

Humpback whale (*Megaptera novaeangliae*) occurrence near the Cape Verde Islands, based on American 19th century whaling records

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ABSTRACT

American 19th century whalers often passed through the Cape Verde Islands (CVI) during the boreal winter and some of them spent a few weeks or months hunting humpback whales (*Megaptera novaeangliae*) in the bays and near-shore waters of the archipelago. Logbooks were examined from 26 voyages that involved some humpback whaling at the CVI, and information was obtained from various sources on approximately 77 additional voyages that definitely or probably humpbacked there. Twenty of the logbooks contained 396 records of an estimated 1,105 humpback whale encounters (catches, strikes and sightings). The largest estimated numbers of encounters and most of the whaling activity were around the islands of Sal, São Vicente and São Nicolau (272, 269 and 229 encounters, respectively). The peak month for humpback whale occurrence in the region appears to have been March (160 records of an estimated 465 whale encounters), with many records from February (110 records of 282 encounters) and April (86 records of 258 encounters). Catch data from the logbooks were combined with commercial data on landings of oil and reported vessel positions to estimate numbers of humpback whales taken in the CVI by the American fleet. Results suggest that American whaling for humpback whales was most intensive in the Cape Verdes during the 1850s and 1860s when at least a few hundred and perhaps more than 500 whales were killed in at least 45 and perhaps more than 80 vessel-seasons. In many respects, the Cape Verdes fishery was similar to that in the West Indies, with cows and calves frequently taken and a similar seasonal peak in whale occurrence. A crude analysis of encounter rates suggests that humpback whale density in the CVI was comparable to that in the major West Indies grounds, a situation that is clearly not the case today.

KEYWORDS: WHALING – HISTORICAL; HUMPBACK WHALE; CAPE VERDE ISLANDS; WEST INDIES; NORTH ATLANTIC; DISTRIBUTION; CATCH HISTORY

INTRODUCTION

Humpback whales (*Megaptera novaeangliae*) occur during the boreal winter and spring around the Cape Verde Islands (CVI), a volcanic archipelago located directly west of Senegal in western Africa (Fig. 1). This seasonal concentration of whales was well known to American whalers during the 19th century (Clark, 1887b; Kellogg, 1929) and some of them spent a few weeks or months cruising for humpback whales on these grounds. Another seasonal concentration, also exploited by the 19th century whalers, occurs farther south along the African coast, centred in the Gulf of Guinea from the Equator south to about 7°S (Clark, 1887b; Townsend, 1935; Aguilar, 1985; Walsh *et al.*, 2000). This latter concentration forms primarily during the austral winter (June–October) and probably consists of Southern Hemisphere animals that migrate to the Antarctic in the summer (Hinton, 1926; Kellogg, 1929; Mackintosh, 1965; Mackintosh and Brown, 1974).

The importance of the Cape Verde archipelago as a wintering ground for humpback whales has sometimes been ignored or underestimated despite references in the literature to substantial catches there (Clark, 1887b; Townsend, 1935; Mitchell and Reeves, 1983; Reeves and Mitchell, 1990; Reiner *et al.*, 1996). Mitchell and Reeves (1983) read logbooks or journals of six American humpbacking voyages to the CVI between 1853–84, recording 45 animals secured and 29 struck but lost. Six additional humpbacking voyages to the CVI were mentioned in passing by Reeves and Mitchell (1986).

The CVI, like the West Indies, were attractive primarily because of their proximity to good sperm whale (*Physeter macrocephalus*) and blackfish (pilot whale, *Globicephala*

spp.) grounds, their strategic location for sailing south from the Azores and Canaries towards the equatorial and southern whaling and sealing grounds, and their mild winter climate. As explained by Hall (1982),

‘The first leg of a whaling voyage from New Bedford frequently consisted of a transatlantic passage to either the Azores or Cape Verde Islands, which with the aid of the prevailing winds could be accomplished within four to six weeks. The islands offered an opportunity to obtain fresh food and to ship additional crew if necessary’

(also see, e.g. Ferguson and Stair, 1936; Fuller, 1980; Haley, 1950). São Nicolau was said to be the ‘most pleasant’ island while Brava was the most lush (Hall, 1982). The island of Sal was a major source of salt for sealing vessels headed towards the Southern Ocean, the salt being used to preserve sealskins (Busch, 1985; Dodge, 1986). Not all whalers that stopped at the CVI, even in the winter and early spring, made an effort to hunt humpback whales. For example, the New Bedford brig *A.J. Ross* visited São Vicente in 1878 following an unsuccessful three-week cruise to Cintra Bay, western Africa, for right whales (*Eubalaena glacialis*). The crew was given shore liberty for a drinking binge. Then, after a few more days at Brava where several crew members were enlisted, the *Ross* set sail for Bermuda (Tilton, 1969).

During the 1880s–1890s, the ‘San Antonio Ground’ in the CVI (also sometimes called ‘the Twenty-Twenties’; Townsend, 1935) was a popular area for hunting sperm and pilot whales between December and March (*George and Mary*, 1888–91, MS; 1892–94, MS). Clark (1887b) described the preferred sperm whale grounds in the southeastern North Atlantic as being along the southern coast of Portugal and Spain from Cape St Vincent to the Strait of Gibraltar, near

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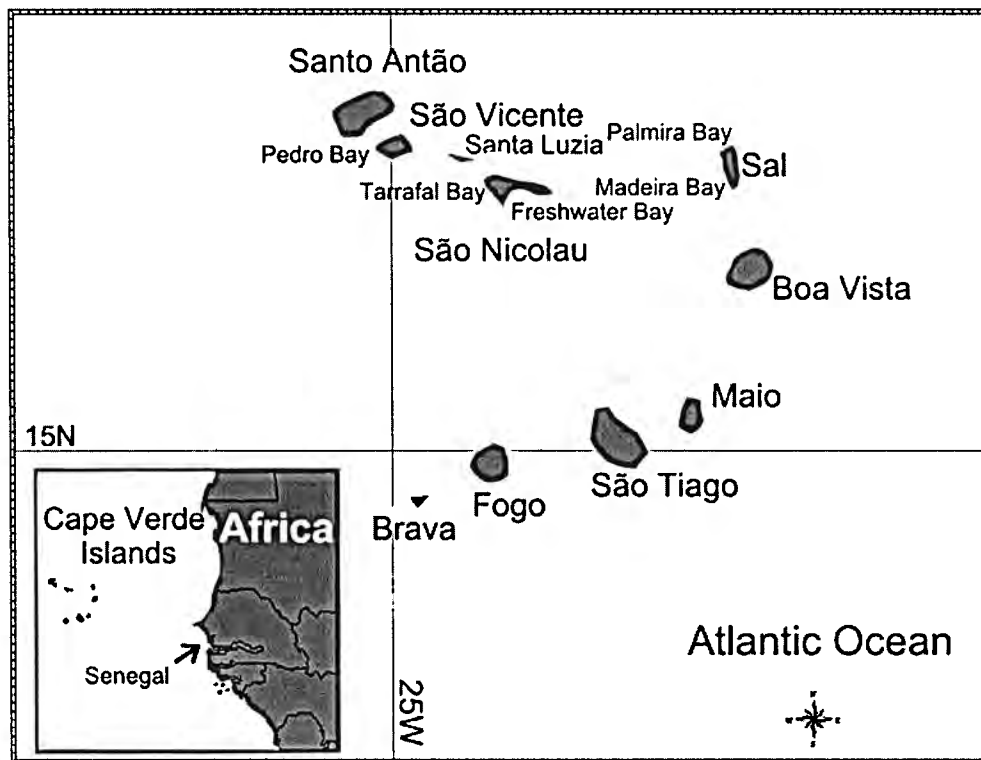


Fig. 1. Map of Cape Verde Islands study area.

the south coast of Tenerife, north and west of the CVI (especially in the winter) and in the areas 10–14°N, 35–40°W (March–May) and 5–7°N, 18–20°W (winter). This latter is what Townsend (1935) called the ‘Cornell Ground’, centred at 4°N, 22°W. Some American whalers, especially the schooner fleet from Provincetown, would cruise near shore for humpback whales at the CVI in the winter, then head north to the sperm whale grounds in the spring or summer (Clark, 1887b). Those North Atlantic whaling vessels that did not stay in the CVI for the humpbacking season often headed west to visit the ‘Twelve-Forty Ground’ (12°N, 40°W) between the CVI and the West Indies from February to May (Townsend, 1935). According to Berzin (1972), waters along 25°W longitude, centred between the CVI and the Equator, constituted an important historical sperm whaling region, with the best whaling there from October to March. The CVI archipelago was also a convenient base for going to and returning from the Cintra Bay Ground on the coast of Africa where right whales were hunted in the boreal winter by some American vessels (Reeves and Mitchell, 1986). However, the small concentration of ‘humpback’ catch positions plotted by Townsend (1935) along the Rio de Oro coast of Africa is misleading. He and his associates seem to have mistaken right whales for humpbacks in their logbook references from this area (Reeves and Mitchell, 1990).

Here, logbooks and journals (both referred to as ‘logbooks’ hereafter) from American whaling vessels are used to investigate the occurrence and distribution of humpback whales in the CVI during the 19th century, in an effort to assess the importance of this region as an historic breeding ground. Results are compared to those from a similar study of 19th century humpback whaling in the West Indies (Reeves *et al.*, 2001). Another main objective of the present study was to document in greater detail the nature, timing and scale of American humpback whaling at the CVI.

MATERIAL AND METHODS

Identifying the logbook sample

In addition to compiling data on CVI whaling from the literature, a non-random sample of logbooks from key collections in New England museums and libraries was examined (Table 1). The goal was to check as many ‘promising’ logbooks as possible within the project’s time and budget constraints. ‘Promising’ meant that information was available to confirm or suspect that humpback whales were hunted in the CVI at some point in the voyage. Such information came from: (a) earlier similar studies that focussed on humpback whaling in the West Indies (Mitchell and Reeves, 1983; Reeves *et al.*, 2001) or right whaling in the North Atlantic (Reeves and Mitchell, 1986); (b) the Dennis Wood Abstracts (Wood, no date, MS); or (c) the Whalemens’ Shipping List (WSL). These last two sources provided information on the itineraries of voyages (e.g. dates of visits to various ports, dates when a vessel was seen or ‘spoken’ at a particular locality at sea) as well as interim and final reports on amounts of oil and baleen obtained (the latter designated as either ‘bone’ or ‘whalebone’). Useful information also came from notes in logbooks referring to other vessels present on the CVI humpback whaling grounds. After identifying a voyage as ‘promising’, the availability of a logbook covering that voyage was determined by reference to Sherman *et al.* (1986), supplemented by indexes of post-1986 acquisitions by the various museums and libraries.

Data recording

Data from logbooks were recorded onto two types of data sheet: one 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 one for details of humpback catches and observations. Few documents were read in their entirety. As a rule, it was

Table 1

'Read' sample of voyages that included some effort at humpback whaling in the Cape Verde Islands. s/l = struck but lost. Published returns are from Starbuck (1878) or Hegarty (1959) except as noted. Wood = Wood (no date, MS); WSL = Whalemens's Shipping List. Sp = bbl of sperm oil; wh = bbl of whale oil; bone = lb of baleen.

Rig and Vessel	Year sailed	Home port	Time at CVI	Known humpback takes	Published returns	Sources
Brig <i>Edward</i>	1815	Nantucket	21 Apr.-4 May 1816	1 s/l	173sp	<i>Edward</i> (1815-17, MS)
Brig <i>By Chance</i>	1826	Dartmouth	13-21 Apr. 1827	cow-calf pair struck - cow escaped, calf sank	160sp	<i>By Chance</i> (1826-28, MS)
Schooner <i>E. Nickerson</i>	1853	Provincetown	17 Jan.-17 May 1854	9+6 cows secured, 14+1 cow-calf pair +5 calves s/l, 2 killed/lost	455wh	<i>E. Nickerson</i> (1853-54, MS)
Brig <i>Homer</i>	1855	Nantucket	11 Jan.-? 1856	Definitely humpbacked	107sp, 20wh	<i>Homer</i> (1855-56, MS)
Schooner <i>Walter Irving</i>	1856	Provincetown	17 Jan.-6 Mar. 1857	3 secured, 3 s/l	50wh	<i>Walter Irving</i> (1856-57, MS)
Schooner <i>E. Nickerson</i>	1856	Provincetown	7 Mar.-early May 1857	No catch; humpbacking desultory	65sp, 200wh, 1800bone, sent home 54sp	<i>E. Nickerson</i> (1856-57, MS)
Bark <i>Osceola 3rd</i>	1865	New Bedford	5 Feb.-16 Apr. 1866	2 secured, 2 s/l	312sp, 2wh, sent home 158sp, 70wh (Starbuck); at Boa Vista on 24 Mar. with 70 humpback, trans-shipped at Barbados early May (Wood)	<i>Osceola 3rd</i> (1865-66, MS a; MS b); Wood (no date, MS)
Bark <i>Stafford</i>	1865	New Bedford	20 Jan.-8 Jun. 1866	2+1 calf secured (540gals + 23bbls + ? oil), 1 cow killed/lost, 1 s/l; while mated with <i>Para 1</i> (194gals half-share) +1 cow-calf pair secured, 1 s/l, 1 killed/lost	250sp, sent home 175sp, 48wh (Starbuck); at CVI on 27 May with 100 humpback (Wood)	<i>Stafford</i> (1865-67, MS); Wood (no date, MS)
Schooner <i>Walter Irving</i>	1865	Provincetown	13 Jan.-22 May 1866	Humpbacking in co. with <i>Antarctic</i> (mated) and <i>E.H. Hatfield</i> ; reported at least 1 secured (cow), 2 killed/lost and 1 s/l with <i>Antarctic</i> ; in addition, 1 secured and 1 s/l; returned 80bbls humpback oil	130sp, 12wh, sent home 35sp, 60wh (Starbuck); at Sal 16 Jan. 'waiting for humpbacks to come into the Bay' (WSL); <i>Irving</i> and <i>Antarctic</i> arrived at Boa Vista from Sal on 16 May with 95wh each (<i>Petrel</i>)	<i>Walter Irving</i> (1865-66, MS); <i>Stafford</i> (1865-67, MS); WSL (31 V 1866); <i>Petrel</i> (1865-66, MS)
Bark <i>Solon</i>	1865	New Bedford	28 Jan.-8 May 1866	3 secured, 1 killed/lost, 7 s/l	210sp, 50wh, wrecked and condemned at Barbados Jun. 1866 (Starbuck); at Sal 28 Jan., landed 53 humpback at Barbados 31 May (Wood)	<i>Solon</i> (1865-66, MS); Wood (no date, MS)
Brig <i>Julia</i>	1865	Fayal	At least 11-16 Feb. 1866	Lowered for humpbacks on 16 Feb. at São Nicolau while 'cruising for Sperm Whales'	Not in Starbuck	<i>Julia</i> (1865-66, MS); <i>Osceola 3rd</i> (1865-66, MS a)
Schooner <i>Petrel</i>	1865	New Bedford	3 Feb.-27 May 1866	3 2/5 secured, 1 calf killed/lost and 9 s/l between 3 Apr.-24 May	28sp, 138wh, 450bone (Starbuck); at Boa Vista on 13 Apr. with 40 humpback, ditto 3 May 95 humpback (Wood); at least some of the bone was from CVI humpbacks (<i>Petrel</i>)	<i>Petrel</i> (1865-66, MS); <i>Osceola 3rd</i> (1865-66, MS a; MS b); Wood (no date, MS)
Schooner <i>E.H.Hatfield</i>	1865	Provincetown	Late Jan.-mid Apr. 1866	0	85sp	<i>E.H.Hatfield</i> (1865-66, MS)
Schooner <i>William A. Grozier</i>	1866	Provincetown	9 Feb.-28 Mar. 1867	2 s/l, 1+ cow killed/lost, 1 calf secured (2bbls)	30sp, sent home 124sp	<i>William A. Grozier</i> (1866-67, MS)
Schooner <i>A.L. Putnam</i>	1866	Provincetown	3 Apr.-2 May 1867	Chased humpbacks once in April	160sp, 70wh, sent home 60sp	<i>A.L. Putnam</i> (1866-67, MS)
Schooner <i>Washington Freeman</i>	1868	Fairhaven	12 Feb.-4 Apr. 1869	2 secured	21sp, 312wh, sent home 137sp; took 7 humpbacks off mouth of Congo in 1870	<i>Washington Freeman</i> (1868-70, MS)
Schooner <i>Albert Clarence</i>	1868	Provincetown	26 Dec.-30 Apr. 1869	Chased humpbacks repeatedly at São Nicolau and São Vicente - took some, judging by oil report	107sp; journal states: left CVI on 30 Apr. with 110bbl humpback oil [imputed catch of 4 humpbacks]	<i>Albert Clarence</i> (1868-70, MS)
Schooner <i>Nellie F. Putnam</i>	1869	Provincetown	2 Feb.-2 May 1870	5+1 cow secured (30+18+36+20+14+20bbls), 2+1 calf s/l, 1 killed/lost	No report, withdrawn 1870	<i>Nellie F. Putnam</i> (1869-70, MS)
Bark <i>Perry</i>	1874	Edgartown	12 Mar.-11 Apr. 1876	3 secured, 3 s/l, 1 killed/lost	810sp	<i>Perry</i> (1874-77, MS)
Schooner <i>Clara L. Sparks</i>	1876	Provincetown	17 Jan.-late Mar. 1877	5 secured (24+46+75+15+20bbls), 3 s/l	310sp, 200wh	<i>Clara L. Sparks</i> (1876-77, MS)
Schooner <i>Express</i>	1878	Provincetown	7 Apr.-24 May 1878	7 secured (incl. 1 cow-calf pair), 2 s/l	25sp, 200wh	<i>Express</i> (1878, MS)
Schooner <i>E.H. Hatfield</i>	1880	Edgartown	12 Jan.-21 Mar. 1882	1 secured (12bbls), 1 s/l	260sp, 10wh	<i>E.H. Hatfield</i> (1880-82, MS)
Schooner <i>Golden City</i>	1882	New Bedford	16 Jan.-6 Apr. 1883; 7-14 Feb. 1884	3 secured (1,779gals oil), 2 s/l - mated with <i>Admiral Blake</i>	250sp	<i>Golden City</i> (1882-84, MS)
Brig <i>Eunice H. Adams</i>	1885	Edgartown	28 Jan.-15 Apr. 1886	1 secured, 5 s/l, plus assisted shore crews in securing 1 and striking/losing 1 (also mated with <i>C.W. Morse</i>)	375sp	<i>Eunice H. Adams</i> (1885-87, MS)
Bark <i>George and Mary</i>	1888	New Bedford	Brief visit to São Nicolau 3-7 Mar. 1891	Desultory effort humpbacking	1150sp	<i>George and Mary</i> (1888-1891, MS)
Schooner <i>Adelia Chase</i>	1901	New Bedford	27 Feb.-30 Apr. 1902	1 secured	305sp	<i>Adelia Chase</i> (1901-02, MS)

determined by rapid scanning if and when the vessel visited the CVI. Daily entries for the period(s) on the grounds were checked for references to humpback whales. Most logbook keepers made clear the distinction between humpback and other whales although in some instances it was necessary for the reader to infer the identity of the whales. Pilot whales were always called 'blackfish.' Whenever sperm whales were seen on the humpback grounds, the logbook writers seem 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). Blue whales (*Balaenoptera musculus*), killer whales (*Orcinus orca*) and assorted other kinds of cetaceans (e.g. 'grampus', probably *Balaenoptera acutorostrata*; 'cowfish', possibly *Tursiops* sp.; dolphins or 'porpoises', probably mostly small delphinids) were also mentioned in the logbooks while vessels were in the CVI (see Reiner *et al.*, 1996; Hazevoet and Wenzel, 2000 for information on the species known to occur there).

The whalers who kept logbooks presented the reader with an often bewildering array of place names, which makes the work of determining where a vessel was at any given time painstaking at best and exasperating at worst. Legibility of the manuscripts was highly variable and so was the level of detail provided by the writers. It was often difficult to match the names given to landmarks in the logbooks to present-day Portuguese place names. All too frequently, nothing was provided beyond the name of the island. In many cases reference was made to the site where the vessel anchored for the night, and it was 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. The logbooks often indicated approximately where a whale was towed for processing; it could only be inferred that the whale therefore had been killed within a short distance of that site.

Data management

A computer database was established with two components. The first was a summary of each voyage, including: vessel name; voyage number 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 contained a summary of all relevant records from each log, including: vessel and voyage number; record type; 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 referred to the absence of whales in a particular location). Other information about where the vessel was on a particular day, shipments of whale oil, processing of whales, other vessels and miscellaneous subjects unrelated to whale encounters *per se* were included in the database but not used in the analyses. Reports of 'lowering for whales', or of whales seen but with no indication of how many were present, were also recorded but not used in the analyses.

Records of whales were further broken down into five categories: (1) 'taken number' (a specific number of whales reported as killed and secured); (2) 'taken barrels' (records in which the oil yield of one or more whales was given, in barrels); (3) 'struck' (whales chased and struck with a harpoon or bomb lance but not killed, or killed but not secured); (4) 'seen number' (a specific number of whales reported as sighted but not struck); and (5) 'seen category'

(records in which sightings of whales were not associated with a number but rather with a descriptive term such as 'few' or 'many').

With regard to the latter category, the various descriptive terms found in the logs were grouped for simplicity into three categories, as follows: (1) 'many' = *many, a school, plenty, great number, a pod, a gam*; (2) 'several' = *a number, several, some, more, saw humpbacks, chased humpbacks*; and (3) 'few' = *few*. For the purpose of analysis, an 'average' (and of necessity, arbitrary) number was assigned to each of these categories, as follows: 'many' equalled ten whales; 'several' equalled four whales; and 'few' equalled two whales. The results presented here are subject to 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, no exact location was given but a general location could be inferred from preceding or subsequent log entries; in the database, these were termed 'inferred' locations. Cases in which a lack of information precluded assignment of even an inferred location were treated as 'no location'.

Estimation of catches

Mitchell and Reeves (1983) used two methods to estimate humpback catches in the West Indies from similar data to those obtained in the present study: (1) they applied the average catch per vessel-season (7 humpbacks) from the voyages for which they had complete logbook data, to all voyages known (or presumed) to have whaled for humpbacks in the West Indies; (2) they used the average amount of oil obtained from humpbacks reported in their logbook sample (25bbl) to convert whale oil returns (from Starbuck, 1878; Hegarty, 1959) into estimated catches¹. Mitchell and Reeves (1983) recognised three categories of humpback voyages: (1) those for which the logbook was read — their 'read' sample; (2) those where the vessel was reported in another vessel's logbook to have been present on the grounds and chasing humpbacks — their 'sighted' sample; and (3) those identified solely on the basis of circumstantial evidence, namely Provincetown as port of origin, sailed between 1866-87, no baleen in the published returns (so as to avoid including right whale catches) and a departure date between October and March with return to port before the following winter — their 'extrapolation' sample. Kills from the three categories of voyages were summed by year, using the midpoints of the ranges between 'oil yield' estimates and 'catch-per-voyage' estimates for the 'sighted' and 'extrapolation' samples (see Mitchell and Reeves, 1983: their table 12).

In the present paper, a similar approach was used although with some significant modifications. Unlike in Mitchell and Reeves (1983), the goal here was not to estimate 'initial' population size, so no attempt was made to estimate total removals by factoring in hunting loss. Instead, secured catches were compiled for the 'read' logbook sample by summing the numbers of whales recorded in the logbooks as killed, regardless of whether they were eventually secured (Table 1). Calves that were harpooned, or whose mothers were harpooned, were counted as dead whales. In addition to the known kill from the 'read' sample, catches of humpback

¹Using an entirely different dataset and a different method, Best (1987) estimated the average oil yield of humpbacks as 24.4bbl (CV = 0.110), apparently applying to all oceans. In the present study, 19 humpbacks from the CVI for which oil yields were recorded in the logbooks produced an average of 25.5bbl (SD 14.1, range = 11-75).

whales were estimated for a 'sighted vessel' sample (Table 2). This sample was identified on the basis of information contained in logbooks, supplemented by information from Townsend and Watson (no date, MS). To estimate catches for the 'sighted vessel' sample, an average yield of 25bbl/whale (see Footnote 1) was applied to the whale oil returns in Starbuck (1878) or Hegarty (1959). In some instances, additional information on oil returns was available from another source.

Participation in the CVI humpback fishery was more heterogeneous than was the case in the West Indies; Provincetown schooners were prominent but not necessarily as predominant in the CVI as they were in the West Indies. Barks engaged more frequently in CVI humpbacking than in West Indies humpbacking. Because of the difficulty of identifying a set of characteristic features of CVI humpbacking voyages, no extrapolation was attempted beyond the 'read' and 'sighted vessel' samples of voyages. However, data contained in Wood (no date, MS) and the WSL made it possible to create an 'extrapolation' sample of sorts. Those sources provided occasional information on localities and amounts of oil and bone on board for most of the American fleet. A number of voyages were thus identified in which there was a high or reasonable likelihood of some CVI humpbacking to have taken place (Table 3). Humpback catches for such voyages were estimated in the same way as for the 'sighted vessel' voyages.

It was not always possible to determine whether whale oil, and even to some extent baleen ('whalebone' or 'bone'), obtained in the southeastern North Atlantic was from right whales (Cintra Bay Ground) or humpbacks (CVI). Various approaches were used to derive inferences, but occasionally no non-arbitrary basis could be found for deciding how to allocate or pro-rate a particular quantity of product. In addition, the proximity of the CVI to the humpback whaling grounds in the Gulf of Guinea (south to the mouth of the Congo) created the potential for misallocating humpback oil or whale oil taken in the tropical and sub-tropical eastern Atlantic. Humpbacking on the coast of Africa was conducted mainly between June and October and was therefore generally out of phase with that in the CVI. Destinations given in itineraries for the Gulf of Guinea grounds included 'St Thomas' (São Tome), Anabon (Annobon, or Pagalu; see Aguilar, 1985), Congo River, Kabenda, Bissau and Loando.

The notes in Wood (no date, MS) frequently posed interpretive problems. For example, the bark *R.L. Barstow* of Nantucket, which humpbacked at the CVI in early 1866 (Table 2), also may have done so in 1863-65. Wood reported its location and products on board as follows: Boa Vista 3 March 1863, 80 sperm; ditto 8 April, 100 sperm; no location or date, 25-30 whale; CVI no date, 80 sperm; CVI 12 June, 70 sperm, 100 'Hump Back'. In the following winter (1864) of the same cruise: Boa Vista before 29 February and trans-shipped 125 sperm; off Bissau, W.C. [West Coast] Africa, 5 May, 60 whale. Finally, in the third winter (1865) of the same cruise: Boa Vista 3 May, having taken 50 sperm and 200 'Humpback oil' and 1200lb 'Bone' during the previous 90 days (reportedly 370 sperm, 450 Humpback and 2000 Bone 'all told') (Wood, no date, MS). Starbuck (1878) gave the returns for this three-year voyage as 360 sperm, 556 whale and no bone. It seems likely that some of the whale oil and possibly the baleen came from CVI whales, but the visit to the coast of Africa just prior to the Gulf of Guinea/Congo humpbacking season in 1864 causes uncertainty and suggests that some portion of the catch could have come from a Southern Hemisphere humpback whale population.

A recurrent problem in the Wood abstracts (as well as the WSL) is that oil other than sperm oil was inconsistently identified as either whale, humpback or blackfish oil. Not infrequently, Wood applied two or three of these terms to the same quantity of oil within a single abstract of a voyage. For example, the Provincetown schooner *S.R. Soper* obtained at least 125bbl of whale oil from right whales in Cintra Bay in 1856 (Reeves and Mitchell, 1986) and another 25bbl possibly from a humpback whale at the CVI (Table 3). Wood listed the return as 150bbl of blackfish oil, which is implausible in any event as individual voyages rarely returned more than 100bbl of blackfish oil (Clark, 1887a).

Comparison with the West Indies

Since the methods and data reporting format used here were virtually identical to those employed by Reeves *et al.* (2001) for 19th century West Indies humpback whaling, it was possible to make a crude comparison of whale densities (encounter rates) at the CVI and West Indies. Although effort was impossible to quantify with any precision, the number of days in which each vessel was known to have been present on the respective whaling grounds was used as a proxy for effort. This assumed that any biases, while undoubtedly differing from vessel to vessel, were not significantly different between the two grounds. There is no way to assess the validity of this assumption.

Encounter rates were calculated by dividing the sum of total reported takes and strikes plus estimated whales sighted, by the number of days that each vessel was known to have spent on the whaling ground. An overall figure for all humpback whale records (takes, strikes and sightings combined) was also calculated in the same way.

These rates were calculated for the Cape Verde Islands with no distinction among islands. For the West Indies, three regions were examined separately: (1) the southernmost area, consisting of Trinidad, Tobago, the Gulf of Paria and the coast of Venezuela; (2) the region from Guadeloupe to St Vincent and the Grenadines, including Barbados (this was the area found by Reeves *et al.*, 2001 to have had the highest number of humpback whale records in the West Indies); and (3) the Dominican Republic and Puerto Rico.

RESULTS

Summary of the data

The data described here came primarily from 20 'read' voyages to the CVI by 18 different vessels (Table 1). The earliest cruise was in 1815-16, the latest in 1901-02. Ports of departure for these voyages (all of them in Massachusetts except as otherwise stated) included: Dartmouth (1); Edgartown (3); Nantucket (2); New Bedford (7); Provincetown (6); and Fayal, Azores (1). A total of 452 records was used for the analysis of distribution and occurrence. This included 396 records of whales and 56 records of 'no whales'.

The study area was divided into eight regions by major island. These included Boa Vista, Brava, Maio, Sal, Santa Luzia, Santo Antão, São Nicolau and São Vicente. The eight regions are listed in Table 4, with a summary of the number of records available for each. The largest number of records came from São Nicolau, Sal and São Vicente (109, 105 and 95, respectively). The fewest (2 records) came from the island of Maio. A ninth island in the CVI group, São Tiago, had no whale-related records.

Table 2

'Sighted vessel' sample of voyages that included some effort at humpback whaling in the Cape Verde Islands, or were in the CVI when other vessels were humpback whaling there. Published returns are from Starbuck (1878) or Hegarty (1959) unless otherwise noted. Wood = Wood (no date, MS); WSL = Whalemens' Shipping List. Sp = bbl of sperm oil; wh = bbl of whale oil; bone = lb of baleen.

Rig and Vessel ¹	Year sailed	Home port	Time at CVI	Known humpback takes	Published returns	Sources	Est. catch
Schooner <i>Antarctic</i>	1852	Provincetown	At least 11 Mar. 1852		240sp, 50wh; at 17°N, 20°24'W on 11 Mar. with 50 humpback in 40 days out	<i>R.L. Barstow</i> (1851-53, MS)	2
Bark <i>Willis</i>	1854	Mattapoisett	At least 8-9 Mar. 1854	1 struck/lost on 9 Mar.	363sp, 24wh	<i>E. Nickerson</i> (1853-54, MS)	1
Brig <i>September</i>	1853	Orleans	At least 16 Feb.-at least 14 Apr. 1854	1 (cow) struck on 16 Feb., 1 secured on 24 Feb., another on 19 Mar., 1 struck on 22 Mar. and another (taken or just struck?) on 14 Apr.	25sp 'at last report'	<i>E. Nickerson</i> (1853-54, MS)	3 or 4
Schooner <i>Watchman</i>	1855	Nantucket	At least 14 Feb.-31 May 1856	Apparently took many CVI humpbacks	530wh (Starbuck); Boa Vista 14 Feb. 125wh, CVI 20 Mar. 140wh, São Tiago 29 Mar. 250wh, no date 400wh, 31 May master drowned at Boa Vista, returned with 550wh (Wood)	<i>Homer</i> (1855-56, MS); Wood (no date, MS)	22
Schooner <i>Hamilton</i>	1855	Nantucket	At least Feb. 1856	Definitely humpbacking	No information	<i>Homer</i> (1855-56, MS)	Prob. some
Schooner <i>William P. Dolliver</i>	1855	Nantucket	At least Feb. 1856	Definitely humpbacking; s/l at least 2	No information	<i>Homer</i> (1855-56, MS)	Prob. some
Bark <i>Osceola</i> (uncertain which one)	1854	New Bedford	Feb. 1856	Unclear if humpbacking	Uncertain (depends which of 3 vessels named <i>Osceola</i>)	<i>Homer</i> (1855-56, MS)	?
Brig <i>Medford</i>	1856	Orleans	At least 24 Mar. 1857		55sp, 285wh, 2100bone	<i>E. Nickerson</i> (1856-57, MS)	0
Brig <i>Parana</i>	1856	Sag Harbor	At least 24 Mar. 1857		450wh, 4900bone, sent home 380sp	<i>E. Nickerson</i> (1856-57, MS)	0
Schooner <i>Silver Cloud</i>	1856	New London	At least 3 Apr.-Jun. 1857	Successful whaling for right whales in Cintra Bay in 1857 or 1858 (see Reeves and Mitchell, 1986, table 4) but probably also took at least 1 humpback at CVI in 1857	No report, wrecked at sea Sep. 1862 (Starbuck); at Boa Vista 3 Apr. 1857 with 130wh (<i>E. Nickerson</i>), at CVI May with 150wh (Wood)	<i>E. Nickerson</i> (1856-57, MS)	1
Bark <i>Spartan</i>	1855	Provincetown	At least 8-24 Mar. 1857		450sp, 450wh, 4000bone	<i>E. Nickerson</i> (1856-57, MS)	0
Schooner <i>Sea Witch</i>	1856	New London	At least 24 Mar.-9 Jun. 1857		130wh, 600bone (Starbuck); no position 1 Dec. 60wh, Boa Vista 29Mar 75wh, CVI 9 Jun. 120wh (Wood)	<i>E. Nickerson</i> (1856-57, MS); Wood (no date, MS)	2 or 3
Schooner <i>Watchman</i>	1856	Nantucket	At least 24 Mar.-9 Jun. 1857	1 s/l on 26 Mar.; some humpbacks apparently secured judging by Wood data	44sp, 386wh, 1350bone (Starbuck) - note that some of production was from Cintra Bay right whales (Reeves and Mitchell); at Canaries 11 Nov. 1856 clean, no position 1 Dec. 60wh, Boa Vista 29 Mar. 1857 75wh, CVI 9 Jun. 120wh; total returns given by Wood as 150wh, 100 humpback, 40sp, plus sent home 130wh, 1500bone (Wood)	<i>E. Nickerson</i> (1856-57, MS); Wood (no date, MS); Reeves and Mitchell (1986)	4
Schooner <i>Montezuma</i>	1857	Provincetown	At least 11 Mar. 1857		7sp, 150wh	<i>E. Nickerson</i> (1856-57, MS)	6
* Schooner <i>E.H. Hatfield</i>	1861	Provincetown	At least 4 Mar.-22 Apr. 1862	8 secured (apparently)	181sp, 239wh, sent home 50sp	Townsend and Watson (no date, MS)	8
Bark <i>Willis</i>	1865	New Bedford	At least 18 Jan.-19 Feb. 1866		Sent home 408sp, 180wh, 800bone (condemned at Fayal 1866) (Starbuck); at CVI 25 Jan. clean, Sal 10 Feb. 25sp, 20wh, 27 May landed 110wh at Barbados (Wood)	<i>Osceola 3rd</i> (1865-66, MS a); <i>Solon</i> (1865-66, MS); <i>Stafford</i> (1865-67, MS); <i>Walter Irving</i> (1865-66, MS); Wood (no date, MS)	4
Bark <i>Thomas Winslow</i>	1865	New Bedford	6 Feb.-5 May 1866	1 secured 18 Mar. (31bbls; <i>Petrel</i>), 1 (cow) secured 3 Apr. (40bbls, in co. with <i>Petrel</i>), 1 secured 10 Apr. (22bbl, in co. with <i>Petrel</i>), 1 s/l 13 Apr. (<i>Petrel</i>), 1 secured 27 Apr. (20bbl; <i>Petrel</i>), 1 secured and 1 killed/lost 4 May (<i>Petrel</i>)	40sp, 210wh, 500bone, sent home 133sp, 37wh, 450bone (Starbuck); at Boa Vista 21 Mar. with 160sp, 25 humpback, ditto 8 May 90 humpback since last report (Wood); note that at least some of the bone was from CVI humpbacks (<i>Petrel</i>)	<i>Osceola 3rd</i> (1865-66, MS a; MS b); Wood (no date, MS); <i>Petrel</i> (1865-66, MS)	5

cont...

Table 2 continued.

Rig and Vessel ¹	Year sailed	Home port	Time at CVI	Known humpback takes	Published returns	Sources	Est. catch
Schooner <i>Eleanor B. Conwell</i>	1864	Provincetown	10 Feb.-12 Mar. 1866	1 killed/sank on 26 Feb. (<i>Petrel</i>), 1 killed/sank on 27 Feb. (<i>Osceola</i>)	63sp, 25wh, sent home 40sp, 180wh	<i>Osceola 3rd</i> (1865-66, MS a); <i>Petrel</i> (1865-66, MS); Walter Irving (1865-66, MS)	2 or 3
Bark <i>R.L. Barstow</i>	1865	Nantucket	At least 5 Feb.-26 May 1866 [later in cruise visited So. Atlantic grounds (Wood)]	Cow-calf secured on 22 Feb. (<i>Petrel</i>), 1 secured (small) on 23 Feb. (<i>Osceola</i>), 1 s/l on 23 May (<i>Petrel</i>)	400sp, 400wh (Starbuck); at Boa Vista 5 Feb. with 80sp, ditto 10 Mar. 85sp, 25humpback, later (prior to 1 Jul.) no position with 90sp, 200 humpback	Wood (no date, MS); <i>Petrel</i> (1865-66, MS); <i>Solon</i> (1865-66, MS); <i>Osceola 3rd</i> (1865-66, MS a)	2 to 8
Schooner <i>Louisa A.</i>	1865	Boston	9 Feb.-26 May 1866; Boa Vista on 9 Feb., 'arrived to humpback' (<i>Petrel</i>); at São Vicente 20 Feb. 1867 (Wood)	1 secured (small) on 24 Mar. (<i>Osceola</i>) (this was a 'bull' acc. to <i>Petrel</i>); Capt Freeman was killed while fast to a humpback at Maio sometime before 21 Apr. (<i>Petrel</i>); 3 secured 10-17 May (one was 18bbl; <i>Petrel</i>)	220sp, sent home 112sp, 175wh (Starbuck); shipped 75bbl whale oil on <i>Fredonia</i> from Fayal prior to Aug. 1866 (Wood); made 320sp, 380wh all told this cruise (Wood)	<i>Osceola 3rd</i> (1865-66, MS a); <i>Petrel</i> (1865-66, MS); Walter Irving (1865-66, MS)	4 to 7
Bark <i>Louisa</i>	1865	New Bedford	At least 17 Feb.-23 Mar. 1866	Definitely humpbacking	470sp, sent home 318sp, 36wh	<i>Osceola 3rd</i> (1865-66, MS a; MS b)	2
Bark <i>Leonidas</i>	1865	New Bedford	At least 27 Jan. -8 May 1866	1 small finback on 14 Feb. (in co. with <i>Solon</i>), 1 on 25 Mar. (apparently took at least 1 more judging by oil returns)	180sp, 270wh, 1000bone, sent home 95sp, 36wh (Starbuck); at São Nicolau no date clean, ditto 21 Apr. 60 humpback, 29 May at Barbados 80 humpback (Wood)	<i>Solon</i> (1865-66, MS); <i>Stafford</i> (1865-67, MS); Wood (no date, MS)	2 or 3
Schooner <i>Varnum H. Hill</i>	1865	Provincetown	At least 27 Jan.- 5 Feb. 1866		160sp, 90wh	<i>Solon</i> (1865-66, MS); <i>Stafford</i> (1865-67, MS)	4
Schooner <i>Admiral Blake</i>	1865	Sippican	At least 2 Feb.-30 May 1866	Definitely humpbacking; arrived São Nicolau 6 Feb., mated with <i>Stafford</i> to humpback, remained in CVI until 30 May (likely that entire 160bbl humpback oil was from CVI)	130sp, 150wh (Starbuck); São Vicente 2 Feb. clean, ditto 28 Mar. 35sp, São Nicolau 6 May 90sp, São Vicente 27 May 150 unsp., 16 Jul. no position 25sp, 160 humpback (Wood)	<i>Solon</i> (1865-66, MS); <i>Stafford</i> (1865-67, MS); Wood (no date, MS)	6
Schooner <i>S.E. Lewis</i>	1865	Boston	At least 13 Feb. 1866		70sp, sent home 131sp	<i>Solon</i> (1865-66, MS)	0
Schooner <i>Mary E. Curren</i>	1865	Provincetown	16 Jan.-at least late Apr. 1866	1 on 26 Apr.	317wh, sent home 507sp (Starbuck); at CVI 17 Mar. with 175wh (WSL)	<i>Stafford</i> (1865-67, MS); Walter Irving (1865-66, MS); WSL	7 to 13
Schooner <i>Rising Sun</i>	1865	Provincetown	At least 2 Feb.-17 Mar. 1866		40sp, 249wh (Starbuck); at CVI 17Mar with 20 unsp. (WSL)	<i>Stafford</i> (1865-67, MS); WSL	10
Schooner <i>Antarctic</i>	1865	Provincetown	At least 22 Jan.-22 May 1866	Definitely humpbacking (in co. with <i>Walter Irving</i>) using bomb lances (see <i>Irving</i> entry in Table 1)	25sp, 40wh, sent home 145sp, 95wh (Starbuck); at CVI 25 Apr. with 75wh (WSL); arrived at Boa Vista from Sal on 16 May with 95wh (<i>Petrel</i>)	<i>Osceola 3rd</i> (1865-66, MS a); <i>Walter Irving</i> (1865-66, MS); <i>S.R. Soper</i> (1865-66, MS); WSL; <i>Petrel</i> (1865-66, MS)	4 to 6
*Schooner <i>Para</i>	1865	Salem	22 Feb.-8 Jun. 1866	1 on 20 Mar. (in co. with <i>Stafford</i>), 1 s/l on 21 Mar., took 1 on 27 Mar., killed/lost 1 on 15 Apr. (in co. with <i>Stafford</i>), killed calf and s/l cow on 21 Apr. (in co. with <i>Stafford</i>), 1 on 29 Apr., took 1 alongside that had been killed by <i>Stafford</i> on 17 May	140wh, sent home 200 humpback (Starbuck) in Nov. 1866 from Barbados (Wood); at São Vicente 7 Mar. with 20 humpback, 19 May with 150 humpback (Wood)	<i>Stafford</i> (1865-67, MS); Wood (no date, MS)	8
Bark <i>St Elizabeth</i>	1866	Boston (Turks Island? <i>fide</i> logbooks of <i>Petrel</i> and <i>Walter Irving</i>)	At least 4-20 Apr. 1866		No returns; condemned (Starbuck); at Boa Vista 15 Apr. clean (<i>Petrel</i>)	<i>Stafford</i> (1865-67, MS); <i>Petrel</i> (1865-66, MS); <i>Walter Irving</i> (1865-66, MS); <i>Osceola 3rd</i> (1865-66, MS a; MS b)	0
Schooner <i>Mary E. Simmons</i>	1865	Provincetown	At least 17 Mar.-29 May 1866		51sp, 252wh, sent home 280sp (Starbuck); at CVI 17 Mar. and 15 May with 150wh	<i>Stafford</i> (1865-67, MS); WSL	6 to 10

Table 2 continued.

Rig and Vessel ¹	Year sailed	Home port	Time at CVI	Known humpback takes	Published returns	Sources	Est. catch
Schooner <i>Sassacus</i>	1865	Provincetown	At least 19 Jan.-23 May 1866		120sp, 45wh, sent home 60sp, 175 humpback	<i>Stafford</i> (1865-67, MS); <i>William A. Grozier</i> (1866-67, MS); <i>Walter Irving</i> (1865-66, MS)	7
Schooner <i>Quickstep</i>	1865	Provincetown	At least 17 Mar.-25 May 1866	Cow/calf on 25 May	80sp, 275wh (Starbuck); at CVI on 17 Mar. with 50wh (WSL)	<i>Stafford</i> (1865-67, MS); WSL	11
Schooner <i>Susan N. Smith</i>	1865	Boston	At least 22 Jan.-Apr. 1866, Feb. 1867		240sp; at CVI 25 Jan. 1866 clean, São Vicente 20 Apr. 120sp, São Nicolau 20 Oct. 125sp (240sp all told); São Vicente 20 Feb. 1867 (Wood)	<i>Stafford</i> (1865-67, MS); <i>Walter Irving</i> (1865-66, MS)	0
Ship <i>Comm. Morris</i>	1865	New Bedford	At least 21 Jan. -Apr. 1866; 6-9 Mar. 1867	1 secured (45bbl) in 1866	850sp, 70wh, sent home 1810sp, 30wh	<i>Osceola 3rd</i> (1865-66, MS a); <i>Stafford</i> (1865-67, MS); <i>William A. Grozier</i> (1866-67, MS); Wood (no date, MS)	1 to 3
Schooner <i>Montezuma</i>	1866	Provincetown	At least 2 Mar. 1867		160sp, 35wh	<i>William A. Grozier</i> (1866-67, MS)	1
Schooner <i>Quickstep</i>	1866	Provincetown	At least 25 Mar.-19 Apr. 1867		200sp, 200wh; at CVI 19 Apr with 200 humpback (WSL 25(14): 4VI 1867)	<i>William A. Grozier</i> (1866-67, MS)	8
Schooner <i>Edith May</i>	1866	Wellfleet	At least 27 Feb. 1867		239sp, sent home 80sp	<i>William A. Grozier</i> (1866-67, MS)	0
Schooner <i>William Martin</i>	1866	Boston	At least Feb. 1867	Evidently visited CVI with intention of humpbacking: at São Vicente, no date, 'with many other whalers, waiting for the weather to moderate. Very few humpbacks about the Islands and but little oil had been taken' (WSL), at Bravo 12 Feb. 20sp (WSL), seen blackfishing at Santo Antão 21 Feb, at Barbados 25 Apr. 50sp (WSL)	225sp	<i>William A. Grozier</i> (1866-67, MS)	0
Schooner <i>A.H. (Abbie) Brown</i>	1867	Provincetown	At least 26 Jan.-7 Feb. 1869		280sp, 80wh, sent home 45sp	<i>Albert Clarence</i> (1868-70, MS)	3
Bark <i>A.R. Tucker</i>	1868	New Bedford	At least 24 Feb.-29 Apr. 1869		147sp, sent home 108sp	<i>Albert Clarence</i> (1868-70, MS)	0
Schooner <i>S.A. Paine</i>	1867	Provincetown	At least 26 Jan. 1869		180sp, 180wh, sent home 114sp	<i>Albert Clarence</i> (1868-70, MS)	?
Schooner <i>Edith May</i>	1867	Wellfleet	At least 26 Jan.-30 Apr. 1869	Much of season in company with <i>A. Clarence</i> , which was definitely humpbacking	260sp, 85wh, sent home 85sp	<i>Albert Clarence</i> (1868-70, MS)	3
Schooner <i>B.F. Sparks</i>	1876	Provincetown	At least mid Mar. 1877	1 secured on 17 Mar.	310sp, 150wh	<i>Clara L. Sparks</i> (1876-77, MS)	6
Schooner <i>William Wilson</i>	1876	Marion	At least 15 Feb. 1877		85sp, 125wh	<i>Clara L. Sparks</i> (1876-77, MS)	5
*Schooner <i>E.H. Hatfield</i>	1876	Provincetown	At least 26 Feb. 1877	1 secured on 26 Feb.	No data	Townsend and Watson (no date, MS)	1
Schooner <i>Crown Point</i>	1882	Provincetown	1 Feb.-at least 14 Mar. 1883	1 before 22 Feb. (19bbl), 1 on 7 Mar. (35bbl - 90bbl total to date), 1 on 14 Mar.	140sp, 100wh	<i>Golden City</i> (1882-84, MS)	4
Schooner <i>Admiral Blake</i>	1882	Marion	1 Feb.- 2 Mar. 1883	1 s/l on 23 Feb. (in co. with <i>Golden City</i>), s/l cow-calf pair on 28 Feb. (in co. as above)	365sp, 30wh	<i>Golden City</i> (1882-84, MS)	1
Schooner <i>M.E. Simmons</i>	1883	New Bedford	At least 7 Feb. 1884	Master aboard <i>Golden City</i> whilst humpbacks being chased in Calm Bay, São Vicente	635sp	<i>Golden City</i> (1882-84, MS)	?
Schooner <i>Adelia Chase</i>	1882	New Bedford	At least 13 Feb. 1884		380sp, 230wh	<i>Golden City</i> (1882-84, MS)	?
Schooner <i>Chas. W. Morse</i>	1883	New Bedford	At least 10 Feb.-11 Mar. 1886	Definitely humpbacking (mated with <i>E.H. Adams</i>), helped process 1 on 17 Feb., struck 1 on 22 Feb.	410sp, 195wh	<i>Eunice H. Adams</i> (1885-87, MS)	1 to 8
Schooner <i>Mary E. Simmons</i>	1889	New Bedford	At least 3-7 Mar. 1891	Desultory effort humpbacking	1580sp	<i>George and Mary</i> (1888-91, MS)	0

¹ Asterisk (*) indicates that Townsend and Watson (no date, MS) recorded at least one humpback kill in the CVI.

Table 3

Voyages suspected of having included some effort at humpback whaling in the Cape Verde Islands. Inferences based mainly on evidence in Wood (no date, MS) or Whalemens's Shipping List (WSL). Published returns are from Starbuck (1878) or Hegarty (1959) unless otherwise noted. Wood = Wood (no date, MS); WSL = Whalemens's Shipping List. Sp = bbl of sperm oil; wh = bbl of whale oil; bone = lb of baleen.

Rig and Vessel	Year sailed	Home port	Time at CVI	Basis for inference	Published returns	Est. catch
Bark <i>Franklin</i>	1853	Provincetown	?	Statement in Starbuck (1878): 'Lost on Isle of Sal, Cape de Verdes; saved 140 barrels whale'.	-	6
Brig <i>Amelia</i>	1854	Sandwich	At least 8 Mar. 1855	Sailed for 'Atlantic' on 27 Jul., called at São Tiago 8 Mar. 1855 with 325wh on board, spoke 28 Aug. NE of Bermuda	265wh [330 'Hump Back Whale oil' (Wood)], after 13mo. cruise	13
Schooner <i>Antarctic</i>	1854	Provincetown	At least 19 Mar.-10 Apr. 1855	Called at CVI 19 Mar. with 25sp, 50 'B.F.' on board; again 10 Apr. with 25sp, 120wh	No information	5
Bark <i>Osceola</i>	1854	New Bedford	At least 11 Feb.-1 Apr. 1856	At Sal 11 Feb. with 20sp, 45wh, having reported previously from Fayal 7 Oct. with no oil; at CVI 20 Mar. with 70sp, 70wh; at São Nicolau 1 Apr. with 50sp, 120wh; at Fayal 10 Jun. with 80sp, 170wh	198sp, 171wh, 400bone, sent home 702sp [200sp, 160wh, 400bone (Wood)]	7
Brig <i>Amelia</i>	1854	Sandwich	At least Mar. 1855	At São Tiago 8 Mar. 325wh	265wh [330 humpback (Wood)]	13
Brig <i>Amelia</i>	1855	Sandwich	At least Mar. 1856	Sailed for 'Atlantic' on 16 Oct., called at CVI in Mar., returned home 2 Sep. 1856	Returned 'clean' (no catch) [23 'Hump Back' sold during voyage (Wood)]	1
Schooner <i>S.R. Soper</i>	1855	Provincetown	Late Mar./Apr. 1856	After right whaling in Cintra Bay (see Reeves and Mitchell, 1986, table 4), master killed by a whale at CVI <i>ca</i> late Mar.-Apr. 1856	42sp, 152wh [45sp, 150 'B.F. oil' (Wood)]	1
Brig <i>Amelia</i>	1855	Sandwich	Mar. 1856	At CVI Mar., no report; sold 23bbl humpback oil during voyage	Clean	1
Bark <i>Benjamin Franklin</i>	1855	Beverly/Fall River	? Possibly Jan.-Mar. 1856	At São Vicente 19 Dec. 1855 'bound HumpBack', sailed from ditto 26 Dec., 1 Jan. 1856 sailed from São Tiago with 40sp, arrived São Tome 17 Apr., at 38°N 2 Jun. with 200wh (apparently humpbacked mainly or only in Gulf of Guinea? Wrong season)	16sp, 169wh	?
Bark <i>Rothschild</i>	1855	Orleans	At least mid-Apr. to late May 1856	Cintra Bay 8 Feb. 40wh, no location 25 Mar. with 120wh, CVI 24 Apr. with 260wh, ditto 22 May with 300wh, Fayal 5 Jul. with 335wh; also see Reeves and Mitchell (1986, table 4)	325sp, 380wh	7
Schooner <i>William Martin</i>	1856	Orleans	At least 16 Mar.-3 Jun. 1856	At Cintra Bay 8 Mar. 1856 clean, ditto 16 Mar., Madeira Bay no date 60 unspecified, CVI 22 May 145unspec., 800bone, Sal 3 Jun. 200unspec.	Not in Starbuck [returned 189wh, 800bone in 8mo. (Wood)]	2
Bark <i>Rothschild</i>	1857	Orleans	At least early Apr. 1858	At Cintra Bay 18 Jan. 1858 clean, CVI 6 Apr. with 30sp, 60 humpback; also see Reeves and Mitchell (1986, table 4)	46sp, 64wh	2
Brig <i>Eschol</i>	1857	Provincetown	At least 16 Feb. 1858	After right whaling in Cintra Bay, arrived CVI 16 Feb. with 210sp, 75wh, returned home 3mo. later with 210sp, 140wh, 300lb bone	200sp, 140wh, 300bone	3
Brig <i>Medford</i>	1858	Orleans	?	At Tenerife 25 Nov., oil not reported; next at Barbados 24 May 1859 with 240 humpback on board	25sp, 224wh, sent home 119sp	Poss. as many as 9
Schooner <i>Watchman</i>	1858	Nantucket	At least 5 Apr. 1859	At Boa Vista 5 Apr. 400wh	563wh	12 to 17
Schooner <i>Watchman</i>	1859	Nantucket	At least 30 Jan.-30 May 1860	At CVI 30 Jan. with 70wh, 700bone, São Nicolau 20 Apr. 270bbls unspecified, ditto 30 May 321humpback, no position 8 Aug. 50sp, 400 humpback	65sp, 430wh [arrived with 65sp, 360wh, sent home 70wh, 700bone (Wood)]	16
Bark <i>Acorn</i>	1859	Provincetown	At least 15 Apr. 1860	50 wh on board at CVI within 4mo of sailing	80sp, 70wh	3
Bark <i>Rothschild</i>	1860	Orleans	At least 20 Feb.-30 May 1860; Apr. 1861	At CVI 20 Feb. clean, ditto 30 Mar. with a whale alongside, São Nicolau 20 Apr. with 190bbl unsp., ditto 30 May with 300 humpback, halfway between Azores and Bermuda 24 Jul. with 350 humpback; at CVI 22 Apr. 1861 120sp, 400wh, Fayal 1 Jul. 125sp, 455wh	30sp, 706wh, sent home 110sp [130sp, 760 humpback (Wood)]	12 (1860); 18 (1861)
Schooner <i>Watchman</i>	1860	Nantucket	1861	At Cintra Bay Jan. 1861 clean, CVI no date 150unspec., no position 13 Jul. 20sp, 350 humpback	20sp, 400wh	14
Schooner <i>S.R. Soper</i>	1861	Provincetown	At least Feb. 1863	At São Nicolau 9 Feb. no report, no date and no position 25-30wh, CVI no date 60wh	75sp	2
Bark <i>Willis</i>	1861	Mattapoissett	At least 4 Feb.-Apr. 1862	At São Vicente 4 Feb. with 70sp, 12blackfish, ditto Apr. with 70sp, 180wh	146sp, 176wh	7
Bark <i>Willis</i>	1862	Mattapoissett	At least Mar. 1864	At Sal 11 Mar. 1864 310 unsp., Barbados 12 May shipped 195wh (of which 55 was from a humpback taken in Barbados)	50sp, 700bone, sent home 303sp, 195wh	Poss. 6 (1864)
Bark <i>R.L. Barstow</i>	1862	Nantucket	At least 3 Mar.-12 Jun. 1863; at least Feb 1864; at least 3 May 1865	At Boa Vista 3 Mar. 1863 with 80sp, at ditto 8 Apr. with 100sp, no date with 25-30wh, at CVI no date with 80sp, at ditto 12 Jun. with 70sp, 100 'Hump Back'; at Boa Vista before 29 Feb. 1864, off Bissau, W Africa 5 May with 60wh; at Boa Vista 3 May 1865 having gotten 50sp, 200 humpback, 1200bone in last 90 days	360sp, 556wh; [370sp, 450 humpback, 2000bone all told (Wood)]	4 (1863); poss. 2 (1864); 8 (1865)

Table 3 continued.

Rig and Vessel	Year sailed	Home port	Time at CVI	Basis for inference	Published returns	Est. catch
Bark <i>Ariel</i>	1862-63(?)	Mattapoisett	At least 9 Feb.-?	At São Nicolau 9 Feb. 1863, no date and no position with 25-30wh, at CVI no date with 60wh, at St Thomas (São Tomé) 15 May 1864	No information	2
Brig <i>Annawan</i>	1863	New Bedford	At least Sep. 1864 and Feb. 1865	Called at São Tiago 11 Sep. 1864 with only sperm on board, called at CVI 9 Feb. 1865 with 30sp, 30wh	121sp, 45wh, sent home 210sp [returned with 125sp, 45wh (Wood)]	Poss. 1 or 2
Bark <i>Solon</i>	1863	New Bedford	At least Apr. 1864; 18 Apr. 1865	At São Nicolau 12 Apr. 1864 with 100 humpback, Fayal 11 Jul. 350 humpback (Wood IV:191); at CVI 18 Apr. 1865 with 200 humpback (WSL 23(16):20 VI 1865)	117sp, 351wh, 1600bone, sent home 163sp, 300wh	14 (1864); 8 (1865)
Bark <i>Thomas Winslow</i>	1864	New Bedford	?	Visited Cintra Bay Ground Feb. 1865 (at Goree 17 Feb. with 40sp on board - Wood)	23sp, 300wh, 1450bone, sent home 150sp [arrived home after 16mo. with 200sp, 300 'HumpBack oil' (Wood)]	Poss. 12
Schooner <i>S.N. Smith</i>	1864	Boston	At Sal some time before Apr. 1865	Arrived Barbados 13 Apr. 1865 with 75sp, 100wh - possibly from CVI	190sp, 100wh, sent home 84sp [275sp, 100wh, sent home 80sp (Wood)]	4
Schooner <i>William Martin</i>	1865	Boston	At least 25 Feb.-20 Apr. 1866	At São Vicente 25 Feb. 20sp, ditto 20Apr 125sp	203sp, 18wh	1
Schooner <i>S.A. Paine</i>	1867	Provincetown	At least 6 Mar.-25 Apr. 1869	At São Vicente 6 Mar. 60 humpback, ditto 25 Apr. 380 oil all told (WSL)	180sp, 180wh, sent home 114sp	7
Schooner <i>Edith May</i>	1867	Wellfleet	At least 6 Mar. 1869	At São Vicente with 1 whale as of 6 Mar. (WSL 27(9):27 IV 1869)	260sp, 85wh, sent home 85sp	3
Brig <i>D.A. Small</i>	1868	Provincetown	At least 6 Mar. 1869	At São Vicente 6 Mar. boiling a whale (WSL 27(9):27 IV 1869)	206sp, 1wh	1
Schooner <i>Chas. A. Higgins</i>	1868	Provincetown	At least 6 Mar. 1869	At São Vicente with 1 whale as of 6 Mar. (WSL 27(9): 27 IV 1869)	80sp, 200wh, sent home 56sp	8
Schooner <i>Louisa A.</i>	1867	Boston	At least 20 Feb. 1870	At Flores 18 Aug. 1869 clean, Bermuda 22 Nov. 4sp, 40 humpback, sailed from Bermuda 8 Dec., at São Vicente 20 Feb. 1870 with no oil since last report, arrived with 50sp, 200wh.	50sp, 200wh, sent home 271sp	6
Schooner <i>S.A. Paine</i>	1870	Provincetown	Feb.-Mar. 1871?	At São Vicente 1 Feb. bound sperm whaling, to 'return to St Vincent March 1 st , for humpbacks' (WSL 29:1871)	151sp, 229wh	9
Schooner <i>Petrel</i>	1871	New Bedford	At least Mar. 1872	At CVI 23 Mar. 1872 with 100sp, then Bermuda mid-Jun. with 120-130bbl humpback	11sp, 112wh [10sp, 120 humpback (Wood)]	5
Schooner <i>William A. Grozier</i>	1875	Provincetown	At least 20 Feb. 1876	At São Tiago 20 Feb. 30wh (WSL 34(9):18 IV 1876)	680sp, 30wh	1
Schooner <i>Antarctic</i>	1881	Provincetown	At least 19 Jan.-23 Apr. 1882	At CVI on 23 Apr. 28 humpback (WSL 40(6):21 III 1882; 40(17):6 VI 1882)	100sp, 25wh	1
Schooner <i>Alcyone</i>	1884	Provincetown	At least Mar. 1885	At CVI on 22 Mar. with 50 humpback; 12 May 80 humpback, 25 of which trans-shipped in Barbados (WSL)	180sp, 50wh	3

Table 4
Summary of records, by type and island, for all Cape Verde Island locations.

Island	Total records	Record type	
		Whales	No whales
Boa Vista	59	55	4
Brava	10	10	
Maio	2	2	
Sal	105	98	7
Santa Luzia	33	29	4
Santo Antão	39	24	15
São Nicolau	109	99	10
São Vicente	95	79	16
Total	452	396	56

Records of humpback whales

The numbers of records ('whale' and 'no whale') are summarised by month in Table 5. Approximately 90% of the whale records were in February, March and April. As noted in Reeves *et al.* (2001), it was difficult to interpret the 'no whale' records. The absence of whales would probably be recorded in the logbook only on days when sighting conditions were acceptable and there was some search effort, although it could not 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 'no whale' days, the very fact that the whalers were searching for them implies an expectation of finding humpbacks in the area, and this

Table 5
Summary of Cape Verde Islands whale-related records by month. There were no records for the months of July to November.

Month	Whale records	'No whales' records
January	7	3
February	110	13
March	160	21
April	86	12
May	27	6
June	2	1
December	4	-
Total	396	56

expectation may have arisen from empirical knowledge concerning whale distribution and movements. No further consideration of the 'no whale' records was judged appropriate.

Records of humpback whales are summarised by region in Table 6, together with estimates of the total numbers of whale encounters. These estimates involve assumptions 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. It is also important to emphasise that two disparate types of data have been combined for this analysis. 'Taken' whales, and probably at least some 'struck' whales, represent unduplicated removals from the whaling ground, whereas 'seen' whales (and to some extent 'struck' whales) probably include repeat encounters with the same individuals. It is possible that, given the relatively small spatial scales of these concentrated fisheries, same-day and between-day sightings of a whale or whales have inflated the number of sightings; however, there is no way of assessing the existence or extent of this bias in the data. Despite such caveats, we believe that these encounter rate data probably provide reasonably valid indications of the relative abundance, or density, of whales in each of the regions. Of the estimated 1,105 humpback whale encounters, the largest numbers were reported from Sal (estimated total 272, or 24.6%), followed by São Vicente (269 whales, 24.3%), São Nicolau (229 whales, 20.7%) and Boa Vista (150 whales, 13.6%). Of the nine islands, Maio and Brava had the fewest encounters (estimated at 8 and 27, respectively).

The numbers of humpback whale encounters off each island for the December-June period are shown in Fig. 2. Peak numbers appear to have occurred in March, with substantial numbers of records for February and April. Once again, however, it must be stressed that these records were not corrected for effort and thus only crudely reflect the occurrence of humpback whales.

Estimated humpback whale catches and vessel-seasons in the Cape Verdes

The total number of humpback whales secured or known to have been killed but lost between 1815-1901, based solely on the 'read' sample, was 89 (Table 7). In addition, 61

Table 6

Summary of records of humpback whales, for all Cape Verde Islands locations, and estimates of total number of whale encounters represented by these records. Areas for which no whale records were found were omitted. Some whales were reported in the logbooks as an exact number of animals, and these are shown here in the categories *Taken*, *Struck* and *Seen*. In other cases, whalers recorded observations of whales with no number of animals specified, using instead a variety of descriptive terms; these terms are grouped here into the three categories *Few*, *Several* and *Many*. For the purpose of estimating whale numbers, the following values were arbitrarily assigned to these three categories: *few* = 2, *several* = 4, *many* = 10. The resulting estimated numbers are given in the *est whales* column under each of the three categories; the previous column (*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.

Island	Total whale records	Humpback whale encounters									Total whale encounters
		(Exact) nos of whales recorded			Whale reports with exact nos not specified						
		Taken	Struck	Seen	'Few'		'Several'		'Many'		
				Records	Est. whales	Records	Est. whales	Records	Est. whales		
Boa Vista	55	20	18	12			25	100			150
Brava	10	2	3	2			5	20			27
Maio	2						2	8			8
Sal	98	17	19	40	2	4	43	172	2	20	272
Santa Luzia	29	2	4	12			14	56			74
Santo Antão	24	3	3	2			17	68			76
São Nicolau	99	11	19	75			31	124			229
São Vicente	79	13	12	30			41	164	5	50	269
Total	396	68	78	173	2	4	178	712	7	70	1,105

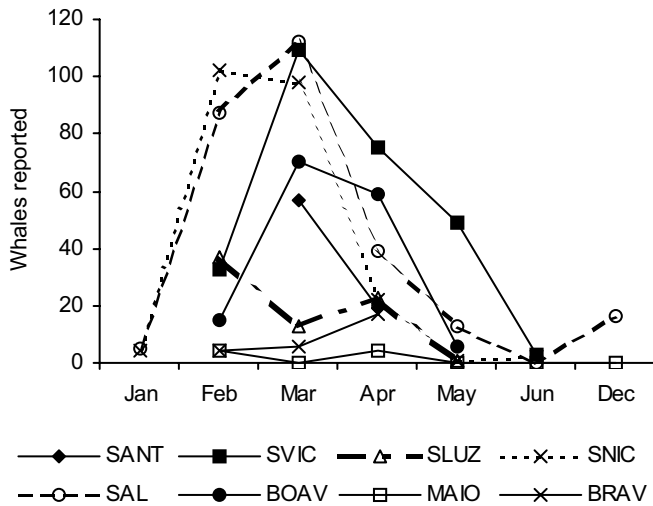


Fig. 2. Estimated numbers of humpback whales observed (sightings, strikes and kills) by month and island. Abbreviations are as follows: SANT Santo Antao, SVIC Sao Vicente, SLUZ Santa Luzia, SNIC Sao Nicolau, SAL Sal, BOAV Boa Vista, MAIO Maio, BRAV Brava.

struck/lost whales were documented. The total estimated catch from the 'sighted vessel' sample was 167-201+ between 1852-1886, and from the 'extrapolation' sample 230-266 between 1853-1884. Estimated removals from 1850-1879, with no adjustment to account for killed/lost or struck/lost whales in the 'sighted vessel' and 'extrapolation' samples, but assuming 100% mortality for all struck whales in the 'read' sample, total 518-581.

The estimated total of vessel-seasons documented from the 'read' sample was 25, the 'sighted vessel' sample 38-40 and the 'extrapolation' sample 37-43, for a grand total of 100-108. Of these, 88-94 took place between 1850-1879.

Peak period of humpback whaling in the Cape Verdes

New England whalers apparently began taking large numbers of humpbacks in the 1830s and effort remained reasonably high for six decades (Mitchell and Reeves, 1983). After about 1888 there seems to have been little interest in humpbacking. The earliest CVI humpback voyage documented in this study was by the brig *Edward* of Nantucket (1815-17 MS) which whaled at Sal from 21

April-4 May 1816 (1 humpback struck). On an 1812 sealing voyage by the brig *Nanina* of New York, the captain and a crew member 'Lanced a Hump back calf whale' at the Cape Verdes on 24 May (Dodge, 1986). This event appears to have been atypical although it serves to demonstrate that humpback whales were at least casually hunted at the CVI by American seamen from as early as the second decade of the 19th century. The brig *By Chance* of Dartmouth (1826-28 MS) cruised mainly in eastern Atlantic equatorial waters for sperm whales and blackfish but also took a humpback calf while anchored at São Vicente in mid-April 1827 (the cow was struck but lost).

Judging by vessel itineraries and oil returns (Wood, no date, MS; Tables 2 and 3) it appears that considerable effort was devoted to humpback whaling in the CVI during the 1850s (also see Table 7). Two 'read' voyages, those by the Provincetown schooner *E. Nickerson* (1853-54 MS) and the Nantucket brig *Homer* (1855-56 MS), included seasons of CVI humpbacking. The *Homer* logbook reported at least four other vessels humpbacking on the same grounds in early 1856: the Nantucket schooners *William P. Dolliver*, *Watchman* and *Hamilton*; and one of the three New Bedford barks named *Osceola* (see Starbuck, 1878, pp.516-7). The master of the *Watchman* drowned at Boa Vista on 31 May 1856, and the vessel returned to Nantucket with 530bbl of whale oil after a cruise of only 6½ months (Starbuck, 1878, pp.530-1).

The logbooks examined in this study confirm that whaling pressure on humpbacks had become particularly intense at the CVI by the mid-1860s (Table 7), a trend mirrored by that in the West Indies (Mitchell and Reeves, 1983). One whaler noted in his journal during a brief visit to Boa Vista in late January 1866, 'humpbacking, for which these Islands are very well noted among all whalers ...' (S.R. Soper, 1865-66, MS). The logbooks of the *Stafford* (1865-67, MS), *Walter Irving* (1865-66, MS), *Petrel* (1865-66, MS), *Solon* (1865-66, MS) and *Osceola 3rd* (1865-66, MS a; MS b) indicate that at least 28 American whaling vessels were present in the CVI during the winter whaling season of 1866, and at least 16 of these were humpbacking. Itineraries and returns from Starbuck (1878) and Wood (no date, MS) strongly suggest that at least four of the others (*Varnum H. Hill*, *Willis*, *Sassacus* and *Rising Sun*) took humpbacks in the CVI, and the brig *Julia* of Fayal (Azores), which arrived at

Table 7

Known and estimated catches of humpback whales and whaling effort (defined as total vessel-seasons, counting only those in Tables 1-3 where some attempt to take humpbacks, however desultory, was documented or inferred) in the Cape Verde Islands by decade and sample.

Sample	1815-49	1850-59	1860-69	1870-79	1880-89	1890+	Total
<i>Read</i>							
Whales secured/killed ¹	1	27	30	24	6	1	89
Whales struck and lost	2	18	22	10	9	0	61
Vessel-seasons	2	4	10	4	3	2	25
<i>Sighted Vessel</i>							
Whales taken ²	0	41-43	108-133	12	6-13+	0	167-201+
Vessel-seasons	0	10	22	3	2-4	1	38-40
<i>Extrapolation</i>							
Whales taken ³	0	73-87	132-154	21	4	0	230-266
Vessel-seasons	0	13-15	18-22	4	2	0	37-43
<i>Totals</i>							
Whales (killed and struck combined)	3	159-175	292-339	67	25-32+	1	547-617+
Vessel-seasons	2	27-29	50-54	11	7-9	3	100-108

¹ Includes whales killed, secured and processed; whales killed but not secured (e.g. sank); and calves that were struck themselves or whose mothers were struck or killed.

² Includes only whales secured and processed, or described as having been killed and lost. In some instances the secured total was estimated from oil returns assuming 25bbl/whale.

³ Includes only whales secured and processed, mainly estimated from oil returns assuming 25bbl/whale.

Sal on 11 February 1866 (*Osceola 3d*, 1865-66, MS a), lowered for a humpback near São Nicolau on 16 February while 'Cruising for Sperm Whales' (*Julia*, 1865-66, MS). Thus, effort amounted to at least 21 vessel-seasons in 1866. The *Petrel* (1865-66, MS) journal was particularly revealing, referring to at least nine of the other humpbacking vessels and recording no less than 13-14 humpbacks taken, 2-3 killed but lost and 14 struck but lost. This vessel's humpbacking season spanned the entire period from 3 February, when it was in the lee of Boa Vista and 'waiting for the humpbacks to come along', to 27 May, by which time most of the other humpbacking vessels had departed the region. Four of the vessel captains had agreed on 5 March to stop chasing humpbacks for three days 'so as to give them a chance to come inshore'. Humpback baleen was being processed and stowed, as evidenced by the fact that on 5 April the *Petrel's* crew boarded the *Winslow* 'and got our bone' (from a 40bbl cow humpback taken on 3 April). Later the same day they 'cleaned' the bone. The *Winslow's* crew came on board the *Petrel* on 11 April 'to show our officers how to cut in the Humpback. They were never Humpbacking before'. At least some of the vessels were using bomb lances to kill the whales (*Petrel*, 1865-66, MS; *Walter Irving*, 1865-66, MS).

A 'large fleet' of Provincetown vessels was again in port at São Vicente in March 1867 (Report from the schooner *William Martin* of Boston in WSL, 19 March 1867). As of then, only a few humpbacks had been taken. 'There had been a few humpbacks about the Islands, but they were shy, and with so many vessels after them, the chance is very small to take humpback oil this season' (*Ibid.*; also see Wood, no date, MS; Table 3). The schooner *William A. Grozier* of Provincetown (1866-67, MS), having spent the first winter of the same voyage (February-April 1866) humpbacking in Tobago, West Indies, was humpbacking around São Nicolau, Sal and São Vicente for most of March 1867. In late February or early March 1867, the *Grozier* observed the *William Martin*, the Provincetown schooners *Sassacus* and *Montezuma*, the Wellfleet schooner *Edith May* and the New Bedford ship *Commodore Morris* - also on the CVI humpbacking grounds. The Fairhaven schooner *Washington Freeman* (1868-70, MS) spent the period from mid-February to early April 1869 humpbacking around Brava and Fogo islands but secured only two whales. No other vessels were reported to be present in this area but the Provincetown schooner *Albert Clarence* (1868-70, MS) and several other vessels (*Edith May*, a Wellfleet schooner; *A.R. Tucker*, a New Bedford bark; *Abbie H. Brown* and *S.A. Paine*, both Provincetown schooners; all reported in the *Clarence* log) were present and apparently humpbacking in the northwestern portion of the archipelago. The Edgartown bark *Perry* took several humpbacks at the CVI in 1876, as did the Provincetown schooners *Clara L. Sparks* in 1877 and *Express* in 1878 (see Table 1). The schooners *Golden City* of New Bedford, *Crown Point* of Provincetown and *Admiral Blake* of Marion humpbacked at the CVI in 1883 (*Ibid.*). In contrast, the New Bedford schooner *Eleanor B. Conwell* (1880-82, MS) called at the CVI in the last week of January 1881 but only chased blackfish before heading southwards and westwards for sperm whales.

All indications are that by the mid-1880s, both effort and catch in the CVI were much less than they had been in the 1860s. The latest CVI humpback voyage in the 'read' sample was by the schooner *Adelia Chase* of New Bedford (1901-02, MS) which spent about two weeks (27 February-12 May) humpbacking at Sal and Boa Vista in 1902 (one 'bull' taken off Coral Point, Madeira Bay, on 5

March). Based on the logbooks of other winter voyages to the CVI in the late 1880s, 1890s and early 1900s (e.g. *George and Mary*, 1888-91, MS, 1892-94, MS) it is concluded that humpbacking had become desultory and that the focus was on sperm whaling, blackfishing, recruiting and provisioning. It is tempting to conclude that few humpbacks were available around the CVI by this time, but the influence of market factors (e.g. the declining price of whale oil, the increasing value of sperm oil and balaenid baleen; Tower, 1907; Bockstoe, 1986) cannot be discounted in trying to explain the reduction in effort and catch. Again, the trend mirrored that in the West Indies (Mitchell and Reeves, 1983).

Seasonality

Humpbacking at the CVI was primarily a winter and spring activity although one contemporary observer (E.J.M., 1864) described the season as extending from January to July, i.e. from mid-winter to mid-summer. Most of the evidence in whaling manuscripts suggests that humpbacks did not arrive until at least mid-January. For example, the brig *Homer* of Nantucket (1855-56, MS) arrived at Sal on 11 January 1856 with the clear intention of humpbacking. The logbook entry for 17 January states, 'no humpbacks on the ground yet'. The entry for 22 January states, 'waiting patiently for humpbacks to come in'. The first humpback of the season was sighted at Sal on 3 February. The *E. Nickerson* (1853-54, MS) chased the first humpbacks of the 1854 season at Sal on 1 February. After an initial four-day run of whales, the master complained in his journal on 10 February, 'Oh where is the hump Backs'. More whales, including two cow-calf pairs, were sighted and chased on 13 February. In 1866 the *Walter Irving* (1865-66, MS) came to anchor in Madeira Bay, Sal, on 13 January and was soon joined by several other American whalers. No humpbacks had arrived yet and none were seen until 16 February. The Provincetown schooner *Clara L. Sparks* (1876-77, MS) first encountered humpbacks on 30 January 1877 while approaching Sal from the north. Thereafter the *Sparks* visited Boa Vista and São Tiago and engaged in blackfishing before commencing the humpback season at Sal on 12 February. The *Petrel* (1865-66, MS) arrived at Boa Vista on 3 February 1866 - 'All we are now waiting for is the humpbacks to come along'. The first sightings there were made on 6 February.

Humpbacks appear to have departed the islands in most years by no later than the second week of June. The *Stafford* and *Para* were still cruising for whales off São Vicente and in Calm and Pedro bays in the first few days of June 1866 (*Stafford* 1865-67, MS). The latest catch reported in the *Stafford* logbook was the cow-calf pair taken by the *Quickstep* on 25 May but humpbacks were seen and chased off São Nicolau as late as 2 June. The *Stafford* logbook entry for 8 June (at São Vicente) states: 'Whales [humpbacks] have about all left for the season' (*Stafford*, 1865-67, MS). In 1854 the master of the *E. Nickerson* (1853-54, MS) wrote in his journal that the humpbacks seen in Madeira Bay (Sal) on 11 May were 'small and wild' and that 'they must be the last that will pass this season'. Nevertheless, the *Nickerson* took a cow-calf pair at Boa Vista on 13 May and struck but lost a humpback there on 17 May.

Composition of the CVI humpback population

Cow-calf pairs were regular targets of the whalers in the CVI. Standard practice was to harpoon but not kill the calf so that the mother would 'stand by' and be more easily harpooned (this was typical of the pelagic whalers; see Tilton, 1969, pp.75-6). Usually the logbook entries are

ambiguous concerning the fates of calves. Even when it is clear that a calf was struck, there may be no further indication as to whether it was secured or cut loose. In assessing removals, the most reasonable assumption is that when a cow was taken, the calf would die regardless of whether it was struck (see Mitchell and Reeves, 1983).

There was also some suggestion that cows and calves appeared on the grounds well after the first humpbacks had arrived. For example, the *Stafford* was on the grounds, cruising mainly in the channels between São Vicente and São Nicolau, from 20 January 1866 but did not see any cow-calf pairs until 26 March (*Stafford*, 1865-67, MS). It is uncertain whether cows arrived pregnant and gave birth near the CVI or instead arrived after having given birth elsewhere. A cow-calf pair was reported on 28 December 1888 at 20°42'N, 20°38'W, in deep water (>3,500m) about 500km northeast of Sal (*Eunice H. Adams*, 1887-90, MS). Assuming that they were headed for the CVI, this would indicate that at least some of the mothers arrived post-partum.

The take at the CVI was said by E.J.M. (1864) to have consisted of more cows than bulls, but this claim was impossible to evaluate from the logbooks. Keepers recorded information on the sex of whales in a non-systematic fashion, with a likely bias toward reporting cow-calf pairs.

Comparison with the West Indies

Table 8 gives mean values for humpback whale encounter rates for the Cape Verde Islands and the three selected West Indies whaling grounds. The area with the highest mean encounter rate was Trinidad/Gulf of Paria/Venezuela (1.47 whales per day overall), although this was based upon data from only six voyages. The lowest encounter rate was from the Dominican Republic and Puerto Rico (0.64 whales per day overall). Despite the fact that the 'principal' West Indies whaling ground from Guadeloupe to the Grenadines had the highest numbers of both vessels employed and whale records, the mean encounter rate there (0.8 whales per day) was somewhat lower than for the CVI (0.96 whales per day). Due to the biased nature of these data (see earlier), no attempt has been made to compare them statistically and they should be viewed as providing only a rough guide to the comparative density of whales in each location.

Other species

Most of the American whalers who hunted humpback whales at the CVI appear to have been 'combination whalers', i.e. they took sperm and pilot whales as well as baleen whales on at least a seasonal or opportunistic basis. Sperm oil was stored separately from 'whale' oil, the latter often including a mix of oils from humpback whales, right

whales and the occasional *Balaenoptera* sp. that might have been taken opportunistically. Although as Best (1987) noted, the oil from pilot whales (blackfish) was 'rated as common whale oil' (see Clark, 1887a), it was not consistently included in the reported whale oil returns; nor was that of the killer whales, 'grampuses', 'cowfish' and 'porpoises' taken from time to time.

While searching for humpback whales near the CVI, the whalers occasionally interrupted their activities to chase blackfish or sperm whales. For example, the *Golden City* mated with the *Admiral Blake* on 3 February 1883 while the two vessels were humpbacking off São Nicolau, with an arrangement that there would be equal shares 'for everything caught except Blackfish' (*Golden City*, 1882-84, MS). On the next day the *Golden City* boats were lowered twice for humpbacks and once for blackfish. After finishing trying out a humpback on the 15th, the *Golden City* crew chased a school of sperm whales on the 16th. On the 22nd they chased blackfish early in the day, then joined the *Admiral Blake* crew to chase sperm whales (2 were struck and lost) in the afternoon. For the next two weeks all attention (both ships) was devoted to humpbacks. In the second week of March they relocated to Santo Antão, where they alternately chased humpbacks and blackfish.

'Finbacks' were sometimes observed on the CVI humpbacking grounds and the whalers occasionally killed them with bomb lances (e.g. *Walter Irving* in company with *Antarctic*, 27 January 1866 in Madeira Bay, Sal; *Leonidas* and *Solon*, 14 February 1866 at São Nicolau). The crew of the bark *Osceola 3rd* (1865-66, MS a) prepared to lower for what they thought was a humpback but proved to be a 'sulphurbottom' (blue whale) at 21°28'N, 20°48'W (ca 575km north-northeast of Sal) on 29 January 1866.

Four references were found to killer whales at the CVI. Some were seen at the same time as humpbacks in the channel between Santa Luzia and São Vicente (6 March 1866; *Stafford*, 1865-67, MS); one was killed at Santo Antão (2 January 1868; *Star Castle*, 1867-68, MS); and some were seen at 18°018'N, 21°048'W (17 January 1891; *George and Mary*, 1888-91, MS) and at 19°01'N, 19°41'W (18 April 1816; *Edward*, 1815-17, MS).

Shore whaling at the CVI

In the West Indies, vessels generally hunted for humpback whales by cruising daily in the bays or inter-island passages and anchoring at night. In contrast, in the CVI the vessels often remained at anchor inshore while the boats deployed from there. This means that what was essentially 'bay whaling' by pelagic whalers (cf. Bannister, 1986; Dawbin, 1986) could be misconstrued for shore-station whaling.

Table 8

Comparison among whaling grounds of humpback whale encounter rates by time spent on the ground. Voyages spending fewer than ten days on the ground in question were ignored. For each area, the total number of days spent on the ground by each voyage ('vessel days') was divided into the total number of takes and strikes and the total number of whale sightings recorded by that vessel; values given are means and standard deviations for all voyages to that ground. The final columns ('Total whales per day') give the observed values for all whale records (i.e. takes, strikes and sightings combined).

Whaling ground	Voyages	Total vessel-days on ground	Takes/strikes per day		Sightings per day		Total whales per day	
			Mean	SD	Mean	SD	Mean	SD
Cape Verde Islands: all areas	14	994	0.13	0.1	0.82	0.45	0.96	0.44
West Indies: Trinidad, Gulf of Paria, Venezuela	6	324	0.19	0.18	1.29	0.59	1.47	0.72
West Indies: Guadeloupe, Dominica, St Vincent and the Grenadines, Barbados	32	2,277	0.11	0.1	0.69	0.59	0.8	0.62
West Indies: Dominican Republic, Puerto Rico	5	235	0.1	0	0.59	0.23	0.64	0.24

Clarke (1954) found no evidence of a shore-based whaling industry in the CVI but Hazevoet and Wenzel (2000) cited several 19th century sources indicating that whaling companies were established on São Nicolau in 1874 and on Sal in 1883. They gave no details about these operations. Also according to Hazevoet and Wenzel (2000), whaling stations on São Nicolau and Maio still existed in 1912 but had by that time 'all but ceased due to the scarcity of whales'. In the present study, only a few cryptic references were found to shore whaling and there was little suggestion of the close interaction between local people and American whalers that characterised winter humpbacking in some other areas (e.g. Adams, 1971; Aguilar, 1985).

In March 1854, a humpback was struck near Sal by a shore-based crew (Mr Fisher and co.). Having lost their lances, the men asked to borrow some from the schooner *E. Nickerson* (1853-54, MS). Instead of loaning them the lances, the *Nickerson's* captain dispatched one of his own boats to take the whale, then gave half the carcass to the shore party. On 5 March 1866, while the *Thomas Winslow*, *Antarctic* and *Walter Irving* were humpbacking at Sal, there were 'also quite a number of shore boats about here' (*Walter Irving*, 1865-66, MS). These records indicate that some shore whaling took place at Sal prior to 1883. Also in March 1866 the bark *Osceola 3rd* of New Bedford (1865-66, MS a) was flensing a humpback at Boa Vista and five boats 'came off from shore to help'. In early April 1876 the bark *Perry* of Edgartown (1874-77, MS) 'mated' with a shore party 'here Engaged in Humpbacking, in Equal Shares'.

On 17 February 1886, the brig *Eunice H. Adams* (1885-87, MS) of Edgartown was cruising for humpbacks off Tarrafal Bay (São Nicolau) when a waif (a makeshift flag) was sighted in the bay. A boat, apparently based on shore, had gotten fast to a humpback and was signalling for assistance. A boat from the *Adams* proceeded to secure the whale and tow it alongside the schooner *Chas. W. Morse* of New Bedford for flensing. Although reference was made in the *Adams* logbook to sharing the oil with the *Morse*, there was no mention of allocating a share to the shore-based crew. Later in the same cruise (20 March) the logbook records:

'...the shore party struck a whale Signaled for help and the waist boat went to them their line shot one bomb into the whale, and then found that they had no more cartridges in the boat. The iron parted and so ends a miserable days work'.

This record corroborates the report by Hazevoet and Wenzel (2000) that shore whaling was underway at São Nicolau in the 1880s.

In an unspecified year prior to 1864, a European resident of one of the islands observed the taking of a humpback in a local harbour (E.J.M., 1864). This whale had originally been harpooned and lost by an American whaling crew near another island some 60 miles distant, and it was attacked by miscellaneous makeshift crews in boats launched from shore and from merchant vessels in the harbour. A boat from an American whaling ship finally arrived on the scene, killed the whale and towed it to the ship for processing (22bbl, or 1,100gal of oil).

DISCUSSION

Abundance, movements and stock identity

The data presented here indicate that the Cape Verde Islands was a major winter destination for humpback whales in the 19th century. The crude encounter rate figures calculated above suggest that whale density in the CVI was at least as high as in the West Indies, including in the 'principal'

whaling ground from Guadeloupe to St Vincent and the Grenadines. Although humpbacks are still found in the CVI today (Reiner *et al.*, 1996; Hazevoet and Wenzel, 2000; Jann and Wenzel, 2001), the local density is much lower than that found in the major West Indies breeding grounds north of the island of Hispaniola (see Winn *et al.*, 1975).

Based on little evidence (song-pattern similarity), the whales that migrate to the CVI and West Indies were considered to belong to a common stock (Winn *et al.*, 1981). This hypothesis appears to be inconsistent with the fact that the two North Atlantic wintering areas were (and still are) occupied simultaneously by parturient females and singing males, and that there is little historical evidence to suggest regular movement by humpback whales across the North Atlantic Ocean in low latitudes. Although the American whalers reported occasional sightings west of the CVI (e.g. 18°48'N, 26°20'W on 9 March 1867 – *E.H. Hatfield*, 1867-68, MS; 15°20'N, 28°50'W on 21 March 1890 and 16°30'N, 26°30'-27°W in late March 1891 – *George and Mary*, 1888-91, MS), such encounters were exceptional as the whalers traversed the Atlantic from east to west with the trade winds. Acoustic data nevertheless suggest that considerable numbers of humpback whales spend time in mid-ocean waters of the North Atlantic (C. Clark, pers. comm.).

A more plausible hypothesis, in our judgement, is that the humpback whales wintering in the CVI are part of an eastern North Atlantic population that undertakes a north-south migration in European waters. Several sightings recorded in the whaling logbooks are suggestive of migration routes. A humpback was seen near the island of Madeira (ca 32-33°N, 18°W) on 2 January 1868 (*Ansel Gibbs*, 1867-68, MS) and the next year on 19 December the same vessel lowered its boats to chase a humpback 16km west of Madeira (*Ansel Gibbs*, 1869-70, MS). In addition to the cow-calf pair reported by the *Eunice H. Adams* at the end of December 1888 about 500km northeast of Sal (see above), humpback whales were observed earlier in the same cruise 'going quick' at ca 25°N, 26°W on 10-11 February and 'going quick towards St Antoine [Santo Antão]' at 18°N, 25°45'W on 26 February (*Eunice H. Adams*, 1887-90, MS). In these latter instances the whales were in deep water (> 3,000m) of the south-flowing Canary Current. Several other sightings were made in early to mid-December 1850 in deep water directly east and northeast of Sal (16°45'-17°30'N, 20-22°W) (*Medford*, 1850-51, MS).

The humpbacks taken off northern Norway in the late 19th and early 20th centuries seem not to fit the model of a north-south feeding-breeding migration to and from the CVI, or for that matter to and from the West Indies (Christensen *et al.*, 1992). They remained in northern waters from August until late in the winter, then migrated west along the Finnmark coast in February-April, at which time the adult females were pregnant with large fetuses (Ingebrigtsen, 1929). With regard to the breeding area of this population, Ingebrigtsen speculated that it could have been just south of Ireland, noting that Norwegian whalers working from Cape Finisterre and Gibraltar had not reported seeing humpbacks. Christensen (1980; citing Benjaminsen *et al.*, 1976 and Jonsgård, 1977) concluded that the northeastern Atlantic population of about 1,200-1,500 humpbacks was reduced to very small numbers by modern whaling from 1881-1910.

Slijper *et al.* (1964) plotted a few sightings in the eastern Atlantic between 10°N-10°S during the boreal winter (November-March) and concluded that they were Northern Hemisphere animals because this was outside the whaling season at Gabon (June-October). Townsend's (1935) chart

shows only one offshore record between the Equator and 10°N in the eastern Atlantic and the month is August (austral winter). His plots overall suggest a hiatus between the equatorial concentration off Gabon and the CVI. Moreover, all of his plots for the Gulf of Guinea are for June-September while those for the CVI are for February-May, which is consistent with the logbook data in this paper. There was nothing in the logbooks examined for the present paper (or indeed in those examined by Reeves in other previous and subsequent studies) to suggest that any humpback whaling took place in the CVI outside the period January to early June.

It is possible that animals from the North Atlantic occasionally move south from the CVI and into equatorial waters during the boreal winter and spring (e.g. see Mackintosh, 1965, p.45). However, the historical records examined for the present study (and further logbook studies by Reeves following completion of the work for this paper) revealed no evidence that the whalers expected to encounter humpbacks as they sailed south from the Cape Verdes, at least not until they reached the humpback whaling grounds in the Gulf of Guinea and southwards along the African coast. One instance was found in which humpbacks were sighted on 20 May 1841 at 10°33'N, 22°44'W, approximately 500km south of Maio (*Braganza*, 1840-43, MS). If these were Northern Hemisphere whales, one would have expected them to be north rather than south of the CVI this late in the season. Nevertheless, they were still several times farther away from the Gulf of Guinea than from the CVI, and this would have been rather early in the year for migrants from the Antarctic to have reached, and indeed moved north from, their West African wintering grounds. Nevertheless, Budker and Roux (1968) reported that humpbacks arrived off Gabon about 15 May and departed at the beginning of October.

The reason for the relatively low abundance of humpback whales at the CVI today remains unclear. The area appears to have been a major breeding ground for humpback whales in the 19th century, but overexploitation both in the CVI and in the whales' high-latitude feeding grounds off Europe had severely depleted the population by the middle of the 20th century (Brown, 1976; Christensen *et al.*, 1992). Today, many of the humpback whales off Norway are known to migrate to the West Indies (Stevick *et al.*, 1999); it is possible that a second, smaller group of humpbacks that feeds in the northeastern Atlantic uses breeding grounds elsewhere, e.g. the CVI, and that this group has yet to recover appreciably. If so, humpback whales should be observed with increasing frequency in the CVI in the future as the population increases.

Humpback whale catches at the CVI

The estimated totals in Table 7 are probably negatively biased even though some of the figures for individual voyages may be too high. The 'read' sample represents only a small fraction of the logbooks and journals available in public collections (see Sherman *et al.*, 1986; Lund, 2001) and the extant cumulative collection of logbooks available for examination covers only about 28% of the total voyages by American whalers (Smith and Reeves, 2002). Although the examined sample of logbooks was selected according to expectations of finding CVI humpback data, some documents in public holdings that contain relevant data certainly would have been missed. At least a few voyages bound (or putatively bound) for areas other than the North Atlantic according to Starbuck (1878) or Hegarty (1959) involved the taking of one or more humpbacks at the CVI

(e.g. *By Chance*, 1826; *Parana*, 1856). Therefore the selection against reading the logbooks of such voyages would mean that their catch records were under-represented in the present compilation.

With respect to non-American (e.g. British or French) whaling in the region, there were some instances in which the presence of non-American vessels was recorded in the logbooks (e.g. an English steamer *John Fenwick*, seen at Santa Luzia or São Nicolau on 7 February 1866; *Stafford*, 1865-67, MS) but there was no suggestion, even in the more detailed and legible logbooks, that British or French whalers engaged in whaling for humpbacks in this area. The British whaling fleet was at its peak in 1815 and by 1850 only 23 British vessels were engaged in the southern whale fishery (as opposed to the Arctic fishery for bowhead whales, *Balaena mysticetus*), 'cruising chiefly on the Brazil Bank' (Clark, 1887b). French vessels were prominently involved in the South Atlantic fishery for right whales through the 1830s, after which they cruised mainly in the Pacific (Du Pasquier, 1986). The brig *Julia* (1865-66, MS), which had reportedly sailed from Fayal in the Azores, was the only vessel from a non-American port that was identified in the studied logbook sample as having attempted to take humpback whales at the CVI (Table 1).

Cintra Bay Connection

The schooner *Watchman* of Nantucket was among the most persistent visitors to both the Cintra Bay right whale ground and the CVI humpback ground. There is definite evidence that this schooner whaled for right whales at Cintra Bay in the winters 1856-57, 1857-58, 1859-60 and 1860-61 (Reeves and Mitchell, 1986; Wood, no date, MS). It is also reasonably certain, based on itinerary considerations and returns reported in Wood (no date, MS), that the *Watchman* humpbacked at the CVI in 1856, 1857, 1858, 1860 and 1861 (see Tables 2 and 3). In 1858-59 the *Watchman* obtained 564bbl of whale oil in a nine-month cruise, and according to Wood (no date, MS) was at Boa Vista on 5 April 1859. Probable Cintra Bay voyages not listed in Reeves and Mitchell (1986: their table 4) include: the schooners *Alexander* of Provincetown which apparently took 2-3 right whales (150bbl whale oil; 1,600lb baleen) in February (and possibly January or March) (Wood, no date, MS), *Mountain Spring* of Provincetown which capsized in Cintra Bay in January 1856 (Wood, no date, MS; Starbuck, 1878, pp.530-1) apparently before killing any whales, and *Watchman* of Nantucket which was in Cintra Bay in January 1861 (Wood, no date, MS) and may have taken one or more right whales.

The most intensive whaling effort on the Cintra Bay Ground appears to have lasted for about three seasons: 1855-56 (at least 14 vessels); 1856-57 (at least 13 vessels); and 1857-58 (at least 11 vessels) (Reeves and Mitchell, 1986; new data in the present paper, see above). Thereafter, effort declined precipitously, judging by the itineraries and returns given in Wood (no date, MS), logbooks and other sources (Reeves and Mitchell, 1986; supplemented by data in the present paper). Evidence has been found of only one Cintra Bay voyage in 1859-60, one in 1860-61, one in 1864-65, a very brief one in 1865-66, one in 1875-76, two in 1877-78 and two in 1879-80. The schooner *Sarah E. Lewis* of Boston visited Goree Bay (within the Cintra Bay Ground) on 21 November 1865 but apparently did not stay for long (Wood no date, MS). Similarly, the bark *Solon* of New Bedford (1865-66, MS) simply anchored at the mouth of Cintra Bay on 6 January 1866 and lowered two boats to search for whales in the bay and 'inquire of the Arabs if they

had seen any'. Having sighted no whales and having found no one present at the shore camp, the *Solon* sailed westwards and southwards, eventually spending the balance of the winter humpbacking in the CVI². The rapid depletion of right whales in Cintra Bay during the 1850s probably contributed to the intensification of humpbacking at the CVI in the following decade. In other words, some vessels that otherwise would have spent some or all of the winter in Cintra Bay hunting right whales began going directly to the CVI for humpbacks instead.

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² Entry 21 in Reeves and Mitchell (1986: their table 4) concerning the bark *Silver Cloud* of New Bedford is erroneous. Two vessels named *Silver Cloud* were in the New England fleet at the time, the other being a schooner from New London. The latter was at the CVI in May 1857 with 150bbl of whale oil on board (Wood no date, MS) and it was clearly this vessel, the New London schooner, that was seen and reported at Cintra Bay on 27 December 1856 by the *E. Nickerson* and on 28 December 1856 by the *Walter Irving* (see Reeves and Mitchell, *op cit.*). The schooner *Silver Cloud* appears to have visited the Cintra Bay Ground for two seasons during its 1856-58 cruise.

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- MANUSCRIPT SOURCES (Denoted in text as 'MS') [Note: Some of the logbooks listed are not cited in the text or tables but data from them were used in the numerical analyses.]
- 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; PFM = Peter Foulger Museum, Nantucket, MA, USA; DCHS = Dukes County Historical Society, Edgartown, MA, USA; MHS = Mattapoisett Historical Society, Mattapoisett, MA, USA.
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- George and Mary*. Logbook of the bark *George and Mary* of New Bedford, Manuel E. Costa, Master. 3 May 1892-1 August 1894. [ODHS]
- Golden City*. Logbook of the schooner *Golden City* of New Bedford, G.W. Bourne, Master. 23 October 1882-19 August 1884. [ODHS]
- Homer*. Logbook of the brig *Homer* of Nantucket, Lewis B. Imbert, Master. 12 August 1855-29 October 1856. [PFM]
- Julia*. Journal kept by William H.H. Ryder on the brig *Julia* of Fayal (Azores), J. Dimmick, Master. 6 November 1865-August 1866. [PFM]
- March*. Journal kept by Calvin J. Reynolds on the brig *March* of New Bedford, C.J. Reynolds, Master. 25 September 1850-20 September 1851. [ODHS]
- Medford*. Logbook of the brig *Medford* of Provincetown, William Dyer, Master. 10 April 1850-27 June 1851. [PPL]
- Nellie F. Putnam*. Logbook of the schooner *Nellie F. Putnam* of Provincetown, John W. Atkins, Master. 1 November 1869-19 September 1870. [PPL]
- Osceola 3rd a*. Logbook (journal) of the bark *Osceola 3rd* of New Bedford, Peleg Cornell, Master. 4 September 1865-15 August 1866. [ODHS]
- Osceola 3rd b*. Logbook (journal) of the bark *Osceola 3rd* of New Bedford, Peleg Cornell, Master. 4 September 1865-15 August 1866. [NBFPL]
- Perry*. Logbook of the bark *Perry* of Edgartown, George W. Bassett, Master. 12 August 1874-8 October 1877. [DCHS]
- Petrel*. Journal kept by Frederic P. Taber on the schooner *Petrel* of New Bedford, John S. Howland, Master. 22 October 1865-23 July 1866. [KWM]
- R.L. Barstow*. Logbook of the bark *R.L. Barstow* of Mattapoisett, Joseph R. Taber, Master. 30 June 1851-9 August 1853. [KWM]

- S.R. Soper*. Journal kept by Caleb Hunt on the schooner *S.R. Soper* of Provincetown, Robert D. Soper, Master. 28 April 1865-26 August 1866. [KWM]
- Solon*. Logbook of the bark *Solon* of New Bedford, John M. Shaw, Master. 22 July 1865-16 June 1866. [NBFPL]
- Stafford*. Logbook of the bark *Stafford* of New Bedford, Charles B. Barstow, Master. 22 November 1865-18 October 1867. [NBFPL]
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