, 1996. This decree established a five-year ban (1996-2001) on the capture, killing, collection, and commerce of green, hawksbill, loggerhead, and leatherback turtles, their eggs, and parts (Article 1). Article 2 allows the collection and artisanal workmanship of marine turtles found to have died of natural causes, when a permit that verifies that the animal died of natural causes is obtained from an inspector or representative of the Department of Fisheries Resources or Department of Wildlife. Article 3 authorizes the departments of Fisheries

Resources and Wildlife (of the Ministry of Agriculture) to proceed with undertaking inventories in handicraft or commercial establishments using or selling parts of marine turtles. Violations are punishable by penalties provided for in Article 47c of Fisheries Law No. 5914, 22 May 1962 (Article 4), which sets forth a fine of 6 to 100 pesos (DOP6-100) or imprisonment from six days to three months.

Resolution No. 2-97, 17 April 1997 (Ministry of Sport, Physical Education, and Recreation). Article 1 prohibits the use of cockfighting spurs (*espuelas*) made of hawksbill shell. The resolution informed artisans and rooster owners that the use of these spurs had to cease after the 1996-1997 cockfighting season. Article 3 states that the judges, owners, renters, and managers of cockfighting rings or clubs are responsible for implementing the resolution and its provisions and must inform the National Commission of Rooster Breeders in the event of any violation.

(2) Membership in international and regional treaties

CITES. CITES entered into force in the Dominican Republic on 17 March 1987; however, specific legislation to implement the convention is lacking. Authorities have used Decree No. 55/92, which prohibits the hunting and commercialization of certain indigenous mammals, birds, terrestrial reptiles, and amphibians. The new environmental framework law specifically addresses CITES and other international treaties to which the Dominican Republic is a Party; the law is intended to enable more efficient implementation of these treaties (Hernández, in litt., 2000).

SPAW Protocol to the Cartagena Convention. The Dominican Republic ratified the Cartagena Convention and its SPAW Protocol on 24 November 1998.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). The Dominican Republic has neither signed nor ratified the IAC.

(3) Responsible agencies

Until the environmental framework law was enacted in August 2000, the agencies responsible for regulating exploitation and trade of marine turtles had been organized under the Secretariat of Agriculture (Secretaría de Estado de Agricultura). The Department of Fisheries Resources (Departamento de Recursos Pesqueros) of the Subsecretariat of Natural Resources (Subsecretaría de Estado de Recursos Naturales) was responsible for the management of freshwater and marine wildlife. Other responsible agencies included the Department of Wildlife (Departamento de Vida Silvestre), which was designated as the country's CITES Management Authority, and the National Parks Directorate (Dirección Nacional de Parques). TRAFFIC researchers met with authorities from these agencies in November 1999.

In August 2000, the Framework Law for Environment and Natural Resources created the Ministry of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales), and several new subsecretariats. The Subsecretariat for Coastal-Marine Matters (Subsecretaría de Asuntos Costero-Marinos) includes the General Directorate for Fisheries Resources (Dirección General de Recursos Pesqueros, formerly the Department of Fisheries Resources) and the newly created Department of Coastal Marine Conservation (Departamento de Conservacion Costero Marina), which is now responsible for the conservation and management of marine turtles.

The Subsecretariat of Protected Areas and Biodiversity (Subsecretaría de Areas Protegidas y Biodiversidad) includes the General Directorate for National Parks (Dirección General de

Parques Nacionales, formerly the National Parks Directorate) and the General Directorate for Wildlife (Dirección General de Vida Silvestre, formerly the Department of Wildlife). The General Directorate for Wildlife is responsible for regulating trade in wildlife and for the implementation of international wildlife conventions. A new enforcement office ("environmental police") is planned (Hernández, in litt., 2000; León, pers. comm., 2001).

b) Conservation Initiatives

(1) Habitat conservation/protected areas

The National Parks Directorate manages nine coastal parks in the Dominican Republic, some of which provide nesting and foraging habitat for marine turtles. Extensive unspoiled beaches in East National Park (Parque Nacional del Este) provide nesting areas for the four species of marine turtles that nest in the country. In Jaragua National Park, guards have been trained to patrol beaches, count turtles, and protect nests (Ramírez, pers. comm., 1999).

(2) Species research and conservation activities

Research on marine turtles is currently carried out at one site in the Dominican Republic--in the coastal waters of Jaragua National Park and Cabo Rojo (León and Diez, 1999a and 1999b).

The National Aquarium of the Dominican Republic (Acuario Nacional) relocates vulnerable turtle nests, incubates the eggs, and releases the hatchlings. To date, staff have incubated over 750 hawksbill, green, and leatherback eggs. The aquarium has also rehabilitated and released more than 70 marine turtles that have been injured or purchased from fishers, and brought in for care by concerned individuals (Vega, in litt., 2000).

Table 17. Main Projects Assessing Marine Turtle Activity in the Dominican Republic

Species Projects	Location
Foraging ecology of juvenile hawksbill turtles (1996-present)	Jaragua National Park and Cabo Rojo
Ecological aspects and population structure of hawksbill turtles (1995-present)	Jaragua National Park and adjacent areas
Leatherback nesting surveys (1995)	Eastern beaches of Jaragua National Park
Opportunistic surveys of use and trade of marine turtles and products (1980-1996)	Selected coastal areas
Assessment of nesting populations, nesting beaches, foraging areas, and exploitation of marine turtles (September 1986 through August 1987)	Countrywide (76 coastal areas)
Assessment of population status of marine turtles (1980-1982)	Countrywide (76 coastal areas)
Aerial and ground surveys of leatherback nesting (24 March-13 April 1980)	South and east coasts

Sources: Dominici, 1996; León and Diez, 1999a and 1999b; León and Mota, 1997; Ottenwalder, 1996; Ross and Ottenwalder, 1983.

Countrywide nesting surveys were undertaken in the 1980s (Ottenwalder, 1987; Ottenwalder, 1996; Ross and Ottenwalder, 1983), and the findings of these surveys form the basis of what is known about the status and exploitation of marine turtles in the Dominican Republic. Ottenwalder (1996) described the situation as it stood in 1987, and it is likely that much of this information has become outdated. However, as no comprehensive surveys have been carried out since, these results remain an important point of reference.

(3) Enforcement and education

Officials in the departments of Wildlife and Fisheries report a lack of personnel to control the sale of hawksbill shell and other products in the country. To enforce some of the provisions of CITES, authorities have relied on Decree No. 55/92 enacted under the Hunting Law of 1931; however, fines set forth in the law 70 years ago are inadequate to deter violations today (Hernández, in litt., 1999).

The National Aquarium has devoted several exhibits to marine turtle conservation issues, and one exhibit currently highlights the problem of illegal trade in hawksbill shell souvenirs. Staff have produced brochures, books, and games about marine turtles for children, and translated a "buyer beware" brochure on illegal wildlife trade into several languages for distribution to tourists from cruise ships when they visit the aquarium. This is important because souvenir outlets and the aquarium are both on the regular itinerary for passengers touring Santo Domingo (Vega, in litt., 2000). The newly established Department of Coastal Marine Conservation has begun preparing posters and other public awareness materials on marine turtles (León, in litt., 2001).

4. Conservation Status and Trends

The primary threat to marine turtles in the Dominican Republic is reported to be exploitation of turtles and their eggs (Groombridge and Luxmoore, 1989; León, in litt., 2000). According to Ottenwalder (1996), marine turtles are exploited indiscriminately, while nesting habitat is being destroyed on a large scale by tourism, sand extraction, and the conversion of beaches for agriculture. Between 1980 and 1996, seven major coastal areas covering a large proportion of the most important nesting habitat in the country were slated to be developed (Ottenwalder, 1996).

a) Leatherback Turtle

Leatherbacks appear in coastal waters only during the breeding season. The Dominican Republic appears to be an important nesting area for the species, particularly on the northeast and southwest coasts (Ottenwalder, 1996). Ross and Ottenwalder (1983) estimated that 300 leatherbacks nested annually in the early 1980s, with 37 percent of the nesting on four beaches: Playa del Muerto, Playa Macao, Playa San Luis, and Playa Aguilas. Take of the known nesting females and eggs for food by local people approached 100 percent at the time (Ross and Ottenwalder, 1983). Following surveys in 1986 and 1987, Ottenwalder (1996) revised the estimate to 265 leatherbacks nesting annually.

b) Hawksbill Turtle

Dispersed nesting of hawksbills occurs on suitable beaches. Information gathered from surveys in 1986 and 1987 yielded an estimate of 310 hawksbills nesting annually. Hawksbills occur in coastal waters throughout the year (Ottenwalder, 1996).

Snorkeling censuses of marine turtles in Jaragua National Park and Cabo Rojo were initiated in April 1996 and continue to be conducted annually (León and Diez, 1999a and 1999b). The surveys revealed that the coastal areas support a high density of juvenile and subadult hawksbill turtles (up to 96.8 turtles per square kilometer/37.23 turtles per square mile). An intensive tagging project was initiated in the summer of 1996 to enable long-term study of these animals. In 1998, 149 hawksbills were captured (120 new animals and 29 recaptures--a 19 percent recapture rate). Some of the findings were that Jaragua and Cabo Rojo are important foraging and recruitment grounds for hawksbills coming from protected nesting beaches in the region; the juvenile population is totally separate from the nesting population; the hawksbills exhibit high fidelity to these sites; and adult turtles are scarce, even during the reproductive season (León and Diez, 1999a and 1999b).

Anecdotal accounts from local people indicate that beaches near the studied feeding grounds were important hawksbill nesting areas in the past. The researchers believe that a major reason the area population is predominantly juvenile and subadult is the past overexploitation of adult turtles for subsistence use (León and Diez, 1999a and 1999b).

During the 2000 surveys, only about 8 percent of the juvenile turtles caught by the researchers had been tagged at the site in previous years; León (in litt., 2000) believes that removal of the turtles from the site is largely responsible and Jaragua is a "sink" to the regional hawksbill population.

(c) Green Turtle

Following surveys in 1986 and 1987, Ottenwalder (1996) estimated that 225 green turtles nested in the Dominican Republic per year, with dispersed nesting on suitable beaches. Coastal waters appeared to be significant foraging grounds for the species, which is present year round. Researchers at Jaragua National Park and Cabo Rojo see juvenile greens regularly during their hawksbill surveys, and have tagged a few individuals (León, in litt., 1999).

(d) Loggerhead Turtle

Loggerheads are occasionally observed in the Dominican Republic. After conducting surveys in 1986 and 1987, Ottenwalder estimated that 50 loggerheads nested there annually. The species forages in the country's coastal waters.

5. Exploitation and Trade of Marine Turtles and Products in the Dominican Republic

a) History of Exploitation and Trade

As in many other areas of the Caribbean, marine turtles were an important component in the diets of native peoples when Columbus arrived in Hispañola in 1493. According to Ottenwalder (1996), early chroniclers reported that marine turtles abounded on the coasts. From the 1490s until the 1890s, European explorers wrote about mass nesting, and described the turtles as "giant, heavy, and optimal for eating." In the 1890s, four species (hawksbill, green, loggerhead, and leatherback) were reported. Turtles were taken from the beaches and in coastal waters, and by the seventeenth century they constituted the second most important source of food (after pork) for "buccaneers and pirates."

b) Recent Harvest and Use of Marine Turtles

Marine turtles were fished legally until 1989, as long as they were of the established minimum sizes. Ottenwalder (1996) compiled official landing statistics from several government sources from 1975 through 1987 (table 18). The terms *carey* and *tortuga* are used for all marine turtle species, which confuses interpretation of these statistics. These are known to be incomplete, and they do not include turtles taken on nesting beaches or in remote areas (Ottenwalder, 1996). Nevertheless, they provide an interesting picture of marine turtle landings that is not available in most other countries in the Northern Caribbean.

Table 18. Landings of Marine Turtle Meat Recorded at Major Fishing Ports in the Dominican Republic, 1975-1987 (in kilograms/pounds)

Year	Kilograms	Pounds
1975	66,000	145,200
1976	45,000	99,000
1977	47,000	103,400
1978	129,000	283,800
1979	94,180	207,196
1980	122,578	269,672
1981	136,900	301,180
1982	51,704	113,749
1983	98,571	216,856
1984	51,970	114,336
1985	44,960	98,912
1986	41,768	91,890
1987	41,000	90,200
Total	**970,631**	**2,135,391**

Source: Ottenwalder, 1996.

Despite current laws prohibiting their capture, marine turtles of all sizes and species are taken in the Dominican Republic. Ottenwalder (1996) estimated that 1,000 to 2,000 turtles were taken annually in the country in the 1980s, with hawksbills and greens thought to make up approximately 70 percent of the total. Hawksbills and greens are taken throughout the year and loggerheads are taken at sea and occasionally while nesting. Leatherbacks are usually taken as they approach the coast during the breeding season. Egg poaching is also a major threat. Nesting beaches are monitored regularly by fishers who look for turtle tracks and dig up the eggs. Upon finding fresh tracks, fishers estimate the date when the female will return and then wait to kill her (Ottenwalder, 1996).

In the 1980s, most turtles were taken in coastal waters by divers with spearguns. Adults were also caught in nets attached to wooden turtle-shaped decoys (*folas*) set in front of nesting beaches. Fishers moved to camps at remote nesting beaches during the breeding season to catch turtles and collect eggs. Today, some turtles are also taken incidentally in seine nets (*chinchorros*) or gill nets (*trasmallos*) (Vega, in litt., 2000). Females are captured on the beaches and eggs are taken whenever possible. In addition to taking turtles in coastal and territorial waters, Dominican fishers have reported taking turtles in the Turks and Caicos Islands and in the Bahamas

(Ottenwalder, in litt., 2000). Fishers in these and other countries confirmed to TRAFFIC researchers during this review that Dominican fishers continue to take turtles from their waters.

In the Dominican Republic, there is a traditional belief that marine turtle eggs have aphrodisiac properties. The meat is also believed by some to be a sexual stimulant. Ottenwalder (in litt., 2000) reports a heavy demand for turtle eggs, and the price from nesting beach to city markets increases from DOP5 to 15 (US$.35 to 1.00) each. As green and hawksbill turtles have become less abundant, exploitation of leatherback meat and eggs has increased. Leatherback meat is dark, tough, and strong in taste, so it is often cut up into steaks and mixed with green and hawksbill meat before being sold (Ottenwalder, in litt., 2000).

Turtle oil is used as an ingredient in cosmetics, skin creams, and soap. It is also valued as a treatment for respiratory ailments. Small containers are sold in public markets and by street vendors in the Dominican Republic at prices ranging from DOP30 to 60 (US$1.95 to 3.90). Seafood markets sometimes offer half liter bottles of turtle oil, which is often mixed with shark oil, for DOP30 (US$1.90) (Ottenwalder, in litt., 2000).

Most notably, hawksbill turtles have been used extensively by the country's domestic carving industry. In the 1980s, raw shell from medium to large specimens was sold to local artisans to be worked, and to local or foreign dealers for export. Juveniles and subadults were stuffed, as their scutes were too thin and small for carving. A handicraft school in Santo Domingo offered a specialization in working hawksbill shell into jewelry and other decorative items. Factories in Santo Domingo and artisans in coastal villages also produced spurs (*espuelas*) to be worn by roosters in cockfights (Incháustegui, pers. comm., 1999; León, in litt., 1999).

The market for hawksbill shell in the Dominican Republic is reported to have declined markedly in the last 15 years. An estimated 600 kilograms (1,320 pounds) of hawksbill shell were used annually in the Dominican Republic in the 1980s; artisans claim that the current market is only 20 to 40 percent of what it was at that time. Today they work more with cattle horn than hawksbill shell. They also reported that Japanese buyers who used to travel regularly to the country to purchase shell no longer do so (Ottenwalder, in litt., 2000). Ottenwalder attributes these developments to the scarcity of large hawksbills in the country, reduced interest in shell handicrafts from local buyers, and increased awareness on the part of foreign tourists of the endangered status of the species and of the legal implications of importing them into their home countries.

Nevertheless, the hawksbill remains the marine turtle most valued by fishers in the Dominican Republic. Leon (in litt., 2000) has found hawksbill carapaces near the study site in Jaragua; the animals were taken for their meat and the shells discarded. Ottenwalder (in litt., 2000) reports that small stuffed hawksbill turtles sell for US$30-80, medium specimens for US$80-300, and large specimens for up to US$550. A fisher is paid US$17-30/pound (US$37.40-66/kilogram) for shell, depending on the quality of the scutes. Hawksbill shell is worth US$110/kilogram (US$50/pound) in Santo Domingo (Ottenwalder, in litt., 2000).

Widespread sale of hawksbill shell items and other turtle products has been well documented in Santo Domingo and a number of coastal developments. In December 1991, Stam and Stam (1992) observed stuffed and live marine turtles--including a hawksbill for US$300 and three live juvenile hawksbills for US$80 to 150 each--for sale in Sosua. In Puerto Plata, they were shown many stuffed hawksbills of various sizes. Domínguez and Villalba (1994) surveyed 55 gift shops in the historic section of Santo Domingo in August 1993. Ninety-eight percent of the shops surveyed were found to sell hawksbill carapace products. They identified 33 different products

including jewelry, decorative articles, and cooking sets. The most frequently observed items were bracelets, purses, earrings, and jewelry boxes. Fifty-three percent of the gift shops visited advertised the sale of these products. Shopkeepers reported that the majority of the buyers were European tourists (Domínguez and Villalba, 1994).

(1) TRAFFIC surveys

In November 1999, TRAFFIC researchers surveyed over 90 shops and vendors catering to tourists in Santo Domingo, Boca Chica, La Romana, Puerto Plata, Playa Dorada, and Sosua. More than 65 percent of these outlets offered hawksbill carapace items for sale. In addition, several duty free shops in the international airport in Santo Domingo offered large quantities of hawksbill shell purses, jewelry, and other articles.

In the areas surveyed, a wide variety of items was observed, including purses (US$90-125), jewelry boxes (US$15-45), bracelets (US$12-25), earrings (US$5), rings (US$2), hairbands, hair clips, barrettes, combs, picture frames (US$45), serving platters (US$185), eating utensils, bowls, letter openers, cigarette cases (US$35) and other articles. In Puerto Plata, a researcher noted the availability of several stuffed juvenile hawksbill turtles (US$200-220 each). Shopkeepers in numerous shops surveyed explained that these items originated from marine turtles taken in the Dominican Republic and that items had been produced by artisans in the country. A number of the shopkeepers also listed "hawksbill" or "hawksbill shell" (*carey* or *concha de carey*) on their business cards or on signs posted above their shops. Several shopkeepers claimed that U.S. citizens often refrain from buying these items for fear of having them seized upon their return home and that most customers are European.

In Santo Domingo, many of these shops also sell bottles of a rum drink containing pieces of fish, leaves, bark, turtle penis, and other ingredients to which additional dried marine turtle penis can be added. The mix is called *damajuana* or *mamajuana*. Shopkeepers explained that the concoction, and the turtle penis in particular, is touted as a male aphrodisiac. A couple of shops sold dried hawksbill penis for DOP50/piece (US$3.20/piece) and DOP40/inch (US$2.60/inch). One shopkeeper claimed her stock was only two months old.

During its market surveys in Santo Domingo in November 1999, TRAFFIC visited a meat market at Mercado Modelo. A man reported that *carey* (marine turtle) eggs and meat are sometimes available, and that they could be ordered. Meat and eggs are available to trusted customers and are not openly advertized (S. Inchaustegui, Y. León, M. Mota, E. Pugibet, and Vega, pers. comm., 2000).

TRAFFIC found that stalls located next to the front and back entrances of the Mercado Modelo in Santo Domingo sold a variety of natural products, such as oils, soaps, and creams, that purport to contain marine turtle. Oils labeled "*aceite de carey*" and "*aceite de tortuga*" were offered for US$19.35/liter. One vendor explained that manatee and marine turtle oils are taken orally to treat asthma and other respiratory problems. Another vendor marketed marine turtle oils he claimed were used to treat skin conditions, such as blemishes, wrinkles, and stretch marks, by applying them to the skin.

c) Recent International Trade in Marine Turtles and Products

Even though the export of whole or unworked hawksbill shell has been prohibited in the Dominican Republic since 18 January 1967 (Law No. 95 of 1967), importing countries reported receiving at least 13,075 kilograms (28,765 pounds) of raw hawksbill shell from the Dominican

Republic between 1964 and 1986 (Ottenwalder, 1996). Between 1970 and 1986, Japanese customs data indicated that the Dominican Republic was a moderate source of hawksbill shell, with a total of 4,366 kilograms (9,605 pounds) exported to Japan. Import volumes increased after 1977 and fluctuated between 219 and 872 kilograms (481 and 1,918 pounds) (Milliken and Tokunaga, 1987). Ottenwalder (1996) cites other instances in which importing countries reported receiving shell from the Dominican Republic since 1967, including Spain (254 kilograms/559 pounds in 1976) and an unspecified country (493 kilograms/1,085 pounds in 1977). Dominican export statistics recorded the sales of US$2,299 worth of carved shell products to France in 1975 (Ottenwalder, 1996).

CITES entered into force in the Dominican Republic in 1987. CITES Annual Reports for the period 1980-1998 record exports from the Dominican Republic of the following species and specimens, about half of which occurred after 1987: loggerhead - 1 body and 2 shells; green - 119 bodies, 17 carvings, 70 derivatives, 10 eggs, 12 leather items, 3 units of meat, 78 units of oil, 15 scales, 192 shells, 1 shipment of shell, 2 skulls, 2 specimens, and 17 unspecified; *Cheloniidae* spp. - 38 bodies, 8 carvings, 466 derivatives, 13 kilograms (29 pounds) of eggs, 24 leather items and 14 kilograms (31 pounds) of leather items, 90 kilograms (198 pounds) of meat, 208 units of oil, 46 shells, and 179 unspecified specimens; leatherback - 2 specimens; hawksbill - 116 bodies, 1,743 carvings, 48 derivatives, 29 eggs, 295 leather items, 40 units of oil, 188 shells, 3 skin pieces, 15 specimens, 1 trophy, and over 866 unspecified items; Kemp's ridley - 3 bodies and 37 shells; and olive ridley - 17 shells.

According to Ottenwalder (1996), since the fisheries for hawksbill turtles had declined considerably by the 1980s, about 60 to 70 percent of the hawksbill shell used in the Dominican Republic, which was estimated at 600 kilograms (1,320 pounds) per year in the 1980s, was imported from St. Martin, Panama, and the Bahamas.

In 1994, the Japanese government seized illegal shipments of hawksbill shell that originated in the Dominican Republic upon their arrival in Japan. In January 1994, 24.1 kilograms (53 pounds) of raw hawksbill shell were seized from two Japanese businessmen (a manufacturer and a retailer of hawksbill shell) at Narita International Airport in Tokyo. They had purchased the shell in the Dominican Republic and smuggled it in their suitcases via Madrid. In March 1994, 587 kilograms (1,291 pounds) of raw hawksbill shell were seized from a Japanese hawksbill shell dealer at Itami Airport in Osaka. The dealer had purchased the shell in the Dominican Republic and sent it to Japan by air cargo (TRAFFIC East Asia, 2000).

A commercial shipment of hawksbill shell is known to have entered the Dominican Republic from Colombia in 1997, and small amounts of hawksbill shell are obtained over land from Haiti, by sea from the Bahamas, Cuba, and the Turks and Caicos Islands, and smuggled in the trunks of cars on ferries from Puerto Rico (Ottenwalder, in litt., 2000).

From these accounts of import and export it is evident that although the Dominican Republic has regulations in place to protect marine turtles, illegal trade has been significant over the years and some illegal trade continues today.

d) Enforcement Efforts

Officials in the Department of Fisheries and the Department of Wildlife have never enforced national prohibitions on the sale of hawksbill shell products. Although authorized to do so by decrees in 1989 and 1996, they have neither inventoried nor inspected handicraft shops or other commercial establishments to enforce the prohibitions on selling marine turtle products

(Martínez, pers. comm., 1999). In November 1999, the Subsecretariat of Natural Resources sent a letter to the Department of Ecotourism and Environment of the Secretariat of Tourism (Departamento de Ecoturismo y Medioambiente de la Secretaría de Turismo) requesting their cooperation in organizing official visits to the gift shops in the main airports to assess the extent of commerce in hawksbill shell items. At the beginning of 2001, these visits had not taken place (Hernandez, in litt., 2001).

During TRAFFIC's interviews in November 1999, staff of the Department of Wildlife in Santo Domingo reported that inspectors from the Fisheries Resources Department occasionally visit fish markets and restaurants to check on the availability of marine turtle meat and eggs. In 1996, inspectors temporarily halted the operations of a restaurant in Azua that listed turtle or hawksbill steak (*filete de carey*) on the menu for DOP80 (US$5.15) (Martínez, pers. comm., 1999). The Fisheries Resources Department recorded confiscating two marine turtle "units," in April and September of 1997 (Hernández, in litt., 2000). Although TRAFFIC requested specific information on these enforcement actions from the Department of Fisheries Resources, officials have yet to confirm or contribute to this information.

Ottenwalder (in litt., 2000) did report that Dominican customs officers seized a commercial shipment of hawksbill shell from Colombia as dealers attempted to collect it in 1997.

6. Summary and Recommendations

Marine turtles have been and continue to be exploited heavily in the Dominican Republic. The combination of direct exploitation of turtles and eggs and the development of nesting beaches has reduced nesting turtle populations to a remnant of their former size. Populations of marine turtles of regional significance have been documented in the country, notably nesting leatherbacks and foraging hawksbills. Indiscriminate take of marine turtles in the Dominican Republic undermines the efforts of other countries in the region to conserve them.

Despite the fact that marine turtles are fully protected under current legislation, compliance with and enforcement of the regulations has been poor. Although international and domestic markets for hawksbill shell have decreased greatly since the 1980s, at least three commercial shipments of hawksbill shell were illegally imported to or exported from the Dominican Republic in the 1990s. Nationals continue to exploit marine turtles opportunistically for food, medicine, shell, and other uses.

A variety of marine turtle products are widely available in coastal markets catering to tourists as well as nationals, with hawksbill shell items particularly numerous in tourist markets. Tourists are reported to purchase and take these products illegally into other countries.

TRAFFIC offers the following recommendations:

- The government agencies established by the 2000 environmental framework law are encouraged to finalize thorough regulations to implement this law as soon as possible. Regulations to enhance the conservation of marine turtles are necessary, including stringent penalties for violations, and the environmental enforcement agency needs to be established without delay. Although the new law and agencies hold promise, political will to conserve marine turtles is essential, and the government must allocate sufficient resources to enforcing the laws and regulations.

- As a first step in enforcing marine turtle regulations, the enforcement agency should investigate and inventory the amount of hawksbill shell in the country. This must include carved items as well as raw material that may be stored by shopkeepers or artisans.

- Wildlife trade specialists are encouraged to investigate the origin, as well as the level of turnover, of marine turtle products in the country. Information is needed about whether fresh hawksbill shell is being added to supplies held by artisans and shop owners, and at what quantities and rates, or whether artisans are selling off old stocks of raw shell and carved products. Markets for eggs and meat, which appear in most cases to be the primary motivation to remove turtles from the wild, need to be thoroughly investigated to shed light on demand and harvest levels. Information obtained should be considered in national conservation strategies.

- The marine turtle research community is encouraged to initiate and support expansion of research on marine turtle distribution and status in the Dominican Republic. Determining the current extent of leatherback nesting should be a priority. Findings should be factored into regional and national conservation and management plans.

Personal Contacts

TRAFFIC researchers visited the Dominican Republic 1-11 November 1999 and met with the following individuals in Santo Domingo: Cecilia Hernández (CITES Management Authority, Department of Wildlife), Yvonne Arias (President, Grupo Jaragua), Sixto Incháustegui (Grupo Jaragua), José Miguel Martínez Guridy (Director, Subsecretariat of Natural Resources), Matilde Mota (biologist), José Ottenwalder (National Coordinator, United Nations Development Programme/GEF), Omar Ramírez Tejada (Director, National Parks Directorate), Enrique Pugibet (Director, National Aquarium), Carlos Rodríguez (Director, Natural History Museum), and Monica Vega (Subdirector, National Aquarium). In addition, researchers consulted with Ricardo Colón (Director, Department of Fisheries Resources), Carlos Diéz (researcher, Jaragua hawksbill study), and Dr. Ramón Ovidio Sánchez (Director, Department of Wildlife) by telephone and email. Meetings were held with Yolanda León (researcher, Jaragua hawksbill study/University of Florida) on 2 March 2000, during the 20th Annual Symposium on Sea Turtle Biology and Conservation in Orlando, Florida. Researchers met again with Yolanda León (Jaragua hawksbill study/University of Rhode Island) on 27 February 2001, during the 21st Annual Symposium in Philadelphia, Pennsylvania.

References

Dominici, G. 1996. Monitoreo de anidamiento de tortuga tinglar (*Dermochelys coriacea*) en playas del Parque Nacional Jaragua. *Memorias del Segundo Congreso de la Biodiversidad Caribeña*. Santo Domingo, República Dominicana. 14-17 de enero de 1996.

Domínguez, T. G. and A. A. Villalba. 1994. Trade of hawksbill carapaces in Santo Domingo, Dominican Republic. Pages 34-35 in K. A. Bjorndal, A. B. Bolten, D. A. Johnson, and P. J. Eliazar, compilers. *Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-351.

Groombridge, B. and R. Luxmoore. 1989. *The green turtle and hawksbill (Reptilia: Cheloniidae): World status, exploitation and trade*. CITES Secretariat. Lausanne, Switzerland. 601 pp.

León, Y. M. and C. E. Diez. 1997. *Proyecto Carey, República Dominicana*. Reporte de investigación sometido a Japan Bekko Association, Nagasaki, Japan. Unpublished. 41 pp.

León, Y. M. and C. E. Diez. 1999a. *Study of the hawksbill sea turtle (Eretmochelys imbricata) at Parque Nacional Jaragua and Cabo Rojo, Dominican Republic*. 1998 Research Report prepared for the Japan Bekko Association, Nagasaki, Japan, and Grupo Jaragua, Santo Domingo, Dominican Republic. Unpublished. 26 pp.

León, Y. M. and C. E. Diez. 1999b. Population structure of hawksbill turtles on a foraging ground in the Dominican Republic. *Chelonian Conservation and Biology* 3(2):230-236.

León, Y. M. and J. M. Mota. 1997. Aspectos ecológicos y estructura poblacional de la tortuga marina carey (*Eretmochelys imbricata*) en el Parque Nacional Jaragua y áreas adyacentes. Tesis de Licenciado en Biología. Universidad Autónoma de Santo Domingo, República Dominicana. 95 pp.

Milliken, T. and H. Tokunaga. 1987. *The Japanese sea turtle trade, 1970-1986*. TRAFFIC Japan. Prepared for the Center for Environmental Education. Washington, D.C. 171 pp.
Ottenwalder, J. A. 1981. Status, distribución y biología reproductiva de las tortugas marinas en la República Dominicana. Tesis de Licenciado en Biología. Universidad Autónoma de Santo Domingo, República Dominicana. 112 pp.

Ottenwalder, J. A. 1987. Population status, exploitation, and management of sea turtles in the Dominican Republic. National report. Research report prepared Western Atlantic Turtle Symposium (WATS II) and Sea Grant Program, University of Puerto Rico. 52 pp.

Ottenwalder, J. A. 1996. Conservation and management of sea turtles in the Dominican Republic. Unpublished report. Conservation and Management of Coastal Biodiversity Project, United Nations Development Program. Santo Domingo, Dominican Republic. 21 pp.

Ramírez, O. and M. Silva. 1994. *Legislación Pesquera Dominicana*. Centro para la Conservación y Ecodesarrollo de la Bahía de Samaná y su Entorno (CEBSE), Inc. Santo Domingo, Dominican Republic. 154 pp.

Ross, J. P. and J. A. Ottenwalder. 1983. The leatherback sea turtle *Dermochelys coriacea* nesting in the Dominican Republic. Pages 706-713 in Rodin, A. G. J. and K. Miyata. 1983. *Advances in Herpetology and Evolutionary Biology*. Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

Stam, S. and R. Stam. 1992. Turtle trouble in the Dominican Republic. *Marine Turtle Newsletter* 57:19-20.

TRAFFIC East Asia, 2000. *Japan's hawksbill shell trade control system*. A briefing paper prepared by TRAFFIC East Asia-Japan. Tokyo. 9 pp.

World Bank. 2000. World development indicators database. http://worldbank.org/data/wdi2000/

Note: *All above-listed proceedings of annual symposia on sea turtle biology and conservation are published by the National Marine Fisheries Service (NMFS), Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149.*

F. The Republic of Haiti (Republique d'Haiti)

1. Introduction

Haiti, the most mountainous country in the Caribbean region, occupies the western third of the island of Hispañola. It shares a 275-kilometer (172-mile) border with the Dominican Republic, and lies south of the Bahamas and the Turks and Caicos and east of Cuba and Jamaica. Haiti has a total land area of 27,560 square kilometers (10,600 square miles), with a 1,771-kilometer (1,107-mile) coastline. The population is approximately 7.8 million and Port-au-Prince is the capital.

Haiti is the least developed country in the Western Hemisphere and among the poorest and most densely populated in the world. Rising poverty is directly linked to long periods of economic stagnation, resulting from political violence, social unrest, a shortage of arable land, and severe environmental deterioration. Nearly 80 percent of the population is impoverished; the per capita GDP is US$1,340. Unemployment, malnutrition, and insufficient education are widespread (World Bank, 2000).

TRAFFIC was unable to send a researcher to Haiti during this project due to prevailing social conditions and a lack of access to appropriate authorities. Unless otherwise referenced, the information in this section is taken from Ottenwalder (1996).

2. Marine Turtle Species in Haiti

Green, hawksbill, leatherback, and loggerhead turtles occur, and are thought to nest, in Haiti. Ottenwalder described nesting intensity as low, with a noticeable decline in marine turtle abundance in the coastal waters.

Table 19. Marine Turtles Occurring in Haiti

Common name	Scientific name	Local name(s)
Hawksbill turtle	*Eretmochelys imbricata*	Caret, caret blond
Green turtle	*Chelonia mydas*	Tortue, tortue verte
Loggerhead turtle	*Caretta caretta*	Caouanne
Leatherback turtle	*Dermochelys coriacea*	Tortue luth
All marine turtles		Caret, tortue

Sources: Ottenwalder, 1996; Badio, pers. comm., 2000.

3. Overview of Marine Turtle Management and Conservation

Ottenwalder (in litt., 2000) is not aware of any current efforts to manage or conserve marine turtles in Haiti.

a) Regulatory Framework

(1) Legislation and regulations

Marine turtles may be harvested in Haiti except during the closed season from May to October. Marine turtle eggs and females may not be harvested from beaches.

Fisheries Law, 27 October 1978. It is prohibited to fish the "tortue" or the "caret" during the months of May to October (laying season); to collect eggs of turtles of all species in the territorial waters, especially those of "caret" and "tortue"; and to capture "marine turtles," and "carets" on the beach (Article 97). The exploitation of "caret" and "tortue" meat and their shells without authorization from the Fisheries Service (Service des Peches) is prohibited (Article 122) (Groombridge and Luxmoore, 1989; Ottenwalder, 1996).

(2) Membership in international and regional treaties

CITES. Haiti is not a Party to CITES. Haitian fisheries management personnel recently expressed interest in joining CITES. The primary motivation is to address a recurring problem in which Haitian marine products (i.e., conch and living rock) are routinely seized upon their arrival into other countries (Badio, pers. comm., 2000). The export documents accompanying the Haitian shipments have not conformed to the standard format recognized for international trade with non-CITES Parties.

Cartagena Convention/SPAW Protocol. Haiti has neither signed nor ratified the Cartagena Convention nor its SPAW Protocol.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). Haiti has neither signed nor ratified the IAC.

(2) Responsible agencies

The Fisheries Service of the Ministry of Agriculture is responsible for the enforcement of fisheries regulations.

b) Conservation Initiatives

(1) Habitat conservation/protected areas

There are no marine protected areas in Haiti (UNESCO, 1998).

(2) Species research and conservation activities

Ottenwalder carried out aerial surveys and interviews to investigate nesting activity and status of marine turtles in Haiti on 10-13 May 1982 (entire coastline), 14 November 1982 (southwestern Tiburon Peninsula, from Cotes de Fer to Jeremie), and 5-7 May 1983 (entire coastline, except

northeastern portion between Cap-Haitian and the mouth of the Massacre River). No further surveys have been undertaken.

(3) Enforcement and education

In the early 1990s, 17 fisheries inspectors were assigned throughout the Haitian coasts to enforce the regulations.

4. Conservation Status and Trends

Virtually no information exists regarding the present status of marine turtles in Haiti. Ottenwalder's aerial surveys and interviews in 1982 and 1983 documented nesting activity for green, hawksbill, loggerhead, and leatherback turtles, the latter two only sporadically. Indications were that nesting intensity for all species was low and that marine turtle abundance in the coastal waters has declined noticeably from that reported in the seventeenth century. The south coast appeared to be the most important nesting area in the country. Data on nesting season, distribution, relative abundance, and exploitation of marine turtles were recorded opportunistically during several additional visits to Haiti between 1982 and 1991. Greens and hawksbills were the most commonly observed turtle species in Haitian waters.

Human activity has had a very negative effect on marine turtle populations and their nesting habitat in Haiti. High human population densities, take of turtles and eggs, pollution, erosion, sedimentation, and the development of prime nesting beaches for hotels are major threats to marine turtles in the country.

a) Green Turtle

The size of the nesting population of the green turtle in Haiti is unknown, and no evidence of important populations resulted from the 1982 and 1983 surveys. Nesting crawls were identified at a number of beaches, and Ottenwalder asserts that nesting populations appear to be seriously depleted and probably are declining still.

b) Hawksbill Turtle

Ottenwalder identified a number of hawksbill nesting sites and reported adults and juveniles in foraging habitats around Ile de la Gonave. Ottenwalder believes that populations have been severely reduced.

c) Loggerhead Turtle

According to Ottenwalder, fragmented and unconfirmed data gathered during the 1982 and 1983 surveys suggested that loggerheads might still nest sporadically in Haiti, although no confirmed nesting records were obtained.

d) Leatherback Turtle

One nesting site for leatherback turtles was recorded during the aerial surveys (in 1983, near Tiburon, on the southwestern corner of the Tiburon Peninsula).

5. Exploitation and Trade of Marine Turtles and Products in Haiti

a) History of Exploitation and Trade

According to Ottenwalder, early chroniclers reported that marine turtles once abounded on the Haitian coasts. Esquemeling (1967) reported that green and hawksbill turtles were abundant in the second half of the seventeenth century. The author reported on aspects of marine turtle anatomy, harvest methods, and widespread exploitation of turtles and eggs by European settlers, particularly the French and Spanish.

b) Recent Harvest and Use of Marine Turtles

No information about the intensity of the turtle fisheries is available in Haiti. Statistics on the number of turtles and turtle products harvested for food and other uses are not recorded. The following accounts are based on surveys conducted in the 1980s and a recent interview with a fisheries official of the Haitian Ministry of Agriculture, Natural Resources, and Rural Development.

Turtles are taken with trammel nets, turtle decoys (*folles*), harpoons, and spearguns. Haitian fishers are known to fish for marine turtles in the Dominican Republic from border towns on the southern and northern coasts. Turtle meat and eggs are reported to be highly prized; eggs are believed to be a source of strength and are provided to children (Badio, pers. comm., 2000). Seafood shops in Port-au-Prince sell meat and eggs, even though the harvest of eggs is prohibited. Haitian fishers reportedly sold marine turtles to specific buyers for US$1-2 each in 2000. Marine turtle penis is also used in Haiti; it is added to a sugarcane-based drink (*clairin)* and drunk by men as an aphrodisiac (Badio, pers. comm., 2000).

In November 1982, Ottenwalder visited a warehouse of a turtle shell dealer in Port-au-Prince, where he observed 20 unpolished, small-to-medium-size hawksbill carapaces for US$24-40 each, as well as 18 large bags of hawksbill shell with an approximate total weight of 600 kilograms (1,320 pounds), valued at US$180 per kilogram (US$82 per pound). All carapaces were reported to have originated from the southern Tiburon Peninsula.

During these surveys, Ottenwalder found small to large carapaces of hawksbill and green turtles readily available in markets and tourist shops. Most carapaces offered by fishers were of small or medium size. Ottenwalder found a single olive ridley turtle carapace in a market gift shop in Port-au-Prince in the early 1980s. The origin of the specimen is unknown.

c) Recent International Trade in Marine Turtles and Products

Together with Cuba and the Cayman Islands, Haiti was once one of the main exporters of hawksbill shell in the Caribbean region. Between 1959 and 1990, Haiti exported an average of 1,500 kilograms (3,300 pounds) a year, and exports represented around 4 percent of all hawksbill shell imported by Japan during the period. From 1959 to 1966, Haiti supplied Japan with an average of 800 kilograms (1,760 pounds) per year. Exports between 1967 and 1984 increased to an average of 1,400 kilograms (3,080 pounds) per year and, at a time when CITES controls gradually reduced trade from other traditional sources of hawksbill shell in the region, imports from Haiti (a non-CITES nation) increased further to an average of 2,700 kilograms (5,940 pounds) per year from 1985 to 1990. After the coup d'etat in Haiti in 1991, Haitian exports to

Japan dropped substantially, to 178 kilograms (392 pounds) in 1991, and halted completely in 1992.

The contradiction between the apparent scarcity of turtles in Haitian waters and high volume of hawksbill shell exported from Haiti to Japan has raised questions about the origin of Haitian shell, which appears to have originated from other Caribbean countries and been channeled through Haiti for export to Japan (Groombridge and Luxmoore, 1989; Milliken and Tokunaga, 1987; Ottenwalder, 1996).

CITES Annual Reports for the period 1980-1998 record exports from Haiti of the following species and specimens: green turtle - 3 bodies, 8,413 kilograms (18,501 pounds) of scales and 61 shells; *Cheloniidae* spp. - 3 bodies, 30 kilograms (66 pounds) of scales and 15 shells; and hawksbill - 1 body, 1 leather item, 186 kilograms (409 pounds) of scales and 19 shells.

d) Enforcement Efforts

Available information indicates that the fisheries regulations have been totally ignored by the populace and are not enforced by authorities.

6. Summary and Recommendations

Although there is very little information available, numbers and nesting sites of marine turtles in Haiti appear to have been substantially reduced from historical levels. Large-scale exports of marine turtles in the past and the apparently critical status of the remaining nesting populations pose significant challenges to prospects for marine turtle conservation in the country. Available literature and data indicate that domestic demand, open markets, and high levels of international trade have been problematic in Haiti for some time, yet Haiti's trade in marine turtles has been overlooked by conservationists for decades.

TRAFFIC offers the following recommendations:

- Nations in the Caribbean are encouraged to collaborate with and assist Haiti in designing and implementing initiatives promoting marine turtle research, management, and conservation.

- The marine turtle research community is encouraged to assist in undertaking aerial and ground truth surveys to compile information on marine turtle distribution, numbers, and activities, particularly along selected coastal areas where nesting sites were recorded in the 1980s.

- Wildlife trade specialists are urged to assist locals in carrying out market surveys in Haiti to gather current information on domestic and international trade in marine turtles.

- Appropriate agencies need to review, update, and enforce current regulations.

- Haiti should take steps to accede to CITES and seek assistance from the CITES Secretariat in doing so.

- Haiti is encouraged to accede to the Inter-American Convention for the Protection and Conservation of Sea Turtles and the Cartagena Convention and its SPAW Protocol.

- Protected area managers from the Wider Caribbean region are encouraged to assist Haiti in creating and managing marine reserves.

- Regional partners should assist Haiti in initiating training, building capacity, institutional development, and education programs.

Personal Contacts

The information in this section was verified with José Ottenwalder (National Coordinator, UNDP/GEF, Dominican Republic) in Santo Domingo in late 1999. In addition, a TRAFFIC researcher met with Jean Robert Badio (Responsible, Peches and Aquaculture, Ministry of Agriculture, Natural Resources and Rural Development, Port-au-Prince) on 1 and 3 March 2000, during the 20th Annual Symposium on Sea Turtle Biology and Conservation in Orlando, Florida. Mr. Badio reports having attempted to fax and email his comments on this section repeatedly since March 2000, without success.

References

Esquemeling, J. 1967. *The Buccaneers of America*. Dover Publishing, Inc. New York.

Groombridge, B. and R. Luxmoore. 1989. *The green turtle and hawksbill (Reptilia: Cheloniidae): World status, exploitation and trade*. CITES Secretariat. Lausanne, Switzerland. 601 pp.

Milliken, T. and H. Tokunaga. 1987. *The Japanese sea turtle trade, 1970-1986*. TRAFFIC Japan. Prepared for the Center for Environmental Education. Washington, D.C. 171 pp.

Ottenwalder, J. A. 1996. The current status of sea turtles in Haiti. *Contributions to Herpetology* 12: 381-393.

UNESCO. 1998. Coasts of Haiti - Resource assessment and management needs. Results of a seminar and related field activities. Coastal region and small island papers 2, United Nations Educational, Scientific and Cultural Organization, Paris. 39 pp.

World Bank. 2000. World development indicators database. http://worldbank.org/data/wdi2000/

G. Jamaica

1. Introduction

Jamaica is an independent member of the British Commonwealth. The third largest island in the Caribbean, Jamaica has a total land area of 10,982 square kilometers (4,224 square miles) with a 1,022-kilometer (639-mile) coastline. Situated in the Greater Antilles, the country is an outcrop of a submerged mountain range. Jamaica lies south of Cuba, southeast of the Cayman Islands, and west of Haiti. It is populated by over 2.6 million people and the capital is Kingston.

The mainland coast comprises sandy beaches, bays, sand spits, sandbars, cliffs, salinas, swamps, lagoons, and shallow reef flats. At least 321 kilometers (200 miles) of sandy beach of the 891 kilometers (557 miles) of mainland coastline are potentially suitable marine turtle nesting habitat. Offshore, the Morant Banks and Pedro Banks, their cays, and the large shelf that extends from the southern coast of the island provide nesting and foraging habitats for marine turtles. Inshore, the Port Royal Cays, which lie to the south of the Palisadoes, and the Portland Bight Cays in Portland Bight are also good turtle habitat (Haynes-Sutton et al., 1995).

Columbus landed in Jamaica in 1494, and the island was ruled by Spain until 1655, when it was captured by British forces. The British administered the Cayman Islands as part of Jamaica, and in 1670 Jamaica and the Cayman Islands were ceded to the British crown by Spain. In 1862, the Caymans became a Crown colony ruled by the British governor of Jamaica. Jamaica became independent in 1962.

Tourism, agriculture, and mining are mainstays of the economy. Jamaica is characterized as a "lower middle income" nation (World Bank, 2000). The country has a per capita GDP of US$3,350. The exchange rate used in this section is 40 Jamaican dollars (JMD40) = US$1 (January 2000).

2. Marine Turtle Species in Jamaica

Five species of marine turtles have been recorded in Jamaican waters (green, hawksbill, loggerhead, leatherback, and Kemp's ridley), and all but the Kemp's ridley have been reported as nesting in the country. The green turtle was reported to have been the most abundant species in the 1850s, but the hawksbill is more frequently encountered today. It is the only species that nests in any appreciable numbers and the most common marine turtle foraging in national waters. The other species are considered rare. Hawksbill and green turtles of varying sizes are found in Jamaican waters year-round, while loggerheads are encountered only occasionally at sea. Leatherbacks migrate through Jamaican waters and may nest in rare instances. A few unconfirmed Kemp's ridley sightings have been reported in Jamaica (Haynes-Sutton et al., 1995).

Table 20. Marine Turtles Occurring in Jamaica

Common name	Scientific name	Local name(s)
Hawksbill turtle	***Eretmochelys imbricata***	hawksbill turtle, carey
Green turtle	***Chelonia mydas***	green turtle
Loggerhead turtle	*Caretta caretta*	loggerhead turtle
Leatherback turtle	*Dermochelys coriacea*	leatherback turtle, three-keel

Sources: Haynes-Sutton et al., 1995; Kerr Bjorkland and Donaldson, pers. comm., 2000.

3. Overview of Marine Turtle Management and Conservation

Marine turtle management and conservation efforts in Jamaica include research on nesting turtles in several locations, education in schools, community outreach, and legal protection. Recently, habitat conservation has become a priority in the country (Kerr-Bjorkland and Donaldson, pers. comm., 2000).

a) Regulatory Framework

(1) Legislation and regulations

It has been illegal to harvest, possess, or sell any marine turtle in Jamaica since 1982 when green, hawksbill, loggerhead, Kemp's ridley, and leatherback turtles were designated as protected species under Schedule III of the Wild Life Protection Act of 1945. Take, possession, and sale of marine turtle eggs has been prohibited since 1945. To advertise the sale of marine turtles or their parts is not illegal per se; the burden of proof rests with officials to confirm that what is advertised or sold actually contains marine turtle (Haynes-Sutton et al., 1995).

The export without a license of unworked marine turtle shell has been prohibited since 1974 (Trade Law 4 of 1955, as amended). International trade in marine turtles and their products is prohibited.

The first statute to control the take of turtle eggs was enacted in 1711. Although it prohibited the destruction of turtle eggs upon any island or cay administered by Jamaica, it was never enforced in the Cayman Islands (Lewis, 1940). The Morant and Pedro Cays Law of 1907 prohibited the capture of turtles without a license and the harvest of eggs on the cays (superceded by the Wildlife Protection Act of 1945, 1982 amendment). The Birds and Fish Protection Law 33 of 1914, which declared a closed season for turtles from 1 through 31 April in 1919, was replaced by the Wild Life Protection Act of 1945. None of these had been enforced vigorously (Haynes-Sutton et al., 1995).

<u>Wild Life Protection Act (1945), 1982 and 1998 amendments</u>. This act has prohibited the take, attempt to take, sale, and possession for purposes of sale of turtle eggs since 1945. Since 1982, green, hawksbill, loggerhead, Kemp's ridley, and leatherback turtles have been included as protected species under Schedule III of the act, which prohibits the harvest, possession, and sale of protected species. A person contravenes the act if they have in their possession the whole or any part of any protected animal.

As amended in 1998, penalties for violations of the act for which no special penalties are stipulated include fines of up to JMD100,000 (US$2,500) or 12 months in prison and confiscation of vehicles, boats, and equipment used to commit the offense. The Minister of Land and the Environment and Housing may give written exemption to any person or institution from all or

any of the provisions of this act for conservation, scientific, historic, or educational purposes (Donaldson, in litt., 2000).

Endangered Species (Protection, Conservation and Regulation of Trade) Act, 2000. This act serves as Jamaica's CITES implementing legislation. It includes species listed in the CITES Appendices and Jamaica's list of plants and animals for which regulation of trade is required. Species are listed in four schedules: Schedules I-III contain CITES species listed in Appendices I-III, and Schedule IV includes endangered species native to Jamaica, which are not CITES-listed (Donaldson, in litt., 2001).

If brought before a Resident Magistrate, unlawful trade is punishable by a fine not to exceed 2 million dollars, or imprisonment not to exceed two years, or both. If brought before a Circuit Court, unlawful trade is punishable by a fine not to exceed 2 million dollars, or imprisonment not to exceed 10 years, or both. All species specimens retrieved from violators are forfeited to the Crown if there is a conviction.

(2) Membership in international and regional treaties

CITES. CITES entered into force in Jamaica on 22 June 1997. In 2000, Jamaica adopted CITES implementing legislation: the Endangered Species (Protection, Conservation and Regulation of Trade) Act, 2000. This act lists CITES Appendices and Jamaica's list of plants and animals for which regulation of trade is required.

SPAW Protocol to the Cartagena Convention. Jamaica ratified the Cartagena Convention on 1 April 1987. Jamaica signed the SPAW Protocol on 18 January 1990 but has yet to ratify it.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). Jamaica has neither signed nor ratified the IAC.

(3) Responsible agencies

The Natural Resources Conservation Authority (NRCA) is the government agency responsible for the management, conservation, and protection of Jamaica's natural resources, including marine turtles (Haynes-Sutton et al., 1995). NRCA is also responsible for implementing and enforcing relevant national legislation and serves as the national CITES Management Authority. The Trade Administrator of the Ministry of Commerce controls the export of unworked turtle shell (Trade Law 4, 1955).

Since 1991, the NRCA has collaborated on marine turtle conservation and recovery planning efforts with the Sea Turtle Recovery Network (STRN), a Jamaican nongovernmental organization active in research and conservation. STRN was established in 1991 to develop a cooperative structure to promote the conservation of marine turtles in Jamaica. Priorities include research and monitoring; identifying important nesting and foraging areas; protecting marine turtle habitat by establishing protected areas and improved regulation of pollution and development; strengthening management and enforcement agencies; improving law enforcement; and expanding public education (Haynes-Sutton et al., 1995).

b) Conservation Initiatives

(1) Habitat conservation/protected areas

Efforts to protect habitat have lagged behind species conservation initiatives in Jamaica (Haynes-Sutton et al., 1995). Since 1992, however, four protected areas that provide marine turtle habitat have been designated under the NRCA Act (1991): Negril Marine Park, Montego Bay Marine Park, Portland Bight Protected Area, and Palisadoes-Port Royal Protected Area (Donaldson, pers. comm., 2000).

(2) Species research and conservation activities

The STRN hosted the first annual sea turtle symposium in Kingston in 1995. This was a major point in the marine turtle recovery planning process and provided an opportunity for the review of the draft Sea Turtle Recovery Action Plan for Jamaica (STRAP). In 1995, the STRN also began an island-wide inventory of beaches to determine areas of nesting, and species and numbers of nesting turtles (Kerr, 1998). Researchers recently completed surveys of most of the national coastline, and plan further work to identify index beaches and target nesting surveys (Kerr Bjorkland, pers. comm., 2000).

In September 1998, satellite transmitters were attached to two hawksbills as part of a U.S. National Marine Fisheries Service (NMFS) satellite tracking project to gain a better understanding of the species' range and migration in the region. Satellite transmitters will be attached to three or four more turtles in 2000 (Woodley, pers. comm., 2000).

Table 21. Main Projects Assessing Marine Turtle Activity in Jamaica

Species Projects	Location
Monthly aerial wildlife surveys/location of turtles (1981-1982)	Coastal areas
Interviews with fishers on locations of nesting beaches and estimated numbers of nests (1982)	Coastal areas
Interviews, market surveys, reports of poaching (1987)	Coastal areas
Aerial manatee surveys/locations of nesting and foraging turtles (1993)	Coastal areas
Evening nesting surveys with volunteers (June-October 1992-1995)	Coastal areas
Reports of turtle sightings, nests, poaching from dive operators (1992-1995)	Coastal areas
Nesting survey: numbers of nests and false crawls, species identification, fate (1995-present)	Entire coast
Compilation of public reports of turtle sightings--mostly killing or nesting (1982-1995)	NRCA files, newspaper reports
Satellite tracking of hawksbills (1998-present)	Jamaican waters

Sources: Haynes-Sutton et al., 1995; Kerr, 1998; Kerr Bjorkland, pers. comm., 2000.

(3) Enforcement and education

NRCA is responsible for enforcing the provisions of marine turtle legislation in Jamaica. The Fisheries Division of the Ministry of Agriculture can also take action against violators of the legislation (Campbell, pers. comm., 2000).

NRCA's Regulation and Compliance Division has 14 wardens, which amounts to one warden in each of the 14 parishes of the country, and 4 investigators who follow up on field reports from wardens. The wardens are authorized to confiscate illegal specimens; however, they lack powers of arrest and must arrange for police officers to do this on their behalf. The Jamaican Defense Force Coast Guard, the Fisheries Division of the Ministry of Agriculture, and the Marine Police are authorized to enforce the law for violations that take place at sea (Campbell, pers. comm., 2000).

The NRCA has no authority to confiscate illegally imported wildlife and it has been attempting to enlist the support of customs and coast guard officials in enforcing CITES provisions. The NRCA provides assistance in identifying species (Strong and Donaldson, pers. comm., 2000).

Penalties for violations are reported to be inadequate. The sanctions include a fine or imprisonment, and courts are reluctant to issue jail sentences unless a repeat offender is involved (Campbell, pers. comm., 2000). The NRCA is assessing the cost-effectiveness of current legislation and regulations, and is seeking alternatives to enforcement. One alternative would be to achieve compliance from the populace by increasing public awareness of the need to conserve marine turtles (Campbell, pers. comm., 2000).

The STRN is active in educating adults and children about marine turtle conservation issues in Jamaica, and NRCA wardens participate in an environmental education program in schools in fishing communities. A private citizen regularly hosts field trips from local schools at his beachfront home near Savanna-la-Mar to educate children about marine turtles and other marine life (Richardson, pers. comm., 2000).

4. Conservation Status and Trends

Unless otherwise referenced, the information in the following section has been adapted from Haynes-Sutton et al., 1995.

Once abundant in Jamaican waters, marine turtle stocks are reported to have "declined catastrophically." The overall decline of marine turtles, and the green turtle in particular, has been attributed to overexploitation of females and eggs on nesting beaches in combination with destruction or disturbance of nesting and foraging habitat. Opportunistic take of turtles by fishers is reported to be the greatest threat to marine turtles in Jamaica. Hotel and other coastal development, sand mining, pollution, dynamiting of reefs, and a variety of other threats have taken a toll on turtle habitat. Predation of nests by mongoose, dogs, rats, and feral cats, as well as turtle entanglement in damaged nets at sea, also threaten the survival of marine turtles in Jamaica. The country has lost more than 90 percent of its live coral stock since 1980, which is likely to emerge as a serious impediment to the recovery of marine turtles. The destruction of coral reefs by pollution, by fishers who use dynamite, and by siltation caused by erosion from deforestation deprives marine turtles of vital foraging areas.

a) Hawksbill Turtle

The hawksbill is the most commonly encountered marine turtle in Jamaica. It frequents coral reefs and nests along the entire coast wherever suitable habitat exists. Nesting occurs throughout most of the year, but the main season seems to be from mid-June through September. Haynes-Sutton et al. (1995) report that the total number of hawksbills nesting on Jamaican beaches is not likely to exceed 100 turtles per year, while Meylan (1999) reports an estimated 200 to 275 females nesting in the country. According to residents, hawksbills nested in Jamaica in much greater numbers in the past than they do today.

Some of the most important nesting areas for hawksbills in Jamaica appear to be the Portland Bight cays, Alligator Pond (Manchester), Great Bay to Luana/Font Hill (St. Elizabeth), and Trelawney (Falmouth) to Runaway Bay (St. Ann) (Kerr Bjorkland and Donaldson, pers. comm., 2000).

Data contributed by aerial surveys, citizens, and dive operators indicate that hawksbills are observed at sea all around the island.

b) Green Turtle

In the 1850s the green turtle was the most abundant marine turtle in Jamaica, but by the1940s nests were rare. Fishers interviewed in 1982 reported that green turtles nested on relatively few of Jamaica's beaches, mostly on the northeast and south coasts. Portland Bight and Hellshire appeared to be important areas. Since 1982, there have been only two unconfirmed reports of green turtles nesting on mainland beaches, which indicates that green turtle breeding populations have been virtually extirpated from Jamaica. Systematic beach surveys are required to determine whether any green turtles still nest on the mainland or offshore cays.

An unknown number of green turtles are present throughout the year in sea grass beds all around the coast.

c) Loggerhead Turtle

Loggerheads have nested on about one-third of all known nesting beaches in Jamaica, mainly on the northeast and southwest coasts. It appears that Morant and Pedro Cays were important sites in the past, but no nesting attempts were observed in the June surveys (very end of the loggerhead season) of 1982-1987. Only one confirmed report of egg laying (in 1987) was reported to STRN in 1995. It is unknown whether loggerheads continue to nest in Jamaica today.

Declines in observations and catches of loggerheads have occurred in Jamaica's waters also. Fishers have reported seeing and catching loggerheads throughout the coastal shelf, yet there were only four confirmed observations in the 1990s.

d) Leatherback Turtle

Since 1851, there have been only 10 reports of leatherbacks nesting in Jamaica, in Big Portland Bay, Hope Bay Beach, Parrottee Beach, and Southeast and Northeast Cays of Morant Bank. Most recently, a fisher reported having killed and taken the eggs from a nesting leatherback on Northeast Morant Cay in September 1995.

Leatherbacks are reported to migrate through Jamaican waters (Kerr Bjorkland, Donaldson, Moodie, Hamilton, pers. comm., 2000). No one has ever reported seeing leatherbacks foraging in Jamaica.

5. Exploitation and Trade of Marine Turtles and Products in Jamaica

a) History of Exploitation and Trade

Marine turtles appear to have been important to humans in Jamaica for over 1,000 years. Marine turtles are thought to have made up an important part of the diets of early inhabitants of Jamaica (Haynes-Sutton et al., 1995). Kerr (1998) reports that post-Colombian use of marine turtles in Jamaica was characterized by intense exploitation for meat, eggs, and shell.

There is little information available about the use of marine turtles during the Spanish reign over Jamaica (1494-1655), but historic accounts describe plentiful stocks of marine turtles after the British took control of the country in 1655. Turtles were reported to have been captured on the coast during the summer months and exported to other parts of the Caribbean as "victuals." The marine turtle harvest in Jamaica after 1655 is difficult to separate from that of the Cayman Islands, which until 1962 was administered by the British as part of Jamaica. Systematic hunting of green turtles in the Cayman Islands, mainly by ships dispatched from Jamaica, started in 1655. The Cayman Islands were the most important regional green turtle rookery, so the fisheries and trade were centered there (Haynes-Sutton et al., 1995; Lewis, 1940).

Turtle meat was commonly sold in Jamaican markets in the 1600s and 1700s; in 1730, green turtles were reported to supply the principal source of meat eaten in Jamaica (King, 1982). Turtle recipes have been featured in local cookbooks since the 1880s. It appears that initially only green turtles were considered edible, but eventually all species were eaten. Turtle meat is reported to have remained an important part of the Jamaican diet well into the twentieth century (Haynes-Sutton et al., 1995; Kerr, 1998).

From May to July each year from the mid-1600s until the late 1700s, ships came from all over the Caribbean to the Cayman Islands to obtain supplies of turtle meat. Green turtles from the Miskito Cays were also shipped live from Jamaica and the Cayman Islands to England as late as the early 1900s for turtle soup (Haynes-Sutton et al., 1995).

Jamaica was once an important trader in turtle shell. Hawksbill shell was imported as well as collected in Jamaica for export (principally to England) in the form of both raw and finished products. While data for shipments does not clearly separate out Jamaican exports, figures for all products shipped through Jamaica and collected from waters Jamaica administered (including the Cayman Islands) show that 1,834 green and 1,850 hawksbill turtles were exported in 1929; 348 green turtles were exported in 1934; and 300 to 600 turtles (mainly hawksbills) were exported in 1945 (Haynes-Sutton et al., 1995).

b) Recent Harvest and Use of Marine Turtles

Marine turtles were harvested legally in Jamaica until 1982. Over the centuries, some fishers targeted marine turtles with special nets and decoys, while others took turtles incidentally at sea. During the nesting season men built small lean-to shelters on nesting beaches, where they spent nights watching for nesting females (Haynes-Sutton et al., 1995). Groombridge and Luxmoore

(1989) report that turtles and their eggs were generally taken whenever encountered and hawksbills were captured with spearguns.

The Fisheries Division of the Ministry of Agriculture kept statistics on marine turtles landed in the country until 1982 (Kerr Bjorkland and Donaldson, pers. comm., 2000). From 1962 through 1968, the reported annual landings declined from 118,116 to 63,377 kilograms (259,855 to 139,429 pounds). Reported landings for 1981 totaled 57,115 kilograms (125,653 pounds), and by 1982 only an estimated 42,025 kilograms (92,455 pounds) were landed. Overall fishing effort increased during this period. By the mid-1970s, turtle landings had declined to the point where there were no longer specialized turtle fishers (Haynes-Sutton et al., 1995).

Of the estimated 9,000 Jamaicans who participated in the marine turtle fishery in 1982, 2,187 actively fished for turtles (the remainder took turtles opportunistically), 50 processed turtles, and 926 sold meat. Approximately 100 to 150 people were reported to have robbed at least 100 to 150 nests of about 30,000 eggs (Haynes-Sutton et al., 1995).

Despite protective legislation since 1982, turtles and their eggs continue to be taken in Jamaica, with residents forming the largest market for turtle products. Most turtles encountered at sea, on the beaches, inshore, or on offshore cays are reportedly captured (Haynes-Sutton et al., 1995). At sea, decoys, nets, and spearguns are employed to target turtles, and turtles are also taken incidentally in nets. There are also reports of foreign vessels taking turtles in Jamaican waters (Kerr Bjorkland, Donaldson, Moodie, Hamilton, pers. comm., 2000).

Moodie (pers. comm., 2000) estimates that as many as 40 percent of all nests on the mainland are robbed. Kerr Bjorkland and Donaldson (pers. comm., 2000) report that nests lost to poachers on the nearshore cays in Portland Bight could approach 80 percent.

Haynes-Sutton et al. (1995) cite examples of illegal take, noting that 30 hawksbill turtles were poached between Alligator Pond and Negril in 1995, and at least 5 adults and 5 juveniles in Portland Bight in 1995. Citizens have been reporting turtle poaching from most parts of the island over the last 10 years.

Meat, eggs, and shell are used and traded in Jamaica, although these activities are not openly advertised, and it is difficult to determine what quantities are involved. Meat is used in soup or stew and sold as steak. Eggs are thought to have aphrodisiac properties; they are mixed with wine, brandy, and beer to make “punch,” which is sometimes called “front end lifter” (Haynes-Sutton et al., 1995). Marine turtle penis is sold by the inch and mixed with rum, wine, roots, oysters, conch, and other ingredients (Moodie, pers. comm., 2000). Haynes-Sutton et al. (1995) report that the penis is referred to as “cod” or “turtle pride,” and is dried and sold. The price in 1992 was up to JMD70 (US$1.52) per inch.

Turtle meat reportedly is sold for JMD20 to 100 (US$0.50-2.50) per pound (US$1.10-5.50 per kilogram), depending on the parish (Moodie and Richardson, pers. comm., 2000). Three turtles of unknown species were reportedly taken in 1999 in the Montego Bay area and the meat sold for JMD20 (US$0.50) per pound (US$1.10 per kilogram).

(1) Hawksbill shell stocks

Jamaican authorities are aware of two privately held hawksbill shell stocks of unknown quantities in the country. A TRAFFIC researcher visited the owners of one of these on 5 January 2000. The owner reported holding 3,000 to 3,500 pounds (1,365-1,590 kilograms) of shell that had been

acquired before the export of unworked shell was prohibited in 1974. The owner operates a factory that previously exported shell to Germany and currently uses the shell stock in the manufacture of eyeglass frames and jewelry for the domestic market.

The owner of the second stock of shell applied in 1990 to export to Japan approximately 6,000 pounds (2,727 kilograms) of hawksbill shell, which was reportedly accumulated from fishing grounds off Jamaica, the Cayman Islands, and Nicaragua before the 1982 prohibition on harvesting turtles in Jamaica. Authorities denied the application.

The NRCA has visited the first establishment to examine the stock and assess the current quantity of shell. To date, the owner of the second hawksbill shell stockpile has refused authorities access to it.

(2) TRAFFIC surveys

In January 2000, a TRAFFIC researcher surveyed over 160 outdoor vendors and craft markets, small tourist malls, and hotels in Negril, Montego Bay, and Ocho Rios for hawksbill shell products, and visited the owner of one of the shell stockpiles. Markets and restaurants in fishing villages around the island were also visited.

Hawksbill shell items were openly sold, though not in large quantities. Vendors claimed the shell originated in Jamaica and that they themselves manufactured their products, which included earrings (US$5-15), bracelets (US$8), pins, barrettes, necklaces, combs (US$15), and other items. These products are sold to tourists from South America, North America, and Europe.

One store in a Montego Bay souvenir mall was of particular interest because it displayed a significant quantity of hawksbill shell items. Many of these were mounted on display cards bearing the name of one of the hawksbill shell stock owners. Approximately 10 bracelets, 40 sets of earrings (US$15 each), an assortment of pins, and some 40 rings were displayed. The vendor brought out four additional shoeboxes of items, and said he had more and could also special order items with a two-week notice. The shopkeeper reported that he has a client who periodically buys about US$2,000 worth of hawksbill products from him and imports it into the USA, declared as plastic. He reported paying US$8-9 for a set of earrings and retailing them for US$15.

The vendor showed the TRAFFIC researcher a 1993 letter from one of the remaining businesses with hawksbill shell stocks. The letter explained that the vendor would not have a problem selling hawksbill shell products because the business had permission to manufacture these, and the Wild Life Act did not apply. In 2000, NRCA authorities confirmed that possession and sale of marine turtle products had been prohibited since 1982, but that there had been some confusion over the years among traders and authorities about how to dispose of the remaining stocks of shell. When the TRAFFIC researcher visited this business in 2000, he observed an employee during various stages of the manufacturing process; possession and sale of hawksbill shell was clearly unlawful at the time. The confusion and enforcement problems will undoubtedly continue until authorities are able to quantify the amount of shell remaining and establish a consistent policy for how to dispose of or monitor the shell.

The researcher visited the Ocho Rios Craft Park as well as several small stores in nearby tourist shopping areas. Hawksbill shell bracelets (US$7-15), earrings (US$5), rings, sweater pins (US$8), and barrettes were offered in a few small stands and stores.

Turtle meat was also offered in several restaurants catering to locals, although not on the menu. Meat sold for US$0.50-2.50/pound. The researcher was offered a glass of turtle punch in Savanna-la-Mar in January 2000 for JMD70 (US$1.75).

c) Recent International Trade in Marine Turtles and Products

The export of unworked hawksbill shell from Jamaica without a license from the Trade Board was prohibited in 1974, but no regulations existed regarding the export of finished products until CITES entered into force in Jamaica in 1997.

Between 1970 and 1986, Japanese customs data indicated that a total of 14,285 kilograms (31,427 pounds) of unworked hawksbill shell was received from Jamaica, with trade reported for every year (Milliken and Tokunaga, 1987). Imports fluctuated considerably, rising as high as 2,521 kilograms (5,546 pounds) in 1973 and dropping to a low of 128 kilograms (282 pounds) in 1978. In 1986, Jamaica exported 2,182 kilograms (4,800 pounds) to Japan. Milliken and Tokunaga (1987) speculate that this sudden increase might have reflected the movement of large quantities of hawksbill shell into Jamaica, a non-Party to CITES at the time, for export to Japan.

Japanese customs data indicate that small volumes of green turtle shell, totaling 1,735 kilograms (3,817 pounds), were periodically received from Jamaica between 1970 and 1986 (Milliken and Tokunaga, 1987).

CITES Annual Reports for the period 1980-1998 record exports from Jamaica of the following species and specimens: loggerhead - 1 shell; green - 2 bodies, 4 carvings, and 22 shells; Cheloniidae spp. - 1 body, 22 carvings, 9 leather items, and 11 shells; hawksbill - 1 body, 272 carvings, 3 eggs, 10 leather items, 450 kilograms (990 pounds) of "pieces," 254 scales, 68 kilograms (147 pounds) of scales, 33 shells, and 10 specimens; and Kemp's ridley - 1 shell. During this period, three unspecified imports of green and two of hawksbill turtle are recorded.

d) Enforcement Efforts

Since 1982, there have been four convictions under the Wild Life Protection Act for catching and killing marine turtles. In 1993, a man from Negril was caught with a hawksbill and sentenced to a fine of JMD10,000 (US$250) and seven days imprisonment (Haynes-Sutton et al., 1995). In 1997, two people were caught in Black River with two turtles, 200 undeveloped eggs removed from the female, and 90 mature eggs. Each person was fined JMD5,000 (US$125) (Spence, pers. comm., 2000). In 1999, a fisher was sentenced to a period of community service for killing a hawksbill. And, in February 2000, a live juvenile hawksbill was confiscated from an individual in Portland Bight. The person was fined JMD5,000 (US$125) (Donaldson, pers. comm., 2000).

NRCA officials receive reports from citizens on turtle and egg poaching, but have difficulty in catching violators. Limited radio communication extends reaction time and it is hard to obtain supporting evidence from witnesses. Neighbors are reluctant to turn in neighbors, and environmental crimes are not taken seriously except by nongovernmental organizations (Campbell, pers. comm., 2000).

6. Summary and Recommendations

Marine turtle populations in Jamaica have been greatly reduced in the last 100 years, to the extent that greens and loggerheads are thought to nest in very small numbers, if at all. Although trade in turtle products has been reduced since legislation was enacted in 1982, take for the domestic market continues and hawksbill products are still sold in the country. At the same time, the destruction of most of Jamaica's coral reefs may doom the foraging hawksbill population.

Jamaican authorities have identified several problem areas, including a lack of compliance and awareness on the part of the populace, coupled with the government's shortage of resources (financial, human, equipment). Inadequate and conflicting legislation complicates matters. Authorities are thus limited in their ability to enforce the regulations and educate the various stakeholders on the importance of protecting turtles and their habitats. Authorities expressed interest in learning about CITES training opportunities for technical, management, and enforcement personnel.

Since 1991, the Sea Turtle Recovery Network has succeeded in raising awareness among adults and children in coastal communities about the importance of conserving marine turtles, and has involved members of the general public in hands-on beach surveys. The network has recently completed the first nationwide nesting surveys, as well as a draft marine turtle recovery action plan detailing priority conservation actions.

TRAFFIC offers the following recommendations:

- The marine turtle research community is encouraged to support expansion of research on marine turtle distribution and status in Jamaica and collaborate with national researchers. Findings should be factored into regional and national conservation and management plans.

- NRCA authorities are encouraged to articulate their specific needs for training and other support to the CITES Secretariat.

- The NRCA is also urged to quantify the amount of hawksbill shell held in the two private stocks in the country and seek ways to prevent shell from being sold to visiting tourists or exported by other methods from the island.

- STRN is encouraged to seek assistance from wildlife trade specialists in investigating the origin, as well as the level of turnover, of marine turtle products in the country. Information is needed about whether fresh hawksbill shell is being added to supplies held by the owners of the two stockpiles and by coastal vendors. Markets for eggs and meat need to be thoroughly investigated to shed light on demand and harvest levels. Information obtained should be considered in national conservation strategies.

- The STRN model is unique in the insular Caribbean and should be strengthened by enlisting increased support from authorities, fishers, and other stakeholders in Jamaica. It might then provide a good mechanism through which to implement the recommendations of the marine turtle recovery action plan.

- STRN is encouraged to amend the marine turtle action plan to take account of new CITES legislation and other recent developments, and finalize and begin implementing its recommendations as soon as possible.

- Priority recommendations for STRN include improving enforcement of and compliance with legislation through educational outreach programs; enlisting the support of fishers and other stakeholders in setting management priorities; improving interagency coordination; and educating the judiciary about the importance of environmental law enforcement.

- Jamaica is encouraged to ratify the SPAW Protocol to the Cartagena Convention and accede to the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC).

Personal Contacts

A TRAFFIC researcher visited Jamaica 4-12 January 2000 and met with the following individuals: Rhema Kerr Bjorkland (Former Curator of Hope Zoological Gardens, Kingston), Charles Moodie (fisher, Old Harbour Bay, St. Catherine), Andrea Donaldson (National Parks, Protected Areas and Wildlife [NPPAW] of the Natural Resources Conservation Authority [NRCA]; Coordinator, Sea Turtle Recovery Network [STRN], Kingston), Yvette Strong (NPPAW, NRCA, Kingston), Michelle Hamilton (NPPAW, NRCA, Kingston), Nelson Andrade (Coordinator, UNEP Caribbean Environment Program [CEP], Kingston), Orville Larman (Nat. Larman and Son's Ltd., Kingston), Denzil Simms (Manager, Fishermen's Cooperative Union, Kingston), Michael Spence (Environmental Officer, NRCA, Kingston), Richie Richardson (Volunteer, beach protection project, Savanna-la-Mar), Fred Campbell (Deputy Executive Director, Regulation and Compliance, NRCA, Kingston), Jeremy Woodley (Former Director of the Center for Marine Sciences, University of the West Indies, St. Andrew), and several fisheries instructors and fishers.

In addition, researchers communicated with Alessandra Vanzella-Kouri (SPAW Program Officer, UNEP CEP, Kingston) via telephone and email, and met with Rhema Kerr Bjorkland and Andrea Donaldson on 1 March 2000, during the 20th Annual Symposium on Sea Turtle Biology and Conservation in Orlando, Florida, to verify the information in this review.

References

Groombridge, B. and R. Luxmoore. 1989. *The green turtle and hawksbill (Reptilia: Cheloniidae): World status, exploitation and trade*. CITES Secretariat. Lausanne, Switzerland. 601 pp.

Haynes-Sutton, A., R. Kerr, and A. Donaldson. 1995. Draft sea turtle recovery action plan for Jamaica. Prepared by the Wider Caribbean Sea Turtle Recovery Team and Conservation Network (WIDECAST) for the UNEP Caribbean Environment Programme. Kingston, Jamaica. Unpublished report. 147 pp.

Kerr, R. 1998. The development of analytical techniques for stock assessment, recovery and management of Jamaica's sea turtle populations. M.S. Thesis, University of Georgia, Athens, Georgia. 100 pp.

King, F. W. 1982. Historical review of the decline of the green turtle and the hawksbill. Pages 183-188 in K. Bjorndal, editor. 1982. *Biology and Conservation of Sea Turtles*. Smithsonian Institution Press, Washington, D.C. 569 pp.

Lewis, C. B. 1940. The Cayman Islands and marine turtle. Pages 56-65 in Grant, C. 1940. *The Herpetology of the Cayman Islands*. Bulletin of the Institute of Jamaica Science Series, No. 2.

Meylan, A. B. 1999. Status of the hawksbill turtle (*Eretmochelys imbricata*) in the Caribbean region. *Chelonian Conservation and Biology* 3(2):177-184.

Milliken, T. and H. Tokunaga. 1987. *The Japanese sea turtle trade, 1970-1986*. TRAFFIC Japan. Prepared for the Center for Environmental Education. Washington, D.C. 171 pp.

World Bank. 2000. World development indicators database. http://worldbank.org/data/wdi2000/

H. United Mexican States, Atlantic Coast

1. Introduction

Mexico (Estados Unidos Mexicanos) is the third largest nation in Latin America. It has a total area of 1,964,375 square kilometers (755,529 square miles), of which 1,959,248 square kilometers (753,557 square miles) are continental and 5,127 square kilometers (1,972 square miles) are islands and cays. It shares a border with the United States to the north and with Guatemala and Belize to the south.

Mexico's eastern coastline borders the Atlantic Ocean (Gulf of Mexico and Caribbean Sea) and includes the Yucatán Peninsula, which lies 210 kilometers (131 miles) west of Cuba. The Atlantic coastline, including the islands and cays, spans 3,130 kilometers (1,956 miles)--27 percent of Mexico's total coastline. The country's population is currently estimated to approach 97.5 million, and Mexico City is the capital. The per capita GDP is US$8,500. The exchange rate used in TRAFFIC's market surveys is 9.25 Mexican pesos (MXP9.25) = US$1 (December 1999).

2. Marine Turtle Species on Mexico's Atlantic Coast

Six of the world's seven marine turtle species occur in Mexico: the hawksbill, green, loggerhead, Kemp's ridley, leatherback, and olive ridley. Five of these species nest along the Atlantic coast--the exception is the olive ridley, which is found on Mexico's Pacific coast. There are no known records of olive ridleys migrating through Mexico's Atlantic waters, or nesting on its Atlantic coast (Frazier, in litt., 2000; Eckert, in litt., 2000). The Atlantic shores and waters of Mexico provide some of the world's most important habitats for marine turtles.

Table 22. Marine Turtles Occurring on Mexico's Atlantic Coast

Common names	**Scientific name**	**Local names**
Hawksbill turtle	**Eretmochelys imbricata**	carey, tortuga de escamas, morrocoy, mocorroy
Green turtle	*Chelonia mydas*	blanca, verde, caballera, tortuga de sopa
Loggerhead turtle	*Caretta caretta*	caguama, caballera, perica, colorada, cabezona, jabalina
Kemp's ridley, Atlantic ridley, Mexican ridley	*Lepidochelys kempii*	lora, boba, tortuga de Kemp, perica, bastarda, kempi, mulata, cotorra
Leatherback turtle	*Dermochelys coriacea*	laud, garapacho, siete quillas, chalupa, baula, machincuepa, galápago, tortuga de canal, tinglada, tinglar de cuero
All marine turtles		caguama, tortuga

Sources: INE, 2000; Márquez, 1976; Herrera, in litt., 2000; Márquez, in litt. 2000; García-Angel, Garduño-Andrade, and Pérez-Ramírez, pers. comm., 1999.

3. Overview of Marine Turtle Management and Conservation

Marine turtle management and conservation efforts in Mexico include a ban on marine turtle harvest and trade, the requirement to use turtle excluder devices on commercial shrimp trawlers, research on turtles, patrol of nesting beaches, regional workshops for researchers, habitat conservation, education in schools, community outreach, contact with the media, and law enforcement. A wide variety of government agencies, nongovernmental organizations, academic institutions, and others collaborate on field research and conservation projects throughout Mexico. They administer at least 127 marine turtle conservation camps (*campamentos tortugueros*) to protect nests and nesting turtles and monitor and record statistics on nesting, hatching, mortality, and other events on the Atlantic and Pacific coasts. The camps also serve as useful platforms for marine turtle field research, as well as community environmental education and law enforcement programs (Abreu Grobois, in litt., 2000; INE, 2000). In 2000, at least 44 camps were operating on Mexico's Atlantic coast (INE, 2000).

a) Regulatory Framework

(1) Legislation and regulations

All species of marine turtles that occur in Mexico have been legally protected since 1 June 1990 under an accord banning the harvest, use, and trade of turtles and products. The harvest of marine turtles occurring on Mexico's Atlantic coast has been prohibited since 1973.

A 1927 decree first prohibited the exploitation of marine turtle eggs and the destruction of nests in the country. Regulations on the harvest of marine turtles and trade in their products were adopted in the 1960s. In 1966, the collection and sale of marine turtle eggs were prohibited, and in 1968, the Ministry of Commerce developed further regulations for the harvest, use, and trade of marine turtles (Cantú and Sánchez, 2000; INE, 1999 and 2000).

Several bans for certain turtle species and areas had been established before 1990; however, they often were not well enforced (Ruíz, in litt., 2000). A ban on the fishing of marine turtles entered into force in the middle of 1971 and remained in place until the end of 1972 (Ramos, 1974). In 1973, the Federal Law for the Promotion of Fisheries of 1972 (Ley Federal para el Fomento de la Pesca de 1972) allowed the harvest of certain marine turtles, but only for fisheries production cooperatives. The law required cooperatives to make full use of the catch through a contract with processing plants, and to take actions to enhance conservation of the turtle resource. Most permits were granted to harvest olive ridley turtles in the Pacific (INE, 1999; Márquez, in litt., 2000; Ruíz, in litt., 2000).

The Partial and Total Bans Accord of 1973 (Acuerdo de vedas parciales y totales de 1973) prohibited the harvest and exploitation of all marine turtles from Mexico's Atlantic coast, and of leatherbacks from both coasts, and established quotas, franchises, and closed seasons for the taking of Pacific coast olive ridley, loggerhead, hawksbill, and green (black) turtles (Márquez, in litt., 2000; Ruíz, in litt., 2000). Separate bans closed the remaining fisheries for Pacific hawksbills in 1979, loggerheads in 1983, and green (black) turtles in the mid-1980s (Márquez, in litt., 2000; Ruíz, in litt., 2000). The 1990 ban closed the Pacific olive ridley fishery.

Commercial shrimp trawlers have been required to use Turtle Excluder Devices (TEDs) in the Gulf of Mexico and Caribbean since 31 December 1993 (NOM-002-PESC-1993) and on both coasts of Mexico since 1 August 1997 (NOM-002-PESC-1993, as amended in 1997). Prior to

this, emergency regulations that expired and required renewal were enacted in Mexico to obligate commercial shrimp trawlers to use TEDs (INE, 2000).

Violations of Mexican legislation protecting marine turtles have both criminal and civil implications. Civil offenses are infractions and criminal offenses are felonies. PROFEPA of SEMARNAP (known as SEMARNAT since November 2000) imposes penalties for civil infractions, and the Federal Judicial Power (Poder Judicial Federal) handles criminal sanctions. [PROFEPA stands for Procuraduría Federal de Proteccíon al Ambiente/Federal Attorney for the Protection of the Environment. SEMARNAP stands for Secretaría de Medio Ambiente, los Recursos Naturales y Pesca/Secretariat of Environment, Natural Resources and Fisheries. SEMARNAT stands for Secretaría de Medio Ambiente y Recursos Naturales/Secretariat of Environment and Natural Resources.]

In general, environmental regulations do not establish specific penalties for each infraction, but rather dedicate one of their chapters to the penalties applicable to violations of the law. Such violations are punishable by fines, confiscation of equipment, and imprisonment through a combination of administrative and criminal sanctions. The environmental crimes (*delitos ambientales*) chapter of the penal code (Article 420) specifies penalties that are separate from those contained within environmental legislation (UNEP-CITES, 1997).

Note: All legislation enters into force in Mexico on the date that it is published in the *Diario Oficial de la Federación*, the government's official legal record. Those dates are included with the title of each law that follows.

General Law of Wildlife (Ley General de Vida Silvestre) (3 July 2000). This law generally overhauls the regulatory framework governing wildlife conservation, use, and trade. The law allows for sustainable use of wildlife, including protected species. Authorities responsible for implementing the law are in the process of developing implementing regulations (Reuter, in litt., 2001).

Article 1 states that the sustainable use of all aquatic species (including marine turtles) considered at risk will be regulated by this new law. Article 92 states "the persons of the locality that make use of the specimens, parts, and derivatives of wildlife for their direct consumption or for sale in quantities proportional to satisfy their basic needs and of those economically dependent on them, will receive support, technical advice and training from the authorities in compliance with this law and its regulation." Transitory Article 7 states that any bans set forth by decree or accord that are contrary to this new law will be reviewed and brought into conformity with this law or repealed.

As of March 2001, regulations to implement the wildlife law had not been enacted. A working group of government officials, nongovernmental organizations, and academics is exploring the implications of the law for the conservation of marine turtles. The group met on 29 January and 2 March 2001 and discussed biological status, trade, and the confusion about the legal status of marine turtles in Mexico (Reuter, in litt., 2001).

Accord establishing a ban on species and subspecies of marine turtles in waters of federal jurisdiction of the Gulf of Mexico and Caribbean Sea, as well as the Pacific Ocean, including the Gulf of California (Acuerdo por el que se Establece Veda para las Especies y Subespecies de Tortuga Marina en Aguas de Jurisdicción Federal del Golfo de México y Mar Caribe, así como las del Océano Pacífico, Incluyendo el Golfo de California) (31 May 1990). This accord established a permanent and indefinite ban on the harvest of all species and subspecies of marine

turtles in waters of Mexican jurisdiction (Article 1). It is strictly prohibited to extract, capture, pursue, disturb, or injure in any way any marine turtle in Mexican waters or on nesting beaches, and to destroy nests or to collect, keep, or sell the eggs (Article 2). The consumption, sale, and export of marine turtles and their products are also strictly prohibited.

Violations of this accord are penalized through the General Law of Ecological Equilibrium and Environmental Protection, the Fisheries Law, the Penal Code, and other judicial means available. The taking of marine turtles or their eggs is punishable by fines ranging from 20 to 20,000 times the daily minimum wage, by prison terms, and by confiscation of equipment, such as boats, motors, and fishing gear (García-Angel, in litt., 1999; Ruíz, in litt., 2000).

Fisheries Law (Ley de Pesca), Modification of 9 June 1992. Article 24, XIX, states that it is unlawful to remove, capture, possess, transport, or commercialize species protected under a fishing ban, or to obtain such species from refuge or repopulation zones or sites (Ruíz, in litt. 2000). Article 24, Section XX, of Chapter IV states that it is unlawful to deliberately capture or not comply with the established technical standards related to marine turtles and species in danger of extinction, without authorization of the Ministry of Fisheries (Secretaría de Pesca).

The penalties established for violations to Article 24 are specified in Articles 25 and 26, and can include revocation of the concession, permission, or authorization; confiscation of fisheries products and/or imposition of fines; and, according to the severity of the infraction, temporary closure of the installation or installations and/or confiscation of the vessel or vehicle used to commit the infraction. In addition, violations are subject to a fine ranging from 1,000 to 20,000 times the general minimum daily wage in effect in Mexico at the time of the infraction.

General Law of Ecological Equilibrium and Environmental Protection (Ley General de Equilibrio Ecológico y Proteccíon al Ambiente) (28 January 1988/amended by decree, 13 December 1996). This law (Chap. III, Art. 85-87) establishes SEMARNAP as the administrative authority for the regulation of import, export, and transit of wildlife, whether native or originating outside the country. It prohibits hunting, commerce, and trade in domestic species designated as endemic, threatened, or endangered, except for purposes of scientific research. The first official list of protected species was published in 1991. Exploitation and trade of other native species is prohibited except when those species have been reproduced under controlled conditions.

Official Mexican Norm (Norma Oficial Mexicana NOM-059-ECOL-1994) (16 May 1994). This regulation classifies certain species and subspecies of wild flora and fauna as endangered, threatened, rare, or subject to special protection, and establishes rules for their protection, as required by the General Law of Ecological Equilibrium and Environmental Protection. It classifies all marine turtles that occur in Mexico as endangered, thereby prohibiting hunting, commerce, and trade, including their parts and derivatives, with the exception of trade for scientific research or in captive-bred specimens.

Violations are penalized through the General Law of Ecological Equilibrium and Environmental Protection, the Fisheries Law, the Penal Code, and other judicial means available. Article 171 of the General Law of Ecological Equilibrium and Environmental Protection states that violations of this law's regulations and provisions are punishable by SEMARNAP, with one or more of these penalties: a fine equivalent to 20 to 20,000 times the general minimum daily wage in Mexico at the time of the infraction; administrative arrest of up to 36 hours; confiscation of the instruments, equipment, products, or parts of flora or fauna, in accordance with this law; and suspension or revocation of the relevant concessions, licenses, permits, or authorizations.

Organic Law of the Public Federal Administration (28 December 1994/30 November 2000). From December 1994 until November 2000, this law delegated responsibility to SEMARNAP for monitoring compliance with the laws, regulations, official norms, and programs related to protected areas, fish, and forest resources, wild flora and fauna, and hunting and aquatic activities. SEMARNAP was responsible for imposing restrictions on the circulation and transport of wild flora and fauna originating in or destined to foreign countries, in addition to promoting the establishment of regulations and restrictions concerning their import and export. Other functions included the development of national environmental policy; creation of law projects, regulations, decrees, agreements, and Presidential Orders on environmental matters; and reviewing applications for contracts, concessions, permits, and authorizations to exploit wild flora and fauna. This law is complemented by the Interior Regulation of SEMARNAP (8 July 1996).

The law was amended in November 2000. SEMARNAP became SEMARNAT (Secretariat of Environment and Natural Resources). Responsibility for managing and conserving Mexico's fisheries resources was transferred to the new Secretariat of Agriculture, Livestock, Rural Development, Fisheries, and Food (Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación).

Decree Promulgating the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Decreto Promulgatorio de la Convencion sobre el Comercio International de Especies Amenazadas de Fauna y Flora Silvestres) (6 March 1992). By means of this decree, the Mexican Congress announced its acceptance of the CITES Convention. It incorporates the text of the Convention, including all Appendices, into current national legislation. Mexican constitutional law establishes the supremacy of treaties over ordinary law, and therefore CITES prevails over other ordinary laws that regulate the trade in CITES species.

Penal Code (Código Penal Para El Distrito Federal En Materia De Fuero Común, Y Para Toda La República En Materia De Fuero Federal), as amended on 13 December 1996. The federal Penal Code was amended in 1996 to include a chapter on environmental crimes (*delitos ambientales*). Violations classified as environmental crimes carry severe penalties that are separate from the administrative penalties stipulated in other legislation. Article 420 provides strong penalties for violations of provisions protecting marine turtles. It sets penalties of six months to six years in prison and a fine equivalent to 1,000 to 20,000 days of minimum wage salary in Mexico at the time the crime was committed. Penalties may be imposed on anyone who (i) captures, harms, or takes the life of any marine turtle, or in any way collects or commercializes their products or derivatives, without appropriate authorization; (ii) captures, collects, transports, destroys, or commercializes species protected under a fishing ban without proper authorization; (iii) hunts, fishes, or captures wildlife species using prohibited methods, or threatens the extinction of the same; (iv) realizes any commercial activity associated with wild species of flora or fauna classified as endemic, threatened, endangered, rare, or subject to special protection, as well as their products, derivatives, and other genetic resources, without proper authorization or permission.

In May 2000, the Mexican House of Representatives *(Cámara de Diputados*) approved a revision to the environmental crimes chapter of the Penal Code. Article 423 states that penalties will no longer apply for violations of Article 420(i) and (ii) when the person taking marine turtle eggs is a fisher who is collecting for personal consumption, or to satisfy the basic necessities of his/her family. Before it can enter into force, the revised chapter requires ratification by the Senate. It is still not clear if any amendments will be made to avoid a loophole permitting unsustainable exploitation of eggs of some marine turtle species (Abreu, in litt., 2001).

(2) Membership in international and regional treaties

CITES and other international treaties signed by Mexico become national law once approved by the Senate and published in the *Diario Oficial de la Federación*. Article 133 of the Mexican Constitution establishes that international treaties signed by the president and approved by the Senate constitute the supreme laws of the Republic; they supercede relevant provisions in other Mexican legislation (UNEP-CITES Secretariat, 1997).

CITES. CITES entered into force in Mexico on 30 October 1991. Mexico implements the Convention and other wildlife trade controls through a variety of legislative measures.

SPAW Protocol to the Cartagena Convention. Mexico ratified the Cartagena Convention on 11 April 1985. The country signed the SPAW Protocol on 18 January 1990 but has yet to ratify it.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). Mexico signed the IAC on 29 December 1998 and deposited its instrument of ratification on 11 September 2000 to become the fifth country to ratify the Convention.

(3) Responsible agencies

The Secretariat of Environment, Natural Resources and Fisheries (Secretaría de Medio Ambiente, Recursos Naturales y Pesca - SEMARNAP) was created in 1994 to implement and enforce the laws, regulations, norms, and programs for protected areas, fisheries and forest resources, wild flora and fauna, international trade in wild species, hunting, and aquatic activities. Three separate agencies within SEMARNAP--the National Institute of Ecology (Instituto Nacional de Ecología - INE), the National Institute of Fisheries (Instituto Nacional de la Pesca - INP), and the Federal Attorney for the Protection of the Environment (Procuraduría Federal de Protecćion al Ambiente - PROFEPA)--each have had specific responsibilities for marine turtle protection and management (INE, 2000). In November 2000, SEMARNAP became SEMARNAT (Secretariat of Environment and Natural Resources/Secretaría de Medio Ambiente y Recursos Naturales). SEMARNAT remains responsible for managing and conserving marine turtles.

A 1993 accord established the National Inter-Ministerial Commission for the Protection and Conservation of Marine Turtles (La Comisión Intersecretarial para la Protección y Conservación de Tortugas Marinas)--which included INP, INE, PROFEPA, the Navy, the Ministry of Communications and Transport, the Ministry of Public Education, and the Ministry of Tourism--to improve coordination and communication on marine turtle conservation activities in Mexico. The accord also established the National Committee for the Protection and Conservation of Marine Turtles (Comité Nacional para la Protección y Conservación de Tortugas Marinas) to advise the Inter-Ministerial Commission. The committee comprised representatives of state and municipal governments, educational and scientific institutions, and NGOs (Silva Bátiz et al., 1995; García-Angel, pers. comm., 1999). Owing to a lack of government funding, the commission and committee functioned only from 1995 through 1997 (Sarti, in litt., 2000).

The National Institute of Fisheries (INP) undertakes research to provide scientific advice on the study, management, and conservation of fisheries resources in Mexico. In 1966, INP developed its National Marine Turtle Research and Management Program (Programa Nacional de Investigación y Manejo de Tortugas Marinas). The Sea Turtle Coordination Office at the Manzanillo Regional Center of Fisheries Research (Centro Regional de Investigación Pesquera-CRIP) coordinates this program through CRIP stations on 15 beaches in Mexico. CRIP Tampico, CRIP Veracruz, CRIP Yucalpetén, CRIP Ciudad del Carmen, and CRIP Puerto Morelos

administer INP's marine turtle research and protection stations and camps on Mexico's Atlantic coast. INP also participates in cooperative international marine turtle research and management programs with government agencies in the United States, Cuba, Nicaragua, El Salvador, and the Cayman Islands (INE, 2000).

The National Institute of Ecology (INE) is responsible for the formulation, establishment, and promotion of policies and programs for the conservation, management, use, and research of wild fauna and flora in Mexico (Acevedo, in litt., 2000). Section XVI of the Internal Regulation of SEMARNAP assigns INE the responsibility of coordinating with the competent authorities to apply the guidelines and resolutions of any international wildlife agreements and conventions to which Mexico subscribes. INE is charged with establishing hunting seasons; it may also establish or remove prohibitions on the exploitation of wild flora and fauna.

Section XVI of the Interior Regulation of SEMARNAP designates INE as the CITES Management Authority and Scientific Authority. However, the General Law of Wildlife that entered into force in July 2000 will likely shift the Scientific Authority designation to another agency (Reuter, in litt., 2001).

INE began working on marine turtle protection and conservation in 1982 at temporary marine turtle camps, and has continued at permanent camps since 1992. In 1990, the Mexican government obtained a World Bank loan to operate a marine turtle protection and conservation program on 12 nesting beaches in 10 states. Under the direction of INE, the program initiated activities in 1992; on the Atlantic coast, INE established camps in Barra de Tecolutla, Veracruz; Chenkan, Campeche; and X'Cacel and Mahahual, Quintana Roo (INE, 1999).

Through this National Marine Turtle Protection and Conservation Program, INE manages and finances marine turtle camps within its jurisdiction, promotes environmental education, and collaborates on marine turtle management and protection initiatives, such as protecting nests, counting eggs, releasing hatchlings, and involving locals in such activities (INE, 2000).

In 1997, INE published its *Program for the Conservation of Wildlife and Diversification of Productivity in the Rural Sector for 1997-2000* (*Programa de Conservación de la Vida Silvestre y Diversificación Productiva en el Sector Rural 1997-2000*) (INE, 1997). This program contains a series of strategies with environmental, economic, social, and legal themes to involve all sectors of society.

Two strategies form the centerpiece of the program. The first is the System of Conservation, Management, and Sustainable Use of Wildlife Units (Sistema de Unidades de Manejo para la Conservación, Manejo, y Aprovechamiento Sustenable de la Vida Silvestre), which aims to promote alternative sources of income for legitimate landowners and rural communities. These alternatives are compatible with conserving the environment and biological diversity through planned use of natural resources. This system creates opportunities for legal use of wildlife in order to complement conventional practices like agriculture, fisheries, or cattle ranching. The basic unit of this system is the Wildlife Conservation Management Unit (Unidad de Manejo para la Conservación de Vida Silvestre - UMA) (INE, 2000).

The second strategy is the Conservation and Recovery of Priority Species (Conservación y Recuperación de Especies Prioritarias), which includes Mexico's marine turtles. It identifies several main elements for achieving conservation and recovery: strengthening the National Committee for the Protection and Conservation of Marine Turtles; promoting the constitution of new turtle camps under the UMA system; striving for self-sufficiency in the camps managed by

SEMARNAP; promoting marine turtle population and monitoring in order to dictate a possible direct use of the resource; promoting ecotourism; identifying economic alternatives for the local communities; and development of environmental education strategies for rural and urban sectors (INE, 2000).

The National Marine Turtle Protection, Conservation, Research, and Management Program (Programa Nacional de Protección, Conservación, Investigación, y Manejo de Tortugas Marinas), begun in May 2000, was formulated to define priority actions and goals, improve coordination of the numerous marine turtle conservation and management activities throughout the country, and formalize collaboration among the many entities involved, including INE, INP, and PROFEPA of SEMARNAP, academic and research institutions, and NGOs (INE, 2000).

The Federal Attorney for the Protection of the Environment (PROFEPA) enforces the laws, regulations, and policies addressing the conservation of wild flora and fauna.

b) Conservation Initiatives

(1) Habitat conservation/protected areas

On 29 October 1986, the federal government designated 16 marine turtle nesting beaches in Mexico as reserves and refuges for the conservation and management of marine turtles as part of the National System of Protected Natural Areas (Sistema Nacional de Areas Naturales Protegidas - SINAP). Three of these are on the Atlantic coast: Rancho Nuevo in Tamaulipas, Ría Lagartos in Yucatán, and Isla Contoy in Quintana Roo. The reserves and refuges include a marine fringe of five nautical miles in front of each beach (Ruíz, in litt., 2000). Other management categories for natural protected areas include biosphere reserves, special biosphere reserves, national parks, national marine parks, state parks and reserves, natural monuments, natural resource protection areas, flora and fauna protection areas, and sanctuaries.

In Mexico, there are currently 127 protected natural areas, 23 of which have been transferred to the state governments. Some of these have been established to protect marine turtles specifically while others contain marine and coastal environments including beaches, lagoons, coral reefs, sea grass beds, and other areas important to marine turtles (Estrada, in litt., 2000).

Table 23. Natural Protected Areas Providing Marine Turtle Habitat on Mexico's Atlantic Coast

State	Zone	Management Category
Tamaulipas	Rancho Nuevo	Reserve zone or refuge site for marine turtles
Veracruz	Veracruz Reef System	National park
Campeche	Laguna de Términos	Fauna and flora protection area
Yucatán	Ría Lagartos	Reserve zone or refuge site for marine marine turtles/biosphere reserve
	Alacranes Reefs	National park
	Ría Celestún	Fauna refuge zone/biosphere reserve
Quintana Roo	Isla Contoy	Reserve zone or refuge site for marine turtles/national park
	Isla Mujeres, Punta Cancún and Punta Nizuc	National park

State	Zone	Management Category
	East coast of Cozumel Reefs of Cozumel	Marine turtle reserve and nesting zone National marine park
	Reefs of Puerto Morelos	National marine park
	Reefs of Sian Ka'an	Biosphere reserve
	Tulum	National park
	Banco Chinchorro	Biosphere reserve
	Yum-Balam	Flora and fauna protection area
	Xcacel-Xcacelito	Marine turtle sanctuary
	Reefs of Xcalak	National park

Sources: INE, 1999 and 2000; Estrada, in litt., 2000; Ruíz, in litt., 2000.

(2) Species research and conservation activities

In Mexico, marine turtle research and conservation activities are more longstanding and involve more participants than those in much of the rest of the Caribbean. Marine turtle camps (*tortugueros campamentos*) provide the foundation for the majority of the marine turtle protection and management initiatives in Mexico. Numerous bodies, including federal, state, and municipal agencies, academic and research insitutions, NGOs, fisheries cooperatives, and hotels and other private companies, collaborate to administer the camps. Twenty-four percent of the 127 camps registered in Mexico are administered by SEMARNAP (INP/INE), while 76 percent fall under the auspices of local government, NGO, or private initiatives (INE, 2000). INE is aware of 44 camps operating along the Gulf of Mexico and Caribbean coasts (see table 24).

Table 24. Turtle Camps on Mexico's Atlantic Coast in 2000

State	Number of Camps	Type of Camp		Species Protected
		Permanent	Temporary	
Tamaulipas	6	4	2	Kemp's ridley and green
Veracruz	3	2	1	Kemp's ridley and green
Campeche	11	7	4	hawksbill and green
Yucatán	5	4	1	Hawksbill, green, and loggerhead
Quintana Roo	19	9	10	Hawksbill, green, and loggerhead
Total	**44**	**26**	**18**	

Source: INE, 2000.

During the nesting season, personnel in the camps conduct basic research on marine turtles; patrol beaches to protect females, nests, and hatchlings; compile data on nesting and hatching activities; and tag adults whenever possible. Camp personnel usually leave nests in situ in areas that are not threatened (i.e., by poaching, erosion, or inundation). Vulnerable eggs are transferred to other beaches or off-site hatcheries.

Marine turtle research and conservation work was initiated in the 1960s by the National Institute of Fisheries Biology Research (Instituto Nacional de Investigaciones Biológico Pesqueras), the precursor to the INP. The earliest marine turtle projects in the Yucatán Peninsula were established in Isla Mujeres in Quintana Roo in 1964, with the primary focus on green and loggerhead turtles (Garduño-Andrade et al., 1999). Efforts were later extended to Campeche and Yucatán in 1977, where the main hawksbill nesting beaches were found to occur. By 1992, the region's conservation programs were covering most of the most important hawksbill nesting sites.

In the Gulf of Mexico, the INP began working to protect Kemp's ridley turtles and nests in 1966 at Rancho Nuevo in Tamaulipas, the most important nesting site for the species. In 1978, the United States joined forces with Mexico to collaborate on Kemp's ridley recovery efforts, which are ongoing (Márquez, in litt., 2000). In 1989, a second field camp was established at Barra del Tordo, south of Rancho Nuevo, and in 1990, a third camp was established at Barra de Ostionales, north of Rancho Nuevo (Márquez et al., 1996). Between 1992 and 1996, several additional camps increased the patrolled area, and since 1997 other nesting beaches in the state of Veracruz have been included (Márquez et al., 1999). Today, research and monitoring continue on over 230 kilometers (104.5 miles) of nesting beach from Rancho Nuevo into Veracruz (Márquez et al., 1998 and 1999; R. Márquez, in litt., 2000).

A national marine turtle information and data bank (Banco de Información sobre Tortugas Marinas - BITMAR) was established in the Marine Science and Limnology Institute at the National Autonomous University of Mexico in 1989. It compiles information on conservation results for all species from government, university, and NGO projects in Mexico (Abreu, in litt., 2000).

(3) Enforcement and education

PROFEPA is responsible for the enforcement of Mexico's environmental laws. It works to investigate and stem illegal activities, apply sanctions, and transfer cases to public prosecutors of environmental crimes. The agency also follows up on citizens' reports of illegal sale of wildlife in restaurants, markets, and pet stores to ensure compliance with relevant legislation. PROFEPA works on national and international activities and maintains an office in every state in Mexico (INE, 2000; PROFEPA, 1998).

PROFEPA's National Inspection and Enforcement Service for Natural Resources and the Environment was established on 28 April 1996. It collaborates with INP, INE, universities, NGOs, and the Navy to protect nesting beach sites. PROFEPA also enforces fishing restrictions, TEDS regulations, and CITES provisions. The inspectors monitor points of sale and check shipments at borders, ports, and airports to regulate international trade in wildlife. In 2000, PROFEPA employed a total of 603 natural resource inspectors throughout Mexico, as well as 22 in the central offices; 113 of these inspectors work on wildlife issues (PROFEPA, 1998; Acevedo, in litt., 2001).

4. Conservation Status and Trends

The major threats facing marine turtles on the Atlantic coast of Mexico include loss or modification of habitat (through beach construction and development for tourism, for instance); sand mining (for use in construction); poaching of turtles and eggs; and the down-scaling of funding for conservation fieldwork (including the maintenance of marine turtle camps) (Garduño-

Andrade et al., 1999; Barrios, García-Angel, Guzmán, Medina García, Pérez Ramírez, Prieto Quintal, Berzunza Chio, Tejero Loria, Márquez, and Sarti, pers. comm., 1999).

All six species of Mexico's marine turtles are listed as endangered. Major marine turtle nesting sites, some of which are of singular regional or global importance, are located in the states of Quintana Roo, Yucatán, Campeche, Veracruz, and Tamaulipas.

a) Hawksbill Turtle

The hawksbill occurs on both the Atlantic and Pacific coasts of Mexico, although it is less common on the Pacific. The Yucatán Peninsula is considered one of the most important hawksbill nesting areas in the North Atlantic, and probably in the world (Garduño-Andrade, 1999; Garduño-Andrade et al., 1999). The peninsula comprises three states: Campeche, Yucatán, and Quintana Roo.

The total hawksbill population nesting on the Yucatán Peninsula has been estimated at 1,900 to 4,300 females, with 4,522 nests under protection in 1996 (Garduño-Andrade et al., 1999). Most hawksbill nesting occurs on beaches in the states of Campeche and Yucatán, from April to September (Garduño-Andrade, 1999; Garduño-Andrade et al., 1999). Major nesting beaches include Ría Lagartos Reserve in Yucatán, and Isla Aguada, Chenkán, Punta Xen, and Sabancuy in Campeche (García-Angel, in litt., 1999; Medina García, in litt., 2000). Another important hawksbill nesting site is found at Holbox in the state of Quintana Roo, where 710 nests were reported in 1999 (Herrera, pers. comm., 2000). Sporadic nesting has also been observed in Sian Ka'an and around Mahahual in Quintana Roo, and in Veracruz and Tamaulipas (Briseño-Dueñas and Abreu-Grobois, 1994; Garduño-Andrade et al., 1999).

Garduño-Andrade et al. (1999) report that in 1996, 57 percent of the 4,522 protected hawksbill nests on the Yucatán Peninsula for which they had information were reported along the coast of Campeche. In 1999, the camps on the nine major nesting beaches in Campeche recorded 3,739 nests (96 at Isla Arena, 47 on San Lorenzo, 152 on Ensenada, 1,056 at Punta Xen, 474 at Chenkán, 689 on Sabancuy, 801 on Isla Aguada, 259 on Isla del Carmen, and 165 on Chacahito) (INP/SEMARNAP, 1999; Guzmán, pers. comm., 2000).

Mexico is one of the few countries in the Caribbean reporting an increased number of nests in recent years. After analyzing trends in hawksbill nesting in the Yucatán Peninsula from 1977 through 1996, Garduño-Andrade et al. (1999) documented a gradual increase in nesting reported for 1977 to 1992, which they believe was a reflection of an increase in monitoring effort during those years. Since 1993, however, monitoring effort has been more or less constant and at a relatively high level. The number of nests counted increased by an average of 270 per year for the period 1993-1996. Conservationists and biologists report that hawksbill nesting activity on a number of Caribbean beaches in Mexico appears to be increasing (Medina, Prieto, Barrios, Tejero, Berzunza, pers. comm., 1999).

Major hawksbill foraging areas are found off the Yucatán Peninsula, in the Gulf of Mexico and into the Banco de Campeche and Caribbean. Important foraging areas near nesting beaches and sea grass beds occur throughout the Banco de Campeche, the Yalahau Lagoon, and the coral reefs off Yucatán and Quintana Roo. Several reefs important for hawksbills include Arrecife de la Serpiente, Arrecife Madagascar, and Arrecife Granville. Foraging areas also exist off the coast of Veracruz, especially around islands between Isla Lobos and Antón Lizardo and around Arrecife Cabezo (Garduño-Andrade et al., 1999; Groombridge and Luxmoore, 1989; Garduño-Andrade,

pers. comm., 1999). Garduño-Andrade et al. (1999) report increasing numbers of juvenile hawksbill turtles in foraging sites in the waters off the Yucatán Peninsula.

According to Garduño-Andrade et al. (1999), the beach coverage and resources that have been allocated to marine turtle conservation in the Yucatán are some of the best in the Caribbean. The increased survival rates of juveniles, subadults, and adults are thought to have been assisted by national and regional conservation measures, including enforcement of Mexico's ban on the harvest and exploitation of marine turtles since 1990, and the significant reduction of harvest of hawksbills in neighboring Cuba since 1993 (Garduño-Andrade et al., 1999; Frazier, in litt., 2000; Abreu Grobois, in litt., 2000).

b) Green Turtle

The state of Quintana Roo has the largest green turtle population, as well as the highest per kilometer green turtle nesting densities, in Mexico--over 2,000 green turtle nests have been recorded in a season (May to September) (Zurita et al., 1993 and 1994; Herrera, in litt., 2000; Márquez, in litt., 2000).
The green turtle also nests at other sites scattered around the Yucatán Peninsula and its offshore islands, in Veracruz, and in Tamaulipas (Márquez, in litt., 2000; García-Angel, in litt., 1999).

Approximately 45 percent of the nests in Quintana Roo occur on beaches in the central part of the coast. X'Cacel is the most important nesting beach for greens along Mexico's Atlantic--approximately 400 green turtle nests are constructed there each year. This rookery contains the highest levels of genetic diversity for the species in the Atlantic basin (Encalada et al., 1999).

Because of a pattern of biannual fluctuations, odd numbered years show lower nest counts than even numbered years. Arenas Fuentes et al. (2000) and Garduño-Andrade et al. (1999) report that numbers of nesting green turtles appear to be increasing in the Gulf of Mexico and Yucatán areas. Data provided by INE for 1992-1997 from Chenkán in Campeche, and Mahahual and X'Cacel in Quintana Roo, suggest that nesting numbers are stable, with biannual fluctuations (García-Angel, pers. comm., 1999). Other biologists note that careful, systematic, long-term monitoring is necessary to understand trends in green turtle nesting on the Atlantic coast of Mexico (Berzunza, Barrios, Medina, Miranda, Prieto, and de la Luz Tejero, pers. comm., 1999).

Important foraging sites for the green turtle lie west and north of the Yucatán Peninsula, and north of Laguna de Términos, extending over the Banco de Campeche. Areas around the offshore cays and reefs and the Banco de Campeche are particularly important (Groombridge and Luxmoore, 1989).

c) Kemp's Ridley Turtle

In June of 1947, more than 40,000 female Kemp's ridleys are thought to have come ashore to nest at Rancho Nuevo, Tamaulipas, during the species's largest documented nesting aggregation (*arribada*). In the 1960s, there were arribadas that numbered only 2,000 nesting turtles (Márquez et al., 1998 and 1999). By the late 1970s, a single arribada at Rancho Nuevo rarely numbered 200 females. The Kemp's ridley population had been depleted severely by the taking of eggs and turtles and incidental take in unmanaged shrimp trawling, mostly in the southeastern United States. The turtle was listed as endangered throughout its range by 1970 (Frazier, 2000).

Rancho Nuevo is the most important nesting site in the world for the Kemp's ridley turtle. Currently, research and monitoring is conducted on over 200 kilometers (320 miles) of nesting

beach from north of Rancho Nuevo into Veracruz (Márquez et al., 1999). The INP began working to protect nests and turtles at Rancho Nuevo in 1966, and egg harvests were reduced as a result. In 1978, the United States joined forces with Mexico to collaborate on Kemp's ridley recovery efforts, including intensified material, financial, and human support, which are ongoing (Márquez et al., 1999). In 1989, a second field camp was established at Barra del Tordo, south of Rancho Nuevo, and in 1990, a third camp was established at Barra de Ostionales, north of Rancho Nuevo (Márquez et al., 1996). Between 1992 and 1996, several additional camps increased the patrolled area and since 1997 other nesting beaches in the state of Veracruz have been included. (Márquez et al., 1999).

Kemp's ridleys nest between March and July at Rancho Nuevo (Márquez et. al., 1996). Márquez et al. (1999) report that in 1985, 1986, and 1987, the annual number of nests recorded along 30 kilometers (18.65 miles) at Rancho Nuevo reached the lowest on record with 740, 752, and 742 nests, respectively. The annual number of nests increased slowly and steadily, reaching 2,409 nests in 1998, and 2,308 nests in 1999. Nesting activity at Rancho Nuevo has exhibited an increasing trend, which may be attributed to a combination of factors, including beach and nest protection activities and the introduction of turtle excluder devices (TEDs) (Márquez et al., 1999). The Mexican government has required commercial shrimp trawlers in the Gulf of Mexico and Caribbean to use TEDs since 1973.

Márquez et al. (1999) report small yet significant numbers of Kemp's ridley nests on additional gulf beaches in Altamira, La Pesca, and Miramar in Tamaulipas, and in Lechuguillas, Los Coyoles, El Llano, and El Laurel in Veracruz. Sporadic nesting has also been reported in Campeche on the southern extreme of what is known to be the historic nesting range for the species (Garduño-Andrade, 1999; Abreu Grobois, in litt., 2000).

Of the approximately 3,875 nests that were protected on Mexico's Gulf Coast during the 1999 season, 264 were at Barra del Tordo and 772 at Tepehuajes (Márquez, in litt., 2000). Approximately 6,000 nests were protected on Mexico's Gulf Coast in 2000.

Biologists believe that because it is under strict protection, the Kemp's ridley population is in the earliest stages of recovery. Nesting aggregations now number in the two to three hundreds, not the thousands that are necessary for the species to survive without human intervention. Present efforts must be maintained for the forseeable future with a recovery goal set at 10,000 nests per year (USFWS/NMFS, 1992).

d) Loggerhead Turtle

Most loggerhead nesting occurs from April to August, and nearly all of it in the state of Quintana Roo, with important sites at X'Cacel, Aventuras DIF, and Xel-Ha. Of these, X'Cacel is the most important in terms of nesting density and numbers of nests, with up to 500 loggerhead turtles nesting every year (Encalada et al., 1999; Garduño-Andrade, 1999). Approximately 2,600 loggerhead nests are recorded annually in Quintana Roo with about half of the nests occurring along the north central coastline (Herrera, pers. comm., 2000). The species also nests in low numbers in Yucatán, Campeche, and Tamaulipas (INP/SEMARNAP, 1999; Márquez et al., 1992a).

Loggerhead nesting numbers are reported to have decreased in some areas of Quintana Roo, such as Mahahual and X'Cacel (García-Angel, pers. comm., 1999), but they have remained steady in most others. Hererra (in litt., 2000) reports that continuous nest monitoring for the last 15 years

along the central coast of Quintana Roo (Playa del Carmen to Punta Allen) indicates that nesting numbers have remained stable there.

The loggerhead has been observed in the waters off of Celestún (Yucatán) and Campeche (Garduño-Andrade, Berzunza Chio, and Prieto Quintal, pers. comm., 1999). The species forages at various nearshore areas along the entire coast of Quintana Roo (Hererra, pers. comm., 2000). Recent genetic research has revealed that loggerheads hatched at Quintana Roo make their way into developmental and feeding habitats in coastal lagoons in the southeastern United States (Encalada et al., 1999).

e) Leatherback Turtle

Leatherbacks nest sporadically on Mexico's Atlantic coast in the states of Yucatán (in Celestún and Ría Lagartos-Colorados) and Quintana Roo (Holbox, Sian Ka'an Reserve, Isla Contoy, Isla Blanca, and Playa Herrero-Xcalak) (Briseño-Dueñas and Abreu-Grobois, 1994; Garduño-Andrade, 1999; Márquez, in litt., 2000). Nesting on the Atlantic coast is considered insignificant, with no more than 10 leatherback nests a year (Sarti, pers. comm., 2000).

Leatherbacks have been observed swimming in the pelagic zone between Mahahual and Banco Chinchorro. Two juveniles have been caught near Isla Mujeres, and individuals are reported to have been caught in the past off Holbox and used as shark bait (Frazier, in litt., 2000; Herrera, in litt., 2000).

5. Exploitation and Trade of Marine Turtles and Products from the Atlantic Coast of Mexico

a) History of Exploitation and Trade

Marine turtles throughout Mexico have long been used for their meat, eggs, oil, skin, shell, and viscera. On the eastern seaboard of Mexico, there is a long tradition of marine turtle exploitation, particularly in the Yucatán Peninsula, where hawksbills and other marine turtles were exploited by native peoples prior to the arrival of the Spanish colonists (Garduño-Andrade et al., 1999; INE, 2000). The use of marine turtles and their products increased with colonization (Cantú and Sánchez, 2000; Garduño-Andrade, 1999).

Large numbers of green turtles were exported from Mexico to the United States in the first half of the 1900s. As many as 2,000 turtles were shipped out each year from Isla Mujeres, which was the center of the turtle industry on the Caribbean side of the Yucatán Peninsula. The trade is reported to have declined in the 1950s, owing to taxes and export duties that rendered it uneconomical (Groombridge and Luxmoore, 1989).

According to Garduño-Andrade et al. (1999), use of turtles by coastal communities increased from the 1950s onwards after outboard motors, nylon nets, and fiberglass boats were introduced and the commercial demand for food and by-products grew as the human population expanded in the Yucatán.

Until the mid-1960s, eggs were heavily exploited all along the Gulf Coast, from Veracruz to Campeche, and the states of Yucatán and Quintana Roo exploited marine turtles on a commercial level (Márquez, in litt., 2000). In the Atlantic, Quintana Roo produced an average of 126 tons of meat per year for 1963-1970, compared with around 25 tons per year in Campeche (the next most important state) in the same period. The green turtle was the most important species taken for

meat in Quintana Roo, followed by the loggerhead and occasionally the hawksbill (Groombridge and Luxmoore, 1989).

Márquez (in litt., 2000) explains that from 1966 until 1990, the Pacific olive ridley fishery accounted for at least 90 percent of the marine turtles legally harvested in Mexico. The primary turtle fishery on the Atlantic (outlawed in 1973) was for the green turtle; other species were of secondary interest. Turtles were taken in coastal waters with nets and harpoons and on nesting beaches. Nets were set for hawksbills and loggerheads near the shore. Off Quintana Roo, nets were set in sleeping refuges (Márquez, in litt., 2000).

Landing data after 1981 are lacking. In 1980, 312 green turtles were landed from Tamaulipas to Yucatán and 100 in Quintana Roo; in 1981, 100 green turtles were landed in Quintana Roo, as authorized by special permits (Groombridge and Luxmoore, 1989; Márquez, in litt., 2000).

Historically, green and loggerhead turtles have been the preferred meat sources in Mexico because they are reportedly meatier than the hawksbill and tastier than other species (Cantú, in litt.,1999). In accordance with the progression of the season, fishers first caught loggerheads, then greens, and then lesser quantities of hawksbills. Greens were destined primarily for export, but the meat of all three species, as well as Kemp's ridley at times, was sold in many Yucatán Peninsula markets (Márquez, in litt., 2000).

The taking of marine turtles in Mexico in the 1960s and 1970s is reported to have been significantly greater than that allowed by the quota system (Cantú and Sánchez, 2000; Frazier, in litt., 2000). Illegal take in Tamaulipas, Veracruz, Tabasco, Campeche, Yucatán, and Quintana Roo targeted the green and loggerhead for meat and hawksbill for shell. Turtle eggs, oil, hide, and meat, as well as hawksbill shell handicrafts, were consumed locally, while stuffed juveniles or subadults and luxury hawksbill shell items were sold as tourist souvenirs (Garduño-Andrade et al., 1999). Illegal take and trade in Mexico continued in the 1990s (Cantú and Sánchez, 2000; Frazier, in litt., 2000).

Garduño-Andrade et al. (1999) suggest that the magnitude of historical hawksbill harvest in Mexico is difficult to estimate because official figures are generally imprecise. Available fishery statistics fluctuate greatly and some years are missing altogether (1948-52, 1957-63). In 1973, 4.87 tons of hawksbill shell were recorded as harvested throughout Mexico (Garduño-Andrade et al., 1999). The total registered take in Mexico for this time period was 12.73 tons of shell (or approximately 8,500 individuals), which is considered an underestimate. No further information has been available since 1976 (Garduño-Andrade et al., 1999).

b) Recent Harvest and Use of Marine Turtles

There is significantly less exploitation of turtle meat and eggs along Mexico's Atlantic coast than on its Pacific coast, which is attributed to the large nesting aggregations of olive ridley turtles on Pacific beaches (García-Angel; Garduño-Andrade, Pérez-Ramírez, and Sarti, pers. comm., 1999). On the Atlantic coast, the numbers of poached nests have steadily decreased over the years (Márquez, in litt., 2000). Marine turtles and eggs are taken opportunistically for personal consumption or sale to family members or friends in the states of Campeche, Yucatán, and Quintana Roo (Garduño-Andrade, pers. comm., 1999; Guzmán, pers. comm., 1999; Miranda, pers. comm., 1999). Marine turtle meat is sold occasionally in local markets to trusted customers only (Guzmán, pers. comm., 1999), and an active market reputedly exists for eggs in a few inland towns in the Yucatán (Frazier, in litt., 2000). INP officials report that eggs and meat are not widely available in markets on the Atlantic coast and that the quantity of all marine turtle

products offered for sale has decreased significantly since the national ban entered into force in 1990 (Garduño-Andrade, pers. comm., 1999).

(1) Yucatán Peninsula

In the state of Quintana Roo, the conservation nongovernmental organization Pronatura reports some egg poaching of hawksbill nests in its turtle camps. In 1999, 12 of 710 identified hawksbill nests (1.7 percent) were poached in Isla Holbox and 12 of 433 documented hawksbill nests (2.8 percent) were poached in Celestún, although these were considered minimum numbers because beach monitoring started late that season and poaching may have taken place before monitoring began. Hawksbills are likely taken opportunistically at sea in the Celestún area. It was reported that hawksbill meat sold in the Celestún area for US$1.00 per kilogram (US$.45/pound) in 1997 (Miranda, pers. comm., 1999).

In the Xcaret-sponsored camps in Quintana Roo, researchers report that from 1987 to 1994, 4 percent of recorded loggerhead nests and 3.6 percent of recorded green turtle nests were poached per season. Approximately six or seven green and loggerhead turtles are poached for local consumption in this area per season (Hererra, pers. comm., 2000).

In Las Coloradas, the INP reports that a few marine turtles or eggs are taken illegally from the patrolled area near its field station (Garduño-Andrade, pers. comm., 1999). Some marine turtles are taken opportunistically or periodically by fishers trying to supplement a poor catch of their target species.

In 1998, in nine turtle camps in the state of Campeche, 104 of the total of 2,817 hawksbill nests recorded (3.7 percent) and 34 of the 670 green nests recorded (5.1 percent) were poached. In 1999, 306 of 4,020 nests recorded (7.7 percent of all species) were lost to poaching in these nine camps (INP/SEMARNAP, 1999).

Some researchers estimated that at least 30 green and hawksbill turtles die in nets or from harpoons per year in Campeche (Guzmán and Medina, pers. comm., 1999), while others consider 30 turtles to be an underestimate (Frazier, in litt., 2001).

In 1999, meat was reported to sell for an estimated MXP30 (US$3.25) per kilogram (US$1.48/pound) in Campeche (INP/SEMARNAP, 1999). Eggs also sold for between MXP1-3 (US$0.11-0.33) each. Opportunistic fishers reportedly take turtles for the meat and discard the shells at sea to conceal the evidence (Guzmán, pers. comm., 1999).
Hawksbill shell products are still sold by vendors in some areas of the Yucatán. Cantú and Sánchez (2000) reported that illegal hawksbill shell products were openly sold in 1998-1999 in Islas Mujeres, Cozumel, Playa del Carmen, and Cancún. Vendors in Isla Mujeres reported that the shell originated from Quintana Roo and that they processed it. Several carvers in Cancún reported getting their shell from Campeche (Cantú and Sánchez, 2000).

(2) Gulf of Mexico

Márquez (pers. comm., 2000) reports that few turtles and nests are taken from Gulf of Mexico beaches--which include the major nesting sites--where conservation camps exist. From Tamaulipas to Veracruz, an estimated 30 to 50 Kemp's ridley, loggerhead, and green turtles wash ashore per year, probably as a result of incidental catch by shrimp trawlers and shark/tuna longliners (Márquez, in litt., 2000).

(3) Shell Stocks

There are no registered stocks of any marine turtle shell or other products in Mexico. Although stocks of olive ridley skins and leather items may remain in the country, any stocks would be held illegally (Márquez, pers. comm., 2000).

The 1990 accord banning the harvest and trade of all marine turtles contained transitory provisions to allow merchants to sell products acquired before the ban entered into force. These products included olive ridley skins, leather, meat, and oil. Merchants were supposed to declare their marine turtle inventories to the Ministry of Fisheries, and to inform the ministry every 15 days of the quantity sold, so that authorities could ensure that no new products entered the market. For the most part, merchants failed to inform the ministry of their stocks, and turtle products are reported to have entered the market in large quantities (Cantú and Sánchez, 2000).

(4) TRAFFIC surveys

In December 1999, a TRAFFIC researcher surveyed markets and shops in the cities of Ciudad del Carmen, Campeche, Mérida, and in the Mérida airport on the Yucatán Peninsula, as well as a small area of Mexico City. Hawksbill shell products were offered for sale in the form of earrings (US$ 5.40-13.00), bracelets (US$1.95-10.80), rings (US$1.10-2.15), picture frames (US$51.30), crucifixes, a salt shaker, bookmarkers (US$0.65-3), combs, hair bands, sweater pins (US$3), jewelry boxes (US$54), letter openers, fans, and guitar picks (US$5.40).

In Mérida, vendors openly sold turtle shell items, which were relatively easy to find, although generally not in large quantities. The Mérida Sunday street market provided the easiest opportunity to observe hawksbill shell products. Seven of 18 handicraft stands (39 percent) surveyed openly sold hawksbill shell items. One vendor who crafts hawksbill jewelry showed a scute to the researcher.

Three of the eight stores in the Mérida international airport sold hawksbill shell items. One vendor acknowledged that selling these products is illegal, but claimed his stock was left over from before the 1990 ban entered into force (although hawksbills on the Atlantic coast have been protected since 1973).

c) Recent International Trade in Marine Turtles and Products

CITES entered into force in Mexico in 1991. Japanese customs data indicate that only 44 kilograms (97 pounds) of hawksbill shell were imported to Japan from Mexico from 1970 to 1986. The imports occurred in 1973 and 1983 (Milliken and Tokunaga, 1987). Japan reported imports from Mexico of 2,366 kilograms (5,205 pounds) of hawksbill shell in 1989 and 106 kilograms (233 pounds) in 1990 (Cantú and Sánchez, 2000).

Reported exports of hawksbill shells, skulls, and trophies from Mexico to the United States totaled 65 in 1980, 59 in 1981, 38 in 1982, 24 in 1983, and 12 in 1984. Reported exports of carvings and unspecified products totaled 473 in 1980, 244 in 1981, 35 in 1982, 41 in 1983, and 6 in 1984. The largest volume of marine turtle products exported from Mexico and recorded in CITES statistics included skin or leather items, the majority of which were from Pacific olive ridley turtles (Groombridge and Luxmoore, 1989; Milliken and Tokunaga, 1987).

On 22 January 1992, Cuban authorities seized 1,033 kilograms (2,273 pounds) of hawksbill turtle shell when it arrived in Cuba inside unaccompanied baggage (67 parcels declared as

"ornamentals"). Cuban authorities seized the shell--which was in transit from Mexico to Japan--from a Costa Rican citizen as he attempted to collect the shipment in Havana (CITES Secretariat, 1996).

d) Enforcement Efforts

More than 4,000 marine turtle products, the majority of which were leather boots from olive ridley turtles from the Pacific coast of Mexico, were confiscated at the U.S./Mexican border from 1990 through 1993 (Steiner et al., 1994).

Acevedo (in litt., 2000) reports that between 1995 and 1998 the following marine turtle products were confiscated by Mexican officials: 1,244 live turtles, 3,873 skins, 896 kilograms (1,971 pounds) of meat, 1,407,653 eggs, 21 carapaces, and 5,240 shell products. These figures include products originating from the Pacific as well as the Atlantic coasts. During the same period, PROFEPA certified 3,822 vessels using TEDs.

In 1996, authorities in Campeche arrested five fishers for taking hawksbill turtles (one turtle each) (Cantú and Sánchez, 2000, citing *El Universal*, 28 April 1996). In September 1997, PROFEPA raided a weekend flea market in Mexico City and seized more than 1,200 hawksbill shell items; the owner reported buying the shell in Campeche (Cantú and Sánchez, 2000).

6. Summary and Recommendations

Many individuals and institutions are currently working on marine turtle protection projects in Mexico, and efforts are under way to streamline collaboration, avoid duplication of effort, and standardize research protocols to increase the impacts of these projects.

The nesting populations of Kemp's ridleys at Rancho Nuevo in Tamaulipas, and of hawksbills on the Yucatán Peninsula, are regionally and globally important. Mexico has experienced significant increases in nesting numbers of Kemp's ridleys and hawksbills, and slight increases in greens, during the last 20 years. Long-term monitoring, protection on beaches, and enforcement of the 1990 ban appear to be paying dividends for these species on the Atlantic coast.

At the same time, trade in marine turtle products is ongoing. Hawksbill shell items are available in tourist markets in the Yucatán and in airports. Tourists are likely to purchase and take these products illegally into other countries.

The government is reviewing legislation that may again allow the exploitation of marine turtle eggs and other products. The current provisions appear to be open to interpretation to include harvest, consumption, and sale of products. There are no stipulations as to species, so presumably all marine turtles potentially could be exploited. Even government officials are unclear as to how these provisions may be interpreted and whether the 1990 ban could be repealed.

TRAFFIC offers the following recommendations:

- As a matter of priority, officials are urged to develop and implement regulations specifying how the new wildlife law and environmental crimes chapter of the penal code are to be interpreted and implemented with respect to marine turtles and eggs. This should be undertaken in a transparent manner, in consultation with marine turtle and wildlife trade experts

in the country. Officials must ensure that there are no loopholes that could allow the unsustainable use of endangered species.

- Once the regulations and policies are clearly determined, the government should ensure that they are communicated widely to members of the general public and merchants to avoid confusion and encourage compliance.

- Officials are encouraged to proceed with clarifying the specific responsibilities for the agencies involved in marine turtle conservation and management and to streamline inter-agency cooperation to avoid unnecessary bureaucracy and duplication of effort.

- PROFEPA is advised to conduct thorough inspections of tourist markets on the Yucatán Peninsula and elsewhere, and in Mérida and other airports, and prevent the sale of hawksbill shell and other turtle products to tourists.

- PROFEPA is also urged to verify whether residual olive ridley skins and hawksbill shells or carvings are held by merchants. If so, the government must implement a policy to ensure that these turtle products are confiscated or otherwise remain in the country.

- Wildlife trade specialists are encouraged to investigate the origin, as well as the level of turnover, of marine turtle products in the country. Information is needed about whether fresh hawksbill shell is being added to supplies held by vendors, and at what quantities and rates, or if merchants are selling off old stocks. Markets for eggs and meat, which appear to drive opportunistic take, need to be thoroughly investigated to shed light on levels of demand and harvest. Information obtained should be factored into national conservation strategies.

- The Mexican government is encouraged to ratify the SPAW Protocol to the Cartagena Convention.

Personal Contacts

A TRAFFIC researcher visited Mexico from 28 November through 9 December 1999, and met with the following individuals: Luis Fueyo Macdonald and Antonio Fuentes Montalvo (Procuraduría Federal de Protecciónal Ambiente-PROFEPA), María Elena Sánchez (President, Teyeliz), Luis Samuel Campos and Manuel Garduño-Dionate (Instituto Nacional de la Pesca-INP), Mauricio Garduño-Andrade (INP, Mexico City), Emma Miranda (Pronatura), Miguel Medina García (President, Comité Estatal Campeche de Protección y Conservación de Tortugas Marinas and President, Enlaces con Tu Entorno, A.C.), Rafael Barrios S. (Subdelegación de Medio Ambiente, Secretaría de Medio Ambiente, Recursos Naturales y Pesca-SEMARNAP, Campeche), Carlos Prieto Quintal and Jorge Berzunza Chio (Secretaría de Ecología-Campeche), María de la Luz Tejero Loria (Subdelegación de Medio Ambiente, SEMARNAP, Campeche), Vicente Guzmán-Hernández (INP, Centro Regional de Investigación Pesquera de Ciudad del Carmen, Campeche), Cristina García-Angel and José Juan Pérez Ramírez (Instituto Nacional de Ecología-INE, Mexico City), and Elizabeth Acevedo (Coordinación General de Inspección en Puertos, Aeropuertos y Fronteras, PROFEPA).

TRAFFIC North America opened an office in Mexico in September 2000, and the national representative, Adrian Reuter Cortes, was instrumental in gathering and confirming information with many of these experts.

The following people were consulted by email and/or telephone: Georgita Ruíz (PROFEPA, Oaxaca), Pablo Arenas Fuentes (INP), Ana Barragán (Universidad Nacional Autónoma de México-UNAM), Juan Carlos Cantú (Teyeliz), Jay Nichols (Wildcoast; Grupo Tortuguero-Baja California), Laura Sarti (UNAM; INP), René Márquez Millan (Coordinator, National Marine Turtle Research Program, Regional Center of Fisheries Research (CRIP), INP/ Manzanillo, Colima), Earl Possardt (International Sea Turtle Specialist, U.S. Fish and Wildlife Service, Carollton, Georgia); Holly Payne (WWF- Mexico), Carlos López (Amigos Sian Ka'an), David Sánchez (Oficina de Fiscal Especial de Delitos Ecológicos), Jack Frazier (CINVESTAV, Unidad Mérida, Mexico; Research Associate, Smithsonian Institution, USA), Lilia Estrada (INE, Mexico City), Julio Zurita (researcher), and Scott Eckert (Hubbs-Sea World Institute, San Diego, USA).

TRAFFIC researchers met with René Márquez, Roberto Herrera Pavón (Researcher, Colegio de la Frontera Sur), and Alberto Abreu Grobois (BITMAR-UNAM; Chair, IUCN/SSC Marine Turtle Specialist Group), on 3 March 2000, during the 20th Annual Symposium on Sea Turtle Biology and Conservation in Orlando, Florida, and with Alberto Abreu Grobois on 26 February 2001, during the 21st Annual Symposium (Philadelphia, Pennsylvania).

References

Arenas Fuentes, P., L. Sarti, and P. Ulloa. 2000. Conservation and management of sea turtles in Mexico. Pages 6-7 in F. A. Abreu-Grobois, R. Briseño-Dueñas, R. Márquez, and L. Sarti, compilers. *Proceedings of the Eighteenth International Symposium on Sea Turtle Biology and Conservation*, 3-7 March 1998, Mazatlán, Sinaloa, Mexico. NOAA Technical Memorandum NMFS-SEFSC-436. 293 pp.

Briseño-Duenas, R. and F. A. Abreu-Grobois. 1994. BITMAR'S survey of sea turtle nesting beaches is part of new approaches to conservation in Mexico. Pages 198-201 in K. A. Bjorndal, A. B. Bolten, D. A. Johnson, and P. J. Eliazar, compilers. *Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation*, March 1994, Hilton Head, South Carolina. NOAA Technical Memorandum NMFS-SEFSC-351.

Cantú, J. C. and M. E. Sánchez. 2000. *Tráfico ilegal de tortugas marinas en México, situación histórica y actual*. Investigación de TEYELIZ, A.C. México.

CITES Secretariat. 1996. Review of alleged infractions and other problems of implementation of the Convention (Doc. 9.22 [Rev.]). Pages 509-564 in *Proceedings of the Ninth Meeting of the Conference of the Parties to CITES*, 7-18 November 1994, Fort Lauderdale, Florida, USA.

Encalada, S. E., J. C. Zurita, and B. W. Bowen. 1999. Genetic consequences of coastal development: The sea turtle rookeries at X'cacel, Mexico. *Marine Turtle Newsletter* 83:8-10.

Frazier, J. and E. Rodriguez. 1992. IV Workshop on Programs of Sea Turtle Conservation 11-13 March 1991, Mérida, Yucatán, México. *Marine Turtle Newsletter* 56:2-5.

Frazier, J. 2000. Kemps' Ridley Sea Turtle. R. Reading and B. Miller, editors. 2000. Pages 164-170 in *Endangered animals: a reference guide to conflicting issues*. Greenwood, Westport, Connecticut.

Garduño-Andrade, M. 1999. Nesting of the hawksbill turtle, *Eretmochelys imbricata*, at Ría Lagartos, Yucatán, Mexico, 1990-1997. *Chelonian Conservation and Biology* 3(2):281-285.

Garduño-Andrade, M., V. Guzmán, E. Miranda, R. Briseño-Duenas, and F. A. Abreu-Grobois. 1999. Increases in hawksbill turtle (*Eretmochelys imbricata*) nestings in the Yucatán peninsula, Mexico, 1977-1996: Data in support of successful conservation? *Chelonian Conservation and Biology* 3(2):286-295.

Groombridge, B. and R. Luxmoore. 1989. *The green turtle and hawksbill (Reptilia: Cheloniidae): World status, exploitation and trade*. CITES Secretariat. Lausanne, Switzerland. 601 pp.

Guzmán, V. 1999. *Mortalidad de tortugas marinas en Campeche. I. De Carmen, I. Aguada-Sabancuy) for 1992-1999*. Instituto Nacional de la Pesca, D.G..P.D.S, Programa Nacional de Tortugas Marinas, Centro Regional de Investigación Pesquera de Cd. del Carmen, Campeche. Internal data sheet.

INE. 1997. *Programa de Conservación de la Vida Silvestre y Diversificación Productiva en el Sector Rural 1997-2000*. Instituto Nacional de Ecología, SEMARNAP. February 1997. Mexico City. 207 pp.

INE. 1999. *Resultados del Programa Nacional de Protección y Conservación de Tortugas Marinas (1992-1997*). Instituto Nacional de Ecología, SEMARNAP. November 1999. Mexico City.

INE. 2000. *Programa Nacional de Protección, Conservación, Investigación, y Manejo de Tortugas Marinas*. Instituto Nacional de Ecología, SEMARNAP. May 2000. Mexico City. 106 pp. + 19 pp. annexes.

INP/SEMARNAP. 1999. Instituto Nacional de la Pesca/Secretaría de Medio Ambiente, Recursos Naturales y Pesca. Internal records compiled by Vicente Guzmán Hernández from data supplied by the Comité Estatal para la Protección y la Conservación de Las Tortugas Marinas de Campeche y Centro Regional de Investigación Pesquera de Ciudad del Carmen, proyecto de tortugas marinas. Ciudad del Carmen, Yucatán.

Márquez, R. 1976. *Estado actual de la pesquería de tortugas marinas en México, 1974*. Instituto de la Pesca. INP/SI:i46. Mexico City.

Márquez, R., M. Garduño, P. Castañeda, M. Carrasco, R. López-M, and A. Villanueva. 1992a. Protection for hawksbill and green sea turtles in Ría Lagartos, Yucatán, Mexico in 1990. *Marine Turtle Newsletter* 58:14.

Márquez R. M., M. Sánchez P., J. Díaz F., J. Vasconcelos, I. Arguello, M. A. Carrasco, and A. Villanueva. 1992b. Research at Rancho Nuevo, Tamaulipas, Mexico in 1990. *Marine Turtle Newsletter* 58:15.

Márquez, R., R. Byles, P. Burchfield, M. Sánchez -P., Juan Díaz-F., M. Carrasco-A., A. Leo-P., M.A. Carmen Jeménez-O. 1996. Good news! Rising numbers of Kemp's ridleys nest at Rancho Nuevo, Tamaulipas, Mexico. *Marine Turtle Newsletter* 73:2-5.

Márquez, R., M. C. Jiménez, M. A. Carrasco and N. A. Villanueva. 1998. Comentarios acerca de las tendencias poblaciones de las tortugas marinas del género Lepidochelys sp. despues de la veda total de 1990. *Oceánides* 13(1):41-62.

Márquez, R., J. Díaz, M. Sánchez, P. Burchfield, A. Leo, M. Carrasco, J. Peña, C. Jiménez, and R. Bravo. 1999. Results of the Kemp's ridley nesting beach conservation efforts in Mexico. *Marine Turtle Newsletter* 85:2-4.

Milliken, T. and H. Tokunaga. 1987. *The Japanese sea turtle trade, 1970-1986*. TRAFFIC Japan. Prepared for the Center for Environmental Education. Washington, D.C. 171 pp.

PROFEPA. 1998. *Informe trianual, 1995-1997*. Procuraduría Federal de Proteccíon al Ambiente. SEMARNAP. Mexico City. 244 pages.

Ramos, P.R. 1974. *Generalidades sobre la pesquería de tortugas marinas en Isla Mujeres, Quintana Roo*. Instituto Nacional de la Pesca, INP/SD: 7. Mexico City.

Steiner, T., H. Aridjis, M. Heitchue, and H. W. Ghriskey. 1994. Illegal trafficking in sea turtle products continues between Mexico and the U.S. *Marine Turtle Newsletter* No. 66:15-16.

UNEP-CITES Secretariat. 1997. *Analysis of Mexican legislation*. National Legislation Project. United Nations Environment Program/CITES Secretariat, Geneva, Switzerland.

USFWS/NMFS (U.S. Fish and Wildlife Service and National Marine Fisheries Service). 1992. *Recovery plan for the Kemp's ridley sea turtle* (*Lepidochelys kempii*). National Marine Fisheries Service. St. Petersburg, Florida. vi + 40 pp.

Zurita, J. C., R. Herrera, and B. Prezas. 1993. Totugas marinas del Caribe. Salazar-Vallejo, S. I. y N. E. González, editors. Pages 735-751 in *Biodiversidad Marina y Costera de México*. Com. Nal. Biodivesidad y CIQRO, Mexico City. 865 pp.

Zurita, J. C., B. Prezas, R. Herrera, and J. L. Miranda. 1994. Sea turtle tagging program in Quintana Roo, Mexico. K. A. Bjorndal, A. B. Bolten, D. A. Johnson, and P. J. Eliazar, compilers. *Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation*, March 1994, Hilton Head, South Carolina. NOAA Technical Memorandum NMFS-SEFSC-351.

Note: *All above-listed proceedings of annual symposia on sea turtle biology and conservation are published by the National Marine Fisheries Service (NMFS), Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149.*

I. The Commonwealth of Puerto Rico

1. Introduction

Puerto Rico, the smallest and most easterly island in the Greater Antilles, is an overseas commonwealth territory of the United States. It includes a complex of islands and small cays surrounded by coral reefs and sea grass beds adjacent to deep water. In addition to the principal island, the territory includes Vieques, Culebra, Culebrita, Palomino (sometimes referred to as the Spanish Virgin Islands), Mona, Monito, and various other isolated islands.

Puerto Rico is located west of the U.S. Virgin Islands and southeast of the Dominican Republic, from which it is separated by the more than 1,000-meter (3,300-feet) deep Mona Passage. The main island has a total land area of some 8,959 square kilometers (3,446 square miles), and the coastline is 700 kilometers (436 miles) if the adjacent islands Vieques and Culebra are included. The population is 3.9 million and San Juan is the capital.

Puerto Rico was discovered by Columbus in 1493 and ceded to the United States by Spain in 1898. Puerto Ricans became U.S. citizens in 1917, when the territory became a semiautonomous commonwealth of the United States.

Puerto Rico has one of the Caribbean's most dynamic economies, with a diverse industrial sector, agriculture, and tourism--an estimated 5 million tourists visited the island in 1999. The per capita GDP is US$9,800; the World Bank categorizes the territory as "upper middle income" (World Bank, 2000). The currency is the U.S. dollar.

2. Marine Turtle Species in Puerto Rico

Puerto Rico provides critical nesting, foraging, and developmental habitat for three species of marine turtles: the leatherback, hawksbill and green. Of these, only hawksbill and leatherback turtles are common nesters. Loggerhead turtles are occasionally seen, but are transitory (Hillis-Starr et al., 1998), and rare olive ridleys have been reported in Puerto Rico twice (Diez, pers. comm., 1999).

Table 25. Marine Turtles Occurring in Puerto Rico

Common name	**Scientific name**	**Local names**
Hawksbill turtle	*Eretmochelys imbricata*	Carey, carey de concha
Green turtle	*Chelonia mydas*	Peje blanco, carey de blanco, tortuga verde
Loggerhead turtle	*Caretta caretta*	Caguama, cabezona
Leatherback turtle	*Dermochelys coriacea*	Tinglar, tinglado, mani
All marine turtles		Carey

Sources: Diez and Montero-Acevedo, pers. comm., 1999.

3. Overview of Marine Turtle Management and Conservation

Marine turtle conservation efforts in Puerto Rico include field research on marine turtles in a number of locations, nest protection efforts, rehabilitation efforts, habitat conservation, a stranding network, education in schools, community outreach, legal protection, and law enforcement (Diez, Rivera, and Santiago, pers. comm., 1999; Tallevast, in litt., 1999).

a) Regulatory Framework

(1) Legislation and regulations

Both federal and commonwealth legislation are applicable in Puerto Rico. The harvest, use, and trade of marine turtles were prohibited in Puerto Rico with the passage of the federal Endangered Species Act of 1973.

U.S. Endangered Species Act of 1973 (16 USC 1531 et seq.). The Endangered Species Act provides for the conservation of species that are in danger of becoming endangered or extinct throughout all or a significant portion of their range, and for the conservation of ecosystems on which they depend. "Species" is defined by the act to mean a species, a subspecies, or, for vertebrates only, a distinct population. As of 31 October 2000, the act, which is periodically amended, listed 1,822 species as either threatened or endangered (USFWS, 2000).

All six species of marine turtles found in the Caribbean are listed either as endangered or threatened under the act. The Kemp's ridley, hawksbill, and leatherback turtles are listed as endangered throughout their ranges. The loggerhead turtle is listed as threatened throughout its range. The green turtle is listed as threatened, except for the "breeding colony populations" in Florida and on the Pacific coast of Mexico, which are listed as endangered. The olive ridley turtle is listed as threatened, except for the "breeding colony populations" on the Pacific coast of Mexico, which are listed as endangered.

The ESA makes it illegal for any person subject to U.S. jurisdiction to import, export, deliver, receive, carry, transport, ship, sell, or offer for sale in interstate commerce and in the course of a commercial activity, any species of plant or animal that has been listed as endangered or threatened pursuant to the act. It also makes it unlawful to take (defined in 16 USCS 1532[19] as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct") any listed species within the United States or its territorial seas. Certain exceptions to these prohibitions may be authorized by permit.

Section 4 requires the U.S. Fish and Wildlife Service (USFWS)--and the National Marine Fisheries Service (NMFS) in the case of marine turtles--to publish recovery plans for species listed as threatened or endangered. It also provides for the designation of "critical habitat" for listed species when "prudent and determinable." Critical habitat includes geographic areas on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations (16 USCS 1533[a][3]). Critical habitat designations affect only federal agency actions or federally funded or permitted activities. Section 7 provides authority to use land and water conservation funds to acquire habitat for the conservation of listed species.

Section 9(c) makes it unlawful for any person to engage in the trade of any specimens of wildlife or plants contrary to the provisions of CITES, or to possess any specimens "traded contrary to the

provisions of the Convention." While possession of an unlawfully imported wildlife specimen is illegal under the act, USFWS must prove that the specimen was illegally imported to obtain a conviction for possession.

The ESA regulates the domestic trade of CITES-listed species also listed under the threatened or endangered categories of the ESA, which prohibits interstate or foreign commerce in species listed as threatened or endangered.

Section 11(f) authorizes the secretaries of the Interior, the Treasury, and Transportation to promulgate any regulations appropriate to enforce the act. For example, the USFWS promulgated 50 CFR Part 17 to enforce the Endangered Species Act, and 50 CFR Part 23 to enforce CITES.

Wildlife and other property involved in a violation may be seized under authority of the ESA (16 USC 1531 et seq. and implementing regulations, 50 CFR Part 12).

Any person who knowingly violates any provision of the act may face a civil penalty or criminal charge. A civil penalty carries a maximum US$25,000 fine, while a criminal violation carries a maximum US$100,000 fine and one year imprisonment (16 USC 1540).

The Lacey Act of 1900(18 USC 42) and Amendments of 1981 (16 USC 3371-3378). The Lacey Act, passed on 25 May 1900, was the first federal wildlife protection law to regulate the commerce of wildlife in the United States. Nearly 100 years and numerous revisions later, the Lacey Act's current focus is the prohibition of interstate and international trafficking in protected wildlife (Anderson, 1997). It assists foreign countries and individual states within the United States with enforcing their wildlife conservation laws. Under the Lacey Act, it is a violation of U.S. law to import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce any wildlife, including fish, that was taken, transported, possessed, or sold in violation of any state or foreign law, or taken or possessed in violation of other federal law. The act applies to nearly all live or dead specimens of fish and wildlife, as well as their parts and derivatives (Anderson, 1997).

In addition, the Lacey Act prohibits the attempted or actual falsification of information, records, or accounts regarding species that have been imported, exported, transported, sold, purchased, or received in interstate or foreign commerce.

An individual convicted of violating the Lacey Act may be imprisoned for up to one year and fined up to US$100,000 for a misdemeanor offense, and up to five years and US$250,000 for a felony offense. Fines for organizations that violate the act are up to US$250,000 for a misdemeanor and US$500,000 for a felony.

Fish and wildlife may be subject to seizure and forfeiture under the Lacey Act and all vessels, vehicles, aircraft, or other equipment used to aid in movement of such products are also subject to forfeiture (16 USC 3374 and 50 CFR 12).

Regulation for the Management of Threatened and Endangered Species in the Commonwealth of Puerto Rico (Reglamento Departamento Recursos Naturales (DRN) Especies Vulnerables y en Peligro de Extincion 08/85) (28 February 1985). It is illegal to catch, kill, possess, sell, transport, or export any endangered species. Local, interstate and international trade is prohibited. Exemptions may be granted to DRN personnel for specific purposes, for specimens born in captivity, and for scientific or conservation purposes. *E. imbricata*, *C. mydas*, *D. coriacea*, and *L.*

kempii are designated as being both locally and federally endangered. *C. caretta* is designated as threatened. Several critical habitats have been designated for hawksbill and green turtles.

Any person who violates the provisions of this regulation may be fined US$50-500 upon summary conviction, or sentenced to 5-90 days in prison, or both. Administrative fines of up to US$5,000 for damage caused to wildlife or for any infraction of this regulation may also be imposed (Section 18).

(2) Membership in international and regional treaties

CITES. CITES entered into force in the United States on 1 July 1975. Since May 1977, the Endangered Species Act (ESA) has served as the CITES implementing legislation for the USA and its overseas territories. The USFWS serves as both the Management and Scientific Authorities; it has separate divisions for each. The secretary of commerce is also given responsibility for implementing the ESA and delegates its authority to NMFS, which provides biological advice to USFWS on marine species.

SPAW Protocol to the Cartagena Convention. The United States ratified the Cartagena Convention on 31 October 1984. The country signed the SPAW Protocol on 18 January 1990 but has yet to ratify it.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). The United States deposited its instrument of ratification for the IAC on 22 February 2001 to become the ninth party to the Convention.

(3) Responsible agencies

At the federal level, USFWS and NMFS share regulatory responsibility for marine turtles. USFWS has lead responsibility for marine turtles on their nesting beaches, while NMFS has responsibility for these species in the marine environment. Federal responsibilities and programs derive from statutory authorities of the Endangered Species Act of 1973, as amended. These include development and implementation of recovery plans; land acquisition; cooperative programs with states, including the Commonwealth of Puerto Rico; consultation with other federal agencies on projects funded, permitted, or carried out by them; international cooperation; promulgation of regulations to reduce take; permitting of activities for research or education involving take; and development of habitat conservation plans (MacPherson, in litt., 2000).

In the early 1990s, NMFS and USFWS published recovery plans for five species of Atlantic marine turtles (hawksbill, green, Kemp's ridley, leatherback, and loggerhead), and plans are under way to revise some of these. The plans describe and prioritize the actions which are necessary to recover populations and conserve the species in the U.S. Atlantic, Caribbean, and Gulf of Mexico (NMFS, 1999).

b) Conservation Initiatives

(1) Habitat conservation/protected areas

On 24 June 1982, USFWS designated several beachfront areas in Puerto Rico, from the mean high tide inland to a point 150 meters from shore, as "critical habitat" for the hawksbill turtle. These include Mona Island (all areas of beachfront on the west, south, and east sides), Culebra Island (beachfront on Playa Resaca, Playa Brava, and Playa Larga on the north shore), Cayo

Norte (South beach), and Isla Culebrita (all beachfront areas on the southwest facing shore, east facing shore, and northwest facing shore) (50 CFR part 17.95[c]). On 2 September 1998, NMFS added the waters surrounding the islands of Mona and Monito, from the mean high water line seaward to three nautical miles (5.6 kilometers) as designated "critical habitat" for the hawksbill turtle (50 CFR part 226.73).

Also on 2 September 1998, NMFS designated the waters surrounding Culebra Island from the mean high water line seaward to 3 nautical miles (5.6 kilometers) as "critical habitat" for the green turtle. These waters include Culebra's outlying keys, including Cayo Norte, Cayo Ballena, Cayos Geniqui, Isla Culebrita, Arrecife Culebrita, Cayo de Luis Pena, Las Hermanas, El Mono, Cayo Lobo, Cayo Lobito, Cayo Botijuela, Alcarraza, Los Gemelos, and Piedra Steven (16 U.S.C. 1533; 50 CFR part 226.72).

(2) Species research and conservation activities

Rivera (pers. comm., 1999) provided the following overview of the marine turtle research and conservation efforts that began in the 1980s in Puerto Rico. Through its field office in Boqueron, Puerto Rico, the U.S. Fish and Wildlife Service provides technical assistance to marine turtle research and monitoring projects in Puerto Rico and the U.S. Virgin Islands. A biologist in the Endangered Species Division of the field office helps coordinate marine turtle conservation and recovery efforts, and an environmental educator visits schools to discuss marine turtle conservation. USFWS also manages the Culebra National Wildlife Refuge (NWR).

USFWS contributes funding to several of the projects that survey marine turtle nesting activity in Puerto Rico (table 26). In 1984, continuous nesting surveys were initiated for assessing population status. Project executants include researchers and refuge personnel from the Puerto Rico Department of Natural and Environmental Resources (DNER) [Departamento de Recursos Naturales y Ambientales—formerly Departamento Recursos Naturales (DRN)], USFWS refuge personnel, contractors, and academics. Project leaders submit annual reports summarizing data that are entered into a database by USFWS. USFWS is currently using this data to prepare GIS maps that will help target conservation efforts (Rivera, pers. comm., 1999). Marine turtle research in Puerto Rico is heading toward the identification and quality assessment of new nesting beaches and foraging grounds (Diez et al., 1998).

Table 26. Main Projects Assessing Marine Turtle Activities in Puerto Rico

Species Projects	Location
Leatherback and hawksbill nest monitoring	Pinones
Leatherback and hawksbill nest monitoring	Fajardo-Rio Grande
Leatherback and hawksbill nest monitoring (1984-present)	Humacao to Maunabo
Nesting ecology and population biology of leatherbacks (1984-present)	Culebra Island
Abundance and growth patterns of green turtles (1986-1989)	Culebra Island
Feeding ecology of hawksbill turtles (late 1980s)	Cayo Luis Pena to Culebra Island
Surveys to locate and describe green turtle foraging grounds (early 1990s)	Puerto Rico, Pineros, Vieques, and Culebra
Hawksbill nesting census (1993-present)	Culebra Island
Leatherback, hawksbill, and green turtle nest monitoring and protection (1990-present)	Vieques Island
Green and hawksbill nest monitoring (1992-present)	Caja de Muertos Natural Reserve

Hawksbill nest monitoring (1984-present) Population dynamics and ecology of hawksbill turtles (1992-present) Home range of immature hawksbill turtles (June 1992-January 1996) Genetic analysis of foraging hawksbill turtles (1993)	Mona and Monito islands
Leatherback nest monitoring (1991-present)	Mayaguez to Rincon

Sources: Belardo et al., 1999; Bowen et al., 1996; Collazo et al., 1992; Diez et al., 1998; Dutton and Soler, 1997; Justiniano Rodriguez, 1998; Morales, 1997; Sadove et al., 1998; van Dam and Diez, 1998 and 1999; Vicente and Carballeira, 1992; Vicente and Tallevast, 1992; Rivera, pers. comm., 1999.

(3) Enforcement and education

Since the passage of the ESA, the federal agencies responsible for enforcement, NMFS and USFWS, have conducted joint operations throughout the islands. USFWS employs one law enforcement agent for the U.S. Caribbean (Puerto Rico and the U.S. Virgin Islands). The agent is based in Puerto Rico and, among other responsibilities, is charged with enforcing the provisions of the Endangered Species Act and the Lacey Act for violations that take place on land (marine turtle egg poaching, for example). There is one NMFS enforcement officer in Puerto Rico, who is responsible for enforcement of federal legislation in the U.S. Caribbean (Puerto Rico and U.S. Virgin Islands) for violations that take place in the water (killing a marine turtle offshore, for example).

DNER of Puerto Rico has approximately 400 rangers (*vigilantes*), some of whom work on enforcing the provisions of the Commonwealth's endangered species regulations. Approximately 160 rangers are stationed in maritime units (Ponce, Boqueron, Guayama, Fajardo, San Juan, Aquadilla, and Arecibo) (Diez, pers. comm., 2000). Some rangers assist DNER researchers by accompanying them on beach patrols and giving talks in schools.

Collaboration among USFWS, NMFS, and DNER on enforcing wildlife regulations recently has begun to increase (Rivera, pers. comm., 1999; Santiago, pers. comm., 1999). Several DNER rangers have been deputized by NMFS to enforce the provisions of federal legislation for violations that take place at sea. Penalties levied for violations of federal endangered species legislation are higher than for those of the territorial legislation, and the collaboration between USFWS, NMFS, and DNER has resulted in the higher penalties being applied in court (Santiago, pers. comm., 1999).

Marine turtles seized by USFWS are sometimes provided to USFWS and DNER officers to be used for educational purposes (Santiago, pers. comm., 1999).

4. Conservation Status and Trends

Marine turtles have been nesting on Puerto Rico since well before any records were kept. Hillis-Starr et al. (1998) report that the greatest threats to marine turtles in Puerto Rico currently include coastal and upland development, introduction of domestic and exotic species, boating, incidental take in fisheries, illegal harvest of adults and eggs, ingestion of and entanglement in marine

debris, inadequate local protection and enforcement of laws, and insufficient regional cooperation for turtle protection.

a) Leatherback Turtle

Leatherbacks are found principally on the west, north, and east shores of Puerto Rico, and on Culebra and Vieques islands (Belardo et al., 1999; Hillis-Starr et al., 1998). Nesting surveys have shown the largest nesting populations in Puerto Rico to be found on Culebra (Brava and Resaca beaches) and in Fajardo. Leatherback nesting in Culebra appears to be either stable or increasing (Sadove et al., 1998). Brava (1.25 kilometers/.78 miles long) and Resaca (1.0 kilometer/.62 mile long) beaches are located on the north side of Culebra and currently remain free of development with little evidence of anthropogenic effects (Sadove et al., 1998). For the last 15 years, both beaches have been surveyed for leatherback turtle nesting and hatching activities from 5 April to August. The peak nesting season has been identified as April through July.

Eighty-eight female leatherbacks were observed on Brava and Resaca in 1997, which was a record number since the project began in 1984 (Dutton and Soler, 1997). That number remained basically steady in 1998 and 1999 (Sadove et al., 1998). No poaching of leatherbacks has been recorded in Culebra since 1992 (Rivera, pers. comm., 1999).

A similar leatherback study at Sandy Point National Wildlife Refuge in St. Croix, U.S. Virgin Islands, has been ongoing since 1981. Together, Culebra and Sandy Point support the largest and best-studied concentration of nesting leatherbacks in the Northern Caribbean. Nesting females have been documented travelling between the two areas both within and between nesting seasons—the two groups appear to be part of a larger regional population (Dutton and Soler, 1997). Several turtles tagged on Sandy Point subsequently nested on Culebra and Vieques (Boulon et al., 1996). In addition, a female that had been tagged at Culebra in 1998 nested four times in 2000 on nearby Tortola, BVI (Hastings, pers. comm., 2001).

Approximately 40 females were recorded in Fajardo in 1997 (Rivera, pers. comm., 1999). From March to June 1999, an estimated 18 females were recorded along 22 kilometers (13.75 miles) of beach in Fajardo (DNER, 1999). During this same period, an estimated 12 females were recorded along an 8 kilometer (5 mile) stretch of beach in Humacao (Montero-Acevedo, in litt., 2000). In April 1998, a gravid female was killed with a machete and her eggs removed on a beach in Maunabo (Montero-Acevedo, pers. comm., 1999).

On the west coast (Mayaguez to Rincon), the number of female leatherbacks recorded by researchers has increased from 4 in the early 1990s to a record of 13 in 1997 (Rivera, pers. comm., 1999). In 1999 a total of 75 leatherback nests were documented from March through June along a 40 kilometer (25 mile) stretch of beach in the Mayaguez area (Anasco, Aguadilla, Quebradillas, Isabela, Rincon, and Mayaquez) (DNER, 1999).

In 1998, 27 leatherback nests were recorded in Vieques. None of these nests were disturbed by poachers. The researchers estimate that 5 females comprised the 1998 breeding population (Belardo et al., 1999).

b) Hawksbill Turtle

In Puerto Rico, hawksbill turtles nest on Mona Island, Vieques, Culebra, and some scattered locations on the mainland (Hillis-Starr et al., 1998). Meylan (1999) quotes a figure of 650 hawksbill nests in Puerto Rico; over 80 percent of these are on Mona Island, where nesting has increased from fewer than 70 per year in the period 1986-1988 to 537 in 1998. Humacao is one of the most important sites on the mainland (Montero-Acevedo, in litt., 2000). The species forages throughout the coastal areas surrounding Puerto Rico (Hillis-Starr et al., 1998).

Mona Island is the most important nesting area for the hawksbill turtle in Puerto Rico. Nesting surveys have been conducted annually at Mona Island since 1984. Situated in the middle of the Mona Passage between the islands of Hispañola and Puerto Rico, Mona (55 square kilometers/21 square miles) and Monito islands are uninhabited natural reserves managed by the Puerto Rico DNER. Survey methodologies have varied from year to year, preventing direct comparisons (Diez et al., 1998). Since 1994, however, surveys have been undertaken with a systematic methodology. Nesting activity appears to have increased significantly for the last five years, making Mona Island one of the most important hawksbill rookeries in the Caribbean (Diez, pers. comm., 1999).

Records show 308 nests in 1994, 157 nests in 1995, 354 nests in 1996, 475 nests in 1997, and 503 nests in 1998 along 7.2 kilometers (4.5 miles) of beach on Mona Island (DNER, 1999; van Dam and Diez, 1999). A valid interpretation of these high nest counts can only be assessed after consistent and reliable methodologies for conducting nesting studies have been under way for a period of several years (Diez et al., 1998). From 1985 to 1987, feral pigs destroyed 44 to 100 percent of hawksbill nests outside of fenced beaches on the island. Then in 1989, fencing was installed to protect nests on Mona Island beaches (Hillis-Starr et al., 1998). From 1990 through 1994, no predation of nests was reported. In recent years, however, degradation of the fencing has allowed some predation, and there are plans to replace the fencing (van Dam and Diez, 1999).

The coral reefs of Mona and Monito islands are among the few known remaining locations in the Caribbean where hawksbill turtles occur with considerable density (Diez and van Dam, 1996). Diez (pers. comm., 1999) estimates that around 1,000 hawksbills live around these islands.

Underwater research surveys on the population dynamics and ecology of hawksbill turtles on Mona and Monito islands has been undertaken since 1992. These surveys have been annual, and in most cases conducted from July to October. Turtles have been caught by hand while snorkeling or scuba diving and brought aboard the research vessel for inspection, measurement, application of tags, or inspection of existing tags. During 1998, a total of 141 hawksbills and 9 green turtles, the majority of which were juveniles and subadults, were captured for study (van Dam and Diez, 1999). Researchers have shown that the large juvenile population of hawksbill turtles around Mona and Monito islands are long-term residents, exhibiting strong fidelity to particular sections of reef for periods of at least several years (van Dam and Diez, 1998).

Recent genetic research has shown the population of hawksbill turtles residing on the Mona foraging grounds to comprise turtles originating from diverse rookeries throughout the Caribbean. These data indicate that the conservation of the juvenile population of hawksbill turtles at Mona can contribute to sustaining healthy nesting populations in the Caribbean region (Bowen et al., 1996).

On Culebra, approximately 60 hawksbill nesting activities, including false crawls, are usually monitored per season (Tallevast, in litt., 1999). From 1 October 1996 through 14 February 1997, researchers conducting diurnal surveys recorded 54 hawksbill nesting activities. Thirty-one of these activities (57 percent) occurred on the Culebra National Wildlife Refuge island of Culebrita (Morales, 1997).

In 1998, four dead hawksbills were found by researchers in Culebra. Two are known to have been killed for their meat, while the other two may have been hit by boats (Carreon, pers. comm., 1999). There are indications that eggs are sometimes taken from beaches (Tallevast, in litt., 1999), and tourists from mainland Puerto Rico are thought to take hawksbill and green turtles in Culebra (Carreon, pers. comm., 1999).

A major hawksbill foraging ground was identified in the early 1990s between Cayo Luis Pena and Culebra Island, in 40-50 feet (13.3-16.5 meters) of water (Vicente and Carballeira, 1992).

On Vieques Island in 1998, 24 hawksbill nests were documented by researchers; the eggs of 14 of these nests (58 percent) were taken by poachers. The researchers estimate that the 1998 breeding population comprised 5 females (Belardo et al., 1999).

In 1999, 160 hawksbill nests were documented by researchers along a 15-kilometer (9.4-mile) stretch of beach in Humacao. In July 1999, 51 hawksbill nests were documented on this beach; poachers took the eggs from 25 of these nests. In 1997, the eggs from 10 to 12 nests had been taken from the same beach (Montero-Acevedo, pers. comm., 1999).

Hawksbills nest year round at Isla Caja de Muertos, in southwestern Puerto Rico (Diaz, 1994). During 1998, researchers documented 38 hawksbill nests along a 0.4-kilometer (a quarter-mile) stretch of beach there (DNER, 1999).

c) Green Turtle

Observations of green turtle nesting populations have been collected opportunistically by leatherback and hawksbill research programs in Puerto Rico since the 1980s. The number of green turtle nests remains low (Hillis-Starr et al., 1999). Limited green turtle nesting occurs on Mona Island (Diez, pers. comm., 1999).

In 1992 (from 26 January to 30 November), 75 green and hawksbill turtle nests were recorded on Isla Caja de Muertos, a natural reserve near Ponce, where illegal take of eggs and adults is reported to be a threat (Diaz, 1994; Hillis-Starr et al., 1998).

In 1998, four green turtle nests were recorded on Vieques. None of these nests were disturbed by poachers. Researchers believe that one female laid all of these nests (Belardo et al., 1999).

Green turtles forage throughout the coastal areas surrounding Puerto Rico (Hillis-Starr et al., 1998). In Culebra, baseline information on abundance and growth patterns of green turtles was collected from 1987 to 1989 (Collazo et al., 1992). A total of 167 individuals were captured, measured, tagged, and released. The observed size-class composition was indicative of a juvenile population (2-14 years in age). The findings established that Culebra supports juvenile and subadult green turtle populations and, together with findings from studies in the U.S. Virgin Islands, confirmed the presence of developmental habitats and maturing populations of green turtles throughout the eastern portion of the Puerto Rican Bank (Collazo et al., 1992).

5. Exploitation and Trade of Marine Turtles and Products in Puerto Rico

a) History of Exploitation and Trade

In the nineteenth century, marine turtles were harvested in Puerto Rico. According to Hillis-Starr et al. (1998), leatherback turtles were killed on nesting beaches for oil, and their eggs were harvested for food. They also report that a substantial green turtle fishery existed for local consumption and export to Europe.

b) Recent Harvest and Use of Marine Turtles in Puerto Rico

Despite protective legislation in Puerto Rico, an unquantifiable but persistent demand for marine turtle products, meat and eggs in particular, has remained since the harvest and use of these was outlawed in the 1970s. Fishers take turtles opportunistically to sell to friends or restaurants, or for personal consumption.

There is a steady black market that is largely organized to fill existing orders from specific buyers (Carreon, Diez, Santiago, and Rivera, pers. comm., 1999). Prices for meat and eggs can be high. Prices reported to TRAFFIC ranged from US$.50 to 5.00 per egg and US$6-15/pound (US$13.20-33/kilogram) for meat for all species (Diez, Horta, and Santiago, pers. comm., 1999). While meat and eggs have not been seen on restaurant menus since the 1980s, these are offered to specific customers in certain establishments in coastal areas--including Humacao, Fajardo, Lajas, Puerto Real, Joyuda, and Mayaguez--where the price for a marine turtle steak is up to US$25 (Carreon, Diez, Rice, and Rivera, pers. comm., 1999).

While green turtle meat is preferred, hawksbill turtles, and to a lesser extent leatherbacks, are also eaten in Puerto Rico. Although there are no complete data on take of marine turtles in Puerto Rico, one estimate is 1,000-1,500 adult, subadult, and juvenile marine turtles poached annually for personal consumption or sale to restaurants, markets, and trusted individuals (Rice, in litt., 2000). Eggs of all species are collected for food (Diez, pers. comm., 1999; Rivera, pers. comm., 1999).

Marine turtles may be taken incidentally in sport or artisanal fishing, or targeted with nets, harpoons, or by hand (Diez, Horta, Montero-Acevedo, Rivera, pers. comm., 1999). In 1993, fishers from mainland Puerto Rico were observed off Culebra National Wildlife Refuge with a dead hawksbill turtle in their net. Although the practice has decreased in frequency, fishers continue to set gill nets in green and hawksbill turtle foraging and resting sites around Culebra (Morales, 1997; Tallevast, in litt., 1999). In Rincon in 1999, a young hawksbill turtle was found harpooned (Justiniano, pers. comm. to Rivera, 1999).

Females are sometimes killed on nesting beaches for their eggs and meat, and nests are robbed on several beaches around Puerto Rico. Hawksbill eggs are most frequently poached since hawksbills lay a few nests on several small pocket beaches, which makes patrol and protection difficult (Diez, pers. comm., 1999; Rice, in litt., 2000). In 1997, 10 to 12 hawksbill nests were robbed on a beach in Humacao; in 1999, the same beach lost 25 of 51 nests to poachers. Researchers in the area report they would likely lose all nests to poachers without consistent beach patrols (Montero-Acevedo, pers. comm., 1999).

It is reported that egg and turtle poaching in some coastal communities (e.g., Fajardo, Humacao, Rincon, and Mayaguez) is conducted by individuals in search of an immediate source of cash;

some of these people have been charged with other violations, such as dealing in narcotics (Evans, pers. comm., 2000; Santiago, pers. comm., 1999).

Since a conservation project and nesting survey for hawksbill, green, and leatherback turtles was initiated in Vieques in 1991, the taking of eggs and gravid females has been controlled effectively in civilian areas there. However, illegal activity on Navy property continues to be a serious problem. In 1998, 14 of 24 hawksbill nests under surveillance on Vieques were robbed (Belardo et al., 1999).

A number of researchers reported finding hawksbill carapaces in the last few years. In 1999, seven hawksbill carapaces were discovered in a cave on Mona Island (Diez, pers. comm., 1999). In Humacao in 1999, a carapace washed up on shore, while another was found buried in the sand (Montero-Acevedo, pers. comm., 1999). The Culebra NWR has also received reports from divers who have found hawksbill turtle shells under water (Tallevast, in litt., 1999). In each of these cases, the carapaces were found intact, the meat having been removed, which indicates that the animals were killed for the meat and the shells left behind or hidden to avoid prosecution.

Leatherback turtles are occasionally killed on nesting beaches and their eggs taken in Puerto Rico. In 1974, the mayor of Culebra informed a USFWS enforcement agent that he had purchased leatherback turtle oil from a local fisher who had killed and dismembered the animal on Resaca Beach. The oil was used to alleviate his wife's rheumatism (Picón, in litt., 2000).

Before the program to monitor leatherback nesting activity on Culebra National Wildlife Refuge began in 1984, the refuge manager and others estimated a loss of up to 90 percent of the turtle nests under surveillance at Brava and Resaca beaches due to human depredation. Since the program started, the documented poaching level has decreased to between zero and 5 percent annually. This is attributed to the presence of researchers on these beaches every night during the surveillance period (Tallevast, in litt., 1999).

In the 1970s, hawksbill shell jewelry and other items were prevalent in shops in San Juan and other markets in Puerto Rico. The availability of these items has been greatly reduced since the 1980s (Picón, in litt., 2000; Diez, pers. comm., 1999). Spot checks of several tourist markets in San Juan in October 1999 by TRAFFIC researchers did not reveal any marine turtle shell or other products.

c) Recent International Trade in Marine Turtles and Products

CITES entered into force in the USA in 1975. Between 1970 and 1979, Japanese customs data indicated that a total of 3,267 kilograms (7,187 pounds) of hawksbill shell had been received from Puerto Rico. Two shipments of green turtle shell, totaling 57 kilograms (125 pounds), were received by Japan in 1971 and 1978 (Milliken and Tokunaga, 1987).

CITES Annual Reports for the period 1980-1998 showed that Puerto Rico exported the following marine turtle products: 1 green turtle shell in 1983 and the following entries for 1984: 2 green turtle bodies, 1 unit of green turtle meat, 15 units of green turtle oil, 3 green turtle shells, 2 hawksbill bodies, 228 hawksbill carvings, 5 units of hawksbill oil, 6 hawksbill shells, and 2 Kemp's ridley shells.

Over the years, Puerto Rican residents who were born on other Caribbean islands have been known to return to Puerto Rico with marine turtle products. A number of products have been

confiscated since the 1970s, including stuffed turtles, shells, hawksbill shell jewelry, eggs, penises, oil, and meat (Picón, pers. comm., 2000).

In the late 1970s, olive ridley turtle meat was imported from Oaxaca, Mexico, to Jacksonville and Miami, Florida, and then transported to Puerto Rico for local consumption and sold as Central American river turtle (*Dermatemys mawii*) (Picón, in litt., 2000).

Following a 1993 survey of turtle shell products in Dominican Republic markets (Dominguez and Villalba, 1994), Dominguez (pers. comm. to Diez, 1995) reported that Puerto Rican tourists were buying and returning home with these items; Santiago (pers. comm., 1999) confirmed that this is still happening.

Hawksbill shell spurs (*espuellas*) used in cockfighting used to be imported from the Dominican Republic; however, marine turtle researchers thought this practice had ceased in recent years (Diez, pers. comm., 1999).

d) Enforcement Efforts

Puerto Rico first focused implementation of the U.S. Endangered Species Act of 1973 on enforcement of what was perceived by fishers as a temporary ban on the taking of marine turtles (Rivera, pers. comm., 1999). In the winter of 1978, the first federal case in Puerto Rico for marine turtle-related violations of the Endangered Species Act involved five adult green and two hawksbill turtles that were being used to race in the outdoor pool for betting tourists at a San Juan hotel on Condado Beach. USFWS seized the turtles and the hotel settled out of court by paying US$10,000 (Picón, in litt., 2000).

In the late 1970s, USFWS seized approximately 40,000 pounds (18,182 kilograms) of illegally imported olive ridley meat in storage in San Juan. During this time, USFWS inventoried all cold storage areas in San Juan that had had legal stocks of marine turtle meat when a one-year grace period was instituted to enable vendors to use up the stock (Picón, in litt., 2000).

A 1991 federal investigation led to the arrests of six fishers on the west coast of Puerto Rico for taking and selling 25 marine turtles (18 hawksbills and 7 greens) to restaurants. All were charged and found guilty in federal court. They were sentenced to six months imprisonment and two years probation (Picón, in litt., 2000).

In December 1992, five fishers were convicted of illegally fishing and selling the meat of 17 young hawksbill turtles. They were arrested by the USFWS Division of Law Enforcement during a six-month undercover investigation that documented the sale of over 300 pounds (136 kilograms) of hawksbill turtle meat for up to US$16/pound (US$35/kilogram). The five men were charged with conspiring to violate the U.S. Endangered Species Act and the Lacey Act. The sentences included jail, fines, and community service at Caribbean Islands National Wildlife Refuge (Picón, 1993; Rice, in litt., 2000).

In 1993, USFWS initiated a second investigation of several restaurants on the western coast of Puerto Rico. Twelve individuals were charged in federal court with violation of federal laws regarding the take and sale of marine turtles. Six vehicles, three fishing vessels, and fishing equipment were confiscated by the U.S. government. The defendants served sentences from two to four months in prison; several fishers were sentenced to 4,000 hours of community service; and others received up to seven years probation. In addition, the local government cancelled some of the defendants' fishing licenses (Picón, in litt., 2000).

On 14 April 1994, 12 Puerto Ricans were charged with violations of the Endangered Species Act, Lacey Act, conspiracy, and aiding and abetting the commission of a crime relating to the take, possession, transportation, and sale of hawksbill and green turtles. Using nets and other fishing gear, two men had killed and dismembered marine turtles around Mona Island. They were charged with selling 119 pounds (54 kilograms) of hawksbill turtle meat for more than US$800. Two others were charged with selling 68 pounds (27 kilograms) of hawksbill meat for more than US$400 (TRAFFIC International, 1994; TRAFFIC USA, 1996).

A 1995 investigation revealed that a hotel and restaurant owner near Guayama regularly bought freshly caught marine turtles from fishers who would land them at the hotel. USFWS terminated the investigation when the owner died and a hurricane subsequently destroyed the premises (Picón, in litt., 2000).

Also in 1995, a customs officer informed USFWS of what appeared to be a turtle slaughtering site on the island of Caja de Muertos, a protected area, offshore from Ponce. USFWS documented a large number of marine turtle carcasses and was informed that some of the DNER wardens stationed on Caja de Muertos allowed local fishers to use the island as a butchering ground for turtles. Federal agents stepped up patrols of the area, and the practice subsequently diminished (Picón, in litt., 2000).

Santiago (pers. comm., 1999) was aware of approximately six court cases involving the poaching of marine turtles and eggs in 1998. In July 1999, poachers robbed 25 of 51 hawksbill nests on a beach in Humacao. One individual, known locally as "the digger," was apprehended with 136 eggs on 5 August 1999 by DNER and USFWS agents (Santiago, pers. comm., 1999). He admitted to the agents that he had dug the eggs to sell them in the area. The defendant was sentenced by a federal magistrate to four months in jail and one year of probation (Santiago, in litt., 2000).

Two fishers who killed a hawksbill for its meat in 1999 were sentenced in 2000 to three and six months of imprisonment. In January 2000, USFWS agents were informed that three shops in a San Juan shopping center were selling hawksbill shell items. Upon visiting these premises, they learned that the items had arrived as part of a shipment consisting of thousands of hawksbill shell articles—worth US$10,000 to US$15,000—that had recently been imported from Indonesia. Agents were working with the importer to learn more from Indonesia (Picón, in litt., 2000).

There are no known stocks of marine turtle shell or other parts or products held in Puerto Rico (Santiago, pers. comm., 1999). When such items are seized by officials, they are either sent to the USFWS's National Wildlife Repository or distributed to USFWS and DNER officials and marine turtle researchers in Puerto Rico for educational use (Rivera and Santiago, pers. comm., 1999).

A recently developed DNA-based method for identifying two species of marine turtle meat (cooked) and differentiating all species of marine turtle eggs is being tested in law enforcement cases in Puerto Rico (Rice, in litt., 2000).

USFWS does not station inspectors at the international airports in Puerto Rico. It collaborates with customs and has kept records of CITES-listed wildlife specimens seized at ports and the airport in San Juan since 1977 (Picón, pers. comm., 2000). For example, confiscations in 1995 included hawksbill turtle products (2 shells, 2 stuffed specimens, and 2 jewelry items); green turtle items (3 shells and 1 stuffed specimen); and turtle products not identified to the species

level (35 bottles of marine turtle oil and 24 containers of cream). And in 1996, records show confiscation of 2 shells, 5 stuffed specimens, 4 spurs, and 1 hairpin from hawksbill turtle; 6 green turtle shells; 1 loggerhead shell; 2 penises; 60 bottles of marine turtle oil; and 77 creams/oils.

6. Summary and Recommendations

Puerto Rico has regionally important nesting and foraging areas for hawksbill and leatherback turtles. Mona Island is a key site for nesting and foraging hawksbills. Field research, monitoring, habitat protection, and Mona's remote location have afforded protection to these turtle populations. The nesting population of leatherbacks at Culebra, which has been under study for 17 years, is also important in the regional population. Community outreach programs and the presence of researchers involved in beach patrols and camps on the beaches have virtually eliminated poaching on the island.

At the same time, turtle meat and eggs have traditionally been consumed in Puerto Rico and, given the opportunity, many people still eat them despite protective legislation. The illegal take of eggs, juveniles, and adults is considered a significant threat to marine turtles in Puerto Rico (Hillis-Starr et al., 1998).

Increased enforcement, education, and ongoing marine turtle research have helped stem poaching in many areas. The presence of researchers on nesting beaches is thought to have been the most significant deterrent to poaching in Puerto Rico (Diez, pers. comm., 1999). Many of the researchers feel that the education of children may be the most effective way of loosening the cultural ties to consuming marine turtles and eggs.

Relative to some of the other nations and territories in the northern Caribbean, considerable financial and human resources have been expended in Puerto Rico on long-term research and management of marine turtles in several locations. In other areas, however, research has been opportunistic, and turtles and their habitat have not received adequate protection.

TRAFFIC offers the following recommendations:

- Outreach and education programs have shown some promise and should be intensified to increase public awareness of threats to marine turtles and their conservation requirements.

- Mona Island's proximity to the Dominican Republic may be cause for concern, given that country's consistent demand for marine turtles. The U.S. and commonwealth governments are encouraged to work with the Dominican Republic on marine turtle research and conservation initiatives. Perhaps enforcement agents in Puerto Rico could help to train the new enforcement officers in the Dominican Republic.

- Marine turtle monitoring programs should be expanded to additional pocket beaches around the island which harbor turtle nesting habitat.

- The local government is urged to enact strict guidelines for development in coastal areas to avoid disturbance or destruction of marine turtle nesting and feeding areas.

- The government and nongovernmental organizations should involve stakeholders in conserving the integrity of marine turtle habitat. For example, developers, architects, property

owners, and construction firms could be involved in ensuring that lighting at beachfront properties does not disorient turtles.

- The U.S. and Puerto Rican governments and private sources are encouraged to purchase and protect particularly valuable and vulnerable areas (Brava beach on Culebra, for example).

- Local researchers and wildlife trade specialists are encouraged to investigate markets for eggs and meat in an attempt to learn about levels of demand and harvest. Information obtained should be factored into national conservation strategies.

- The U.S. government is encouraged to ratify the SPAW Protocol to the Cartagena Convention.

Personal Contacts

TRAFFIC researchers visited Puerto Rico from 4 through 11 October 1999 and met with the following individuals: Carlos Diez (Researcher, Endangered Species Program, Department of Natural and Environmental Resources/DNER, San Juan), Hector Horta (Manager, Natural Reefs of La Cordillera Reserve, DNER, Fajardo), Lesbia Montero-Acevedo (Sea Grant College Program, University of Puerto Rico, Humacao), Luis Santiago (Special Agent, Division of Law Enforcement, USFWS, Guaynabo), Marelisa Rivera (Fish and Wildlife Biologist, USFWS, Boqueron Field Office), and Carlos Carreon (Volunteer Coordinator of Community Activities, Culebra NWR, USFWS).

In addition, discussions were held by telephone and email with Teresa Tallevast (Refuge Manager, Culebra NWR, USFWS), Jorge Picón (Special Agent in Charge, Division of Law Enforcement, USFWS), Sandra MacPherson (National Sea Turtle Coordinator, USFWS, Jacksonville, Florida), Susan Rice (Refuge Manager, Eastern Shore of Virginia NWR, USFWS), Victor Ramos (Lieutenant, Bureau of Law Enforcement, DNER, Cabo Rojo), Michael Evans (Refuge Manager, Sandy Point NWR, USFWS, St. Croix, USVI), and Mervin Hastings (Marine Biologist, Conservation and Fisheries Department, British Virgin Islands).

The information in this section was verified with Carlos Diez, Lesbia Montero-Acevedo, Hector Horta, Carlos Carreon, and Jorge Picón on 2 March 2000 during the 20th Annual Symposium on Sea Turtle Biology and Conservation in Orlando, Florida.

References

Anderson, R. S. 1997. Investigation, prosecution, and sentencing of international wildlife trade offenses in the U.S. federal system. *National Environmental Enforcement Journal* 12(5):14-26.

Belardo, E., R. Matos, and F. Ortiz. 1999. *Sea turtle conservation project on Vieques Island*. 1998 annual report to the U.S. Naval Station Roosevelt Roads, Public Works Department, Environmental Engineering Division, July 1999. Department of Natural and Environmental Resources, San Juan, Puerto Rico. 8 pp.

Boulon, R. H., Jr., P. H. Dutton, and D. L. MacDonald. 1996. Leatherback turtles (*Dermochelys coriacea*) on St. Croix, U.S. Virgin Islands: Fifteen years of conservation. *Chelonian Conservation Biology* 2(2):141-147.

Bowen, B. W., A. L. Bass, A. Garcia-Rodriguez, C. E. Diez, R. van Dam, A. Bolten, K. A. Bjorndal, M. M. Miyamoto, and R. J. Ferl. 1996. Origin of hawksbill turtles in a Caribbean feeding area as indicated by genetic markers. *Ecological Applications* 6(2):566-572.

Collazo, J.A ., R. Boulon, Jr., and T. L. Tallevast. 1992. Abundance and growth patterns of *Chelonia mydas* in Culebra, Puerto Rico. *Journal of Herpetology* 26(3):293-300.

Diaz, A. C. Sea turtles population study and nesting activity in Isla Caja de Muertos, Puerto Rico. 1994. Pages 53-54 in M. Salmon and J. Wyneken. *Proceedings of the Eleventh Annual Workshop on Sea Turtle Biology and Conservation*, 26 February – 2 March 1991, Jekyll Island, Georgia. NOAA Technical Memorandum NMFS-SEFSC-302.

Diez, C. E. and van Dam, R. P. 1994. *Foraging ecology and population dynamics of the hawksbill (Eretmochelys imbricata) at Mona Island, Puerto Rico.* Research report submitted to the Japan Bekko Association. Nagasaki, Japan. 37 pp.

Diez, C., M. A. Garcia, and R. P. van Dam. 1998. A historical review of the research and conservation of marine turtles in Puerto Rico. NOAA Technical Memorandum NMFS-SEFSC-415. Page 170 in S. P. Epperly and J. Braun, compilers. *Proceedings of the Seventeenth Annual Sea Turtle Symposium*, March 1997, Orlando, Florida. NOAA Technical Memorandum NMFS-SEFSC-415.

Diez, C. E., K. A. Marshall, and R. P van Dam. 1998. *Assessment of hawksbill nesting activities and nest production on Mona Island, Puerto Rico, 1997.* Final report to the U.S. Fish and Wildlife Service. USFWS Cooperative Agreement No. 1448-0004-94-9115. Boqueron, Puerto Rico. 16 pp.

DNER. 1999. Endangered Species Program, Department of Natural and Environmental Resources. *Annual report on status of marine turtles nesting beach productivity in Puerto Rico (Study XI).* Unpublished report submitted to USFWS. Boqueron, Puerto Rico.
Dominguez, T. G. and A. A. Villalba. 1994. Trade of hawksbill carapaces in Santo Domingo, Dominican Rebublic. Pages 34-35 in K. A. Bjorndal, A. B. Bolten, D. A. Johnson, and P. J. Eliazar, compilers. *Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation*, March 1994, Hilton Head, South Carolina. NOAA Technical Memorandum NMFS-SEFSC-351.

Dutton, D. and R. Soler. 1997. *Leatherback turtle (Dermochelys coriacea) nesting on Brava and Resaca Beaches on Culebra, Puerto Rico, in 1997*. Final Report to the U.S. Fish and Wildlife Service, Contract #1448-40181-97-M188. Boqueron, Puerto Rico. 12 pp.

Groombridge, B. and R. Luxmoore. 1989. *The green turtle and hawksbill (Reptilia: Cheloniidae): World status, exploitation and trade*. CITES Secretariat. Lausanne, Switzerland. 601 pp.

Hall, K. V. 1989. Intra-seasonal variation of *Dermochelys coriacea* reproductive characteristics at Culebra, Puerto Rico., 1989. Pages 69-71 in S. A. Eckert, K. L. Eckert, and T. H. Richardson, compilers. *Proceedings of the Ninth Annual Workshop on Sea Turtle Biology and Conservation*, February 1989, Jekyll Island, Georgia. NOAA Technical Memorandum NMFS-SEFC-232.

Hillis-Starr, Z. M., R. Boulon, and M. Evans. 1998. Sea turtles of the Virgin Islands and Puerto Rico. Pages 334-337 in Mac M. J., P. A. Opler, C. E. Pucket Haecker, and P. D. Doran. *Status and Trends of the Nation's Biological Resources*, Volume 2. U.S. Department of the Interior, U.S. Geological Survey, Reston, Virginia. 964 pp.

Justiniano Rodriguez, M. 1998. *Informe final del proyecto de tortugas marinas del area oeste en Puerto Rico, 1998*. Departamento de Recursos Naturales y Ambientales, Oficina Regional de Mayaguez. Mayaguez, Puerto Rico. 10 pp.

Meylan, A. B. 1999. Status of the hawksbill turtle (*Eretmochelys imbricata*) in the Caribbean region. *Chelonian Conservation and Biology* 3(2):177-184.

Milliken, T. and H. Tokunaga. 1987. *The Japanese sea turtle trade, 1970-1986*. TRAFFIC Japan. Prepared for the Center for Environmental Education. Washington, D.C. 171 pp.

Morales, R. 1997. *Hawksbill sea turtle, Eretmochelys imbricata, and Green sea turtle, Chelonia mydas, nesting census, Culebra, Puerto Rico (1 October 1996-28 February 1997*). Final report to U.S. Fish and Wildlife Service, Order No. 40181-6-5680. Boqueron, Puerto Rico. 9 pp.

National Marine Fisheries Service. 1999. *Our Living Oceans. A Report on the status of U.S. living marine resources, 1999*. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-F/SPO-41. 301 pp.

Picón, J. 1993. Poachers sentenced to jail in Puerto Rico. *Marine Turtle Newsletter*, No. 62: pp. 26-27.

Sadove, S. S., S. Deruyter, N. Mattocks, and M. Castellote. 1998. *Leatherback sea turtles Dermochelys coriacea nesting and hatching activity on Culebra Island, Puerto Rico, 1998*. Report to the U.S. Fish and Wildlife Service, Contract # 1448-40181-98M006. Boqueron, Puerto Rico. 23 pp.

TRAFFIC International. 1994. Seizures and prosecutions. *TRAFFIC Bulletin* 14(3):116.

TRAFFIC USA. 1996. Sea turtle poachers nailed in Puerto Rico. *TRAFFIC USA* 13(2):9.

USFWS, 2000. Species listed and recovery plans. U.S. Fish and Wildlife Service Division of Endangered Species Web site. (http://www.fws.gov/r9endspp/)

van Dam, R. P. and C. E. Diez. 1998. Home range of immature hawksbill turtles *Eretmochelys imbricata* (Linnaeus) at two Caribbean islands. *Journal of Experimental Marine Biology and Ecology* 220:15-24.

van Dam, R. P. and C. E. Diez. 1999. *Mona and Monita Island hawksbill turtle research report for 1998, February 1999.* Puerto Rico Department of Natural and Environmental Regulation. San Juan, Puerto Rico. 72 pp.

Vincente, V. P. and N. M. Carballeira. 1992. Studies on the feeding ecology of the hawksbill turtle (*Eretmochelys imbricata*) in Puerto Rico. Pages 117-120 in M. Salmon and J. Wyneken, compilers. *Proceedings of the Eleventh Annual Workshop on Sea Turtle Biology and Conservation*, 26 February – 2 March 1991, Jekyll Island, Georgia. NOAA Technical Memorandum NMFS-SEFSC-302.

World Bank. 2000. World development indicators database. http://worldbank.org/data/wdi2000/

Note: *All above-listed proceedings of annual symposia on sea turtle biology and conservation are published by the National Marine Fisheries Service (NMFS), Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149.*

J. The Turks and Caicos Islands

1. Introduction

The Turks and Caicos Islands (TCI) is an overseas territory of the United Kingdom. Geologically, the islands are part of the Bahamian archipelago and consist of 8 islands and 40 small cays. Surrounded by one of the longest coral reefs in the world, the islands have a total land area of 502 square kilometers (193 square miles) with a 389 kilometer (243 mile) coastline. Four banks fall within the territorial area of the islands: the Turks, Mouchoir, Silver, and Caicos banks. The territory lies directly southeast of the Bahamas and northwest of the Dominican Republic and has a population of 22,000. Cockburn Town on Grand Turk is the capital.

The territory consists of two island groups separated by the Turks Island Passage (or Columbus Passage), a 35 kilometer (22 mile) long channel which is over 2,333 meters (7,000 feet) deep and connects the Atlantic Ocean and the Caribbean Sea. Only eight islands are inhabited: the main islands of the Turks group, Grand Turk and Salt Cay; the larger islands of the Caicos group, South Caicos, Middle (or Grand) Caicos, North Caicos, and Providenciales; and two privately owned resort islands, Pine Cay and Parrot Cay. East and West Caicos are uninhabited.

The Turks and Caicos has been controlled by the Spanish, French, and British. The islands were part of the Bahamas British colony from 1766 to 1848, and then were administered by Jamaica until 1962. The Turks and Caicos Islands had the opportunity to become independent, but chose to remain a British territory.

In the last 30 years, the local economy has shifted from salt production to fisheries to tourism; in 2000, the islands received 140,000 tourists, mostly from the United States. The offshore financial services industry is substantial and growing rapidly, and conch and lobster fisheries are important to the local economy. The per capita GDP is estimated at US$7,700. The U.S. dollar is the official currency; the treasury also issues a Turks and Caicos crown and quarter.

2. Marine Turtle Species in the Turks and Caicos Islands

Very little life history information is available on marine turtles in the Turks and Caicos. Three species of marine turtles are known to occur throughout the islands: hawksbills, greens, and loggerheads. The three species nest in low densities on beaches around the country. Hawksbills and greens are found commonly throughout the region, where they feed in the shallow waters of bays, creeks, coral reefs, and coral heads. Large numbers of juvenile and subadult marine turtles are present, suggesting that the territory provides important feeding and developmental habitats for these species (Franz et al., 1996). A few reports of Kemp's ridley and olive ridley turtles remain unconfirmed (Fulford-Gardiner, pers. comm., 2000).

Table 27. Marine Turtles Occurring in the Turks and Caicos Islands

Common name	Scientific name	Local names
Hawksbill turtle	**Eretmochelys imbricata**	hawksbill turtle
Green turtle	*Chelonia mydas*	green turtle
Loggerhead turtle	*Caretta caretta*	loggerhead turtle, mulato

Sources: Fulford-Gardiner and Been, pers. comm, 2000.

3. Overview of Marine Turtle Management and Conservation

Marine wildlife conservation efforts in the Turks and Caicos have focused on marine and coastal habitat conservation, educational programs for children and adults, and legal protection.

a) Regulatory Framework

(1) Legislation and regulations

It has been prohibited to take marine turtles and their eggs from beaches since 1976 (Fisheries Protection Regulations, 1976). Minimum size limits have been established for the harvest of turtles.

Fisheries Protection Ordinance of 1941 and Subsidiary Legislation (1997 Revision). The 1941 ordinance created the framework for the regulation of fisheries in the Turks and Caicos Islands. The revision of 14 November 1997 consolidates previous ordinances and regulations. Section 3 of the ordinance contains the Fisheries Protection Regulations, 1976. A license is required for commercial fishing and sale of all marine products; subsistence fishing is excluded. Part 14c of these regulations prohibits the take, possession, and sale of any marine turtle smaller than the following legal sizes: a shell length of 20 inches (51 centimeters) measured from "neck scales to the tail piece, and a weight of at least 20 pounds" (9 kilograms) for hawksbills and greens; and a weight of at least 20 pounds (9 kilograms) for any other turtle species. Part 17 prohibits the taking of any turtle from a beach or any place above the low water mark, and the take, possession, and offer to buy or sell any "laid turtle eggs." A closed season is not established. Upon summary conviction, offenses are punishable by a fine of US$5,000 or imprisonment of up to six months, or both (Part 36).

(2) Membership in international and regional treaties

U.K. overseas territories are not automatically included as Parties under the UK's ratification of international treaties. Individual territories are asked whether they want to have ratification of the conventions extended to them.

CITES. CITES entered into force in the UK on 31 October 1976, but the Turks and Caicos Islands have not signed on to the treaty and lack legislation to implement it.

SPAW Protocol to the Cartagena Convention. The UK ratified the Cartagena Convention and extended ratification to the Turks and Caicos Islands on 28 February 1986. The UK signed the SPAW Protocol on 18 January 1990 but has yet to ratify it.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). The UK has neither signed nor ratified the IAC.

(3) Responsible agencies

The Department of Environment and Coastal Resources (DECR) of the Ministry of Natural Resources is responsible for the conservation and management of marine species and habitats, and for enforcing applicable regulations. Their current priorities include finfish, lobster, and conch, and marine turtles may become a priority for 2002. The Fisheries Advisory Committee (a statutory board created under the Fisheries Protection Ordinance) comprises representatives of DECR, the Civic Society, fishers, and fish processors and provides recommendations on the

regulation and management of fisheries in the Turks and Caicos. The Coastal Resources Management Project (CRMP), which is sponsored by the governments of the UK and Turks and Caicos Islands, manages three national parks.

The Turks and Caicos does not attempt to implement CITES, beyond issuing export permits (that conform to standards established for international trade by non-Parties) for queen conch (*Stombus gigas*). During a CITES training seminar in 1998, DECR representatives explained that they were constrained by the lack of adequate legislation and by customs officials' limited awareness of CITES. Since that time, the DECR has begun to draft relevant legislation; however, a shortage of staff has prevented significant progress on that front. Nevertheless, a CITES working group has been formed and meets quarterly to discuss CITES issues; it includes representatives from the DECR, customs, the marine police, the tourist board, the Coastal Resources Management Project, the Turks and Caicos National Trust, and the Fisheries Advisory Committee (Fulford-Gardiner, pers. comm., 2000).

b) Conservation Initiatives

(1) Habitat conservation/protected areas

In 1992, the TCI government established 34 protected areas that total more than 845 square kilometers (325 square miles) and cover over 30 percent of the territory: 11 national parks, 12 nature reserves, 4 sanctuaries, and 7 historical sites. An additional nature reserve was established in 1996 (Garland, 2000). National parks are set aside for responsible recreational use. Nature reserves are established to protect particularly sensitive and unique areas or rare species; development is prohibited and access is limited. Sanctuaries are important breeding or spawning grounds for wildlife; entry is by permit only. Within these areas it is prohibited to remove any plant, animal, or eggs; damage, destroy, hunt, or fish any animal; remove any plant or animal products, rocks, or sand; or litter (The National Parks Ordinance and Subsidiary Legislation of 1992/15 May 1998 Revision).

There is no national parks service in the Turks and Caicos. However, in July 2000, the Executive Council (EXCO) approved the establishment of the national parks service. EXCO also transferred management of the historical sites to the TCI National Trust. The Coastal Resources Management Project (CRMP), a four-year project begun in 1998, may ultimately develop into the national parks service. CRMP's main goals are to manage three national parks (Princess Alexandra Land and Sea National Park and Northwest Point Marine National Park in Providenciales, and West Caicos Marine National Park in West Caicos), with the intention of extending management throughout the system of protected areas; to increase public awareness; and to establish a park headquarters and interpretative center in Providenciales (Taylor, pers. comm., 2000).

Most protected areas in the Turks and Caicos contain marine and coastal environments including beaches, creeks, tidal bays, coral reefs, sea grass beds, and other areas important to marine turtles (Garland, 2000). The following information is contained within the schedule of the National Parks Ordinance: Lake Catherine Nature Reserve on West Caicos (green and hawksbill nesting turtles); Big Sand Cay Sanctuary on Salt Cay (nesting turtles), and North, Middle, and East Caicos Nature Reserve (creeks and lagoons used by turtles). Local fishers refer to the western shore of East Caicos and the southern shores of North and Middle Caicos as "the best turtling grounds in the TCI" (Hall, pers. comm., 2000).

(2) Species research and conservation activities

In the early 1990s, a DECR research officer conducted beach surveys and tagging exercises. According to Fulford-Gardiner (pers. comm., 2000), the DECR is interested in carrying out more surveys in the future to pinpoint important nesting and foraging sites for marine turtles, but current priorities do not include turtles.

A project initiated by a dive operator in Grand Turk raises money to buy turtles from fishers; he has tagged and released nearly 300 turtles in the last few years (Ingham, pers. comm., 2000).

(3) Enforcement and education

The DECR's 14 conservation officers and the marine police are responsible for enforcing the national parks and turtle regulations in the Turks and Caicos Islands. The Coastal Resources Management Project's chief park warden and another three wardens currently lack powers of arrest. The CRMP wardens spend most of their efforts on education and awareness raising activities, and will begin enforcing the park regulations when they receive powers of arrest.

The National Trust is developing slide shows and other materials for schools on conservation of marine life and coral reefs. The Turks and Caicos National Museum has an exhibit on marine life that includes marine turtles and posts information about marine conservation on its Web site (http://www.tcmuseum.org). A sign at the airport summarizes some of the national parks regulations.

4. Conservation Status and Trends

The extent and pristine quality of the TCI coastal system are unique in the Caribbean. The main threats to marine turtles in the Turks and Caicos Islands derive from a surge in development of the coastal zone: resorts and hotels, industrial facilities, channeling and dredging, boat and diver damage to reefs, and other forms of disturbance.

a) Hawksbill Turtle

The hawksbill nesting population is considered to be moderately abundant but decreasing. It is the most abundant turtle species nesting in the Turks and Caicos Islands. Nesting has been reported on many of the cays south of the Caicos Bank, Grand Turk, and on the cays between Providenciales and North Caicos. Feeding areas include Big Ambergris Cay, Little Ambergris Cay, Fish Cay, Highas Cay, Grand Turk, Gibbs Cay, Cotton Cay, East Cay, Salt Cay, Grand Caicos, and North Caicos (Groombridge and Luxmoore, 1989).

b) Green Turtle

Nesting green turtles are considered to be moderately abundant, though there may be a continuing decline in the nesting population. Most nesting has been reported on the cays south of the Caicos Bank. Foraging sites include Big Ambergris Cay, Little Ambergris Cay, Fish Cay, Bottle Creek, Highas Cay, Grand Turk, Gibbs Cay, Cotton Cay, East Cay, Salt Cay, Grand Caicos, North Caicos, and Ocean Hole (Groombridge and Luxmoore, 1989). Canals, mangrove creeks, and tidal bays throughout the archipelago are important habitats for immature green turtles (Rigby, pers. comm., 2000).

c) Loggerhead Turtle

Loggerheads nest in regionally important numbers on South Caicos and Grand Turk (Ehrhart, 1989).

5. Exploitation and Trade of Marine Turtles and Products in the Turks and Caicos Islands

a) History of Exploitation and Trade

Marine turtles, and green turtles in particular, were an important food source for native peoples in the Turks and Caicos 1,000 years ago. Native peoples (Tainos) lived on Grand Turk between 700 A.D. and at least the 1300s. By looking at food remains in archeological sites, archeologists determined that 77 percent of the calories derived from meat at the Coralie site on Grand Turk came from marine turtles. Among some of the discoveries were a loggerhead skull from a 1,000 pound (455 kilogram) turtle and 50 green turtles identified from many thousands of bones. The population of harvested green turtles ranged from hatchlings to 350 pound (159 kilogram) adults, suggesting that East Beach on Grand Turk was a nesting site for loggerheads and greens at the time. Most of the turtle bones were from subadults, so these turtles were harvested while feeding in shallow grass flats (Carlson, 1999; 2000). Turtles could have been hunted with nets, spears, and bow-and-arrow; several turtle bones from the Coralie site on Grand Turk have spear holes. Adult turtles were taken from the nesting beaches, and turtle eggs were likely important sources of food also (Carlson, 1999; Keegan, 1997).

There are reports from as early as the Spanish exploration and on through to the late nineteenth century of ships stopping to replenish food supplies with marine turtles from the Turks and Caicos Islands. As late as 1878, green turtles were being harvested from the mouth of North Creek (Grand Turk) and exported to New York (Carlson, 1999). In 1906, the islands exported hawksbill shell worth US$3,538. The local turtle industry reached its peak around 1907. Although relatively large during this period, the industry gradually declined until it virtually disappeared by 1950. A presumed decline in turtle populations and a reduced demand for turtle products are thought to be responsible for the disappearance of the industry (Groombridge and Luxmoore, 1989).

Fishers sold turtle shell until about 25 years ago. Eggs were also collected, especially in South Caicos and Salt Cay, until 15 or 20 years ago.

b) Recent Harvest and Use of Marine Turtles

Marine turtles are taken on an opportunistic basis in the Turks and Caicos, with only three to four fishers taking turtles consistently (Bethel, pers. comm., 2000). One of these fishers is notorious for slaughtering turtles in front of tourists in Grand Turk and Salt Cay (Been, Fulford-Gardiner, Ingham, and Riggs, pers. comm., 2000). The most important turtle fisheries are centered in Grand Turk, South Caicos, and Salt Cay. Nets are set in creeks, and fishers jump or spear turtles on the grass flats. Overall, few turtles are thought to be taken; the target is meat, which is cooked at home or in restaurants catering to local people. Green turtle is preferred, but hawksbill and loggerhead are also eaten. Activists have been successful in eliminating the sale of turtle meat in most hotels and restaurants frequented by tourists (Fulford-Gardiner, Ingham, Riggs, and Taylor, pers. comm., 2000).

Turtle carapaces were regularly offered to tourists until about five years ago; however, this practice is rarely reported today. In 1997, a U.S. citizen offered to buy a hawksbill carapace from a scientist for US$750, and offered US$1,500 if the owner would carry it to the United States (Taylor, pers. comm., 2000).

A turtle fisher reported that he used to catch hawksbill turtles for buyers from the Dominican Republic; he sold the scutes for US$20 per pound (US$44 per kilogram) in the early 1990s. Others reported that Dominican fishers from Puerta Plata fished for turtles on the TCI's Moichoir Banks; locals described how the carapace was heated and the scutes removed (Fulford-Gardiner, Ingham, and Taylor pers. comm., 2000).

(1) TRAFFIC surveys

During a study carried out by TRAFFIC in 1998, a researcher visited a shop in Providenciales and found four hawksbill carapaces and three shell products that had been imported from Southeast Asia (Allan, 1998). In 2000, a researcher found only meat in several restaurants. The owner of a restaurant featuring local specialties in Providenciales buys turtle meat for stew (US$14.95) and steak (US$16.95). She has demand for one turtle per week and has standing orders with three fishers from whom she buys meat for US$3/pound (US$6.60/kilogram). A turtle fisher reported he sells whole turtles to local restaurants for US$2/pound (US$4.40/kilogram).

c) Recent International Trade in Marine Turtles and Products

Between 1970 and 1986, Japanese customs data indicated that hawksbill shell was received from the Turks and Caicos only in 1970 and 1971. The total amount was 234 kilograms (515 pounds) (Milliken and Tokunaga, 1987). Since 1997, the DECR has issued two permits to export marine turtle tissue to Cuban researchers.

(d) Enforcement Efforts

Fulford-Gardiner (pers. comm., 2000) is not aware of any arrests or prosecutions for violations of the marine turtle regulations.

6. Summary and Recommendations

The coastal ecosystem in the Turks and Caicos Islands is unusually pristine, and therefore is valuable marine turtle habitat. However, development associated with tourism has recently become a threat to the natural landscape on Providenciales and other islands, and this threat will likely increase in the future.

Protected areas cover over 30 percent of the national territory, and efforts are under way to implement management plans for some of these and establish a national parks system to administer these areas. As population censuses have not been undertaken, little is known about the health of the marine turtle populations in the islands. A traditional harvest is ongoing, but anecdotal accounts suggest that it remains small. Given the lack of information about populations and levels of take, it is impossible to know whether the harvest has been or will remain sustainable.

The Turks and Caicos has not ratified CITES and lacks legislation to implement the convention. Its marine turtle regulations do not establish a closed season for harvesting turtles, so there is no

legal provision to prohibit a fisher from taking mature females from below the low water mark during the nesting season. Furthermore, the regulations prohibit take, possession, and sale of "laid" turtle eggs, which seems to suggest that eggs removed from a gravid female could be taken, possessed, and sold. This would be counterproductive to marine turtle conservation.

The DECR reports being hampered in its efforts to manage and conserve marine life by a shortage of staff. The scientific and enforcement sectors of the DECR appear not to communicate formally, but on an *ad hoc* basis.

TRAFFIC offers the following recommendations:

- The Turks and Caicos is encouraged to ratify CITES.

- The U.K. CITES Management Authority and U.K. Foreign and Commonwealth Office need to assist the Turks and Caicos in ensuring that authorities have the resources and capacity to implement and enforce CITES. This includes developing legislation, establishing Management and Scientific Authorities, providing training opportunities, augmenting staffing levels, and providing reference tools and materials.

  - DECR officials are encouraged to contact the Cayman Islands Department of Environment, which has recently drafted comprehensive CITES implementing legislation, and to assess the extent to which the Caymans' legislation could be used as a model. Authorities in the Cayman Islands have already received feedback from the UK, so working with the Caymans could save time and effort on the part of DECR.

  - The DECR is urged to revise its turtle regulations and establish a closed season for harvest during the nesting season. It is also encouraged to participate in the Wider Caribbean Sea Turtle Conservation Network (WIDECAST), which provides assistance in the development of national marine turtle management plans.

- The marine turtle research community is encouraged to initiate research on marine turtle distribution and status in the Turks and Caicos Islands. Research findings should be factored into regional and national conservation and management plans.

Personal Contacts

A TRAFFIC researcher visited the Turks and Caicos Islands from 12 through 18 October 2000 and met with the following individuals: Michelle L. L. Fulford-Gardiner (Acting Chief Scientific Officer, Department of Environment and Coastal Resources- DECR, Turks and Caicos Islands Ministry of Natural Resources, Grand Turk), Brian Riggs (Manager, Turks and Caicos National Museum, Grand Turk), Cecil Ingham (Sea Eye Divers, Grand Turk), Floyd Bethel (turtle fisher, Grand Turk), Michele Taylor (Scientific Monitoring Officer, Coastal Resources Management Project/CRMP, DECR, Providenciales), Glesen Been (Park Warden, CRMP), Galvin Hall (Park Warden, CRMP), and Ernest Rigby (fisheries plant manager, South Dock, and Fishery Advisory Committee member, Providenciales). TRAFFIC also spoke with Dora Lightbourne (Dora's Restaurant, Providenciales), Chuck Hess (Caicos Conch Farm, Providenciales), and Debby Been (Salt Cay Divers, Salt Cay) by telephone, and by email with Judith Campbell (Manager, CRMP, Providenciales) and Mark Day (Director, DECR, Grand Turk).

References

Allan, C. J. 1998. *Conched out: A review of the trade in CITES-listed species in the United Kingdom overseas territories in the Caribbean*. WWF-United Kingdom. Godalming, UK. 87 pp.

Carlson, L. A. 1999. Aftermath of a feast: human colonization of the southern Bahamian archipelago and its effects on the indigenous fauna. Dissertation at University of Florida, Gainesville. 279 pp.
Carlson, B. 2000. Grand Turk: Its bones are the key to an unexpected past. *The Times of the Islands* 4(4):54-57.

Ehrhart, L. M. 1989. Status report of the loggerhead turtle. Pages 122-139 in L. Ogren, F. Berry, K. Bjorndal, H. Kumpf, R. Mast, G. Medina, H. Reichart, and R. Witham, editors. 1989. *Proceedings of the Second Western Atlantic Turtle Symposium*. NOAA Technical Memorandum NMFS-SEFC-226. 401 pp.

Franz, R., C. K. Dodd, Jr., and S. D. Buckner. 1996. A review of herpetology of the Bahamian archipelago. *Bahamas Journal of Science* 3(3):23-30.

Garland, J. 2000. National Parks of the Turks and Caicos Islands. Pages 25-27 in *The Turks and Caicos Islands 2000 Annual Visitor's Guide*. Olympia Publishing Company, Providenciales, The Turks and Caicos Islands.

Groombridge, B. and R. Luxmoore. 1989. *The green turtle and hawksbill (Reptilia: Cheloniidae): World status, exploitation and trade*. CITES Secretariat. Lausanne, Switzerland. 601 pp.

Keegan, W. F. 1997. Life in the Bahamas and Turks and Caicos Before Columbus. *Bahamian Archaeology*. Media Publishing, Nassau, the Bahamas. 104 pp.

Milliken, T. and H. Tokunaga. 1987. *The Japanese sea turtle trade, 1970-1986*. TRAFFIC Japan. Prepared for the Center for Environmental Education. Washington, D.C. 171 pp.

K. The Virgin Islands of the United States

1. Introduction

The U.S. Virgin Islands (USVI) are an unincorporated territory of the United States that includes four main islands--St. Croix, St. John, St. Thomas, and Water Island--and over 50 small islets and cays, most of which are uninhabited. Lying east of Puerto Rico and just 1 kilometer (0.6 mile) south of the British Virgin Islands, these small, mountainous islands are surrounded by coral reefs and sea grass beds adjacent to deep water. The total land area is 350 square kilometers (140 square miles), with a 188-kilometer (77-mile) coastline. The population approaches 121,000 and Charlotte Amalie on St. Thomas is the capital.

In 1493, Columbus discovered the islands, which Denmark purchased in 1733. Six different flags (Spain, the Netherlands, United Kingdom, France, Knights of Malta, and Denmark) flew over the islands before they were purchased by the United States in 1917.

Tourism is the primary economic activity--the territory receives more than 2 million visitors a year. The per capita GDP is US$15,000, and the World Bank categorizes the territory as "high income" (World Bank, 2000). The currency of the U.S. Virgin Islands is the U.S. dollar.

2. Marine Turtle Species in the U.S. Virgin Islands

According to Hillis-Starr et al. (1998) marine turtles have been nesting on the USVI since well before records were kept. Today the island complex provides critical nesting, foraging, and developmental habitat for three marine turtle species, leatherback, hawksbill, and green turtles. USVI waters support relatively large populations of juvenile green and hawksbill turtles, which have increased significantly since being protected under the U.S. Endangered Species Act of 1973 (Boulon, 1998). The loggerhead turtle is transitory and only rarely seen (Hillis-Starr et al., 1998).

Table 28. Marine Turtles Occurring in the U.S. Virgin Islands

Common name	Scientific name	Local name(s)
Hawksbill turtle	*Eretmochelys imbricata*	hawksbill turtle, carey
Green turtle	*Chelonia mydas*	green turtle, greenback
Loggerhead turtle	*Caretta caretta*	Loggerhead turtle
Leatherback turtle	*Dermochelys coriacea*	Leatherback, trunk turtle

Source: Hillis-Starr, pers. comm., 2000.

3. Overview of Marine Turtle Management and Conservation

Marine turtle management and conservation efforts in the USVI include regulation of marine turtle harvest and trade, field research on turtles in several locations, patrol of nesting beaches, habitat conservation, education in schools, community outreach, contact

with the media, a marine turtle stranding network, and law enforcement (Hillis-Starr, pers. comm., 2000).

a) Regulatory Framework

(1) Legislation and regulations

Both U.S. federal and territorial legislation are applicable in the U.S. Virgin Islands. The harvest, use, and trade of marine turtles was prohibited in the territory in the 1970s. Under the U.S. Endangered Species Act, leatherbacks, hawksbills, and Kemp's ridleys were listed as endangered in 1973, and greens, olive ridleys, and loggerheads were listed as threatened in 1978. Prior to this, eggs and nesting turtles were protected, while there was a seven-month open season (October through April) allowing a harvest of marine turtles in the water.

U.S. Endangered Species Act of 1973 (ESA) (16 USC 1531 et seq.). See page 128 in the national review of Puerto Rico.

U.S. Lacey Act of 1900(18 USC 42) and Lacey Act Amendments of 1981 (16 USC 3371-3378). See page 129 in the national review of Puerto Rico.

U.S. Virgin Islands Code, Chapter 9A, Title 12, Section 318: Protection of marine turtles, nests and eggs, Act No. 3330, 21 November 1972 amendment. It is prohibited to take, kill, possess, or mutilate or in any way destroy any loggerhead, leatherback, hawksbill, ridley or green turtle or other marine turtle on the beaches. It is prohibited to import, trade, sell or in any way deal in young marine turtles, except under permit for display purposes. No person may take, possess, destroy, or sell any marine turtle eggs, or disturb any marine turtle nest, at any time.

Indigenous and Endangered Species Act of 1990 (Act No. 5665). This act provides for protection of all territorial and federal endangered and threatened species. It also provides for the creation of a territorial endangered species list. It establishes requirements for all collection of and research on indigenous species. It establishes fines of up to US$10,000 and/or one year imprisonment per offense.

(2) Membership in international and regional treaties

CITES. CITES entered into force in the United States on 1 July 1975. Since May 1977, the Endangered Species Act (ESA) has served as the CITES implementing legislation for the USA and its overseas territories. The U.S. Fish and Wildlife Service (USFWS) serves as both the Management and Scientific Authorities; it has separate divisions for each. The secretary of commerce is responsible for implementing ESA and delegates authority to the National Marine Fisheries Service (NMFS), which provides biological advice to USFWS on marine species.

SPAW Protocol to the Cartagena Convention. The United States ratified the Cartagena Convention on 31 October 1984. The country signed the SPAW Protocol on 18 January 1990 but has yet to ratify it.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC). The United States deposited its instrument of ratification for the IAC on 22 February 2001 to become the ninth party to the Convention.

(3) Responsible agencies

At the federal level, USFWS and NMFS share regulatory responsibility for marine turtles. USFWS has lead responsibility for marine turtles on nesting beaches, while NMFS has responsibility for these species in the marine environment. Federal responsibilities and programs derive from statutory authorities of the Endangered Species Act of 1973, as amended. These include development and implementation of recovery plans; land acquisition; cooperative programs with states, including the U.S. Virgin Islands; consultation with other federal agencies on projects funded, permitted, or carried out by them; international cooperation; promulgation of regulations to reduce take; permitting of activities for research or education involving take; and development of habitat conservation plans (MacPherson, in litt., 2000).

In the early 1990s, NMFS and USFWS published recovery plans for five species of Atlantic marine turtles (hawksbill, green, Kemp's ridley, leatherback, and loggerhead), and plans are under way to revise some of these. The plans describe and prioritize the actions that are necessary to recover populations and conserve the species in the U.S. Atlantic, Caribbean, and Gulf of Mexico (NMFS, 1999).

USFWS provides technical assistance to marine turtle research projects in the U.S. Virgin Islands and Puerto Rico. USFWS also employs managers for Sandy Point and Green Cay national wildlife refuges in St. Croix, and funds projects monitoring marine turtle activities in the USVI. The Virgin Islands Department of Planning and Natural Resources (DPNR) manages a number of these projects (table 29).

b) Conservation Initiatives

(1) Habitat conservation/protected areas

The National Park Service (NPS) established the Virgin Islands National Park on St. John in 1956 (Boulon, in litt., 2000). The park occupies 56 percent of St. John's total area of approximately 17,000 acres (6,883 hectares) and provides nesting habitat for hawksbill turtles. Records show that green and leatherback turtles nested within park boundaries in the past (Small, 1982).

The NPS established Buck Island Reef National Monument (BIRNM), located 2 kilometers (1.25 miles) northeast of St. Croix, in 1962. The island and surrounding coral reef ecosystem is an important marine turtle nesting and juvenile developmental habitat. Hawksbill, green, and leatherback turtles nest on Buck Island (Hillis-Starr and Phillips, 1998).

In 1978, NMFS designated the nearshore waters around Sandy Point National Wildlife Refuge as "critical habitat" for the leatherback turtle (50 CFR Part 17.95); in 1979, USFWS designated the beach areas of Sandy Point as "critical habitat" for nesting leatherback turtles (50 CFR Part 17.95). In 1984, Sandy Point's beach and surrounding waters became part of the USFWS's Caribbean Islands National Wildlife Refuge System. The Sandy Point refuge in St. Croix supports the largest and best-studied population of nesting leatherback turtles in the United States and northern Caribbean (Boulon et al., 1996; Dutton et al., 1999).

In 1999, The Nature Conservancy purchased Jack's Bay and Isaac's Bay on the East End of St. Croix. This 301-acre (122-hectare) tract contains the last undeveloped turtle nesting beaches on St. Croix (Aristy, 1999).

(2) Species research and conservation activities

Over the years, the NPS and USFWS have taken a number of conservation actions to balance preservation, conservation, and recreation; eliminate poaching of both adult females and their nests; and control predation on nests and hatchlings in protected areas. In 1980, NPS initiated projects to monitor the beaches at the Virgin Islands National Park on St. John and Buck Island Reef National Monument (BIRNM) just off St. Croix, in order to locate and map all marine turtle nesting activities; identify threats to the nests; determine species nesting, nest habitat, and hatchling identification; devise means to mitigate
threats to nests and hatchlings; determine hatchling success; and gather information on nesting biology (Small, 1982; Small-Zullo, 1986).

Research was continued until 1997 at the Virgin Islands National Park, with survey effort varying from intensive to sporadic (Boulon, pers. comm., 2000). At BIRNM, hawksbill turtles are monitored throughout the year, but monitoring is intensified during the nesting season. From July to October, research staff and volunteers patrol the nesting beaches each night and record information on site selection and fidelity, migration intervals, fecundity (clutch and egg size), carapace size, weight and growth of individuals, nesting and hatching success, and recruitment. Threatened clutches are relocated (Rockwell, 1997).

Table 29. Main Projects Assessing Marine Turtle Activities in the U.S. Virgin Islands

Species Projects	Location
Records of reported marine turtle strandings (1982-present)	U.S. Virgin Islands
Leatherback turtle research and conservation (1981-present)	Sandy Point National Wildlife Refuge (NWR), St. Croix
Hawksbill, green, and leatherback nesting surveys (1980-present)	Buck Island Reef National Monument (BIRNM), St. Croix
Telemetry studies of internesting movements and behavior of hawksbill turtles (July-August 1991)	BIRNM, St. Croix
Juvenile hawksbill foraging surveys, tagging, and genetic work (1994-present)	BIRNM, St. Croix
Leatherback, green, and hawksbill turtle nesting surveys (1983-1997)	Manchenil Bay and portions of Ha'penny Bay, St. Croix
Surveys to identify key hawksbill and green turtle nesting beaches (1 July-31 December in 1992 and 1993)	31 St. Croix beaches
Hawksbill and green turtle nesting surveys (1994-present) (1997-present)	East End beaches (Jack's Bay, Isaac's Bay, East End Bay), St. Croix Sandy Point NWR, St. Croix
Hawksbill, leatherback, and green turtle nesting beach surveys (1994-present)	The Buccaneer Hotel beaches (Whistle, Grotto, and Cutlass Cove), St. Croix
Daytime surveys of hawksbill and green turtle nesting activity (1993, 1995-1998)	northern St. Thomas and offshore cays, St. Thomas
Growth rates of wild juvenile hawksbill turtles (1981-1983)	Magens Bay, St. Thomas
Growth of wild juvenile green turtles (1981-1986)	Several locations, St. Thomas and St. John

Marine turtle nesting surveys (1980-1981, intensive; 1982-1987, sporadic)	Virgin Islands National Park, St. John
Hawksbill turtle nesting and hatching surveys (1991-1997)	Virgin Islands National Park, St. John

Sources: Boulon, 1994; Boulon, 1998; Boulon and Frazier, 1990; Boulon and Tarantino, 1998; Mackay and Rebholz, 1996, 1997, and 1998; Mackay, 1994; Mendelson, 1991; Mizak, 1992, 1993, and 1994; Rockwell, 1997; Small-Zullo, 1986; Starbird and Hillis, 1992.
In 1991, radio and acoustic telemetry and satellite tracking were added to visual monitoring to determine the movements of nesting hawksbill turtles (Rockwell, 1997).

In 1994, the NPS began a study of juvenile marine turtles in the nearshore waters of BIRNM. Information is being collected on habitat use and behavior, size and age class distribution, population size, gender composition, length of residency, food sources, and genetic lineage of juvenile hawksbill turtles. In 1997, 45 of 80 sighted juvenile turtles had been tagged (Rockwell, 1997). In addition, as part of the NPS Prototype Inventory and Monitoring Program, BIRNM is one of three parks developing protocols for monitoring the flora and fauna of tropical ecosystems. Biologists from the U.S. Geological Survey's Biological Resources Division are working with NPS to develop detailed protocol manuals. A manual that provides instructions for undertaking seasonal marine turtle nesting surveys has been peer reviewed. Another manual on surveying juvenile marine turtles living in the reef system around the monument is in draft form (Hillis-Starr and Phillips, pers. comm., 2000).

Since 1981, saturation tagging and consistent night patrols during the leatherback nesting season at Sandy Point have yielded a comprehensive database of information on each female nesting at the refuge. The objectives of the project have been to assess management priorities for this population by documenting and tagging all nesting females, in order to protect adults, nests, and hatchlings from predators and poachers, and to protect nests from erosion and inundation (Boulon et al., 1996; Dutton et al., 1999).

Despite these long-term projects, information on the extent of marine turtle nesting in the rest of the USVI had been fragmented until recently. Prior to 1993, all information concerning overall numbers of green and hawksbill turtle nests per year in the USVI had been collected on an opportunistic basis (Boulon and Tarantino, 1998). Surveys to identify beaches that support marine turtle nesting on St. Croix were initiated in 1992. Thirty-one beaches were monitored in 1993. Of these, Sandy Point National Wildlife Refuge and the East End beaches (Jack's Bay, Isaac's Bay, and East End) were identified as supporting a significant amount of green and hawksbill turtle nesting (more than 30 nests) (Mackay and Rebholz, 1996). Since 1982, DPNR's Division of Fish and Wildlife has maintained records of all reported marine turtle strandings in the U.S. Virgin Islands (Boulon, 1998).

(3) Enforcement and education

The USFWS employs one enforcement agent in the Caribbean. The agent is based in Puerto Rico and has jurisdiction in Puerto Rico and the U.S. Virgin Islands. Among many responsibilities, the agent is charged with enforcing the provisions of the federal Endangered Species Act and the Lacey Act for violations that take place on land (selling marine turtle products, for example).

One NMFS enforcement officer for the Caribbean, based in Puerto Rico, is charged with enforcing the provisions of federal legislation for violations that take place at sea (harpooning a marine turtle, for example).

The USFWS Division of Law Enforcement has primary responsibility for controlling trade in wildlife. The Virgin Islands Department of Planning and Natural Resources (DPNR) has nine environmental enforcement officers in St. Thomas/St. John and six in St. Croix, some of whom work on enforcing the provisions of federal and territorial endangered species regulations. All environmental enforcement officers of DPNR have been deputized by NMFS to perform these functions at sea (Farchette, pers. comm., 2000).

USFWS and DPNR began educating children and the general public about marine turtles in the early 1980s (Boulon, pers. comm., 2000). Current efforts include presentations in schools and field trips to the Sandy Point refuge. DPNR also distributes a natural resources package of educational materials for children, which includes an endangered species coloring book, a video on marine turtles of the USVI, informational pamphlets, posters, fishing regulations, and fact sheets on coastal and marine ecosystems. Marine turtles are specifically featured in these materials.

4. Conservation Status and Trends

Today the greatest threats to marine turtles in the USVI are coastal and upland development, introduction of domestic and nonindigenous animals, boating, incidental take in fisheries, illegal harvest of adults and eggs, ingestion of and entanglement in marine debris, inadequate local protection and enforcement of laws, and insufficient regional cooperation for turtle management and conservation (Hillis-Starr et al., 1998). The British Virgin Islands (BVI), which lies just one kilometer (.62 mile) from St. John and St. Thomas, maintains an open season of four months for harvesting green and hawksbill turtles. Illegal fishing of turtles and trade of turtles and products between the USVI and BVI continue to be problematic (Hillis-Starr et al., 1998).

USVI records have documented at least 122 turtle strandings from 1982 through 1997, with boat strikes accounting for the greatest number of strandings (34.43%), followed by undetermined causes (29.51%), poaching (13.11%), other (12.3%), and fishing gear entanglement (10.66%) (Boulon, 1998). Longlining is reported to be on the increase around St. Croix and several leatherback females have arrived at Sandy Point entangled in or scarred from the gear (Evans, pers. comm., 2000).

On St. Thomas, the majority of nesting activities by green and hawksbill turtles now occur on offshore cays, which is probably due to disturbance and development of beaches on the main island (Boulon and Tarantino, 1998).

a) Leatherback Turtle

Found in the USVI only during their nesting season, leatherback turtles migrate from the North Atlantic to nest on only a few beaches in the USVI, in individual nesting intervals of two years or more (Boulon, 1998). The largest nesting aggregation of leatherbacks in the United States occurs on Sandy Point refuge on St. Croix. The species also nests at Manchenil Bay, St. Croix. Only one or two nests per year are reported from St. Thomas or St. John (Boulon, 1998). Leatherback turtles nested at Trunk Bay in St. John, which bears the local name for the species, until the mid-1950s (Small, 1982). The fact that leatherbacks no longer nest on some USVI beaches may be partly attributed to egg collection and the exploitation of adults for medicinal oil, which has sold for high prices both in the U.S. Virgin Islands and the British Virgin Islands (Small, 1982; Boulon and Hastings, pers. comm., 2000).

A total of 436 leatherbacks were tagged from 1977 through 1999 at Sandy Point refuge. Since consistent beach patrols were initiated in 1981, between 18 and 55 turtles have nested there each year (Dutton et al., 1999). During the course of this project, a number of inter-beach and inter-island movements and nesting activities have been documented within seasons. The documentation of these movements became possible with the start of the Manchenil Beach leatherback monitoring project in 1983 and the Culebra Island (Puerto Rico) project in 1984 (Boulon et al., 1994).

Given the movements between this and other nearby aggregations, the Sandy Point aggregation may be part of a larger population that has subgroups with stronger fidelity to particular beaches (Boulon et al., 1994). Several turtles tagged on Sandy Point were later observed to nest on Vieques (Puerto Rico), Culebra (Puerto Rico), and Anguilla (Boulon et al., 1996).
Prior to 1981, poaching of nests was reported to approach 100 percent. The nightly patrol presence on the beach throughout the nesting season has reduced that amount to between zero and 1.8 percent per year, with no known poaching of leatherbacks at Sandy Point refuge since 1986 (Boulon et al., 1996).

Leatherback nesting activities were surveyed at Manchenil Bay from 1983 to 1997. The area was found to support a nesting population of 8 to 10 leatherback turtles (Boulon, in litt., 2000; Mizak, 1992, 1993, 1994).

b) Hawksbill Turtle

Hawksbill turtles are the most common nesters on the many small pocket beaches of the USVI (Boulon, 1998). Meylan (1999) estimated from 1995 nesting data that approximately 400 hawksbill nests may be laid annually. The species also forages throughout the coastal areas surrounding the Virgin Islands (Hillis-Starr et al., 1998).

In 1993, and from 1995 through 1998, daytime beach nesting surveys were undertaken on northern St. Thomas and offshore cay beaches (Boulon and Tarantino, 1998). In 1998, 19 beaches surveyed had 57 hawksbill nests; 97 percent of these nests were laid on the offshore cays, while only 3 percent occurred on the main island of St. Thomas. Boulon and Tarrantino (1998) stress the importance of the offshore cays, which are much less developed than the St. Thomas beaches, to nesting hawksbill turtles.

Surveys on St. John from 1991 to 1997 documented from 60 to 70 hawksbill nesting activities per year, with 30 to 40 of the nests on the island found within the Virgin Islands National Park. During surveys in 1999, only three hawksbill nests were documented in the park (Boulon, pers. comm., 2000).

Buck Island Reef National Monument's nesting hawksbill population has been monitored since the mid-1970s. The monument supports from 80 to 125 hawksbill nests per year (Hillis-Starr and Phillips, 1998). By 1993, saturation tagging of the existing nesting population had been reached, and beginning in 1995, an increased number of first-time nesting turtles or new recruits (untagged females) to the population were observed. As a direct result of nesting beach protection, enforcement of conservation laws, public education, research, monitoring of the nesting population over the years, and hurricane mitigation, there has been an increase in the number of nests surviving to term and producing hatchlings, and a small increase in the number of nesting adults (Hillis-Starr and Phillips, 1998).

Telemetry revealed that hawksbills remain close to Buck Island during the nesting period but depart immediately after laying their final clutches of the season. Satellite tracking revealed that turtles travel hundreds to thousands of kilometers from Buck Island to their foraging grounds (Rockwell, 1997; Starbird and Hillis, 1992; Starbird et al., 1999).

Genetic analysis of 38 juvenile hawksbills studied since 1994 in the nearshore waters of Buck Island revealed that 8 were of the same haplotype as the females that nest on Buck Island (which are closely related to the hawksbill turtle haplotype that nests on Belize), and that the remaining individuals were related to populations in Mexico, Puerto Rico, Cuba, and Antigua. The diversity of the haplotypes of the juveniles identifies Buck Island as a developmental habitat that supports juvenile hawksbill turtles from all over the Caribbean (Rockwell, 1997).

Hawksbill nesting activities were monitored in Manchenil Bay, on the southwestern shore of St. Croix, during the nesting seasons in 1992, 1993, and 1994 by an independent researcher (Boulon, pers. comm., 2000). In 1992, 27 activities were documented; in 1993, 10 activities were documented; and in 1994, 13 were documented, including the information that most of the nests were systematically probed and dug up by poachers. Since 1994, hawksbill nesting activity at Manchenil Bay has been low and the monitoring sporadic (Boulon, pers. comm., 2000).

In Sandy Point National Wildlife Refuge, from 1 July to 31 December, 1993 to 1997, the total number of hawksbill turtle nesting activities observed per season during daytime patrols has ranged from a low of 52 in 1997 to a high of 118 in 1993 (Mackay and Rebholz, 1998).

On the East End beaches in St. Croix, from 1 July to 31 December, 1993 to 1997, the total number of hawksbill turtle nesting activities observed during daytime patrols has ranged from a high of 92 in 1994 to a low of 30 in 1997. From 1994 to 1997, researchers tagged 39 hawksbill turtles on the East End beaches (Mackay and Rebholz, 1998).

c) Green Turtle

Green turtles nest in fewer numbers than hawksbills in the USVI, with their most important nesting areas located on St. Croix East End beaches (Boulon, 1998). They forage throughout the coastal areas surrounding the Virgin Islands (Hillis-Starr et al., 1998).

St. Croix had an average of 100 green turtle nests per year between 1980 and 1990 (Eckert, 1992). On the East End beaches, from 1 July to 31 December, 1993 to 1997, the total number of green turtle nesting activities observed during daytime patrols has ranged from a low of 36 in 1993 to a high of 143 in 1996. From 1994 to 1997, researchers tagged 46 green turtles on the East End beaches (Mackay and Rebholz, 1998).

In the Sandy Point refuge, from 1 July to 1 December, 1993 to 1997, the total number of green turtle nesting activities observed during daytime patrols has ranged from a low of 7 in 1997 to a high of 82 in 1996 (Mackay and Rebholz, 1998).

Green turtle nesting activities were monitored in Manchenil Bay during the nesting seasons in 1992, 1993, and 1994 by an independent researcher. In 1992, 25 nesting activities were documented and nests were reported to be major poaching targets; at one point during the survey, all the green turtle nest sites on the entire beach had been systematically probed or dug up (Mizak, 1992). In 1993, researchers documented 14 nesting activities without much poaching (Mizak, 1993). In 1994, 19 green turtle nesting activities were described, and nearly all nests were probed and dug up by poachers (Mizak, 1994).

In 1993 and 1995-1998, daytime beach nesting surveys were undertaken on northern St. Thomas and offshore cay beaches. In 1998, green turtle activities were found mostly on the main island, with 11 nests on St. Thomas beaches and 6 nests on the offshore cays (Boulon and Tarantino, 1998).

5. Exploitation and Trade of Marine Turtles and Products in the U.S. Virgin Islands

a) History of Exploitation and Trade

Marine turtles are reported to have been much more abundant in the past than today in the USVI, where they have historically been important components in the culture and economy (Eckert, 1992). Buck Island was used by early natives as a fishing camp and marine turtle is believed to have been a significant part of their diet (Hillis-Starr and Phillips, 1998). According to Hillis-Starr and Phillips (1998), the taking of eggs and adults by humans, combined with mongoose predation beginning in the late 1800s, significantly reduced the marine turtle population at Buck Island.

According to Eckert (1992), nineteenth-century fishers on St. Thomas depended on green and hawksbill turtles to feed their families. The fishery was sustainable, as human populations were low and a large turtle could be used to feed a family for a long time. Nets were set for turtles and the eggs were taken opportunistically and shared among friends. Both men and women are reported to have considered turtles as a source of strength, with medicinal and aphrodisiac qualities (Eckert, 1992).

In the 1920s, dealers began to buy hawksbills and export the carapace scutes to Panama and South America (Eckert, 1992). Dealing in scutes was reported to earn US$28/day, compared with an average wage of US$.50/day in the USVI at the time, which presented a significant temptation to catch turtles far in excess of the amount required for household consumption. Fishers used turtle-shaped buoys to attract turtles to the nets, and nesting turtles were taken from the beaches. Turtles were taken only for the scutes, and the meat was discarded along with the carcass. The waste was significant, and within a few years there were fewer turtles in the waters and carcasses littered the beaches. The market remained lucrative until the advent of nylon and plastics after World War II (Eckert, 1992).

Until the 1950s, marine turtles at Buck Island were hunted by local fishers, who shot them from the cliffs when they surfaced to breathe; eggs were also taken (Hillis-Starr and Phillips, 1998). As late as the 1950s, seagoing ships were supplied with fresh meat from green turtles kept in an enclosure at the Fredericksted Pier in St. Croix and other markets (Mackay, 1994; Mackay, pers. comm., 2000). Turtle races were held in the USVI in the 1950s and 1960s (Eckert, 1992; Mackay, pers. comm., 2000).

Eckert (1992) reports that marine turtle populations in the USVI were severely depleted after World War II, and pressure on remaining stocks continued into the 1950s. Subsistence harvest increased as human populations expanded, and restaurants offered turtle meals to tourists. Turtles were imported from other islands to meet demand, and fishers from Dominica and St. Lucia are reported to have arrived in St. Thomas in boats filled with green turtles (Eckert, 1992).

Leatherback turtle eggs have been eaten in the USVI, and salted and cured meat was available infrequently in the markets in the past (Eckert, 1992). Green turtle meat and turtle eggs were still available in markets in the USVI in the 1970s. It used to be common for people to hang turtle

carapaces in their homes, but this practice is much less frequent today (Mackay, pers. comm., 2000).

b) Recent Harvest and Use of Marine Turtles

With the exception of use for educational, scientific or display purposes, there is currently no legal harvest, use, or trade of marine turtles in the U.S. Virgin Islands. Despite protective legislation in the USVI, there is demand for marine turtle meat and eggs and the domestic use of these continues. Hawksbill shells have been found on beaches with the meat removed, which appears to indicate that the animals were taken for the meat only (Hillis-Starr, pers. comm., 2000; Kojis, pers. comm., 2000).

(1) St. Thomas and St. John

Low levels of poaching of turtles and eggs is known to occur in St. Thomas and St. John (Boulon, pers. comm., 2000). Fishers in Frenchtown, on St. Thomas, have traditionally harvested turtles and eggs, and periodically poach them today in the USVI (Kojis, pers. comm., 2000), but more often travel to the BVI to take turtles (Evans, pers. comm., 2000).

In 1982, seven hawksbill nests at Cocoloba Point Beach in Virgin Islands National Park in St. John were thought to have been poached. In 1983, one nest was believed to have been poached at Salt Pond Bay Beach in the park (Small-Zullo, 1986).
According to Mendelson (1991) and Boulon (pers. comm., 2000), fishers from the British Virgin Islands have been known to take turtles from St. John waters and retreat with their catch to British waters at the first sign of a law enforcement officer.

(2) St. Croix

The bulk of the marine turtle nesting in the USVI occurs on St. Croix beaches, and there is more poaching of eggs and turtles on this island than elsewhere in the USVI (Evans, pers. comm., 2000). This is also partly attributed to a more depressed economy and a larger Hispanic population, which retains its cultural practices of eating eggs and turtles (Eckert, 1992; Evans, Farchette, and Hillis-Starr, pers. comm., 2000).

Prior to the establishment of law enforcement patrols on Buck Island in 1975, poaching of adult nesting turtles and nests was rampant (Hillis-Starr and Phillips, 1998). Even with patrols, however, in 1982, 14 to 16 of 48 nests (29-33 percent) were still poached (Small-Zullo, 1986). The presence of researchers on nesting beaches has greatly reduced poaching since then (Hillis-Starr, pers. comm., 2000). According to Hillis-Starr (pers. comm., 2000), the only instance of egg poaching on Buck Island in the last 13 years occurred when a freighter from the Dominican Republic anchored off the monument to conduct engine repairs after Hurricane Hugo in 1989. Five hawksbill nests were excavated when patrols were temporarily discontinued due to the hurricane.

Poaching has been a traditional threat to the marine turtle nests on the East End beaches on St. Croix, with up to one-third of the nests dug up or probed on Jack's Bay in the early 1990s. Early in the 1994 season, four hawksbill and two green turtle nests were poached (Mackay and Rebholz, 1996). Hawksbill shells have been found intact with the meat removed on East End beaches (Mackay, pers. comm., 2000). Manchenil Bay and Ha'penny Bay beaches are also subject to moderate rates of poaching, owing to the fact that they are not protected and are easily

accessed (Rebholz, pers. comm., 2000). Researchers found the remains of a mature green turtle on the beach in Manchenil Bay in October 1994 (Mizak, 1994).

According to Boulon et al., (1996), in the absence of all-night patrols at Sandy Point refuge, poaching of leatherback nests would likely occur again. Green and hawksbill turtle eggs and adults are frequently taken on Sandy Point after seasonal all-night patrols for leatherbacks have ended (Boulon et al., 1996).

Reportedly, many of the poachers are in search of an immediate source of cash and have often been charged with other violations, such as assault and dealing in weapons and narcotics. Eggs are sold in ethnic neighborhoods for US$1 each (Evans, pers. comm., 2000).

Influential residents on St. Croix have set a new trend by placing orders for turtle eggs as a demonstration of their personal status and authority (Evans and Farchette, pers. comm., 2000). In the last seven years, prices for turtle eggs have risen from US$15 to US$55 per dozen eggs (Evans, pers. comm., 2000).

In the past, vendors would occasionally sell turtle shells and stuffed marine turtles on the waterfront in St. Thomas near the cruise ship docks (Kojis, pers. comm., 2000), although there have been no recent cases (Roberts, pers. comm., 2000).

Many of the children participating in marine turtle educational programs on St. Croix have reported eating marine turtle eggs and meat (Mackay, pers. comm., 2000).

c) Recent International Trade in Marine Turtles and Products

The USVI has apparently never been involved in large-scale commercial export of marine turtles and marine turtle products. Prior to 1975, when CITES entered into force in the USA, some hawksbill shell and other turtle items did enter the U.S. mainland from the USVI (Boulon, pers. comm., 2000).

CITES Annual Reports for the period 1980-1998 record exports from the USVI of one green turtle shell in 1986, one hawksbill shell in 1987, and nine hawksbill specimens in 1993. There are no recorded imports into the USVI of marine turtle products during this period.

Leatherback turtle (trunk) oil has been brought into the USVI illegally by boat from the BVI over the years. In 1998, a ferry captain brought a bottle of trunk oil from Tortola to give to a resident of St. John. When unable to locate the intended recipient of the oil, the captain gave it to a customs officer, who seized the oil. No charges were filed (Boulon, in litt., 2000).

d) Enforcement Efforts

(1) St. Thomas

The DPNR's Department of Environmental Enforcement has received reports of marine turtle poaching in recent years, but none of these has panned out to the point of anyone being prosecuted (Roberts, pers. comm., 2000).

One individual was prosecuted in 1999 after leaving his fish net unattended; it caught two green turtles that died as a result. Fines and jail time were levied (Boulon, in litt., 2000).

Stuffed turtles have been seized from incoming passengers at the airport in St. Thomas and destroyed by Customs officers (Roberts, pers. comm., 2000).

(2) St. John

In 1982, NMFS enforcement agents arrested a native of St. John after observing him removing a hawksbill turtle from a preset tangle net and carrying it ashore, just outside the south shore boundary of the Virgin Islands National Park in St. John (Small-Zullo, 1986). The person died just before his case was to have been prosecuted (Boulon, in litt., 2000).

Small-Zullo (1986) reported that in 1982, during a routine north shore boat patrol, an NPS ranger discovered a fishing boat from the British Virgin Islands with a green turtle aboard within park waters. The fishers fled to Tortola before the ranger could apprehend them.

(3) St. Croix

Enforcement of cases in St. Croix in the last 10 years has reportedly declined substantially owing to shortages in equipment and manpower, and the extra toll on each taken by response and recovery efforts for six hurricanes. Enforcement is expected to improve in the next few years with the formation of a task force by the NMFS (Farchette, in litt., 2000).

Farchette (in litt., 2000) provided information on enforcement of cases of illegal harvest and possession of marine turtles in St. Croix. The following examples involved violation of the U.S. Endangered Species Act. In August 1987, two individuals were charged with possession of 32 hawksbill turtle eggs and 195 pounds (87 kilograms) of turtle meat, which were taken at Isaac's Bay; they each received a sentence of six months in prison. In October 1994, one individual was charged with possession of 86 hawksbill turtle eggs, which were taken at Ha'Penny Bay; he received a fine of US$300.

In September 1995, an individual was charged with possession of the front flippers of a hawksbill turtle, which violated Title 12 of the Virgin Islands Code. He was fined US$500 and sentenced to one year on probation.

Also in 1995, the Sandy Point refuge manager confiscated hundreds of hawksbill shell items from the Dominican Republic at an airport gift shop and a shop in downtown Christiansted (Hillis-Starr, in litt., 2000; Evans, pers. comm., 2000).

6. Summary and Recommendations

Relative to some of the other nations and territories in the northern Caribbean, significant financial and human resources have been allocated to long-term research on and management of marine turtles in certain areas of the USVI. These efforts appear to be assisting the recovery of populations in those areas. In other areas, however, research has been opportunistic, and inadequate protection of nesting habitat in several areas, such as on the offshore cays, could lead to eventual extirpation of marine turtles from those places (Boulon and Tarantino, 1998).

Some poaching of turtles and eggs continues, despite protective legislation in effect since the 1970s. Enforcement capacity is limited. In most cases, poaching appears to be opportunistic and

carried out by immigrants from other islands who maintain a cultural practice of eating eggs and turtles. Most researchers interviewed stressed that education seems promising in this regard.

TRAFFIC offers the following recommendations:

- The United States government is encouraged to provide additional funding for endangered species education programs in the general community and in schools.

- Funding is also required to augment enforcement, although the need for enforcement might be lessened on St. Croix if funding were made available for intensive scientific monitoring programs on the major nesting beaches, such as at Sandy Point and East End.

- The local government is encouraged to adopt more stringent guidelines on coastal development (addressing issues such as lighting and vegetative buffers), and on enforcement of speed limits for boats in bays.

- Enforcement officers have expressed frustration at arresting poachers only to have their charges dropped in court, and note that they would be better motivated to enforce the laws if they had increased cooperation from the justice system. The USFWS, in conjuction with DPNR, should systematically supply educational materials on marine turtle conservation to relevant people in the justice system. The agencies also should provide examples of court cases, sentences, and penalties imposed in the United States and other countries that might be guideposts for cases in the USVI.

- The U.S. government is encouraged to ratify the SPAW Protocol to the Cartagena Convention.

Personal Contacts

A TRAFFIC researcher visited the U.S. Virgin Islands (USVI) from 22 to 26 January and from 31 January to 1 February 2000, and met with the following individuals: Zandy-Marie Hillis-Starr (Natural Resource Management Specialist, Buck Island Reef National Monument -BIRNM, U.S. National Park Service, St. Croix), Brendalee Phillips (Biologist, Biological Resource Division, U.S. Geological Survey, BIRNM, St. Croix), Mary Edwards (Executive Director, St. Croix Animal Shelter), Michael Evans (Refuge Manager, Sandy Point National Wildlife Refuge, U.S. Fish and Wildlife Service-USFWS, St. Croix), Amy Mackay (marine turtle researcher/educator, St. Croix), J. Rebholz (marine turtle researcher, St. Croix), Carlos Farchette (Deputy Chief, Division of Environmental Enforcement, Virgin Islands Department of Planning and Natural Resources-DPNR, St. Croix), Ralf Boulon (Chief, Resources Management, Virgin Islands National Park, U.S. National Park Service, St. John), Barbara Kojis (Director, Division of Fish and Wildlife, DPNR, St. Thomas), Donna Griffin (Conservation Educator, DPNR, St. Thomas) and Lucia Roberts (Chief, Division of Environmental Law Enforcement, DPNR, St. Thomas).

The researcher consulted with Sandra MacPherson (National Sea Turtle Coordinator, USFWS, Jacksonville, Florida) and Mervin Hastings (Biologist, Conservation and Fisheries Department, BVI) by email. Meetings were held with Jorge Picón (Special Agent in Charge, Division of Law Enforcement, USFWS, Florida/Puerto Rico/USVI), and Roy Pemberton, Jr. (College of William and Mary/Virginia Institute of Marine Science) on 29 February 2000, during the 20th Annual Symposium on Sea Turtle Biology and Conservation in Orlando, Florida.

References

Aristy, N., editor. 1999. *The year in conservation: 1999*. The Nature Conservancy, Arlington, Virginia. 20 pp.

Boulon, R. H., Jr. 1994. Growth rates of wild juvenile hawksbill turtles, *Eretmochelys imbricata*, St. Thomas, U.S. Virgin Islands. *Copeia* (3):811-814.

Boulon, R. H., Jr. 1998. Trends in sea turtle strandings, U.S. Virgin Islands: 1982-1987. In F. A. Abreu-Grobois, R. Briseño-Dueñas, R. Márquez, and L. Sarti, compilers. *Proceedings of the Eighteenth International Symposium on Sea Turtle Biology and Conservation*, 3-7 March 1998, Mazatlán, Sinaloa, Mexico. NOAA Technical Memorandum NMFS-SEFSC-436. 293 pp.

Boulon, R. H., Jr. and N. B. Frazier. 1990. Growth of wild juvenile Caribbean green turtles, *Chelonia mydas*. *Journal of Herpetology* 24(4):441-445.

Boulon, R. H., Jr. and S. Tarantino. 1998. *Turtle nesting activity on St. Thomas and offshore cays: 1998*. Annual report submitted to USFWS, E1-15. Division of Fish and Wildlife, Department of Planning and Natural Resources, U.S. Virgin Islands. 5 pp. and 37 pp. appendices.

Boulon, R. H., Jr., D. L. McDonald, and P. H. Dutton. 1994. Leatherback turtle (*Dermochelys coriacea*) nesting biology on Sandy Point, St. Croix, U.S. Virgin Islands 1981-1993. Pages 190-193 in K. A. Bjorndal, A. B. Bolten, D. A. Johnson, and P. J. Eliazar, compilers. *Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation*, March 1997, Orlando, Florida. NOAA Technical Memorandum NMFS-SEFSC-351.

Boulon, R. H., Jr., P. H. Dutton, and D. L. MacDonald. 1996. Leatherback turtles (*Dermochelys coriacea*) on St. Croix, U.S. Virgin Islands: Fifteen years of conservation. *Chelonian Conservation Biology* 2(2):141-147.

Dutton, D. M., R. H. Boulon, Jr., A. Barragan, J. Smith, and L. Taylor. 1999. *Tagging and nesting research on leatherback turtles (Dermochelys coriacea) on Sandy Point, St. Croix, U.S. Virgin Islands*. Annual report to the U.S. Fish and Wildlife Service pursuant to contract #Pc-PNR-156-99. Division of Fish and Wildlife, Department of Planning and Natural Resources, U.S. Virgin Islands. 30 pp.

Eckert, K. L. 1992 (revised edition of 1989 original). Draft sea turtle recovery action plan for the United States Virgin Islands. Unpublished report. Prepared by the Wider Caribbean Sea Turtle Recovery Team and Conservation Network (WIDECAST) for the UNEP Caribbean Environment Programme, Kingston, Jamaica.

Hillis-Starr, Z. and B. Phillips. 1998. Buck Island Reef National Monument hawksbill nesting beach study - could conservation be working? In F. A. Abreu-Grobois, R. Briseño-Dueñas, R.

Márquez, and L. Sarti, compilers. *Proceedings of the Eighteenth International Symposium on Sea Turtle Biology and Conservation*, 3-7 March 1998, Mazatlán, Sinaloa, Mexico. NOAA Technical Memorandum NMFS-SEFSC-436. 293 pp.

Hillis-Starr, Z. M., R. H. Boulon, Jr., and M. Evans. 1998. Sea turtles of the Virgin Islands and Puerto Rico. Pages 334-337 in Mac M. J., P. A. Opler, C. E. Pucket Haecker, and P. D. Doran. *Status and Trends of the Nation's Biological Resources, Volume I.* 1998. U.S. Department of the Interior, U.S. Geological Survey, Reston, Virginia. 964 pp.

Mackay, A. L. 1994. Sea turtle activity survey on St. Croix, U.S. Virgin Islands. 1992-1993. Pages 247-248 in K. A. Bjorndal, A. B. Bolten, D. A. Johnson, and P. J. Eliazar, compilers. *Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation*, March 1994, Hilton Head, South Carolina. NOAA Technical Memorandum NMFS-SEFSC-351.

Mackay, A. L. and J. L. Rebholz. 1996. Sea turtle activity survey on St. Croix, U.S. Virgin Islands (1992-1994). Pages 178-181 in J. A. Keinath, D. E. Barnard, J. A. Musick, and B. A. Bell, compilers. *Proceedings of the Fifteenth Annual Symposium on Sea Turtle Biology and Conservation*, February 1995, Hilton Head, South Carolina. NOAA Technical Memorandum NMFS-SEFSC-387.

Mackay, A. L. and J. Rebholz. 1997. *1996 sea turtle monitoring program, Sandy Point National Wildlife Refuge and the East End beaches (Jack's, Isaac's, and East End Bay), St. Croix, U.S. Virgin Islands*. Final report to the U.S. Fish and Wildlife Service, Requisition No. 1448/40181-96-M002. Boqueron, Puerto Rico. 19 pp.

Mackay, A. L. and J. Rebholz. 1998. *1997 sea turtle monitoring program, Sandy Point National Wildlife Refuge and the East End beaches (Jack's, Isaac's, and East End Bay), St. Croix, U.S. Virgin Islands*. Final report to the U.S. Fish and Wildlife Service, Requisition No. 1842/41520-7-0005. Boqueron, Puerto Rico. 20 pp.

Mendelson, T. 1991. *Hawksbill sea turtle nesting and hatching activities, St. John, U.S. Virgin Islands*. Research/Resources Management Report. U.S. Department of the Interior, National Park Service, Southeast Region. Atlanta, Georgia. 23 pp.

Meylan, A. B. 1999. Status of the hawksbill turtle (*Eretmochelys imbricata*) in the Caribbean region. *Chelonian Conservation and Biology* 3(2):177-184.

Mizak, T. J. 1992. *Manchenil Bay, St. Croix, Virgin Islands leatherback turtle project, 1992 research data sheets*. Department of Planning and Natural Resources, St. Thomas, USVI.

Mizak, T. J. 1993. *Manchenil Bay, St. Croix, Virgin Islands leatherback turtle project, 1993 research data sheets*. Department of Planning and Natural Resources, St. Thomas, USVI.

Mizak, T. J. 1994. *Manchenil Bay, St. Croix, Virgin Islands leatherback turtle project, 1992 research data sheets*. Department of Planning and Natural Resources, St. Thomas, USVI.

NMFS. 1999. *Our living oceans. Report on the status of U.S. living marine resources, 1999*. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-F/SPO-41. 301 pp.

Rockwell, E., ed. *Inventory and monitoring program annual report, fiscal year 1997*. Natural Resource Information Division, National Park Service, Fort Collins, Colorado. 151 pp.

Small, V. 1982. *Sea turtle nesting at Virgin Islands National Park and Buck Island Reef National Monument, 1980 and 1981*. Research/Resources Management Report SER-61. U.S. Department of the Interior, National Park Service, Southeast Region, Atlanta, Georgia. 54 pp.

Small-Zullo, E. S. 1986. *Sea turtle nesting at Virgin Islands National Park and Buck Island Reef National Monument, 1980-1985*. Research/Resources Management Report. U.S. Department of the Interior, National Park Service, Southeast Region, Atlanta, Georgia. 27 pp.

Starbird, C. H. and Z. M. Hillis. 1992. Telemetry studies of the internesting movements and behavior of hawksbill sea turtles *(Eretmochelys imbricata)* Around Buck Island Reef National Monument, St. Croix, U.S. Virgin Islands. Pages 134-137 in J. I. Richardson and T. H. Richardson, compilers. *Proceedings of the Twelfth Annual Workshop on Sea Turtle Biology and Conservation*, February 1992, Jekyll Island, Georgia. NOAA Technical Memorandum NMFS-SEFSC-361.

Starbird, C. H., Z. Hillis-Starr, J. T. Harvey, and S. A. Eckert. 1999. Internesting movements and behavior of hawksbill turtles *(Eretmochelys imbricata*) around Buck Island Reef National Monument, St. Croix, U.S. Virgin Islands. *Chelonian Conservation Biology* 3(2):237-243.

World Bank. 2000. World development indicators database. http://devdata.worldbank.org/data-query/

Note: *All above-listed proceedings of annual symposia on sea turtle biology and conservation are published by the National Marine Fisheries Service (NMFS), Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149.*

V. SUMMARY

The TRAFFIC study of the exploitation, trade, and management of marine turtles in the Northern Caribbean has compiled a variety of baseline information that should provide a useful foundation for further work in the region. The study gathered information on marine turtle harvest; the species taken; uses, preferences, and prices for certain turtle products; stakeholders; national and regional demand; trade routes and trading partners; field research; legislation and regulations; management and conservation plans; and seizures and prosecutions. While much of this information is fragmented or anecdotal, the study has confirmed that demand for turtle meat and eggs remains strong in the region, and the use of marine turtles continues in all areas surveyed, despite fully protective legislation in 5 of the 11 nations/territories reviewed.

Marine turtles are affected by a myriad of threats, notably habitat loss, incidental take in net and line fisheries, and illegal or unsustainable harvest from the water and from beaches. Past overexploitation devastated nesting populations in the Cayman Islands, and they remain on the verge of extinction in that territory. Overexploitation has also depleted certain marine turtle populations in the British Virgin Islands and Jamaica. In some countries, such as the Dominican Republic, overexploitation is thought to be the primary threat today to marine turtles found within their territories.

The largely domestic demand for meat and eggs appears to be driving ongoing harvests. Shell, oil, skin, penis, and other derivatives are also used. Subsistence and opportunistic take of turtles and eggs are widespread in the region, at unquantified levels. The shell and curio trades appear to have been greatly reduced since the entry into force of CITES and related national legislation during the course of the last 25 years; an indicator of this is the seemingly common current practice found in several areas visited of discarding the carapace after removing the meat.

While all countries reviewed in this report have enacted regulations to control the exploitation and trade of marine turtles, these regulations vary widely in terms of the protection afforded various species, the dates for open seasons, enforcement, penalties for infractions, and judicial sentencing.

Each of the 11 countries/territories surveyed offers full protection of eggs and turtles on beaches. Five of them also prohibit the take and trade of all marine turtle species occurring in their waters: Jamaica (since 1982), Mexico (since 1990), Puerto Rico (since 1978), the U.S. Virgin Islands (since 1978), and the Dominican Republic (1989-1991 and 1996-2001). The remaining six countries/territories maintain an open season for taking turtles from their waters: the British Virgin Islands, the Cayman Islands, Cuba, Haiti, the Turks and Caicos Islands (which has no closed season), and the Bahamas (which prohibits the take of hawksbills).

Hawksbill shell products continue to be sold in violation of domestic legislation in airport shops (in the Dominican Republic and Mexico) and other markets catering to tourists (Dominican Republic, Jamaica, and Mexico). Travelers leaving these countries can easily purchase these products and return with them to their home countries, in violation of CITES and most national laws in the Caribbean and further afield.

Three stocks of unknown quantities of accumulated hawksbill shell are known to exist: one in the Bahamas and two in Jamaica. The shell from one of the Jamaican stockpiles is fashioned into jewelry and other items and sold to local vendors for sale in tourist markets. No information was found on possible increases to these stocks.

The Cuban government has accumulated a marked registry of hawksbill shell from their harvest program since 1993. By April 2000, the Cuban stockpile had reached approximately 6,900 kilograms (6.8 tons).

The designing of effective management and conservation strategies—particularly on a regional scale—is challenged by a number of factors, including gaps in the knowledge about marine turtle life history patterns and the actual conservation status of some of these turtle populations; a lack of understanding of current levels of exploitation and trade and the effects these are having on particular species or populations; and the unregulated and unmanaged nature of turtle catches and trade.

Unilateral conservation programs by governments cannot completely protect marine turtles, given that the animals disperse and migrate over vast distances, and routinely live successively in the territories of numerous sovereign nations, as well as on the high seas. It is widely acknowledged that cooperation among range countries is critical to ensure the conservation of marine turtles in the region.

Several recent initiatives have been undertaken in the Caribbean to address information gaps and management needs. In March 1996, a regional meeting on conservation and sustainable use of marine turtles was held in Cuba to present Cuba's experiences and to foster and encourage cooperation with regional neighbors. Representatives from 12 Caribbean governments attended and presented summaries on their national marine turtle conservation and management programs. The participants agreed that management programs at the country level need to be woven into a regional cooperation plan.

In November 1999, a meeting titled “Marine Turtle Conservation in the Wider Caribbean--A Dialogue for Effective Regional Management” was convened in the Dominican Republic. The meeting was sponsored by WIDECAST, IUCN/SSC Marine Turtle Specialist Group, WWF, and UNEP (Caribbean Environment Programme) and attended by 48 resource managers, scientists, and conservationists from 29 countries/territories. The participants confirmed the fact that marine turtles are a shared resource and agreed to a series of regional conservation recommendations for consideration by governments, international organizations, nongovernmental organizations, academic institutions, and other sectors of society. The need to cooperate in the region was the focus throughout the meeting, which identified as priority actions the development of national and regional management plans and the promotion of harmonization of national policies aimed at conserving marine turtles.

A CITES-organized dialogue meeting for hawksbill range states in the Caribbean region is planned for May 2001 to advance regional efforts to manage and conserve hawksbill turtles.

In addition to these regional meetings, two unique treaties have been negotiated during the last decade. In 1990, the Protocol to the Cartagena Convention concerning Specially Protected Areas and Wildlife (SPAW) was adopted in Kingston, Jamaica, and entered into force in 2000. The Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC) was concluded in 1996; it will enter into force on 2 May 2001.

In summary, the Caribbean region has made significant advances in the areas of national law, international agreements, community participation in conservation, collaboration among researchers, and national capacity building for science-based marine turtle conservation and management over the course of the last 25 years, and particularly in the last 10 years. With

continuing attention focused on regional management, it may ultimately set an example for other regions of the world.

Notwithstanding, serious deficiencies remain in efforts to conserve marine turtles in the Northern Caribbean. Today, marine turtles are swimming against a tide of deeply entrenched use patterns, insufficient law enforcement and awareness, and inadequate political commitment. To counter the current situation, TRAFFIC has identified eight major areas of action: (1) filling information gaps and increasing information exchange; (2) expanding public education and awareness; (3) building national and regional cooperation; (4) increasing participation in international and regional conventions; (5) strengthening national legislation; (6) supporting training and capacity building; (7) enforcing laws that affect local and tourist markets; and (8) documenting and monitoring existing stocks of marine turtle products in the region.

VI. RECOMMENDATIONS

To address some of the deficiencies in monitoring and controlling the exploitation of and trade in marine turtles in the Northern Caribbean region, TRAFFIC offers the following recommendations.

Fill Information Gaps and Increase Information Exchange

- The marine turtle research community is encouraged to initiate and support expansion of research on marine turtle distribution and status in the region. Determining the current extent of nesting in certain countries for which there is little information should be a priority and should include the Bahamas, British Virgin Islands, Dominican Republic, Haiti, Jamaica, and Turks and Caicos Islands, in particular. Findings should be factored into regional and national conservation and management plans.

- Governments should endeavor to keep statistics on the numbers of marine turtles and eggs removed from the wild, legally and illegally, in their countries. This information could be fed into a regional repository to establish baseline indicators of harvest levels. The repository should compile statistics of legal landings, reported poaching incidents, strandings, and the level and nature of incidental take of marine turtles in the Caribbean region by commercial and artisanal fisheries. Information is needed on the interaction of marine turtles and various gear types, characteristics of the turtle bycatch (species, size, whether tagged and where), status of the turtle (alive, dead, healthy, injured, diseased), and the fate of turtle bycatch (discarded alive/dead, retained).

  - Wildlife trade specialists are encouraged to undertake surveys on exploitation, trade, and management of marine turtles in the rest of the Caribbean region to augment the information compiled concerning the Northern Caribbean.

- Wildlife trade specialists are urged to collaborate with national researchers to investigate the origin, as well as the level of turnover, of marine turtle products in the countries and territories in the region. Information is needed about whether fresh hawksbill shell is being added to supplies held by artisans and shop owners in the Dominican Republic, Jamaica, and Mexico, and at what quantities and rates. Markets for eggs and meat, which appear in most cases to be the primary motivation to remove turtles from the wild, need to be thoroughly investigated to shed light on demand and harvest levels. Next to nothing is known about Haitian markets for marine turtles. Information obtained should be considered in regional and national conservation strategies.

- A centralized database of seizures of marine turtles and products, and prosecutions for related offenses, should be established in the region to assist governments in assessing trends in law enforcement, trade routes, levels of illegal trade, values of products, and smuggling methods. The database could be adapted for use in other regions or evolve into a database that contains global information.

- Governments should initiate efforts to quantify the full economic value of marine turtles on the local and national levels. To understand the full economic potential of these species, governments should take into account sustainable, nonconsumptive end markets, as well as

income-generating fisheries. Included in such evaluations should be revenue generated by marine turtles at public aquaria, in diving operations, and in ecotourism projects.

- Those conducting regional efforts to study and manage marine turtles are encouraged to make full use of existing resources. For example, WIDECAST is a clearinghouse on marine turtle research and conservation projects in the region; updated project rosters and contact persons will be available online at http://www.widecast.org by the end of 2001. The IUCN/SSC Marine Turtle Specialist Group recently updated its book *Research and Management Techniques for the Conservation of Sea Turtles* (which is also being published in Spanish). These and other useful references can enhance the work of researchers, students, and resource managers.

- Prior to the 12th meeting of the Conference of the Parties to CITES, the Parties might consider adopting a special mechanism to assess the nature, operation, and likely effectiveness of the hawksbill shell trade control system in Japan.

- If hawksbill shell exports are permitted in the future, it will be necessary to monitor the status of illegal trade and trends in the Wider Caribbean region and globally as an important part of assessing impact and providing early warning of any resulting conservation problems.

Expand Public Education and Awareness

- TRAFFIC recognizes that governments and NGOs alike have made significant investments in general public education and awareness-raising initiatives in recent years. It is clear, however, that much remains to be done. Such initiatives need to be strengthened and expanded with an aim to motivate all stakeholders (residents and tourists) to support marine turtle conservation programs.

- Socioeconomic research into the cultural, traditional, and economic affinities of Caribbean peoples to marine turtles could improve the design of awareness programs aimed at reducing demand for marine turtles, their parts, and their eggs.

- Marine turtle eggs and other marine turtle products are still used in the region, and can be found for sale in local markets. Education programs should be developed to inform users that continued harvest might further endanger marine turtles and that they should consider using alternative products that do not contain endangered species.

- Public awareness materials aimed at international tourists--"Buyer Beware" brochures, posters, and other materials on the risks of returning home with marine turtles and other Caribbean wildlife--should be produced in English, Spanish, French, Japanese, and other languages, and circulated and displayed in Caribbean airports, dive operations, hotels, and other places frequented by tourists. Existing materials produced in conjunction with the CITES Secretariat, Caribbean governments, and the European Commission could be adapted easily for wider use in the region.

- The same materials should be widely circulated in North America, Central America, South America, and Europe, home to the majority of tourists visiting the Caribbean, to discourage the purchase of illegal wildlife products when traveling.

- In a number of countries, enforcement efforts are dampened by insufficient penalties and judicial commitment. Educational materials are needed within the region to raise awareness

on the part of enforcement personnel, prosecutors, and judges. TRAFFIC distributes information on seizures and prosecutions related to illegal wildlife trade in the *TRAFFIC Bulletin* and the *TRAFFIC North America* newsletter, which are mailed to CITES Management Authorities. Management Authorities are encouraged to share this information with wildlife enforcement officials, the Attorney General's office, prosecutors, judges, and their counterparts involved in fisheries management. Anyone wishing to receive these publications may request them from TRAFFIC (address on the back cover of this report). They are also available online at http://www.traffic.org (*TRAFFIC Bulletin*) and http://www.worldwildlife.org (*TRAFFIC North America*).

- National activists can initiate campaigns to persuade tourist and curio shops to stop selling products from marine turtles and other endangered species. Retailers of traditional Chinese medicine, for example, who have stopped selling products containing tiger bone, rhinoceros horn, and other derivatives from endangered species, have participated in a sticker campaign in which they affix a sticker to the shop window declaring they do not sell products from endangered species; stickers could be adapted to read "we do not sell products made from marine turtles and other endangered species."

- Conservation organizations are encouraged to draft text for publication in popular travelers' guides on marine turtle conservation efforts in the region and the prohibitions on international trade.

Build National and Regional Cooperation

- Governments should strive to involve all stakeholders in the stewardship of the marine turtle resource. All stakeholders need to be part of the decision-making process that establishes regulations and other restrictions. Fishers and other local people are more likely to embrace conservation policies when they understand the need for them and participate in their implementation, than when such policies are applied from the top down by the government. This participatory approach has been used in Jamaica, Mexico, and other countries by governments and nongovernmental organizations which have employed local residents in research and monitoring programs, negotiated comanagement agreements with community-based organizations, and sponsored regular interactive meetings to discuss resource management objectives and policies.

- Interdepartmental coordination and cooperation among the authorities responsible for implementing wildlife conservation and trade regulations are needed to identify and eliminate regulatory redundancies and legislative conflicts, as well as to streamline implementation and enforcement. The establishment of national and regional wildlife enforcement task forces that enable the exchange of information and experience should be encouraged. Avoiding duplication of effort and collaborating on cases can conserve time and money, thereby extending the value of limited resources. Similar entities in the European Union, North America, and Africa could be considered as adaptable models.

- Marine turtle range states are encouraged to participate in regional dialogue meetings to improve management of shared marine turtle populations.

- Countries sharing marine turtle populations should consider establishing bilateral or multilateral agreements and management plans. Lessons could be drawn from the experience

of trying to form the Tripartite Agreement (among Costa Rica, Nicaragua, and Panama) to conserve shared green turtle stocks.

Increase Participation in International and Regional Conventions

- Haiti should take the necessary steps to accede to CITES. As a first step, Haiti could contact the CITES Secretariat for technical assistance in drafting CITES-implementing legislation. Once Haiti becomes a Party to CITES, Haiti's Management Authority will have the opportunity to participate in the decisions of the CITES membership, totaling over 150 countries. Haitian authorities would have increased access to expertise in the CITES Secretariat, information on changes in CITES, identification manuals, CITES training seminars, and other areas of support.

- The United Kingdom should encourage the Turks and Caicos Islands to ratify CITES and should assist the territory in preparing CITES implementing legislation and developing the capacity and infrastructure necessary to implement and enforce its provisions.

- The countries in the Caribbean that have not yet done so should ratify or accede to the SPAW Protocol. Of those reviewed in this report, Jamaica, Mexico, the United Kingdom (British Virgin Islands, Cayman Islands, and Turks and Caicos), and the United States (U.S. Virgin Islands and Puerto Rico) have signed the protocol, but have not ratified it. The Bahamas and Haiti are encouraged to accede to the Cartagena Convention and its SPAW Protocol.

- The CITES Secretariat and the Regional Coordinating Unit of the UNEP Caribbean Environment Programme (SPAW Secretariat) have signed a memorandum of understanding to help coordinate the implementation of CITES and SPAW in the region. Every effort should be made to ensure that these powerful agreements complement each other in letter and intent, and that duplicative reporting and enforcement efforts are avoided.

- Caribbean governments are encouraged to support the Cartagena Convention and its SPAW Protocol financially; Parties are encouraged to submit their dues in a timely fashion in order to ensure implementation of the work plans.

- Of the countries reviewed in this report, only Mexico and the United States have ratified the IAC. Once the Convention enters into force, other countries in the region are encouraged to accede.

Strengthen National Legislation

- In Caribbean countries that allow a marine turtle harvest, national legislation needs to be strengthened to overcome several deficiencies: (1) widespread application of minimum (as opposed to maximum) size limits, which contradict scientific knowledge on marine turtle demography and sustainable use of late-maturing and long-lived species; (2) contradictory legislation (for example, marine turtles are fully protected by wildlife laws but subject to an open season under fisheries laws); and (3) overlapping jurisdiction and law enforcement responsibilities, so that one agency assumes another will take the lead.

- Most of the countries included in this survey need to create or improve legislation through which to implement CITES.

- A number of governments have drafted or are in the process of drafting CITES implementing legislation, and they should seek technical assistance from the CITES Secretariat. At a minimum, legislation should prohibit trade in violation of CITES provisions and should provide for sanctions and penalties at levels sufficient to deter illegal trade. Governments need to ensure that funds are made available for CITES implementation and enforcement.

- The CITES Secretariat is urged to respond in a timely manner to Parties' requests for assistance in drafting or revising domestic legislation.

- CITES Management Authorities in the United Kingdom, France, and The Netherlands are encouraged to investigate their obligations for ensuring compliance with CITES and the EU wildlife trade regulations in their overseas territories. The EU countries are encouraged to follow up by providing the necessary assistance for their territories to achieve compliance.

Support Training and Capacity Building

- The U.S. government needs to assist its overseas territories with the following recommendations to ensure that implementation and enforcement of CITES legislation is effective: ensure that those charged with implementation have the capacity and tools to undertake the task; maintain strong links between the U.S. Management and Scientific Authorities and those responsible for enforcing CITES in the overseas territories; develop general awareness of CITES in enforcement officers; train territorial wildlife and customs authorities to enforce CITES; provide tools such as identification materials and guidelines; and develop public awareness initiatives.

- The U.K. government also needs to assist its overseas territories with the following recommendations to ensure that implementation and enforcement of CITES is effective: assist in the development of CITES legislation in the territories; ensure that those charged with implementation have the capacity and tools to undertake the task; establish Management and Scientific Authorities where needed; maintain strong links between the U.K. Management and Scientific Authorities and those responsible for enforcing CITES in the overseas territories; designate and train staff to enforce CITES; provide tools such as identification materials and guidelines; develop general awareness of CITES among enforcement officers (customs, police, fisheries); and develop public awareness initiatives.

- Regional training and capacity-building workshops could be convened with technical support from the CITES Secretariat and the UNEP Caribbean Environment Programme. Such workshops would benefit the implementation and enforcement of wildlife conservation and trade regulations at the national and regional levels. Training could be offered on methods to obtain and maximize human and financial resources; how to access useful resource materials, manuals, and information; technical issues; operating protocols; enlisting the support of the citizenry; and other areas. The last regional CITES training seminar on regulating international trade in wildlife was convened in Port of Spain, Trinidad, in September 1992.

- The wealthier and/or more experienced countries in the region (United Kingdom, Cuba, Mexico, and United States) are encouraged to increase their assistance of others in conserving regional marine turtle populations. Countries that have operated long-term research programs are in a position to share their expertise with countries that lack such programs.

Enforce Laws that Affect Local and Tourist Markets

- Vigorous enforcement efforts should target suppliers of hawksbill shell and other turtle products to tourists in the Dominican Republic, Mexico, Jamaica and other areas in which products are openly sold in the Caribbean. The management of the Cayman Turtle Farm and government officials should ensure that turtle products offered for sale in the farm's gift shop are not sold to tourists.

- Customs officials should be diligent about requesting information from returning tourists regarding the purchase of wildlife souvenirs. Tourists found returning home with marine turtle and other products prohibited from international trade should be penalized to deter further demand. Prominent displays that include color photographs of turtle shell trinkets should be visible in Immigration and Customs waiting areas.

Document and Monitor Shell Stocks

- Authorities in the Bahamas and Jamaica should proceed with documenting the quantity of hawksbill shell in the three stocks identified in this review (one in the Bahamas, two in Jamaica) and devise a system for ensuring that these stocks remain intact (do not expand or contract in contravention of domestic legislation) and can be monitored.

- Wildlife trade specialists are encouraged to undertake a survey to identify and inventory stocks of shell and other marine turtle products throughout the Caribbean region to assist international marine turtle trade monitoring efforts.

[end]