Entrapments and Strandings Reported to the Entrapment Assistance Program during 1991; and a Test of "Whale Alerts" for Preventing Whale Collisions: A Preliminary Report to the Department of Fisheries and Oceans and the Newfoundland and Labrador Department of Fisheries.

Jon Lien, Wayne Barney, Amy Verhulst, Rosie Seton

Whale Research Group
230 Mount Scio Road
Memorial University of Newfoundland
St. John's, Newfoundland

31 December 1991

Summary

During 1991 the Entrapment Assistance Program received reports of whales entrapped in fishing gear, ice-entrapments and cetacean strandings. Fishermen were surveyed regarding the assistance they received from the program. Finally, "alarm" devices, designed to prevent whale collisions with fishing gear were tested.

Gear Entrapments: A total of 137 humpbacks were reported entrapped; this was the highest number ever reported since the Entrapment Assistance Program began. Most entrapments occurred in codtraps and cod gillnets in July and August. A total of 15 humpbacks (10.9%) died during entrapments.

It is estimated that there were a total of 1,280 collisions which occurred in Newfoundland and Labrador during 1991 which cost inshore fishermen just under one million dollars in lost gear and fish.

Although there are not firm data which permit evaluation of the number of humpback entrapments and collisions, it is known from annual surveys that there were large numbers of humpbacks inshore during 1991. This may in part be due to the unusual status of capelin distribution which occurred apparently in response to the cold water of 1991.

There were few entrapments of other whale species reported except for harbour porpoise. Under-reporting of collisions and entrapments involving the smaller whales is high.

Fishermen are extremely positive about the Entrapment Assistance Program. They estimated that the program saved them an average of $1,243.00/entrapment.

Ice Entrapments and Strandings: There were 18 ice-entrapments involving 4 species and 17 strandings involving 7 whale species reported during 1991.

Tests of Whale "Alarms": Test of 'Whale Alert' acoustical "alarms" on codtraps indicate that the devices reduce the probability of a collision by at least 50% and, as well, reduce entrapments and the seriousness of accidents if they occur. About 90% of fishermen that participated in the experiment believed the "alarms" worked and would purchase one. Four traps accounted for 50% of all the accidents which occurred on "alarm" protected traps. Further work is required to understand why "alarms" do not work under some circumstances.

Table of Contents

Introduction to the Problem:

The NW Atlantic population of humpback whales, protected since 1955, contains an estimated 5,500 animals divided into several distinct feeding sub-stocks (NMFS 1990). The feeding sub-stock resident in Newfoundland and Labrador is the largest and contains about 2,000-4,000 whales (Katona and Beard 1990). Historical data are fragmentary, and probably unreliable, but suggests that this number may be approaching historical carrying capacity (estimates of original numbers range from 4,700-10,000) (Mitchell and Reeves 1983; Winn and Reichley 1985). The NW Atlantic humpback is classified as "rare" by COSEWIC (Whitehead 1987).

Since the middle 1970's different feeding sub-stocks of the NW Atlantic humpback have had rather different fates. Off the eastern United States, the Gulf of Maine humpbacks have enjoyed increasing adoration of whale-watching audiences and have been the wildlife resource on which this new tourism industry is based (Swartz 1989). There, each humpback attracts $36,000. in direct whale-watching revenues each year (Lien 1990). Off Greenland and Iceland feeding sub-stocks have been indifferently managed, with a small traditional fishery for the species in West Greenland (Whitehead 1987).

In Newfoundland and Labrador humpback whales began appearing in inshore fishing areas in unprecedented numbers in the mid-1970's due to reduced stocks of immature, offshore capelin (Lien, 1980; Whitehead and Carscadden 1985). In the late 1970's to 1980, humpbacks caused millions of dollars of damage to inshore fishing in Newfoundland, and prompted petitions by fishermen and requests by the Newfoundland and Labrador Minister of Fisheries for renewed whaling based on the presumed dramatic recovery of this whale (Lien 1980).

Damages to the inshore fishery due to humpbacks, however, declined dramatically with recovery of capelin stocks and establishment of programs to help fishermen minimize damages to fishing gear (Lien 1991). Nevertheless, damages to the inshore fishery due to humpbacks have increased irregularly over the past decade. From 1981-1989 they have doubled and now cost Newfoundland and Labrador fishermen at least one-half million dollars a year (Lien et al. 1989). Since 1988, record levels of reported entrapments have been reported (Lien 1991). Entrapments reported for other species, such as the minke, have remained low and irregular. These data are illustrated in Figure 1. Total number of accidents and the total cost of gear losses and fish losses parallel entrapment figures.

The problem will not likely get better in the long run. Recent management exercises, such as the Humpback Whale National Recovery

Plan of the National Marine Fisheries Service in the United States (NMFS 1990), have indicated that the recovery goal for North Atlantic humpbacks is to achieve a population of about 15,000 individuals. That would mean a population objective for Newfoundland and Labrador stocks of between 8,000 and 11,000 whales. Feelings about humpback whales in Newfoundland and Labrador which are negative now, will not likely improve much should they increase to such numbers (Lien et al. 1990a).

Entrapment Assistance Program:

The object of the work performed in the Entrapment Assistance Program is to deal with the conflict between inshore fishermen and large whales and the problem of incidental catches of cetaceans by an integrated program of services to fishermen (Lien 1991). Although many collisions do not result in the animal becoming entrapped, collisions which involve entrapment are by far the most serious. Such an accident with a cod trap can destroy the gear which may cost between $5,000 and $8,000. An accident at the start of the short trapping season can easily produce damages impractical to fix quickly; thus a trap can be lost for a season. Down-time losses can be extreme with such entrapments (Lien 1980).

Further, animals caught by gear will remain entrapped until finally struggling desperately to release themselves. This causes more damage. Such struggles also produce mortality as during the struggle animals frequently catch more gear. Without assistance it is estimated that 50% of large whales die during entrapments. Frequently during entrapments animals succeed in breaking moorings for gear and simply tow the gear off. Animals towing gear are a serious hazard to boats and to other fishing gear (Lien 1980). Gear from as many as ten different fishermen/areas have been removed from a single whale that continued towing long strings of gear for some time (Lien et al. 1986). Whale mortality in such cases is unknown, but may be very high.

Beginning in 1979 technology was developed to carefully remove large whales and sharks from fishing gear quickly with a minimum of damage to the gear (Lien 1980). Since then the Entrapment Assistance Program has operated to minimize losses in the whale/fishermen conflict. Although there is some damage which still results from entrapments even when the fishermen receive this assistance, cost of an accident is greatly reduced. As a result of the Entrapment Assistance Program, mortality of humpbacks has been reduced from about 50% prior to the program, to an average of 9.4% for the past several years. Estimated savings to fishermen in direct gear losses range from $250-1,100 per accident. There has not been a single accident or injury which has resulted from dealing with the 887 whale entrapments reported during the period; and most importantly, fishermen continue to value and cooperate with the program (Lien 1991).

Development of Technology to Prevent Collisions:

Work has continued on the development of acoustical alarms to reduce the number of whale collisions with fishing gear in Newfoundland and Labrador throughout the past decade (Lien et al. 1990b). World-wide,there have been many efforts, most inconclusive, to modify fishing gear in order to reduce by-catch of cetaceans (Todd and Nelson 1991). Early "alarm" designs used in the Newfoundland and Labrador inshore fishery have shown potential usefulness in reducing the probability of collisions, and the amount of damage which results if a collision does occur (Lien et al. 1990b).

Several studies have shown the perceptual difficulties involved in detecting and locating nets due to the minimal acoustical target which nets provide and the interaction of these sounds with ambient sounds and the presence of bait (Lien et al. 1989b ; Todd 1991). New "alarm" devices, 'Whale Alerts', which were much louder and produce a sound which should optimize detection under these constraints (Guigne et al. 1990a; 1990b) were tested during 1991 to determine their usefulness in preventing whale collisions with codtraps.

Methods

Entrapment Assistance Program: The Entrapment Assistance Program operated as it has for over a decade. Entrapment assistance was widely advertised by a variety of publications and advertisements, and through meetings with fishermen. Fishermen could call a 24-hour, toll-free phone service for advice and assistance. If assistance was requested, a trained crew was dispatched to help remove the entrapped animal as quickly as possible. During peak periods of entrapment, two assistance crews were on call at peak times.

Additional details of the operation of the Entrapment Assistance Program can be found in previous annual reports (Lien et al. 1988; 1989; 1990a).

Tests of Whale "Alarms": Effectiveness of the 'Whale Alert' devices was evaluated by in situ field tests with codtraps. Initially, trap berths which in past years had a 100% probability of whale collisions were registered for the experiment. Fishermen who used the berths were asked began monitoring as soon as was practical during the summer; they reported weekly on the numbers of whales seen in their fishing zones. The goal of pre-installation monitoring was to place "alarms" in fishing areas where there were large numbers of whales to insure they were tested during highest risks of collisions.

One-half of all high risk berths were assigned to the experimental group and given six "alarms". An "alarm" was installed on each corner of the box to the trap; two "alarms" were placed on the leader. Control traps were given no "alarms".
If a fishermen used two berths which were selected to participate in the experiment, one in the experimental group and the second in the control group, he was given the choice of which berth to designate as the "alarm" berth.

Fishermen were required to report on conditions at the berth once the traps were installed. Daily records of fish catches, whales sighted, sea conditions, by-catch and damage to the trap were recorded or solicited by frequent phone calls.

Complete details of these tests can be found in Lien et al. (1991).

Results

Entrapment Assistance Program

Results of the Entrapment Assistance Program services during 1991 are presented in Tables 1 - 7.

Humpbacks: There were a total of 137 entrapments of humpback whales reported during 1991; a list is provided in Table 1. Locations of these entrapments is shown in Figure 2.

Most humpback entrapments occurred in codtraps (51.8%) and cod gillnets (31.4%). Other types of fishing gear, including salmon nets (51.3%), lobster pots (3.6%) and herring nets (1.2%) were also involved in humpback entrapments. A wide variety of other nets and devices including boat moorings, lumpfish nets, and experimental moorings accounted for remining entrapments (5.1%).

A few entrapments occurred in the spring (April - 2.2%, May - 4.4%), some in June (13.1%), most in July (51.8%) and August (25.5%), and a few in September (0.7%) and October (1.4%).

The outcomes of humpback entrapments varied. A total of 15 humpbacks died as a result of entrapment (10.9%). In 26 cases (19%) the whale towed the gear off; whales eventually released themselves in 36 cases (26.3%). A total of 70 humpbacks (51.1%) were freed from the entrapping nets with assistance.

Minke whales: There were only 7 minke whales reported caught during 1991 (Table 2). Two of these whales were reported stranded and determined to have been killed in fishing gear. Mortality (57.1%) was high. Two live animals were released and 1 towed the gear off.

Other cetaceans entrapped: There were few other species of

cetaceans reported entrapped. Only 2 white-beaked dolphins and 1 beluga were reported (Table 3).

Ice entrapments: There were 18 separate ice entrapments reported during 1991 (Table 4). Finback, humpback, minke whales and white-beaked dolphins, as well as large unidentified species were involved. Most of the entrapments occurred around the Avalon Peninsula in late April (50%) and May (22.2%) but ice entrapments also occurred in June and July as well.

In all ice entrapments there was no known mortality; as the ice moved the stranded whales simply disappeared.

Strandings: There were 17 reports of strandings during 1991 involving 7 species (Table 5). There was one mass stranding of white-sided dolphins which involved 6 animals; all other strandings involved single individuals. There were 3 reports of belugas recorded as strandings. Each of these whales acted strangely, frequented harbours and visited boats. Although all reports suggested imminent possibility of stranding, none of the whales actually stranded, and eventually disappeared.

Sharks and misc. species: There were few sharks reported during 1991 (Table 6). Blue and basking sharks were incidentally caught. Other marine species caught (Table 7) that were reported included ring and harp seals, leatherback turtles and sunfish.

Attitudes of fishermen about entrapment assistance received: Results of the survey of fishermen sent a questionnaire regarding the entrapment assistance they received are presented in Table 9. Just over 50% of fishermen sent questionnaires returned them. Generally their response was very positive. However 19% reported delays in responding to their calls for assistance. In some cases the Entrapment Assistance crew got poor ratings as the whale was already gone when they arrived (25%). The estimated savings that the Entrapment Assistance Program saved was $1,243.; 75% of fisherman reported that the program saved them time.

Whale Collisions and Their Cost

Monitoring of the codtraps which participated in the test of "alarms" showed that only 19 entrapments occurred (10.3%) in 185 collisions. Gear losses in these accidents totalled $30,650.00 or about $173.00/collision. Losses of fish were estimated by comparing catches the days just before and just after an accident (Table 9). Collisions which produced damage which could be mended without removing the gear from the water produced an average loss of 2,500 lbs. of fish. About 15% of collisions resulted in gear being removed from the water for an average of 2.4 days. Based on an average daily catch of about 5,000 lbs., losses in these cases would average 12,000 lbs.

Tests of Whale "Alarms"

Results of the tests of 'Whale Alert' "alarms" are presented in Table 10. Devices were installed on a total of 54 different traps. Early in the season they were used in Fortune Bay. As whale numbers increased in Placentia Bay and St. Mary's Bay we used them there. Later they were used on the Southern Shore, Conception Bay, Trinity Bay and so on, all the way up to White Bay. These traps were fished for a total of 1,762 days and, in total, caught 2,659,704 lbs. of fish.

In some cases fishermen using "alarm" traps did not get their "alarms" installed when the traps were first put in the water. This happened in 22 cases. These traps fished a total of 169 days and caught 87,630 lbs. of fish.

There were a total of 53 control traps. These fished for a total of 2,223 days and caught 1,561,963 lbs. of fish.

Control traps without "alarms" had a total of 79 collisions including 9 entrapments. Traps designated for "alarms" but before the "alarms" were installed had a total of 59 collisions and 8 entrapments. Thus the totals for the control traps and those without "alarms" was 129 collisions and 17 entrapments or 146 accidents in total.

Experimental traps fitted with "alarms" on had a total of 39 collisions including 2 entrapments.

Control traps without "alarms" had about twice as many accidents as those with alarms. Only 21 of 53 traps with "alarms" on had accidents (39%) compared to 40 of 54 control traps (74%) had accidents. If we include the collisions which happened to the "alarm" traps before the "alarms" were installed 80% of unprotected traps had collisions; and unprotected traps had nearly 4 times the number of collisions as "alarm" protected traps.

Alarms seem to help reduce the seriousness of accidents as well. There were 17 entrapments where the whale was actually caught in the gear in unprotected traps; only 2 in "alarm" protected traps. When the whale is actually caught the most serious damage to the gear can occur. Cost of an accident with an unprotected trap averaged $170. Costs of an accident with an "alarm" protected trap averaged $146.

The amount of fish lost due to a whale collision was estimated by counting up fish catches the day before and the first day after a trap collision occurred and compared that with catches on the day of the collision (Table 8). Fish losses due to a whale collision average 2,500 lbs.

Only 5 "alarm" protected traps accounted for half of all the collisions for this group. It's clear in these cases that the "alarms" simply did not work. Most of the fishermen in the experiment were very positive and thought the "alarms" worked. Less than 10% of you were not convinced the "alarms" worked or thought they did not work.

Discussion

Entrapments of humpback whales: During 1991 record number of humpback whales were reported entrapped, increasing the 1990 numbers of 83%. For the past three years new record highs of humpback entrapments have occurred (Figure 1). There may be a number of reasons for this increase (Lien et al. 1990; Lien 1991). These include: (1) increased numbers of whales; and (2) increased fishing effort.

(1) Numbers of humpbacks:

There are no new data regarding numbers of humpback whales in the Newfoundland and Labrador feeding population. There is a new effort to census the entire NW Atlantic population (Matilla et al. 1991). Initial results of this survey will not be available until 1993.

Some data are available on relative abundance of humpbacks in inshore waters of Newfoundland and Labrador. Figure 3 shows the results of transects between St. John's and Nain, Labrador which have been conducted from 1977 (Whitehead and Carscadden 1985; Lien 1991). Although these transects have used a number of different vessels and there has been some variability in the exact time they have occurred this variation in methods has not greatly influenced numbers of animals seen (Whitehead and Carsadden 1985) Numbers of humpback whales inshore in 1991 was high; numbers of minke whales seen appear to be typical of most years (P. Stevick, pers. comm.). Numbers of humpbacks in an area correlate closely with the number of collisions which occur with fishing gear (Lien 1980).

Whitehead and Carscadden (1985) related inshore abundance of humpbacks inversely to the immature biomass of capelin offshore, particularly on Hamilton Bank. Estimates of the 1991 offshore, immature biomass was high although during fall research cruises no large schools of capelin were located offshore(J. Carscadden, pers. comm.). There is currently speculation regarding what might have happened to capelin which are normally found on Hamilton Bank; this concentrated on the fishes reaction to the extremely cold water which characterized summer months of 1991. However, whatever the state of capelin stocks, it makes sense that if the research cruises cannot find the fish, whales may have similar difficulties.

In the period 1977-1980 when offshore capelin were scarce, Whitehead et al. (1983) humpbacks had a relatively low residency

time. Average time spent in the Bay de Verde area was only a few days. Similarly in 1991 residency time was low. Average residency was 1-2 days in Witless Bay (Lien et al. 1991). The whales seemed to be moving rapidly "searching" for food rather than feeding in one area for long periods of time.

(2) Fishing Effort:

Biological activity as well as fishing effort was very late during 1991. Some fishermen installed fishing gear at traditional starting times. As fish were late arriving, gear stayed in a bit longer than usual. As a comparison codtraps, in 1991 remained in the water for an average of 37.2 days; codtraps in 1979-1980 averaged 35.2 fishing days (Lien 1980).

There are no overall available data on effort in the inshore fishery. However, as cod have been scarce and landings low, most fishermen appear to escalate effort, trying to earn an adequate income (Lien, pers. obs.).

In future quantified effort in the inshore fishery will be available (B. Davis, pers. comm.) but data presently in hand certainly suggest greater effort. The more fishing gear and effort, the greater the number of collisions (Lien 1980).

Numbers of collisions and their cost: Estimates of the total numbers of collisions and their cost have been attempted using a number of different formulas (Lien 1980; Lien et al. 1986). Data from the "alarm" experiment monitoring provide a new basis for such estimates. These are presented in Table 11. Overall, 1,280 collisions are estimated costing $958,720.00.

The Entrapment Assistance Program: Average savings estimated by fishermen because of assistance received are $1,243./ incident. This estimates over $87,000 in savings to fishermen. Although it cannot be accurately estimated, a fairly high percentage of the 70 humpbacks released would have died without assistance.

Prevention of collisions with acoustical "alarms": It appears that the 'Whale Alert' devices prevent at least 50% of whale collisions. A complete discussion of the results of the "alarm" experiment can be found in Lien et al. (1991).

Acknowledgements

Financial support for the Entrapment Assistance Program was provided by funds from the Department of Fisheries and Oceans and the Newfoundland and Labrador Department of Fisheries. Funds to

test the "Whale Alerts" came from the Centre for Fisheries Innovation. We received help in the field from many individuals including Missy Power, Wayne Ledwell, Sean Todd, Tim Huntsman, Peter Stevick, Bryan Alexander, Cherry Alexander, O.J. Lien, Jacques Guigne, Clay Reimer, John Guzzwell,and Belinda Anderson. We are most grateful to the inshore fishermen that we work for; it is their cooperation with the Entrapment Assistance Program that makes it work. We thank them for their assistance, encouragement, and the endless cups of coffee and tea they provided.

References

Guigne, J.Y., J. Lien, J. Guzzwell (1990a) Development of acoustic protection for fixed fishing gear to minimize incidental catches of marine mammals. First interim progress report for the Centre for Fisheries Innovation. Centre for Cold Ocean Engineering (C-CORE), St. John's, Newfoundland, June, 14 pp.

Guigne, J.Y., J. Lien, J. Guzzwell, A. Smith (1990b) Development of acoustic protection for fixed fishing gear to minimize incidental catches of marine mammals. Second progress report for the Centre for Fisheries Innovation. Centre for Cold Ocean Engineering (C-CORE), St. John's, Newfoundland, August, 14 pp.

Katona, S. K., J.A. Beard (1990) Population size, migrations and feeding aggregations of the humpback whale (Megaptera novaeangliae) in the Western North Atlantic Ocean. Rep. Int. Whal. Commn (Special Issue 12) 295 - 305.

Lien, J. (1980) Whale collisions with fishing gear in Newfoundland. Report to Fisheries and Oceans Canada: Newfoundland Region, 31 December, 316 pp.

Lien, J., K. Breeck, D. Pinsent, H. Walter (1986) Whale and shark entrapments in inshore fishing gear during 1986. A Preliminary Report to Fisheries and Oceans Canada. 15 November, 33 pp.

Lien, J. (1988) Problems of Newfoundland fishermen with large whales and sharks during 1987 and a review of incidental entrapment in fishing gear during the past decade. The Osprey 19: 1, 30-38 and 19:2, 65-71.

Lien, J., W. Ledwell, J. Nauen (1988) Incidental entrapments in inshore fishing gear during 1988: A preliminary report to the Newfoundland and Labrador Department of Fisheries and Fisheries and Oceans Canada - Newfoundland Region, St. John's, Newfoundland, 15 December, 30 pp.

Lien, J., W. Ledwell, J. Huntington (1989) Whale and shark entrapments in inshore fishing gear in Newfoundland and Labrador. Report to the Newfoundland and Labrador Department of Fisheries and the Department of Fisheries and Oceans; Newfoundland Region, 10

January, l4 pp.

Lien, J. (l990) The impact of tour boats in the Witless Bay Ecological Reserve on seabirds, whales and human visitors. A proposal to A.C.O.A., St. John's, Newfoundland, 18 pp.

Lien, J., J. Huntington, W. Ledwell, T. Huntsman (l990a) Whale entrapments in inshore fishing gear and a summary of the Entrapment Assistance Program in Newfoundland and Labrador during l990. Report to Fisheries Development Branch, Department of Fisheries and Oceans, and the Newfoundland and Labrador Department of Fisheries, St. John's, Newfoundland, 35 pp.

Lien, J., S. Todd, and J. Guigne (l990b) Inferences about perception in large cetaceans, especially humpback whales, from incidental catches in fixed fishing gear, enhancement of nets by "alarm" devices and the acoustics of fishing gear. In Sensory Abilities of Cetaceans, J. Thomas and R. Kastelein (eds.), Plenum Press, New York, pp.

Lien, J. (l99l) Entrapments of large cetaceans in passive inshore fishing gear in Newfoundland and Labrador (l979-l990). Intl. Whal. Commn. Special Issue on Gillnet by-catch. In Press.

Lien, J., W. Barney, S.K. Todd, R. Seton, J. Guzzwell (l99l) Tests of "Whale Alert" acoustical devices to prevent whale collisions with codtraps. Report to the Centre for Fisheries Innovation, St. John's, Newfoundland, 31 December, 46 pp.

Matilla, D, P. Clapham, J. Lien, F. Larsen, J. Sigurjonsson, N. Oien, S. Katona, J. Beard, P. Palsboll, T. Smith, P. Hammond (l99l) YoNAH: Years of the North Atlantic Humpback Whale - A research proposal. 80 pp.

Mitchell, E., R. Reeves (l983) Catch history abundance, and present status of northwest Atlantic humpback whales. Rep. Int. Whale. Commn. 32, l6l-l69.

National Marine Fisheries Service (l990) Recovery Plan for the Humpback Whale. Office of Protected Resources, Washington, D.C.

Swartz, S.L. (l989) Proceedings of the workshop to review and evaluate whale watching programs and management needs. Center for Marine Conservation, Washington, D.C., 53 pp.

Todd, S.K. (l99l) The acoustics of whale collisions and fishing gear. M.Sc. Thesis, Memorial University of Newfoundland, St. John's, Newfoundland.

Todd, S.K., D. Nelson (l99l) A review of modifications to the webbing and setting strategies of passive fishing gear to reduce incidental by-catch of cetaceans. Submitted to International Whaling Commission Special Issue on Gillnet by-catch. In Press.

Whitehead, H., P. Harcourt, R. Silver (l983) Migration of the humpback whales past the Bay de Verde Peninsula, Newfoundland. Can. J. Zool., 60, 2173-2179.

Whitehead, H., J.E. Carscadden (l985) Predicting inshore abundance of whales and capelin off the Newfoundland coast. Canadian Journal of Fisheries and Aquatic Science 42 (5) 976-981.

Whitehead, H. (l987) Updated status of the humpback whale, Megaptera novaeangliae, in Canada. Canadian Field-Naturalist l0l (2) 284-294.

Winn, H.E., N.E. Reichley (l985) Humpback whale Megaptera novaeangliae (Borowski, l78l). In Handbook of Marine Mammals, Vol. 3, Ed. by S.H. Rigdway and R. Harrison, Academic Press, London, pp. 24l-273.

List of Tables and Figures

Tables

Table 1: Humpback whale entrapments in inshore fishing gear reported during 1991.

Date	Location	Gear	Dead/Alive	Comments
12 04	Jacques Fontaine	Herring Net	Alive	Towed gear off
13	St. Bernards	Herring Net	Alive	Released
14	Harbour Mille	Codtrap	Alive	Self release
20 05	English Hbr. East	Codtrap	Alive	Self release
21	English Hbr. East	Codtrap	Alive	Self release
22	English Hbr. East	Cod Gillnets	Alive	Towed gear off
22	English Hbr. East	Codtrap	Alive	Self release
22	Trouty, T.B.	Codtrap	Alive	Self release
23	Little Bay, F.B.	Balloons (?)	Alive	Balloons in tow
01 06	New Harbour, T.B.	Codtrap	Dead	Examined; M
07	St. John's	Cod Gillnets	Alive	Towing gear
07	Dildo, T.B.	Codtrap	Alive	Released
11	Norman's Cove, T.B.	Codtrap	Dead	Examined; M
15	Grand Bank	Salmon Net	Alive	Released
21	Harbour Mille, F.B.	Codtrap	Alive	Released by 2nd whale
22	Cox's Cove	Cod Gillnets	Alive	Towed gear off
22	Carbonear	Lumpnets	Alive	Released
22	Norman's Cove, T.B.	Codtrap	Alive	Released
22	Gaskiers, S.M.B.	Codtrap	Alive	Released
22	Rocky Harbour	Cod Gillnets	Alive	Released
23	Rocky Harbour	Lobster Pots	Alive	Released
26	Baine Harbour	Codtrap	Dead	Not examined
26	Grand Bank	Codtrap	Alive	Released
27	Cox's Cove	Cod Gillnets	Alive	Towed gear off
28	Bellevue, T.B.	Codtrap	Dead	Examined; F
28	Whiteaway, T.B.	Codtrap	Alive	Released
01 07	Trout River	Codtrap	Dead	Killed; Not examined
02	Pond Cove	Lobster Pots	Alive	Self release
02	Baker's Brook	Lobster Pots	Alive	Self release
04	Sunnyside, T.B.	Construction nets	Alive	Self release
08	Chance Cove, T.B.	Codtrap	Alive	Self release
10	Red Harbour, P.B.	Cod Gillnet	Alive	Released
10	Chance Cove, T.B.	Salmon Net	Alive	Released
10	Red Harbour, P.B.	Codtrap	Dead	Examined; M
11	Pouch Cove	Codtrap	Alive	Self release
11	Bellevue, T.B.	Salmon Net	Alive	Released
12	Fermuse	Codtrap	Alive	Self release
12	Fermuse	Codtrap	Alive	Released
13	Brigus South	Salmon Net	Alive	Released

14	Red Island, P.B.	Codtrap	Alive	Released
15	Hermitage	Cod Gillnets	Alive	2 whales caught in same net; Self release

Table l: Continued - Humpbacks

Date	Location	Gear	Status	Comments
l5	Grand Banks	Cod Gillnets	Alive	Towed gear off
l5	Fortune, F.B.	Cod Gillnets	Alive	Towed gear off
16	Grand Banks	Cod Gillnets	Alive	Towed gear off
16	Calvert	Codtrap	Alive	Released
16	Bell Island, C.B.	Salmon Net	Alive	Released
17	Fairhaven, P.B.	Cod Gillnet	Alive	Towed gear off
17	Pt. La Haye, S.M.B.	Codtrap	Dead Released	2 dead;
l7	Fortune, F.B.	Cod Gillnets	Alive	Towed gear off
18	Turbeck's Cove, W.B.	Salmon net	Alive	Released
l8	Aspen Cove, N.D.B.	Codtrap	Alive	Self release
19	Fox Harbour, P.B.	Codtrap	Alive	Self release
19	Pt. LaHaye, S.M.B.	Codtrap	Alive	Released
19	Pouch Cove	Codtrap	Alive	Self release
20	Dildo, T.B.	Codtrap	Dead	Examined; M
21	Job's Cove, C.B.	Codtrap	Alive	Released
21	Harbour Grace, C.B.	Cod Gillnet	Alive	Towed gear off
22	Pouch Cove	Codtrap	Alive	Released
22	Small Point, C.B.	Codtrap	Alive	Released
22	Bay Bulls	Codtrap	Alive	Released
22	Biscay Bay	Codtrap	Alive	Self release
22	Small Point, C.B.	Codtrap	Alive	Self release
23	Torbay	Codtrap	Alive	Released
23	Admiral's Beach	Codtrap	Alive	Released
24	Pt.La Haye,S.M.B.	Codtrap	Alive	Self release
24	Small Point, C.B.	Codtrap	Alive	Self release
24	New Harbour, T.B.	Codtrap	Alive	Released
24	Small Point, C.B.	Codtrap	Alive	Self release
24	Fairhaven, P.B.	Cod Gillnets	Alive	Towed gear off
25	Fairhaven, P.B.	Cod Gillnets	Alive	Towed gear off
25	St. Steven's, S.M.B.	Codtrap	Alive	Released
25	Bauline South	Codtrap	Alive	Released
26	Foxtrap, C.B.	Cod Gillnets	Alive	Released
26	Norman's Cove, T.B.	Codtrap	Alive	Self release
26	St.Phillip's, C.B.	Cod Gillnets	Alive	Towed gear off
26	Point May	Codtrap	Dead	Examined; F
26	Fairhaven, P.B.	Cod Gillnets	Alive	Towed gear off
26	Bauline, C.B.	Codtrap	Alive	Released
27	Long Pond, C.B.	Cod Gillnets	Alive	Released
27	Arnold's Cove, P.B.	Cod Gillnets	Alive	Towed gear off
28	Portugal Cove, C.B.	Nets (?)	Alive	Released
28	Portugal Cove S.	Codtrap	Alive	Released
28	Spaniard's Bay, C.B.	Cod Gillnets	Alive	Released
29	Cape St. Francis	Codtrap	Alive	Released

29	Portugal Cove S.	Codtrap	Dead	Examined; F
29	Little Harbour, P.B.	Cod Gillnets	Alive	Towed gear off
29	Swift Current, P.B.	Cod Gillnets	Alive	Released
29	Bay de Verde	Cod Gillnets	Alive	Towed gear off
29	Long Cove, T.B.	Cod Gillnets	Alive	Towed gear off

Table 1: Continued - Humpbacks

Date	Location	Gear	Status	Comments
30	Bay de Verde	Cod Gillnets	Alive	Towed gear off
30	St. Steven's	Codtrap	Alive	Self release
30	Bay de Verde	Codtrap	Alive	Released
31	Tors Cove	Codtrap	Alive	Released
01 08	St. Brenden's, B.B.	Cod Gillnets	Dead	Not examined
01	St. Stephen's	Cod trap	Alive	3 in pound; Self release
02	Old Perlican, T.B.	Cod Gillnets	Alive	Released
03	Dildo, T.B.	Codtrap	Alive	Released
04	Hampton Beaches	Salmon net	Alive	Released
04	Hermitage	Moorings	Alive	Disappeared
05	Mobil Bay	Exp. gear	Alive	Self release
07	St. Mary's	Codtrap	Alive	Released
07	St. Phillip's, C.B.	Codtrap	Alive	Released
08	Pouch Cove	Codtrap	Alive	Self release
08	Pouch Cove	Codtrap	Alive	Self release
09	Cape St. Francis	Codtrap	Dead	Examined; F
09	Bay de Verde	Codtrap	Alive	Self release
09	Bay de Verde	Codtrap	Alive	Self release
10	Pouch Cove	Moorings	Alive	Released
10	Cottrell's Cove	Salmon Net	Alive	Self release
12	Bell Island, C.B.	Cod Gillnets	Alive	Released
12	Musgrave Harbour	Cod Gillnets	Alive	Released
13	Flatrock	Codtrap	Alive	Released
13	Bellevue	Cod Gillnets	Alive	Towed gear off
13	Flatrock	Codtrap	Dead	Not examined
15	Stag Harbour, Fogo	Salmon Net	Alive	Self release
15	Bare Need, C.B.	Codtrap	Alive	Released
15	Lumston, B.B.	Codtrap	Alive	Released
15	Burnside, B.B.	?	Dead	Not examined
16	Bay Roberts	Gillnets ?	Alive	Towing gear
17	Petty Harbour	Codtrap	Alive	Self release
19	Bell Island	Gillnets ?	Alive	Towing gear
20	Conception Bay	Gillnets ?	Alive	Believed same as previous
20	St. Anthony	Gillnets ?	Dead	Not examined
21	Sybley's Cove, T.B.	Codtrap	Alive	Released
21	Hermitage	Cod Gillnets	Alive	Released
23	Hermitage	Cod Gillnets	Alive	Released
23	Hermitage	Cod Gillnets	Alive	Towed gear off
30	St. Brendans	Cod Gillnets	Alive	Self release
16 09	St. John's	Cod Gillnets	Alive	Towed gear off
17 10	Fogo Island	Cod Gillnets	Alive	Released

21	Whiteaway, T.B.	Squid trap	Alive	Released

Table 2: Minke whale entrapments in inshore fishing gear reported during l99l.

Date	Location	Gear	Dead/Alive	Comments
29 05	Bull Arm, T.B.	Not Known	Dead	Fresh net marks; stranded
30 06	Bay de Verde	Not Known	Dead	Net marks; stranded
08 07	Chance Cove	Codtrap	Alive	Released
18	St. John's	Cod Gillnets	Alive	Towed gear off
30	Portugal Cove S.	Codtrap	Dead	Examined; F
01 08	Bay Roberts	Cod Gillnets	Alive	Released
14 08	Musgrave Harbour	Codtrap	Dead	Not examined

Table 3: Misc. species of cetaceans reported entrapped in inshore fishing gear during l99l. No record was kept of harbour porpoise reported; these were referred to S. Richardson of D.F.O.

Date	Location	Species	Gear	Status
18 08	Lord's Cove	Wt.-beak dolphin	Codtrap	Dead
19	St. Bernard's	Beluga	Gillnets	Dead; Examined
28	St. Bride's	Wt.-beak dolphin	Gillnets	Dead

Table 4: Ice entrapments of cetaceans reported during 1991.

Date	Location	Species	Comments
03 03	Port aux Basques	wt.-beak dolphin	Alive; disappeared
13 04	Petty Harbour	Large; ?	Alive; disappeared
14	Portugal Cv., CB	humpback	Alive; disappeared
18	Bauline So.	humpback	Alive; disappeared
18	Portugal Cv.,CB	2 humpbacks	Alive; disappeared
19	Cape St Francis	humpback	Alive; disappeared
22	Cape St Francis	minke	Alive; disappeared
23	Cape St Francis	minke; humpback	Alive; disappeared
24	St. Phillips, CB	fin	Alive; disappeared
24	Bell Is., C.B.	2 large; ?	Alive; disappeared
01 05	Maddox Cove	minke	Alive; disappeared
02	Petty Harbour	fin	Alive; disappeared
07	Admiral's Cove	large; ? minke	Alive; disappeared
29	Chapel Arm, T.B.	large; many; ?	Alive; disappeared
07 06	Bonavista	humpback	Alive; disappeared
07	Cape Bonavista	large; ?; several	Alive; disappeared
23	Counch	8-9; large; fin?	Alive; disappeared
02 07	Pond Cove	large; ?	Alive; disappeared

Table 5: Strandings of cetaceans reported during 1991.

Date	Location	Species	Comments
13 01	Ship Cove, P.B.	pothead	Dead; partial examination
15	Point Lance	pothead	Dead; not examined
15	Port au Choix	sperm	Alive; died; not examined
13 05	Botwood	beluga	Alive; disappeared
16	Exploits Is.,NDB	beluga	Alive; disappeared
20	Wild Cove, W.B	beluga	Alive; disappeared
09 07	Sunnyside, T.B.	?	Acting strange; disappeared
25	Gros Morne	lg.; ?	Dead; decomposed; not examined
03 08	Daniel's Harbour	fin ?	Dead; not examined
07	Aquaforte	beluga	Acting strange; disappeared
26	Riverhead, S.M.B.	humpback	Gear kill from 17 July
28	Elliston, B.B.	?	Floating; not examined
23	Lethbridge, B.B.	Wt.-sides	5 stranded alive; died; Examined
06 10	Burgeo	humpback	Dead; not examined
28	Thornlea, T.B.	minke	Dead; decomposed, not examined
31	Carbonear, C.B.	pothead	Dead; examined
01 11	Tizzard's Hbr.	minke	Alive; drove out

Table 6: Incidentally caught sharks reported during 1991.

Date	Location	Gear	Species
29 07	St. Anthony	Salmon net	blue
01 09	Renews	Codtrap	immature basking shark
27	Heart's Desire	Gillnets	blue
22 11	Cottles Cv, NDB	Gillnets	immature basking shark

Table 7: Misc. species of marine animals that were reported entrapped in inshore fishing gear during 1991.

Date	Location	Species	Comments
15 01	Branch	ring seal	alive; collected by MSRL
16	South Dildo, T.B.	harp seal	alive; examined
31	Branch	8 harps	dead; not examined
16 06	Witless Bay	leatherback turtle	sighted
02 07	St. Mary's Bay	harp seals	ave. 15 seals/net
05	Long Pond, C.B.	harp seals	1 fisherman caught over 500 so far
26 08	St. Bernard's, F.B.	leatherback turtle	dead; Cod gillnets; not examined
29	Witless Bay	sunfish	examined
05 09	Torbay	harp seal	alive; acting strange

Table 8: Lost fish as a result of whale collisions. N = 22 traps where the traps could be mended in the water and there were no lost fishing days.

Measure	Total fish caught	Mean fish caught
2 days before collision	109,199	4,964
1 day before collision	125,099	5,686
day of whale collision	52,898	2,404
1 day after collision	94,939	4,315
2 days after collision	72,486	3,295

Table 9: Survey of fishermen's reactions to help received from the Entrapment Assistance Program. Number originally sent questionnaires was 30; number responding = 16.

Basic Questions about the Entrapment

Type of gear that caught the whale:
78% codtrap; 11% cod gillnet; 6% lump net; 5% salmon

Whale was: 75% alive; 25% dead

Whale was: 75% humpback; 6% other; 18% don't know

Questions about Assistance Received

Was the first phone contact helpful?
0% terrible; 0% bad; 19% "O.K."; 19% good; 62% great

Given accurate time when assistance would arrive:
0% terrible; 6% bad; 12% "O.K."; 25% good; 56% great

Was the time between your call for help and the response satisfactory?
6% terrible; 13% bad; 6% "O.K."; 19% good; 56% great

Did the assistance crew have a good understanding of your entrapment problem?
0% terrible; 6% bad; 13% "O.K."; 25% good; 56% great

How did the crew do in removing the whale from your gear?
6% terrible; 6% bad; 0% "O.K."; 31% good; 56% great

Did the entrapment assistance you received save you time?
56% A lot; 19% some; 0% don't know; 25% none

Did the entrapment assistance you received save you gear?
31% a lot; 44% some; 0% don't know; 25% none

Give an estimate of the amount of money the assistance saved you.
mean = $1,243.00

Did the assistance crew give you information on the whale

problem?
88% yes; 0% no; l2% don't know

Table 10: Collisions and entrapments in codtraps with "Whale Alerts" and in control traps.

Measure	Type of Trap			
	No Alarms on Trap			Alarms on Trap
	Controls	Traps Before Alarms Installed	Total	
Number of Traps	54	22	77	53
Number of Days Traps Fished	2,223	l69	2,392	l762
lbs. Fish Caught	l,474,333	87,630	l,56l,963	2,659,704
Number of Collisions	70	59	129	37
Number of Entrapments	9	8	l7	2
Total Number of Collisions	79	67	l46	39
Gear Losses Because of Collisions	l5,l00	9,850	24,950	5,700
Probability of a Collision per trap day	.035	.35	.06	.02
Costs of Gear Loss per Trap Day ($)	6.79	58.28	l0.43	3.23
Fish caught per trap day (lbs.)	663	5l8	653	l509

Table 11: Estimated numbers of collisions with fishing gear and the costs of those collisions. (1) Cost of lost fish is estimated at .20$/lb.

N of 1991 humpback entrapments	Ratio: Collisions/ Entrapment	Estimated N Collisions	Losses (1) (in $) Gear	Down-time	Total
137	185/19	1,280	222,720	736,000	958,720

Figures