

Historical occurrence and distribution of humpback whales in the eastern and southern Caribbean Sea, based on data from American whaling logbooks

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ABSTRACT

The best-known present-day wintering areas for the North Atlantic population of humpback whales (*Megaptera novaeangliae*) are in the northern West Indies, notably off the island of Hispaniola. However, it is known that in the nineteenth century American whalers hunted humpbacks in the Windward Islands (primarily from Guadeloupe southwards), along the coast of Trinidad, in the Gulf of Paria and westwards along the Venezuelan coast. To investigate the historical distribution and occurrence of humpback whales, data were extracted from nineteenth century American whaling logbooks and journals covering 48 voyages by 29 vessels to the West Indies from 1823-1889. Humpback whale records in these documents came from a geographical area that encompassed Haiti to the coast of Venezuela. Of 807 records in which whales were mentioned (as sightings, strikes or catches), the largest number was from the Windward Islands and Venezuela, especially St Vincent and the Grenadines (319 records covering an estimated 958 humpbacks), Guadeloupe (190 records, 592 humpbacks), Dominica/Martinique/St Lucia (74 records, 193 humpbacks) and Venezuela (64 records, 216 humpbacks). These totals should be regarded only as approximate indicators of the relative abundance of whales since the effort involved cannot be meaningfully quantified. Similarly, effort-uncorrected data suggest that the peak months for humpback whales in the Windward Islands were February, March and April. Few sightings were recorded off the Dominican Republic after March, but this may reflect a lack of effort there in April and May. However, humpbacks apparently were abundant in the Windwards in April and even May, which is not the case in the major present-day wintering areas off Hispaniola. With one notable exception, there is little evidence in the logbooks and journals that humpbacks were taken on a more than casual basis in waters off Hispaniola, where the major aggregations are found today; possible explanations for the marked contrast in present versus historical distribution are discussed. The highly seasonal visitation of the West Indies by the American nineteenth-century whalers precludes a meaningful investigation of the possibility that some humpbacks from the Southern Hemisphere migrated to the Caribbean Sea in the austral winter.

KEYWORDS: HUMPBACK WHALE; WHALING-HISTORICAL; CARIBBEAN SEA; WEST INDIES; DISTRIBUTION

INTRODUCTION

Most of the North Atlantic population of humpback whales (*Megaptera novaeangliae*) is today believed to overwinter in the West Indies region (Winn *et al.*, 1975; Katona and Beard, 1990). When the whales are in these warm tropical waters, calving and mating take place, but little feeding occurs. Whaling data compiled by Townsend (1935), Mitchell and Reeves (1983) and Price (1985) indicate that humpbacks were taken by American whalers during the nineteenth and early twentieth centuries primarily in the Windward Islands region from Guadeloupe south to the coast of Venezuela. In contrast, most of the recent research effort directed at overwintering humpbacks has been focussed in the northern part of the Antillean chain, with the greatest concentrations of whales found on banks north of the Greater Antilles. The greatest concentrations of humpbacks are found today off the northern coast of the Dominican Republic (on Silver Bank and Navidad Bank, and in Samana Bay). To the east of this region (from Puerto Rico to the Windwards), whale densities are at least one order of magnitude lower (Mattila and Clapham, 1989; Mattila *et al.*, 1994).

Improved understanding of the stock origin and status (current versus historical abundance) of humpbacks in the eastern and southern Caribbean Sea is needed for the IWC's Comprehensive Assessment of humpbacks in the North Atlantic and for planning field work in the Caribbean region. The study by Mitchell and Reeves (1983) was intended primarily as a reconstruction of the humpback's catch history; it was not among those authors' priorities to specify

the precise dates and positions of kills or sightings. The primary objective of the present study was to establish where and when the sailing-vessel whalers encountered humpbacks in the eastern and southern Caribbean region. The unpublished data presented here are from whaling records and refer only to years well before the late 1920s, by which time American pelagic whaling in the North Atlantic had ended (Hegarty, 1959) and shore whaling for humpbacks was no longer practised in the Caribbean region except on the island of Bequia (Adams, 1971; Mitchell and Reeves, 1983). A map showing the places referred to in the text is given as Fig. 1.

MATERIALS AND METHODS

Identifying the logbook/journal sample

Mitchell and Reeves (1983) tabulated humpback catch data from logbooks or journals covering some 80 American whaling voyages. They selected documents to maximise the probability of finding evidence of humpback whaling in the West Indies. Their sample was taken from two major collections: Providence Public Library (PPL) and Old Dartmouth Historical Society (ODHS). In a later, similar study targeted at North Atlantic right whales (*Eubalaena glacialis*), Reeves and Mitchell (1986) examined the logbooks or journals from an additional 50 voyages to North Atlantic whaling grounds, including documents from six other major North American collections. Although their focus on right whales meant that Reeves and Mitchell (1986) did not consistently extract data on humpback observations,

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Fig. 1. Map of study area.

their study identified additional approaches to obtaining such data. Some collections have their own indices which include ports of call mentioned in logbooks and journals. This provides an efficient way of identifying promising manuscripts in the collection (i.e. by checking for voyages that called at Caribbean destinations). The Dennis Wood Abstracts at the New Bedford Free Public Library (NBFPL) contain valuable data on the itineraries and production (oil and baleen on board at various stages of a voyage) for some 3,500 American whaling voyages (cited herein as: Wood, no date, MS). Sherman *et al.* (1986), in a comprehensive inventory of logbooks and journals in public collections, provide a means of determining whether a document covering a particular voyage was available as of the mid-1980s. This volume is particularly useful because it is indexed by port, master and keeper, sailing year, ground(s) visited and document repository.

For the present study, the documents previously checked by Mitchell and Reeves (1983) and Reeves and Mitchell (1986) were subsampled. Initially, voyages were selected that were already known or suspected to have whaled for humpbacks in the eastern or southern Caribbean. The characteristics described by Mitchell and Reeves (1983) were then used to identify additional voyages likely to have included a period of whaling for humpbacks in this region. The most promising voyages were those by smaller vessels (brigs and schooners of less than about 140 tons) sailing from Provincetown and a few other minor ports (e.g. Westport, Mattapoissett, Fairhaven, Edgartown and Boston) and indicating a 'North Atlantic' or 'Atlantic' destination. A late autumn or early winter departure (e.g. November to January) and a return to home port by the following late summer or autumn were considered especially favourable, although it was not unusual for a vessel to visit the West Indies and to whale for humpbacks in the second winter of a multi-year cruise.

Clark (1887) describes a typical humpbacking itinerary for a Provincetown whaler, on the authority of Captain Atwood. The vessel would sail in mid to late January and go directly to the West Indies. It would cruise for humpbacks near one or more of the islands between Tobago (11°20'N, 60°27'W) and Marie-Galante, Guadeloupe (15°52'N, 61°18'W) until late April or early May. From the West

Indies most vessels headed for the Western, Charleston or Hatteras Ground in pursuit of sperm whales (*Physeter macrocephalus*), returning to Provincetown in September.

In many instances the foregoing considerations were supplemented with information on itineraries, ports of call and oil returns (intermediate or final) from Wood (no date, MS). Although final returns for most voyages are given by Starbuck (1878) or Hegarty (1959), these are generally expressed only in barrels of sperm oil, barrels of whale oil and pounds of bone (i.e. whalebone, or baleen). In contrast, Wood (no date, MS) frequently specifies whether the whale oil was from blackfish (pilot whales, *Globicephala* spp.) or humpbacks. However, his references to blackfish oil were not always found to be reliable. For example, his abstract of the 1857-59 cruise of the barque *N.D. Chase* of Beverly makes it clear that several right whales were taken on the Cintra Bay Ground off West Africa (also confirmed by Reeves and Mitchell (1986, table 4) on the basis of information in another vessel's logbook). In his summary at the end of the abstract, Wood indicates a return of 575 barrels of 'blackfish' oil alongside 6,000 pounds of bone (no mention of 'whale' oil in the summary). This is a rather egregious example of an inconsistency that arises often in the Wood material. On a few occasions Wood mentions humpbacking explicitly as an activity reported for a particular voyage. Inclusion of 'bone' (baleen) in the returns listed by Starbuck, Hegarty or Wood usually means that one or more right whales were taken and thus that at least some of the whale oil (or 'blackfish' oil; see above) listed was from right whales rather than humpbacks or blackfish.

Data recording

Data were recorded onto two types of data sheet: (1) for information on the voyage as a whole, including the vessel specifications, itinerary, time spent on the humpback grounds and other vessels seen there; and (2) for details of humpback observations. Very few documents were read in their entirety. As a rule, it was determined by rapid scanning whether and when the vessel reached the West Indies. From that point until the vessel departed the region, daily entries were checked for references to humpbacks. Most logbook or journal writers made clear the distinction between humpbacks and other whales although in some instances the reader had to infer the identity of the whales. Pilot whales were always called 'blackfish'. When sperm whales were seen or chased on the humpback grounds, the writer seems invariably to have specified them as such. 'Finbacks' mentioned in this region could have been fin whales (*Balaenoptera physalus*), sei whales (*B. borealis*) or Bryde's whales (*B. edeni*) (cf. Mead, 1977).

The whalemens who kept logbooks or journals present the reader with an often bewildering array of place names; this makes the work of determining where the vessel was at any given time painstaking at best and exasperating at worst. Legibility of the manuscripts is highly variable and so is the level of detail provided by the writers. In some instances landmarks are very precise, referring to a rock, islet or farm (i.e. plantation or estate). On other occasions nothing is provided beyond the name of the island. Frequently reference is made to the site where the vessel anchored for the night, and it is either stated or implied that the intervals between anchorings were spent cruising, with a lookout kept for whales. At times the vessel would remain anchored while the boats were lowered to chase whales in nearby waters. More often than not, the reader is told approximately where a whale was towed for processing and can only infer that it was therefore taken within a few miles of that site.

Data management

A computer database was established with two components. The first was a summary of each voyage, and included information on vessel name, voyage number (a reference number that was assigned by us), port and date of sailing, ground(s) worked, and notes about the legibility, usefulness or other characteristics of the log. The second component contained a summary of all relevant records from each log, including vessel and voyage number, record type (see below), date, location and (where relevant) number of whales seen, struck or killed. Record types examined here were categorised as either 'whale' (information about sightings of, or attempts to kill, whales), or 'no whales' (records in which a log explicitly refers to the absence of whales in a particular location). Other information about where the vessel was on a particular day, and records which mention shipments of whale oil, processing of whales, reports of other vessels and other miscellaneous items not related to whale sightings *per se* were included in the database but are not discussed further here. Reports of 'lowering for whales' or of whales seen but lacking any indication of how many whales were present, were recorded but not used in this analysis.

Records of whales were further broken down into five categories: 'taken number' (a specific number of whales reported as killed and secured); 'taken barrels' (records in which the number of whales taken is expressed in terms of oil yield, in barrels); 'struck' (whales chased and struck with a harpoon but not killed, or killed but not secured); 'seen number' (a specific number of whales reported as sighted but not struck); and 'seen category' (records in which sightings of whales are not associated with a number but rather with some descriptive term, e.g. 'few', 'many').

With regard to the latter category, the various descriptive terms found in the logs were grouped for simplicity as follows: 'many' = *many, a school, plenty, great number, a pod, a gam*; 'several' = *a number, several, some, more, saw humpbacks, chased humpbacks*; and 'few' = *few*. For the purpose of analysis, an 'average' number was assigned to each of these categories, as follows: 'many' equalled ten whales, 'several' equalled four whales and 'few' equalled two whales. It is recognised that these choices are arbitrary, and results are presented with that caveat.

Location information associated with whale reports fell into two categories. In many cases, an exact location (such as a bay or a latitude and longitude) was given; in the database, these were termed 'certain' locations. In other cases, an exact location was not given but a general location could be inferred from preceding or subsequent log entries; in the database, these are termed 'inferred' locations. Cases in which a lack of information precluded assignment of even an inferred location were treated as 'no location'. Major geographic names used in this report are defined in Appendix 1.

RESULTS

Summary of the data

The data described here came from a total of 48 voyages to the West Indies by 29 vessels. The earliest cruise occurred in 1823, the latest in 1889. Ports of departure for these voyages were: Beverly, Massachusetts (1 voyage); Boston, Massachusetts (1); Dartmouth, Massachusetts (2); Fairhaven, Massachusetts (1); New Bedford, Massachusetts (6); Provincetown, Massachusetts (26); Rochester, Massachusetts (3); and Westport, Massachusetts (5). The port was uncertain for three voyages (two of them by a vessel

known to have made six other voyages, all from Provincetown). A total of 850 records was used in the analysis. This included 807 records of whales and 43 records of 'no whales' (Table 1).

Table 1

Summary of records relating to humpback whales for all West Indies locations. 'Dominican Republic' includes all records relating to Mona Passage. 'Coast of Venezuela' excludes the Gulf of Paria. Regions for which there was no mention in the logbooks of the presence (or absence) of humpback whales were ignored.

Region	Whales	No whales	Total
St Martin to Montserrat	16	3	19
Barbados	3	0	3
Caribbean Sea (Aves Is.)	1	0	1
Dominica, Martinique, St Lucia	74	2	76
Dominican Republic	68	2	70
Gulf of Paria	24	6	30
Guadeloupe	190	5	195
Haiti	1	0	1
Puerto Rico	8	2	10
St Vincent and the Grenadines	319	18	337
Trinidad and Tobago	39	3	42
Coast of Venezuela	64	2	66
Total	807	43	850

The study area was divided somewhat arbitrarily into 12 regions. This division was not intended to provide a grid of equal-sized regions, but rather to distinguish the major whaling grounds geographically. The 12 regions are listed in Table 1, with a summary of the number of records available for each. Some logbooks mention other regions (Anguilla to the Virgin Islands, Cuba, Jamaica and the Turks and Caicos) but provide no information on the presence (or absence) of humpback whales there, and thus were ignored. By far the largest number of records (337) came from St Vincent and the Grenadines. Other regions with numerous records included Guadeloupe (195), Dominica/Martinique/St Lucia (76) and the coast of Venezuela (66, with an additional 30 from the Gulf of Paria).

Records of humpback whales

The number of records ('whale' and 'no whale') are summarised by month in Table 2. The great majority of humpback whale observations were reported in February, March and April: 679 (85.1%) of the 798 whale records are from these three months. Nine additional whale records had no month indicated.

Table 2

Summary of West Indies whale-related records by month. There were no records for the months of July to November. Nine records (all concerning whales) for which no month was specified are excluded.

Month	Whale records	'No whales' records
January	43	8
February	168	13
March	278	9
April	233	11
May	74	1
June	2	0
December	0	1
Total	798	43

Records of humpback whales are summarised by region in Table 3, together with estimates of the total numbers of whales represented. These estimates involve assumptions

Table 3

Summary of records of humpback whales, for all West Indies locations, and estimates of total numbers represented by these records. Areas for which no whale records were found were omitted. Whales were either reported as an exact number of animals (either *Taken*, *Struck* or *Seen*), or by various terms which are grouped here as *Few*, *Several* and *Many*. For the purpose of estimating whale numbers, the following values were assigned to the latter three categories: *Few* = 2, *Several* = 4, *Many* = 10. The resulting numbers are given in the *Whales* column under each of the three categories; the previous column (*Recs* = records) shows the number of records found for each category (in *italics*, since these are not included in the *Total Whales* column at the end). See text for other definitions.

Region	Total whale records	Humpback whales reported									Total whales
		Number of whales			'Few'		'Several'		'Many'		
		Taken	Struck	Seen	<i>Recs</i>	Whales	<i>Recs</i>	Whales	<i>Recs</i>	Whales	
St Martin to Montserrat	16	0	1	22	<i>0</i>	0	<i>3</i>	12	<i>0</i>	0	35
Barbados	3	0	0	3	<i>0</i>	0	<i>1</i>	4	<i>0</i>	0	7
Caribbean Sea (Aves Is.)	1	0	0	0	<i>0</i>	0	<i>1</i>	4	<i>0</i>	0	4
Dominica, Martinique, St Lucia	74	20	20	71	<i>1</i>	2	<i>15</i>	60	<i>2</i>	20	193
Dominican Republic	68	15	5	63	<i>0</i>	0	<i>21</i>	84	<i>0</i>	0	167
Gulf of Paria	24	2	2	11	<i>0</i>	0	<i>7</i>	28	<i>6</i>	60	103
Guadeloupe	190	72	15	83	<i>21</i>	42	<i>80</i>	320	<i>6</i>	60	592
Haiti	1	0	0	0	<i>0</i>	0	<i>1</i>	4	<i>0</i>	0	4
Puerto Rico	8	1	0	3	<i>0</i>	0	<i>4</i>	16	<i>0</i>	0	20
St Vincent and the Grenadines	319	102	57	141	<i>1</i>	2	<i>139</i>	556	<i>10</i>	100	958
Trinidad and Tobago	39	4	5	10	<i>2</i>	4	<i>23</i>	92	<i>3</i>	30	145
Coast of Venezuela	64	13	18	21	<i>0</i>	0	<i>26</i>	104	<i>6</i>	60	216
Total	807	229	123	428	<i>25</i>	50	<i>321</i>	1,284	<i>33</i>	330	2,444

regarding the number of whales represented by terms such as 'few' or 'many' (see above); given this, as well as probable inaccuracies in reporting, the estimates should be treated as no more than crude approximations. That said, they probably provide reasonably valid indications of the relative abundance of whales and/or effort in each of the regions concerned. Of the estimated 2,444 humpback whales represented in the records, the largest numbers were reported from St Vincent and the Grenadines (estimated total 958, or 39.2%); followed by Guadeloupe (592 whales, 24.2%); the coast of Venezuela (216 whales, and an additional 103 from the Gulf of Paria, 13.1% combined); Dominica/Martinique/St Lucia (193 whales, 7.9%); the Dominican Republic (167 whales, 6.8%); and Trinidad and Tobago (145 whales, 5.9%). As noted below, more than a third of the estimated number of whales for the Dominican Republic (65 or 38.9%) come from the logbook of a single voyage, that of the *Cicero* in 1872.

The relative numbers of humpback whales in each region for the months of January through May are shown in Fig. 2

(with regions arranged from north to south). Peak numbers appear to have occurred somewhat earlier to the south (February or March off Trinidad, Venezuela and in the Gulf of Paria) and later to the north (March and April in the area from Guadeloupe to St Vincent and the Grenadines). Once again, however, it is stressed that these records cannot be corrected for effort and thus only crudely reflect the occurrence and movements of humpback whales.

The 43 records in which the absence of humpback whales was explicitly noted are broken down by region and month in Table 4. It is difficult to interpret these 'no whale' records. The absence of whales would likely be recorded in the logbook only on days when sighting conditions were acceptable and there was some search effort, although it cannot be assumed that the whalers' thresholds of 'acceptable' sighting conditions and the quality of their search effort were in any sense standardised. While it may be reasonable to conclude that whales were not present in the immediate vicinity of the vessel on these 'no whale' days, the very fact that the whalers were searching for them

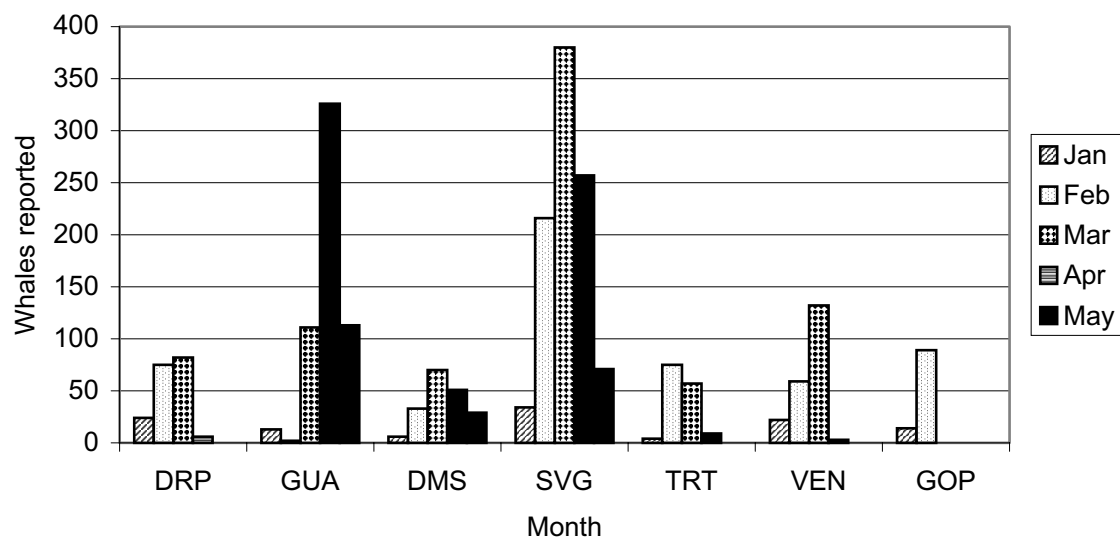


Fig. 2. Estimated numbers of humpback whales observed (sightings, strikes and kills) by month and region. The regions are arranged from north to south, with abbreviations as follows: *DRP* Dominican Republic and Puerto Rico, *GUA* Guadeloupe, *DMS* Dominica/Martinique/St Lucia, *SVG* St Vincent and the Grenadines, *TRT* Trinidad and Tobago, *VEN* coast of Venezuela and *GOP* Gulf of Paria.

implies an expectation of finding humpbacks in the area, and this expectation may have arisen from empirical knowledge concerning whale distribution and movements. No further consideration of the 'no whale' records was judged appropriate.

Table 4

Summary of records, by region and month, in which the absence of humpback whales was explicitly stated.

Region	Records of 'no whales'						Total
	Jan.	Feb.	Mar.	Apr.	May	Dec.	
St Martin to Montserrat				3			3
Dominica, Martinique, St Lucia	1	1					2
Dominican Republic			2				2
Gulf of Paria	3	3					6
Guadeloupe	1			3	1		5
Puerto Rico		2					2
St Vincent and the Grenadines	3	3	6	5		1	18
Trinidad and Tobago		2	1				3
Coast of Venezuela		2					2
Total	8	13	9	11	1	1	43

Narrative of results by area

A detailed narrative of results for each area is given below. The results are presented in geographical order starting in the north and working south. The evidence is summarised for humpback whales and whaling in the vicinity of each major island or island group.

Greater Antilles

A puzzling feature of the logbook records is how little effort seems to have been devoted to pursuing humpbacks in areas of the Greater Antilles where they are known to be abundant today. The brig *Annawan* of Rochester (1836-37, MS) cruised along the southern coast of Puerto Rico ('Porto Rico') during the last week of February and first few days of March 1837, clearly in pursuit of sperm whales and blackfish. No attempt was made to catch humpbacks even though one was seen on 20 February at 17°17'N and more off Isla Caja de Muertos ('Deadman's Chest') on 2 March. This lack of interest in humpbacks is particularly striking because the *Annawan* had made dedicated searches for them earlier in the season around St Vincent, Bequia and Trinidad. Two years later the brig *Solon* of Rochester (1838-39, MS) also encountered humpbacks off the south side of Puerto Rico on 10 and 15 March but ignored them. Similarly, on 12 April 1843 the schooner *Esquimaux* of Provincetown (1843, MS) lowered the boats to close on a 'breach' in Mona Passage¹ only to discover that the whale was a humpback, at which point the chase was abandoned and the crew's attention redirected to the search for blackfish.

The brig *Medford* (1849, MS) of Provincetown was in Mona Passage for approximately the first three weeks of March 1849. Humpbacks were reported as being seen several times, including a cow and calf on 6 March, and the boats were lowered for humpbacks once (17 March). Most lowerings were for blackfish. By early April the *Medford* was whaling elsewhere to the west and north (calling at Port

au Prince Bay and at Watling and Mayaguana islands in the Bahamas, for example), clearly in search of sperm whales and blackfish. Two years later the *Medford* (1850-51, MS) again visited Mona Passage, this time from 17 February to 7 March. Occasionally within sight of as many as eight other whaling ships, the *Medford* cruised daily for humpbacks and blackfish between Isla Mona and Cabo Rojo ('Cape Roxo'). Humpbacks were seen on at least seven days. Although the boats were lowered to chase them several times, no humpbacks were struck. On 7 March, while the vessel was heading west around Hispaniola, humpbacks were seen off Isla Saona.

In the late 1860s several vessels devoted considerable effort to catching humpbacks in Mona Passage. The schooner *Winged Racer* of Provincetown (1867, MS) sailed directly to Mona Passage ('Mooner Passage') and began chasing humpbacks there on 14 February. By the second week of April, when the *Winged Racer* relocated to Samana Bay (on the northeastern coast of the Dominican Republic), five humpbacks had been secured. At least one other vessel had been seen whaling in the Passage in mid-March (schooner *Watchman*). The next year the *Winged Racer* (1868, MS) returned to the same area and hunted humpbacks in company with the *Ellen Rizpah* of Provincetown from early February through March. At least two humpbacks were taken, and one was struck and lost.

There is circumstantial evidence that several other vessels might have taken humpbacks off Puerto Rico. The brig *Imogene* of Provincetown was in the same area as the *Solon* in March 1839 with 125bbl of humpback oil on board (*Solon* 1838-39, MS; also noted in Wood, no date, MS). The schooner *Harmony* of Nantucket was on the Bahama Banks in June 1837 with 200bbl of humpback oil on board, having been seen off the west end of Puerto Rico in early May (Wood, no date, MS). The barque *Richard Henry* of Rochester was off Puerto Rico on 30 March 1843 with 40bbl of humpback oil on board, having been reported less than three months earlier at La Blanquilla ('Blanco') with only sperm oil on board (Wood, no date, MS). The barque *Parker Cook* of Provincetown was reported off the southwestern coast of Puerto Rico on 20 January 1848 with 200bbl of sperm oil on board and then off Santo Domingo ten days later with 200bbl of sperm and 20bbl of humpback oil (Wood, no date, MS). The brig *Ellen Rodman* of New Bedford was off Puerto Rico in mid-February 1847 with two whales, apparently humpbacks judging by the oil returns (70bbl humpback oil) (Wood, no date, MS). The schooner *Oread* of Provincetown sailed on 1 January 1861 and was off Saona Island, Santo Domingo, on 10 March with 100bbl of humpback oil on board (Wood, no date, MS). It is important to note that it was not unusual for voyages to the Grenadines for humpbacks to end in April or May, with the vessel stopping at Dominica or St Eustatius to transship oil and refit, then head to Hispaniola, Puerto Rico or the Bahamas to hunt sperm whales *en route* northwards.

With one notable exception (see below), humpbacking in Samana Bay ('Sam Bay', 'Samba' etc.) on the northeastern coast of Hispaniola was desultory. The brig *Mexico* of Westport (1823-24, MS) cruised there from about 13 January to early March 1824 and reported seeing humpbacks on only one occasion (24 February); no attempt was made to take them. The *Annawan* (1836-37, MS) was in the bay hunting sperm whales and blackfish during the first two weeks of March 1837 but reported no humpbacks. The schooner *Walter Irving* (1856-57, MS) of Provincetown, having spent a month and a half chasing humpbacks in the Cape Verde Islands, arrived in Samana Bay on 24 March

¹ Mona Passage lies between the west coast of Puerto Rico and the eastern end of Hispaniola. Because locations were usually not specific, and for the sake of simplicity, all whale records mentioning Mona Passage were assigned to the 'Dominican Republic' region.

1857. The boats were lowered for humpbacks twice (24 March and 1 April), but it is clear that sperm whales and blackfish were the primary prey, and by 10 April the vessel was 'running down' the south side of Cuba and headed for the sperm whale grounds in the Gulf of Mexico. In 1891 the schooner *Golden City* of New Bedford (1889-91, MS) took a cow/calf pair of humpbacks on 25 March while whaling in Samana Bay for sperm whales and blackfish. A year earlier, on 24 February 1890, the schooner's boats had been lowered in Samana Bay for two humpbacks, 'thinking it was Sperm Whales'.

Although the above would suggest that humpbacks were not plentiful in Samana Bay, the log of the barque *Cicero* of New Bedford (1871-73, MS) tells a rather different story. The *Cicero* cruised widely in the North Atlantic in the early winter of 1871-72, briefly visiting Madeira, Cintra Bay on the west coast of Africa, and the Cape Verde Islands before arriving in Dominica in the second week of January. During the following two weeks, the vessel worked northwards, chasing humpbacks off the northern end of Guadeloupe (12 January) and in Mona Passage (25 January) before stopping in Samana Bay on 26 January. For the next two and a half months, the *Cicero* devoted full attention to humpbacking in Samana. At least 10 humpbacks were taken or struck, including cows with calves on 20 February and 18 and 27 March. Wood (no date, MS) reports the *Cicero* as having been in Samana Bay on 24 February 1872 with 135bbl of humpback oil on board from the 'last cruise' (by this time, three had been taken and processed in Samana). It was next reported on 6 April 1872, landing 290bbl of humpback oil and 1,300lb of bone in Samana Bay for shipment (Wood, no date, MS). No more humpbacks were taken after that date although one was struck and lost in Samana Bay on 10 April (*Cicero*, 1871-73, MS). Overall, the *Cicero* accounts for 65, or 38.9%, of the estimated 167 humpback whales taken, struck or seen off the Dominican Republic (Table 3).

Leeward Islands

Little evidence was found of whaling in the northern Leeward Islands. In 1878, towards the end of a humpbacking season that began in late February in Tobago and ranged northwards along the island chain to Guadeloupe through mid-April, the Provincetown schooner *Rising Sun* (1875-83, MS) was off the northern end of St Christopher (St Kitts) when a cow and calf were seen on 16 April. From 18-20 April the vessel cruised for humpbacks off St Martin, chasing cow-calf pairs twice. The following winter the *Rising Sun* made another brief and desultory effort at whaling in this area from 4-18 April. Humpbacks (including cow-calf pairs) were sighted and chased in the vicinity of Barbuda; St John's and Five Island harbours, Antigua; St Martin; and St Barthélemy ('St Barts') (*Rising Sun*, 1875-83, MS). Several humpbacks (also 'finbacks') were seen in the area between Antigua, Redonda and Montserrat on 7-8 January (*Annawan*, 1836-37, MS).

The island of Sint Eustatius (often called 'St Eustatia' by the whalers) was a regular port of call for American whalers, particularly as they sailed northwards in the spring from the Lesser Antilles to Puerto Rico, Hispaniola or the Bahamas. Although the vessels seem not to have spent more than a few days there at a time, humpbacks were seen and occasionally taken (e.g. a cow/calf pair chased on 28 May 1886; *D.A. Small*, 1886-88, MS).

Humpback whaling in the southern Leeward Islands began at least as early as the late 1820s (e.g. *Industry*, 1828-29, MS). Most activity was centred around the small island of Marie-Galante (adjacent to Guadeloupe), with the

vessels working mainly in the area bounded in the west by Basse-Terre and Les Saintes ('the Saints') and in the east by Îles de la Petite Terre ('Peter Terry Island'). The *Rising Sun* (1875-83, MS) spent six winter seasons whaling near Marie-Galante in the period 1875-83. In all of these seasons other Provincetown vessels were there as well. The journal kept by the *Rising Sun*'s master documents a minimum of 20 vessel-seasons of humpbacking at Marie-Galante by other Provincetown schooners in 1875-77, 1880 and 1883. The *Rising Sun* alone accounted for at least 34 killed humpbacks in these five seasons, and at least 11 more taken by other vessels are reported in the *Rising Sun* master's journal. Judging by whale oil returns and itineraries of the other vessels (from Hegarty, 1959), at least 50 additional humpbacks were killed in the same area in the five seasons concerned. In April 1880, when the Provincetown schooner *Agate* took a humpback off Marie-Galante, the crew saved the baleen ('bone') as well as boiling the blubber (*Rising Sun*, 1875-83, MS). This practice of keeping the baleen of humpbacks was exceptional, although there was some demand for it during at least the 1860s and 1870s (Mitchell and Reeves, 1983). In each of the three seasons 1886, 1887 and 1888 the brig *D.A. Small* of Provincetown (1886-88, MS) whaled at Marie-Galante for at least part of the period 21 March-20 May, accounting for at least eight cow-calf pairs and four other humpbacks killed (including those taken by other vessels but mentioned in the *Small* logbook).

It is clear from the *Rising Sun* master's journal that humpbacks, including cow-calf pairs, were still present near Marie-Galante in mid to late May. Indeed, in 1882 the last sighting of the season was at Îles de la Petite Terre on 6 June (*Rising Sun*, 1875-83, MS). The decision each year to stop whaling and head north seems to have been made for reasons other than the abandonment of Guadeloupe waters by humpbacks. The *Agate* (1872, MS) also reported late-season success near Marie-Galante. While *en route* northwards from a season's humpbacking in the Grenadines, the *Agate* took a calf at Marie-Galante on 25 May and a cow on 28 May and chased a cow-calf pair on 1 June. Similarly the *D.A. Small* (1886-88, MS) continued chasing humpbacks, including cows and calves, into mid-May in 1886 and 1887.

It was unusual for vessels that were humpbacking in the Lesser Antilles to see and chase sperm whales on the humpback grounds. However, this happened at least occasionally at Marie-Galante. For example, on 15 May 1875 the *Rising Sun*'s crew took a 49bbl sperm whale and struck another of similar size while whaling for humpbacks off St Louis (on the western side of Marie-Galante). The next year, on 3 April, the *Rising Sun* and four other vessels chased a school of sperm whales somewhere between St Louis and Îles de la Petite Terre. The *Gracie M. Parker* secured a sperm whale, while on the same day the *Rising Sun*'s crew killed (and lost) one of several humpbacks seen (*Rising Sun*, 1875-83, MS).

Certain New England schooners, most of them from New Bedford, were involved in the late 1870s-1880s in near-shore right whaling off the southeastern United States (Reeves and Mitchell, 1986; 1988). The *Rising Sun* (1875-83, MS) sailed from Provincetown on 12 November 1879 and headed initially for the Charleston Ground (29-32°N, 74-77°W; Clark, 1887, p.8) in pursuit of sperm whales. On 5 January 1880, the *Rising Sun* anchored at St Simon, South Carolina, and the next day the boats were lowered to search for right whales. The crew worked along the coast to Brunswick, Georgia, for a month, with no whales sighted. On 4 February the *Rising Sun* sailed for

Marie-Galante, where humpbacking began on 26 February and continued until 15 May. The following winter, the *Rising Sun* made a special (completely unsuccessful) two month cruise (26 February-29 April 1881) for right whales, concentrating effort along the Outer Banks of North Carolina. Two other schooners, the *Bloomer* of Provincetown and the *Lottie E. Cook* of New Bedford, were also there (*Rising Sun*, 1875-83, MS) as were the schooners *E.H. Hatfield* and *Emma Jane* of Edgartown (Reeves and Mitchell, 1988). The next two winters the *Rising Sun* sailed in early March directly for Marie-Galante to humpback (*Rising Sun*, 1875-83, MS). Although 'finbacks' were reported occasionally while the whalers were searching for right whales on the near-shore Southeast US Coast Ground, no references to humpbacks were found there.

Humpbacks were seen occasionally by vessels visiting Dominica but it does not appear that this was a major destination for humpbacking. In the last week of February 1859, the schooner *Washington* of Edgartown (1858-59, MS) and bark *Orray Taft* of New Bedford took humpbacks in a Dominican bay (probably Prince Rupert Bay) but the season was short (21 February-9 March) and the effort seemingly desultory. On 3 May 1869, while the *Nellie S. Putnam* (1868-69, MS) was anchored in Prince Rupert Bay, the crew interrupted their painting of the ship to chase a humpback cow-calf pair that passed close by. Two days later, as the vessel was leaving Dominica for Guadeloupe, a cow and calf were taken. On some occasions, it was impossible to determine whether a sighting or take was on the Guadeloupe or Dominica side of the channel between the two islands. The brig *Industry* of Westport (1828-29, MS) took a humpback in Dominica Passage on 7 February 1828 during what was primarily a cruise for sperm whales. In fact, the crew interrupted their processing of the humpback on 8 February to chase a school of sperm whales. On the following day the *Industry* was cruising for humpback and sperm whales near Martinique.

Martinique

Martinique is often mentioned in logbooks and journals (sometimes as 'Martinico') but mainly just as a landmark as the vessel cruised past it. No evidence was found that the American whalers used Martinique as a base of operations for humpbacking, although whalers based in St Lucia hunted humpbacks in the channel separating the two islands (see below).

A passing comment in the logbook of the schooner *E.H. Hatfield* (1867-68, MS) refers to 'plenty of Humpbacks' in the channel between Dominica and Martinique on 3 May 1867. However, no effort was made to chase them. The *Industry* (see above) struck a humpback off Martinique on 10 February 1828.

St Lucia

Lindeman (1880; see True, 1904, p.61) claimed that one or two American vessels whaled for humpbacks along the western and southern coasts of St Lucia during the 1870s between March and July. Judging by our logbook sample, St Lucia was visited regularly by humpback whalers from New England during the 1880s. However, no evidence was found that they saw or took humpbacks there as late in the season as July; nor was any evidence found of humpback whaling off the southern coast of the island.

A detailed record of whaling activities is provided in the logbook of the schooner *Franklin* (1885-87, MS) of New Bedford. The *Franklin* stopped for two days at Dominica for provisions (23-25 January 1886), then proceeded directly to

Castries on the northwestern coast of St Lucia. From the last few days of January until 3 May the crew followed a daily routine of cruising for humpbacks between the northern half of St Lucia and the southern coast of Martinique, with anchorages including Castries, Soufrière, Cul de Sac Bay, Gros Islet ('Gross let') and Pigeon Island. Humpbacks were seen on at least 47 days; at least seven were secured and three struck and lost. Cow-calf pairs were reported on 9, 16, 24 and 28 March; 3, 10, 21, 26 and 29 April; and 1 and 3 May. At least one other Provincetown vessel, the brig *D.A. Small*, was whaling at St Lucia that season.

Although few details are given about localities in its logbook, the New Bedford schooner *Union* (1882-83, MS) spent two consecutive winter/spring seasons humpbacking in St Lucia. The first season spanned 23 February-early May 1882 (first humpback taken 24 February, last taken 27 April); the second, 6 February-17 May 1883 (first humpbacks seen 6 February, last taken 10 May). Cow-calf pairs were reported on 2 and 27 April. At least four other New England vessels were present, apparently also humpbacking, during the 1883 season.

A report that the schooner *Sarah E. Lewis* of Boston was at St Lucia on 24 February 1866 and then at Bermuda three months later with 100bbl of humpback oil (Wood, no date, MS) suggests that there was some humpbacking around St Lucia that season.

Barbados

Considering the regularity with which the shore whalers at Barbados took humpbacks, it is surprising that so few pelagic whalers seem to have humpbacked there other than opportunistically. Barbados was a major port of call for the American whaling fleet, but most of the whalers' activity there involved business transactions on shore rather than active whaling. Mitchell and Reeves (1983) summarised the evidence of shore whaling in Barbados from 1869-1913. Shore whaling reportedly began at Speightstown early in 1867, when one cow-calf pair was taken prior to 24 April (Anon., 1867). The following year a large female was taken in mid-May (Anon., 1868).

The whaling operation established by A. Archer in 1869 was based on the central part of the leeward side of the island (Archer, 1881; also see Lindeman, 1880; True, 1904, p.61). It was the practice during the whaling season to launch four whaleboats every weekday, two going north and two south from the station. The humpbacks normally arrived in January and left by June. Although the daily whaling regimen did not begin until March, the boats were kept ready before then and whales were often taken opportunistically in January and February. According to Archer (1881), 'In the month of March they begin to arrive pretty plentifully, and the cows then begin to calve or bring in their young calves with them to feed close in shore in smooth water'. The cows and calves apparently were taken with relative ease except when accompanied by a 'bull'. In Archer's experience this companion whale 'kept watch' and made the cow and calf more difficult to approach. Archer makes the following comment but unfortunately fails to elaborate: 'It is very interesting to see the whales at feed in the shallow and clear water, and to notice the manner in which the mother protects her offspring, and the way it suckles her'.

Takes by the American pelagic whalers included: a 24bbl whale (one of a pair) by the barque *Messenger* of Salem in March 1859 in Carlisle Bay (Anon., 1859; Wood, no date, MS); a 55bbl whale by the barque *Willis* 'in port' sometime between 12-21 May 1863 (Wood, no date, MS; also *Whalers' Shipping List* as cited by Mitchell and Reeves,

1883); one in 1864 (*Whalemen's Shipping List* 22(16): 21 June 1864; see Mitchell and Reeves, 1983, p.192); and a 70bbl whale by the *Willis* 'while at anchor' sometime in June 1866 (before the 21st) (Wood, no date, MS; also *Whalemen's Shipping List* 24(18): 3 July 1866; see Mitchell and Reeves, 1983, p.192). In addition, two humpbacks were seen at Barbados on 10 February 1840 (*Two Sisters*, 1839-40, MS); 'several' were seen on 26 January 1853 as the barque *Solon* 'sailed outside' from Bridgetown (*Solon*, 1852-53, MS); the *Willis's* boats chased humpbacks 'a dozen times' off Barbados without success in February-April 1858 (Mitchell and Reeves, 1983); one was struck but lost by the crew of the *A.R. Tucker* while at anchor in Barbados in May 1863 (Mitchell and Reeves, 1983); and one was seen from the *Mattapoissett* (1862-64, MS) while anchored in Bridgetown harbour on 12 February 1864.

St Vincent and Bequia

This area was a fairly popular destination for humpbacking from at least as early as the 1830s and through the 1880s. Among the best records from the logbook sample is that of the schooner *Nellie S. Putnam* (1867-68, MS) of Provincetown, which arrived at St Vincent on 25 January 1868 and remained in the Grenadines for the next four months. The daily routine between 7 February-26 April was to cruise in the inter-island channels and occasionally in Friendship Bay (Bequia) and the upper bay of Mustique. Humpbacks seem to have been present almost continuously during this time but the *Putnam* secured none and managed only to strike three (several were taken by other vessels). Cow-calf pairs were not seen until the *Putnam* made a brief sojourn in the Canouan-Mayreau-Union area to the south (see below) between 27 April and 3 May. A pair was sighted near Canouan on 2 May. Upon returning to Bequia a second cow-calf pair was chased off Paget ('Packet') Farm on 4 May. The humpback season ended for the *Putnam* in mid-May (*Nellie S. Putnam*, 1867-68, MS). The Provincetown schooner *J. Taylor* spent the winter seasons of 1866 (*ca* 15 March-19 May) and 1867 humpbacking between Bequia and Mustique, and at least three other Provincetown schooners (*C.H. Cook*, *A.H. Brown* and *Watchman*) did the same in 1866 (*J. Taylor*, 1866-67, MS). The barque *Mattapoissett* of Westport (1862-64, MS) spent about a month humpbacking at Bequia ('Beckque') at the end of a multi-year voyage. Four schooners were already present when the *Mattapoissett* arrived on 18 February 1864. The barque obtained only one humpback in spite of repeated efforts to catch others. The barque *Leonidas* of New Bedford (1864-65, MS) spent the entire period 23 February-2 May 1865 humpbacking in the area bounded by Paget Farm, Friendship Bay, Baliceaux ('Balaso'), Petit Nevis ('Pettaneaves') and Mustique, taking one cow humpback (yielding 1,323 gallons of oil, or about 42bbl), striking at least two calves and striking but losing an additional three humpbacks. At least four Provincetown schooners were also present and presumably humpbacking in this area.

Adams (1971) provides a detailed description of the shore-based whaling operations at Bequia, including a chart of the main whaling grounds (also reproduced in Adams, 1975). Most of the whales were taken within a 10-15 n.mile (16-24km) radius of the shore stations at Friendship, Pt Hillary, Semple Cay and Petit Nevis (Adams, 1971: his Map 5). Adams indicates that the whalers generally worked to the windward so that they would receive assistance from the trade winds in towing killed whales ashore. This, according to Adams, explains why the hunting grounds lay as they did mainly to the east of Bequia, embracing Mustique, Battowia

and Baliceaux, and occasionally reaching all the way to Argyle on the southeastern coast of St Vincent. The heavy seas made it difficult to spot whales from the whaleboats, especially in January and February, so shore-based lookouts with flashing mirrors were often used to direct the boat crews onto whales (Adams, 1971).

A few humpbacks were seen each year by whalemen (i.e. the pilot whale fishermen) along the lee shore of St Vincent during the 1960s (Caldwell *et al.*, 1971) but we have no evidence that humpbacks have been hunted there in recent times.

Grenadines South from Bequia

Lindeman's (1880; see Trude, 1904, p.61) reference to whaling in 'the Grenada Ids.' in spring and early summer may apply to anywhere from St Vincent south to Grenada. He claimed that 500-800bbl of oil were secured from humpbacks annually in this region. At an average yield of 25bbl per whale (Mitchell and Reeves, 1983) this would imply a secured catch of 20-32 whales per year.

A series of logbooks from the schooner *Agate* of Provincetown (1869-70, 1871, 1872, MSS) contain detailed records of humpbacking in the Grenadines south of Bequia. Much success at finding humpbacks was reported off the southwestern coast of Grenada (Saint George's to Calivigny Island, with anchorages including Anse aux Pines, Point Saline, Grande Anse and Glover Island) from 12 March-7 April 1869 and again from 9 February-24 March 1870 and 14 April-18 May 1870. In these two seasons the *Agate* secured 13 humpbacks and struck/lost five. Cow-calf pairs were reported off Anse aux Pines on 18 and 30 March. In the following two winters the *Agate* worked primarily in the chain north of Grenada around Mayreau ('Mirou', 'Myro' etc.), Union and Carriacou ('Curracoaia', 'Caricou' etc.) with anchorages including Frigate Island, Chatham Bay, Hillsborough, Harborville and L'Esterre ('Lestere'), and with occasional forays to Sail Rock. The *Agate* took 20 humpbacks in the two seasons, and of those, at least 15 were members of cow-calf pairs. Humpbacks were seen regularly between late February and mid-May. The proportion of cow-calf pairs mentioned in the logbooks is exceptionally high, particularly for the 1871 and 1872 seasons in the middle Grenadines. Judging by reports in the *Agate* logbooks (and corresponding whale oil returns in Starbuck, 1878), much of the Provincetown fleet humpbacked, with considerable success, in these same Grenadine waters from 1869-72. The schooner *Clara L. Sparks* of Provincetown (1879-80, MS), along with at least four other New England schooners, seems to have whaled in this area from about 10 March-9 April 1880. In 1886 the *D.A. Small* (1886-88, MS) spent a month (20 February-17 March) humpbacking at Carriacou and Union before relocating to Marie-Galante for the rest of the season.

Another itinerary, based somewhat farther north, was followed by the schooner *Arthur Clifford* of Provincetown in five consecutive winters (*Arthur Clifford*, 1866, 1867, 1867-68, 1868-69, 1869-70, MSS). The seasons were all within the period from mid-January to early or mid-May and the *Clifford* cruised primarily between Bequia and Union. Mayreau and Canouan ('Kanawan' etc.) were the centres of whaling operations in all five seasons but humpbacks were also observed consistently around Bequia and Union. Between late January and late April 1870, the *Clifford* secured 9 humpbacks, most of them at Mayreau; the *Clifford* logbook records an additional 16 taken and 7 struck and lost, of which 14 and 4, respectively, were at Mayreau, by the four other Provincetown vessels whaling there that season. Of all

the humpbacks mentioned in the five *Clifford* logbooks as having been taken or struck in the Bequia-Union corridor (whether by the *Clifford* or another vessel), at least 55% (36 of 66) were members of cow-calf pairs. In addition, several 'bulls' were struck or taken, and many of the whales seen and chased but not struck were described as cow-calf pairs or cow-calf-bull groups. When the *Rising Sun* (1875-83, MS) took a small calf on 18 March 1878, they towed it to Canouan 'and sold him to parties on shore'. Although rarely mentioned in the logbooks and journals, such sales may have been common in view of the local demand for fresh meat on the Caribbean islands (cf. Adams, 1994).

The Provincetown schooner *Nellie S. Putnam* (1868-69, MS) followed a similar itinerary to the *Clifford's* in the winter of 1868-69. The *Putnam* arrived at Union Island on 23 December and began cruising daily for whales. Nothing was seen until 13 January when the first three humpbacks were seen and chased. From then until about 20 April humpbacks and blackfish were chased regularly, mainly at Mayreau and Union but also occasionally off Bequia and Kingstown (St Vincent). The *Putnam* took six and struck but lost four humpbacks in the Grenadines that season. Four additional New England schooners (including the *Clifford*, see above) were humpbacking on the same grounds.

Tobago, Trinidad and Coast of Venezuela

Clark (1887) cites the vicinity of Trinidad and the Gulf of Paria (often given as 'Para'), specifically waters between 10-11°N and 61-63°W, as among 'the most noted places for hunting humpbacks in the North Atlantic'. Voyages to this area seem to have been undertaken with the sole and explicit purpose of catching humpbacks. The earliest voyage to the area by an American whaler in the logbook sample was in 1837 and the latest in 1871. However, other evidence shows that a few earlier voyages took place, and also that shore-based whaling for humpbacks in northern Trinidad began some time in the 1820s (Reeves *et al.*, 2001).

The logbook of the barque *Solon* (1852-53, MS) provides evidence that at least a few American vessels continued to visit the Gulf of Paria and Dragon's Mouth (the northern entrance to the Gulf between Trinidad and the Paria Peninsula) in search of humpbacks through mid-century (see Reeves *et al.*, 2001). After touring the Gulf from 28 January to late February 1853, the vessel worked west along the Caribbean side of the Paria Peninsula on 26 February and 'saw plenty of whales outside some going into the Bay [Gulf of Paria]'. A small humpback (which proved to be 'very fat') was taken on 27 February as the vessel steered towards Isla de Margarita and the carcass was towed to Isla Coche ('Coache', 'Cotche') for processing. On 3 March, as the *Solon* approached Isla Cubagua, the logbook records that there were 'plenty of whales round'. After anchoring off the south coast of Isla de Margarita on 4 March, the *Solon* found humpbacks to be plentiful in all directions, but the sea was too rough for whaling and the ship steered for Cumana. Several days were spent negotiating with authorities about the payment of duties to whale in the Gulf of Cariaco ('Carriarca'). Finally, on 11 March the vessel proceeded east into the Gulf, coming to anchor on the south side about 25 n.miles east of Cumana. Humpbacks were moving into and out of this gulf, and the *Solon* remained there until 23 March. Although two whales were struck on 17 March, none were secured. On 21 March, a whaleboat was purchased for the *Solon* from Captain Heath of the brig *September* of Boston; this ship was apparently also humpbacking in the Gulf of Cariaco (*Solon*, 1852-53, MS). The *September* was reported

at Cumana on 18 April with 50bbl of sperm oil on board and had 120bbl of sperm and 150bbl of humpback oil upon arrival in Boston 18 June 1853 (Wood, no date, MS). A humpback was struck by the *Solon's* crew on 10 April somewhere between Isla de Margarita and Cumana. Three days later the vessel headed to Blanquilla and resumed the hunt for sperm whales and blackfish, having had an eventful but unproductive season humpbacking off Trinidad and Venezuela (*Solon*, 1852-53, MS).

The brig *Star Castle* of Fairhaven (1867-68, MS) sailed west from the Cape Verdes in January 1868, calling at St Eustatius and Guadeloupe, then heading directly from St Eustatius towards the coast of Venezuela on 4 February. Two humpbacks were seen 10 n.miles offshore of Bahía de Margarita ('Margriter Bay') on 6 February and the boats were lowered on 7 February to chase humpbacks in the Gulf of Cariaco ('Corraco'). After looking for humpbacks in the Gulf, the vessel relocated to Isla de Margarita ('Magerate Island') on 13-14 February, then steered south and came to anchor at Isla Piritu on 18 February. Humpbacks were chased regularly through the rest of the month, with three taken (including a cow-calf pair) and two more struck but lost between 27 February-4 March. On 7 March the *Star Castle* was 'beating up to Gulf [of Cariaco]' and five more humpbacks were taken between 9-21 March. On 26-28 March the vessel was anchored at Isla Borracha ('Berracer'). A cow-calf pair was struck (only the cow secured) on 29 March, and on 2 April the *Star Castle* came to anchor at Santa Fe for water. The 6 April logbook entry states, 'take our Departure from Humpback ground bound to Northwd', with 160bbl of humpback oil on board.

The schooner *Thriver* of Boston (1870-71, MS) spent at least three months in 1871 (7 January-9 April) humpbacking in an area centred on Cumana. It has been impossible to identify some of the places mentioned as landmarks in the logbook. In general, however, it appears that the *Thriver* sailed directly from Dominica to Isla Piritu ('Purata'), arriving on 25 December 1870. For a week, daily cruises were made to look for whales and the vessel returned to anchor at the island each night. The vessel re-located to Cumana on 6 January, and the first humpbacks were chased the next day in Cumana Bay. From then onwards, the *Thriver* cruised back and forth, throughout the Gulf of Cariaco, offshore to Isla Cubagua and Isla de Margarita and along the mainland coast to Guanta and Isla Piritu. Humpbacks were seen, chased and occasionally struck in all of these areas. A cow and calf were chased near Isla Piritu on 5 March. There is no suggestion that the season was over when the logbook abruptly stops on 9 April with the vessel moving west from the head of the Gulf of Cariaco.

The schooners *George J. Jones* of Fairhaven and *Eleanor B. Conwell* of Provincetown were whaling in the same region that winter (*Thriver*, 1870-71, MS) and the *Jones* secured 140bbl of humpback oil (Wood, no date, MS). The *Jones* is also known to have been at Trinidad in February and March 1867 (Wood, no date, MS). The *Thriver* seems to have followed a similar itinerary in 1866 (arrived at Barbados 4 January; at Curaçao 6 May with 100bbl of humpback oil) and 1867 (at Piritu in February with 80bbl of humpback oil; at Curaçao 26 April with 160bbl of oil) (Wood, no date, MS).

An entirely different type of itinerary was followed by the schooner *Rainbow* of Dartmouth (1866-67, MS), which sailed in mid-December 1866, spent about a month at Bermuda undergoing repairs, then proceeded directly to the southern coast of Trinidad in search of humpbacks. The *Rainbow* came to anchor at Galeota Point on 8 February,

finding the schooner *George J. Jones* of Fairhaven already there. For the next two months the *Rainbow* (and apparently also the *Jones*) cruised almost daily along the coast between Galeota Point and Erin Bay ('Herron Bay'), frequently calling at Moruga, with humpbacks seen or chased on most fair-weather days. Cow-calf pairs were chased on 23 February and on 1, 13 and 27 March. Four humpbacks were taken, another was killed but lost and two more were struck (none of these totals include calves that were struck in order to capture their mothers). Humpbacks were still being sighted through the first week of April when the *Rainbow* departed northwards. The next year the *Rainbow* visited the same grounds in early February but made no attempt to catch humpbacks (*Rainbow*, 1867-68, MS). Several 1868 logbook entries refer to 'pods' or 'shoals' of 'bull humpbacks', and the entry for 7 February states: 'Saw plenty humpbacks ... but ... no cows and calves'.

The schooner *William Martin* of Orleans was off Trinidad sometime between 9 February-1 March 1857, probably humpbacking. This North Atlantic cruise had some unusual features, judging by notes in Wood (no date, MS). After sailing from Orleans the day after Christmas 1856 the schooner was at Dominica on 27 January, having taken one right whale (neither the locality of the take nor the oil production is given). The *Martin* was next reported on Grenada Bank, 9 February, with 25bbl of whale oil (presumably the yield from the right whale); then off Trinidad, no date, with 120bbl of whale oil (presumably some of it from humpbacks); and at Grenada on 1 April with 110bbl whale oil. In the same winter the schooner *Delaware* of Edgartown was reported at Trinidad in January with no oil on board. The vessel later capsized in a squall south of Puerto Rico (Wood, no date, MS).

DISCUSSION

Historical and present distribution

In January and February of 1972/73 Winn *et al.* (1975) surveyed what they presumed was the entire range of humpback whales in the West Indies. This assumption was apparently based on Townsend's (1935) plotted catch positions of nineteenth-century American whalers. Their conclusion that they covered the main areas of the species' winter distribution is generally supported by the findings here, except that they did not enter the Gulf of Paria, visit the southern coast of Trinidad or travel farther west than about 63°W on the Venezuelan coast.

As Winn *et al.* (1975) observed, the relatively small numbers of whales seen and heard in the 'Lower Chain' compared with the 'Upper Chain' to the north was the reverse of what would be expected on the basis of Townsend's (1935) historical catch data. This conclusion is borne out by the whaling logbook data summarised here, which often show an abundance of humpbacks in the eastern and southeastern Caribbean, but relatively few off the islands of the Greater Antilles (notably Hispaniola).

Subsequent surveys of much of the West Indies have generally confirmed Winn *et al.*'s (1975) concept of the present distribution of humpback whales in this region. As noted previously, Silver and Navidad Banks off the northern coast of the Dominican Republic today host large numbers (probably thousands) of humpbacks (Balcomb and Nichols, 1982; Whitehead and Moore, 1982; Mattila *et al.*, 1989). Local abundance at nearby Samana Bay is quite large but approximately an order of magnitude lower than on Silver and Navidad Banks (Mattila *et al.*, 1994), and humpbacks

occur in relatively small numbers from Mona Passage through the various island waters to the east (Mattila and Clapham, 1989).

A recent research cruise described by Swartz *et al.* (in press) has provided the most comprehensive coverage to date of the eastern and southeastern Caribbean region, and represents the first systematic survey of this area since that summarised by Winn *et al.* (1975). The Swartz *et al.* (in press) survey, conducted between 16 February and 29 March 2000, covered most of the Lesser Antilles, Trinidad, Tobago, the Gulf of Paria and much of the coast of Venezuela as far west as Islas Los Roques (at about 67°W). Using sonobuoys deployed throughout the study area, 75 acoustic detections of singing humpback whales were obtained from approximately 350 hours of monitoring. In contrast, there were only 30 visual sightings of 46 humpbacks (including three calves), with most of these detected first acoustically (only nine humpback whales were found by visual observation without prior acoustic detection).

In sharp contrast to these recent observations, the whaling data reviewed for this paper demonstrate that humpbacks were formerly common throughout the Lesser Antilles, along the Caribbean coast of Venezuela, in the Gulf of Paria and along the southern coast of Trinidad during January through May. It is emphasised that the records reviewed here represent only part of the historical picture, given that many logbooks and journals from this period of whaling have not survived or are otherwise unavailable for study. That the ultimate cause of the relative scarcity of humpback whales in this region today is the overexploitation to which they were subject in the nineteenth and early twentieth centuries is difficult to question. Whaling in this region continued into the early part of the twentieth century, culminating in a Norwegian shore-based whaling operation from the island of Grenada in 1925/26 (Mitchell and Reeves, 1983; Romero and Hayford, 2000); the collapse of this fishery after two years of substantial catches likely reflects the severe depletion of the local population of humpbacks. However, the failure of humpback whales to recover or to recolonise the eastern and southeastern Caribbean in significant numbers since the cessation of commercial whaling in 1926 is curious.

Winn *et al.* (1975) offered two possible explanations for the difference between former and current humpback whale distributions in the West Indies: (1) that the timing of their survey in the Lower Chain may have been too early, ahead of the main influx of whales; and (2) that the ongoing hunt at Bequia (which was taking zero to six animals per year at the time) may have 'kept the population suppressed, due to the fact that only females and calves are caught'. Other possibilities are that: (1) the catch positions from American whalships (Townsend, 1935; this study) are unrepresentative of the nineteenth-century distribution and relative abundance of humpbacks in different parts of the West Indies; (2) the relatively few animals found in the southeastern Caribbean today are the descendants of a distinct population that was overexploited historically, either locally or also in high latitudes (Mitchell and Reeves, 1983); or (3) the winter distribution of North Atlantic humpbacks has changed since the nineteenth century.

Of these explanations, the first cannot be excluded but seems unlikely. Although the timing of the most recent dedicated survey of the region (Swartz *et al.*, in press) did not extend beyond late March, the peak of observations from the whaling data were in March for St Vincent and the Grenadines as well as for Venezuela, and in February for the Gulf of Paria (Fig. 2). The contention that the hunt at Bequia

might have suppressed the population is not tenable in view of the small catch (presently two whales per annum) and the known resilience of humpback whale populations elsewhere (Clapham *et al.*, 1999). The possibility that positions noted from whaling manuscripts by Townsend (1935) and by the present study are unrepresentative of contemporary distribution cannot be ruled out, but beyond noting the marked contrast in numbers of whales from the eastern versus northern Caribbean, this issue cannot be addressed further. The fourth explanation (that the region hosts a population separate from that found in the major modern breeding areas to the north) seems unlikely in light of recent photo-identification data (Stevick *et al.*, 1999).

With regard to the final hypothesis, Clapham and Hatch (2000) suggested that the difference in historical and current distributions of humpback whales was probably real, and had its origin in a characteristic of the mating system of this species. Specifically, they suggested that there is likely to be only one major aggregating point in any humpback whale breeding range and, following the overexploitation of the nineteenth century, this focal point shifted to the northern West Indies. Further consideration of this idea is beyond the scope of this paper, but it may be the most parsimonious explanation in light of current knowledge.

Although the data presented here certainly strengthen the argument that humpback whales were not historically abundant in their present major wintering areas off Hispaniola, we do not consider this question to be closed. The experience of the *Cicero* at Samana Bay in 1872 notwithstanding, if the large numbers of humpbacks found today off Hispaniola had been present there in the nineteenth century, it is hard to imagine whalers failing to find or exploit them. However, too little is known about the possible economic, logistical and other factors that might have influenced the whalers' itineraries and search effort, so it is premature to draw definitive conclusions.

Other issues

Observations of cow-calf pairs and cow-calf-bull groups were recorded regularly in the whaling manuscripts of voyages to the Grenadines and Trinidad-Venezuela coasts. Those records, together with published accounts of whaling in Barbados (Archer, 1881) and the Grenadines (Fenger, 1913), demonstrate that these areas served as calving, nursing and probably mating grounds in the past. The positions where humpback songs were recorded during 1969-77 (Winn and Winn, 1978), and during the 2000 survey (Swartz *et al.*, in press) suggest that mating, if not also calving and the nurturing of calves, still occurs throughout much of the historic range.

No evidence was found that the whalers sailed farther westwards along the Spanish Main than approximately longitude 65°30'W, although the offshore island La Blanquilla (often called 'Blanca' or 'Blanco'; not to be confused with the small island of Branco in the northwestern Cape Verde Islands) was a frequent landmark and stopover site for sperm whale and blackfish hunting cruises. Although such occurrences may have been exceptional, humpbacks were sometimes seen at La Blanquilla (e.g. some on 7 January 1891, many on 28 January 1891 – *Golden City*, 1889-91, MS). The recent sightings of solitary humpbacks in January and February near the coast of Curaçao (Debrot and Barros, 1994) demonstrate that the total Northern Hemisphere winter range of humpbacks today extends at least as far west as latitude 69°W in the southern Caribbean. In addition, the logbook of the *E.B. Conwell* (1890-92, MS) of New Bedford records a sighting of a 'large school of

humpbacks' at 12°15'N, 65°00'W on 22 January 1891; this position is northwest of La Blanquilla and approximately midway between Grenada and Bonaire. Movements by humpbacks across deep water within the eastern Caribbean region (e.g. the Grenada and Tobago basins) can be inferred from these sightings, as well as others at Barbados (see above) and west of Dominica (e.g. 11 February 1892 at 16°06'N, 62°59'W and 13 February 1892 at 16°08'N, 65°36'W – *E.B. Conwell*, 1890-92, MS). Humpbacks were also seen well offshore to the east of Trinidad ('plenty' on 9-10 February 1868 at 9°23'-9°56'N, 59°20'-59°46'W – *Rainbow*, 1867-68, MS) and at least occasionally far to the east of Barbados (e.g. 28 February 1868 at 12°55'N, 53°10'W – *Rainbow*, 1867-68, MS).

The suggestion by Acevedo and Smultea (1995) that Southern and Northern Hemisphere humpbacks use the same wintering grounds along the Pacific coast of Costa Rica (six months out of phase) raises the possibility that a similar situation exists in the southeastern Caribbean Sea. The possibility that humpbacks from the South Atlantic at least occasionally visit the southern or eastern Caribbean during the boreal summer cannot be ruled out. However, the historical data indicate that American whalers visited this area primarily during the boreal winter, so they had few opportunities to observe and report humpbacks there during the season when Southern Hemisphere animals would be expected to appear. In effect, the highly seasonal character of the 'sighting effort' in the present study precludes any evaluation of the possibility that Southern Hemisphere humpbacks occurred in the study area during the austral winter.

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MANUSCRIPT SOURCES (Denoted in text as 'MS')

KEY: KWM = Kendall Whaling Museum, Sharon, MA, USA; PPL = Providence Public Library, Providence, RI, USA; NBFPL = New Bedford Free Public Library, New Bedford, MA, USA; ODHS = Old Dartmouth Historical Society, New Bedford, MA, USA.

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Appendix 1

TOPONYMY (BASED ON 'WEST INDIES AND CENTRAL AMERICA', SUPPLEMENT TO *NATIONAL GEOGRAPHIC*, FEBRUARY 1981, PAGE 224A, VOL. 159, NO. 2; EXCEPT WHERE NOTED OTHERWISE).

Greater Antilles: the island chain from Cuba in the west to Puerto Rico and the Virgin Islands in the east.

Leeward Islands: the island chain from Dominica in the south to Anguilla and Sint Eustatius in the north.

Lesser Antilles: the north-south-oriented Windward and Leeward Islands in the east, and the east-west-oriented chain of islands off the Venezuelan coast in the south (Aruba eastward).

Lower Chain: defined by Winn *et al.* (1975:502) as Martinique and all islands to the south (including Trinidad and Tobago).

Spanish Main: formerly the northeast coast of South America, between the Orinoco River and the isthmus of Panama, and the adjoining part of the Caribbean Sea (*Century Dictionary*, 1904).

Upper Chain: defined by Winn *et al.* (1975:502) as areas north of Martinique to Hispaniola and the Grand Turks, including Mouchoir Bank.

Windward Islands: the island chain from Grenada in the south to Martinique in the north.
