

DAMAGE TO INSHORE FISHING GEAR IN NEWFOUNDLAND AND LABRADOR

BY WHALES AND SHARKS DURING 1981.

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Abstract:

Entrapments and damages to inshore fishing gear by whales and sharks in Newfoundland and Labrador were monitored by a card reporting system and a toll-free phone line. Results obtained by these methods which were based on fishermen volunteering information were validated by interviews and in fishermen's committee meetings. Entrapments of large whales and damages were down considerably in 1981 compared to reports from the previous two years the reporting system has operated. Entrapments of pothead whales and basking sharks increased significantly in this same period.

INTRODUCTION

Whale collisions with inshore fishing gear are not a new problem for Newfoundland's inshore fishermen. There is much anecdotal and historical evidence indicating that inshore gear damage due to whales and sharks has always occurred at a low, irregular level.

During the period from the mid-seventies, there has been a substantial increase in the amount of damage reported. In 1979, a widely publicized reporting system was established by which fishermen could record damages (Lien, 1980). In 1979, 327 reports of gear damage were received estimating about one-half million dollars in gear damage and two and one-half million dollars in lost fish. In 1980, 562 damage reports were received which totalled \$380,000.00 in gear damage and about one and one-half million dollars in lost fish.

Data on whale damages collected prior to 1979-1980 is not directly comparable but the amount of damage estimated appears to have increased sharply since the mid-seventies (Lien, 1980). Based on a survey of 125 fishermen from 1970-1980, Lien and Aldrich (1982) found that catch/effort for basking sharks (*Cetorhinus maximus*) had remained relatively constant during the period but the catch/effort for whales had increased. Increased entry into the inshore fishery during this same period has further amplified the whale collision problem (Lien, 1980).

The purpose of the present study was to continue monitoring of the collision problem in Newfoundland's inshore fishery.

METHODS

To obtain reports of damage, a card reporting system was developed and extensively advertised. This report system has been described in Lien (1980). The card system has remained consistent from 1979-1981.

One exception in 1981 was that the card was modified to include a box which the fishermen could check if the damage was due to a shark. As in previous years, about 20,000 of the cards were distributed.

In 1979 a phone line which fishermen could call collect to report entrapped whales was installed. Fishermen were told that if they had a live or dead entrapped whale in their fishing gear they should call for advice, access to tools, or if requested, a team would be sent to release the whale and minimize damage to the fishing gear. This service has been widely advertised during the past three years and fishermen in most areas are now well familiar with it. In 1981, the entrapment phone program was operated in the same manner as previous years (Lien, 1980).

One exception occurred in the advertising for the phone line during this period. In 1979 it became obvious that fishermen were often mis-identifying basking sharks as whales. Thus in 1980, fishermen were encouraged to call in reports of either whales or sharks. In 1981 a market developed for fins and livers of basking sharks. Fishermen were urged to call in entrapments of basking sharks to learn of marketing. This resulted in less under-reporting of entrapments of basking sharks in 1981 than in previous years (Lien & Aldrich, 1982).

To cross-check for under-reporting of entrapments and accuracy of fishermen's reports, four methods were used: (1) Meetings were held with two fishermen's committees during which fishermen's reports to other fishermen were obtained. These could then be compared to damage card reports and entrapment calls. (2) Newfoundland Department of Fisheries Field Representatives interviewed fishermen in each district by visits to communities and by phone to secure damage reports. Wherever gear damage

was suspected or rumored, they concentrated interview efforts. (3) Platt (1982) interviewed 84 fishermen on the Avalon Peninsula from Portugal Cove South to Pouch Cove to obtain reports of by-catch. (4) Lien & Aldrich (1982) surveyed 125 fishermen on basking shark by-catch during 1982. Fishermen who caught a basking shark were paired with a control fisherman who had not. All were surveyed for whale damage and by-catch and this was compared with reported damage by these same fishermen.

RESULTS

Entrapped animals reported are listed by species in Tables 1-7. These data are summarized and compared with reports in 1979 and 1980 in Table 8. Stranded animals reported are listed in Tables 9 and 10.

A total of 31 humpbacks (*Megaptera novaeangliae*) were reported entrapped in gear during 1981; 23 were released alive, 8 died in the entrapment. Only 4 animals were sexed, 3 females, 1 male. About 80% of the entrapments occurred in equal numbers during June and July. Half of the animals entrapped were estimated under 10 m. in length; only two animals were 12 m. or over. Locations of the entrapments (Fig. 1) were concentrated around the Avalon Peninsula, along the NE Coast and in the Labrador Straits. About 45% of the entrapments occurred in groundfish gillnets, 32% occurred in codtraps, 16% occurred in salmon nets, while the remaining entrapments occurred in squid traps.

Eleven minke whale (*Balaenoptera acutorostrata*) entrapments were reported; 54% occurred in codtraps, the remainder in either salmon nets or groundfish gillnets. Only six animals were examined, 4 females and 2 males. Overall lengths were from 4.3-7.9 m. Locations of entrapments are shown in Fig. 2.

A total of 43 potheads (*Globicephala melaena*) were entrapped; 87% died during entrapment. Most potheads were caught in squid traps (63%), 27% were caught in groundfish gillnets. The remaining entrapments occurred in either herring nets or trawls. On three occasions several animals were involved in the same entrapment. The primary location of pothead entrapments was centered in Trinity Bay (Fig. 3).

Other species of cetaceans entrapped include harbor porpoise (*phocoena phocoena*) (11), white-sided dolphin (*Lagenorhynchus acutus*) (1), saddle-backed dolphin (*Delphinus delphis*) (1), beleuga (*Delinapterus leucas*) (1) and fin whales (*Balaenoptera physalus*) (1). Locations of these entrapments are presented in Fig. 4.

Sharks were commonly reported during 1981. A total of 125 basking sharks were caught in the summer inshore fishery; 13 other sharks were also entrapped, primarily greenland sharks (*Somniosus microcephalus*) and porbeagles (*Lamna nasus*). During 1981, 49% of entrapments were with salmon nets, 22% with codtraps, 13% with groundfish gillnets and 3% with misc. gear.

In 1981, we recorded the number of instances of gear damage that occurred in the area from Grand Bruit to Port aux Basques as well as entrapped animals. A total of 15 entrapments occurred during the study period but 43 collisions were reported. As there were no whales sighted in the area during this period, the collisions were probably due to sharks. Thus a 3:1 collision to catch ratio is estimated for sharks.

Strandings were commonly reported on the entrapment phone line. In 1981, 60 potheads were reported; 16 occurred as single animal strandings and there were two mass strandings. We were unable to examine most of the single stranded animals for signs of injury due to gear accidents. Two

sperm (*Physeter catodon*) whales, 1 fin, 1 minke and 1 unknown large whale were also reported stranded (Table 10). Locations of whale strandings are presented in Fig. 7.

Gear damage by whales and sharks is presented in Tables 11-15.

A total of 83 reports of collision damage due to whales were reported during 1981 on the card system. Most collisions occurred with salmon nets (34%), codtraps (28%) and gillnets (27%). Gillnets incurred the most expensive damage (\bar{X} = \$811) along with codtraps (\bar{X} = \$738.) (Table 11). Collisions with other gear were less expensive. Collisions are concentrated during June (33%) and July (30%); 15% of reported collisions occur in either May or August (Table 12). Total cost of the gear damage reported on the card system was \$48,844. Gear damage due to whales was also reported on the entrapment phone. A total of 100 damage reports were received in this manner totalling \$13,690. Locations of reported damages due to whales are presented in Fig. 8.

Gear damage was also associated with basking shark entrapments and is presented in Table 14. A total of 124 shark entrapments occurred although damage was reported in only 55 of these collisions. Gear loss in these collisions was estimated by fishermen to be \$17,121.

A total of 238 damage reports were received from all sources during 1981 estimating \$79,574.00 in gear damage (Table 15).

Data collected by Piatt (1982) is presented in Table 17. A total of 31 collisions/entrapments were reported. Table 18 presents 61 reports of damage collected by the Newfoundland Dept. of Fisheries field representatives (Morris, 1982).

A total of 8 collisions were reported by fishermen's committees in two communities. Of these, 7 had been reported to the card system; one had not. Comparison of costs reported in the meeting and to the card system agreed well; a total of \$10. was the difference between the two reports in 7 collisions.

DISCUSSION

Data presented in Table 15 represent a minimum catch and damage estimate. Reporting of entrapments and collisions relies on fishermen volunteering information. Under-reporting of minor occurrences by fishermen is common. The most serious collisions are almost always reported. Over-reporting of the amount of damage may occur depending on the reporting system (Lien, 1980). When reported to both Fisheries and Oceans officers and the card system, the reports to Fisheries and Oceans averaged \$887. higher, possibly because there was some expectation of compensation. Matched reports from field representatives of the Newfoundland Department of Fisheries averaged \$150. higher than the card system reports (Lien, 1980).

The minimum reported damages to the card system and the entrapment phone can be corrected in several ways. First, fishermen do not tend to report damage and entrapments to two sources. Only about 15% of damages are reported to a second report system that operates simultaneously with the card system (Lien, 1980). Therefore Piatt's (1982) reports should properly be considered a supplement to damage reports rather than a cross-check. This increases damage reports by 31. Piatt's (1982) data does not have gear loss estimates, but using mean values from the card system, these instances of collision add \$15,500. in gear damage. Additional instances of damage collected by the Newfoundland Department of Fisheries field representatives added 7 cases. Again, dollar estimates of damage were not obtained. By using mean values for such collisions reported to the card system, an addition of \$2,870. in gear losses is added.

Combining all available reports, a total of 276 instances of whale and shark collisions estimating gear losses of \$97,954. during 1981 is reasonable.

In meetings of fishermen, 1 in 8 instances of collisions were not reported. These communities were selected as representative of major whale/shark collision areas, and thus under-reporting of about 13%

is estimated. In general, the most serious collisions resulting in the most gear loss are reported. Instances of gear damage may increase the frequency of collisions but probably would not substantially increase the total dollar value of gear loss.

The total estimated frequency of collisions in 1981, assuming an under-reporting estimate of 14% and using damage reported to all report systems, is about 300 with a total of \$100,000. in gear damage. Down-time losses average about 4 times the actual gear loss (Lien, 1980). Thus total losses due to whales and sharks in 1981 is estimated to be about one-half million dollars.

Reports of the number of large cetaceans and sharks probably reflect reasonably accurately the actual by-catch. With smaller cetaceans, collisions most commonly do not cause damage, and therefore, the catch of these animals is greatly under-reported. In the last several years, the total number of entrapped animals reported on the entrapment phone has been increasing, primarily due to reports of small cetaceans. This probably reflects increasing familiarity by fishermen with the reporting system and the personell that operate it.

The 1981 damage compares with a total reported frequency of 371 and an estimated total frequency of 556 collisions during 1979. Reported gear loss totalled \$384,298. and estimated losses of about one-half million dollars during 1979. Frequency of reported collisions in 1980 was 813 with gear loss estimated to be \$384,298. Under-reporting in 1980 was estimated to be less than 10% (Lien, 1980).

The tendency, during the three years the reporting scheme for entrapment and damage has been operating, has been for less and less serious collisions to be reported. The mean cost of a reported collision in 1979 was about \$900., in 1980 the mean cost was \$468. and in 1981 the mean cost of a collision was \$368. This probably reflects the fishermens willingness to use the reporting system and also increasing numbers of sharks and small cetacean reports. Damages incurred in a collision with these species are less. Throughout the three years the reporting system has operated, frequent checks on the accuracy of fishermen damage estimates have been made (Lien, 1980) and their estimates reported to the card system accuratly reflect damage as accessed by other fishermen and ourselves.

In addition to the trend for reporting less serious collisions there has been a noticeable decline in the dollar value of gear loss since 1979. In comparing 1979 to 1978 losses by interviewing fishermen that did and did not report losses, Lien (1980) suggested that in 1979, damages, especially for codtraps, had declined from 1978 although directly comparable data were not available. The decline from either 1978 or 1979 has continued in 1981.

Entrapments of humpback whales follow this same trend (Table 8); in 1981, 31 humpbacks were entrapped, about 50% of the previous years total. Although the total reported humpback entrapments in 1979 was lower than 1980, estimated entrapment frequency has steadily declined throughout the monitoring period. It has been estimated that humpbacks are involved in from 70 - 90% of inshore gear collisions (Lien, 1980).

Several factors may account for this reduction in damages. During both 1980 and 1981, effort in the inshore fishery was somewhat reduced due either to strikes or poor fish markets. Second, in 1980, and especially in 1981, there were fewer whales observed inshore (Lien and Aldrich, 1980b, Whitehead and Lynch, 1981; Whitehead and Lien, 1982) and large whales such as humpbacks occurred in less dense concentrations inshore than in 1979. Inshore capelin (*Mallotus villosus*) abundance was much higher in most inshore areas in 1981 compared to previous years (B. Nakashima, pers. comm.) although little beach spawning was observed in some areas. Offshore capelin abundance was also good (J. Carscaden, pers. comm.). The relationship between inshore capelin and fishing gear collisions has been discussed elsewhere (Douglass and Green, 1980; Lien, 1981). In general, high incidence of whale damage has been associated with concentrations of humpback whales which occur in inshore areas where capelin are most plentiful. Finally, in 1981, water conditions were colder than usual (Canadian Armed Forces Metoc Reports; Lynch, 1982). This effected inshore groundfish abundance and catchability and may also have effected whale distribution and damage.

During 1981, the number of pothead entrapments increased substantially. Mercer (1975) has shown the relationship between inshore squid (*Illex illecebrosus*) abundance and numbers of potheads taken inshore. In 1980 and again in 1981 the index of squid abundance (Dawe and Hurley, 1982) has decreased (E. Dawe, pers. comm.). Although there is little quantitative

data, some observations suggest that in the period of decreased squid abundance, larger, more concentrated groups of potheads were sighted in areas where squid were relatively abundant (P. McLeod, K. Lynch, and others, pers. comm.).

In 1981, 125 basking sharks were caught in inshore fishing gear. Sale of livers from this by-catch totalled about \$60,000.. In 1980 when there was no market for liver, 66 basking sharks were reported entrapped. A survey of fishermen found that basking shark by-catch/effort has been relatively constant from 1970 to 1980; in 1981 there was a significant increase in catch (Lien and Aldrich, 1982). We believe that the higher 1981 catch resulted from a functional increase in effort on the South Coast. Normally, when basking sharks appear, salmon nets are removed from the water. In 1981 nets were not removed because of the market for the animal.

It is difficult to estimate the exact relative contribution of basking sharks vs whales to the inshore collision problem in Newfoundland. Based on the relative catch of sharks and large whales in 1980 and 1981, their comparative catchability, and the average cost of a collision by each type of animal, it is estimated that the basking sharks contribution to the frequency of collisions is about 40%; to the total cost of collisions the sharks contribution is about 25%. In the past, fishermen often could not distinguish between sharks and whales caught in fishing gear and, in fact, for them it was irrelevant. As markets for this shark became well known, the discrimination from whales was quickly learned.

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Table 1. Humpback Whale Fishing Gear Entrapments Reported During 1981.

Date	Length (Meters)	Sex	Status Alive/Dead	Type of Gear	Damage To Gear	Location
6 May	7.3	-	Dead	Gill Net	\$910	St. Brides
18 May	11.6	-	Alive	Cod Trap	\$350	Port Royal, P.B.
25 May	-	-	Alive	Cod Trap	\$100	Islington T.B.
5 June	-	-	Alive	Salmon Net	\$300	Battle Hrb. Lab.
12 June	10.7	-	Dead	Salmon Net	\$500	Englee
12 June	9.1	Male	Dead	Gill Net	\$350	St. Brides, P.B.
13 June	12.2	-	Alive	Cod Trap	\$1,000	Green Island, W. B.
14 June	9.1	-	Dead	Gill Net	\$520	St. Brides, P.B.
16 June	11.3	-	Alive	Salmon Net	-	Point May
16 June	10.7	-	Alive	Cod Trap	-	Brig Bay
24 June	7.9	Male	Alive	Gill Net	\$200	St. Vincents
27 June	12.8	Female	Dead	Cod Trap	\$1,200	Caplin Cove, C.B.
30 June	10.7	-	Alive	Cod Trap	-	Port-Aux-Choix
31 June	9.1	-	Alive	Gill Net	\$350	Bragg Island, B.B.
- June	-	-	Alive	Salmon Net	\$500	Grady Lab
1 July	11.1	-	Alive	Salmon Net	\$10	Caplin Cove, C.B.
4 July	8.5	-	Alive	Gill Net	\$300	Braggs Island, B.B.
7 July	-	-	Alive	Cod Trap	-	Stephens, S.M.B.
8 July	-	-	Alive	Gill Net	\$450	Lumsden, B.B.
12 July	10.7	-	Alive	Gill Net	-	St. Brendens, B.B.
12 July	11.3	-	Alive	Gill Net	\$450	Musgrave Hrb., B.B.
12 July	8.5	-	Alive	Gill Net	\$10	Musgrave Hrb., B.B.

Table 1. Humpback Whale Fishing Gear Entrapments Reported During 1981 (cont.)

Date	Length (Meters)	Sex	Status Alive/Dead	Type of Gear	Damage To Gear	Location
8 July	-	-	Alive	Gill Net	-	Lumsden, B.B.
12 July	7.9	Female	Alive	Gill Net	\$400	Carbonear, C.B.
19 July	-	-	Alive	Cod Trap	-	Bonavista, B.B.
29 July	-	-	Alive	Gill Net	-	Lewisporte, N.D.B.
30 July	9.1	-	Dead	Cod Trap	-	Fox Hrb. Lab.
30 July	-	-	Dead	Cod Trap	\$1,200	St. Lewis, Lab.
7 Aug	5.5	-	Alive	Squid Trap	\$150	Holyrood, C.B.
9 Aug	5.5	-	Dead	Squid Trap	\$300	St. Phillips, C.B.
19 Aug	7.9	-	Alive	Gill Net	\$1,810	Snooks Arm, N.D.B.

Table 2. Minke Whale Entrapments in Fishing Gear Reported During 1981.

Date	Length (Meters)	Sex	Status Alive/Dead	Type of Gear	Damage To Gear	Location
18 May	6.1	-	Dead	Gill Net	\$520	St. Brides, P.B.
3 June	4.9	-	Alive	Salmon Net	\$500	Deep Bay/Fogo
7 June	4.0	Female	Alive	Salmon Net	-	Bellevue, T.B.
15 June	7.9	-	Dead	Cod Trap	\$300	Chapel Arm, T.B.
23 June	7.6	Female	Dead	Gill Net	\$200	Gaskiers, S.M.B.
24 June	4.3	Female	Dead	Cod Trap	-	Portugal Cove South
30 June	4.6	Male	Dead	Cod Trap	-	Flatrock
3 July	6.1	-	Alive	Cod Trap	-	St. Lawrence
8 July	7.8	-	Dead	Salmon Net	\$300	Burnt Point, C.B.
10 July	6.2	Male	Dead	Cod Trap	-	Long Cove, T. B.
21 July	6.7	Female	Dead	Cod Trap	-	Catalina

Table 3

Pothead Whale Entrapments Reported During 1981.

Date	No.	Length (in m)	Sex	Status Alive/Dead	Type of Gear	Damage to Gear	Location
16 July 81	1	3.7	male	dead	gillnet	—	Fermeuse
26	4	—	—	dead	gillnet	—	Long Harbour, P.B.
31	1	2.3	male	dead	gillnet	—	New Harbour, T.B.
7 Aug.	1	—	—	dead	gillnet	—	Bay Bulls
11	1	—	—	dead	squidtrap	—	Dildo, T.B.
12	1	6.1	—	dead	gillnet	—	Bay de Verde
12	1	5.5	male	dead	squidtrap	—	New World Island N.D.B.
13	1	—	—	dead	squidtrap	\$250	South Dildo, T.B.
13	1	—	—	alive	squidtrap	\$250	South Dildo, T.B.
13	1	—	—	dead	squidtrap	—	South Dildo, T.B.
14	1	5.3	—	alive	squidtrap	—	Chance Cove, T.B.
14	1	—	—	dead	squidtrap	—	Dildo, T.B.
18	1	—	—	dead	squidtrap	—	Boat Harbour, P.B.
18	1	4.9	—	alive	squidtrap	—	Chance Cove, T.B.
28	1	5.3	—	alive	herring net	—	Hampton, W.B.
28	1	1.8	—	dead	herring net	\$5	Hampton, W.B.

Table 3 (continued)

Pothhead Whale Entrapments Reported During 1981.

Date	No.	Length (in m)	Sex	Status Alive/Dead	Type of Gear	Damage to Gear	Location
28	2	—	—	dead	squidtrap	—	Dildo, T.B.
29	1	—	—	dead	squidtrap	—	New Harbour, T.B.
29	1	—	—	dead	squidtrap	—	Dildo, T.B.
30	11	various	various	dead	squidtrap	—	Greens Harbour, T.B.
1 Sept.	1	3.1	—	alive	squidtrap	—	Bellevue, T.B.
2	1	3.1	—	alive	trawl line	—	St. Mary's, S.M.B.
4	1	—	—	dead	gillnet	—	Chance Cove, T.B.
6	1	5.5	—	dead	herring net	—	New World Island
6	1	—	—	dead	squidtrap	—	Fogo
7	1	—	—	dead	gillnet	—	Dildo, T.B.
10	1	4.9	—	dead	gillnet	—	Fox Harbor, P.B.
10	1	2.1	—	dead	gillnet	—	Fox Harbor, P.B.
11	1	4.3	—	dead	squidtrap	—	Greens Harbour, T.B.
5	1	4.7	—	dead	herring net	—	Upper Island Cove, C.B.

Table 4

Misc. Species of Whales Entrapped in Fishing Gear During 1981

Date	Species	Length (in m)	Sex	Status	Type of Gear	Location
1 May 81	Beleuga	5.5	—	dead	herring nets	Seal Cove, W.B.
9 June	Harbor Porpoise	—	male	dead	codtrap	Gaskiers, S.M.B.
9	Harbor Porpoise	1.3	male	dead	salmon gillnet	Dildo, T.B.
19	Harbor Porpoise	—	—	dead	codtrap	St. Vincent's
19	Harbor Porpoise	—	—	dead	codtrap	St. Mary's S.M.B.
19	Harbor Porpoise	—	—	alive	codtrap	St. Mary's
25	Harbor Porpoise	1.2	female	dead	groundfish gillnet	Peter's River
1 July	Harbor Porpoise	1.4	male	dead	groundfish gillnet	Trepassey
5	Wt-sided Dolphin	2.8	male	dead	codtrap	Riverhead, S.M.B.
11	Harbor Porpoise	—	—	dead	codtrap	St. Mary's, S.M.B.
13	Harbor Porpoise	—	—	dead	codtrap	St. Mary's, S.M.B.
6 Aug.	Saddle-Back Dolphin	2.4	?	dead	groundfish gillnet	Salvage, B.B.
10	Harbor Porpoise	—	—	dead	groundfish gillnet	Cape Spear
10	Harbor Porpoise	—	—	dead	groundfish gillnet	Cape Spear
22 Sept.	Fin	18.2	male	dead	herring nets	Reefs Harbour

Table 5

Unknown Species of Whales Entrapped in Fishing Gear During 1981

Date	Length (in m)	Status	Type of Gear	Location
30 June	2.5	alive	codtrap	Bay Roberts, C.B.
18 July	10.7	alive	gillnets	Fermeuse
25 July	—	—	codtrap	Bonavista, B.B.

TABLE 6: Basking Shark Entrapments Reported During 1981

Date	Length (Meters)	Sex	Status Alive/Dead	Type of Gear	Damage To Gear	Location
5 June	-	-	Dead	-	-	Bellevue, T.B.
8	8.5	Male	Dead	Salmon Net	-	Burnt Is.
12	-	-	Alive	Salmon Net	\$50	Rose Blanche
13	8.2	Male	Dead	Salmon Net	\$300	Grand Bruit
14	-	-	Dead	Salmon Net	\$900	Grand Bruit
15	9.1	-	Dead	Salmon Net	\$80	Rose Blanche
15	-	-	Dead	Salmon Net	-	Rose Blanche
15	-	-	Dead	Salmon Net	-	Fox Roost
15	-	-	Dead	Salmon Net	-	Isle of Morte

(Continued...)

Basking Shark Entrapments Reported During 1981 (Cont.)

Date	Length (Meters)	Sex	Status Alive/Dead	Type of Gear	Damage To Gear	Location
15 June	-	-	Dead	Salmon Net	\$250	Rose Blanche
15	-	-	Dead	Salmon Net	-	Ile-A-Mort
15	7.8	Male	Dead	Salmon Net	\$300	Marystown
15	-	-	Dead	Salmon Net	-	Petites
15	-	-	Dead	Salmon Net	-	Rose Blanche
15	-	-	Dead	Salmon Net	-	Hatchers
17	-	-	Dead	Salmon Net	-	Grand Bruit
17	8.4	-	Dead	Salmon Net	\$300	Burgeo
17	7.6	-	Dead	Cod Trap	-	St. Vincents
17	-	-	Dead	Salmon Net	-	Brand Bruit
17	8.3	Female	Dead	Salmon Net	\$500	Burgeo
18	7.3	Female	Dead	Cod Trap	\$18	Pouch Cove
18	-	-	Dead	Salmon Net	-	Rose Blanche
18	7.9	Male	Dead	Cod Trap	-	Pouch Cove
18	7.6	-	Dead	Salmon Net	\$300	Burnt Is.
18	8.1	Male	Dead	Squid Trap	-	Lords Cove
18	7.0	Male	Dead	Salmon Net	\$300	Hermitage
18	-	-	Dead	Salmon Net	\$200	Burnt Is.
19	-	-	Dead	Salmon Net	-	Burgeo
19	-	-	Dead	Salmon Net	-	Ile-A-Mort
20	-	-	Dead	Salmon Net	-	Petites

Basking Shark Entrapments Reported During 1981 (Cont.)

Date	Length (Meters)	Sex	Status Alive/Dead	Type of Gear	Damage To Gear	Location
20 June	7.6	Female	Dead	Salmon Net	\$300	Hermitage
20	-	-	Dead	Salmon Net	-	Hermitage
20	7.6	-	Dead	Cod Trap	-	St. Vincents
20	-	-	Dead	Salmon Net	-	Grand Bruilt
21	-	-	Dead	Salmon Net	\$200	Burgeo
22	-	-	Dead	Salmon Net	-	Burgeo
23	7.2	-	Dead	Cod Trap	\$900	St. John's
23	7.3	Male	Dead	Salmon Net	\$300	Bauline
23	-	-	Dead	Salmon Net	-	Ramea
23	7.6	-	Dead	Salmon Net	-	Francois
24	6.1	-	Dead	Cod Trap	-	Lawn
24	-	-	Dead	Salmon Net	-	Burnt Is.
24	7.3	Female	Dead	Cod Trap	\$200	Mal Bay, S.M.B.
25	7.6	Male	Dead	Salmon Net	-	Hermitage
25	7.3	Male	Dead	Salmon Net	-	Bauline
26	7.2	Female	Dead	Salmon Net	\$200	Bauline, C.B.
20	-	-	Alive	Salmon Net	\$1,000	Ashford Petites
20	-	-	Dead	Cod Trap	\$200	Point-Au-Gaul
20	8.9	Male	Dead	Cod Trap	\$700	Lords Cove
20	7.9	Female	Dead	Salmon Net	\$150	Burgeo
20	-	-	-	Salmon Net	\$150	Ramea
20	-	-	Dead	Salmon Net	-	La Poille

Basking Shark Entrapments Reported During 1981 (Cont.)

Date	Length (Meters)	Sex	Status Alive/Dead	Type of Gear	Damage To Gear	Location
25 June	7.9	Male	Dead	Cod Trap	-	Hearts Delight, T. B.
26	7.6	Male	Dead	Salmon Net	-	Bay Bulls
26	-	-	Dead	Cod Trap	-	Portugal Cove, C. B.
26	8.5	Male	Dead	Cod Trap	-	Portugal Dove, C. B.
27	-	-	Dead	Salmon Net	-	La Poile
30	-	-	Dead	Salmon Net	-	Grand Bruit
30	-	-	Dead	Salmon Net	-	Grand Bruit
30	7.3	Female	Dead	Salmon Net	\$100	Portugal Cove
30	4.6	Male	Dead	Cod Trap	\$350	St. Brendans, B.B.
- July	8.5	Male	Dead	Salmon Net	\$100	Portugal Cove, C. B.
2	8.4	Female	Dead	Cod Trap	-	Quidi Vidi
3	8.2	Female	Dead	Salmon Net	-	Fogo, N.D.B.
3	2.7	Female	Dead	Cod Trap	-	Ferryland
3	8.2	Male	Dead	Salmon Net	\$325	Bonavista, B.B.
5	8.5	Male	Dead	Salmon Net	\$300	Fogo, N.D.B.
5	6.6	Female	Dead	Cod Trap	-	lt. Paradise
6	7.3	Female	Dead	Cod Trap	-	Bauline, C. B.
7	3.7	Male	Dead	Cod Trap	-	Ferryland
7	3.0	Male	Dead	Cod Trap	\$300	Little Bay, P. B.
8	8.5	Male	Dead	Salmon Net	\$300	Turbeck Cove
8	7.3	Female	Dead	Salmon Net	\$50	Bauline, C.B.
8	7.9	Female	Dead	Cod Trap	\$100	Duntara, B.B.

Basking Shark Entrapments Reported During 1981 (Cont.)

Date	Length (Meters)	Sex	Status Alive/Dead	Type of Gear	Damage To Gear	Location
11 July	3.4	Female	Dead	Cod Trap	-	Renews
12	7.3	Male	Dead	Cod Trap	\$150	Fogo
13	-	-	Dead	Cod Trap	-	Dildo
13	3.7	Female	Dead	Cod Trap	\$100	Williams Hrb. Lab.
13	-	-	Dead	Cod Trap	-	Twillingate
14	7.6	Male	Dead	Salmon Net	\$50	Fogo
14	8.4	-	Dead	Cod Trap	-	Brents Cove, W.B.
15	4.8	Female	Dead	Cod Trap	\$300	Sommerville, B.B.
15	7.0	Female	Dead	Gill Net	\$450	Bagers Quay, B.B.
15	7.0	-	Dead	Cod Trap	-	La Scie, N.D.B.
17	5.5	Male	Dead	Gill Net	\$50	St. John's
17	8.1	Female	Dead	Salmon Net	\$200	La Scie, W.B.
17	5.3	-	-	Cod Trap	-	Carbonear, C.B.
18	6.7	Female	Dead	Gill Net	\$250	Gaskiers, S.M.B.
18	3.7	Male	Dead	Salmon Net	\$50	Portugal Cove, C.B.
18	-	-	Dead	Cod Trap	-	Elliston, T. B.
18	8.8	Female	Dead	Gill Net	\$100	Fogo
20	8.2	Female	Dead	Cod Trap	\$250	Old Perlican
21	8.5	Female	Dead	Gill Net	\$100	Come By Chance
23	6.7	Female	Dead	Salmon Net	\$50	Fogo
25	8.2	Female	Dead	Crab Pot	-	Valleyfield, B.B.
27	9.1	-	Dead	Gill Net	\$130	Wild Cove, W.B.
29	-	-	Dead	Salmon Net	\$300	La Poile

Basking Shark Entrapments Reported During 1981 (Cont.)

Date	Length (Meters)	Sex	Status Alive/Dead	Type of Gear	Damage To Gear	Location
4 Aug	8.5	Male	Dead	Cod Trap	-	Bauline, C.B.
6	3.0	Male	Dead	Cod Trap	-	Bay Bulls
10	-	-	Dead	Salmon Net	-	Fogo Is.
10	6.1	Female	Dead	Gill Net	\$200	Twillingate, N.D.B.
10	9.1	Female	Dead	Gill Net	\$130	Bonavista, B.B.
10	0.8	-	Alive	Gill Net	-	Bonavista, B.B.
14	8.2	Male	Dead	Cod Trap	-	Charlottetown
17	7.6	Female	Dead	Gill Net	\$300	Newtown, B.B.
8	-	-	Dead	-	-	Little Catalina
20	7.0	Female	Dead	Herring Net	\$100	Fortune Hbr, N.D.B.
20	7.9	Male	Dead	Gill Net	\$300	Valleyfield, B.B.
21	8.5	Female	Dead	Gill Net	-	Valleyfield, B.B.
22	-	-	Dead	-	-	Sommerford, N.D.B.
22	-	-	Dead	Gill Net	-	Wild Cove, W.B.
24	7.9	-	Dead	Crab Pot	-	Badgers Quay
- Sept	6.1	Female	Dead	Gill Net	\$180	Happy Adventure, B.B.
16	7.9	Female	Dead	Gill Net	-	Greenspond B.B.
16	4.9	-	Dead	-	-	Twillingate

Table 7

Misc. Species of Sharks Reported Entrapped in Fishing Gear During 1981

Date	Species	Length (in m)	Sex	Location	Type of Gear
13 June 81	Porbeagle	1.3	male	St. Brides	groundfish gillnet
15	Shark spp?	2.4	—	Princeton, B.B.	salmon gillnet
15	Greenland	4.9	—	Salvage, B.B.	groundfish gillnet
16	Greenland	3.7	—	Fleur de Lys, W.B.	groundfish gillnet
21	Porbeagle	2.4	male	Hopenall, B.B.	salmon gillnet
1 July	Porbeagles (2)	various	various	Fogo Island	groundfish gillnet
7	Porbeagles (5)	various	various	Badgers Quay, B.B.	groundfish gillnet
18	Porbeagle	1.8	male	St. Lawrence	groundfish gillnet
23	Shark spp?	1.9	male	Burin	groundfish gillnet
3 Aug.	Porbeagle	2.4	?	Cavendish, T.B.	codtrap
10	Porbeagle	2.5	female	Cape Spear	groundfish gillnet
11 Sept.	Porbeagle	2.3	?	Carters Cove, P.B.	groundfish gillnet
16	Greenland	4.6	?	Glovertown	groundfish gillnet

Year	SPECIES														Total			
	Humpback		Minke		Fin		Pothead		Misc		Total		Total					
	Alive/	Dead Total	Alive/	Dead Total	Alive/	Dead Total	Alive/	Dead Total	Alive/	Dead Total	Alive/	Dead Total	Alive/	Dead Total				
1979	34	13	47	1	9	10	4	3	7	0	4	4	6	1	7	53	22	75
1980	44	17	61	3	9	12	1	2	3	3	3	6	8	1	7	65	22	89
1981	23	8	31	3	8	11	0	1	1	6	37	43	5	12	17	37	66	102
TOTALS	101	38	139	21	12	33	5	6	11	9	44	53	19	14	31	155	114	269

Table 8: Whales reported entrapped in fishing gear from 1979-1981. Data from 1979 and 1980 is from Lien (1980).

Table 9

Pothead Whale Strandings Reported During 1981

Date	No.	Length (in m)	Sex	Status: Alive/dead	Location
21 July 81	1	4	female	dead	Riverhead, S.M.B.
27	1	—	male	dead	St. Shott's
14 Aug.	1	1.8	—	dead	Bay de Verde
16	1	5.6	male	dead	St. Bride's
25	1	6.1	male	dead	New Melbourne, T.B.
29	1	1.8	—	alive	Dildo, T.B.
30	2	—	—	1 alive 1 dead	Twillingate
31	39	various	various	dead	Little Burnt Bay, N.D.B.
4 Sept.	2	—	—	dead	Chance Cove, T.B.
4	5	various	various	dead	Branch, S.M.B.
29	1	5.8	—	dead	McCallum
7 Oct.	1	—	—	alive	Charlston, B.B.
21 Oct.	1	5.5	—	dead	St. Vincent's
27 Oct.	1	4.9	—	dead	Flatrock
3 Nov.	1	1.9	female	dead	Flatrock
24 Dec.	1	4.7	female	dead	Botwood

Table 10

Misc. Species of Whales Reported Stranded During 1981

Date	Species	Length	Sex	Location
2 July	?	'large'	—	St. John's
14 Aug.	Sperm	16.1	Male	Reefs Harbour, St. Margarets Bay
29 Aug.	Fin	18.2	—	St. John's
5 Oct.	Sperm	11.5	—	Nain
16 Aug.	Minke	8.8	Female	St. John's Bay

Gear Type	No.	%	Mean cost of gear damage (in \$)	Mean time lost (in days)	Mean lbs fish lost (in days)
Codtrap	23	27.7	738	5.2	3242
Gillnet	22	26.5	811	1.8	927
Herring net	5	6.0	188	5.7	500
Salmon net	28	33.7	404	6.3	71
Squidtrap	4	4.8	375	8.5	5075
No data or other	1	1.2	—	—	—
TOTALS	83	100	48,763	—	—

Table 1b: Collision damage due to whales reported during 1981 by type of gear.

Month	No. of Collisions	%	Total cost of gear damage (in \$)	\bar{X} cost of gear damage (in \$)
April	1	1	150	150
May	12	15	5,415	451
June	27	33	13,272	510
July	24	30	14,976	680
August	12	15	4,600	460
September	4	5	7,100	1,775
October	1	1	250	250
TOTALS	81 (1)	100	45,763 (1)	565

Table 12: Collision damage due to whales reported during 1981 by month. (1) Two reports were received which did not specify date of damage; they are therefore not included in this table.

Statistical Region	Frequency	Percent	Total Cost of Gear Damage (in \$)	Mean Cost of Gear Damage (in \$)
1	1	—	—	—
4	2	2.410	840	420
5	2	2.410	1810	905
7	1	1.205	100	100
8	2	2.410	575	287
9	1	1.205	400	400
10	3	3.614	1160	386
11	4	4.819	995	248
12	1	1.205	—	—
13	2	2.410	400	200
14	3	3.614	4160	1386
15	1	1.205	1000	1000
17	3	3.614	1833	611
18	4	4.819	1300	325
20	1	1.205	4000	4000
21	1	1.205	250	250
22	1	1.205	150	150
23	5	6.024	2015	403

(Continued)

Statistical Region	Frequency	Percent	Total Cost of Gear Damage (in \$)	Mean Cost of Gear Damage (in \$)
25	2	2.410	2777	1388
28	6	7.229	4175	695
29	11	13.253	11010	1000
31	1	1.205	300	300
32	5	6.024	2555	511
34	1	1.205	150	150
37	5	6.024	1550	310
38	4	4.819	1275	425
39	2	2.410	1800	900
40	1	1.205	100	100
48	1	1.205	200	200
51	5	6.024	1883	470
54	2	2.410	—	—
TOTAL	83	100	48,763	—

Table 13: Collision damage due to whales reported during 1981 by Statistical Region

Category	Salmon nets	Codtraps	Ground Fish gillnets	Other	Total
Number	55	36	15	5	111
% of total	49.5	32.4	13.5	4.5	—
% of N where gear (1) damage is known	36	63	86	100	—
Mean cost (in \$) of reported gear lost per entrapment	191	144	168	85	168
Mean down time loss (in \$) (2)	120	344	49	0	198
Mean total loss (in \$)	311	479	217	85	366
Total estimated gear loss (in \$) (3)	10,521	5,204	2,521	425	18,671
Total estimated fish loss (in \$) (3)	6,600	12,050	3,258	0	21,908
Total estimated loss (in \$)	17,121	17,254	5,779	425	40,579

Table 14: Gear damage associated with basking shark entrapments. (1) Fishermen are provided with cards to report damages. These usually are not returned if damage is minimal. The cards are typically returned in fall and winter. (2) Downtime loss is calculated based on daily fish yield in pounds reported X days down time X market price of species last pound. (3) mean cost/entrapment X total n.

Table 5: Total damage reports from all sources including basking shark phone reports, whale entrapment phone reports and the card damage reporting system.

Source of Damage Report	No.	Total Cost (in \$)
Card Damage Reporting System	83	48,763
Shark Entrapment Phone	55	17,121
Whale Entrapment Phone	100	13,690
TOTAL	238	79,574

Species	Total N	% codtrap	% gillnet	% salmon net	% squid trap	% other	\bar{x} Damage (in \$)	Total Cost of Damage (in \$)
Basking Shark	111	22	13	49	0	3	168	18,671
Misc. Sharks	13	8	77	15	0	0	37	480
Humpback	31	32	48	13	6	0	464	10,680
Minke	11	55	18	27	0	0	175	1,920
Pothhead	42	0	21	0	71	7	89	800
Misc. & Unknown spp. whales	16	56	31	6	0	6	21	290
TOTAL	224	29	35	19	14	3	147	32,841

Table 16: Cost of entrapment by species and gear involved.

1981 collisions/entrapments by species and gear type obtained from interviews with fishermen on the Avalon Peninsula from Portugal Cove South to Pouch Cove. 29 Fishermen's reports were obtained on both groundfish gillnets and salmon nets, 23 fishermen's reports were obtained on codtraps and 3 on other gear. In total, these fishermen used 60% of total gillnets fished in the area and 30% of salmon nets and codtraps. Data is from Platt (1982).

Table 17

Gear Type	Animal Involved	Total No. of Collisions/Entrapments	Estimated total Collisions/Entrapments
Groundfish Gillnets	Whale	4	6
	Shark	0	0
	Porpoise	1	2
Salmon Nets	Whale	2	6
	Shark	1	3
	Porpoise	2	6
Codtraps	Whale	16	48
	Shark	4	12
	Porpoise	1	3
Other	Whale	0	0
	Shark	0	0
	Porpoise	0	0
TOTALS		31	86