

Winter capture of a harbor porpoise in a pelagic drift net off North Carolina

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Harbor porpoise, *Phocoena phocoena*, of the Bay of Fundy and Gulf of Maine are among the best-studied small cetaceans owing to their coastal nature, frequent encounters with commercial fisheries, and subsequent accessibility to researchers. Unfortunately, our knowledge of these animals is limited primarily to observations made during summer. In autumn most porpoises leave these coastal waters, and their winter distribution is unknown. Various hypotheses have been constructed to explain the apparent disappearance of these animals during the winter months, including that of migration to offshore banks or to a southern coastal area (Gaskin, 1984). Information on the winter distribution of harbor porpoises in the northwest Atlantic is needed to understand better the effects of human activities on this population, which is subject to large removals in coastal gill nets during the spring, fall, and summer (Read et al., 1993).

Existing information on the winter distribution of porpoises comes

from strandings and a small number of dedicated surveys. From January to May, porpoises strand on the coasts of Massachusetts to North Carolina (Polacheck et al., in press), but most of these individuals are very young. Stranded adults are seldom encountered. Winter surveys are hampered by poor sighting conditions and so far have failed to find any significant concentrations of porpoises (Palka¹). In this report, we document the incidental capture of a harbor porpoise in a pelagic drift net off the coast off North Carolina, during winter. The record is significant for two reasons. First, it is the southernmost incidental capture of a harbor porpoise in the northwest Atlantic. Second, observations of the stomach contents of this specimen suggest that the ecology of this population may be quite different in winter than in summer months.

The porpoise was captured on 25 February 1993, 75 km east of Nag's Head, North Carolina, at 35°55'N and 74°47'W, in water 229–293 m deep. Surface water temperature

was 12–13°C. The net was set the previous evening and hauled early (0630–0830 h) in the morning. The float line was approximately 10 m below the surface of the water, and the porpoise was entangled near the top of the net. The porpoise was examined at sea by an observer, who noted that the porpoise had been killed recently "because the insides were steaming." Also in the net were a basking shark (*Cetorhinus maximus*), 2 ocean sunfish (*Mola mola*), 2 swordfish (*Xiphias gladius*) and 3 bluefish (*Pomatomus saltatrix*).

The porpoise was male, with a standard length of 129 cm and mass of 28.5 kg. Measurements of girth and blubber thickness indicated that the animal was healthy and robust. The observer collected life history tissues (teeth, stomach, and reproductive tract) from the carcass and transported them to Woods Hole. The age of the porpoise was estimated in the laboratory from counts of dentinal growth layers in thin, decalcified, and stained sections of teeth. Two independent estimates of the age of the animal were made, both indicating that the porpoise was born between April and June 1991. One testis measured 5.3 × 2.4 × 1.2 cm and weighed 11 g without the epididymis. Histological examination of the testis and epididymis (Read and Hohn, 1995) revealed that the porpoise was sexually immature.

The forestomach contained the remains of many small mesoplagic prey not recorded from other harbor porpoises in the northwest Atlantic (Smith and Gaskin, 1974; Recchia and Read, 1989; Fontaine

¹ Palka, D. 1995. Preliminary cruise report of the spring distribution survey of harbor porpoises in the mid-Atlantic. Northeast Fisheries Science Center, Natl. Mar. Fish. Serv., Woods Hole MA 02543.

et al., 1994). Approximately 99% of the contents (145 g wet weight) comprised partially digested remains of a single species of lanternfish, *Ceratoscopelus maderensis*. Other prey were represented only by hard parts, such as otoliths and squid beaks. Cephalopod prey remains included 7 upper and one lower beak of *Selenoteuthis scintillans* and 2 lower beaks of *Loligo pealei*. In total, 1,994 otoliths from at least 8 fish species were recovered from the stomach (Table 1). The state of digestion of stomach contents suggested that the porpoise had been feeding mostly at night and in the early morning on small-bodied fish and squid.

Of the prey items we identified from this porpoise, only silver hake, *Merluccius bilinearis*, are common prey of harbor porpoises in the Gulf of Maine. In summer, harbor porpoises in the Bay of Fundy and Gulf of Maine feed primarily on Atlantic herring, *Clupea harengus*, augmenting this with silver hake and other demersal species (Smith and Gaskin, 1974; Recchia and Read, 1989). Recent analyses of the stomach contents of harbor porpoises from the southern Gulf of Maine indicate a shift to smaller-bodied prey, such as pearlside, *Maurollicus weitzmani*, during autumn (Read et al.²).

These observations lead us to suggest that harbor porpoises in the northwest Atlantic are not tied to shallow nearshore waters during winter. The stomach contents of this specimen indicate that porpoises can forage successfully on midwater prey in deep water. Similar prey remains have been recovered

from the stomach of a harbor porpoise taken in Irish waters (Rogan and Berrow³). Porpoises can dive to depths of more than 225 m (Westgate et al., 1995), although deep-feeding excursions would not be necessary if mesopelagic prey are taken at night when they migrate toward the surface. Adult *Ceratoscopelus maderensis*, for example, are found at depths of 33–250 m at night (Scott and Scott, 1988). If porpoises are able to use the shelf edge and slope waters during winter, a large expanse of suitable habitat is available from the Grand Banks to Cape Hatteras. This hypothesis is supported by the observations of Stenson and Reddin,⁴ who reported the incidental capture of harbor porpoises in experimental drift nets set during winter and spring off the slope of the Grand Banks outside the 1,000 m isobath.

A largely offshore winter distribution of harbor porpoises would explain the paucity of sightings of this species outside the summer and fall months. The Gulf of Maine population of harbor porpoises is believed to number more than 45,000 individuals (Palka, in press); such a large number of animals would have been detected in coastal waters, even during winter. We hypothesize that the population disperses to the south during winter and is found in low densities over the shelf and slope waters, possibly mixing with porpoises that summer in the Gulf of St. Lawrence and Labrador. Molecular genetic techniques are being used to address the question of stock mixing during winter (Rose⁵). The many young porpoises that strand along the mid-Atlantic coast during this season, most of which are less than a year old, may have been segregated from the remainder of the population after they were weaned from their mothers.

We recognize that it is difficult to test this hypothesis of offshore dispersion during winter. Traditional visual census techniques are ineffective with very low densities of harbor porpoises, particularly given the weather conditions that prevail during this season. Few fisheries that might capture harbor porpoises are operative during this season; pelagic drift-net fishing effort is currently limited to only a few

² Read, A. J., J. E. Craddock, and D. Gannon. 1994. Life history of harbor porpoises and pilot whales taken in commercial fishing operations off the Northeast United States. Northeast Fisheries Science Center, Natl. Mar. Fish. Serv., Woods Hole, MA 02543. Final Contract Rep. 50-EANE-2-00082.

Table 1

Fish remains in the stomach of a harbor porpoise, *Phocoena phocoena*, killed in a pelagic drift net off Cape Hatteras on 25 February 1993.

Family	Species	Number of otoliths
Ophichthidae	<i>Myrophis punctatus</i>	2
Myctophidae	<i>Ceratoscopelus maderensis</i>	1,920
	<i>Ceratoscopelus warmingii</i>	1
	<i>Myctophum affine</i>	2
	<i>Hygophum hygomii</i>	4
Moridae	<i>Laemonema</i> sp. (?)	29
Merlucciidae	<i>Merluccius bilinearis</i>	4
Percomorph	Unidentified	32

³ Rogan, E., and S. D. Berrow. 1995. Aspects of the biology of the harbour porpoise, *Phocoena phocoena*, in Irish waters. Paper SC/47/SM40 presented at the 47th meeting of the Scientific Committee of the International Whaling Commission, Dublin, Ireland.

⁴ Stenson, G. B., and D. G. Reddin. 1991. Incidental catches of small cetaceans in drift nets during salmon tagging experiments in the Northwest Atlantic. In Harbor porpoise in eastern North America: status and research needs; workshop held 5–8 May 1992 at Northeast Fish. Sci. Cent., Natl. Mar. Fish. Serv., Woods Hole, MA 02543.

⁵ Rose, P. 1995. Department of Zoology, Univ. New Hampshire, Durham NH 03824. Personal commun.

trips each winter. Instead, alternative techniques, such as tracking the movements of individual porpoises by satellite telemetry and the use of nontraditional census techniques (e.g. acoustic surveys), may reveal where these animals spend their winter months.

Acknowledgments

We thank the observer, Dianne Borgaard, for her careful observations and meticulous dissection at sea. Damon Gannon identified the cephalopod prey remains, Eugenia Bohlke identified the worm eel, Stephanie Fernandez prepared the tooth sections, and Aleta Hohn read the tooth and testis sections. This research was supported by Contract 50-EANE-2-00082 from the Northeast Fisheries Science Center, NMFS/NOAA.

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