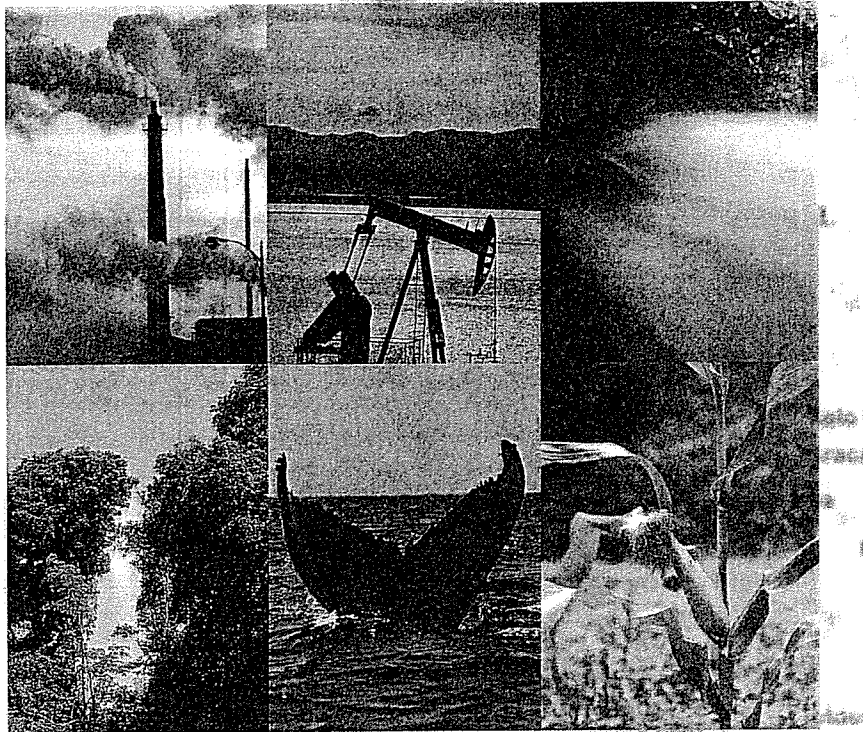


Environmental Issues in Latin America and the Caribbean

Edited by
Aldemaro Romero and Sarah E. West



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Chapter 1

IN THE LAND OF THE MERMAID: HOW CULTURE, NOT ECOLOGY, INFLUENCED MARINE MAMMAL EXPLOITATION IN THE SOUTHEASTERN CARIBBEAN

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Abstract: Although some progress has been made toward a better understanding of marine mammal utilization in the Southeastern Caribbean, no comparative analysis has been carried out to see how such practices originated, developed, and finally impacted the marine mammal populations in that region. We conducted field and archival studies for Venezuela, Trinidad and Tobago, Grenada, Barbados, and St. Vincent and the Grenadines. We analyzed records of whaling, dolphin fisheries, and manatee exploitation for those countries, interviewed local fishers, and explored the remains of whaling stations in each area. Our results show that each of these countries developed a different pattern of whale and dolphin exploitation, but similar patterns of utilizing manatees. We conclude that these five neighboring countries, although sharing essentially the same marine mammal species, developed different exploitation practices in terms of species targeted, capture techniques, and time periods in which that exploitation took place, due to different cultural circumstances.

Key words: whaling; dolphin fisheries; whales; dolphins; manatees

1. INTRODUCTION

Patterns of species exploitation by humans can be influenced by both environmental conditions and culture (e.g., religion) (Adeola, 1992; Richerson et al., 1996). Anthropogenic species extinctions (neoextinctions)

and/or depletion can provide a wealth of information regarding the biological and cultural aspects of interactions between humans and those species. In this chapter we intend to investigate the relative importance of both culture and ecology in determining how wildlife is exploited. To that end, we have chosen to study the history of exploitation of the same resource (marine mammals) among a group of five neighboring countries (Venezuela, Trinidad and Tobago, Grenada, Barbados and St. Vincent and the Grenadines) in the southeastern Caribbean.

Intentional captures of small cetaceans (whales and dolphins) throughout Latin America have been widely reported (see Romero et al., 1997 and references therein) as have incidental captures by gillnets in Mesoamerica and the wider Caribbean (Vidal et al., 1994). Organized commercial whaling of some kind has also been reported for the southern Caribbean (Caldwell and Caldwell, 1971; Romero et al., 1997; Romero and Hayford, 2001; Romero et al., 2002; Creswell, 2002). Dolphin fisheries have been reported in the same area (Romero et al., 1997 and references therein). It is also well known that manatees, *Trichechus manatus manatus*, have been overexploited in the Caribbean basin and that most, if not all populations, have become either extinct or severely depleted (Lefebvre et al., 2001). Despite the increasing amount of data in this field, this information has yet to be placed within a wider cultural perspective to ascertain how factors other than ecology can explain differences in modes of exploitation of the same resources among contiguous (by nature of their maritime borders) but culturally different countries.

In this chapter we examine marine mammal exploitation in the southeastern Caribbean and its cultural circumstances. We provide information that is consistent with our main argument, i.e., that local cultural, historical, economic, and political circumstances, are the determining factor in how those species have been exploited.

2. MATERIALS AND METHODS

Given the diversity in time and nature of many of the sources used for this research, we followed the basic principles of research synthesis (for details see specifics in Romero et al. 1997; Romero and Hayford, 2000; Romero et al. 2001; Romero 2002a,b and Creswell 2002). For St. Vincent and the Grenadines we relied on previously published reports since marine mammal exploitation activities have been widely documented in the past (e.g., Caldwell and Caldwell, 1975). Therefore, we summarize here both field and archival work carried throughout the study area.

2.1 The study area

For comparative purposes, we chose five neighboring countries whose exploitation of marine mammal resources has been well documented but that differ in history and culture. They are Venezuela, Trinidad and Tobago, Grenada, Barbados, and St. Vincent and the Grenadines.

These nations offer a unique opportunity to study faunal depletion/extinction because: (1) they have been subject to occupation by two highly different human cultures -Amerindians and Europeans- at different times and in multiple waves for which archaeological and historical data are available, and (2) they were among the first lands colonized and exploited by Europeans in the American continent, which allows us to understand, from historical records, how the social, economic, and political aspects of the colonization process affected species. Recent studies have shown that by combining paleontological, archaeological, ecological, historical, and economic data, one can reconstruct fairly precisely the historical ecology for some marine species of the Caribbean. This has been shown for coral reefs (Jackson, 2001), mollusks (Romero, 2003), whale sharks (Romero et al., 2000), whales and dolphins (Romero et al., 1997; Romero and Hayford, 2000; Creswell, 2002; Romero et al., 2002) and manatees (Lefebvre et al., 2001).

2.2 Historical setting

The early inhabitants of the Caribbean basin were the Paleo-Indians. They started colonizing the Caribbean basin as early as 7,000 YBP (years before the present). They traveled from the mainland to the islands by means of rafts and subsisted by fishing (Rouse and Cruxent, 1963). On the mainland, they were characterized as being collectors and gatherers of food as well as hunters of big game, and did not practice agriculture or used stone tools. It is widely held that these peoples probably migrated in response to the extinction of the large game animals and the subsequent decline of big game hunting culture on the mainland. In the Caribbean, Paleo-Indians were followed by Meso-Indians (about 3,000 YBP). They were more technologically sophisticated and reached the Greater Antilles from what is today Venezuela. They also invaded Trinidad in about 2,800 YBP but like the Paleo-Indians, they did not settle in the Lesser Antilles (with the exception of St. Thomas). They too lacked agricultural skills, being mostly gatherers and fishers. Only a few of them survived until the arrival of the Europeans (Watts, 1987).

Meso-Indians were supplanted in the Caribbean basin by the Neo-Indians. Two distinct groups composed the Neo-Indians: the Arawaks and the Caribs. The Arawaks originated in South America. They began

colonizing the Greater Antilles around 2,100 YBP (Rouse and Cruxent, 1963). They were the first Amerindians encountered by Columbus. Arawaks were mostly farmers who sometimes lived in stable villages. They also consumed fish, shellfish, turtles, and manatees. Land animals played a minor role in their diet (Watts, 1987). The Caribs came from the Orinoco region and followed the Arawaks path of colonization. They colonized the Lesser Antilles in about 1,000 YBP. By the time of Columbus, the Caribs could be found in what is today northern Brazil, the Guianas, Venezuela, and the Lesser Antilles while the Arawaks dominated in the islands north of Venezuela, Trinidad, and the Greater Antilles. Like the Arawaks, the Caribs also practiced agriculture, but because they tended to move more in pursuit of aggressive expansion, they depended on hunting, fishing, and collecting more than the Arawaks. It is difficult to determine the population size of these indigenous people (and, thus, their potential effect on natural resources); past attempts to estimate population figures have been highly controversial (Henige, 1998). A widely held figure for humans inhabiting the area considered for this study at the time Columbus' arrival is 50,000 (Lockhart and Schwartz, 1983). In general, remains of marine mammals have been found in archaeological sites associated with all of these cultures throughout the Caribbean (Wing and Reitz, 1982).

2.3 Species composition

The marine mammals of the southeastern Caribbean are poorly known. Beginning in the 1990's, some more systematic efforts have been carried out. These include Romero et al. (1997) and Romero et al. (2001) for Venezuela, Romero and Hayford (2000) and Romero et al. (2002) for Grenada, Creswell (2002) for Barbados, and Romero et al. (2002) for Trinidad and Tobago. Based on these efforts, we now have a more complete picture of the marine mammal composition of this region. Marine mammals in this part of the world can be divided into two major groups: sirenians (the manatee) and cetaceans (dolphins and whales). The species of marine mammals whose presence has been confirmed for the study area are listed in Table 1-1. This list excludes the boto (*Inia geoffrensis*), a dolphin found exclusively in freshwaters.

3. COMPARATIVE ANALYSIS

3.1 Venezuela

Venezuela is a continental, Hispanic country, with highly mixed ethnicity, whose economy is largely based on oil. It became formally independent from Spain in 1824. Fishing is largely a marginal activity (Romero, 1990). Legends about marine mammals occur among many peoples that traditionally inhabit the Orinoco Delta area. Human characteristics are attributed to whales and dolphins and most other wildlife. Tales about some animals portray them to be good while others clearly consider them to be bad. Some indigenous people kill some species without any cultural consideration while others species are respected and beloved. There is no uniform set of characteristics attributed to all marine mammals, thus traditional beliefs only influence the exploitation of certain species, and not marine mammals as a group. What follows is summarized from Romero et al. (1997, 2001) unless otherwise noted.

3.1.1 Manatee exploitation

Manatees have been exploited in Venezuela since pre-Columbian times. Indigenous peoples of the lower Orinoco River (the Waraunos, an Arawak tribe) believed that manatees had special powers that were released during the eclipse of the moon. They also called the Milky Way 'the road of the manatee.' Manatee meat has been used as food, their oil for cooking, and their skin for the manufacture of whips. These products, as well as ear bones, have also been used for medicinal purposes in different forms. In addition, ear bones were used as amulets. Tribes in the Amazon, however, believed that people that drown or ate manatees became manatees themselves. There is little question, however, that manatees have been heavily exploited in the past and that illegal hunting occurs to the present day leading to a severe depletion of the fragmented populations of this species (Lefebvre et al., 2001).

Table 1-1. List of marine mammal species whose presence has been confirmed in the countries of the study area.

Species	Venezuela	Trinidad and Tobago	Grenada	Barbados	St. Vincent/ Grenadines
<i>T. manatus</i>	X ¹	X ²	X ³		
<i>B. borealis</i>	X				
<i>B. edeni</i>	X	X ⁴	X ⁵		
<i>B. physalus</i>	X				
<i>M. novaeangliae</i>	X	X ²	X ³	X ⁶	X
<i>P. macrocephalus</i>	X		X ³	X ⁶	X
<i>K. breviceps</i>				X ⁶	X
<i>K. sima</i>					X
<i>M. europaeus</i>		X			
<i>S. bredanensis</i>	X	X ⁵		X	X
<i>S. fluvialis</i>	X	X			
<i>G. griseus</i>	X				X
<i>T. truncatus</i>	X	X ²	X ³	X ⁶	X
<i>S. frontalis</i>	X	X	X ⁶	X ⁶	X
<i>S. attenuata</i>	X	X ⁵	X		X
<i>S. longirostris</i>	X		X ⁶		X
<i>S. clymene</i>	X				X
<i>S. coeruleoalba</i>	X				X
<i>D. capensis</i>	X		X ⁶		
<i>L. hosei</i>	X ⁷				X
<i>P. electra</i>	X ⁸		X ⁶		X
<i>F. attenuata</i>	X				X
<i>P. crassidens</i>	X	X	X ⁶		X
<i>4O. orca</i>	X	X ²	X ⁶	X ⁶	X
<i>G. macrorhynchus</i>	X	X ²	X ⁶	X ⁶	X
<i>Z. cavirostris</i>	X			X	X
Total	23	12	13	9	19

Numbers refer to most recent source(s). For all records prior to 2001 (without superscript) Romero et al., 2001 and references therein.

- 1 Lefebvre et al. (2001)
- 2 Romero et al. (2002a)
- 3 Romero and Hayford (2000), Romero et al. (2002b)
- 4 Swartz (et al. 2001)
- 5 Romero et al. (2002b)
- 6 Creswell (2002)
- 7 García et al. 2001
- 8 Bolaños et al. 2001

3.1.2 Whaling

Venezuelan fishers have never been involved in whaling. Yankee whalers visited the Gulf of Paria, between Venezuela and Trinidad, between 1837 and 1871 but may also have visited at other times. They hunted predominantly for humpbacks, but occasionally they killed sperm whales and 'blackfish,' *G. macrorhynchus*. At least nine whaling voyages were carried out by Yankee whalers, capturing at least 25 whales (Reeves et al., 2001). There was very little, if any, interaction between the whaling crews and Venezuelans. Therefore, there is no evidence that they ever influenced any marine mammal exploitation practice in Venezuela. There has never been shore whaling in Venezuela.

The ecological impact of whaling in Venezuelan waters is not known, except for the fact that whales are no longer found in the Gulf of Paria (see Trinidad and Tobago section below). Humpbacks are still found in other Venezuelan waters.

3.1.3 Dolphin fisheries

Venezuelan fishers usually employ small boats with a crew of at least three people (the captain, the harpooner, and his assistant) to hunt for dolphins. Indigenous peoples used harpoons for marine and freshwater captures of cetaceans and manatees. Although all other fisheries tools used in Venezuela today can be traced to Mediterranean origins, harpoon points sharpened from bone date back to Meso-Indian times (7,000 - 3,000 YBP). The ancient harpoon heads are remarkably similar to those made today along the Upper Orinoco. Hand-thrown harpoons are still used today for most intentional catches of marine mammals in Venezuela. Throughout the country, all harpoons are very similar in design and structure. The local names used for the different parts of the harpoons are also similar, despite some of them deriving from many different Arawak and Carib languages. This structural and linguistic consistency suggests that use of harpoons is of ancient origin and is widespread. Today harpooning is the preferred method

for dolphin fisheries in Venezuela. Dolphins that are accidentally netted are usually consumed.

Cetacean oil was widely used in the nineteenth century for lamps, as a lubricant, and for medicinal purposes. Even today some fishers employ the blubber of the boto, *Inia geoffrensis*, as asthma remedy, and fishers at Maracaibo Lake rub the fat of the tucuxi, *Sotalia fluviatilis*, on the chests of sufferers of coughs, flu, and asthma. However, today dolphins are captured almost exclusively for the purpose of obtaining meat as bait for shark (and sometimes crab) fishing. The liver of the dolphin is commonly consumed directly as a delicacy and dolphin teeth are sometimes used to make necklaces. Occasionally, some freshwater dolphins have been captured for exhibition in aquaria both in and outside Venezuela; however, recent attempts to do so have encountered stiff criticism (Romero, 2000).

There is evidence that at least 12 of the 23 marine mammal species found in Venezuela have been taken by fishers. The species most frequently mentioned are the common dolphin, *Delphinus capensis* (25%), the bottlenosed dolphin, *Tursiops truncatus* (23%), and the boto *Inia geoffrensis* (16%). Most of the animals taken inhabit coastal areas.

Capture occurs throughout the year. There has been an increase in the last few decades in reports of dolphin hunting. That probably reflects an intensification of fisheries in general that followed the Venezuelan government's 1960's policy of granting fishing licenses, docking rights, and Venezuelan flags to numerous long-line fishing boats of Japanese, South Korean, and Taiwanese origin.

There is no formal system for monitoring or reporting cetacean catches in Venezuela. Fishers are aware that the activity is illegal. Catches thus go unreported. When interviewed, fishers say that they capture several dolphins per sortie, a minimum of two or three, sometimes as many as 12. Some remote beaches are used to butcher dolphins out of sight of authorities, and contain numerous remains of dolphins in different states of decomposition (Fig. 1-1).

The Venezuelan government estimates that a total of 200 to 300 dolphins are killed every year, but all other sources put the figure 25 to 70 times higher. Fishers of the eastern part of the country, where there is an abundance of dolphins, are the ones that most commonly hunt dolphins. Nothing is known about the population status of the species involved in cetacean fisheries; therefore, there is no way to quantitatively ascertain the impact of the fisheries on their stocks.

Venezuela has no legislation that specifically addresses the exploitation of marine mammals. There are two pieces of legislation designed to protect wildlife in Venezuela: the Wildlife Protection Law (a civil statute enacted in 1970) and the Environmental Criminal Law (a penal statute enacted in 1992); but enforcement is rare.

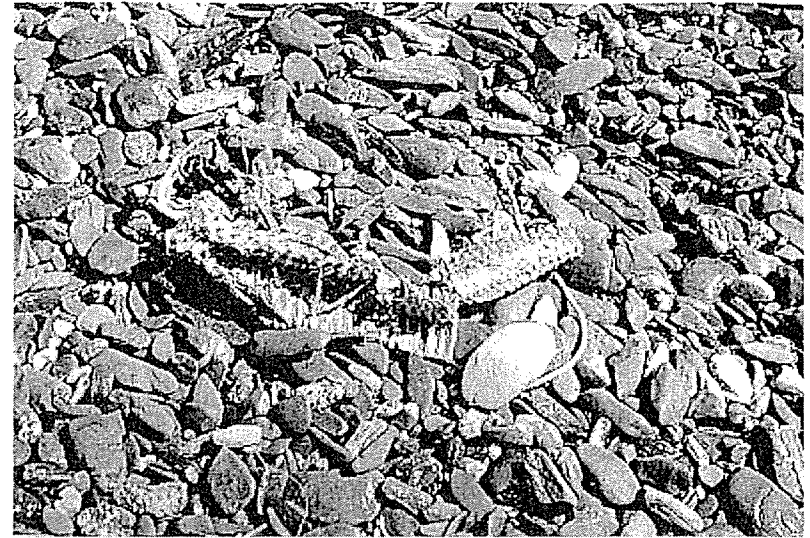


Figure 1-1. Remains of *Delphinus capensis* in La Francesa Beach, Sucre State, Venezuela (Photo by A. Romero).

3.2 Trinidad and Tobago

This is basically a two-island country, originally inhabited by the Arawaks. It was under Spanish rule until 1797, when the local Spanish government capitulated to a British force, and was formally ceded to Great Britain in 1802. Slavery was abolished in 1833 and between 1845 and 1917 more than 150,000 Muslim and Hindu Indians were brought to the island of Trinidad by the British to replace plantation slaves. Tobago, originally inhabited by the Caribs, was successively a Spanish, British, Dutch, and French possession until 1814, when France ceded it to Britain. Tobago formed a part of the Windward Islands Colony until 1889, when it was joined to Trinidad. Today Trinidad and Tobago, which became independent in 1962, is a multicultural nation with a mixed industrial-agricultural economy in which fishing plays a minor role. What follows has been summarized from Romero et al. (2002a) unless otherwise noted.

3.2.1 Manatee exploitation

Manatees have been harpooned for their meat, oil, and hide from Colonial times until relatively recently. Today the only remaining area in Trinidad still inhabited by manatees is the Nariva Swamp. A 1997 survey revealed the presence of at least 18 individuals, down from an estimate of 25-30 in 1991. If manatees were accidentally caught in nets, they were butchered. Despite legal statutes aimed at protecting both the species and its habitat, the manatee is still locally threatened with extinction. The enforcement arm of Trinidad's Wildlife Section does not have sufficient staff to enforce the laws. Therefore, poaching, squatting, harmful agriculture practices, indiscriminate harvesting of mangroves, and mining continue to this day.

3.2.2 Whaling

All available data indicate that there was never much interaction between Yankee and shore whalers. Yankee whaling in the area did not start until the 1830s, when Trinidadian shore whaling was already in full swing.

Shore whaling by Trinidadians, on the other hand, was widely practiced as an opportunistic endeavor. When humpback whales (the only species they regularly captured) were spotted from shore, the whalers launched a small boat called 'pirougue' (wooden skiff) led by a captain at the stern, six stalwart oarsmen, and a harpooner in the bow. If a cow and calf were encountered together, the whaler attempted to wound the calf with the least possible injury in order to ensure that the mother could be easily approached and harpooned, due to the strong mother-calf bond exhibited by the target species. Once struck, a flag was stuck in the whale, the mouth was sewn up so the whale would not take in water and sink, and the carcass was towed to the station. Local laborers worked for up to 24 hours at a time flensing the animal, as near to the shore as possible. The slices of blubber were placed in sugar coppers (copper kettles formerly used to boil sugarcane) and boiled to extract the oil. During this period, numerous sharks showed up to take bites out of the remains of the whales. Apparently they were so numerous that the whaling company employed men to kill them with harpoons and hatchets. A Bermudan whaler known as 'Old Abraham' may have been instrumental in the introduction of some whaling techniques. In 1834 a professional harpooner from Germany was brought in.

By the early 1830's there were already four whaling stations in operation in the 'Bocas' (passages between nearshore islands) area in northeastern Trinidad. The whaling stations were very primitive consisting essentially of either of shacks or one-story buildings (Fig. 1-2).

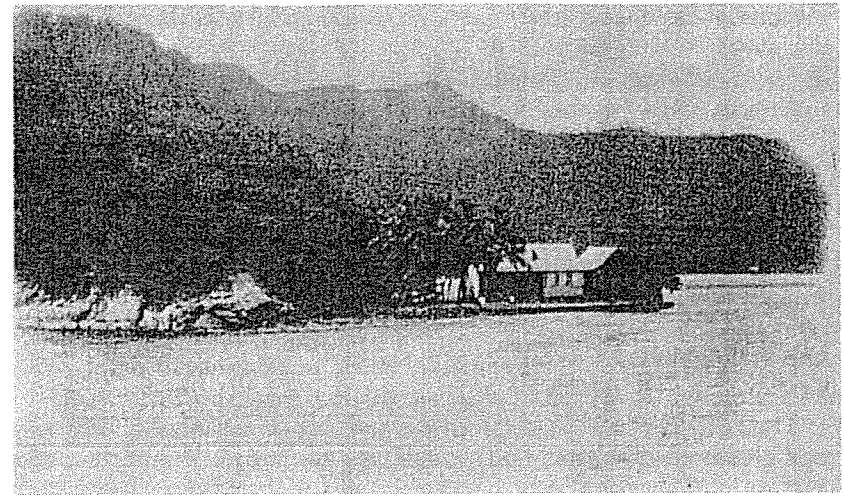


Figure 1-2. Whaling Station, Copper's Hole, Monos Island, Trinidad Ca. 1900 (Photo by an anonymous photographer; picture found at the Library of the University of the West Indies in St. Augustine, Trinidad).

Today there is little left of these whaling operations except for two coppers and one container submerged just a few meters from the location of one of the former stations.

The oil was taken to Port of Spain and was mostly consumed locally as lamp oil or medicine-whale oil (mixed with honey, a flu remedy). Oil that was exported was sent mostly to British colonies. The meat was consumed locally. Whalebone was sent to London for use as manure.

Although there are some unconfirmed reports of shore whaling taking place in Trinidad at the end of the eighteenth century, commercial whaling most likely began around 1826 initially employing slave labor. Whaling operations ceased at the end of the 1870's due to the depletion of the local whale population. Whaling took place between January and May every year, when humpbacks visited Trinidadian waters.

The number of whales caught annually was usually between 20 and 35 totaling least 500 whales killed. Baleen whales no longer frequent Trinidadian waters and are only seen in very small numbers around Tobago.

The establishment of whaling in Trinidad was authorized in 1827. Japan requested that the government of Trinidad and Tobago join the IWC and oppose the ban on commercial whaling. To this day, the Trinidadian

government has done neither. Legal protection for cetaceans in Trinidad is ambiguous.

Shore whaling in Trinidad must have required important local investment, given that from the beginning we find the names of upper-class Trinidadian families involved in this business. All of these were merchant and planter families. Some had been involved in coconut oil production and sales; therefore, they saw in whale oil an opportunity to expand their business. The development of commercial whale fisheries in Trinidad coincided with bad economic times for the island and with the decline in the local population between 1827 and 1833.

3.2.3 Dolphin fisheries

There is only one piece of evidence of possible utilization of cetaceans by pre-Columbian inhabitants of Trinidad: an unidentified bony remain of a cetacean at St. Joseph (the first Spanish capital of Trinidad) on a branch of the Caroni River on the south side of the North Range. There is no indication of the type of capture.

Dolphin fisheries have always been rare in Trinidad and Tobago waters. Reports of these activities are scant and most are related to accidental nettings. When captured, the animals are butchered and usually sold. They are sometimes labeled as 'shark.' The species involved in these incidental takings are *Stenella* spp. and *Tursiops truncatus*. The largest animal ever taken in this way was an orca, *Orcinus orca*. The only other current utilization of marine mammals is an occasional dolphin watch operation in Tobago.

3.3 Grenada

The Caribs originally inhabited this small country. The first Europeans to establish themselves permanently here were the French in 1650. In 1783, the island was ceded to the British who immediately imported large numbers of slaves from Africa and established sugar plantations. The colony gained independence in 1974. It maintains a strong mixture of French and British culture as evidenced by names of people and places, and by the overwhelming predominance of Catholicism. It has a small-scale agricultural economy with a fledgling tourism industry. Fishing is a marginal activity. The information below has been summarized from Romero and Hayford (2000), and Romero et al. (2002b) unless otherwise indicated.

3.3.1 Manatee exploitation

Archaeological and historical records indicate that manatees were hunted for their meat, using harpoons, by pre-Columbian people as well as Europeans up to the seventeenth century).

3.3.2 Whaling

Some Yankee whaling took place in these waters from as early as 1857 until 1888. Whaling ships primarily hunted humpbacks, but occasionally landed sperm whales. The ships provided whale meat to the local market of Grenada and the neighboring southern Grenadines (Reeves et al., 2001).

However, it was shore whaling the activity that most impacted marine mammals populations in the waters of Grenada. Between 1920 and 1923 shore whaling was purely opportunistic. Local fishers harpooned whales from small boats that had previously been used for the same purpose in Barbados (Creswell, 2002). Fishers from Bequia were known to whale in Grenadian waters. In 1925 and 1926, Norwegian whalers brought two and three, respectively, modern steam-driven whaling vessels from Norway. Each vessel had a crew of eleven men and employed harpoons with explosive heads. Whaling always took place between January and April.

The Norwegians built a modern, 2-story whaling station on Glover Island (in the south of Grenada) in 1924 (Fig. 1-3) and directed the entire operation from that point onward.

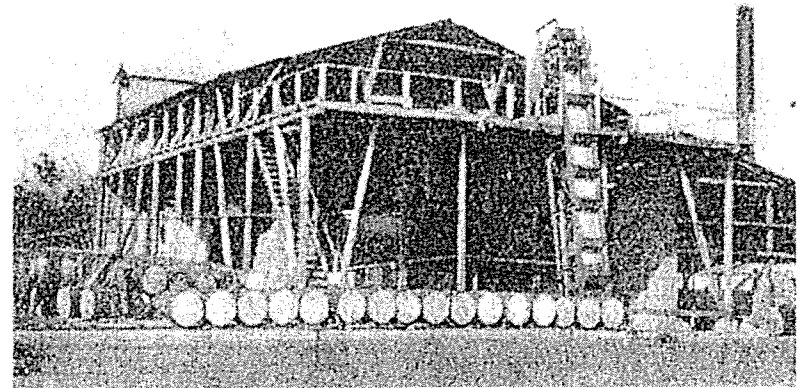


Figure 1-3. Only known picture of the whaling station at Glover Island, Grenada (picture by unknown photographer at the Grenada Archives).

About seventy people (mostly locals) were employed at Glover Island. They almost exclusively captured humpback whales although there was a landing of a Bryde's whale, *Balaenoptera edeni*.

Between 1920 and 1923 whale oil was exported to Trinidad, Barbados, and the United Kingdom. Under the Norwegians, whale oil was exported to Norway, the Netherlands, the United Kingdom, Barbados, and Demerara (today's Guyana). Some of the whale meat was sold for human consumption. Manure was exported to Trinidad.

We have very precise figures on the number of whales taken in Grenadian waters by shore-whaling operations: 10, 1, and 5 whales were taken in 1920, 1921, and 1923, respectively. In 1925 and 1926, the Norwegians captured 105 and 72 whales respectively. After that, the operation was abandoned due to the scarcity of whales. No operations were carried out in Grenada during the 1927 season. Whales in the area are very rare today.

With the establishment of the whaling operation by the Norwegians, the colonial government of Grenada required that every piece of the animal had to be utilized and that strict measures be taken to avoid the foul smell of these operations spreading to the main island of Grenada.

The establishment of the Norwegian operation required extensive investment. After the 1926 season, where no whales could be seen and/or captured, the operation collapsed. All attempts to refinance the company failed. This coincided also with a more general depletion of whale stocks in the Northern Hemisphere. In addition, beginning in 1925, factory whaling ships were equipped with ramps that allowed the catch to be processed on board, making land stations like the one at Glover Island unnecessary. In 1928, the whaling industry at Glover Island was finally abandoned and the factory was dismantled in 1929. The only current utilization of marine mammals is by two whale watching operations.

The Grenadian government has supported Japan's position in favor of commercial exploitation of whales in the most recent meetings of the International Whaling Commission (IWC). During the 1999 meeting of the IWC that took place in Grenada, abundant literature in English, printed in Japan, promoted the development of 'traditional' whaling. One week before the aforementioned meeting, a humpback whale and its calf were killed in the Grenadines. The news was highly publicized in the Grenadian media, which was critical of their government's pro-whaling policies, leaving Grenadians wondering if the practice of whale killing will reach their island.

3.3.3 Dolphin fisheries

There are no records of intentional dolphin exploitation in Grenada. We heard of an instance of a stranded dolphin which was butchered and its meat later consumed by the locals.

3.4 Barbados

From the time of its discovery by the Spaniards, Barbados was raided for slaves, and by 1500, was entirely depopulated. After that, the Portuguese visited occasionally. The British established it as a colony in 1627. Slavery was abolished in 1833, leading to a substantial increase in agricultural production, particularly sugar. It gained independence in 1966. It is the most densely populated of the Lesser Antilles and its economy is dependent on tourism, agriculture, and offshore banking. Fishing is a secondary industry but, comparatively speaking, is slightly more important than in the other countries covered in the present study. The information below is summarized from Creswell (2002).

3.4.1 Manatee exploitation

There is no evidence that manatees ever inhabited Barbados.

3.4.2 Whaling

Under British rule, Bridgetown became a busy port and Barbados a regular stop on the routes of many cargo, passenger, and whale ships. Despite early descriptions of an abundance of humpbacks in Barbadian waters, it seems that Bridgetown was mostly used as a port for supplies replenishment and crew recruitment. Curiously there was relatively little Yankee whaling in Barbadian waters. Whaling campaigns were recorded between 1859 and 1866.

Shore whaling was a different story. There are archaeological remains of a sperm whale and dolphins in Barbados, but none of humpback whales. These remains most likely correspond to stranded animals. The first historical record of a whale (probably a stranded humpback calf) utilization in Barbados dates to 1813. The meat was consumed by the local black population.

Shore whaling was an opportunistic operation based on humpback whale sightings from the shore. Whalers employed boats powered by both sails

and oars that were operated by a relatively small crew. They used harpoons to capture the whale and an explosive lance ('bomb lance'), to kill it (Fig. 1-4).



Figure 1-4. Aldemaro Romero holds a whaling gun, from which the bomb-lance was shot. Shotgun courtesy of Charles Jordan. Picture by J. Creswell.

The whalers jumped into the water and sew the whale's mouth shut, to prevent it from filling with water and sinking. The whale was then dragged ashore, alongside a jetty on the beach for flensing. Although there are reports of sharks attacking whale carcasses, the local operations never employed anyone to kill the sharks while the animal was being flensed. In fact, the whalers could reportedly walk through the water in the midst of the frenzied sharks and not be harmed. Barbadians were routinely recruited to join the crews of Yankee whaling ships. Some of these Barbadians returned home after the voyages, having gained the necessary skills to hunt whales, and started their own operations.

Beginning in 1867, three shore whaling stations were established. They consisted of shacks on the beach where the whaling gear was stored. The blubber was boiled in copper kettles, of the same design as those used to boil sugar cane juice. The oil was exported to England and Canada. The bones were ground and used as fertilizer. The meat was sold locally for consumption and eaten by the black populations. The baleen plates were used to make brooms.

Records of whaling operations span from 1879 to 1910, always between January and May. The average number of whales taken per year between

1889 and 1902 was 11.6 with a maximum of 37 in 1901. The total number of whales killed in the Barbadian shore whaling industry was at least 187. Shore whaling ceased due to the scarcity of whales. At that time, the two remaining whaling boats were taken to Grenada and operated there from 1920 to 1923.

There was usually significant competition between the stations over whales. Two of the stations were located next to each other and both saw whales at essentially the same time. In 1904, the government passed the Fisheries Regulation Act, updating all of Barbados' fishing regulations and consolidating them into a single bill. This included laws governing competition between whaling boats from different operations, probably as a response to quarrels between the two stations. These laws include provisions that establish ownership of a whale by the first boat that strikes it and the ownership of a mother by a boat that strikes her calf, and vice versa. They even detail how profits and expenses are to be split if two boats happen to strike the same whale.

Local business families owned and ran the whaling operations but whaling was not their primary source of income. Although Barbados is not a member of the IWC, it may soon join. It has received financial assistance from Japan to upgrade its disaster emergency mechanism, a move seen by many as Barbados accepting a bribe in exchange for supporting the Japanese pro-whaling agenda.

3.4.3 Dolphin fisheries

The rare dolphin captures in Barbados are limited to accidental nettings. The primary use of nets by Barbadian fishers is to catch flying fishes for which gill nets are used.

3.5 St. Vincent and the Grenadines

Caribs were the original inhabitants of these islands. They aggressively resisted European settlement until 1719, when the French settled St. Vincent. During the eighteenth century, African slaves from St. Lucia and Grenada, intermarried with the Caribs and became known as 'black Caribs.' The French established plantations for a variety of agricultural products and imported many slaves. In 1763 St. Vincent was ceded to Britain. Slavery was abolished in 1834. This resulted in shortages of labor, attracting Portuguese and East Indies immigrants. The colony gained independence in 1979. Today its economy depends heavily on agriculture (mostly banana) and tourism. Fishing is a minor industry. Bequia, an island in the northern

Grenadines, is home to most of the whaling and dolphin fisheries in the country.

3.5.1 Manatee Exploitation

There is no evidence that manatees ever existed in these islands.

3.5.2. Whaling

3.5.2.1 Yankee whaling

Yankee whalers visited the St. Vincent and the Grenadines area very consistently between the 1830's and the 1880's. Some of the ships whaled there for several months at a time.

Yankee whalers influenced the beginning of this activity at the local level by recruiting some seamen/fishers in the Grenadines to man their whaling boats. That was the case of William Thomas Wallace, Jr. ('Old Bill'), born in Bequia in 1840. Of Scottish ancestry, he was a planter who served as a seaman on numerous whaleships beginning in 1857. He went to Provincetown and New Bedford, major whale ports at the time, marrying in the former and learning ship building in the latter. He returned to Bequia where he established a shore whale fishery sometime between 1875 and 1876. This activity was carried out as a supplement to income from the agricultural industry, which, by this time, was in decay. The whaling season coincided with the time of year when less labor was needed for the cultivation of crops (Adams, 1970).

3.5.2.2 Shore Whaling/Dolphin Fisheries

Unlike the other countries covered in this study, St. Vincent and the Grenadines' shore-based marine mammal exploitation encompasses both large whales and dolphin fisheries. Some of those activities still take place today; hence, the use of present tense in some of our statements.

Most captures took/take place on the windward side of the islands in order to help bring the whales to shore after they had been harpooned. Whales were/are spotted from shore-based lookouts. The spotters use signal mirrors to direct boat crews toward whales. Whalers originally employed Nantucket-type sailing boats. Much later, some were outfitted with engines. Initially they used hand-held harpoons, but gun harpoons were introduced in 1958. Butchering took/takes place in the water near the beach. The flensed parts of the animals were/are placed in boats pulled alongside the carcass and transported to shore. Men in boats lance sharks scavenging in the area (Adams, 1970, 1971).

The number of whaling stations has varied through time. At one point there were seven whale-fishing operations in Bequia and Ile-de-Caille, with four boats, each employing six men. In Bequia the whaling stations have always been primitive and consist of a small shed for storing blubber and a small structure that supported their boiling kettles, but no buildings of substantial size. In 1931 a local resident started a whaling company with three boats to hunt pilot whales, sperm whales, and dolphins. Later others became interested and the fleet was expanded to 15 boats; today that number is somewhat reduced. All of these whaling initiatives were developed by local planters with the necessary capital to invest in the operations. Crewmen, however, were/are from the lower social classes (Adams, 1971; Beck, 1986).

Captured humpbacks generate meat and oil as primary products. A humpback yields between 400 and 1,500 gallons (ca. 1,500 and 5,700 liters respectively) of oil, and adults could yield more than 2,000 pounds (ca. 908 kilograms) of meat (Rack, 1952; Adams, 1973). In the past, most of the oil was sent to Kingston, St. Vincent, where it was subsequently routed to England and the U.S. Some (about 1,000 gallons – 3,785 liters- a year) was sent directly from Bequia to Trinidad and Barbados. Between 1893 and 1903 an average of 25,000 gallons (about 95,000 liters) was exported. Meat was very popular among blacks, but unpopular among whites (Adams, 1970). Because there is no market for whale oil today, meat is the main product obtained from modern whaling. The procedures for flensing the animal and preparing oil today are essentially the same as that used in the past (Fenger, 1958; Beck, 1986). The main usage of non-humpback marine mammals is for meat, although their oil can be used for cooking, medicinal purposes, and as a lubricant (Brown, 1945; Adams, 1970). An average pilot whale yields 25 gallons (ca. 95 liters) of oil.

In addition to humpback whales, the others species exploited in waters of St. Vincent and the Grenadines have been: pilot whales ('blackfish'), *G. macrorhynchus*; sperm whales ('sea-guaps'), *P. macrocephalus*; orcas ('Whitefish'), *O. orca*; and dolphins (*T. truncatus* and *Stenella* spp.). Other species, such as the false killer whale, *P. crassidens*, Cuvier's beaked whale, *Z. cavirostris*, the rough-toothed dolphin, *S. bredanensis*, the pygmy killer whale, *F. attenuata*, the dwarf sperm whale, *K. sima*, and Fraser's dolphin, *L. hosei*, may be taken occasionally, on an opportunistic basis (Caldwell and Caldwell, 1975; Caldwell et al., 1976).

Humpbacks were taken very actively between 1875 and 1925 and the whaling season was between January and May (Adams, 1970). Initial hunting of pilot whales took place from the nineteenth century to the present in a very occasional and intermittent way; only since 1931 it has been a major operation. This activity is a year-round one with lows between mid-December and mid-January and during holidays (e.g., Carnival) or special occasions (e.g., weddings, funerals) (Rack, 1952).

The total number of humpbacks taken in St. Vincent's and the Grenadines waters has yet to be fully ascertained. Most estimates suggest at least 550 whales in total killed through shore whaling alone between early 1860's to the present. It seems that early on about 115 humpbacks were taken per year. Around 1900, 50 were captured and from 1910 until the present no more than 10 have been landed per year. Between 1940 and 1957 no whales were taken. Between 1958 and 1984 between 52 and 70 humpbacks were landed. This decline is the result of overexploitation (Adams, 1971; Beck, 1986; Price, 1985; Agard and Gobin, 2000). Today the quota allowance granted by the IWC is three humpbacks per year.

The number of pilot whales captured between 1962 and 1979 was between 25 and 422 per year (average = 194 per year), while the number of killer whales was 0 to 12 per year, sperm whales 0 to 6 per year, and false killer whales 0 to 15 per year. The total number of dolphins captured has been between 200 and 500 per year for the same period. In all cases, the declining number of catches beginning in the 1970's has been attributed to overfishing (Adams, 1973; Caldwell and Caldwell 1975; Price, 1985).

There is a law in St. Vincent and the Grenadines, governing the whale fishery at Bequia. The 'Whalers Ordinance of 1887' lays out many of the same rules as the Fisheries Regulation Act of Barbados. The Whalers Ordinance was the result not only of quarreling, but also of hostile behavior between whaling companies, such as boats ramming each other and whalers scaring whales away to prevent their competitors from catching them (Adams, 1971; Beck, 1986).

In 1868 whaling ranked fourth in the value of exports from St. Vincent. Shore whaling was a prestigious activity among locals (Adams, 1970). St. Vincent and the Grenadines and St. Lucia have enough marine mammals present to support small whaling operations (Hoyt, 1994). These two countries are the only ones in the Caribbean countries that have whaling allowances (three and two, respectively) from the IWC on aboriginal whaling grounds (Agard and Gobin, 2000).

4. DISCUSSION

Archaeological evidence strongly suggests that pre-Columbian cultures in the Caribbean opportunistically exploited any and all marine mammal resources available to them. The little we do know about Amerindians of the Caribbean suggests that they did not have widespread cultural barriers to marine mammal consumption. In fact, on some islands, marine mammals made up a portion of the Carib and Arawak diets.

Manatees were present in Venezuela, Trinidad, and Grenada and were consumed by the indigenous people of the Lesser Antilles before the arrival

of Columbus. Archaeological remains indicate that the West Indian manatee was distributed throughout most of the Lesser Antilles and that indigenous people inhabiting those islands consumed them (Ray, 1960; Wing et al., 1968; Watters et al., 1984; Lefebvre et al., 2001; Wing and Wing, 1995). A single manatee yielded an average of around 440 kg of meat, plus some fat, making it an excellent, easily exploitable food source. They were hunted from canoes, using harpoons with floats and ropes attached (Rouse, 1948; McKillop, 1985; Watts, 1987). With the arrival of the Europeans their exploitation accelerated to the point that they became extinct in Grenada and severely depleted in Venezuela and Trinidad. Historical accounts also support the idea that manatees were hunted with harpoons throughout Colonial times (Du Tertre, 1667; Dapper, 1673; Labat, 1742; Bullen, 1964; Wing and Wing, 1995; for additional citations on pre- and post-Columbus use of manatees in the Caribbean see McKillop, 1985).

The pattern of cetacean exploitation developed into two differentiated types in the region: Venezuela, a Hispanic country, did not engage in whaling but rather in dolphin fisheries. This is the same pattern followed by other Latin American countries (Romero et al. 1997 and references therein). On the other hand, the other four countries of our study, all of them at some point under British influence, developed shore whaling, with St. Vincent and the Grenadines also engaging in dolphin fisheries, an alternative developed after local whale population became depleted.

Despite the fact that Yankee whaling took place in all of the countries in our study area, it did not have any significant cultural influence either in Venezuela or in Trinidad. The reason the Yankee whalers had little influence on Trinidad was because shore whaling was already taking place by the time the first of them arrived. Although Yankee whalers visited Grenada, there is no evidence of their influence in the country, since shore whaling began in the twentieth century, i.e., well after Yankee whalers stopped visiting those waters. Grenada's whaling industry did really not take off until the Norwegians started to exploit the resource in 1925.

Barbados and St. Vincent and the Grenadines were different cases. Yankee whalers recruited natives of both countries as crews for their ships. Further, the last known whaling campaign by a Yankee whaler in Barbadian waters was in 1866 and the very next year, Barbadians started to develop shore whaling, for which they used Nantucket-type sailboats very similar to those employed by Yankee whale ships to pursue whales. The same can be said of St. Vincent and the Grenadines, where they still employ similar boats today. Whalers from Barbados and St. Vincent and the Grenadines used different boats than the ones from Trinidad and Tobago: the former used sailboats and the latter rowing boats. Therefore, Caldwell and Caldwell's (1971) statement that 'All of the formal whaling in the Lesser Antilles is patterned after the style of the New England whalers' is not completely accurate.

Whaling stations were also different: the ones in Barbados consisted of a shack on the beach in which whaling gear was stored. There were no permanent buildings. This situation is similar to the one in Bequia, in which the whaling stations had a small shed for storing blubber and a small structure that supported their boiling kettles, but no buildings of substantial size. The stations in Trinidad ranged from the shack type to one-story buildings, but none had structures to assist with bringing whales onto the beach, as whales were flensed in the water. These examples stand in stark contrast to Grenada, whose Norwegian-built station on Glover Island was a two-story building with a concrete chute for dragging whales up to a flensing platform. In Venezuela, the flensing of dolphins takes place either on isolated beaches or on board long-line fishing boats, in order to hide this illegal activity.

Oil was the main reason for hunting whales. In the case of Barbados, the whale oil export market exhibited a normal economic relationship between supply and demand. The value of oil remained relatively constant at low levels of production, but when production increased dramatically, the price of oil dropped substantially. Other than the one-year peak in 1907, the price of whale oil in the twentieth century never returned to its previous high value. Indeed at the peak of production, in 1901, the price per barrel dropped below £1 (from a maximum of £4). The fact that the price per barrel remained relatively low after the peak suggests that the market was saturated in those years. It also suggests that the demand for whale oil was decreasing as people began to substitute alternatives for whale products (Creswell, 2002). The same factor contributed to the demise of Trinidad's whaling industry. From the 1870's onward, there was an overproduction of whale oil, and kerosene was being used as lamp fuel, instead of whale oil. Thus the price of whale oil plummeted (Romero et al., 2002a).

The level to which whale products were used varied from country to country. In Trinidad and St. Vincent and the Grenadines people use(d) oil for medicinal purposes while the meat was consumed locally. In Trinidad the bones were used for manure. A similar pattern was followed in Grenada, except that law mandated the full utilization of the carcass. In Barbados people of African descent were the main consumers of whale meat and the whale plates were used to make brooms. It is interesting to note that contemporary accounts tend to emphasize that whale meat was popular among people of African descent but not among those of European descent throughout the Caribbean.

Humpback whales were overwhelmingly the target species in the former British colonies, although in the case of St. Vincent and the Grenadines catches were progressively diversified to include all available species of marine mammals.

Another interesting fact among the countries involved in whaling was that they developed whaling at different points in history. The first to

develop shore whaling was Trinidad (1830-1862), then Barbados (1879-1910), and then Grenada (1920-1926) (Fig. 1-5).

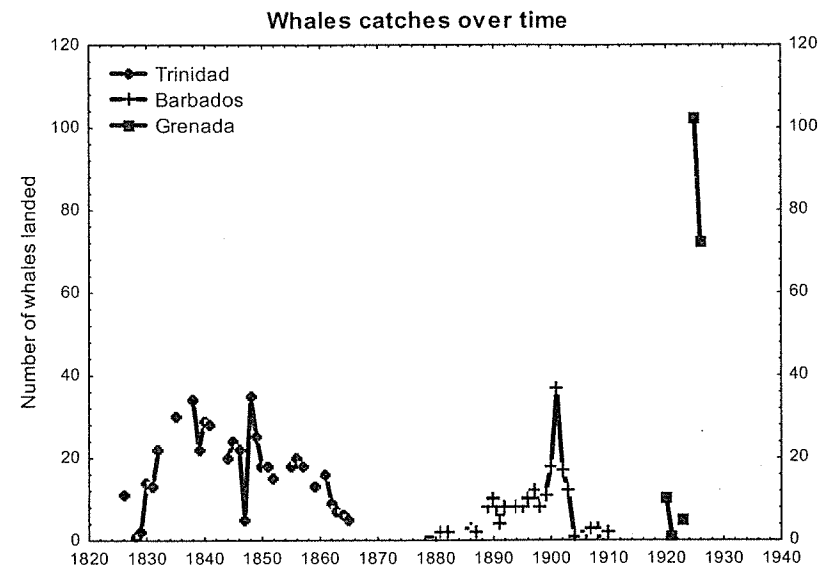


Figure 1-5. Whale catches for Trinidad, Barbados, and Grenada, not counting those from Yankee whalers (based on Romero et al., 2002; Romero and Hayford, 2000; and Creswell, 2002; respectively).

St. Vincent and the Grenadines had a more complicated history: They began shore whaling for humpbacks in 1875 and temporarily stopped doing so around 1920, which means that their industry operated concurrently with the one in Barbados; yet, unlike Barbados, humpbacking has continued in a small scale and very intermittently since then. Further, as humpbacking declined, the capture of other species, from sperm whales to pilot whales to small dolphins, surged dramatically from the 1930's to the 1970's. Whaling always took place between January and May (when humpbacks were present in the southeastern Caribbean for breeding and calving). On the other hand, dolphin fisheries in both Venezuela and St. Vincent and the Grenadines take place virtually year-round, since they target resident populations of these species.

There can be little doubt that the combined whaling efforts of Yankee whalers and shore whalers in the southeastern Caribbean must have had an important impact on the humpback population of the region. Data

summarized in this paper show that if we add the number of whales taken in Trinidad (500+), the ones taken in Grenada (193), in Barbados (187), and in St. Vincent and the Grenadines (550+), we are talking about at least 1,400 whales having been captured through shore whaling. This figure is conservative since it does not include: (1) whales taken for which data are not available because the source (e.g., a Blue Book) for a specific year is not available; (2) whales whose capture may have gone unreported (see, for example, some cases in Romero et al., 1997); and (3) whales that were struck but not recovered and died shortly after as a consequence of the wounds.

Yankee whalers may have had an even higher impact in the area. According to Mitchell and Reeves' (1983) between 1866 and 1887, Yankee whalers killed 2,421 humpbacks in the Caribbean. Therefore, the figure of somewhere between 3,821 and 4,500 humpbacks killed in a little more than 100 years must have had a significant impact. The best supporting evidence that whaling had a large impact is that humpback whaling ceased in Trinidad, Barbados, and Grenada (and has been severely reduced in St. Vincent and the Grenadines) due to the scarcity of whales. Further, the population for those waters has yet to be recovered. A recent visual and acoustic survey (Swartz et al., 2001) showed very few humpbacks in the area. This is consistent with our own fieldwork that includes field surveys as well as extensive interviews with both fishers and whale-watching operators that indicate that humpbacks are very rare in the southeastern Caribbean. This is in sharp contrast with both contemporary descriptive narratives and whaling figures for the area from the 1830's to the 1920's.

All countries involved with whaling developed, in one way or another, legislation to specifically permit and/or regulate the industry. The least sophisticated of these was Trinidad's, probably because it was the first one, while Grenada had the most sophisticated and strict legislation, probably because it was the last one to enact such laws. Although there is some general legislation such as the Wildlife Protection Law and the Criminal Environmental Law, Venezuela does not have specific regulations regarding the protection of marine mammals. This, combined with the general lack of law enforcement, can explain why dolphin fisheries continue up to this day with very little control.

Despite the decimation of the humpback population in the southeastern Caribbean and the possible impact on other species as a result of uncontrolled marine mammal exploitation, this resource may become, again, the target of exploitation in these countries. The Venezuelan government has shown interest in studying dolphin populations in order to ascertain the feasibility of their 'harvesting' (Cohen, 1994), and it has persecuted those who opposed the exploitation of marine mammals in Venezuelan waters (Stone, 1995). St. Vincent and the Grenadines has transitioned into dolphin fisheries while continuing to humpback, despite the fact that its marine

mammal resources seem depleted at the present time. Eastern Caribbean countries have been under heavy pressure to join the IWC and/or support the resumption of commercial whaling while opposing any attempt to put small marine mammals under the regulatory mandate of the IWC (Anonymous, 2001b).

Some have argued that instead of attempting to pursue whale and dolphin watching, it would be more economically feasible for southeastern Caribbean countries to resume whaling. The main proponents of this idea are Grenada, Dominica, Antigua, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines. They argue that the IWC's international ban on whaling is not supported by sufficient scientific data, but is rather a form of 'Eco-Posturing.' They, along with, Japan, Norway, and China are attempting to form a pro-whaling voting bloc within the IWC to pass a resolution allowing what they call sustainable use of marine resources. Japan has been particularly active in the past few years in providing financial and technical assistance to eastern Caribbean countries, a policy that has been denounced as a way to buy their votes in the IWC (Alleyne, 2001; Ally and Peltier, 2001; Anonymous, 2001a,b).

5. CONCLUSIONS

Despite the fact that the southeastern Caribbean countries share the same marine mammal fauna, those animal species have been exploited differently in time and space, due to differences in the dominant cultures, and whether each culture had intrinsic (Amerindian, Latin, British) or extrinsic (Yankee whaling, Norwegian whaling) motivations to begin whaling. This is evidenced by variations in the animals targeted for capturing, specific methods used in capturing the animals (boat and whaling station design), and by the way the whaling products were/are used. The utilization of these resources has always been largely opportunistic and in almost all cases has led to the depletion and/or extinction of the resource in question at the local level. The legislation designed to regulate that exploitation (when enacted) was drawn up to regulate competition among whaling enterprises rather than to protect the resource in question.

The inclination of most of the nations within our study area to pursue legal avenues to resume marine mammal exploitation is a matter of concern not only because of their past history and present trends, but also because such intentions are not based on scientific knowledge of species diversity and population status of the fauna involved. Again, foreign influence may convince some of these countries to utilize these resources without a clear understanding of the ecological, economic, and political consequences of doing so.

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Chapter 2

CONSERVING THE PINES OF GUADALUPE AND CEDROS ISLANDS, MEXICO: AN INTERNATIONAL COLLABORATION

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Abstract: Monterey pine (*Pinus radiata* D. Don) is an enigmatic species. Native to only Mexico and USA, it is restricted to three populations along the central coast of California and one on each of two Mexican islands off Baja California—Guadalupe and Cedros Islands. Commercially, it is grown in exotic plantations worldwide on over 4 million hectares with high economic value, yet there is little value in its countries of origin. Overall, the species has lost perhaps 50% of its natural habitat and is threatened by various human-related influences. The two insular pine populations are well differentiated genetically and have different ecological associations both from each other and the mainland populations. Although Guadalupe Island has protected status under the Mexican Ministry of the Environment and Natural Resources (SEMARNAT), the pine population may be headed towards extinction because of grazing pressure from introduced goats. On neither island are the pines protected from current threats or do they have dedicated funding or a specific conservation plan. Effective longterm conservation of the pines requires a consistent, institutionalized strategy and dedicated funding. International interest in the insular pine populations can contribute to their conservation through research, providing information to support conservation plans and public education materials, providing the technical justification and a proposal to include the island populations of Monterey pine on the threatened and endangered species list in Mexico, maintaining a backup seed collection for restoration, publicizing the value and vulnerability of these populations, and providing funds, as possible. A multinational expedition to both islands in 2001 to collect seeds and information for conservation purposes is an example of the feasibility and value of international collaboration in protecting the Mexican island pines.