# Humpback whales around New Zealand

Nadine Gibbs and Simon Childerhouse
Science and Research Unit
Science, Technology and Information Services
Department of Conservation
PO Box 10-420
Wellington

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# Summary

The number of humpback sightings and the number of whales recorded in this study suggest a slow increase over the last 10 years, particularly in the last 4 years. The results of this study may have been influenced by a variety of factors, the most important of which may be inconsistent effort. The results presented in this report are broadly consistent with that described by Dawbin (1956). As reported by Dawbin (1956), and found in this study, the northern migration occurs between May and August while the southern occurs from September to December. There is little evidence of a change in migration patterns past the New Zealand coast. The inability to quantify effort is a major limitation with the data and does not make it possible to draw clear conclusions on population size or trends in migration. However, the results are useful in determining the locality and seasonality of humpback whales as they migrate along New Zealand coasts.

# 1. Introduction

The humpback whale, *Megaptera novaeangliae*, is a migratory species of baleen whale and has a cosmopolitan distribution throughout the oceans of the North Atlantic, North Pacific and Southern Hemisphere. Humpbacks are a relatively common coastal species and are popular for whale-watching operations worldwide including Alaska, Hawaii, Tonga, New Caledonia and Australia (Donoghue 1994). The humpback whale can grow up to 16 m in length and weigh between 30 and 40 tonnes and has a variable colour pattern but is generally black with white patches especially on the flippers and tail flukes (Baker 1999). Adult humpbacks can be recognised by their small dorsal fin, the knobbly protuberances on the head, tip of lower jaw and leading edge of flippers, and by long pectoral flippers, which are up to one-third of the body length (Baker 1999) Calves are lighter coloured and are less than one-third the length of their mother (Clapham et al. 1999). Known causes of natural mortality include strandings, killer whale (*Orcinus orca*) predation, and human-induced mortality including ship strikes, incidental entrapment, entanglement and whaling (Chittleborough 1953,Volgenau et al. 1995).

Southern Hemisphere humpbacks feed in the circumpolar waters of the Antarctic during summer and then migrate north to breeding grounds in subtropical or tropical waters in the winter (Dawbin 1956). While in Antarctic waters, humpback whales are segregated into six relatively separate groups that show significant genetic divisions from each other (Mackintosh 1942, Baker et al. 1998). Of these six groups, the whales found in the Ross Sea area (130°E, 170°W), known as "Group V", comprise the humpbacks that are seen along the coast of New Zealand while they are migrating between feeding and breeding grounds (Omura 1953, Dawbin 1956, Chittleborough 1965).

The breeding grounds of humpbacks migrating along New Zealand coastlines have not been clearly identified (Baker et al. 1998). However, mark-recapture studies using discovery tags between 1950 to 1960 have demonstrated connections between New Zealand and Norfolk Island, east Australia and Fiji (Chittleborough 1959, Dawbin 1964). More recently it has been suggested there are also connections with Tonga (Donoghue 1994).

Work by Dawbin (1956) suggests that northern migrating humpbacks in New Zealand waters pass along the east coast of the South Island and then divide into two groups, with one continuing up the east side of the North Island and the other passing through Cook Strait and up the west side of the North Island (Figure 1). Smaller numbers pass the western side of Stewart Island and around the south-west corner of the South Island before moving offshore. The bulk of southern migrating humpbacks pass along the west coast of both the North and South Islands and form a large aggregation near the south-west corner of the South Island before moving further south. Others follow the east coast of the North Island as far south as East Cape before moving offshore, with a few occurring along the eastern coastlines (Dawbin 1956).

The northern migration spans late May to earlyAugust, and the southern from mid September to early December (Lillie 1915, Dawbin 1956). Both the northern and southern migrations follow the same pattern of a gradual increase in the numbers of whales passing through New Zealand waters with a peak near the middle of the season. The peak is in late June to mid July for the northern and late October to late November for the southern migration, and is followed by a slow decline in numbers until the end of the season (Dawbin & Falla 1949, Dawbin 1956).

Segregation by age and sex is evident during the northern migration (Dawbin 1960, 1997). Lactating females and yearlings are seen early in the season, followed by immature whales, then mature males and females, and late in the season pregnant females. A similar relationship has also been seen during the southern migration but with more mixing between age and sex classes. Mature females and immature whales pass through first, followed by mature males, and finally females in early lactation with calves (Dawbin 1960, 1997).

# 2. Current knowledge of humpbacks around New Zealand

Humpback whales were almost taken to extinction by intensive whaling activities during the past century. In Area V, an original population of approximately 10 000 humpbacks at the beginning of the century had been reduced to less than 5%, or estimated 250-500 whales of the original population (Chittleborough 1965). Humpbacks were given total protection from commercial whaling by the International Whaling Commission (IWC) in 1966 and presently have an International Union for Conservation of Nature (IUCN) status of Vulnerable (Donoghue 1994). Although protected, subsistence hunting of humpbacks continued in Tonga until 1979 when whaling was prohibited by Royal Decree; and in Antarctica by illegal Russian whaling of approximately 47 000 humpbacks, which continued until the 1980s (Donoghue 1994, Yablokov 1994).

Although all six Southern Hemisphere humpback stocks are listed as Vulnerable, there is considerable debate about the present status of each stock. This is largely due to the difficulty in accurately assessing absolute population size and in measuring rates of population change. This is particularly true of the humpbacks that migrate past New Zealand.

Recent research on humpbacks around western and eastern Australia (Bannister 1994, Paterson et al. 1994) and the North Atlantic (Winn et al. 1975, Smith et al. 1999) have indicated that humpback whale numbers are increasing. By comparison, there is little evidence of recovery in Tonga and New Caledonia (Cawthorn 1981a, Donoghue 1994, Greaves & Garrigue 1997).

While some humpback whale populations have been widely studied, others including the population that migrates along the New Zealand coast are little known since the cessation of commercial whaling. Following the closure of Tory Channel whaling station in 1964, humpbacks have rarely been sighted in New Zealand waters (Helweg et al. 1999), suggesting that this migratory population has not shown any significant recovery, although Cawthorn (1997) reported an apparent increase in New Zealand waters. Due to the differences in population structure between areas, knowledge derived from one ocean or population cannot easily be applied to others.

# 3. Relevance and importance of research

The current knowledge of the occurrence, distribution and population structure of Southern Hemisphere humpbacks varies considerably by area. There is a lack of information available on the humpback whales that migrate past New Zealand as there has been little recent research and, although some sighting data have been recorded, there is no standardised method of collection or reporting. Questions about the status of humpbacks in the New Zealand region have been raised over recent years at international forums such as the IWC and the Convention for the Conservation of Antarctic Marine and Living Resources (CCAMLR), and New Zealand has been unable to provide any new information.

Large numbers of humpbacks were killed in commercial whaling operations around New Zealand particularly, in Cook Strait and along the north-east coast of the North Island. This indicates that significant numbers of whales used to migrate past New Zealand and that New Zealand had, and probably still has, an important role in the migratory patterns of the stock. It is still unknown whether the Group V stock of whales, of which the humpbacks that migrate past New Zealand form a part, have ever recovered from the effects of whaling. However, it appears from anecdotal reports of fishermen and other vessels that humpbacks are now being seen more often in areas such as Cook Strait and Kaikoura. It has been difficult to piece together the reports of sightings, as there is no central sightings database. Without a centralised database it is impossible to make any meaningful comments on the status of the humpback whales that migrate past New Zealand, and there is a need to collate these reports to build up a picture to determine their status.

Assessment of the status of the migratory population is important for use in the international management of whale stocks. To accurately gauge the recovery of humpback whales passing through New Zealand waters it is necessary to have reliable, repeatable surveys to investigate any possible trends. There is at present no such systematic survey set up in New Zealand, without which it is impossible to measure population change. To effectively monitor population change, the biology of humpbacks must be known and therefore it is critical to compile the only recent data available, anecdotal sightings, to make recommendations on survey location, timing and design.

Because of increasing pressure from Japan and other nations for a resumption of commercial whaling and possible resumption of indigenous whaling in Tonga, it is vital to have accurate information on every whale stock to argue against the resumption of whaling, especially on stocks that are in low numbers. This is particularly important for New Zealand, as the breeding population in Tonga, on which subsistence whaling may resume, may be the same group of humpback whales that pass through New Zealand waters and any subsistence whaling quota fromTonga may well impact on these humpbacks. New Zealand is a strong advocate of the present moratorium on commercial whaling and the Southern Ocean Whale Sanctuary, and to support this stance it is particularly important to provide scientific data on whale stocks around New Zealand to prevent whaling on these depleted stocks.

# 4. Aims of research

The aims of this work are to:

(1) compile a database of all sightings of humpback whales around New Zealand within the Exclusive Economic Zone (EEZ);

(2) prepare a report for presentation to the IWC on the status of humpback whales around New Zealand within the EEZ;

(3) make recommendations on the feasibility of regular surveys in New Zealand including dates and method; and

(4) prepare a sightings form and centralised reporting system to facilitate collection of sighting information around New Zealand in the future.

# 5. Methodology

Collation of sighting information was achieved through detailed literature searches of published and unpublished work and contacting people through phone interviews and email. These sources included:

- existing sighting sheets from relevant Department of Conservation (DOC) conservancies/field centres and Ministry of Fisheries scientific observers,
- vessel log books from fishermen, whale-watching tour operators and commercial spotter plane pilots,
- whale researchers,
- public,
- media reports,
- whale stranding records from Te Papa/Museum of New Zealand,
- published papers and reports.

Sighting forms (Appendix 1) were also distributed to information centres, ferry operators and commercial pilots for future sightings to be recorded. The information collected included:

- date, location and observer,
- confirmation of species sighted,
- numbers, movements and status (i.e. cow-calf pair, adult, juvenile) behaviour,
- samples collected (i.e. photo identification),
- anecdotal observations.

All the sighting information that was collected was entered into an excel spreadsheet and analysed to determine:

- locations of sightings,
- date and seasonality of sightings,
- composition of sightings (i.e. singles, groups, cow-calf pairs),
- common behaviour states (i.e. feeding, travelling, nursing, surface active).

This information was then used to make recommendations about the feasibility of a regular survey to assess humpback whale status in New Zealand, including likely locations, date of survey and possible techniques.

# 6. Results

The following results incorporate the number of humpback whale sightings and the number of whales. However, many of the results are illustrated using sighting data only, even though other reports have used numbers of whales. Sightings are used in this report because there are similar trends between number of sightings and number of whales, particularly as pod composition is usually less than 3, and it reduces the bias of incorrectly identifying group size and of a few accounts of large groups of whales.

The humpback whale sightings collected from around New Zealand within the EEZ covered a period of 30 years, from 1970 to 1999. A total of 157 sighting events were collated, and consisted of 437 alive and 4 dead including 3 stranded and 1 entangled humpback whales. Only stranding events that occurred after whaling operations ceased were included in the sighting data.

For the purpose of this report, the year has been divided into three seasons to coincide with the migratory movements of humpback whales, as follows:

1. January-April - no distinct migratory period
2. May-August - northern migratory period
3. September-December - southern migratory period

## 6.1 LOCATION

Figure 2 shows the location of all recorded sightings around New Zealand. Of the 157 recorded sightings of humpback whales, over three-quarters were from the east coast (including Cook Strait), consisting of 80% (n=126), compared to 18% (n=28) from the west coast. Of all the sightings, almost half were from Cook Strait and Kaikoura, consisting of 24% (n=38) and 23% (n=36) of the sightings, respectively. A further 10% (n=16) were from the Bay of Islands, 9.6% (n=15) were from the east coast of the South Island, 7% (n=11) were from the Hauraki Gulf, 7% (n=11) from the New Plymouth area, and the remainder of sightings were recorded from various other locations.

Although Cook Strait and Kaikoura recorded similar numbers of sightings, Cook Strait had a much higher total number of whales seen, 28% (n=125). This suggests that at Cook Strait the pod compositions are larger than at Kaikoura. The average pod size at Cook Strait was 3.3 (sd=2.8) while Kaikoura was 1.9 (sd=2.6). This was found to be highly significant (t-test, df=72, $p<0.001$).

## 6.2 YEAR

Sightings spanned a period of 30 years, with 95% (n=149) of sightings reported from the last 10 years (1990 to 1999) and with a steady increase over the last four years. Figures 3a and 3b show the number of sightings and the number of whales reported each year. Both indicate an increase over time.

Sightings were most common during the winter with over half of the sightings recorded from May to August (Figure 4). Over this 4-month period, 68% (n=106) of all sightings were made and 75% (n=331) of total whales were sighted. 25% (n=39) of total sightings and 18% (n=77) of whales were recorded during the period September to December, while 8% (n=12) of sightings and 8 % (n=33) of whales were made during January to April.

## 6.3 COMPOSITION

Of the humpbacks sighted, 96°x6 (n=425) were adults, with the remaining 4% divided equally into juveniles (n=8) and cow/calf pairs (n=8). On only one occasion was a cow/calf pair seen with an escort, while the other cow/calf pairs were alone. Many of the juveniles (n=5) and cow/calf pairs (n=6) were observed during September to December, with the remaining juveniles (n=3) and cow/calf pairs (n=2) recorded during July to August.

Of the recorded sightings, most were either of solitary individuals (36%, n=57), pairs (29%, n=46) or trios (15%, n=24). The group sizes ranged from 1 to 30, with most groups less than 9, except three, with one group of 12 and two groups of 30. The average group size was 2.8 (sd=3.6).

## 6.4 BEHAVIOUR AND DIRECTION OF TRAVEL

The behaviour of many humpbacks was reported for 60% (n=263) of sightings, and of these, 52% (n=231) were travelling, 3 % (n=15) were surface-active, 2% (n=8) were feeding, 1% (n=5) were resting or other, and 1% were dead (n=4). Of the 52% of humpbacks that were travelling, 46% (n=202) were in a northerly direction, 3% (n=12) southerly, 2% (n=11) west and 1% (n=3) east.

## 6.5 SOURCES

Tour operators contributed much of the sighting information, with 41% (n=63) of sightings, followed by DOC records of 23% (n=36). The public, with 12% (n=19), and researchers, with 11% (n=18), also contributed a moderate number of sightings, followed by small numbers from media (6%, n=9), fishermen (4%, n=7) and published reports (3%, n=5) (Figure 5). The number of sightings from tour operators has increased by 78% (n=49) in the last 3 years.

# 7. Discussion

## 7.1 FACTORS INFLUENCING THE RESULTS

This study is based on non-systematic and anecdotal reports of humpback whale sightings, which means that it is difficult to draw any definitive conclusions from the data. However, the data can be useful in investigating the status of humpbacks in general terms but before conclusions can be made, it is important to consider the limitations. For example there are a number of factors that may influence the results presented in this report.These include:

**Effort**

The magnitude of effort (i.e. the number of boats on the water, or hours spent on the water searching for whales) is likely to have a large influence on the number of sightings reported, as it is probable that the number of sightings is proportional to effort in some way. Effort around the country is highly variable and may depend on seasonal and geographical conditions, local economies and the population size at each location. As this study considered sightings from around the country it was not possible to make any meaningful comparisons of effort. Hence, areas with relatively high numbers of sightings, such as Kaikoura and Cook Strait which have regular marine mammal tour operators, cannot be compared with the West Coast which has little marine mammal tourism. According to Cawthorn (1981b, 1993) changes in effort due to incompatible work programmes, staff reductions, poor weather and changes in tour operator numbers, directly affect the number of annual humpback whale sightings. Inconsistent effort, both within and between locations, is likely to be the single largest contributing factor to variation in sighting records.

Kaikoura, with a year-round marine mammal tourist industry, is perhaps the only location in New Zealand where effort has been reasonably constant over the last several years. The number of tour operators has been constant over the last 6 years and the number of boats has remained relatively similar over this period. However, despite this consistency in the number of operators and vessels, it is still difficult to say that effort has been truly constant.

**Observer reliability**

Species identification in particular, and to a lesser extent, determination of group sizes and behaviour by untrained observers, are potential limitations of the data. Although most of the sightings were from people experienced in the identification of whale species there are some anecdotal reports from less experienced sources, and hence observer error is a possibility. However, humpbacks are perhaps the most distinctive whale species and are among the easiest to identify, and in discussions with observers all adequately described the whale seen as a humpback. It is difficult to assess the accuracy of the other information collected such as group size, direction of travel and behaviour.

### Duplicate sightings

These may occur in the results. There is potential for duplicate sightings at the same location on different days as even though humpbacks are migrating along New Zealand coastlines they have been reported to linger around certain areas (Dawbin 1956). Most whales were recorded as travelling, which fits in with the transient behaviour of migrating humpbacks, but as most sightings are made from vessels it is possible that there may be some degree of vessel avoidance occurring which can influence behaviour. There is potential for the same whales to be sighted at different locations because of their transient behaviour. This is not a concern if whale numbers are compared locally, but becomes a problem if observations are combined over the country. Without individual identification, it is not possible to quantify this proportion of resighting. This sighting information can, however, still be useful in investigating biological information such as migratory patterns.

### Incomplete sighting record

It was not possible to compile all records of humpback sightings in New Zealand, as some records were unavailable. M. Cawthorn, who maintains an active whale sighting database, and a number of tour operators, were unable to contribute their sightings and hence have not been included in this report. Without an idea of what data are missing it is difficult to speculate what impact they may have had on the sighting record presented and conclusions made in this report. The sightings from Mr Cawthorn may have helped clarify trends in abundance over time, particularly as he has been collecting sightings since before 1978.

### Whale strandings

The inclusion of dead whale sightings may influence the results to a small extent, as it is possible that location of the stranding may not reflect the true range of that individual. This is not a significant issue as only four dead whales were included in this report. Although this information is not useful to our understanding of population size because dead animals do not exist in the population, it can still be useful in understanding parameters such as migratory patterns.

## 7.2 GENERAL OBSERVATIONS

Despite some reservations about the quality of the data collected, it is still possible to make some general observations about humpback whales in New Zealand from the sighting information collected. These include:

1. Overall, sightings show an increase over the last 10 years, with a steady increase over the last 4 years. Although these results are likely to reflect an increase in effort, or simply an increase in the reporting of whale sightings, they may indicate an increase in humpback whale numbers around New Zealand, particularly as increases have been reported within some other sub-populations of Group V, as well as within Groups

VI and II (Bannister 1994, Paterson et al. 1994, Smith et al. 1999). However, increases have not been reported in all other sub-populations of Group V (Cawthorn 1981a, Donoghue 1994, Greaves & Garrigue 1997).

An apparent increase in numbers of humpback whales was reported by Cawthorn (1997), which ranged from 23 to 126 a year between 1979 to 1992 (Figure 6). Cawthorn (1997) also reported sightings for a single year after 1992, i.e 1996/97, where 407 whales were recorded, although this was greatly influenced by several resightings of a large group (average size of 73 whales) over a few days. This unusual year appears to be substantially different from all other years reported by Cawthorn and in this paper, and it is not evident why.

2. Most reported sightings were along the east coast of New Zealand and in Cook Strait, with the bulk occurring during the northern migratory period (May to August). During this period, most sightings occurred along the east coast of the South Island, while during the southern migratory period (September to December) most sightings occurred along the coastlines of the North Island. Broadly, these results are consistent with the migratory patterns described by Dawbin (1956), shown in Figure 1. Dawbin (1956) reported large numbers of whales along the east coast of the North Island during the northward migration, whereas only a single sighting was collected for the same period in this report. Similarly, Dawbin (1956) reported equal numbers of whales around New Zealand during the northern and southern migratory periods, while in this report two-thirds of the sightings were during the northern migratory period. Once again, variable effort is the most likely explanation.

3. Most humpback whales sighted were groups of less than 3 animals. These small pod sizes are consistent with that reported by Bryden (1985) from the east coast of Australia and are characteristic of migrating hump backs. The pod sizes recorded in Cook Strait were larger than elsewhere around New Zealand, suggesting that the migratory pathway is concentrated in this area, as inshore and offshore migrating whales join up to pass through Cook Strait. Similarly, Dawbin (1956) also described large numbers of whales passing through Cook Strait, although the impact of these large numbers on pod sizes was not discussed.

4. Marine tour operators were the major source of sightings, particularly in the last 3 years. Tour operators are probably the best source of sighting information as they are regularly on the water and specifically keep an eye out for marine mammals. Of all potential observers, most effort was made to contact tour operators and get sighting information from them, which may explain why they are the most dominant source. The increased contribution during the last 3 years may indicate improved recording by operators or an increase in numbers of operators.

Cawthorn (1997) is the only other source of sighting information after 1963. Unfortunately, no direct comparison can made between the results in this report and those reported by him. Cawthorn (1997) described the sightings collected from coastal and trans-oceanic vessels, oilrigs, shore stations and aircraft, and it is unclear if these sightings were solely within in the New

Zealand EEZ. Cawthorn (1993) has previously reported sightings to be within the New Zealand region but included whales from the east coast of Australia and the Pacific Islands. Therefore, because of the ambiguity and the unavailability of the data, the sightings by Cawthorn (1997) were unable to be directly compared with the results of this report although they are included in Figure 6.

The shore-based whaling around New Zealand and the illegal Russian whaling in Antarctica severely depleted the group of humpback whales that historically migrated along the coastline of New Zealand. It is unlikely that the migratory pattern of humpback whales around New Zealand has changed significantly in response to exploitation, as the results presented in this report were broadly consistent with those described by Dawbin (1956). Similar assumptions regarding humpback whales avoiding the east coast of Australia occurred as a result of a paucity of incidental sightings around east Australia in the first decade post-whaling (Anon 1976). However, it was not until systematic surveys were undertaken that it was discovered that the route used by the east Australian group remained unchanged (Paterson 1991). These systematic surveys have also yielded high numbers of migrating whales where previously they were thought to be in low numbers.

The high rate of population increase seen in east Australian humpbacks in recent years is close to the theoretical maximum (Best 1993). Best (1993) notes that because the stock was so depleted it may show higher rates of increase than expected for other stocks of baleen whales. In addition, there is considerable uncertainty in estimating many of the biological parameters used for theoretical estimates, which may be more inaccurate than the observed rate of increase. It is possible that the increase seen in east Australian humpbacks is due to recruitment of whales that traditionally migrated along the New Zealand coast which have changed their migratory patterns, although this seems unlikely as migratory behaviour is probably the result of strong maternal traditions (Baker et al. 1990).

It is unlikely that the migration route has changed in response to other conditions such as environmental factors. Dawbin (1966) reported that the most important environmental factor that influences the path followed by humpbacks appears to be the orientation of the coastline in relation to the migration route. While small and localised effects on migratory behaviour are produced by turbidity, tidal streams and the presence of prey concentrations, no consistent modification of the migration route due to bottom topography, ocean currents or hydrological conditions has been demonstrated (Dawbin 1966).

## 7.3 ORGANISATION OF SIGHTING DATA

The DOC standard sighting form (Appendix 1), designed by Alan Baker, was sent to potential sources of sightings that could be contacted. This form has recently been developed and is now being used around New Zealand, and therefore it was not necessary to develop another form specifically for humpbacks for use in this project. All sighting records were entered into an Excel spreadsheet (listed in Appendix 2), as it met all the requirements of this project.

Alan Baker has agreed to act as the central contact point for humpback and other marine mammal sightings. His contact details are included on the standard sighting form. He will provide sighting forms to anyone who requests them and will collate all the records.

# 8. Research methods

This report has highlighted the lack of knowledge of the present status of humpback whales that migrate past New Zealand. Research is required to remedy this lack of information and to enable meaningful comments to be made about possible changes in the status of these whales. In an investigation into population trends it is important to consider the characteristics of the population to assess the most effective survey method (Buckland et al. 1993). The specific qualities of the humpbacks around New Zealand that will affect the success of a survey include:

- both a northward and southward migratory pattern,
- slow swimming (< 5 knots), with up to 80% of time spent underwater (Dolphin 1987),
- apparently in low numbers,
- past areas of known concentration (i.e. Foveaux and Cook Strait) frequently have poor sighting conditions (i.e. wind > Beaufort 3),
- acoustic behaviour by males during the northern migration,
- generally coastal but with an unknown offshore component.

All of these characteristics suggest that accurate assessment of status will be difficult. Perhaps the most important characteristic of the population is that it appears to be in low numbers. Although there have been no systematic data collected since the demise of commercial whaling, the information presented in this report indicates that there are not large numbers of humpbacks migrating past the New Zealand coastline. This has implications for most survey methods in that observational effort may have to be extensive.

There are several research options available to investigate the status of humpbacks in New Zealand waters. All of these options suffer from a lack of systematic baseline data from which to assess which is likely to be the most effective method. As a result, a pilot study would be required to assess the characteristics and provide insight into the most useful technique. Such a study would provide estimates of such parameters as encounter rate, which would be crucial in determination of the technique to be used.

Possible techniques to specifically investigate population trends include:

- continuation of the present collection of anecdotal sightings,
- aerial surveys,
- land-based surveys,
- boat-based surveys,
- acoustic surveys,
- genetic investigations,
- an integrated investigation including a combination of these techniques.

## 8.1 ANECDOTAL SIGHTINGS

This report summarises all anecdotal sightings from around New Zealand and highlights the difficulties in using this kind of information to assess trends. The major problem inherent in this technique is inconsistent effort, which means that any clear conclusions about trends cannot be made. However, this method does make it possible to collect useful information such as locations and seasonality, with the caveat that variable effort may influence results. Most anecdotal sightings will never be able to offer an alternative to systematic surveys but can still provide useful data on humpbacks in New Zealand.

The setting up of a centralised database would be a good way to make the most of anecdotal sighting information. At present, local sighting information is generally retained locally and is not passed to a central collection point, as is seen with all stranding information, which is collected by Anton van Helden atTe Papa/Museum of New Zealand. Alan Baker at DOC collects some sighting information from around the country and M. Cawthorn also maintains a sighting database. A single, centralised collection of anecdotal sightings providing a complete record of sighting information from around New Zealand is required before the data can really be used in a meaningful way.

Marine tour operators offer perhaps the best possibility for providing information that may be useful in assessing trends. Most operators already keep accurate records of marine mammal sightings and, with the addition of accurate recording of effort, could provide an insight into possible trends similar to the use of Catch Per Unit Effort (CPUE) in fisheries management. In its most basic form, operators could report the number of whales seen and number of hours on the water. With the inclusion of more detailed information such as weather, individual photographic identification (to eliminate possible resights of the same individuals), and locational information it may be possible to determine changes in abundance. As with almost all CPUE studies, it is difficult to measure all changes in effort (i.e. a tour operator changing to a faster vessel that can cover more ground), which means that any trends seen in the data would have be examined closely. Most operators contacted were enthusiastic about the project and welcomed the opportunity to provide sighting and effort data into a centralised database.

## 8.2 AERIAL SURVEYS

Aerial surveys have the advantage of being able to cover large areas quickly but often have a lower encounter rate than other methods when used on marine mammals. This is because marine mammals spend a significant proportion of their time underwater and are frequently missed by even relatively slow flying aircraft, and therefore aerial surveys with only one observer platform will generate relative abundance estimates only (Hiby 1999). To calculate absolute abundance, the proportion of whales missed through being underwater must be quantified. There are methods to adjust for the proportion that is missed including the use of two independent observational platforms, which could be two observers in the same plane, in different planes, or in simultaneous vessel/aircraft platforms (Hiby 1999). Once a robust measure of this missed proportion has been generated it can be applied over future surveys, assuming the surveys are carried out in the same way, without the need for independent observers.

All line surveys are less efficient when encounter probabilities (i.e. the chance of encountering a whale) are low (Buckland et al. 1993). Without a pilot study it is impossible to determine the encounter probability of humpbacks around New Zealand. However, the sightings collected in this report suggest that the number of whales around New Zealand may be low and therefore encounter rates will also be low. Aerial surveys generally allow for more ground to be covered (i.e. longer transects) than boat-based line surveys, which means that, even with a low encounter rate, whales should be sighted, as they have more encounters in total and therefore an increased sample size giving a lower variance estimate.

Aerial surveys are particularly useful in areas where unfavourable weather conditions are common as they can reach the study site, complete the survey, and return quickly before conditions deteriorate. Surveys can therefore be undertaken at short notice when weather conditions are most advantageous and eliminate the need for personnel to be waiting in the field for conditions to be favourable.

Optimum requirements for humpback aerial surveys include:

- an aircraft with a high wing and twin engines which allows slow flying speeds of 100 knots,
- flying at an altitude of 1000 ft which maximises whale sighting while maintaining a survey width of 3-5 km (approximately 1.5-2.5 km on either side of aircraft) which still allows for observations to be made of behavioural state and pod composition,
- plan for two surveys, one for the northern and another for the southern migration period,

- plan for a surveying period of 4 weeks during the peak in migration period (late June to mid July for the northern and late October to late November for the southern migration), see Figure 7,

- plan for 2 flights a week but make flights opportunistic according to the weather conditions and aim for a Beaufort sea state <3,

- surveys should be conducted as close to midday as possible to reduce glare and maximise water penetration,

- at least two observers plus the pilot,

- use of a data-logger integrated with aircraft instruments to record,

- two independent observer platforms to be used at the same time to measure the proportion missed by the primary observer.

Aerial surveys can be expensive with aircraft costing approximately $150-250 per hour. A single observer can be used if the pilot is also able to double as an observer but at least two observers is ideal. The minimum equipment required would be a laptop computer and/or data-logger, GPS, binoculars and clinometer. Sophisticated data-logger packages are available that can be integrated with the aircraft's instruments to collect data including location, speed, and altitude and into which real time sighting information can be recorded which aids analysis and minimises data input errors.

## 8.3 LAND-BASED SURVEYS

Land-based surveys are a cost-effective way of estimating abundance of species that migrate close to land (Hiby & Hammond 1989). They are particularly useful when populations are in low numbers and for species that spend a significant proportion of their time underwater. This means they can be an excellent method of assessment for marine mammals that migrate along the coast.

Land-based surveys are generally point-based estimators, that is, the survey is conducted from a fixed point and the number of individuals passing is recorded. The major difficulty with this technique is estimating the area that can be effectively searched for whales, as some will pass offshore out of sight of the viewing point. However, if information on the offshore distribution of whales is available through aerial or boat surveys, it is possible to fit land-based surveys into the framework of line transects to get abundance estimates (Hiby & Hammond 1989). Alternatively, it is possible to have two independent observational platforms (i.e. one land-based and another aerial) to quantify the proportion of whales not sighted and to obtain a broader survey area. It is also necessary to assess the length of time that whales stay submerged and average swimming speed, as this will affect the proportion of migrating whales that are counted.

Land-based surveys are generally more robust to variable weather conditions than vessel or aerial surveys, as they can be halted when conditions deteriorate and then resume once conditions improve with minimal effort. Vessel and aerial surveys are also weather-dependent but require more time and effort to restart a survey once conditions improve.

Optimum requirements for humpback land-based surveys include:

- an elevation of approximately 120 m above sea level to ensure visibility of approximately 10 km with reasonable sea state,

- the use of a but or shelter for protection from adverse weather conditions,

- easily accessible either by vehicle or boat,

- plan for two surveys, one for the northern and another for the southern migration period,

- plan for a surveying period of 4 weeks during the peak in migration period (late June to mid July for the northern and late October to late November for the southern migration), see Figure 7,

- surveys should be conducted for as long as possible each day,

- at least two observers to scan for blows with naked eye and regular scans by binoculars to identify species,

- use of a theodolite to accurately determine distance of whales from shore, and the measurement of movements including speed and direction of travel.

A good site for a land-based survey during the northern migratory period is the old Whalers Lookout at Tory Heads in Cook Strait. This site satisfies the optimal requirements and has an additional advantage in that it is the same site used by Dawbin, who did considerable humpback whale research during the commercial whaling period. Therefore, any information collected from the surveys could be compared with the historical data which will provide a long time series from which to investigate trends. Another potentially good location to monitor the northern migration is at Whangamumu at Cape Brett, which was also a site of a commercial whaling station

Puygesur Point in Foveaux Strait is a good site for land-based surveys during the southern migratory period. Foveaux Strait was recognised for having large congregations of humpback whales that would linger for days at a time before heading offshore to southern feeding grounds (Dawbin 1956).

Most of the cost of a land-based survey would be observer wages. The minimal equipment required would be binoculars, a theodolite and computer and a VHF radio. The theodolite and computer could be loaned from a variety of research institutes, thereby minimising the cost of the project.

## 8.4 BOAT-BASED SURVEYS

Boat-based line transect surveys could be used to estimate abundance. Like other line surveys they perform poorly at low population sizes and require significant adjustment due to missed individuals. They have the added disadvantage that marine mammals can be either boat positive or boat negative, which will influence the survey results. As with other line surveys, these potential influences can be estimated and used to modify the results accordingly. Boat-based surveys are also very weather-dependent.

A major advantage of boat-based work is that additional information can be collected, including individual photographic identification, biopsy sampling and acoustic recording. Individual identification allows for the use of mark-recapture methods, which can be used in estimating abundance and movement patterns of individual humpbacks (Katona & Whitehead 1981). Photographs can be arranged into a catalogue from which individual whales can be identified and to enable comparisons to be made with photos taken of humpbacks in Australia,Tonga and New Caledonia to reveal more about humpback whale migrations.

Optimal requirements for boat surveys include:

- a vessel with an elevated observer platform,
- speed should be such that individuals are not missed but sufficient ground is covered to provided an adequate sample size,
- standardised distance and angle recording - preferably using binocular reticule and angle boards,
- plan for two surveys, one for the northern and another for the southern migration period,
- plan for a surveying period of 4 weeks during the peak in migration period (late June to mid July for the northern and late October to late November for the southern migration),
- a Beaufort sea state of <3,
- at least two observers plus the skipper,
- a GPS for navigation and data recording,
- each encounter should continue only long enough to determine group composition, behaviour, and for obtaining photographs and biopsies before returning to the survey trackline.

Boat-based surveys are likely to be the most expensive option, with vessel rental and running costs and observer wages making up much of the expense. The minimal equipment required would be a GPS, laptop, binoculars, angle boards and, if additional information is required, a camera with a zoom lens to 300 mm, a crossbow for genetic samples, and a hydrophone for acoustic monitoring.

## 8.5 ACOUSTIC SURVEYS

Populations can be identified by the complex songs that humpback whales produce. The songs are subject to continual and gradual change during the winter breeding months and are distinct in different geographical areas (Helweg et al. 1990). Singing peaks in winter months but can be heard in migratory waters and is a reliable indicator of a migratory route (Thompson & Friedl 1982, Clapham & Mattila 1990). Acoustic monitoring is used on bowhead whales (*Balaena mystlcetus*) in Alaska along with shore-based surveys to accurately estimate population size and migratory patterns and is highly successful (Zeh 1999).

Kibblewhite et al. (1967) reported migrating humpbacks frequently singing off Great Barrier Island. There have been no further acoustic recordings of humpbacks reported until a singing whale was heard off Kaikoura in 1994 (Helweg et al. 1998). Helweg (1998) monitored the waters off Great Barrier Island between 1996 and 1997 for humpback whale song and found no trace of singing humpbacks.

The major advantages of acoustic monitoring are that it can be used day and night, is not constrained by weather conditions, and can be completely automated (Cato 1991). Acoustics is the only survey technique that can operate at night and some studies have shown there are apparent differences between numbers of whales moving past a point between day and night (Hiby & Hammond 1989). This is a good technique to monitor relative numbers and possible trends, but needs to be integrated with other survey methods to provide estimates of overall abundance (Zeh 1999).

In humpback whales, only the males are thought to sing (Payne & McVay 1971). This method is therefore unlikely to monitor numbers of female and immature whales. As the migration in New Zealand is thought to be segregated by sex and age, monitoring only the adult male portion of the population is unlikely to yield anything about the seasonality of migration. It is also difficult to distinguish individual whales from one another and the same individual may be recorded several times over time and appear as several different whales.

The application of this technique in New Zealand would be difficult without a large budget. The sophisticated equipment required including hydrophones, powerful computers, and specifically designed software would be difficult to obtain unless research could be conducted in co-operation with the New Zealand Navy. The Navy has access to this technology and maintains a functional acoustic monitoring system that is permanently placed off the east of Great Barrier Island, which is along the traditional migratory route.

## 8.6 GENETIC INVESTIGATIONS

Another mark-recapture method involves the collection of skin biopsies or sloughed skin for DNA extraction for analysis of sex and genotype (Palsboll et al. 1997). These genetic markers are permanent and exist in all individuals and can show both the relationships between whales in different areas and the family relationships between whales which frequent the same breeding area (Palsboll et al. 1997). Using these markers, it is possible to "resight" individuals over seasons, which can be used in estimating population size and composition. It is also possible to look at genetic diversity, which can be used as an indication of population size (Palsboll et al. 1997).

For mark-recapture, this technique can yield a substantial amount of information that is likely to be more accurate than photographic identification. The samples collected from New Zealand could be compared to existing databases of genetic samples of whales in Group V collected from around Australia, Tonga and New Caledonia, and from whales in other Antarctic Groups. However, this technique would be difficult to implement in New Zealand as a large number of samples are required and these are not easy to obtain. There is also a significant cost involved in the preparation and analysis of samples.

## 8.7 I NTEGRATED INVESTIGATION

This option would include a combination of techniques described above. Through combining several methods, it would be possible to use the most advantageous feature of each and derive a robust and comprehensive estimate of abundance and other biological parameters. This is of course the best option but would require a substantial budget and a significant increase in logistics.

To assess the status of humpback whales in New Zealand waters, a land-based pilot study to assess numbers should be conducted during the peak of the northern migration (mid June to mid July) at Whalers Lookout in Cook Strait. A pilot study is strongly recommended because it can provide insights into how best to meet the important assumptions of the survey. It will provide rough estimates of encounter rate and feasibility of a more committed survey such as aerial, land- or boat-based surveys. For a pilot study, an intensive land-based survey is suggested because it is likely to be the most cost-effective option and will determine if there are sufficient numbers of whales before investing in more extensive surveys such as aerial or boat-based surveys.

If the pilot study finds regular numbers of whales, then an aerial survey should be used in conjunction with a systematic land-based study in Cook Strait at the same time in the following year. If the pilot study fails to find whales, then other sites should be considered for land-based pilot surveys such as Whangamumu and Puygesur Point.

Once a suitable site has been found, regular systematic land-based surveys should be undertaken annually, perhaps in conjunction with boat surveys to collect individual identifications and genetic information.

It is recommened also that DOC continues to encourage the reporting of anecdotal sightings and their collation into a centralised database.

# 10. Acknowledgements

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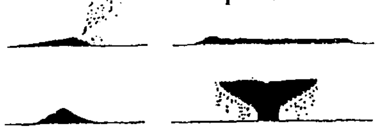
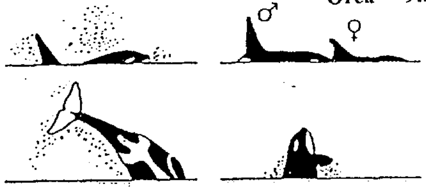
Appendix 1: DOC standard sighting form

Sperm whale <18m



Large blunt head, humped ridge along back wrinkly skin, blow angled forward, shows flukes

Orca <9m




Black & white patterned, male dorsal fin very tall & sharp, flippers rounded

False Killer Whale <5.5m

Black body, erect dorsal fin, rounded head

Pilot Whale <6.5m

Dark brown with white streak behind eye, Long low dorsal fin, bulging forehead

Beaked whales <9m

Slender body, prominent beak often whitish near tip, small dorsal fin well back

Date........................ Time.................Location.......................................................

Lat & Long............................................ Sea State...........................................

Estimated length of whale(s)...................... No. calves & length......................

Total No. of whales.................................... Direction whales heading...........

Shape of blow.....................................Colour of whales body...........................

Colour of baleen in mouth..........................Any scars on body?.......................

Behaviour (breaching, diving etc)..........................................................................

..............................................................................Photos?..................................

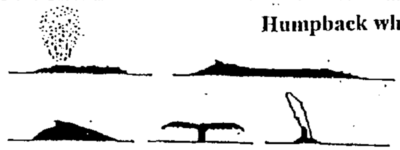
Observers name............................................ Contact details...........................

...............................................................................Ship's name...........................

**Please tick drawing if you recognise the species of whale.**

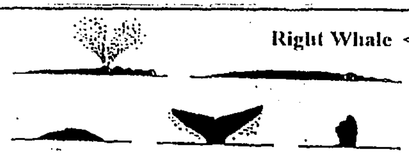
*Please return completed record sheet to: Alan Baker, Science & Research Unit, Department of Conservation, PO Box 10-420 Wellington, or fax to 04 471 3279.*

Humpback whale <16m



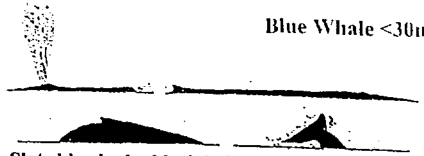
Blackish body with some white esp under tail and flippers, knobbly head, long flippers, dorsal fin on hump

Right Whale <18m



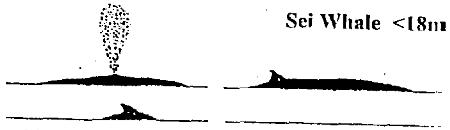
Blackish body, some white, blow V-shaped, white patches on head & jaws, arched jaw No dorsal fin

Blue Whale <30m



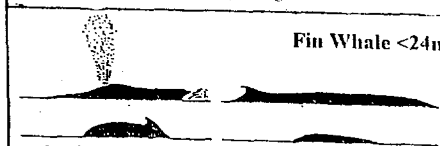
Slate blue body, black baleen, small dorsal fin well back, shows flukes

Sei Whale <18m



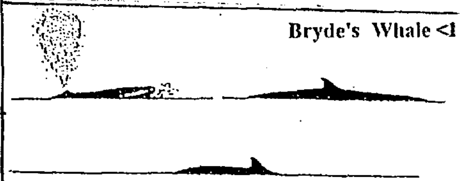
Blue-grey body, white under, black baleen with white fringe, highish dorsal fin

Fin Whale <24m



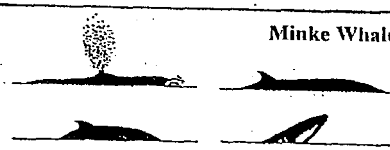
Dark grey body, white below, pale baleen, highish dorsal fin

Bryde's Whale <1



Blue-grey body, baleen pale at front black at back, 3 ridges on head

Minke Whale <9m



Dark blue-grey body, pale scallops on sides yellowish baleen, white patch on flipper

# Appendix 2: List of humpback whale sightings around New Zealand

HUMPBACK WHALE SIGHTINGS AROUND NEW ZEALAND

| Date | Area | Site | Latitude S | Longitude E | # HB | Direction travelling | Behaviour | Source | Reliability of data | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| North east of North Island | | | | | | | | | | |
| *Bay of Islands* | | | | | | | | | | |
| 20/08/78 | BOI | Poor Knights Island | 3527 | 17441 | 2 | Nil | Surface active | J&T Enderby | 1 | |
| 16/10/93 | BOI | 4m N Okahu Island | 35 11.5 | 174 12.5 | 3 | Nil | Surface active | A.Booth | -HB | -300 common dolphins |
| 9/11/93 | BOI | 1.5m N Motuarohia Island | 35 13.5 | 17410 | 2 | S | Travelling | A.Booth | -HB | |
| 13/08/94 | BOT | *Bay of Islands* | 3503 | 17412 | 1 | ? | ? | R.Constantine | 1 | |
| 19/11/94 | BOI | Bay of Islands | 3503 | 174 12 | 2 | ? | ? | R.Constantine | I | |
| 25/05/96 | BOI | Bay of Islands | 35 03 | 174 12 | 1 | ? | ? | R.Constantine | 1 | |
| 31/10/96 | BOI | NE Bird Rock | 35 10 | 174 18 | 3 | ? | ? | R.Constantine | 1 | c/c/e |
| 28/11/96 | BOI | Bay of Islands | 3503 | 174 12 | 2 | ? | ? | R.Constantine | 1 | c/c |
| 1/12/96 | BOI | E Takou Bay | 3505 | 17400 | 2 | ? | ? | R.Constantine | 1 | c/c |
| 2/12/96 | BOI | S Momarohia Island | 35 14.5 | 174 10 | 2 | ? | ? | R.Constantine | 1 | c/c |
| 2/12/96 | BOI | E Parekura Bay | 35 16 | 17414 | 2 | ? | ? | R.Constantine | 1 | c/c |
| 28/06/97 | BOI | E Cape Brett | 35 10 | 17420 | 2 | ? | ? | R.Constantine | 1 | A.Fleming |
| 12/10/97 | BOI | Bay of Islands | 3503 | 17412 | 1 | ? | ? | R.Constantine | 1 | A.Fleming |
| 1/11/97 | BOI | E Tutukaka | 35 38 | 17435 | 3 | N | Travelling | A.Booth | 1 | |
| 1/11/97 | BOI | E Tutukaka | 35 37, | 17434 | 1 | N | Travelling | A.Booth | 1 | |
| 5/11/97 | BOI | S Waewaetoria Island | 35 13 | 174 12 | 2 | ? | ? | R.Constantine | 1 | c/c, NZ Herald |
| *Bay of Plenty* | | | | | | | | | | |
| 16111/93 | BOP? | Unknown location | | | 1 | ? | ? | A.Jones | --S | |
| 5/12/93 | BOP | 1m N Rabbit Island | 3642.5 | 17549 | 1 | Nil | Drowned | Bay of Plenty Times | 1 | Juv entangled mooring line |
| 4/12/94 | BOP | N Motiti Island | 3735 | 17625 | 2 | ? | ? | A.Jones | 1 | |
| 27/08/95 | BOP | Pukehina Beach | 3747 | 17630 | 1 | ? | ? | A.Jones | 1 | |
| 23/10/95 | BOP | W Motiti Island | 3738 | 17620 | 2 | ? | ? | A.Jones | 1 | |
| late 10/95 | BOP | N Whakatane | 37 56 | 17700 | 2 | N | Travelling | Bay of Plenty Times | 1 | |
| 28/10/95 | BOP | W Motiti Island | 3738 | 17623 | 2 | N | Travel/Surface ac | Bay of Plenty Times | 1 | |
| 30/10/95 | BOP | 3 m ENE Tauranga | 3740 | 17620 | 2 | ? | ? | A.Jones | 1 | |
| 9/08/97 | BOP? | 2 m A Beacon | | | I | ? | ? | A.Jones | 1 | |
| *Hauraki Gulf* | | | | | | | | | | |
| 20/05/78 | Hg | Little Barrier Island | 36 11 | 175 02 | 2 | N | Travelling | J&T Enderby | 1 | |
| Aug-94 | Hg | E Whangaparaoa Pens. | 3636 | 17451 | 30 | ? | ? | C.Duffy | 1 | |
| Aug-94 | Hg | N Waiheke Island | 3643 | 175 10 | 2 | NW | Travelling | C.Duffy | 1 | c/c, harassed by orcas |
| 28/04/96 | Hg | 6 miles E Leigh | 36 18 | 17450 | 2 | ? | ? | P.Maxine | 1 | |
| 15/06/97 | Hg | 2 m E Leigh | 36 18 | 17449 | 2 | ? | ? | P.Maxine | 1 | |
| 24/30/31/8/97 | Hg | Little Barrier Island | 36 11 | 17502 | 2 | Nil | Surface active | J&T Enderby | 1 | seen over 3 weeks |
| 28/09/98 | Hg | E Takatu Point | 3622 | 17448 | 2 | Nil | Resting | J&T Enderby | 1 | I juv |
| 28/02/99 | Hg | 6 miles E Cape Rodney | 36 17 | 17450 | 2 | ? | ? | P.Maxine | 1 | |
| 14/08/99 | Hg | 2 m E Leigh | 36 18 | 17449 | 2 | ? | ? | P.Maxine | 1 | |
| 28/08/99 | Hg | 2 m E Leigh | 36 18 | 17449 | 4 | S | Travelling | P.Maxine | 1 | |
| 18/09/99 | Hg | E Leigh | 3618 | 17450 | 8 | ? | ? | J&T Enderby | 1 | 2juv |
| East of North Island | | | | | | | | | | |
| 14/09/98 | ENI | Anaura Bay, Gisbome | 38 14 | 178 19 | 1 | Nil | Floating dead | D.Freeman | 1 | |
| West of North Island | | | | | | | | | | |
| *New Plymouth* | | | | | | | | | | |
| 11/06/90 | Np | W Bell Block | 3900 | 174 03 | 2 | E | Travelling | B.Williams | 1 | |
| 12/07/92 | Np | 5 m NE New Plymouth | 3901.5 | 174 05 | 2 | S | Travelling | B.Williams | 1 | |
| 28/09/93 | Np | 5 m NW New Plymouth | 3902 | 17401 | 2 | S | Travelling | B.Williams | 1 | |
| 2/12/94 | Np | W New Plymouth | 3903 | 17400 | 1 | S | Travelling | B.Williams | 1 | calf |
| 3/12/94 | Np | 10 m W Motonui | 38 58.5 | 17417 | 1 | N | Travelling | B.Williams | 1 | |
| 3/08/99 | Np | W Bell Block | 3902 | 17401 | 4 | 2 W, 2 Nil | Travel, Rest | B.Hartley | 1 | |
| 5/08/99 | Np | W Oakura | 3905.5 | 17355 | 6 | N | Travelling | B.Hartley | 1 | |
| 8/08/99 | Np | W Back beach | 3902 | 173 58 | 8 | N | Travelling | B.Hartley | 1 | |
| 9/08/99 | Np | W Back beach | 3902 | 17405 | 4 | N | Travelling | B.Hartley | 1 | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 63 | 9/08/99 | Nit | W Saddleback Island | 3902 | 17401.5 | 30 | N | Travelling | C.Duffy | 1 | |
| 64 | 10/08/99 | Nit | W New Plymouth | 3903 | 17400 | 4 | ? | ? | B.Hartley | 1 | |
| 65 | | | | | | | | | | | |
| 66 | West of North Island | | | | | | | | | | |
| 67 | 21/09/95 | WNT | WNW Gannet Island | 37 56 | 17404 | 1 | ? | ? | B.Williams | 1 | |
| 68 | | | | | | | | | | | |
| 69 | North West of North Island | | | | | | | | | | |
| 70 | 17/11/95 | NWNI | NW North Head | 3604 | 17304 | 4 | ? | ? | B.Williams | 1 | |
| 71 | 22/11/95 | NWNI | NW North Head | 3609 | 17248 | 1 | NW | Travelling | B.Williams | 1 | |
| 72 | | | | | | | | | | | |
| 73 | | | | | | | | | | | |
| 74 | Cook Strait | | | | | | | | | | |
| 75 | 6/07/91 | Cs | Stephens Island | 4040 | 17401 | 1 | To Narrows | Breaching, Trave | C.Duffy | 1 | |
| 76 | 1/06/93 | Cs | 3 run N Bros Island | 4105 | 17426 | 1 | N | Travelling | L.Battersby | 1 | |
| 77 | 2/06/93 | Cs | 7 run NNE Stephens Island | 4040 | 17402 | 4 | NW | Travelling | L.Battersby | 1 | |
| 78 | 1/05/94 | Cs | W Marta Island | 41 05 | 174 45 | 2 | N | Travelling | B.Dix | -HB | |
| 79 | 8/08/94 | Cs | 1 min SW Awash rock | 4109 | 17425 | 2 | NW | Travelling | L.Battersby | 1 | |
| 80 | 12/08/94 | Cs | 1 nm Cape Koamam | 4105 | 17423 | 3 | N | Travelling | L.Battersby | 1 | |
| 81 | 4/06/95 | Cs | 1 run E Tory Heads | 41 13 | 17420 | 3 | NNW | Travelling | L.Battersby | 1 | |
| 82 | 17/06/95 | Cs | 4 ran E Tory Heads | 41 13 | 17420 | 3 | NW | Travelling | L.Battersby | 1 | |
| 83 | 8/07/95 | Cs | E Wellington bay | 41 12.5 | 17420 | 2 | N | Travelling | L.Battersby | 1 | |
| 84 | Jul-95 | Cs | Unknown location | | | 3 | ? | ? | B.Dix | -S | |
| 85 | 11!06/96 | Cs | 2 nm E Tory Heads | 41 13 | 17420 | 3 | N | Travelling | L.Battersby | 1 | |
| 86 | 17/06/96 | Cs | 1 nm NE Tory Heads | 14 12.5 | 17420 | 3 | N | Travelling | L.Battersby | 1 | |
| 87 | 9/06/97 | Cs | 4 nm WNW Cape Koamaru | 4104 | 17422 | 3 | NW | Travelling | L.Battersby | 1 | |
| 88 | 12/07/97 | Cs | 4 nm E Tory Heads | 41 13 | 17420 | 5 | N | Travelling | L.Battersby | 1 | |
| 89 | 20/07/97 | Cs | 3 nm SW Karori rock | 41 20 | 17439 | 7 | NW | Travelling | L.Battersby | 1 | |
| 90 | 29/07/97 | Cs | 1 nm E Jordy rocks | 41 15 | 174 18 | 4 | NNW | Travelling | L.Battersby | 1 | |
| 91 | 29/07/97 | Cs | 2 rtnt N Cape Koamam | 4105 | 17423 | 4 | N | Travelling | L.Battersby | 1 | |
| 92 | Late May-97 | Cs | OffMukamukaiti Stream | | | 1 | ? | ? | B.Dix | -S | |
| 93 | 4/06/98 | Cs | E Wellington bay | 41 12.5 | 17420 | 6 | NW | Travelling | L.Battersby | 1 | |
| 94 | 16/06/98 | Cs | E Jordy rocks | 41 15 | 174 18 | 7 | NW | Travelling | L.Battersby | 1 | |
| 95 | 17/06/98 | Cs | E Jordy rocks | 41 15 | 174 18 | 5 | WNW | Travelling | L.Battersby | 1 | |
| 96 | 20/06/98 | Cs | 4 nm E Tory Heads | 41 13 | 17420 | 2 | N | Travelling | L.Battersby | 1 | |
| 97 | 21/06/98 | Cs | Close into Tory heads | 41 13 | 17420 | 3 | N | Travelling | L.Battersby | 1 | |
| 98 | 18/09/98 | Cs | E Tory Heads | 41 13 | 17420 | 2 | N | Travelling | L.Battersby | 1 | |
| 99 | 26/05/99 | Cs | E Lyall Bay | 4121 | 17448 | 1 | ? | ? | B.Dix | -HB | |
| 100 | 16/06/99 | Cs | E RununderPoint | 41 19 | 174 15 | 3 | NW | Travelling | L.Battersby | 1 | |
| 101 | 26/06/99 | Cs | ? | | | 3 | N | Travelling | L.Battersby | 1 | |
| 102 | 11/07/99 | Cs | ? | | | 5 | N | Travelling | L.Battersby | 1 | |
| 103 | 16/07/99 | Cs | E Awash rock | 4108 | 17424 | 3 | NW | Travelling | L.Battersby | 1 | |
| 104 | 18/07/99 | Cs | E Perano Head | 41 12 | 17423 | 3 | WNW | Travelling | L.Battersby | 1 | |
| 105 | 22/07/99 | Cs | Jacksonsbay | 41 12.5 | 17417 | 3 | N | Travelling | L.Battersby | 1 | |
| 106 | 24/07/99 | Cs | N Cape Koamaru | 4105 | 17423 | 1 | N | Travelling | L.Battersby | 1 | |
| 107 | 25/07/99 | Cs | Tory channel | 41 13 | 174 17 | 2 | N | Travelling | L.Battersby | 1 | |
| 108 | 30/07/99 | Cs | Okukari bay | 41 12.5 | 174 18.5 | 2 | NE | Travelling | L.Battersby | 1 | |
| 109 | 7/08/99 | Cs | E Tory Heads | 41 13 | 17420 | 3 | ? | ? | L.Battersby | 1 | |
| 110 | 19/08/99 | Cs | NE Motuara Island | 4105 | 174 17 | 7 | W | Travelling | L.Battersby | 1 | |
| 111 | 30/08/99 | Cs | NE Motuara Island | 4105 | 174 17 | 5 | NW | Travelling | L.Battersby | 1 | |
| 112 | 11/09/99 | Cs | 1 nm W Cape Koamam | 4105 | 17422 | 5 | NW | Travelling | L.Battersby | 1 | |
| 113 | | | | | | | | | | | |
| 114 | | | | | | | | | | | |
| 115 | East of South Island | | | | | | | | | | |
| 116 | 24/08/91 | ESI | E New Brighton Beach | 4330 | 17245 | 1 | ? | Travelling | T.Sintes | 1 | |
| 117 | late 08/92 | ESI | E New Brighton Beach | 4330 | 17245 | 1 | Nil | Surface active | T.Sintes | 1 | |
| 118 | 6/05/94 | ESI | i km E Katiki Point | 4524 | 17053 | 2 | N | Travelling | J.Fyfe | 1 | |
| 119 | 18/07/94 | ESI | Shag Point | 45 28 | 17051 | 1 | Nil | Grounded in chad.Lilley | | --HB | |
| 120 | 22/10/94 | ESI | loom E Pigeon Bay | 4337 | 17256 | 2 | 1 NNW, 1 E | Travelling | J.Lilley | 1 | l ilri entangled in net |
| 121 | 22/11/95 | ESI | 200m off Opihi River mouth | 44 17 | 17122 | 1 | Nil | Surface active | Timaru Herald | -HB | |
| 122 | 5/11/96 | ESI | 20 km S Taiaroa Head | 45 57 | 17044 | 1 | ? | ? | L.Perriman | -HB | |
| 123 | 4/07/97 | ESI | Near Taiaroa Head | 4546 | 17044 | 1 | S | Travelling | L.Perriman | 1 | juvenile |
| 124 | 18/08/97 | ESI | E Porpoise Bay | 4639 | 16908 | 1 | N | Travelling | J.Fyfe | 1 | |
| 125 | 18/08/97 | ESI | E Porpoise Bay | 4639 | 16908 | 1 | Nil | Surface active | The Southland Times | 1 | pod ofdolphins |
| 126 | 25/06/98 | ESI | E St Clair Beach | 45 55 | 17032 | 4 | N | Travelling | J.Fyfe | 1 | |
| 127 | 7/07/98 | ESI | E Otago harbour entry | 4547 | 17043 | 3 | ? | ? | J.Fyfe | 1 | |
| 128 | 7/07/98 | ESI | E Otago Harbour entry | 4547 | 17043 | 3 | S | Travelling | L.Perriman | 1 | |
| 129 | 16/07/98 | ESI | S Bobby's Head | 45 32.5 | 170 46 | 7 | N | Travelling | J.Fyfe | 1 | |
| 130 | 21/05/99 | ESI | Taiaroa Head area | 4546 | 17044 | 2 | ? | ? | L.Perriman | 1 | -loo dusky dolphins, |
| 131. | | | | | | | | | | | l tip of dorsal missing |

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