History of Bermuda shore whaling, mainly for humpback whales

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ABSTRACT

From its first colonisation in the early 1600s, Bermuda was known as a potentially profitable whaling site. Humpback whales (*Megaptera novaeangliae*) were common in coastal waters during the late winter and spring (March-May); sperm whales (*Physeter macrocephalus*), in offshore waters probably throughout much of the year. Initial efforts at shore whaling in 1616-17 were not very successful but whaling continued at least intermittently until 1685 when Bermuda became a Crown Colony and the whaling industry was placed on a firm footing. The shore whaling industry in Bermuda was never particularly large or profitable. Although it continued into the 20th century and was episodically re-invigorated with new financing and equipment, shore whaling never met the high expectations of those who invested in it. In the 1780s and for several decades thereafter, a few whaling voyages sailed from Bermuda for distant whaling grounds in the South Atlantic and Indo-Pacific, targeting sperm whales and right whales (*Eubalaena* spp.). There is no evidence to suggest that local catches by Bermudian shore whalers exceeded more than a few tens of whales per year, the vast majority of them humpback whales.

KEYWORDS: DIRECT CAPTURE; EFFORT; WHALING-HISTORICAL; ATLANTIC OCEAN; BERMUDA; HUMPBACK WHALE; SPERM WHALE

> 'There are also great plenty of Whales, which I conceave are very easie to be killed, for they come to usually, and ordinarily to the shore, that we heard them oftentimes in the night a bed; and have seene many of them neare the shore, in the daytime.'
>
> Silvester Jourdain's 'A Discovery of the Barmudas' (1610)

INTRODUCTION

Whaling for humpback whales (*Megaptera novaeangliae*) in the North Atlantic Ocean has a long and diverse history (Reeves and Smith, 2002). Two previous papers summarised some of the early literature concerning the fishery for this species in Bermuda and confirmed the great antiquity of the whaling enterprise there (Mitchell and Reeves, 1983; Stone *et al.*, 1987). This paper was initiated in response to the IWC Scientific Committee's interest in modelling the North Atlantic humpback whale population (IWC, 2002; 2003). As background for that work, Reeves and Smith (2002) reviewed the fisheries that hunted humpback whales in the North Atlantic and identified the 'Bermuda non-mechanised shore fishery' as the most longstanding (1600s-1941). In a separate exercise, Smith and Reeves (2002) made what they described as 'a series of highly speculative interpolations and extrapolations' to provide input on removals for the Committee's model runs. For modelling purposes, they proposed combining the Bermuda catches with those of the 'West Indies non-mechanised shore fishery'.

The present paper is the result of a more thorough search of published and archival material and provides the basis for a more precise and accurate catch series than was previously available. It also provides a synthesis of the historical development and decline of the Bermuda shore fishery, with additional information on Bermuda's relatively brief and limited involvement in long-distance offshore whaling.

MATERIALS AND METHODS

The reviews by Mitchell and Reeves (1983) and Stone *et al.* (1987) were greatly expanded and updated. In addition, a search was conducted of customs records and whaling ('fishing') returns deposited in the Bermuda Archives in Hamilton. These records included microfilms of the Bermuda Blue Books submitted to the Colonial Office between 1824-59 (Colonial Secretary, 1824), manuscript quarterly returns of goods exported in British and foreign vessels kept by the Hamilton and St George's customs collectors from 1827-54 (C33/1-C33/5), outbound manifest declarations for the same ports from 1795-97 and 1851-60 (C14, C15, C16) and annual statements of Bermudian exports from 1830-32 (C35).

Bermuda customs records provide sporadic but presumably reliable data for the period 1795-1857. Differences in tariffs between locally produced oil and oil imported into the colonies meant that the products of shore stations were clearly differentiated from those obtained elsewhere. Locally produced oil was frequently marked in quarterly export returns with descriptions such as 'oil drawn here', or 'oil, whale, produce of the fisheries of this colony'. Inbound and outbound manifests – documents required for all inbound and outbound vessels – are available in the Bermuda Archives from the beginning of the 19th century. Customs officials in Hamilton and St George's compiled quarterly cargo returns from these documents in bound blank books specifically printed for the purpose. The books, in turn, helped to ensure that each customs agent had comprehensive lists of all exports when quarterly returns were prepared and submitted to Bermuda's Controller of Customs. Ideally, these data were then used to compile annual export statements, known as Blue Books, which were sent to the Colonial Secretary in London. Rote language submitted between 1832 and 1860 and inconsistencies between Blue Book records and customs records in 1840, however (see later), suggest that this did not always occur.

Bermuda Blue Books in addition to those examined on microfilm in Hamilton, covering 1821-23 and 1860-1935, are available in the Public Record Office (PRO), London (CO 41/18 – 129), but it was not possible to check those due to resource constraints. Given the results from examining the 1824-59 sample and the evident trend in the whale

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fishery from 1860 onwards (see below), however, this was not judged to be a serious omission. A large body of Bermuda 'Correspondence, Original – Board of Trade' extending from 1692-1792 (CO 37/1 – 23) and Bermuda 'Entry Books of Commissions … Orders in Council, Correspondence …' extending from 1615-1807 (CO 38/1 – 17) is also available in the PRO. Examination of those materials, although very time-consuming, would have provided a more detailed and exhaustive history of the whale fishery than is presented here.

Defining the various measurement units for whale products in many older whaling records presents an interpretive challenge (cf. Lindquist, 1992). In the case of Bermuda, it is often unclear exactly what was intended by the terms 'gallon' and 'barrel'. Some equivalencies are given in Table 1 but a degree of uncertainty is unavoidable. A small data set from the customs records, 1832-57 (above), implies that barrels (bbl) contained from 20 to 44 gallons (gal), with an average of about 36gal/bbl. Unless there was evidence to the contrary, it was assumed in this paper that quantities of oil expressed in gallons were imperial gallons. Barrels were defined in 1675 as containing 31.5gal (Edwards and Rattray, 1932, pp.274-5), apparently meaning Queen Anne's gallons of 1707, which have since become known as US gallons (Lindquist, 1992). It is thus concluded that barrels in Bermuda could have contained anywhere from 119 litres (assuming 31.5 US gallons) to 164 litres (assuming 36 imperial gallons).

RESULTS AND DISCUSSION

Chronological summary of events and developments

Table 2 provides a chronological summary of Bermuda whaling. Narratives for various periods are provided in the following sections.

Early years (1615-1684)

A successful whaling industry was key to planning and financing Bermuda's early colonisation. The British governor's remuneration was to consist of a land grant together with a twentieth of the net profits on whaling, pearl fishing and farm produce as well as a commission on ambergris (Wilkinson, 1933, p.112), which at the time was obtained primarily if not exclusively by scavenging (e.g. see Jones, 1884, pp.154-6). When the first governor, Daniel Tucker, arrived in 1616 he encouraged the people to hunt whales as well as to fish and farm (Ives, 1984, p.6). However, by all accounts the colonists were not skilled whalers and had little success (Ives, 1984, pp.13, 36). Even after the arrival in about mid-April 1617 of a ship (*Neptune*) specially fitted out for whaling, many whales were harpooned but none secured (Wilkinson, 1933, p.119; Norwood, 1945, p.lxxvi; Ives, 1984, pp.16, 38). Tucker himself, discouraged, diverted his own energies away from whaling (Wilkinson, 1933, p.119) and the literature is largely silent on the subject from 1617 until the early 1660s. Indeed, one source claims that 'little experience' with whaling was acquired during the 40-plus years following the initial failed attempts (Wilkinson, 1933, p.323).

Even though no explicit evidence was found for either whaling activities or catches between 1617 and the 1660s, some whaling probably occurred then. Zuill (1972, p.174), for example, noted that tobacco, 'once regarded as the islands' staple, was ... in decline' during the decade of Cromwell's dictatorship (1649-58). As tobacco's importance waned, 'whale-fishing became very important and this business grew rapidly'. In fact, conflict arose between the Bermuda Company's interests and those of local whaling entrepreneurs. The Company having ordered that all whale oil be shipped to London, 'Many of the settlers grumbled at this especially when it became known that there was a good market for whale-oil at Barbados; surely, it was argued, this was a far better plan, for the oil sent to Barbados would be for benefit of the ship and whoever owned the oil' (Zuill, 1972, p.174). As a consequence two prominent colonists, John Somersall and William Reighton, were accused in 1663 of smuggling whale oil from Bermuda to Barbados and they were summoned to London to account for their subterfuge.

Some time in the late 1660s, a Bermuda whaling company was formed under the patronage of the Earls of Manchester and Devonshire. Shares were sold in London at £50 each and islanders were offered shares for 50 shillings. However, the company was under-subscribed and incurred much resentment on the part of local Bermudians who viewed its monopoly on whale products as intrusive on their fishing rights (Wilkinson, 1933, p.323). Whales were certainly killed during the mid to late 1660s, possibly in fairly large numbers, but mismanagement and local hostility ensured that little profit accrued to the company. Stafford (1668), writing to the Royal Society of London, boasted, 'I have my self killed many of them [humpback whales, judging by the context]'. A total of 131 tuns (t) of oil were shipped to London in the four years preceding June 1669 (Verrill, 1907; Wilkinson, 1933, p.324). Of that amount, only 95t was reported to company officials and only 45t was registered as having arrived in London. Of the shortfall, some 29t was accounted for by a ship's having been lost in hostilities with the Dutch. There is no record of what happened to the rest (Wilkinson, 1933, p.324).

Events from 1670 onwards are difficult to reconstruct because of incompleteness and apparent inconsistencies in the literature. A footnote in Wilkinson (1933, p.324) stated that 'additional information on the Whaling Co.' was available at 'St John Baptist College' (presumably present-day St John's College), Oxford, citing an article in *The Times*, 16 October 1931. The company shares in 1670 were said to be worth £16 and the whaling prerogative was leased

Table 1

Measures and equivalencies. Also see Lindquist (1992) and Reeves *et al.* (1999).

Tun (t) (in some sources spelled 'ton' or tonne')	957.6 litres (L)	210 imp. gal	252 US gal	
Gallon (gal), US	3.785 L	0.83267 imp. gal		Standardised in 1707
Gallon (gal), imperial (imp.)	4.546 L	1.20095 US gal		Standardised in 1825
Barrel (bbl)	119.228 L	26 imp. gal	31.5 US gal	Standardised in 1675
Hundredweight (cwt) (long)	50.8 kg	112 lb		
Cwt (short)	45.36 kg	100 lb		
Hogshead (hhd) (British)	286.43 L	63 imp. gal	76 US gal	
Pound (lb)	0.4536 kg			

Table 2

Bermuda whaling from the early 1600s to 1942. 'Whales', unspecified to species, are assumed to have been humpbacks. Information from Mitchell and Reeves (1983: table 7) is included (and in some instances, corrected).

Year/period	General information	Oil and baleen exported ('gal' presumably imperial)	Source
1616-17	Efforts at whaling unsuccessful; many whales reported to have been struck.		Lefroy (1877); Verrill (1907); Ives (1984)
1621	Unsuccessful attempt.		Verrill (1907)
Dec. 1663	Stock company organised for whaling; special rules enacted by Bermuda Company.		Verrill (1907)
1664	17 'voyages', 'fastened' to whales 'a dozen' times, secured 2 adult females and 3 juveniles producing 11t oil all told (year unclear; could have been 1665).	44hhd (= 9t) whale-oil and blubber, 4cwt baleen shipped to London in *Elias*.	Anon. (1665); Verrill (1907)
1665	16 whales taken.	50-60t oil from these whales arrived at Limerick, Ireland, either late 1665 or early 1666.	Anon. (1666); Verrill (1907)
1664-65		'…only 92 tons whale oil were shipped out of Bermuda between 1664-1665.'	Kennedy (1971): p.269
1666		117hhd (= 29t) oil shipped to London (on *Hercules*?).	Verrill (1907)
1667	'Within these 2 or 3 years, in the spring-time and fair weather, they take sometimes one, or two, or three [probably humpbacks] in a day' (Norwood).	47½ t whale-oil shipped to London (Verrill).	Norwood (1667); Verrill (1907)
1668		13½ t oil shipped on *Elizabeth and Marie* in June.	Verrill (1907)
June 1669		Total of 131t oil exported to London in previous 4yr.	Verrill (1907)
1671	Whaling company 'reorganized'.		Verrill (1907)
June 1676	Sperm whale stranded on reef; oil extracted.		Verrill (1907)
1679	Taking of whales 'prohibited' but some illegal whaling continued.		Verrill (1907)
1682	Whales being killed 'indiscriminately' (i.e. with no royalty paid to Bermuda Company).		Kennedy (1971): p.249
1685	C. 14 whales taken; large whale worth £80 at the time.		Verrill (1907)
1691	Four large, 4 small whales taken; 3 (additional?) large ones escaped (after being struck?).		Anon. (1946)
1748	Statement that up to 20 whales could be taken in one year by the shore whalers.		Mitchell and Reeves (1983), citing Goode (1884), quoting from Douglas (1755)
Mid-1780s	Five whales taken at St George's parish, apparently in one season, driving local price of oil down from 3s.4d. (as retailed in Somerset) to 2s.8d.		Wilkinson (1973)
1792	Right whale taken in Castle Harbour, 'the only known instance of a whale being taken in the enclosed bays of the islands' (Verrill); 12 other whales (presumably humpbacks) taken (Schortman).		Verrill (1907); Schortman (1969)
17 April 1817	F.F. Hinson of Paget Island shot a whale with a 'whale-gun'.		Schortman (1969): p.83
1819	Paget's Whale Fishery active on New Ledge.		Schortman (1969): p.83
Spring 1829	Published results of the season: 3 stations at St George's took 12 whales, 300bbl oil (Mr Hinson's); 3 whales, 80bbl (Mr Higg's); and 1 whale, 14bbl (Mr Athell's); 1 station at Somerset took 1 whale, 40bbl (Mr Burrows').	774gal common oil.	Schortman (1969): p.83
1830		£187 worth of whale oil (sterling).	Schortman (1969): p.83
1832	A sperm whale taken at St David's, by Hayward's whale oil establishment; 12 boats active; 6 whales taken previously that season.	300gal common oil.	Verrill (1907)
1833-34	At least 1 whale taken, 3 more struck.	71gal and 4hhd common, 1833; 490gal common, 1834	Gosling (1952)
1830s/1840s	>12 whales struck in 1 year, nearly as many in another.		Wilkinson (1973)
1839	40ft sperm whale taken by Devonshire whale boats; 18-20bbl 'sperm' (spermaceti?), 40bbl oil.	450gal sperm	Schortman (1969): p.83
1839	Sperm whale taken off St David's Island, 84bbl, 'regarded as the largest one ever taken here'; struck by Josiah Smith.		Verrill (1907)
1840	70ft (*sic*) sperm whale taken by Tucker's Town Whaling Establishment; for some reason much of the oil was lost.	541gal common oil, 1638½gal sperm oil	Schortman (1969): p.83
1840	A 'half-grown' sperm whale taken, 'the first one of the kind that had been captured in nine years (*sic*)'.		Verrill (1907); also see Table 3
c. 1840	2 right whales taken.		Verrill (1907)
1849	45ft whale towed into Somerset, 21 April after being found dead by the whale boats, either 'killed by the Sword Fish' or stranded on the reefs but 'There is … every reason to believe it was killed by an American whaler, sighted off these islands'.	[some sperm oil but no amount indicated]	Hurdis (1897)

Cont.

Table 2 cont.

Year/period	General information	Oil and baleen exported ('gal' presumably imperial)	Source
1849	Sperm whale drifted onto shore 1 June, supposedly killed by crew of American whaler that had been cruising nearby.		Hurdis (1897)
1851	New whaling company formed, in addition to 'independent whaling crews'; 2 whales taken, c. 30bbl each.		Wilkinson (1973)
July 1851	Sperm whale taken at Hamilton, 'a rare capture'.	464gal sperm oil	Verrill (1907)
1852	A large whale taken, plus a 30ft sperm whale.		Wilkinson (1973)
1853	2 adults, 1 'small' whale taken at East End; 1 boat 'smashed'; stations at Port Royal and Somerset also active; total of 12 humpbacks struck, 7 landed, total 350bbl oil.	1,180gal sperm oil	Wilkinson (1973); Mitchell and Reeves (1983), citing *Whalemen's Shipping List*
1854	54ft whale taken.	44gal common oil, by 5 April	Wilkinson (1973)
1855-58	No catch reported.		Wilkinson (1973)
1859	Whale boats deployed at St David's, Tucker's Town and Southampton; no catch.		Wilkinson (1973)
May 1863	Sperm whale taken, 47ft		Jones (1884)
22 Apr 1866	33ft 'exceedingly fat' whale (female) taken, expected to produce 40bbl; harpooned then shot with bomb lances; 'first whale...captured here for some years'.		Jones (1884)
19 June 1869	Sperm whale taken (40ft; 14mi S of David's Head).		Jones (1884)
26 Apr 1871	22ft calf taken at Port Royal (expected to produce 5½ bbl), mother struck but lost bleeding 'freely'.		Jones (1884)
c. 1880	Active whale boats included: H.M. Fox's *Shamrock* (equipped with a 'whale-gun'), T.S. Hayward's *Molly*, H.W. Lightbourne's *Three Sisters* and J. Minor's *Rebecca*.		Schortman (1969): p.84
1892 (late Sept.)	30bbl sperm whale taken.		Wilkinson (1973)
1894 (Dec.)	56ft whale (presumably humpback) taken.		Wilkinson (1973)
April 1901	Small sperm whale taken, placed on exhibition, 'regarded as a curiosity'.		Verrill (1907)
1915	Antonio Marshall and Rev. Darrell brought 2 whale boats and £500 worth of whaling equipment from New Bedford.		Kan (1933)
c. 1900	Joe Smith and David Burchell whaling with hand harpoons.		Kan (1933)
1932	Young sperm whale taken.		Wheeler (1933)
1932	Humpback struck but lost.		Kan (1933)
1933	Whale boat and new equipment introduced.		Kan (1933)
17 Apr. 1940	1 humpback taken (of 3 sighted 15mi SW of Bermuda); killed with bomb lance; 42ft male; said to have been first whale (presumably meaning humpback) secured in >40yr 'although a number of attempts have been made, especially in recent times'.		Wheeler (1941)
13-18 Nov. 1942	1 humpback taken; struck initially with shark harpoon; killed with 'a shower of machine-gun bullets'; 38ft male.		Wheeler (1943)

to a Mr Crook of London in 1671, for 7yr at £100/yr (Wilkinson, 1933, p.324). Another source (Schortman, 1969, p.78) indicated that a whaling company was formed in 1670 by the governor (Sir John Heyden) and three other prominent colonists. Whether this was the same company as the one to which Wilkinson referred is not clear; Schortman provided no further details. War with Holland continued to plague British shipping until the end of 1673, at which time the whaling industry was 'revived' on the understanding that oil could be exported directly to any part of the British empire rather than solely to London (Wilkinson, 1933, pp.325-6). For obscure reasons, however, it continued to be unprofitable and by 1676, according to Wilkinson (citing Lefroy, 1877, pp.ii, 357-60, 382, 402, 412), 'the vaunted whaling rights had almost lapsed through disuse'. According to Kennedy (1971, p.249) 'whales were being killed indiscriminately' in the early 1680s, meaning that the Bermuda Company's efforts to collect the royalty on whale oil had become ineffectual.

1685-1779

Bermuda became a Crown Colony in 1685 and according to Verrill (1907), the intensity of whaling increased thereafter. The catch that year was 14 whales. At the time a large whale was valued at about £80, presumably in local currency (Verrill, 1907).

In 1687, the stifling restrictions on whaling (see above) were lifted and this must have encouraged more people to attempt it (Schortman, 1969). Beginning in 1689 Governor Richier petitioned the Lords of Trade and Plantation for more resources to develop the local whale fishery, claiming that the island's only 'staple export' was tobacco (Anon., 1946). By implication, the production of whale oil was modest despite the great demand for it in Britain. At the time, whale oil cost £12/tun in the colony compared with £26-£30 in London. Richier regarded the whale fishery as 'wholly destroyed' and in great need of restoration. He noted that although the governor's salary was supposed to be supplemented each year by a £100 share from the proceeds of the whale fishery, his predecessor had realised no more than £36 annually. Apparently referring to the period 11 January-20 July 1691, Richier wrote that 4 large and 4 small whales had been taken and that 3 more large ones had 'escaped owing to bad tackle'. He went on to describe the circumstances and prospects of the whale fishery as follows (Anon., 1946):

> '... there are but three boats, one at both ends of the Island. I have computed the charge of fitting out six or eight boats, well equipped, with warps, irons, large kettles for boiling and cisterns for preserving the blubber, and all complete. It will amount to £1,100 or £1,200, and such a sum must be disbursed before the trade can become considerable. I am very willing to lay out the money, could I have a grant for a certain term of years; but until such a grant is made not many whales can be killed;

for no Governor will risk his money on an uncertainty and the inhabitants will never attempt to build boats and buy utensils when they are only to fish according to pleasure of future Governors.'

The decline in profitability of tobacco farming in Bermuda in the late 1600s apparently made whaling an increasingly attractive alternative as an export industry.

British import records for London and outports, 1697-1731, indicate whale oil returns from Bermuda totalling about 20,000gal(US), equivalent to only about 20 humpback whales at 1000gal(US)/whale (cf. Adams, 1971) over the entire 35yr period (Reeves *et al.*, 1999, table 13). Reference was made in the Calendar of Treasury Books, 1702-03, to the profits accruing to the British Crown from 'Licences for Fishing of Whales' in Bermuda (Shaw, 1936, p.197).

In the 1720s, 1730s and 1740s, the subject of whaling frequently arose in meetings of the Council because a tax on each whale landed was still being used to supplement the governor's salary (Anon., 1950a; b; 1955a; b; 1956; 1959a; b; 1960a; b; c; 1968a; b). The intent was to raise £100 sterling annually from the whale fishery. One proposal discussed in 1732 was that a duty of 40 shillings be imposed 'on every old whale that shall be killed and brought into these Islands' (Anon., 1955b). Alternative proposals were for duties of £10, £12 or £14 per large whale, 'large' being defined as yielding at least 500gal of oil (Anon., 1960b). At the time, local currency was valued such that £140 was equivalent to £100 sterling. One way of interpreting this information is to estimate that the legislators viewed a catch of 12-14 adult whales per year as a reasonable expectation. However, according to Anon. (1960a), whaling 'was destined never to yield £140 currently a year for any governor' (also see Anon., 1950a). In June 1750 the Council received encouragement from the Lord's Commissioners for Trade and Plantations to enlarge the whale fishery (Anon., 1977). Very little information was found on whaling effort or catches from the 1750s through 1770s although one source indicated that there was considerable enthusiasm for whaling in Bermuda during the 1770s (Anon., 1976a).

1780-1850s

In 1782, the licensing fee owed to the governor was dropped and whaling became a 'free' enterprise (Verrill, 1907; also see Anon., 1976b). As Wilkinson (1973, p.31) noted, the prospect of catching even an 'occasional' whale was so poor that the whaling equipment at St George's was put up for sale (see Fig. 1 for locations of places mentioned in text). However, 5 whales were taken one year in the early 1780s and the local glut of oil caused the price in St George's to drop to 2s8d/gal compared with 3s4d/gal retail in Somerset.

The whale fishery in Bermuda was said to have experienced a 'big revival' in 1780 when an American named Pinkham arrived and introduced an improved method of flensing whales, 'thus avoiding waste' (Zuill, 1946, p.259). Loyalist whalers from Nantucket were encouraged to settle in Bermuda after the American War of Independence, which ended in 1783, but there is scant evidence that they did so (Schortman, 1969; Brown, 1976). Although Zuill (1946, p.259) claimed that whaling was 'one of the colony's important industries' for 50 years starting in 1780, the evidence suggests a much briefer surge. Oil production in some years reached 400-500bbl (Zuill, 1946, p.259). In 1786, Bermuda began sending vessels to the South Seas whale fishery (e.g. the ship *Queen Charlotte*, brig *Governor Browne*, schooner *Governor Hamilton*, sloop *Mercury* and brig *Bermuda*; Wilkinson, 1973, p.31). In 1788, the *Governor Browne* returned with 550bbl of oil and 6cwt of bone (baleen) (Anon., 1976b). In 1792, the *Bermuda* brought home 900bbl of oil and 7000lb of baleen while the *Governor Browne* returned 400bbl and 5000lb (Wilkinson, 1973, p.31). These large quantities of oil and baleen attributed to Bermuda at this time clearly came from whales taken elsewhere. However, Bermuda's fleet experienced a major downturn after the *Bermuda* was wrecked and the *Governor Browne* became 'generally disabled by the sickness of her crew' in 1793 (Schortman, 1969, p.81). Despite the availability of a small government subsidy and the fact that another brig *Bermuda* returned from the South Seas with 800bbl of oil in 1794, the war with France dampened the islanders' enthusiasm and they failed to respond to a call for more long-distance whaling in the early 1800s (*ibid*.).

At least two shore stations were operating in the late 18th century, one on Paget Island owned by the Hon. John Hinson and another on Smith's Island owned by the Forbes family. Relics of the Smith's Island station were still evident in the 1940s (Zuill, 1946, p.259). Schortman (1969, p.31) described the local catch of 12 whales in 1792 as 'unexpectedly good'. The encyclopaedia statement in 1797 that 'all the attempts to establish a regular whale-fishery on the islands have hitherto proved unsuccessful' (Anon., 1972) suggests that the returns from shore whaling remained modest even as Bermuda's offshore fleet prospered in the late 1780s and early 1790s.

Shore whaling persisted into the early 19th century but the annual catch seems not to have exceeded about a dozen whales. In the 1820s, at least one mariner from Bermuda, C.A. White, emigrated to Trinidad, seeking to establish a shore whaling enterprise there (De Verteuil, 1994, p.70; Reeves *et al.*, 2001). Wilkinson (1973, p.656), apparently referring to the 1830s-40s, reported that 'more than a dozen whales were struck' in one year and 'nearly as many during another season'. This led 'several ardent spirits' elsewhere in the colony to start whaling so that in addition to the main 'whale house' on Smith's Island, smaller operations began at Ferry Point and Tucker's Town. Additional 'cottages' were devoted to opportunistic whaling in Devonshire, Warwick and Southampton and at Whale Island in Ely's Harbour (also see Tucker, 1955). This proliferation of whaling sites seems to have impaired rather than improved the overall efficiency of shore whaling, as 'competing boats encumbered each other in chasing the occasional whale which came close to the shore' (Wilkinson, 1973, p.656). Verrill's (1907) perusal of newspaper accounts led him to conclude that humpback whales had become 'comparatively rare' in the coastal waters of Bermuda by about 1840. He attributed this scarcity to a decline in humpback whale numbers caused not only by local whaling around Bermuda, but also by American whalers working in New England and the West Indies, who 'killed as many and perhaps many more, than the Bermudians'.

In 1832, the Hayward establishment at St David's, one of the largest whaling stations in Bermuda, processed at least seven whales, including one sperm whale, *Physeter macrocephalus* (Verrill, 1907). In 1833-34, whalers by the names of Higgs and Howard were whaling at St George's and at least one whale was secured by Howard's crew: it was 'carried up by moonlight and there were five row boats and two whale-boats to tow it' (Gosling, 1952). On another occasion in one of those years a whale was struck and lost (the line had to be cut) but the same crew 'struck' two more as they were returning to shore (Gosling, 1952). At the time 'good money [was] to be made out of whale-oil' (Gosling, 1952). For an unspecified time within the period 1808-43, two whale boats and their crews were 'ready at a moment's

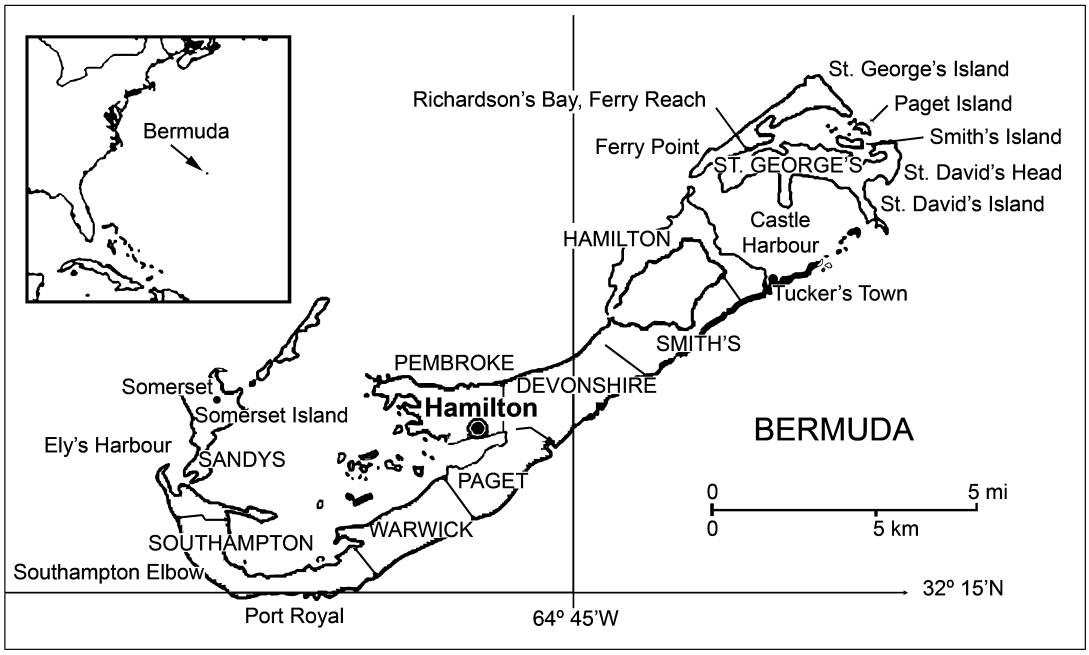

Fig. 1. Place name map of Bermuda prepared by Elizabeth Josephson.

notice' during the whaling season, apparently on the western or south-western part of the main island (Tucker, 1953, p.11).

A new whaling company formed in 1851 was equipped with a darting gun and several new whaleboats, but only one whale was taken that year (plus one more by an 'independent' boat) (Wilkinson, 1973, p.656). The next year a large humpback was taken at St David's as well as a small sperm whale and in 1853 two large whales and one small one were taken at the east end. A 54ft whale was secured in 1854 but for the next five years the company's boats were unsuccessful. Apparently other companies took several additional whales in 1853 (see Table 2).

Customs and export data, 1795–1860

Data from Blue Books reveal little about Bermudian whaling before 1840. In 1824 and 1825, customs agents stated that Bermuda exported 8,390 and 4,002gal of common oil (here interpreted to mean whale oil, i.e. oil from baleen whales), respectively. Thereafter, customs collectors merely reported the total value of the exports by category. Thus, for oil exports the values listed in the Blue Books and reported to London reflected the total value of all kinds of animal fats, oars and ochre, to name but a few of the commodities grouped together under a single heading.

Annual produce of the shore whale fishery was reported almost verbatim year after year for a quarter of a century (1832 to 1858), thus:

> There is an inconsiderable Whale fishery carried on in Bermuda that employs about twelve whale boats and their crews, three months in the year: the number of whales taken seldom exceeds 20 in the season; yielding about 1000 barrels of oil. This Fishery, being carried on very near the land, is capable of considerable extension, at small risque, by the employment of additional capital. The reefs that surround the Islands abound in fish of great variety; and the inhabitants being in general exceedingly well supplied with it at all seasons, it constitutes a considerable portion of their food: there is not, however, any Fish cured for exportation (Bermuda Blue Books, 1832-58).

This repetition suggests that the Colonial Secretary paid little attention to the industry and did not bother, except in 1840 (see below), to make a detailed annual inventory of the whaling industry. Rather, the previous year's assessment was simply copied into the Blue Book, year after year, as an expedient. It was not until 1859 that the statement characterising the whaling industry changed (and it was repeated verbatim in 1860), as follows:

> The once flourishing whale fishery in Bermuda has declined a long time since; and this business now employs only about 6 boats and their crews, for three months of the year. The number of whales taken seldom exceeds eight in the season, yielding some 200 barrels of oil. This fishery is capable of much extension by the employment of additional capital, and better labour (Bermuda Blue Books, 1859-60).

For two reasons, outbound manifests and quarterly returns are considered to provide a more reliable picture of oil production and export than that provided by the Blue Books, at least during the mid-19th century. Firstly, ship captains and customs collectors had vested interests in ensuring that outbound manifests were both accurate and preserved because these documents served as the basis for levying tariffs. Secondly, quarterly returns submitted by Bermuda's Controller of Customs between 1840-55, when this post was held by John L. Hurdis, are considered reliable because Hurdis was an amateur naturalist and ornithologist with an interest in natural history and thus probably had a personal scientific bent towards accurate reporting.

Throughout Hurdis's tenure as controller, quarterly returns and export data (i.e. outbound manifest declarations) generally matched well. For example, on 1 July 1850 the Bermudian brig *Flora*, bound from St George's to Antigua, declared a cargo of 3bbl of common oil (108gal if converted at 36gal/bbl – see above) and quarterly returns for the port of St George's during that period indicated a total of 107gal exported to the British West Indies. A number of inconsistencies within the quarterly return data from 1840-55 nevertheless suggest that these sources need to be interpreted cautiously. For example, Hurdis's 1840 census of Bermuda whaling (Table 3) indicated that all 9,449gal of oil was sold domestically, yet outbound manifests for that year indicated 541gal of common oil and 1,638$^{1}/_{2}$gal of sperm oil exported, all labelled as locally produced. Unfortunate gaps in the available records preclude a systematic comparison between outbound manifests and the quarterly returns submitted to Hurdis. Fig. 2 shows common

oil exports based on outbound manifests; Fig. 3 shows sperm and mixed oil exports, also based on outbound manifests.

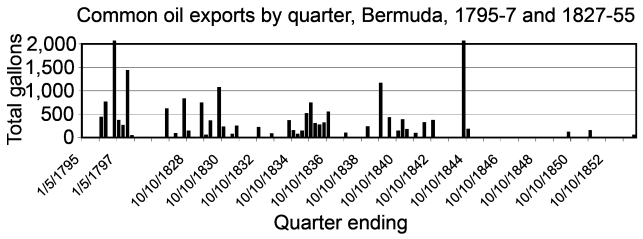

Fig. 2. Quarterly exports of 'common' (whale) oil from Bermuda, 1795-7 and 1827-55. Gallons are presumed to be imperial.

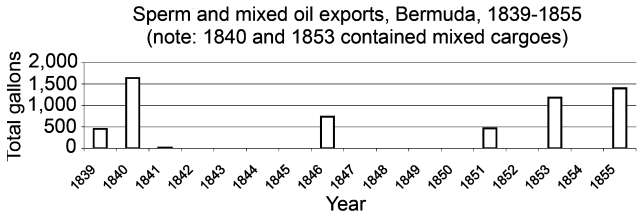

Fig. 3. Occasional exports of sperm oil and of mixed cargoes of sperm and common oil from Bermuda, 1839-55. Gallons are presumed to be imperial.

1860s and later

Although whaling 'ceased to be of any importance to the colony' after 1859 (Wilkinson, 1973, p.657) and whale oil may have become insignificant as an export commodity, some effort continued. Jones (1884, pp.148-49) recorded catches in April 1866 (Masters' establishment at Port Royal) and April 1871 (calf secured, mother struck and lost, boats of Port Royal). 'Almost every year some ... whales [were] taken' and at least 20 were taken in one year off the east end. The whaling stations on Paget Island and Smith's Island closed some time in the 19th century but whaling continued 'in a casual way' from St David's (Zuill, 1946, p.260). Henry ('Tommy') Fox was a well-known shore whaler at St David's Island, apparently beginning sometime in the 1870s or early 1880s (Anon., 1973). A sperm whale was processed at the Smith's Island whale house in 1892 and it supposedly had been 23 years since the previous catch there. In December 1894, a 56ft whale, species unspecified, was taken (Wilkinson, 1973, p.657n).

Verrill (1907) claimed that although boats were still 'kept in readiness' through the end of the 19th century, 'very few' whales were taken from the 1860s onwards. Verrill's view that whaling in Bermuda declined to a desultory condition after the American Civil War was echoed by Schortman (1969), who noted that only a few boats 'occasionally' operated out of St George's in the last decades of the 19th century. There were suggestions that the demise of shore whaling in Bermuda was linked to a decline in availability of humpback whales. Some local people believed that the relative scarcity of whales in the late 19th century was due to the fact that the Royal Navy had begun holding 'target practice' on the whaling grounds to the south of the islands (Schortman, 1969, p.85).

Whaling equipment and techniques

The whaling equipment and methods, as described in the 1660s (Norwood, 1667), were essentially the same as those described for 17th century New York and New England

Table 3

'Return of Whale Fisheries in Bermuda 1840', Colonial Secretary Series, Blue Books, 1840 (mf reel 757), Bermuda Archives, Hamilton.
Note that 'Black' in the 'No. of whales taken' column refers mostly if not entirely to humpback whales.

Estabs.	Date of formation of estab.	No. of whale boats employed	Total no. men employed	No. months employed	Whales and products						[Race of crew]
					Black			Spermaceti			
					No. taken	No. of gal oil sold in island	No. of gal oil exported	No. taken	No. of gal oil sold in island	No. of gal oil exported	
John Hayward and Co.	1812	2	21	2	5	4,000					White men
Dan.'l Lightbower and Co.	1838	2	19	2.5	2	2,019					Ditto
Port Royal Co.	1839	3	25	2							Coloured men
Jones, Smith and Co.	1840	2	19	2.5	1	880		1	2,550		Ditto
	Total	9	84		8	6,899		1	2,550		

Estabs.	Total gal produced
John Hayward and Co.	4,000
Dan.'l Lightbower and Co.	2,019
Port Royal Co.	
Jones, Smith and Co.	3,430
	9,449

shore whaling. The dimensions of the Bermuda whale boat (Schortman, 1969) exactly matched those of a Long Island whale boat (Edwards and Rattray, 1932): 28ft long, 6ft across. Although Schortman (1969, p.84) described a typical Bermuda crew as including five or six oarsmen, a steersman and a harpooner, this may have come from a misunderstanding of roles. A Long Island whale boat carried a crew of six: the harpooner sat in the bow, followed by four oarsmen, with the captain sitting in the stern and steering (Edwards and Rattray, 1932, pp.56-7). The harpooner rowed with his back to the whale until it was time for him to stand up and fasten to the whale. After darting the whale, he switched places with the captain, who was expected to kill the whale with a lance. The whale towed the boat until it became too exhausted and disabled to avoid being approached closely for lancing. In Bermuda, as in other areas where shore whaling was conducted with small open boats, dead whales were towed to shore and flensed in shallow water. A whale-house would often be equipped with a capstan, situated between the high and low water marks, to allow carcases to be hauled into the shallows. In addition, a limestone block would be set in the intertidal zone to receive the tail anchor, allowing the carcase to be securely moored parallel to the beach for flensing (Schortman, 1969, plate I).

Schortman (1969, p.48) considered the Bermudians' use of a relatively short warp (harpoon line) to have been a major handicap. In his view, it helped explain 'the numerous reports of boats that returned with their bow planks sprung from the stem'. The boat and crew must have been under tremendous strain as they attempted to quell a humpback tethered to a line scarcely longer than 100ft (compared with the 100fa lines used by some American whalers; Edwards and Rattray, 1932, p.56). Interesting by its absence in descriptions of Bermuda shore whaling is any kind of 'drug' (drogue), or buoy, as was typical of shore whaling kits in North Carolina (Reeves and Mitchell, 1988). The Carolina whalers seem to have been loath to remain fast to the whales (usually right whales, *Eubalaena glacialis*, their principal quarry) and instead used the drug to follow the animal's underwater movements and anticipate where it would rise.

Whaling guns were introduced to Bermuda in c.1817 and apparently were prevalent by the 1830s (Schortman, 1969). Details regarding the types of guns are lacking, but one item imported from England in the early 19th century was described as 'a piece of ordnance (half musket, half cannon) ... used to shoot whales with powder and a harpoon made for that purpose; the latter attached to the gun by a coil of rope – a most ingenious affair' (army officer quoted in Schortman, 1969, p.84).

Species hunted

There is no doubt that the humpback whale was the main target of Bermuda's whalers (see Godet, 1860; True, 1904; Verrill, 1907; Mitchell and Reeves, 1983). The whales' appearance near the islands was strongly seasonal. They arrived in January and left towards the end of May (Norwood, 1945, p.lxxvi), the main whaling season being from early March to the end of May (Anon., 1665; Zuill, 1946, p.259) and thus bracketing the peak period of the humpback's presence in Bermuda's near-shore waters (Stone *et al.*, 1987). Mothers and calves comprised a large proportion of the catch (Jones, 1884; Verrill, 1907).

Sperm whales were described by some authors as having been taken only occasionally (Jones, 1884, pp.153-54; Zuill, 1946, p.259), yet according to Verrill (1907, p.277) they were taken 'frequently' during the 18th and 19th centuries. He considered them the most frequently caught species in the 1800s and 'almost the only whales taken' during the last three or four decades of that century. Verrill's supposition rested on meagre evidence, however, as he recorded only seven specific catches (in 1832, 1839, 1840, 1851, 1863, 1869 and 1901) and repeatedly discounted comments associated with the records indicating that they were exceptional. For the most part, the term 'whale' in the literature on Bermuda whaling appears to refer to the humpback, whereas references to sperm whales are usually specified as such (e.g. Wilkinson, 1973, p.657).

Right whales would have been welcome targets but there is little evidence of their regular presence around Bermuda. True's (1904, p.29) assessment concerning the literature on Bermuda whaling seems reasonable:

> '... whalebone [baleen] is seldom referred to. It is usually mentioned as something which might be expected to form a valuable product of the industry, but never as a product actually in hand. From this it would appear that to the close of the 17th century at least, the Right whale was not taken at the islands, for it is not probable that the valuable whalebone of that species would have been ignored'.

Logbooks of American offshore ('pelagic') whalers during the 19th century give no suggestion that right whales were found regularly around Bermuda (Reeves and Mitchell, 1986; Reeves, 2001). Apparently a few right whales were taken by the shore whalers in Bermuda, one in 1792 and a pair in about 1840 (Verrill, 1907). A sighting of two right whales reported by Payne and McVay (1971) stands as the only recent record in spite of substantial search effort (e.g. Stone *et al.*, 1987). In 1848, 1850, 1852 and 1855 outbound manifests and quarterly returns list whale bone and whale fins (i.e. baleen) as exports (it should be noted, however, that the 1850 and 1852 exports of whale fins did not appear on the corresponding quarterly returns, perhaps suggesting their infrequent occurrence as a valuable export commodity).

Verrill (1907) mentioned that 'fin-back' whales (*Balaenoptera* spp.) were observed around Bermuda occasionally but not hunted, owing to their 'pugnacity'.

Products and yields

References to oil yield must not be taken literally in all cases. The whalers, and those who reported on their activities, typically assigned whales to size categories by a crude assessment of their potential yield. In many instances the realised production fell short of the whaler's initial estimate (cf. Reeves *et al.*, 1999). Scavenging by sharks during towing reduced oil yields in other low-latitude humpback whaling areas (Mitchell and Reeves, 1983; Reeves *et al.*, 2001) and Bermuda was no exception (Schortman, 1969). In fact, the fishermen there used flensed whale carcases as bait for large sharks, which they speared to obtain liver oil to be used in lamps and, later, as lubricant (Verrill, 1907). In Bermuda's warm conditions, some oil was also lost during towing, flensing and mincing in spite of explicit efforts to avoid wastage. At least some of the whale-houses were equipped with cedar cisterns where the blubber was to be placed as quickly as possible to await mincing and boiling (Schortman, 1969). One cistern would rest at a higher elevation than a second one so that any 'naturally' clarified oil would drain into a separate container for sale at a premium price. Otherwise, the blubber was cut into blanket pieces for carrying from the beach, then chopped into smaller pieces, fed into a mincer and cooked in the trypots. The oil in the pots was strained and poured into a cooling pit, either made of copper or plastered with tarras, 'German earth or natural cement' (Schortman, 1969, p.79).

Whale oil was used in the 19th century and earlier as lamp fuel in homes, offices, lighthouses, beacons and lightships and in industry for paints, tanning hides and lubrication (Stackpole, 1972, p.372). It is reasonable therefore to assume that some of the oil obtained from humpback whales in Bermuda was consumed domestically. At a minimum, local people were allowed to scavenge the flensed carcases and recover small amounts of 'low-grade oil for their lamps' (Schortman, 1969, p.79). A certain amount of the better oil also must have been used to meet the needs of islanders. Note, for example, the reference to local prices of whale oil at St George's and Somerset in the 1780s, mentioned earlier. Records of quantities of whale oil exported should be understood as reflecting less than the full amount produced in any given year. At the same time, however, it cannot be assumed that all oil produced in Bermuda, whether for illumination or lubrication, was whale oil. As noted above, sharks were also fished in Bermuda for their oil and there was some agricultural production of plant oils (e.g. castor and olive) (Verrill, 1907). Coconut oil was commonly used for illumination in Trinidad (Reeves *et al.*, 2001) and may have been among the oils produced in Bermuda as well.

The average yield of humpback whales at Bermuda was 30-40bbl, with each barrel containing 33gal according to Schortman (1969, p.80). Maximum yields were 60-70bbl (Jones, 1884, p.149). Hurdis's data (above) suggest that the whales taken in 1840 were somewhat smaller, averaging 26bbl (based on 33gal/bbl *fide* Schortman, 1969).

A 22ft first-year calf taken in late April was expected to yield about $5\frac{1}{2}$bbl; a juvenile female taken in the same season, 40bbl (Jones, 1884, pp.148-49). If, as Jones claimed, 'cub whales' (first-year calves and juveniles?) were caught more often than adults, the realised per capita yield in the fishery would have been lower than from a non-selective or primarily adult catch composition. As Schortman (1969, p.83) observed, 'The size of the whales caught must … have been small or the methods of extracting the oil inefficient'.

No specific reference was found to the Bermuda whalers saving baleen from humpback whales although according to Verrill (1907), 'small quantities were shipped to London'. The export of 4cwt of 'fins' in 1664 (see earlier) is a clear reference to baleen, but this amount could represent the yield from a single right whale.

Like their counterparts in parts of the Lesser Antilles (see Mitchell and Reeves, 1983), the local people in Bermuda relished whale meat (especially that of young animals) and it was less expensive than livestock meat or poultry (Jones, 1884, p.151; also see Godet, 1860). A newspaper report in 1827 described the scene when a whale was towed near shore and local people gathered to claim 'the fleshy parts – called "sea beef"...' (Schortman, 1969, p.82). Although British residents were said to have 'a strong prejudice against this food,' the Bermudians had 'a method of cleansing it, which leaves no fishy flavour and it is tender as veal' (*ibid.*). In times of economic depression, the local importance of 'sea beef' as an inducement for whaling may have rivalled that of oil (*ibid.*).

Sites of whale-houses

During the early years of whaling, humpback whales came very near shore and could be attacked in shallow water. The difficulty and danger of striking them in deep water meant that they were usually struck in 'shoal-water' (Norwood, 1667). At some sites lookouts were stationed on shore to watch for whales and a conch horn was blown to signal a sighting (Schortman, 1969). During the second half of the 18th century most of the whale-houses were at the east end of the archipelago. Schortman (1969) listed six sites, noting that they were not necessarily all active simultaneously: 'Old Whale-House' at Richardson's Bay, Ferry Reach; Green Bay, Castle Harbour; Smith's Island; East Whale Bay, Southampton; Tucker's Town, Devonshire; and Whale Island, Sandy's Parish (at the west end of the island).

In the early 19th century there seems to have been a need to extend operations farther from the coast or at least to more remote areas within the range of the shore whalers. For example, in 1819 the owners of Paget's Whale Fishery advertised that they were stationing a brig on New Ledge 'for the accommodation and security of the Men and Boats' (Schortman, 1969, p.83). They invited anyone with whaling experience to use this platform and hunt whales 'on shares' with the understanding that if no whales were taken, 'no charge will be made'. A chart published in 1814 shows whaling grounds off St David's Head and off Southampton Elbow (western end) (Fig. 4).

CONCLUSIONS

Published sources refer to only 43 successful captures of individual whales and ten additional strikes of what were presumably humpback whales in Bermuda between 1664-91 (Table 2). However, if the 11t of oil obtained from five whales in 1664 were used as a standard (i.e. 2.2t/whale), then the reported amounts of oil exported during that period (Table 2) would indicate about twice that many whales taken. The published record may be only minimally illustrative of the scale of removals in the 1600s.

Little information is available on catch levels at the end of the 1600s and into the early 1700s but they appear to have been fairly low, perhaps only a few whales/yr until the 1730s (see above). Douglas's (1755, *in* Goode *in* Mitchell and Reeves, 1983) reference to single-season catches of up to 20, apparently referring to the late 1740s, is difficult to interpret, as is Tucker's (1959) statement that in some years less than ten whales were taken, apparently referring to the 1700s. All indications are that catch levels declined from the mid- to late 1700s, such that by the early 1780s a single-season catch of 5 whales was regarded as exceptional (Wilkinson, 1973) and 12 (in 1792) as 'unexpectedly good' (Schortman, 1969, p.81). As mentioned earlier, Bermuda exported a total of only 5,478gal of common oil from 1795-97, implying a total catch of 5 or 6 whales by the shore stations in 2 or 3 years.

The available information on catches during the 1800s suggests that rarely more than 10, and never as many as 20, whales were taken by the Bermuda shore whalers in a single year (Table 2). One problem in interpreting the published information is that, with the proliferation of newspapers and growing literacy, the probability that a whaling event would have been recorded in a printed source and thus become available for the edification of 21st century scholars steadily increased with time. Therefore, any impression of increased whaling effort or take could be at least partly a reporting artefact. Another (lesser) problem is determining the species taken. In the early years (e.g. before about 1750), it is possible that right whales were taken more often than seems to have been the case in the last two centuries of Bermuda shore whaling. Also, it is difficult to gauge the relative importance of sperm whales. Their capture appears, judging by the 19th century reports in Table 2, to have been especially noteworthy. Thus, it seems likely that whilst catches of a few humpback whales in a given year may not have been mentioned in newspapers and therefore in derivative compilations such as those by Verrill (1907) and

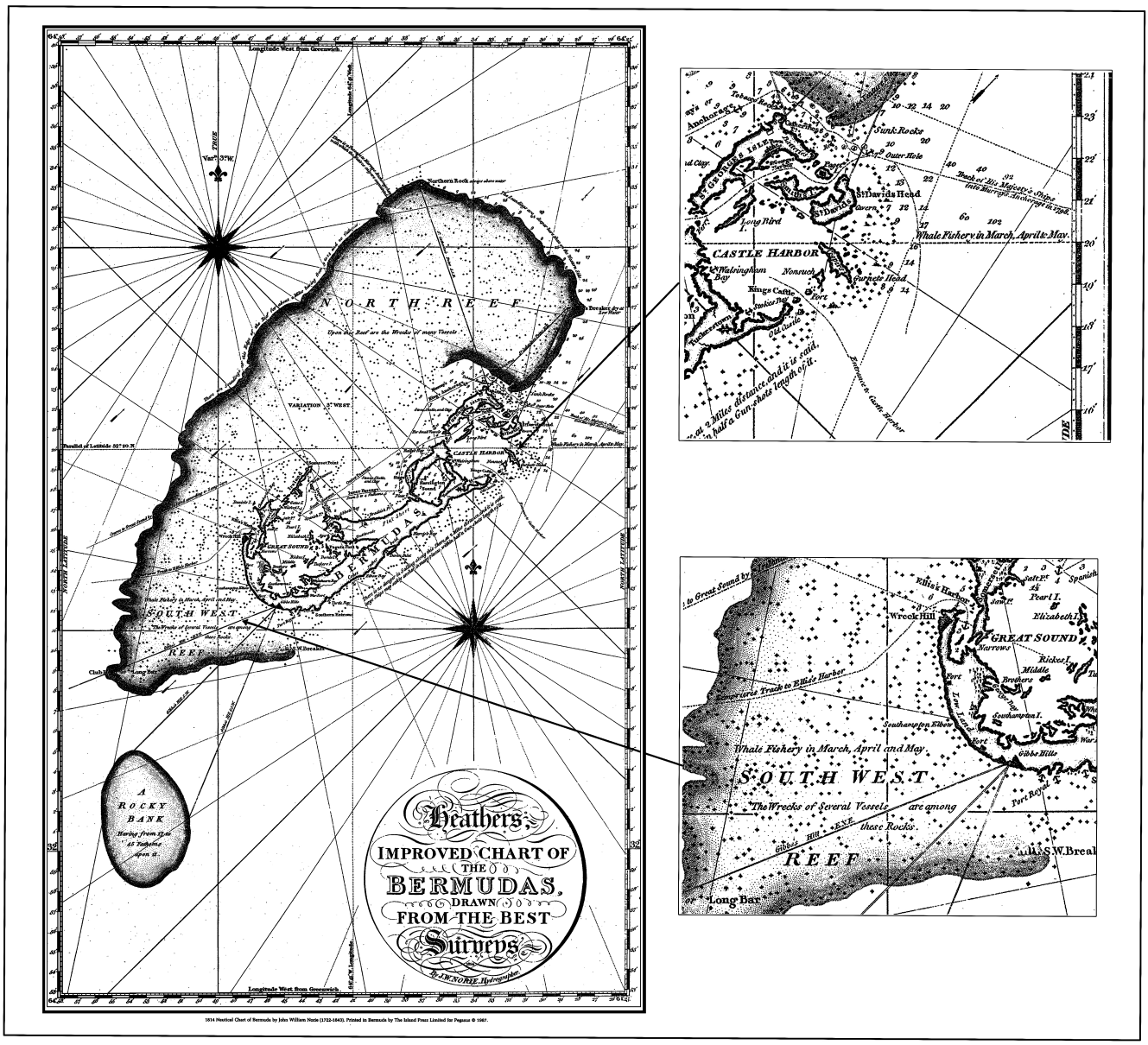

Fig. 4. Heathers Improved Chart of the Bermudas (Norie, 1814). Image courtesy of Bermuda Maritime Museum, Hamilton.

Wilkinson (1973), any catch of a sperm whale (with its relatively valuable spermaceti and sperm oil) was considered worthy of notice.

The conclusion of Mitchell and Reeves (1983, citing Wilkinson, 1973) that by about 1860 whaling in Bermuda had declined to a desultory level still seems valid. With no oil exported and several thousand barrels imported, it appears that Bermudians had opted for more reliable import sources to meet their needs. In fact, despite repeated calls for increased whaling effort, Bermudian shore whaling from the early 1800s onwards is probably best characterised as an intermittent industry of opportunity. From 1860 until 1942 only about a dozen whale catches were explicitly mentioned in the literature and nearly half of those were of sperm whales (Table 2).

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