Account of Harbour Porpoise (*Phocoena phocoena*) Strandings and Bycatches along the Coast of British Columbia

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ABSTRACT

Little is known about the biology or status of the harbour porpoise (*Phocoena phocoena*) in British Columbia (BC), Canada. In this study, all available records of stranded and incidentally caught harbour porpoise are reviewed. Eighty-one records of stranded animals, or of animals caught in fishing gear along the BC coast, from the period 1934–1991, are presented. The harbour porpoise is the most frequently recorded cetacean stranding on the coast of BC. Stranding records are concentrated where there are large areas of water ranging in depth from 10 to 100m, usually associated with human population centres. Strandings have occurred throughout the year, but biases in effort preclude the determination of any seasonal or geographic trends. Records exist of animals taken incidentally in three commercial fisheries as well as in Canadian government test and research fisheries. Two animals taken incidentally in fisheries in adjacent US waters have also been recovered in BC. In addition, shark predation has been implicated in the death of one individual.

KEYWORDS: NORTH PACIFIC; HARBOUR PORPOISE; STRANDINGS; INCIDENTAL CAPTURE; PREDATOR-PREY; DISTRIBUTION; MOVEMENT; REPRODUCTION

INTRODUCTION

Throughout its range, many populations of the harbour porpoise (*Phocoena phocoena*) appear to be decreasing (Gaskin, 1984). In British Columbia (BC), Canada, little is known about this species, and no directed studies have ever been undertaken. Up until the beginning of this century, harbour porpoises appear to have been regularly taken by natives in this area (Boas, 1909; Drucker, 1951; Suttles, 1951; Barnett, 1955; Waterman, 1973). More recently, Cowan (1988) noted that the harbour porpoise population in BC appears to be decreasing. He suggested that this is most likely to be due to entanglement in fishing gear. Everitt *et al.* (1980) observed that in Puget Sound, Washington, the continual incidental take of this species in salmon gillnets is the most serious factor affecting the growth of the population. They also suggested that the harbour porpoise may be sensitive to pollutants, possibly accounting for its decline in these waters. In their analysis of pollutant levels in seven harbour porpoises from the Strait of Georgia, BC, Muir and Norstrom (1990) noted high levels of dioxins and furans relative to the other species of cetaceans tested. D.E. Gaskin (University of Guelph) recently reviewed the status of the harbour porpoise in Canadian waters and in 1990 recommended to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) that both the eastern and western Canadian populations of harbour porpoise be listed as threatened (R.R. Campbell, pers. comm.). Although COSEWIC listed the eastern Canadian population as threatened, the Committee concluded that insufficient information was available to classify the western Canadian population (Gaskin, 1992). The purpose of this report is to summarise and present information on harbour porpoises that stranded or were caught incidentally to

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fishing operations on the BC coast. Information on distribution, seasonal movements, length at birth, sex ratio and calving seasonality are presented.

METHODS

Records were collected of animals that: (i) were found dead, either on shore or in the water; (ii) were live-stranded or moribund in the water; or (iii) were caught incidentally during fishing operations. Records of types (i) and (ii) are hereafter referred to as stranding records. All published records were tabulated and further records were obtained from several unpublished reports as well as from the Stranded Whale and Dolphin Program of BC, the Royal British Columbia Museum, the University of British Columbia, the Department of Fisheries and Oceans' (DFO) Pacific Biological Station and the Vancouver Public Aquarium. Whenever possible, sex was recorded, standard length was measured (American Society of Mammalogists, 1961), the ovaries and the uterus were examined for signs of past or current pregnancies, mammary glands were examined for the presence of milk and the testes were examined for the presence of sperm. Most animals were examined for signs of potential entanglement in fishing gear, as described by Hare and Mead (1987).

RESULTS AND DISCUSSION

Harbour porpoises are the most frequently reported cetacean stranding on the BC coast (Baird, unpublished data). A total of 81 records of stranded or incidentally caught animals was compiled, and these records are presented in Appendix 1, with locations shown in Fig. 1. Thirty-four of these records have not been previously reported and an additional nine were compiled from unpublished documents. The trend in the number of stranded and incidentally caught animals recorded annually since 1978 is presented in Fig. 2. The large increase in records since 1987 probably reflects increase in effort, rather than an increase in the number of occurrences. As has been reported elsewhere for this species (cf. Mead, 1979), all records were of single individuals and only a small proportion (7.5%) of the strandings were live animals.

Stranded and incidentally caught harbour porpoises have been recorded along the entire BC coast (Fig. 1). The records are concentrated near human population centres (again probably reflecting levels of effort), in areas where the shoreline is bordered by large areas of water greater than 10m but shallower than 100m in depth. Barlow (1988) noted that no harbour porpoises were seen in waters greater than 110m in depth during surveys off the California coast, and Watts and Gaskin (1985) observed that harbour porpoises appear to avoid narrow shelf regions with strong currents. Sighting records of harbour porpoises from around the southeastern tip of Vancouver Island similarly showed concentrations in broad areas of water ranging in depth from 20 to 100m, with few records in water outside that depth range, or in areas with a steep slope (Baird and Guenther, 1991). More effort is required in areas of the coastline where there is little or no human settlement yet extensive shallow habitat, presumably suitable for harbour porpoises.

Polacheck *et al.* (1995) note the value of using stranding records to examine seasonal migrations in the harbour porpoise. The seasonal distribution of stranding records for BC is shown in Fig. 3. The spring through fall peak in stranding records probably reflects a lack of effort during winter months. Records collected in this study do not indicate any North-South movement, as seems to occur in the western North Atlantic (Gaskin, 1992). The seasonal distribution of records in northerly areas in the province generally matches that of southerly areas, although this may possibly be due to the limited latitudinal range

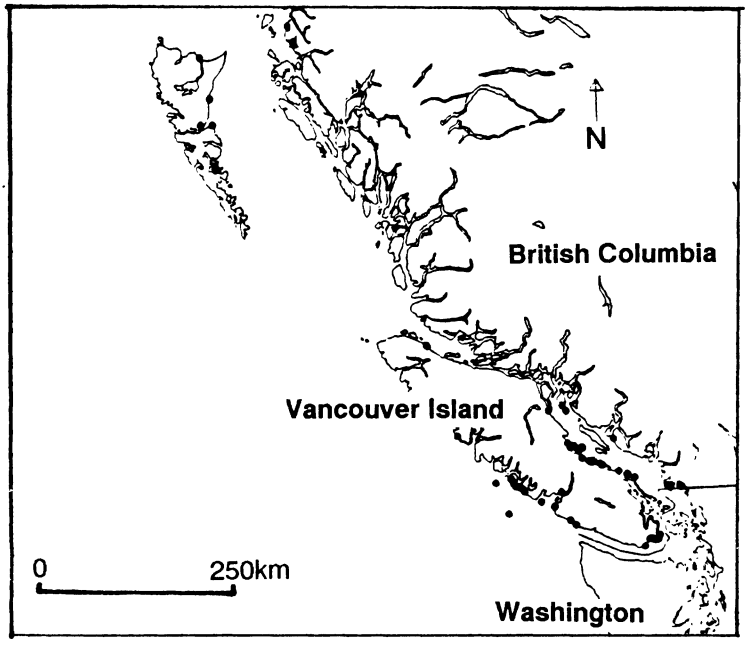

Fig. 1. Geographic distribution of stranding and incidental catch records of harbour porpoises in BC waters.

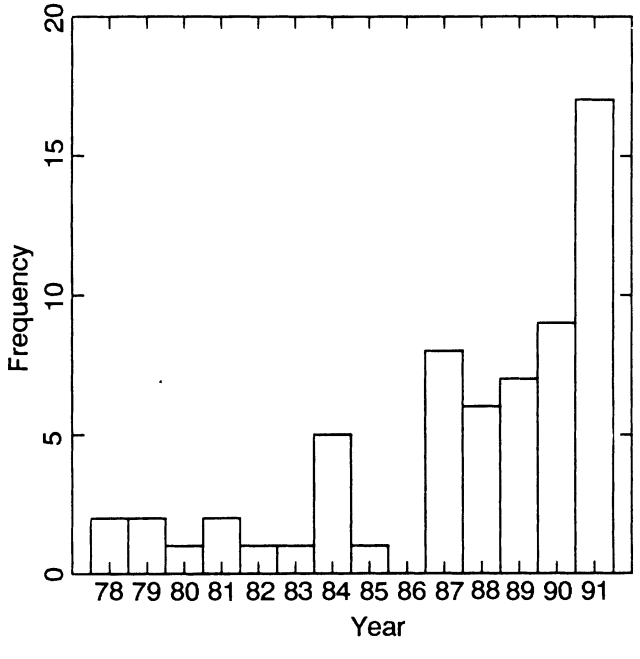

Fig. 2. Trend in the number of stranding and incidental catch records of harbour porpoise recorded annually since 1978 (n=62). Recent increases probably reflect increased effort.

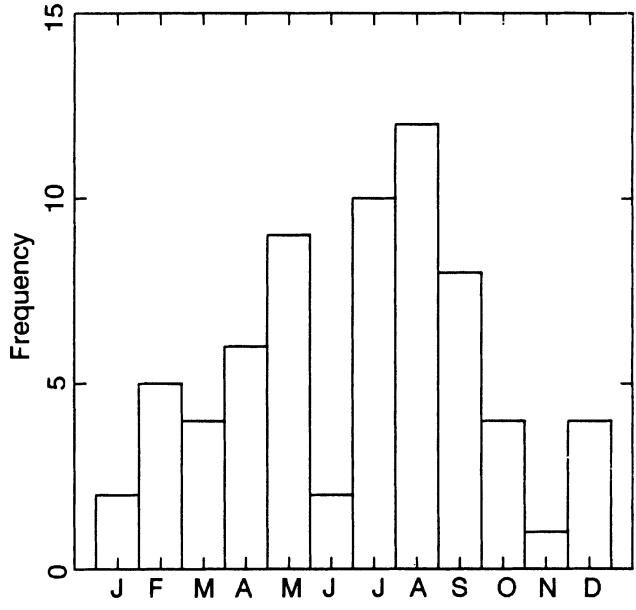

Fig. 3. Monthly distribution of 67 harbour porpoise stranding records in BC. Incidental catch records are not included here since all Canadian fisheries which have been conclusively recorded to catch harbour porpoises since 1981 take place between May and October.

covered by the records. Virtually all commercial fisheries are undertaken during the period from May through October, so the records of incidentally caught animals (not included in Fig. 3) are biased towards these months.

Total length was tabulated for 47 stranded and incidentally caught animals (Fig. 4). Total length was also noted for four foetuses. The smallest recorded neonate was 78.2cm, while the largest foetus was 77.0cm (Appendix 1). Gaskin *et al.* (1974) summarised information on length at birth in this species with neonatal lengths ranging from 70.0 to 99.1cm. Records from BC generally fall in the middle of this range. The size distribution in Fig. 4 indicates several peaks, with the first representing neonatal mortality. Such a neonatal peak was not apparent in the size distribution of 276 harbour porpoises stranded along the US northeastern coast (Polacheck *et al.*, 1994). Their data included animals killed in bottom set net fisheries off the US East coast. Read (1990a) noted that calves may be under-represented in this catch because they may not be able to dive to depths where the nets are set. The salmon drift gillnet fishery in BC is a surface fishery, and thus is unlikely to have a bias towards older animals as on the East coast. However, only one calf was recorded as being caught in fishing gear in BC. The mean length of stranded animals in BC was greater than that recorded by Polacheck *et al.* (1995). The largest animal recorded from BC was a 197cm female, which is close to the maximum recorded length for this species (Leatherwood and Reeves, 1983).

The sex for 61 harbour porpoises was noted (including two foetuses) from BC, with almost equal numbers of males (30) and females (31). Accurate determination of pregnancy rates in BC populations is not possible because of the small sample size and unequal seasonal distribution of records. Information derived from stranded animals however may help define calving seasonality, based on: (i) animals which had recently calved; (ii) the size of foetuses; and (iii) the presence of neonates (defined here as animals

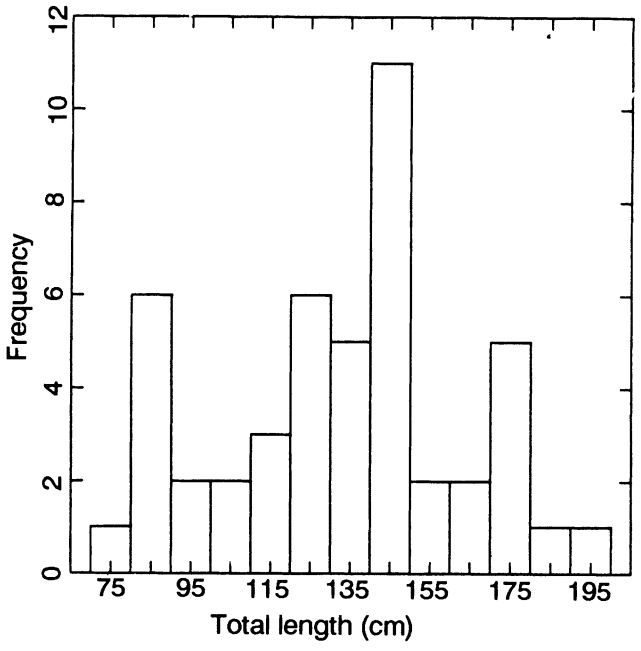

Fig. 4. Length distribution of 47 stranded and incidentally caught harbour porpoises in BC. X-axis labels represent the mid-point for each size class interval.

less than 100cm in length). Calving appears to extend from May through September, but one large (estimated 70cm) foetus was recorded from December, indicating that some calving must occur in early spring as well. Read (1990b) noted a distinct synchronisation of calving in May by the harbour porpoise in the western North Atlantic. Off California, calving appears to occur from May through July (Simons, 1984).

At least 12 animals were caught in fishing gear, ten of which were killed. More animals may have died from entanglement, since not all specimens were examined closely, and some may have died with no obvious signs of entanglement. In addition, external markings may become obliterated due to abrasion on a beach, decomposition or damage from scavengers. Mortality was noted in three commercial fisheries (salmon troll, salmon drift gillnet, hake trawl), as well as one research fishery (dogfish shark) and one test fishery (salmon drift gillnet) undertaken by the Canadian DFO. In addition, two harbour porpoises were recorded with signs of net entanglement which can be attributed to a monofilament set gillnet fishery for salmon by US native Americans in Semiahmoo Bay, Washington. These animals were recovered in the Boundary Bay-White Rock area in Canada, immediately adjacent to Washington State, in an area where no inshore or offshore Canadian fisheries were being undertaken.

Absolute levels of incidental mortality cannot be estimated using existing stranding data. Stacey *et al.* (1990) used data collected through a questionnaire survey of fisherman in BC to produce an estimate of incidental mortality of this and other species of small cetaceans. They estimated at least 43–59 individuals are killed annually, which is much greater than the number recorded through strandings or from occasional reports by fishermen. In addition, biases inherent in such questionnaire surveys typically result in a large underestimation of mortality levels (e.g. see Lien *et al.*, 1994).

One animal found dead had been attacked by a shark, judging by the wounds. Sharks have not previously been recorded as predators of harbour porpoises in British Columbia, although this has been noted elsewhere (Arnold, 1972). Harbour porpoise predation by transient killer whales (*Orcinus orca*) is regularly recorded in BC (Morton, 1990; Baird, unpublished data). One harbour porpoise specimen in the collection of the Royal British Columbia Museum was recovered floating at the surface after being partially eaten by two killer whales, so such remains may occasionally wash on shore and be recorded as stranded.

ACKNOWLEDGEMENTS

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Appendix 1

RECORDS OF STRANDED AND INCIDENTALLY CAUGHT HARBOUR PORPOISES WITHIN BC. ALL RECORDS ARE OF SINGLE INDIVIDUALS.

Date	Type[1]	Location	Sex	Source[2]	Length (cm)	Comments[3]
00/07/34	1	Nootka I	F	1		BCPM 3630
00/08/39	1	Hardy Bay, VI[4]	M	1		BCPM 4556
00/08/40	1	Victoria, VI	M	1		BCPM 4757, skeleton to UBC, immature
00/07/42	1	Herrando I	U	1		BCPM 4935, skeleton discarded
17/07/43	1	Cortes I, Mary I	U	2		BCPM 4999, mature
00/03/46	1	Qualicum VI	U	1		BCPM 5215, mature
11/05/46	1	Queen Charlotte City?	F	1		UBC 1880
12/07/48	1	Bella Bella, Denny I	F	1		UBC 2796
14/06/57	1	Massett, Graham I	U	2		UBC 13427, immature
10/02/62	2	Baynes Sound, VI	M	1	147	PBS, skeleton discarded, unspecified gillnet
11/10/64	1	Long Beach, VI	F	3	125.6	UBC 9055
Summ. 65	1	Long Beach, VI	U	4		Not recovered
21/02/69	3	Tofino Inlet, VI	M	3	134	
11/07/70	4	Pearl Harbour	U	2		Salmon gillnet
10/08/70	5	Nanaimo, VI	M	2	97.5	CMN, circling at surface
28/03/71	1	Long Beach, VI	F	3	159	Shot, not recovered?, foetus 53.5cm TL
26/02/74	1	Qualicum Bay, VI	M	2		Not recovered
25/07/75	1	Victoria, VI	F	2	176.5	BCPM 9249, mature
00/09/76	6	Pender Harbour	F	2	167.6	VPA, died
07/05/78	1	Qualicum Beach, VI	M	2	128.3	Not recovered, mature
Fall 78	1	Ten Mile Pt, VI	U	2		RBCM?, mature
00/05/79	1	Tofino, VI	F	2		Female not recovered, foetus male 75.5cm TL
07/08/79	7	Parksville, VI	F	2	80.7	Not recovered
00/07/80	1	Bamfield, VI	M	2		BCPM 10098, immature
30/07/81	1	Prince Rupert Harbour	F	2	124.5	Not recovered?, entanglement?
15/08/81	2	10 miles S Flores I	F	2	102.0	BCPM 12833, salmon troll fishery
07/04/82	1	Denman I	U	2		BCPM 11209, mature
05/08/83	7	Qualicum Beach, VI	F	5	170.0	BCPM 11767, recently calved
27/07/84	1	Crescent Beach	U	6		Not recovered?
02/08/84	1	Crescent Beach	F	6	182	Not recovered?
18/08/84	1	Gabriola I	M	6	81.5	Not recovered?, had breathed
23/08/84	1	Esquimalt, VI	F	2	102.0	BCPM 12694, immature
04/09/84	1	Long Beach, VI	F	6	177	PRNP, lactating
09/03/85	1	N of Qualicum, VI	M	2	149	Not recovered
17/02/87	1	Victoria, VI	F	7,8	167E[5]	BCPM 16042, foetus 31cm TL
29/04/87	1	Victoria, VI	F	8,9		BCPM 16118
01/05/87	1	Victoria, VI	F	8,9	118.5	BCPM 16119
11/05/87	1	Campbell River, VI	F	8,9	179	RBCM, had calved within days
25/08/87	1	Olibar Pt, Gabriola I	F	8,9	96	BCPM 16648
17/11/87	1	Sandspit, Moresby I	M	8,9	146	BCPM 16638, entanglement?
12/12/87	1	Long Beach, VI	M	8,9	147	BCPM 16647
12/12/87	1	Tsawwassen	F	8,9	161	BCPM 16650
23/05/88	1	Victoria, VI	M	10	144	BCPM 16655
23/05/88	1	Metchosin, VI	U	10	106E	Not recovered
00/07/88	1	Long Beach, VI	U	10		Not recovered
02/09/88	1	Union Bay, VI	F	10	84	Collected
23/09/88	2	La Perouse Bank	U	10		Not recovered, foreign bottomfish trawler
15/10/88	1,2	Hornby I	M	10	140	Sidney Mus. MM990.1, salmon? gillnet

Appendix 1—*continued.*

Date	Type[1]	Location	Sex	Source[2]	Length (cm)	Comments[3]
29/01/89	1	Boundary Bay	F	11	135	SWDP89-01
25/02/89	1	Tlell River, Graham I	U	11	124E	NPP
19/03/89	1	Tlell River, Graham I	U	11		CMN
12/05/89	2	Qualicum Beach, VI	F	11	197	SWDP89-09, DFO salmon gillnet test fishery
14/07/89	1	Wickaninnish Beach, VI	M	11	88.2	SFU, had breathed
20/09/89	1	Long Beach, VI	U	11		Not recovered
24/10/89	1	Tlell, Graham I	U	11		Not recovered
21/04/90	1	Clover Pt, Victoria, VI	M	12	119	UVIC
25/07/90	2	Qualicum River, VI	M	12	146	BMS, skeleton discarded, dogfish research sunken set gillnet
06/08/90	1	Clark I, Broken Group	U	12		Not recovered
00/09/90	1	Cox Bay, VI	U	12	122E	Not recovered
18/09/90	1	Wickaninnish Beach, VI	U	12	122E	Not recovered
25/09/90	1	Victoria, VI	M	12	86	RBCM
00/10/90	1	Loch Bay, Gabriola I	U	12	61E	Not recovered
11/10/90	1	Tofino, VI	U	12	122E	Not recovered
08/12/90	1	NE Side Vance I	F	12	190E	SFU, foetus 70E cm TL
14/01/91	1	Hornby I	F	2	128	Collected, entanglement?, immature
08/02/91	1	Kildonan, VI	M	2	134.6	Skeleton discarded, immature
08/04/91	1	Pedder Bay, VI	U	2		Not recovered
16/04/91	1,2	White Rock	F	2	143.0	SWDP91-07, native US salmon set gillnet, immature
18/04/91	1	White Rock	M	2	149.2	SIC
26/04/91	1	Victoria Harbour, VI	M	2	114.8	SWDP91-09
09/05/91	1	Esquimalt, VI	M	2	120.6	Sidney Museum MM991.1
14/05/91	1,2	Boundary Bay	F	2	159.0	VPA, native US salmon set gillnet, immature
15/05/91	1	Saxe Pt, Esquimalt, VI	F	2	143.4	UVIC, immature
15/06/91	1,8	Craig Bay, VI	M	2	134	AC, partially eaten by a shark
20/08/91	1	NE shore Hornby I	M	2	78.2	SWDP91-36, had breathed
23/08/91	1	NE shore Hornby I	F	2	88	RBCM, likely had breathed
07/09/91	1	N side Gabriola I	F	2	176.6	SWDP91-38, fetus UVIC male 77.0cm TL
07/09/91	4,6	Bamfield Inlet, VI	M	2	90E	Pt. Defiance zoo and aquarium, died
15/10/91	2	Qualicum, VI	M	2	131	NIWRA, DFO salmon drift gillnet test fishery
25/10/91	2	Off Nitinat, VI	M	2	149	SWDP91-43, salmon drift gillnet fishery, mature
30/12/91	1	Carmanah Pt, VI	M	2	120.1	RBCM, immature

[1] Type: 1, found dead on beach or floating; 2, incidental catch, died; 3, live stranding, returned to water; 4, collided with fishing gear, not killed; 5, taken deliberately; 6, live stranded, taken into captivity; 7, live stranded, died; 8, killed by predators.

[2] Source: 1. Pike and MacAskie, 1969; 2. unpublished records collected from the Royal BC Museum, Department of Fisheries and Oceans, University of British Columbia, the Vancouver Public Aquarium and the Stranded Whale and Dolphin Program of BC; 3. Hatler, 1972; 4. Buffam, 1965; 5. Goodman, 1984; 6. Anon., 1985; 7. Cooper, 1987; 8. Baird *et al.*, 1988; 9. Anon., 1988; 10. Stacey *et al.*, 1989; 11. Langelier *et al.*, 1990; 12. Baird *et al.*, 1991. Note: Dates may differ from published sources if available unpublished details indicate the animal first stranded on an earlier date. Similarly, sex was occasionally misreported in earlier sources, and has been changed here based on available unpublished data.

[3] Comments: Locations of specimens noted where applicable. BCPM or RBCM = Royal British Columbia Museum, Victoria, BC. UBC = University of British Columbia, Vancouver, BC. PBS = Pacific Biological Station, Nanaimo, BC. DFO = Department of Fisheries and Oceans. PRNP = Pacific Rim

Appendix 1—*continued*

National Park, Ucluelet, BC. SWDP = Stranded Whale and Dolphin Program of BC, Victoria. NPP = Naikoon Provincial Park, Tlell, BC. CMN = Canadian Museum of Nature, Ottawa, ON. SFU = Simon Fraser University, Burnaby, BC. SIC = Stubbs Island Charters, Telegraph Cove, BC. VPA = Vancouver Public Aquarium, Vancouver, BC. BMS = Bamfield Marine Station, Bamfield, BC. UVIC = University of Victoria, BC. AC = Arctic College, Fort Smith, NWT. NIWRA = North Island Wildlife Recovery Association, Errington, BC.

[4] VI = Vancouver Island.

[5] E = estimated length.

Note: Canada (1988) reported a female harbour porpoise stranded in Sooke, BC on 27 August 1987, for which the skeleton was deposited in the Royal British Columbia Museum. However, this animal was misidentified, and was actually a Dall's porpoise.