

# Status of Risso's Dolphin, *Grampus griseus*, in Canada\*

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In the eastern North Pacific and the western North Atlantic, the Risso's Dolphin, *Grampus griseus*, reaches its northern limits in Canadian waters, and is rare in Canada. General biology, world-wide status and management are reviewed. Twenty-one records from Canadian waters are presented. Records from the Pacific coast of Canada are from throughout the year and show no seasonal trends. Little information is available on stocks or population estimates, but Risso's Dolphins are not uncommon worldwide. They are taken only in small numbers in whaling and incidentally in fisheries. The effects of longterm degradation of its environment and subsequent impact on its populations are potentially serious and should be monitored.

Le Marsouin gris, *Grampus griseus*, atteint la limite nord de son territoire dans les eaux canadiennes du Pacifique nord-est et de l'Atlantique nord-ouest. L'espèce est rare au Canada. Ce rapport examine la biologie générale de l'espèce ainsi que sa situation et sa gestion à l'échelle internationale et présente 21 observations dans les eaux canadiennes. Les observations dans les eaux canadiennes du Pacifique sont notées tous les mois de l'année et ne présentent aucune tendance saisonnière. Bien qu'il existe peu d'information sur les stocks et d'estimations des effectifs, le Marsouin gris n'est pas considéré comme rare à l'échelle mondiale. En dépit du fait que ce cétacé n'est capturé qu'en petit nombre à l'occasion de chasses à la baleine ou accidentellement dans les pêcheries, les effets à long terme de la dégradation de son environnement et ses répercussions sur ses effectifs pourraient être graves et doivent faire l'objet de surveillance.

**Key Words:** Risso's Dolphin, Marsouin gris, *Grampus griseus*, Canada, status, cetacean, North Pacific, North Atlantic.

This report provides an overview of the biology and management of the Risso's Dolphin, *Grampus griseus* (Cuvier 1812), and summarizes knowledge of its status, especially in Canadian waters.

The Risso's Dolphin (Figure 1) is a large dolphin with a stocky body that becomes slender behind the dorsal fin. It reaches a maximum length of 4 m (Mitchell 1975a) and weight of 500 kg. There is no evidence of size differences between the sexes (Leatherwood et al. 1982). The head is bulbous; the melon is much larger than that of most delphinids (Mead 1975); and there is no beak (Ross 1984). A shallow, V-shaped crease extends from the blowhole to the tip of the rostrum (Leatherwood et al. 1982). Two to seven pairs of teeth are present in the lower jaw (Ross 1984). One or two pairs of teeth may be found in the upper jaw (Fraser 1976). The lower jaw does not quite reach the tip of the snout (Tomilin 1957). The pectoral flippers are long, narrow and falcate. The dorsal fin is high, erect and falcate, and is set at the mid-point of the body (Ross 1984).

Risso's Dolphins are a uniform light gray at birth. They darken to a chocolate brown or black and appear to lighten again as they age (Leather-

wood and Reeves 1983). Larger animals are typically cream-white or silver-grey, although the dorsal fin, flukes, and distal half of the flippers remain dark. The body is usually covered with linear scratch marks which may be from intraspecific encounters or from bites from the sharp-beaked squids on which Risso's Dolphins prey (Leatherwood et al. 1982). Their diet consists mainly of cephalopods and occasionally small fish (Tsutsumi et al. 1961; Mitchell 1975a).

## Distribution

Until recently, little reliable information has been available on the distribution of many of the small cetaceans, including Risso's Dolphins. Risso's Dolphins have a world-wide distribution in tropical and warm temperate seas (Leatherwood et al. 1980). In the North Atlantic they have been reported from Newfoundland (Mitchell 1975a) and the Orkney Islands (Fraser 1974), south to the Lesser Antilles (Caldwell et al. 1971) and the Mediterranean area (Pilleri and Gühr 1969; Notarbartolo-di-Sciara 1987). In the South Atlantic they have been sighted as far south as Argentina (Goodall and Galeazzi 1987) and South

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FIGURE 1. Risso's Dolphin from the Queen Charlotte Islands. This animal live-stranded and died. Photo courtesy Gary Cardinal, Department of Fisheries and Oceans.

Africa (Barnard 1954). In the Pacific they are found as far north as the Gulf of Alaska (Braham 1983) and the Kurile Islands (Leatherwood and Reeves 1983), and as far south as central Chile (Aguayo 1975). They are distributed throughout the Indian Ocean (Kruse et al. *in press*) and are thought to be present throughout the Indo-Pacific area, occurring as far south as New Zealand and Australia (Mitchell 1975a). No information is

available on the number and distribution of stocks (Mitchell 1975a).

A total of 21 records, totalling 15 separate occurrences from within the Canadian 320 km (200 mi) extended economic zone, have been located (Figure 2) and are summarized in Table 1. Details of 10 of these records have been previously published. E. D. Mitchell, Arctic Biological Station, also has records from the Canadian east

coast which will be reported in a future publication. Records from the west coast have been obtained from nine months of the year, showing no obvious seasonal trends. The five records listed in Table 1 from August and September 1978 in British Columbia were likely repeat sightings of a single group of individuals over a 13-day period (Baird et al. 1988). If these sightings are treated as a single occurrence then there are ten known occurrences in British Columbia waters, six of which are strandings. The November 1977 record from British Columbia waters listed in Table 1 appears to be the northernmost confirmed record from the eastern North Pacific, further north than those presented by Braham (1983). None of the east coast records are of strandings. Off the east coast all records have been from August or October, and all were obtained through the Cetacean and Turtle Assessment Program (CETAP). Other researchers working off the east coast of Canada have no records of this species (D. Gaskin, C. Haycock, S. Kraus, J. Lien, K. Lynch, J. Mead, R. Reeves, H. Whitehead, personal communications). Additional sightings and strandings have been reported in adjacent United States and international waters (Guiguet and Pike 1965; CETAP 1982; Braham 1983; Osborne et al. 1988).

## Protection

### International

Regulation of international trade between members of the Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973 (CITES) and between non-members and Convention members, has been established by listing the Risso's Dolphin under Appendix II of the Convention (see Birnie 1982). The International Whaling Commission (IWC) regulates the taking of whales in accordance with the current Schedule provisions, but whether this regulation applies to Risso's Dolphins is unclear, as members of the Commission are divided as to whether the "whale" refers to all cetaceans, or only to some species (Klinowska 1987).

### National

**Canada:** The 1982 Cetacean Protection Regulations of the Fisheries Act of Canada of 1867 (as amended to date) provide protection for this and other species of cetaceans for all but aboriginal hunting. "Hunting" is defined as "to chase, shoot at, harpoon, take, kill, attempt to take or kill, or to harass cetaceans in any manner", and can only be undertaken under licence.

**United States:** All cetaceans are protected under the Marine Mammal Protection Act of 1972, as well as through the Packwood-Magnuson

Amendment of the Fisheries and Conservation Act and the Pelly Amendment of the Fisherman's Protective Act.

## Population Sizes and Trends

Only one abundance estimate is available, and only for a fairly small defined area in the western North Atlantic. Hain et al. (1985) report that the abundance of animals in the northwestern Atlantic area from Cape Hatteras, North Carolina, to the Gulf of Maine, reaches a peak of an estimated 3543 ( $\pm 4350$ , 95% CI) individuals in summer and a low of 364 ( $\pm 1254$ , 95% CI) in winter. CETAP (1982) reported that in these waters the Risso's Dolphin was the fifth most commonly sighted small whale. The relative abundance per unit effort of Risso's Dolphin sightings decreased west of 70° W, in the waters approaching Nova Scotia (CETAP 1982). It appears that Risso's Dolphins are at the margin of their normal distribution in Canadian waters and have always been rare. Present population trends are unknown due to the scarcity of reported sightings and lack of distribution surveys.

## Habitat

Risso's Dolphins are generally thought to be a widespread, warm-water pelagic species. Leatherwood et al. (1976) suggest that the species may not be as rare as the paucity of records indicates, as Risso's Dolphins usually remain seaward of normal boating traffic. In recent years a large number of data has been collected in connection with the incidental catch of delphinids in offshore fisheries. During a four-year study by Polacheck (1987) in the eastern tropical Pacific, high encounter rates of Risso's Dolphins tended to be mainly in relatively nearshore areas compared to pelagic offshore areas for some other small delphinids. Polacheck found that a concentration of Risso's Dolphins in association with Bottlenose Dolphins (*Tursiops truncatus*), Short-finned Pilot Whales (*Globicephala macrorhynchus*) and Common Dolphins (*Delphinus delphis*) existed near the Gulf of Panama. Hain et al. (1981) and Kenney and Winn (1986) identified the edge of the northeast United States continental shelf as a high-use area for Risso's Dolphins; their distribution pattern is generally along this edge from south of Nantucket, southwestward to Cape Hatteras (Hain et al. 1981). Summer extensions of the distribution eastward of Nantucket along Georges Bank occur, but there is no general tendency for them to move inshore onto the shelf proper (Hain et al. 1981). The average depth of Risso's Dolphin sightings was 1092 m, with a range of 20 to 4938 m which corresponded well with the concentration of sightings along the shelf edge during this study,

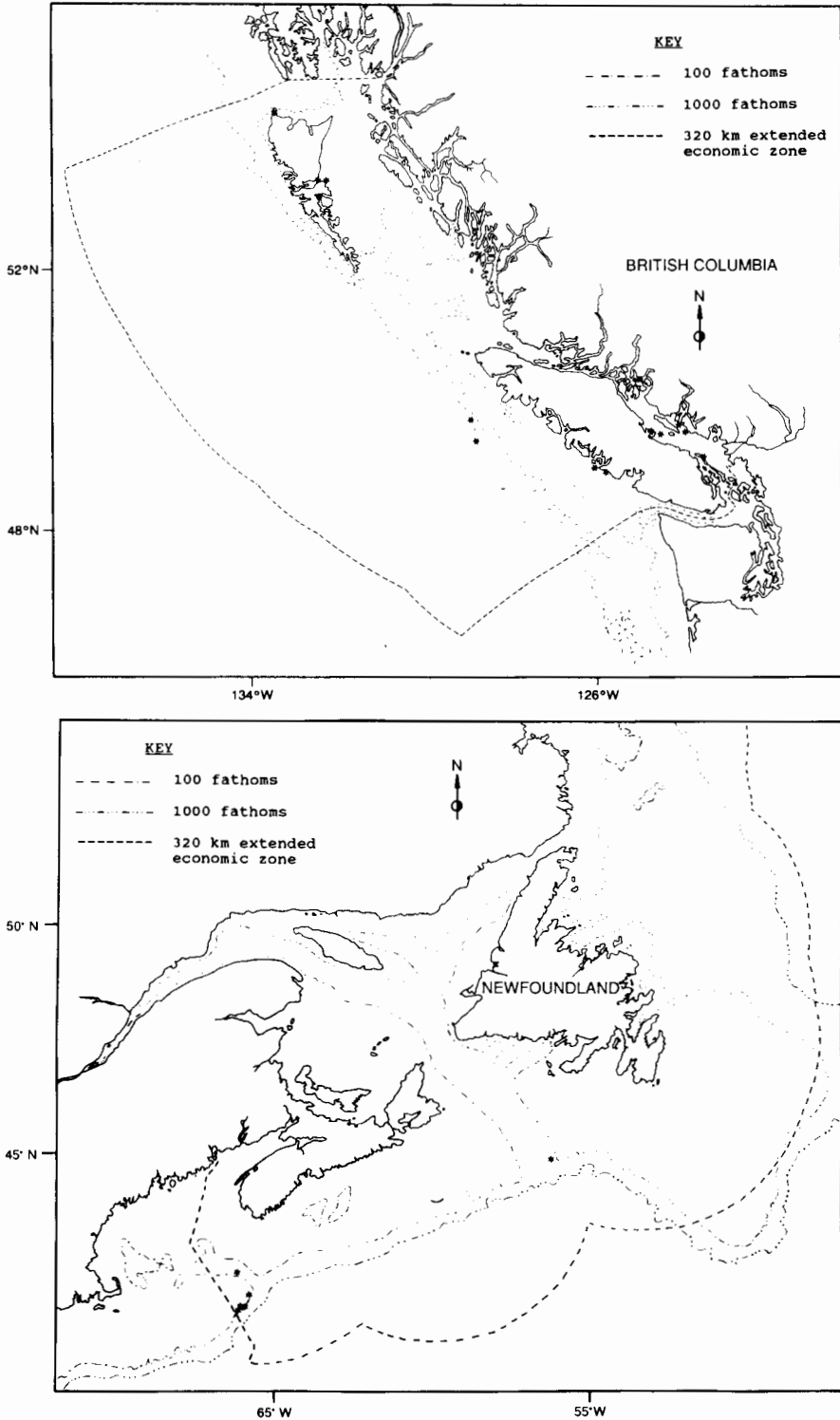


FIGURE 2. Known records of Risso's Dolphins in Canadian waters west coast (above) and east coast (below). See Table I for details.

TABLE 1. Records of Risso's Dolphins from Canadian waters.

Date	Location	Number	Type <sup>a</sup>	Source <sup>b</sup>
00 May 1964	50° 20'N, 125° 00'W	1	1	1
08 August 1968	45° 00'N, 56° 20'W	6	2	2
17 April 1970	49° 10'N, 125° 58'W	1	3	3
09 March 1976 <sup>c</sup>	49° 52'N, 128° 37'W	2	2	4
09 March 1976 <sup>c</sup>	49° 50'N, 128° 30'W	3	2	4
15 November 1977 <sup>d</sup>	55° 55'N, 130° 02'W	1	4	5
27 March 1978	54° 11'N, 133° 01'W	14	2	6
13 August 1978 <sup>c</sup>	49° N, 123° W	6	2	5
20 August 1978 <sup>c</sup>	49° 08'N, 123° 40'W	6	2	7
27 August 1978 <sup>c</sup>	49° 29'N, 124° 00'W	10-12	2	7
31 August 1978 <sup>c</sup>	49° 31'N, 124° 40'W	5-8	2	7
02 September 1978 <sup>c</sup>	49° N, 124° 00'W	5-8	2	5
15 October 1978	41° 38'N, 65° 58'W	11	2	2
22 August 1979	41° 17'N, 66° 15'W	30	2	2
XXX 1979 <sup>e</sup>	53° 03'N, 132° 00'W	1	3	8
25 August 1980 <sup>c</sup>	41° 20'N, 66° 02'W	5	2	2
25 August 1980 <sup>c</sup>	41° 19'N, 66° 01'W	18	2	2
15 October 1980	42° 10'N, 66° 19'W	7	2	2
26 January 1987	53° 12'N, 131° 48'W	1	3	7
06 March 1988 <sup>f</sup>	53° 15'N, 132° 00'W	1	4	9
10 June 1989 <sup>g</sup>	49° 04'N, 125° 46'W	1	3	10

<sup>a</sup>Type: 1. Direct take; 2. Sighting; 3. Stranding, found dead; 4. Live stranding, died.

<sup>b</sup>Source: 1. Guiguet and Pike 1965; 2. CETAP program; 3. Hatler 1971; 4. Braham 1983; 5. Vancouver Public Aquarium; 6. Reimchen 1980; 7. Baird et al. 1988; 8. M. Morris (Kallahin Expeditions, Queen Charlotte City, B.C.), N. Gessler (University of California, Los Angeles, California), personal communications; 9. Stacey et al. 1989. 10. Royal British Columbia Museum.

<sup>c</sup>For the purposes of determining the total number of separate occurrences in Canadian water records from the same date and in close proximity are considered a single occurrence and the five records from August and September 1978 are likely repeat sightings of the same individuals in the same general area.

<sup>d</sup>Specimen collected and held at the Vancouver Public Aquarium.

<sup>e</sup>Specimen collected and held at the Queen Charlotte Islands Museum, Skidegate.

<sup>f</sup>Specimen collected and held at the Royal British Columbia Museum (BCPM 16670).

<sup>g</sup>Specimen collected and held at the Royal British Columbia Museum (BCPM 16904).

although the distribution relative to depth was broadly defined (CETAP 1982).

Risso's Dolphins have been recorded in waters with surface temperatures ranging from 4.5° to 28°C, although in the area from Cape Hatteras to the Gulf of Maine 90% of all sightings were in waters that fell within the range 21.3° to 25.1°C (CETAP 1982). In the Pacific, sightings have been reported in water temperatures between 10° and 28°C (Leatherwood et al. 1980). A recent record in British Columbia is from mid-winter (January), when water temperature was approximately 8.2°C (Baird et al. 1988).

## General Biology

### Reproduction

The length at birth ranges from 110 to 166 cm (Tomilin 1957; Mizue and Yoshida 1962). Risso's Dolphins become sexually mature at about 3 m in length and are believed to live at least 20 years (Leatherwood et al. 1982). Age at first reproduction and calving interval are not known (Mitchell

1975a). There are several reports on the possible timing of births. Tomilin (1957) suggests that births may occur in winter. In one study in Monterey Bay, California, the smallest calves were observed in November (Kruse 1987). In CETAP surveys along the northeast coast of the United States, the seasonal number of calf sightings related to the total number of sightings was relatively similar. It seems from this information that calves may be born in all seasons, and perhaps geographical differences exist; however, further investigation is needed. Information gathered from 23 females driven ashore in Japan suggests that gestation time may be 13 to 14 months; gross reproductive rate in this group was 6 to 7% (Kasuya 1985). Hybridization with Bottlenose Dolphins both in the wild and captivity has been reported (Fraser 1940; Leatherwood and Reeves 1983).

### Species Movement

Based on stranding data from the United Kingdom spanning 53 years, Sergeant (1982)

suggests that some populations of odontocetes may change in abundance with time. However, these records indicate that Risso's Dolphin numbers were consistent there throughout that period. There may be long-term fluctuations in the geographical ranges of Risso's Dolphins, possibly in response to long-term environmental changes (Leatherwood et al. 1980). Leatherwood et al. (1980) note that records of Risso's Dolphins in the North Pacific from latitude 45° to 51°N are most abundant during summer, and appear to relate to the warming of surface waters. However, records from British Columbian waters presented here (Table 1) do not appear to corroborate this seasonal trend, especially considering the lack of search effort during winter months. In the northeastern Pacific, until 1971, Risso's Dolphins were usually sighted in waters deeper than 100 fathoms. Since then, and increasing in frequency to 1975, most sightings were over the continental shelf where, in 1974 and 1975, sea surface temperatures were unusually high (Leatherwood et al. 1980). Events such as the El Niño in the North Pacific in the 1980s can be accompanied by range extensions (Leatherwood et al. 1987).

In the North Atlantic, seasonal migrations to higher latitudes have been suggested (Mitchell 1975a). In the northwestern Atlantic between Cape Hatteras and the Gulf of Maine, a general northward expansion of range reaches its maximum in summer, as does the number of individuals (CETAP 1982). A marked contraction in the occupied habitat and an emigration from the study area, to offshore or southern waters or both, were also found. Kasuya (1971) reports that, in winter, Risso's Dolphins migrate to the coastal waters adjacent to the north and west coast of Kyushu, Japan. In U.S. National Marine Fisheries Service surveys in the eastern tropical Pacific, no temporal trend in relative abundance of cetacean schools was evident over the four-year study period (Polacheck 1987). No seasonal variation in group size of Risso's Dolphins has been found in a study of Monterey Bay, California (Kruse 1987).

#### *Behaviour*

Mean reported group sizes range from approximately 11 (Leatherwood et al. 1980) to 45 (Kruse 1987) in the eastern North Pacific. The analysis of Leatherwood et al. showed a modal group size of two, and a range of 1 to approximately 220 individuals, with no differences in group sizes between different areas or seasons (Leatherwood et al. 1980). The Cetacean and Turtle Assessment Program (CETAP 1982) recorded a mean group size of 17.2 in the northwest Atlantic between Cape Hatteras and the Gulf of Maine, with a range of 1 to 400. The mean group size from Canadian sightings presented in Table 1

is approximately 9, with a range from 2 to 30 individuals ( $n = 14$ ). Maximum reported group size appears to be a group of over 2000 individuals seen off Washington State (Braham 1983).

Based on a photo-identification study, Kruse (1987) suggests that Risso's Dolphins may have a fairly cohesive social organization in which individuals stay together for extended periods of time. However, the age and sex composition of groups is not known (Leatherwood et al. 1982). In the eastern tropical Pacific they are most often found as a small component of schools of other types of dolphins (Polacheck 1987). The number of large groups sighted and their frequent association with other small cetaceans such as Northern Right-Whale Dolphins (*Lissodelphis borealis*), Short-finned Pilot Whales, Pacific White-sided Dolphins (*Lagenorhynchus obliquidens*) (Fiscus and Niggol 1965), Dall's Porpoise (*Phocoenoides dalli*) (Braham 1983), and Dusky Dolphins (*Lagenorhynchus obscurus*) (Wursig and Wursig 1980) suggest a gregarious nature. However, in the northwest Atlantic, Risso's Dolphins were only rarely observed in association with other species (CETAP 1982). Shane (1987) has observed apparently aggressive interactions between Risso's Dolphins and Short-finned Pilot Whales.

One factor relating to sighting frequencies is the relative visibility of Risso's Dolphins compared to other species. Only anecdotal observations are available on their reactions to vessels, and many are conflicting. Tomilin (1957) reports that Risso's Dolphins often follow moving vessels, while others suggest that they are usually shy of small vessels but will ride the bow wave on larger ships (Department of Commerce 1984). Schevill (1954) reports that Risso's Dolphins stayed 75 yards from his ship but would come up to a dory when it was launched. Pilleri and Gihl (1969) and Pike and MacAskie (1969) also describe bow-riding. Risso's Dolphins breach clear out of the water, slap their sides or tails on the surface (Leatherwood et al. 1982) and are known to surface with only their tail or head showing above the water (Pilleri and Knuckey 1969). These behaviours suggest that the lack of sightings in some areas where surveys have been undertaken may correspond more with an absence of Risso's Dolphins, rather than a possible avoidance of vessels or a difficulty in spotting them.

#### **Limiting Factors**

Historically, Risso's Dolphins have not supported a major fishery. Small numbers have been taken in small whale fisheries in European waters (Duguay and Hussenot 1982), off Sri Lanka (Alling 1985; International Whaling Commission 1986), the Lesser Antilles (Caldwell et al. 1971), Peru (Read et al. 1985), along the east coast of the

United States, Japan, Indonesia, the Indo-Australian archipelago, the Solomon Islands and in the East China Sea (Mitchell 1975b; International Whaling Commission 1984; Reeves and Leatherwood 1984) and they are caught incidentally in fishing nets (Mitchell 1975b; International Whaling Commission 1983). In the Iki Island area of Japan, they have been deliberately killed to reduce competition with fisheries (Kasuya 1985).

Killer Whales (*Orcinus orca*) and large sharks, well known marine predators, could prey on Risso's Dolphins. Potentially, False Killer Whales (*Pseudorca crassidens*) might also prey on Risso's Dolphins, as they have been seen preying on small delphinids (*Stenella* spp. and Common Dolphins) (Perryman and Foster 1980), and a Humpback Whale calf (*Megaptera novaeangliae*) (Hoyt 1983). However, it appears no incidents of predation have been reported (Jefferson et al. 1991), and it is unlikely that predation has much effect on populations.

Continuous introduction of toxic chemicals into the dolphins' habitat occurs, but the absolute effect of these chemicals on cetaceans is still unclear. Martineau et al. (1987) present evidence that Beluga Whales (*Delphinapterus leucas*) from the St. Lawrence Estuary are contaminated by compounds known to induce severe reproductive dysfunctions in many other animal species at similar concentrations. They suggest that organochlorine contamination should be considered as a prime cause for the low recruitment observed in this population. Risso's Dolphins are not typically an inshore coastal species and would thus presumably have less exposure to high levels of chlorinated hydrocarbons (Gaskin 1985). However, high levels of both organochlorines and heavy metals have been found in the tissues of two False Killer Whales, typically an offshore species, which stranded in British Columbia (Baird et al. 1989; Langelier et al. 1990). The effects of industrial activities, such as oil and gas exploration in the Risso's Dolphins' habitat along the eastern United States continental shelf, as well as shipping and fishing, are largely unknown but warrant further study (Hain et al. 1985). During the monitoring of an oil spill southeast of Cape Cod using aerial surveys, Goodale et al. (1981) observed no attraction or repulsion between cetaceans and oil.

Mass strandings of Risso's Dolphins have been reported and could be detrimental to local populations (Leatherwood et al. 1979). Preliminary observations of cetacean strandings in British Columbia indicate that species at the northern limits of their range are disproportionately represented in strandings compared to their observed abundance. This suggests that cetaceans

outside of their usual range and habitat, such as Risso's Dolphins in coastal Canadian waters, may tend to strand more often (Baird et al. 1988).

### Special Significance of the Species

Many populations of dolphins and small whales are exploited directly or incidentally and must be assessed and managed (Perrin and Reilly 1984). Risso's Dolphins and other small cetaceans have generally received little attention and concern compared to the larger, commercially-harvested species. Yet one individual, named "Pelorus Jack", may be one of the most well-known individual wild cetaceans. It escorted ships into Admiralty Bay in New Zealand over a period of up to 17 years (Leatherwood et al. 1982). Risso's Dolphins have been kept in a variety of aquariums and oceanariums both in Japan and the United States (Leatherwood et al. 1982). Their presence in these facilities has brought increasing attention and interest to them and other small cetaceans. Captive specimens in Japan have survived for over five years and have successfully conceived and given birth. However, increasingly complex factors may be affecting their populations and status. Implications of toxic chemicals on mortality in populations are not yet known.

### Evaluation

Occasional catches incidental to small-whale fisheries will probably continue as long as these are in operation (Mitchell 1975a). There is no evidence that this species is common in Canadian waters, although it does not appear to be under any particular risk here. Based on the small number of data available, it is impossible to determine population trends.

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### Addendum

Three additional records of this species from Canadian waters in July and August 1990, after the completion of this paper, are included here. H. Whitehead, Dalhousie University, reports a record obtained from F. D'Entremont of 16 individuals sighted 30-31 August 1990 at 42°15'N, 66°40'W, in Canadian waters south of Nova Scotia. R. Waryk and A. Preston of the FPV Tanu observed a group of approximately 10 individuals, including four calves or small juveniles, on 7 July 1990 at 50°03'N, 127°56'W, off the northwest coast of Vancouver Island. The depth of water for this sighting was 65 fathoms, and the sea surface temperature was 14.8°C. In the same area on 25 August 1990, D. Nelson and P. Murphy of the same vessel photographed a group of about 30 individuals, including at least six calves or small juveniles, at 50°15'N, 128°05'W. The depth of water for this sighting was 75 fathoms, and the sea surface temperature was 15.2°C.

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