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NORTH ATLANTIC KILLER WHALES

Guest Editors

Jóhann Sigurjónsson Stephen Leatherwood

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Photo: J. S.

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Preface

Killer whales, Orcinus orca, *have long captured the imagination of scientists and laypersons alike. Since about 1973, however, the attention they have received from cetologists has increased dramatically. This is evidenced by the numerous recent publications in scientific and popular journals and two sets of collected papers based on workshops devoted exclusively to this species (Perrin, editor, 1982; Kirkevold and Lockard, editors, 1986). Most of these contributions have dealt with studies in the northeast Pacific (Washington and British Columbia and southern Alaska) and in the Antarctic. Only a few have added information on killer whales of the North Atlantic.*

During 1986 and 1987, a group of scientists from nine nations cooperated in „The North Atlantic Killer Whale Project" to review information available on killer whales of their respective regions and within the topics of their special expertise. The core group of the Project met in Provincetown, Massachusetts, U.S.A., 11 through 14 May 1987, to outline and discuss their findings. This workshop attempted to: 1) describe distribution, movements and numbers of killer whales in the North Atlantic; 2) identify stocks and describe relationships among them; 3) critically evaluate recently completed and ongoing research on this species; 4) promote increased cooperation and exchange of data among researchers working in the same or adjacent geographical areas or disciplines; 5) discuss potential improvements in methods for studying this species; and 6) to suggest geographical areas and topics on which future research on killer whales should focus, particularly in the North Atlantic. The full report of the workshop was prepared by Stephen Leatherwood (Convenor) and Randall R. Reeves (Rapporteur) and submitted (as doc. SC/39/SM18) to the Scientific Committee of the International Whaling Commission (IWC) for consideration during its meeting in Bournemouth, England, in 1987.

In this special issue of RIT FISKIDEILDAR, entitled North Atlantic Killer Whales, *revised versions of 15 of the 25 papers presented at the Provincetown workshop are published. The other 10 were published elsewhere or withdrawn. The issue also includes six papers not presented at the workshop but solicited because they were known to contain information pertinent to the primary goals of the Project. All papers published herein benefitted from anonymous review by at least two qualified experts. It is our hope that this publication promotes an improved understanding of the biology, behaviour and status of killer whales and provides a better basis for rational deliberations concerning the management and conservation of the species in the North Atlantic and elsewhere. We also anticipate that the contributions to this issue will encourage additional work on this species.*

On behalf of the participants in the Project and the workshop, the editors wish to thank the following: Sea World, Inc., particularly Dr Lanny H. Cornell, for providing funds to support the North Atlantic Killer Whale Project; the Marine Research Institute (MRI), Reykjavík, in particular Director Jakob Jakobsson, for the generous offer to publish this volume; the referees for their critical reviews and helpful suggestions and comments. We thank all participants of the workshop for the lively and provocative discussions, reflected in the quality of these papers. Kathy Kangas of Hubbs Marine Research Center assisted in all stages of the Project, in her capacity as Leatherwood's assistant, Árni Alfreðsson, Atli Konráðsson

and Sigurður Gunnarsson of the MRI provided various technical assistance during the editing of the volume. Finally, we extend our special thanks to Professor Unnsteinn Stefánsson for his hard and efficient work at all stages of this volume's preparation and to the staff of Prentsmiðja Hafnarfjarðar hf, in particular Albert Þorsteinsson and Guðrún Guðmundsdóttir, for their consistently efficient and high quality printing work.

Reykjavík, December 1988

Jóhann Sigurjónsson *Stephen Leatherwood*

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Killer whale sightings and takes by American pelagic whalers in the North Atlantic

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ABSTRACT

Sightings and takes of killer whales, *Orcinus orca,* as recorded in logbooks and journals of American pelagic whalers, were compiled and plotted to help elucidate the North Atlantic distribution of the species. Of the 96 killer whale observations documented, about 80 percent were on recognized whaling grounds for sperm whales, *Physeter catodon,* right whales, *Eubalaena glacialis,* and humpback whales, *Megaptera novaeangliae.* American whalers in the North Atlantic rarely lowered their boats to chase killer whales.

The records presented here demonstrate the wide distribution of killer whales in the North Atlantic, including areas far from any coastline. A relatively large number of records is from the Western Ground, in the central North Atlantic between Madeira and Bermuda, where mainly sperm whales and blackfish, *Globicephala* spp., were hunted. The whalemen encountered killer whales in this area from March through September (peak in May–September). Large groups of killer whales also were seen in winter (November–April, peak in January–March) close inshore off West Africa, on the Cintra Bay Ground at about 23°N, coincident with the presence of right whale mothers and calves. Other clusters of records of killer whales were on the Cape Farewell Ground, east of Cape Farewell, Greenland (June–July); The Shoals, south and east of Newfoundland (July and September); the Southern Ground, northwest of Bermuda (April– July); the Charleston or Hatteras Ground, south and east of the Carolinas (February–June); The Bahamas (January, May–June); and the Caribbean Sea (March–May, July).

The current status of killer whales in some of these areas of past occurrence is unknown due to a lack of observational effort there. However, any attempt at a comprehensive understanding of the stock identity, overall distribution and abundance of killer whales in the North Atlantic must take account of the offshore, widespread observations reported here.

INTRODUCTION

American whalers searched far and wide for their prey, beginning in the early 18th century and until the early 20th. As they gained experience about where and when to find preferred quarry – right whales, *Eubalaena* spp., sperm whales, *Physeter catodon,* less importantly humpback whales, *Megaptera novaeangliae,* pilot whales, *Globicephala* spp., and later bowhead whales, *Balaena mysticetus* – these whalemen came to recognize whaling "grounds", which they visited year after year. The various named whaling grounds provide a convenient way of identifying areas where concentrations of balaenids, sperm whales and humpbacks occurred (and often still occur) (e.g. Clark 1887; Townsend 1935; Gilmore 1959; Bannister and Mitchell 1980; Wray and Martin 1983; Mitchell 1983; Reeves and Mitchell 1986).

The killer whale, *Orcinus orca,* was not a principal target species for the American

whalemen. In fact, it was often regarded as a competitor or pest. The "symbiotic" relationship between a local pod of killer whales and the shore whalers of Twofold Bay, Australia (Dakin 1934; Mitchell and Baker 1980), had no parallel, as far as we know, in any pelagic whale fishery, including the American one. However, killer whales were sometimes observed to scavenge from the carcasses of whales killed by the whalers, and their presence on the grounds often made the sperm, right, bowhead and humpback whales shy and wild, thus more difficult to approach than usual in open boats. Occasionally, the whalers themselves scavenged the carcasses of whales killed by killer whales (e.g. Brown 1887, p. 284; Ferguson and Stair 1936, pp. 261–262), and on at least one occasion a whale was said to have been so frightened by killer whales that it approached a whaling vessel closely enough to be taken easily by the whalers (Schmitt *et al.* 1980, pp. 59–60; also see Andrews 1914, p. 240).

Considering the areas covered, the quiet method of closing on whales from sailing ships and the cumulative time spent at sea by the whaling fleet, the whalemen's observations represent a potentially valuable source of information on killer whale distribution and relative abundance.

In this paper we use data from whaling logbooks and journals to identify some areas in the North Atlantic where killer whales were and may still be found. Out of interest, we have plotted the positions of the whalers' observations and compared these to the whaling grounds to see what proportion of the records come from observations made on the grounds vs. in areas *en route* to or from the grounds. We also have assessed the extent to which American sailing-vessel whalers took killer whales as a secondary target species. One of our aims in undertaking this study was to identify areas formerly inhabited by killer whales but where modern researchers have not yet looked for them or noted their presence.

MATERIALS AND METHODS

In the course of two previous studies, we examined American whaling logbooks and journals covering more than 200 voyages to the North Atlantic whaling grounds (Mitchell and Reeves 1983; Reeves and Mitchell 1986). For these studies, we attempted to locate and examine all the manuscripts available in American east-coast museums and archives covering voyages with a nominal "North Atlantic" destination. Although some documents undoubtedly were overlooked, and more have been acquired by the various repositories during the years since our previous studies were completed (see Sherman *et al.* 1986 for a list of available manuscripts, current through 1984), our searches covered the majority of manuscripts on American pelagic whaling in the North Atlantic that were readily available at the time.

Manuscripts were read and indexed primarily for data on the occurrence and exploitation of humpback whales (Mitchell and Reeves 1983) and right whales (Reeves and Mitchell 1986). In addition, records of other species of interest, including killer whales, were logged for most of the manuscripts examined. We did not take note of "effort" data in any systematic way, nor did we plot cruise tracks for analysis of areas searched and not searched by the whalers.

After compiling all the North Atlantic killer whale records indexed from the logbook/journal sample, we verified these records by re-examining the original sources. Most were obtained as microfilms on interlibrary loan. Those that were unavailable on interlibrary loan were checked on our behalf by members of the repositories' staffs. During this checking process, additional notes were kept on other cetaceans seen on or near (within 2 days of) the days of killer whale sightings (Appendix 1, see at end of paper). The compilation by Townsend and Watson (no date MS) led us to check several manuscripts which we had not seen previously.

One problem that can plague research of

this kind is that whalemen did not adhere to an agreed lexicon for the species of cetaceans they observed. Thus, a variety of colorful but not necessarily helpful vernacular names appears in any large sample of logbooks and journals. Many historical records of cetacean observations are rendered useless or only marginally useful to modern researchers because of uncertainty which species was meant. Fortunately, the killer whale was usually identified unambiguously by the keepers of logbooks and journals. American whalers generally called it the killer or killer whale, at least in the late 18th- and 19th-century logbooks and journals that we have examined (also see, for example, Barron 1895, p. 86). Wray and Martin (1983, p. 229) noted that in the Indian Ocean whaling manuscripts they examined, "killer whales were always differentiated from 'grampus'." It was mainly British whalemen who used the terms "grampus" and "swordfish" in referring to killer whales (e.g. Brown 1868; Markham 1875, p. 246; Barron 1895, p. 86; Lubbock 1937, p. 368; Reeves and Mitchell 1988 – this volume). We have no reason to believe that any English-language whalemen applied the term "blackfish" to the killer whale (*contra* Rumage 1980), although the oil obtained from killer whales was classified as blackfish oil (Ferguson and Stair 1936, p. 26).

RESULTS AND DISCUSSION

Whaling grounds

Most of the observations of killer whales (at least 77 of 96, or about 80 percent) occurred on or near one of the whaling grounds (Appendix 1; Fig. 1). However, meaningful quantitative comparisons of killer whale abundance on the various grounds, and on vs. off whaling grounds generally, cannot be made from the data at-hand, largely because we do not have good information about observational effort. There is also the problem of determining how the idiosyncracies of various keepers influenced the record of encounters found in logbooks and journals. Some of the writers probably noted faithfully all their observations of such non-target species as the killer whale. Others, judging by the sparseness of their entries generally, apparently did not note sightings of non-target species at all. Some may have logged killer whales (and other non-target species) in a haphazard or inconsistent fashion.

About a third of our records are from the Western Ground, but this may be related to the fact that most vessels leaving New England crossed this ground *en route* to the Azores, where they usually stopped for provisions and crew before heading for grounds in other oceans or elsewhere in the North Atlantic. Thus, there may have been much more searching effort on this ground than on some of the others. Also, in comparison to most of the other grounds, the Western Ground encompassed a larger area.

Townsend (1935, p. 12) defined the Western Ground as "the great mid-ocean Sargasso region, its center being in the latitude of Bermuda, and nearer Bermuda than Madeira." Although we recognize the difficulty oceanographers have had in defining the Sargasso Sea, at least two major efforts to chart it (Ryther 1956) have shown this water mass as extending over much of the whalers' Western Ground, as defined by Townsend (1935). Thus, the statement by Leatherwood and Dahlheim (1978, p.31) that killer whales probably are not present in the Sargasso Sea needs to be re-evaluated.

Due to depletion by whaling, there were few areas in the North Atlantic where concentrations of right whales could be found by the 19th century. Two such areas were the Cape Farewell and Cintra Bay grounds (see Reeves and Mitchell 1986). Judging by entries in the logbooks and journals we examined, virtually none of the target and non-target species normally logged, other than the right whale and killer whale, was encountered in Cintra and Gore bays and in adjacent nearshore waters along the African coast south to Cape Barbas. If the killer whales were there looking for mammalian prey, it seems likely that right whales (particularly mothers and young calves) would have been the principal

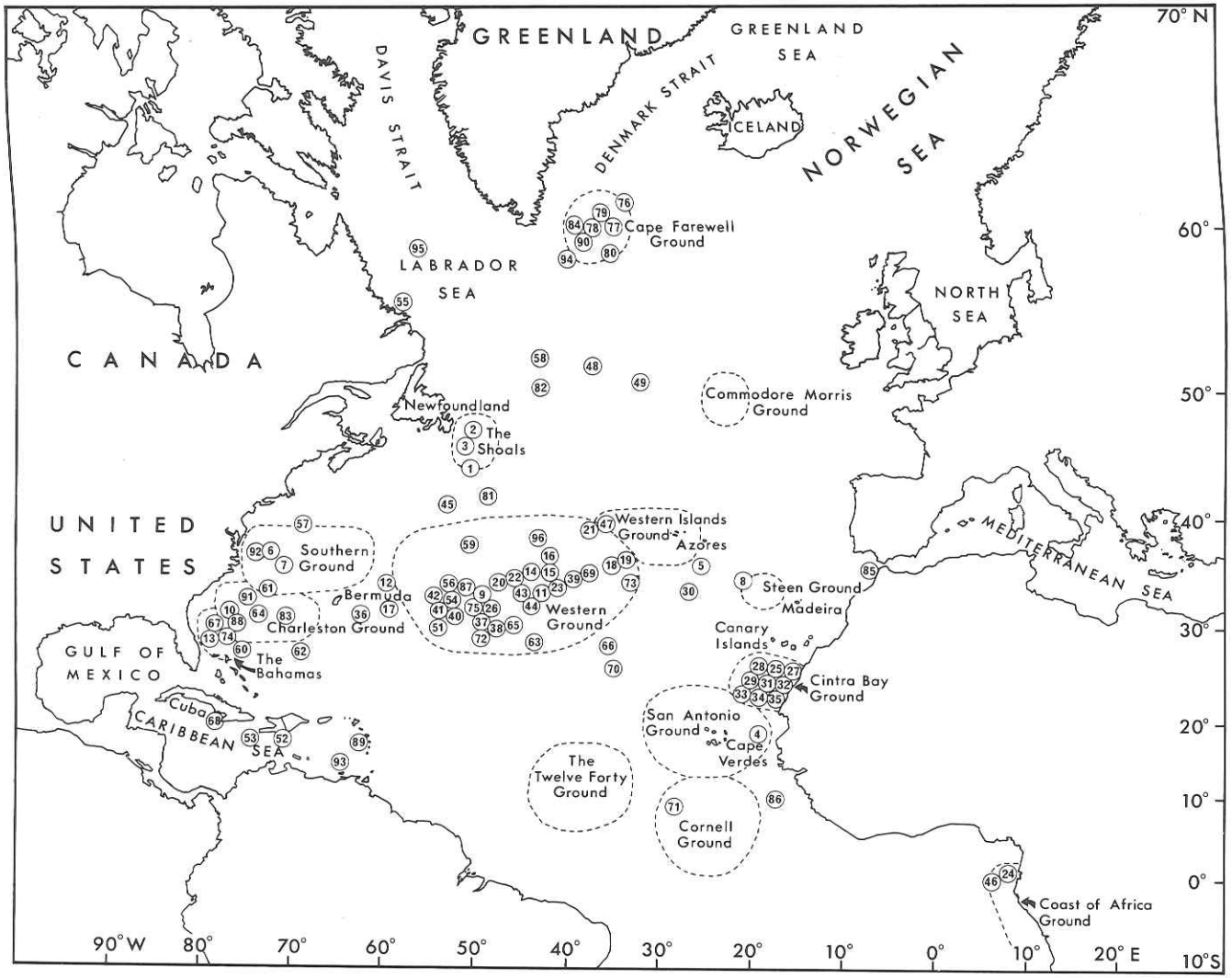


Fig. 1. Map of North Atlantic Ocean with killer whale records plotted. Numbers correspond to entries in Appendix 1.

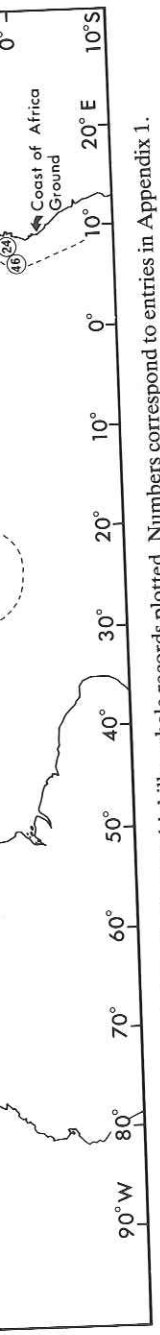


Fig. 1. Map of North Atlantic Ocean with killer whale records plotted. Numbers correspond to entries in Appendix 1.

attractant. On the Cape Farewell Ground, centered at about 61°N, 35°W, a much greater variety of cetaceans was seen and reported in the logbooks and journals, including not only right whales and killer whales but "finbacks" (*Balaenoptera* spp.), "sulphur bottoms" (blue whales, *B. musculus*), "grampuses" and "porpoises." On all occasions but one, other cetaceans were seen within one day of the killer whale sightings on the Cape Farewell Ground (Appendix 1). The availability of such a variety of potential prey on this ground means that the killer whales could have been attracted there for various reasons other than, or at least in addition to, the ready availability of right whales. Although relatively few manuscripts covering voyages to the Cintra Bay and Cape Farewell grounds are available (nine voyages to Cape Farewell [plus two additional ones by the *Andrews* 1865–1866 MS and 1867 MS] and seven to Cintra Bay were represented in our sample: less than 9% of the more than 200 voyages covered), 16 (17%) of our records are from them (Appendix 1). On the third important 19th-century right whaling ground in the North Atlantic, the Southeast U.S. Coast Ground (five voyages represented in our sample – Reeves and Mitchell 1986), no killer whales were reported as having been seen.

We note in passing that more than a third of the killer whale sightings occurred within one day of a sighting of another cetacean species (Appendix 1). In addition to the observations on right whale grounds mentioned above, killer whales were observed on sperm whale, blackfish and humpback grounds and in areas where "finback" whales (*Balaenoptera* spp.) were seen. The fact that most of the killer whale sightings were on the whaling grounds might be taken to suggest an association of some kind between killer whales and the large baleen and sperm whales. Such an association could be related to: (a) the habit of killer whales and some large whales of preying upon the same types of organisms in the same area at the same time, (b) the fact that killer whales prey upon the large whales (e.g. humpbacks [Whitehead and Glass 1985], sperm whales [Arnbom *et al.* 1987] and blue whales [Tarpy 1979]) or (c) some other factor or combination of factors. We emphasize that the observations of killer whales attacking large whales do not necessarily demonstrate that large whales form a major component of the killer whale's diet. Without quantitative information on searching effort on and off the whaling grounds and on the incidence of sightings of species other than the killer whale, we cannot evaluate fully the significance of the whalers' encounters with killer whales on the whaling grounds.

Seasonal movements

Any analysis of trends in killer whale sightings through time, whether comparing frequencies across years of the fishery or across seasons (months) on a single whaling ground, would be confounded by the factors mentioned above under "Whaling Grounds". Also, our sample sizes for all the grounds are small, and we do not have useful data from our sample on searching effort. In the absence of such data, we referred to Townsend's (1935), Clark's (1887) and our own (Reeves and Mitchell 1986) qualitative comments about the whaling seasons on the various grounds and compared these to the dates of killer whale observations.

On the Western Ground, whaling was conducted "almost entirely during the season from April to September, inclusive" (Townsend 1935, p. 12). Thus, the pattern shown on Figure 2a, with killer whales present mainly during March–September (peak in May–September), could be due as much to a trend in sighting effort as to a killer whale migration. Since there was little whaling during October–March, the lack of more sightings in those months is to be expected. However, we can at least surmise that, judging by their timing, the sightings on the Western Ground do not represent the wintering or southern component of a north-south migration cycle. This suggests either that the pods on the Western Ground were different from those summering in more northern regions (cf. Jonsgård and Lyshoel 1970; Reeves and

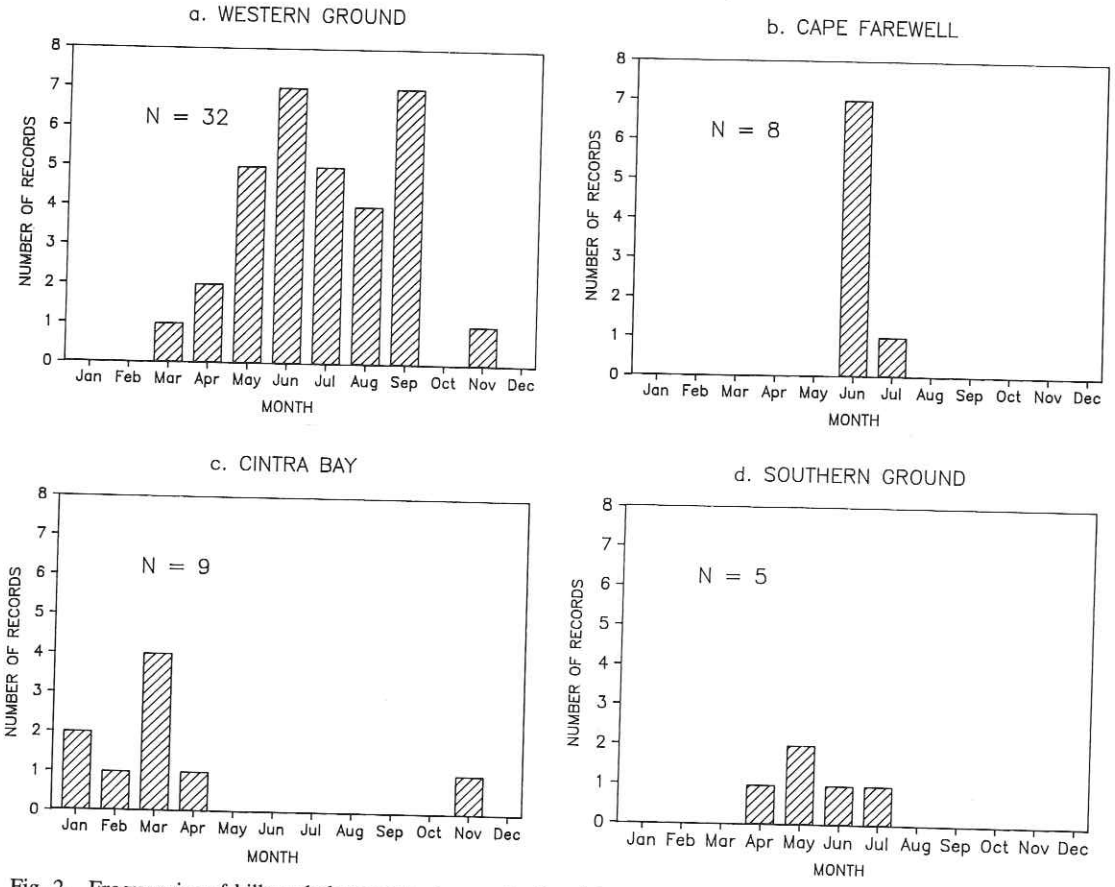


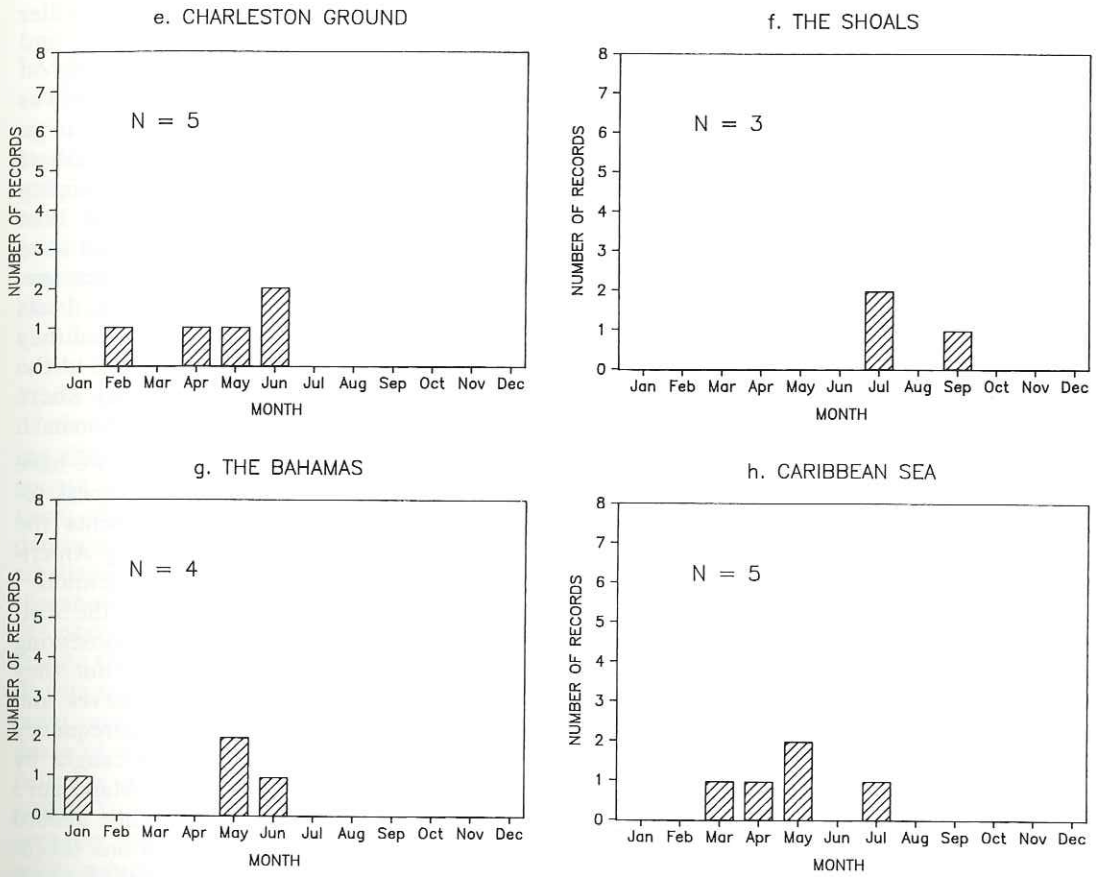
Fig. 2. Frequencies of killer whale records, by month, for eight whaling grounds in the North Atlantic. Data from Appendix 1, a–d p. 12, e–h p. 13.

Mitchell 1988 – this volume; Heide-Jørgensen 1988 – this volume) or that there is one widespread North Atlantic stock.

Records for the Cape Farewell Ground are restricted to June–July (Fig. 2b). Virtually all the whaling effort on this ground was during summer (Clark 1887; Reeves and Mitchell 1986).

The Cintra Bay Ground was visited by whalers (and killer whales; Fig. 2c) during late fall, winter and early spring (November–April) (Reeves and Mitchell 1986). Thus, once again, we have no basis for suggesting seasonal trends in the killer whale's occurrence on this ground. The records compiled by Hammond and Lockyer (1988 – this volume) indicate that killer whales are present off Northwest Africa throughout the year.

Townsend (1935) indicated that sperm whaling on the Southern and Charleston grounds generally extended from April to September and January, respectively. Thus, the few records for the Southern Ground (April–July) show no definite trend (Fig. 2d), and there is only one "outlier" for the Charleston Ground (Record No. 88, Appendix 1). However, it is interesting to note the complete absence of sightings on the latter ground during July–January (Fig. 2e). There should have been substantial sighting effort during this



period, so the falling-off in sightings after a May–June peak may indicate an actual migration by the whales.

The data for other grounds are similarly inconclusive. The Shoals, generally on or near the Grand Banks of Newfoundland, were fished mainly in the 18th century during summer, so the records for July and September are as expected (Fig. 2f). The Bahamas, essentially a southwesterly extension of the Charleston Ground, were presumably visited from April to January, so the killer whale records on this ground from May, June and January are not surprising (Fig. 2g). The March–May records from the Caribbean Sea are also more or less as expected, but the July record (No. 68, Appendix 1) is interesting (Fig. 2h). Summer records of killer whales at these low latitudes (see Katona *et al.* 1988 – this volume for others) demonstrate that the species' overall seasonal distribution in the North Atlantic is complicated. It may involve one or more stocks which summer in the tropics and others which summer in the Arctic, stocks or population units which are non-migratory, or other patterns of distribution as yet unrecognized from the available data.

Exploitation

We documented only ten previously unpublished records of killer whales being taken by American whalers in the North Atlantic (Appendix 1). American whalemen obviously did not consistently lower their boats and chase killer whales. This was probably due both to the difficulty of capturing them and to the re-

latively low yield of oil that could be obtained. Davis (1874, p. 295) told of chasing a pod of killer whales near Hawaii:

> ". . . the roughness of the sea, the erratic movements of the killers, and their short risings, prevented our getting on. They manifested no fear of the boat, as they rose and rolled about it, giving us a good chance to observe them at some distance, but evading closer examination."

Scammon (1874, p. 90) mentioned taking a killer whale "by chance" at the island of Asuncion in the western North Pacific. On at least four occasions when killer whales were seen (Appendix 1), the whalers initially mistook them for whales of a preferred species, such as the sperm whale. The boats were lowered three times in error. Some killer whale takes may have resulted from such situations, the boats already being lowered and chasing, the men then deciding to cut their losses by taking one or more of the killer whales.

New England whalemen took killer whales occasionally off Cape Cod (Dudley 1725; True 1884; Stevenson 1904, p. 192). The American whaleman Thomas Welcome Roys may have had some experience trying out killer whales, since he described them as yielding about 5 barrels of oil (Maury 1855 ["The 'Killer Whale,'" *Annual of Scientific Discovery* (London, 1855), pp. 369–70] as cited in Schmitt *et al.* 1980, p. 211). Such a yield was probably higher than the average; for example, the *Andrews* (1865–66 MS) obtained only four barrels from the two killer whales taken in 1865 (Appendix 1, entry No. 49). Tomilin (1967, p. 626) mentioned two killer whales which yielded 950 kg of oil each, but this apparently included the oil obtained from the bones as well as blubber. The American 19th-century whalers normally tried out only the blubber of the whales they caught.

Ferguson and Stair (1936, pp. 261–2) described an observation in the South Atlantic on 6 March 1884 as follows:

> "Seeing a finback breaching and making whitewater, we headed for it and saw that it was fighting about a dozen killer whales. The finback was worried and tried to shake them off. They hung on and bit the finback until the water was red with blood . . . We took a boat to go and get the whale but it sunk. The killers tackled our boat and we had a mighty lively time of it with lances and boat spade, keeping them off. We must have killed ten or twelve of them. When several came at the boat at one time, I was worried. As fast as they were killed they sank out of sight. We went back to the ship with our boat leaking badly where one of the killers banged his head on it."

This is the most convincing account we have read of the killer whale's aggressiveness toward whale boats. It also represents the largest single take of killer whales by American whalers that has come to our attention.

Like their American counterparts, the Scottish arctic whalemen mentioned observing killer whales from time to time, but they rarely tried to harpoon them (Reeves and Mitchell 1988 – this volume). The infrequency with which the killer whale was caught by Scottish whalers is indicated by Markham's (1875, p. 247) statement that no one aboard the *Arctic* in 1873 had ever seen one taken. The Scottish whaler and adventurer Murdoch (1917, p. 291) mentioned a sighting of killer whales on 7 August 1913 about 300 naut. miles southeast of Shannon Island, East Greenland (apparently not far from Jan Mayen), noting that the whales were not chased because "they do not have very much blubber." Nevertheless, Murdoch indicated that he (or at least one of his crewmates) had had some experience at harpooning them:

> "When you get fast to one of these killers the others hang round till their companion is quite dead, much as sperm whales do, and even try to help their harpooned friend to freedom by giving him a shoulder on either side."

This observation is a classic account of "succorant" behaviour as described by Caldwell and Caldwell (1966).

CONCLUSIONS

The data presented in this paper show that killer whales were widely distributed in the North Atlantic during the 18th and 19th centuries. Although most photodocumentation work conducted in recent years has been in Icelandic, Norwegian and North American coastal waters, the species' distribution in the North Atlantic clearly extended far offshore and included many areas not investigated recently by competent observers with cameras. While the overall pattern of relative abundance of killer whales may have changed during the last hundred years, whether in response to fluctuating oceanographic conditions, shifts in prey distribution and abundance or since the 1940's direct removals by whaling (e. g. Jonsgård 1977), it is unlikely that they have entirely abandoned these areas of past occurrence. In the Northeastern Pacific Ocean, for example, killer whales are distributed widely in tropical, temperate and polar seas well beyond the bounds of the few areas of detailed photographic study (Dahlheim *et al.* 1982; Braham and Dahlheim 1982). Thus, a complete picture of the present-day distribution, movements and stock relationships of killer whales in the North Atlantic (and elsewhere) probably will not emerge until there is photodocumentation (or other sampling) of the animals inhabiting these offshore areas.

The summer observations of killer whales at various latitudes, from the High Arctic to the tropics, suggests that stock divisions and movement patterns are complicated.

Killer whales were only lightly exploited in the North Atlantic by sailing-vessel whalers, so there is no reason to believe their numbers were greatly reduced by whaling before the late 1920's, when Norwegian whaling for small whales began (Jonsgård 1977). However, if their numbers and movements are in any way tied to those of commercially important whales or fish, the abundance and distribution of killer whales may have changed markedly in the 20th century from what they were in the 18th and 19th, due to the impact of human predation on the populations of their prey.

ACKNOWLEDGMENTS

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APPENDIX 1

Records of killer whales in the North Atlantic Ocean, from American whaling logbooks and journals. References for these manuscripts are given alphabetically by vessel name in the list of Unpublished References.

Record No.	Date	Locality (Ground)[1]	Number of whales			Comments	Source
			Seen	Chased	Taken		
1	7 July 1758	On Grand Banks (The Shoals)	+				*Francis* 1758
2	21 July 1765	*Ca* 46°20′N, on or near Grand Banks (The Shoals)	"School"				*Diamond* 1765
3	12 Sept. 1768	45°40′N, on Grand Banks (The Shoals)		~20		Finbacks seen earlier same day; tried to harpoon the killer whales from the sloop, but they dove and escaped.	*Nightingale* 1768
4	18 April 1816	19°01′N, 19°41′W, Cape Verde Islands (San Antonio)	+				*Edward* 1815–17
5	14 July 1817	35°25′N, 24°49′W, SE of the Azores		+		"Chasing Killars Cald them Sperm."	*Edward* 1817
6	28 May 1834	37°13′N, 73°05′W (Southern)			1	Took a sperm whale two days earlier, a blackfish this day, saw "plenty of Porpoises" day after.	*Grand Turk* 1834–36
7	30 April 1839	36°57′N, 72°30′W (Southern)	+			Porpoises seen same day; blackfish and porpoises on day before and day after.	*Primrose* 1839–41
8	22 April 1848	34°49′N, 22°34′W (Steen)	+			"Finbacks" seen same day, "porpoises" seen day before, "finbacks" seen day after.	*Solon* 1847–49
9	22 June 1849	33°20′N, 48°48′W (Western)	+			Saw "grampuses" on following day.	*Solon* 1847–49
10	28 April 1850	30°20′N, 76°54′W (Charleston)	"Shoal"				*Lewis Bruce* 1850
11	21 Sept. 1850	33°25′N, 42°39′W (Western)	+			Readied to lower but did not when whales were discovered to be killer whales.	*Lewis Bruce* 1850
12	19 Oct. 1850	33°10′N, 59°40′W (E of Bermuda)	+				*Lewis Bruce* 1850
13	30 May 1851	27°15′N, 79°11′W (Bahamas)	+				*Lewis Bird* 1850
14	8 June 1851	*Ca* 34–35°N, 43–44°W (Western)	"School"				*Tropic Bird* 1851–53
15	23 July 1851	*Ca* 35°N, 43°W (Western)	+			Saw humpbacks day before, "blackfish" same day.	*Tropic Bird* 1851–53
16	25 July 1851	*Ca* 36°30′N, 43°W (Western)	+			Saw "blackfish" day before, "grampuses" and "porpoises" same day.	*Tropic Bird* 1851–53
17	4 August 1851	32°10′N, 58°15′W (E of Bermuda)	+				*Lewis Bruce* 1851
18	1 Sept. 1851	35°46′N, *ca* 34°W (Western)	+				*Nye* 1851–53
19	3 Sept. 1851	36°18′N, 33°37′W (Western)	+				*Nye* 1851–53
20	15 June 1852	*Ca* 34°N, 47°W (Western)	+			Large group.	*Tropic Bird* 1851–53

Appendix 1 (continued)

Record No.	Date	Locality (Ground)[1]	Number of whales			Comments	Source
			Seen	Chased	Taken		
21	6 Aug. 1852	*Ca* 38°N, 37°W (Western)	+				*Tropic Bird* 1851–53
22	7 Sept. 1852	34°38′N, 43°45′W (Western)		"Shoal"		"Grampuses" seen same day.	*Lewis Bruce* 1852
23	24 Sept. 1852	34°21′N, 42°40′W (Western)		"Shoal"			*Lewis Bruce* 1852
24	4 July 1854	Off West Africa, near Equator (off "Garboon R")			1	On humpback grounds.	*Cornelia* 1853–56
25	29 Nov. 1855	23°49′N, 16°12′W (Cintra Bay)	"School"				*N. D. Chase* 1855–56
26	30 Aug. 1856	32°36′N, 47°32′W (Western)	+			"Blackfish" sighted the same day.	*Walter Irving* 1855–56
27	21 Jan. 1857	Cintra Bay	+				*E. Nickerson* 1856–57
28	22 Jan. 1857	Cintra Bay	"A few"				*E. Nickerson* 1856–57
29	21 Feb. 1857	Cintra Bay	+				*E. Nickerson* 1856–57
30	6 Nov. 1857	32°55′N, 27°33′W (S of Azores & W of Madeira)		"Shoal"		"Saw a shoal of killers called them sperm whales lowered the boats."	*Richmond* 1857–60
31	1 March 1858	Cintra Bay	+			On right whale nursery ground.	*Richmond* 1857–60
32	5 March 1858	Cintra Bay	+			"Saw a considerable number of killers in the bay"; right whales chased same day.	*Richmond* 1857–60
33	17 March 1858	Cintra Bay	"Great" number			Right whale taken following day.	*Richmond* 1857–60
34	31 March 1858	Cintra Bay	+				*Richmond* 1857–60
35	6 April 1858	Cintra Bay		+			*Richmond* 1857–60
36	14 May 1858	30°58′N, 62°06′W (S of Bermuda)	+			Saw "flying fish" same day; saw "sharp fin Black fish" and "porpoises" day before and "Black Fish" day after.	*Antarctic* 1858–59
37	14 June 1858	29°45′N, 48°46′W (Western)		+			*Antarctic* 1858–59
38	15 June 1858	29°45′N, 48°21′W (Western)		+			*Antarctic* 1858–59
39	19 July 1858	34°50′N, 39°10′W (Western)		+			*Annawan* 1857–59
40	21 May 1859	30°18′N, 51°12′W (Western)		"Quite a number"		Seen "amongst" a "School of Sharp Fin Black Fish."	*Rienzi* 1859–60
41	24 May 1859	30°25′N, 53°16′W (Western)	"Large School"				*Rienzi* 1859–60
42	28 May 1859	30°38′N, 53°30′W (Western)	"School"			Saw large school of sperm whales on day before.	*Rienzi* 1859–60

Appendix 1 (continued)

Record No.	Date	Locality (Ground)[1]	Number of whales			Comments	Source
			Seen	Chased	Taken		
43	31 Aug. 1859	32°21′N, 45°05′W (Western)	"Several"			"Grampuses" also seen that day, chased "Black Fish" day after.	*Rienzi* 1859–60
44	5 July 1862	Western Ground	+				*Awashonks* 1862–63
45	21 July 1862	41°47′N, 52°30′W (S of The Shoals)	+			"Finback" seen day before.	*Falcon* 1862–63
46	20 July 1863	SE of Annabon Island (present-day Pagalu) (equatorial West Africa)	School		1	On humpback grounds.	*Chili* 1863
47	6 Sept. 1863	38°21′N, 35°55′W (Western Islands)	"School"			Also saw "large piece of squid" this day.	*Nimrod* 1863–65
48	17 July 1864	51°40′N, 38°33′W (W of Commodore Morris)		+		"Lowered the Boats and gave chase without Success."	*Concordia* 1864–65
49	30 May 1865	Between the Azores and 58°30′N, 34°W	"Shoal"		2	Produced 4 barrels of oil.	*Andrews* 1865–66
50	29 Jan. 1866	Location not precise, but vessel heading S for Cape Verde Islands (not plotted on Fig. 1)		"School"			*Julia* 1865–66
51	17 May 1866	*Ca* 29°N, 53°W (Western)	+				*Julia* 1865–66
52	28 May 1866	*Ca* 17°30′N, 71°50′W off southern tip of central Hispaniola (Caribbean Sea)			1	1 "blackfish" taken at same time.	*Arthur Clifford* 1866
53	30 May 1866	Off SW Hispaniola (Caribbean Sea)		+			*Arthur Clifford* 1866
54	11 Aug. 1866	33°11′N, 52°19′W (Western)	"Some"				*Walter Irving* 1865–66
55	27 Aug. 1866	*Ca* 55°N, 57°20′W	"Shoal"				*Andrews* 1865–66
56	7 Sept. 1866	33°42′N, 52°59′W (Western)	"Some"			"Saw some killers and porpoises they all going very quick."	*Walter Irving* 1865–66
57	23 May 1867	*Ca* 39°N, 68°30′W (Southern)		+		3 days' sail from New Bedford; "blackfish" taken following day.	*Andrews* 1867
58	12 June 1867	51°55′N, 42°22′W			1	"Small one a cow."	*Andrews* 1867
59	17 June 1867	37°29′N (Western)	+			Also saw sperm whales and "blackfish" same day, "finbacks" day before, took 2 sperm whales on following day.	*Henry Taber* 1866–68
60	27 May 1868	*Ca* 27°N, 76–77°W (Bahamas)		+			*Star Castle* 1867–68
61	4 June 1868	33°N, 71°48′W (Southern)		+			*L. P. Simmons* 1868–70
62	4 June 1868	*Ca* 27°N, 69°W (E of Bahamas)	+				*Alleghania* 1868
63	27 March 1869	28°31′N, 42°23′W (Western)	+				*L. P. Simmons* 1868–70

Appendix 1 (continued)

Record No.	Date	Locality (Ground)[1]	Number of whales			Comments	Source
			Seen	Chased	Taken		
64	1 June 1869	30°08′N, 72°30′W (Charleston)		+			*Nellie F. Putnam* 1868–69
65	22 July 1869	30°00′N, 46°36′W (Western)	+			Sperm whales seen same day and day before.	*Eschol* 1869–70
66	18 Nov. 1869	*Ca* 27°N, 36°30′W		+(?)		"Small whales or killers," saw "finbacks and porpoises" day before, 2 "finbacks" 2 days earlier.	*Nellie F. Putnam* 1869–70
67	3 June 1872	28°28′N, 78°26′W (Bahamas)	+				*Cohannet* 1872–73
68	29 July 1872	21°06′N, 77°05′W (Caribbean Sea)	+				*Cohannet* 1872–73
69	26 Sept. 1875	35°12′N, 36°34′W (Western)		+		Chased killer whales by accident.	*Perry* 1874–77
70	5 Jan. 1875	*Ca* 25°N, 34°W	+				*William Wilson* 1874–75
71	6 Feb. 1875	8°40′N, 28°W (Cornell)		+			*William Wilson* 1874–75
72	26 April 1875	28°45′N, 48°33′W (Western)	+				*Pioneer* 1875–77
73	21 Nov. 1875	34°41′N, 32°40′W (Western)		+			*Ohio* 1875–78
74	21 Jan. 1876	27°27′N, 78°41′W (Bahamas)	+			Saw "finbacks" 2 days before in same area.	*Golden City* 1875–76
75	29 June 1876	32°12′N, 48°06′W (Western)	"School"				*Clara L. Sparks* 1876–77
76	16 June 1877	60°30′N, 33°43′W (Cape Farewell)	"Two schools"			Porpoises seen same day.	*Daniel Webster* 1877–79
77	17 June 1877	59°42′N, 33°30′W (Cape Farewell)	"Large school"			On the same day, took a right whale calf, cow struck but lost.	*Daniel Webster* 1877–79
78	20 June 1877	60°N, 35°28′W (Cape Farewell)	School			Saw one "Sulphur Bottom" same day, "Grampuses" day before, school of "porpoises" following day.	*Daniel Webster* 1877–79
79	25 June 1877	60°19′N, *ca* 34°W (Cape Farewell)	School			A school of "Grampuses" and "porpoises" and a "Sulphur Bottom" seen same day.	*Daniel Webster* 1877–79
80	26 June 1877	59°48′N, 33°15′W (Cape Farewell)	3–4 schools			On the same day, one "Squarehead Grampus" and two schools of "porpoises" were seen; following day 2 "Sulphur Bottoms" and 3 schools of "porpoises".	*Daniel Webster* 1877–79
81	25 July 1877	41°30′N, 49°02′W (SE of The Shoals)	+			Also saw "spouts" previous day; "grampuses" seen same day.	*John A. Ross* 1877–78
82	30 July 1877	*Ca* 49–50°N, 42°W (E of The Shoals)	+			Also saw "porpoises".	*John A. Ross* 1877–78
83	28 May 1880	30°N, 70°40′W (Charleston)	+			Also saw "grampuses"; saw "grampuses" and "porpoises" 2 days earlier.	*Clara L. Sparks* 1879–80
84	8 June 1880	*Ca* 60°N, 38°W (Cape Farewell)	+			Killer whales and ice in sight.	*A. R. Tucker* 1880–83

Appendix 1 (continued)

Record No.	Date	Locality (Ground)[1]	Number of whales			Comments	Source
			Seen	Chased	Taken		
85	14 Aug. 1880	In Atlantic off Strait of Gibraltar	Large group		1	Made 1 barrel of "blackfish" oil.	Ferguson and Stair 1936, pp. 25–26 (journal kept on board bark *Kathleen*)
86	20 Feb. 1882	9°15′N, 18°24′W	+		1	Saw "Black Fish" on day before, took one on day after.	*Eleanor B. Conwell* 1880–82
87	21 April 1883	33°20′N, 51°37′W (Western)	+		1	Saw "Fin Backs" two days later.	*Eleanor B. Conwell* 1883–84
88	11 Feb. 1884	30°43′N, 76°06′W (Charleston)	+			Saw "finbacks" same day.	*Franklin* 1883–85
89	30 April 1884	Off N end of St. Lucia, West Indies (Caribbean Sea)			1	Also saw "five whales" [humpbacks].	*Franklin* 1883–85
90	24 July 1886	*Ca* 60°N, 37°W (Cape Farewell)	"School"			Also saw "one scool of Porpoise." Whaling for *Eubalaena;* killed one on 22 July.	*Palmetto* 1886
91	7 June 1888	31°18′N, 75°20′W (Charleston)		+		Took a "porpoise" on day before.	*Golden City* 1888–89
92	2 July 1892	37°28′N, 72°39′W (Southern)	+				*Golden City* 1891–94
93	3 March 1894	At Blanco [Blanquilla, Venezuela] (Caribbean Sea)	+				*Golden City* 1891–94
94	29 June 1895	59°15′N, 39°57′W (Cape Farewell)	Many			"Saw quite a show of 'Killers' plenty Feed"; saw a "Finback" and "some Grampus" previous day.	*Canton* 1895–96
95	21 July 1895	59°49′N, 56°48′W, N Labrador Sea	+				*Canton* 1895–96
96	22 May 1897	38°08′N, 43°20′W (Western)	+			Saw humpbacks same day.	*Canton* 1897–98

[1] Based primarily on descriptions by Clark (1887) and Townsend (1935).