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### INCIDENTAL CATCH OF HARBOR PORPOISE, *PHOCOENA* *PHOCOENA* (L.), IN HERRING WEIRS IN CHARLOTTE COUNTY, NEW BRUNSWICK, CANADA

In this report we examine the indirect exploitation of harbor porpoises, *Phocoena phocoena*, by the weir fishery for herring (*Clupea harengus*) in Charlotte County, New Brunswick, in the lower Bay of Fundy. This fishery is of considerable economic importance to the region; the landed value averaged 2.2 million dollars annually from 1974 to 1979 (table 11 in Iles 1979). Although herring constitute 50% of the harbor porpoise diet (Smith and Gaskin 1974), the level of competition and conflict between *P. phocoena* and the fishery is unknown.

The harbor porpoise is taken accidentally by several commercial fisheries throughout the world (Mitchell 1975), including a pound net fishery in Denmark (Andersen 1974) similar to the weir fishery of eastern Canada. In Canadian waters, harbor porpoises have been caught frequently in Newfoundland cod traps (Sergeant and Fisher 1957) and an unknown number are killed annually in gill nets in the Gulf of St. Lawrence (Laurin 1976). In addition to the indirect catch in the Bay of Fundy, harbor porpoises have been hunted for food and oil by native people and fishing families from at least the 19th century to the present (Gilpin 1878; Leighton 1937; Prescott et al. 1981). An unknown number of animals were also used as mink food in the 1950s (Fisher and Harrison 1970).

As part of a continuing study of *P. phocoena*, we had the opportunity to examine 48 specimens trapped in herring weirs since 1969. Eleven were tagged or equipped with radio-telemetry packs and released (Gaskin et al. 1975). The remainder were routinely autopsied and ages of 30 specimens were estimated

from dentinal growth layers (Gaskin and Blair 1977).

Since no formal reporting system exists, we attempted to assess the annual rate of entrapment by mailing questionnaires to all 214 members of the Fundy Weir Fishermen Association in 1980. A total of 49 questionnaires were returned, of which 36 (16.8%) were of a usable nature.

### Specimens Examined from Herring Weirs

The 48 harbor porpoises examined between 1969 and 1982 consisted of 22 females and 26 males. Harbor porpoises became trapped in weirs from May to December with the majority (36) taken in July and August. Ages ranged from 0 to 8 yr, with a disproportionate number of 1-yr-old animals. Over half (52%) of the aged sample ( $n = 25$ ) taken from 1969 to 1973 consisted of 1-yr-old harbor porpoises, while yearlings constituted only 18.9% of a sample of 95 animals collected by shotgun from the free-ranging population during the same time period (Fig. 1).

This catch bias may be a consequence of the inexperience of 1-yr-old harbor porpoises in echolocation, navigation, and prey capture. *Phocoena phocoena* has a lactation period of only 8 mo (Gaskin et al. 1981), short in comparison with other odontocete species. Brodie (1969) suggested that prolonged lactation in odontocetes is attributable to the

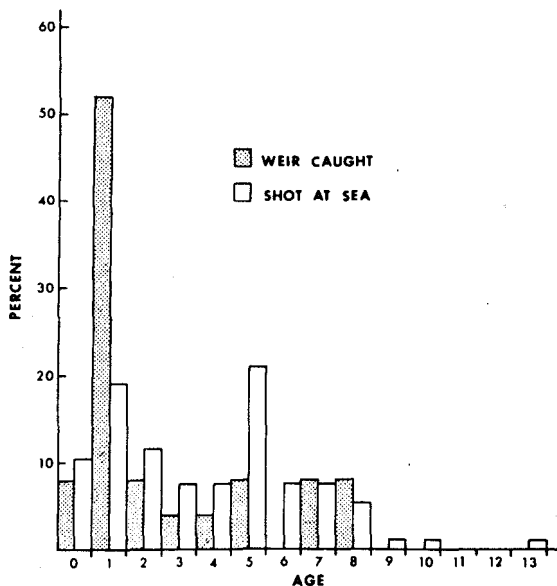


FIGURE 1.—Frequency histogram of age classes (estimated from dentinal growth layers) of harbor porpoises collected in the Bay of Fundy, 1969-73, expressed as percentage of totals captured by two methods: Weir-caught ( $n = 25$ ) and shot at sea ( $n = 95$ ).

sophisticated navigational training required by young animals.

Andersen (1974) concluded, on the basis of parasitic infestation, that about 90% of the 50 harbor porpoises he examined from Danish pound nets were "sick." Most of the yearlings autopsied from our weir sample were only lightly parasitized and appeared to be in good health. Older harbor porpoises were heavily infected with pseudaliid lung worms and campulid liver flukes, but in our experience this is typical of the adult population in general (Arnold and Gaskin 1974).

Many of the harbor porpoises we examined had empty stomachs, indicating either a lack of available fish in the weir or refusal to feed while trapped. Harbor porpoises observed inside weirs usually appeared to be stressed, breathing rapidly and swimming quickly (1.5 m/s) in a regular circular or figure-eight pattern. These animals rarely demonstrated any behavior that might have been interpreted as feeding or foraging activity.

### Weir Entrapment Questionnaire

The 36 respondents reported 59 trapped harbor porpoises over the 5-yr period, 1975-79. Of these animals, 23 (39%) were shot or died accidentally, usually by drowning after becoming entangled in the seine net while being removed. The majority of weir fishermen (72%) indicated that they endeavored to release the animals unharmed, either by seining and releasing them, or by waiting for the animals to escape on their own. One respondent who shot entrapped harbor porpoises indicated that the meat was used for human consumption. In general, weir fishermen displayed a favorable attitude towards harbor porpoises, in contrast to their attitude towards harbor seals, *Phoca vitulina*. Harbor seals are generally considered pests, as they swim freely in and out of weirs and may chew holes in the netting.

Fourteen respondents indicated that harbor porpoises became trapped in weirs during the summer months (July-September), while only one reported entrapment at other times (September-October). This is in agreement with our own observations and reflects the seasonal abundance of both harbor porpoises and herring in inshore waters (Gaskin 1977).

Many responses (12 of 18) indicated that harbor porpoises usually entered herring weirs at night. This suggests that visual detection of the weir is important in avoiding entrapment. Busnel et al. (1965) found that a captive harbor porpoise using only echolocation had difficulty avoiding transparent nylon monofilament 3.5 mm in diameter. Since the netting on weirs is constructed from synthetic material, it may

not be readily detectable by echolocating harbor porpoises.

Herring tend to be closer to the surface at night than during daylight hours (Brawn 1960) and thus are more susceptible to the weir fishery during this period. Harbor porpoises may follow schools of herring into the weirs and then become trapped. However, questionnaire respondents indicated that large numbers of herring were not always present when entrapment occurred. Some harbor porpoises, therefore, presumably became trapped as a result of foraging on small schools of herring or other prey species.

### Impact of the Fishery on the Population

If the annual bycatch per weir (0.328) calculated from the questionnaire returns is representative of all 216 licensed weirs, some 70 harbor porpoises become trapped in Charlotte County each year. Of these animals, 27 die as a result of entrapment.

Gaskin (1977), using uncorrected sighting per unit effort data, estimated the harbor porpoise population in the lower Bay of Fundy as 4,000 during mid-August. Prescott et al. (1981) estimated the August population in the "western half of the Bay of Fundy" as 3,456, using aerial strip census methodology. The annual mortality inflicted on the harbor porpoise population by weirs in Charlotte County would appear to be <1% of these population estimates. An unknown number of individuals from this population are trapped in weirs in northern Maine (Prescott and Fiorelli 1980) and a few scattered weirs along the Digby, Nova Scotia, shore and in Saint John County, New Brunswick (incomplete data from questionnaire returns).

Subsistence hunting for harbor porpoises is at a very low level in Charlotte County at the present time, although one native hunter claimed to have taken approximately 50 animals in 1979 (Prescott et al. 1981). Based on our own observations, however, native hunters from Maine take only 5-10 harbor porpoises each summer in the area. Harbor porpoises used for human consumption by New Brunswick fishing families are almost invariably from herring weirs or gill nets.

Entanglement in gill nets has a much greater potential for impact on the *P. phocoena* population since there is no opportunity for live release. About 20 fishermen actively gill net in the county (A. B. Cross<sup>1</sup>), but we have little information on the level of

<sup>1</sup>A. B. Cross, Fisheries and Oceans Canada, Lord's Cove, Deer Island, New Brunswick, Canada E0G 2J0, pers. commun. August 1982.

incidental catch. Those interviewed by us reported catching 0-3 harbor porpoises/year. Prescott and Fiorelli (1980) suggested that the incidental catch by gill nets in the Gulf of Maine may be as high as 300 harbor porpoises/year. In Charlotte County, however, the mortality appears to be no greater than that inflicted by the weir fishery.

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