STRANDED WHALE AND DOLPHIN PROGRAM OF B.C. - 1987 REPORT

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Live-stranded false killer whale at Ucluelet, B.C. Mark Hobson photo.

The Stranded Whale and Dolphin Program of B.C. has been established recently to investigate cetacean strandings. Obtaining the maximum amount of information from each cetacean stranding is only the first step in creating a database that can be used to determine population trends, as well as allowing for important comparisons in the case of a periodic population event, which may take a serious toll on the population of a species in a certain area. The stranding of more than 600 bottlenose dolphins (Tursiops truncatus) off the eastern coast of North America during 1987 is an example of one of these events. Strandings can also be an indicator of the degree of incidental catch that occurs with commercial net fisheries, which have been identified as a serious threat to some populations of cetaceans in other areas. As well, response to these strandings creates a body of expertise in local veterinarians and biologists which will be of great value in the case of the occasional mass stranding that occurs on the B.C. coast, such as the stranding of 20 killer whales (Orcinus orca) at Estevan Point, Vancouver Island, in 1945 (Carl, 1946).

This summary of cetacean strandings from British Columbia waters for 1987 has been prepared for several reasons. The first is to stimulate interest in obtaining the maximum amount of information and use from such strandings and the second is to disseminate the information obtained from strandings, making it available for researchers, veterinarians, biologists and the general public.

Reported here are four types of strandings; dead strandings (when found); live strandings; animals known to be killed as incidental catches; and animals seen floating dead, but which were not recovered. Each record in itself is an important piece of information which may tell researchers about the presence or abundance of the species in different localities at different times of the year. Also, an increasing amount of information can be gained from a stranding, including type of whale, size, sex, various morphological characteristics, prey species, presence of organochlorines, dioxins, and heavy metals, and in some cases the actual cause of death. This type of information is used by a variety of researchers and will be reported in future publications. This information is made possible by punctual reporting of strandings, thus making the specimen available to qualified researchers before decomposition renders such information unobtainable.

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Twenty-two individual cetaceans were reported to the stranding program in 1987. This is twice the number of strandings recorded in any previous year, most likely due to the increase in reporting effort. Based on the distribution of strandings over the 27,300 km of B.C. coastline, it is probable that many more strandings are going unreported, especially from more isolated areas. We expect that with increased reporting in upcoming years the number of reported strandings should more than double. In areas with well-established stranding networks and equivalent lengths of coastline, up to five times the number of strandings are reported each year.

Eight different species of cetaceans were represented in the records of strandings from 1987. Of these, five were species common to British Columbia: killer whale, harbour porpoise (Phocoena phocoena), Dall's porpoise (Phocoenoides dalli), minke whale (Balaenoptera acutorostrata), and gray whale (Eschrichtius robustus). One species is common in northern areas: humpback whale (Megaptera novaeangliae). One is rare in B.C., having been recorded only a few times previously: Risso's dolphin (Grampus griseus) (Braham, 1983). And one was the first recorded for Canada: false killer whale (Pseudorca crassidens) (Baird et al., 1988). Pinnipeds (seals and sea lions) are not included in this stranding program beacuse the number of strandings each year is high, and the funds and manpower available to deal with strandings are limited.

The information in this report was collected by the authors from ten of the strandings, and the remainder was provided by other individuals and institutions (see Acknowledgements).

An additional 88 cetaceans were caught and killed in the Canadian offshore flying squid experimental driftnet fishery from June through August, including: 58 Dall's porpoise, 16 Pacific white-sided dolphins (Lagenorhynchus obliquidens), 9 northern right-whale dolphins (Lissodelphis borealis), 3 pilot whales (Globicephala macrorhynchus), 1 harbour porpoise and 1 unidentified dolphin.

CAUSES OF DEATH

It is still unknown why many cetaceans strand. Strandings can be categorized into mass and single strandings, mass strandings being those of two or more whales in one event (not including mother and calf).

Single strandings can be due to a number of different causes, often reflecting the normal mortality patterns of a species, with the very young and the very old highly represented. The false killer whale (#87-6) was discovered to be at least 26 years of age by tooth sectioning (Baird et al., 1988). The advanced age was also evidenced by severe osteoarthritis in the atlanto-occipital and radio-humeral joints, and high bioaccumulation of pesticides and heavy metals. The other false killer whale to strand (#87-11) was a juvenile. That the very young also commonly strand is evidenced as well by the juvenile harbour porpoise stranding (#87-12). The extremely emaciated condition, lack of other pathological findings on post-mortem examination, and young age indicate that this individual died of starvation after being separated from its mother. Separation from parents in cetaceans has been found to be the cause of death of juveniles in other studies (Jones, 1987).

TABLE 1. CETACEAN STRANDINGS FOR 1987

Stranding #	Date	Species	Location	Lat. and Long	Stranding Workup/Comments*
87-1	26Jan87	Risso's dolphin	Sandspit, Moresby Is.	53° 12'N, 131° 48'W	1, 2
87-2	17Feb87	Harbour porpoise	Clover Pt. Victoria	48° 24'N, 123° 22'W	1, 2, 3, 4, 5, 9, 10, 15, female
87-3	29Apr87	Harbour porpoise	Macauley Pt. Victoria	48° 26'N, 123° 24'W	1, 4, 5, female
87-4	01May87	Harbour porpoise	McNeil Beach, Victoria	48° 25'N, 123° 19'W	1, 2, 4, 5, female
87-5	00May87	Gray whale	Estevan Pt. VCI.	49° 23'N, 126° 31'W	
87-6	03May87	False killer whale	Denman Island	49° 30'N, 124° 42'W	1, 2, 3, 4, 5, 8, 9, 10, 11,12, 13, 14, 15, male (see Baird et al., 1988)
87-7	11May87	Harbour porpoise	Campbell River, VCI.	50° N, 125° 12'W	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 19, female
87-8	12May87	Killer whale	Englefield, Moresby Is.	53° 0'N, 132° 18'W	male
87-9	21May87	Dall's porpoise	French Beach, Sooke	48° 24'N, 123° 57'W	1, 2, 4, 5, 9, 10, 11, 12, 13, female
87-10	09Jul87	Humpback whale	Smith Inlet	51° 20'N, 127° 20'W	released
87-11	28Jul87	False killer whale	Ucluelet, VCI.	48° 58'N, 125° 34'W	1, 2, male, returned to water
87-12	25Aug87	Harbour porpoise	Gabriola Island	49° 10'N, 123° 45'W	1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 15, female calf
87-13	27Aug87	Dall's porpoise	Becher Bay, Sooke	48° 20'N, 123° 45'W	1, 2, 4, 5, 8, 9, 10, 11, 12,13, 15, 18
87-14	10Sep87	Gray whale	Kyuquot, VCI	50° N, 127° 20'W	45 foot length
87-15	20Sep87	Gray whale	Long Beach, VCI	49° 2'N, 125° 40'W	1, 10, 11, 12, 13, calf
87-16	11Nov87	Killer whale	Ucluelet, VCI	48° 58'N, 125° 34'W	1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 15, 17, male, calf
87-17	18Nov87	Harbour porpoise	Sandspit, Moresby Is.	53° 12'N, 131° 48'W	1, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, male
87-18	12Dec87	Harbour porpoise	Long Beach, VCI	49° 4'N, 125° 50'W	1, 4, 5, 9, 10, 11, 12, 13, male
87-19	12Dec87	Harbour porpoise	Tsawassen	49° 3'N, 123° 5'W	1, 2, 4, 5, 9, 10, 11, 12, 13,14, 15, 16, male
87-20	02Jul87	Minke whale	Tofino, VCI	49° 8'N, 125° 54'W	
87-21	05Aug87	Humpback whale	Union Island	49° 59'N, 127° 30'W	2
87-22	16Nov87	baleen whale	Aristablad Is.	52° 30' N, 128° 50' W	floating, possibly humpback, 50-60 foot

*** Stranding Workup Legend**

1. Measurements taken
2. Photographs taken
3. Radiographs taken
4. Skeleton, whole/partially collected
5. Aging of teeth
6. Blood tests/cultures taken
7. Histology samples taken
8. Gross post mortem examination done
9. Heavy metal toxicology analysis
10. Organochlorine tissue level analysis
11. Dioxin tissue level analysis
12. Duplicate tissue samples storage in Ottawa
13. Duplicate tissue samples storage, Nanaimo
14. Parasitology examination
15. Stomach content analysis
16. Reproduction studies
17. DNA fingerprinting
18. Plaster cast replica of whole/part animal
19. Educational use (anatomy labs, class displays etc.)

The harbour porpoise from Campbell River (#87-7) had recently calved. This, combined with having over 1800 gastric nematodes (Anasakis sp.), trematode invasion of the pancreas and bile duct, localized peritonitis, and osteogenic malformation of three thoracic vertebrae, most likely resulted in weakness and subsequent death by drowning. Cetaceans that have recently calved are seen frequently as dead strandings in other studies (Jones, 1987).

Fractures of vertebral processes in harbour porpoise #87-17 makes death from net entrapment most likely. Net entanglement was also responsible for the death of Dall's porpoise #87-9 and the large number of cetaceans in the experimental Canadian driftnet fishery. The high cetacean mortality has resulted in cancellation of further experimental flying squid driftnet fishing. In total, eight harbour porpoise strandings were reported in 1987, the largest number of a single species to strand this year. Whether this large number represents an unusual mortality rate is unknown, but in other areas, large numbers of harbour porpoise strandings are correlated with increased commercial net fisheries (Seagars et al., 1986). The finding of a cetacean that may have drowned may indicate net entanglement. Close inspection of the external surfaces should always be made to look for marks made by a net.

A high neonatal mortality is becoming apparent in our killer whale population, with a sex predisposition to males. On November 16, 1987, a newborn killer whale calf washed ashore on the west coast of Vancouver Island near Ucluelet. This calf represented the ninth male calf to wash ashore on the B.C. coast, whereas no single strandings of female calves have been reported.

Although no one knows if this is "normal" mortality in neonatal killer whales, it is becoming increasingly unlikely. Why there is a sex predisposition to males is unclear. No evidence of bruising is apparent to indicate aggression by other members of the pod. Whether the organochlorines and dioxins that do get passed in utero to the fetus results in weakness at birth is not known. Organochlorines have been shown to have estrogenic properties, which may have a greater effect on male, versus female, calves. A very high priority has been placed on investigation into strandings of newborn killer whales.

Harbour porpoise #87-19 died with zygomycotic gastritis similar to that seen in a captive killer whale that died in B.C. Such an infection usually indicates a suppressed immune system. Whether this may be related to the immunosuppression seen with organochlorines will be investigated.

Trying to determine cause of death is important, although not often possible. Depending on the degree of decomposition, bacteriology and histology are rarely possible. In many cases, factors contributing to death can be found, but the definitive cause of death may not be possible to determine with confidence. A rapid reporting scheme is essential to aid in determining causes of death in cetacean strandings.

RESEARCH USES:

Determining cause of death is only one part of the investigation of dead-stranded cetaceans. Very little is known about cetaceans, and a stranded specimen can provide researchers with valuable information to help better understand the species. Since 1950, five new species of cetaceans have been classified, and it is postulated that there may be more new species identified in the future, by examining specimens and noting their variations and distributions.

Some of the data collected are listed below. New requests for specimens and data require frequent updating. It is important for investigation teams to take as much advantage of each stranding as possible. Some studies complement others (for example, having individuals aged adds more meaning to organochlorine levels, since they are accumulated throughout the individual's life), but all data help to increase our understanding.

- Morphological data are gathered. In most cases, the specimen is carefully measured and photographed before a detailed post-mortem is undertaken. Individual variation, geographical variation and sexual dimorphism are not well established for many cetacean species. These data are also an important record to complement other studies.
- Depending on the degree of decomposition, a complete post-mortem examination is made.
- The stomach contents are examined. Very little is known about the feeding habits of many cetacean species. In toothed whales, the otoliths (fish ear-bones) and squid beaks remain intact after the rest of the prey has been digested. By examining these, one can tell the species and often even the size of the prey item taken by the whale.
- By examining reproductive organs much can be determined. Cetaceans are unique among mammals in that scars left by old follicles in the female's ovary remain apparent throughout her life. By examining the ovaries, one can determine the number of times a female has ovulated. By examining the testes of a male, an estimate of maturity can be made. The National Marine Fisheries Service (NMFS) in Seattle is utilizing reproductive tracts for population studies.
- By counting the number of layers of dentine or cementum in the teeth, many species of toothed whales can be aged. This helps determine the life expectancy and age of sexual maturity of cetaceans. Age is also important when studies of morphology and toxicology are performed.
- DNA fingerprinting of killer whale skin samples is done by A.R. Hoezel of Cambridge University, England, for genetic studies, including determination of stock (resident versus transient killer whales) and perhaps parentage.
- Most skeletons are archived by the Royal British Columbia Museum in Victoria for their research collection-used by researchers from around the world in population studies, others are used for educational displays or exhibits.
- Toxicology samples are taken from most specimens. Being high on the food chain, long-lived, and often spending time in polluted waters make cetaceans ideal monitors of our environment. Being mammals also makes them good models to extrapolate data to humans. Triplicate samples of blubber, liver, kidney, and brain are usually taken, with one set sent to Dr. Ron Lewis of the Veterinary Pathology Lab in Abbottsford for heavy-metal and organochlorine analysis, one stored with the Stranded Whale and Dolphin Program, and one sent to the National Wildlife Research Laboratory in Ottawa for dioxin analysis and long-term storage. Of interest is that the liver mercury level of the false killer whale (#87-6) appears to be the highest ever reported for any cetacean worldwide (728 ppm wet wt.) (Baird et al., 1988). Brain mercury levels were also quite high. Pesticide levels were unusually high despite the fact that false killer whales typically inhabit tropical to warm-temperate open-ocean areas, giving them minimal exposure to organochlorines.

Veterinarians Ken Langelier, Bill Proctor and Lance Lam examining stranded harbour porpoise in Campbell River. Robin Baird photo

Studies of organochlorine ratios indicate that harbour porpoises tend to reside in certain areas, making them good monitors of organochlorines (Calambokidis, 1986). Because the harbour porpoise is fairly elusive, population studies are often difficult to undertake. The harbour porpoise was once the most common cetacean in the Puget Sound area but has virtually been eliminated, with organochlorines incriminated as the cause (Calambokidis et al., 1985). This year, a record number of eight harbour porpoises were found dead-stranded in B.C., the largest number of any species stranding. Although this may reflect an increasing population's normal mortality, or increased reporting frequency, it may also indicate increased mortality. It is possible that harbour porpoises may be the most common cetacean in B.C. and thus the most well represented in strandings. The importance of investigating strandings of this species should be emphasized.

Studies are currently underway to determine the levels of dioxins in our cetaceans. Levels and the effect they may have on cetaceans have not been previously reported.

- Other samples (muscle, liver, and kidney) are collected for electrophoresis analysis, lung tissue and eyes for separate studies, as well as samples for a histology collection, biochemical assays, electron microscopy, and other studies.
- Occasionally, stranded cetaceans are also important in determining the presence of uncommon species. The false killer whales reported were the first records in Canadian waters, (Baird et al., 1988) and the Risso's dolphin (#87-1) is only the fourth published record from the inshore waters of B.C. Risso's dolphins are generally a tropical to warm-temperate species of dolphin. Three additional, previously unpublished records of Risso's dolphins in inshore waters exist: 6 Risso's dolphins sighted off the southeast tip of Gabriola Island (49° 8'N, 123° 40'W) on August 20, 1978; 10 to 12 sighted off the west side of Thornmanby Island, (48° 29'N, 124° 0'W) on August 27, 1978; and 5 to 8 sighted off Hornby Island (49° 31'W, 124° 40'W), on August 31, 1978--a total of seven records. It is most likely that these three sightings were all from the same group that stayed in the area for at least 11 days. This is unusual as well in that Risso's dolphins are generally a pelagic species, not spending time in such confined areas.

Particularly of interest with the Risso's dolphin stranding at Sandspit in the Queen Charlotte Islands (#87-1) is the time of year. It appears to be the first mid-winter record for this species north of California. The animal most likely died several weeks prior to being discovered on January 26, 1987. Sea surface temperatures for Hecate Strait at that time were also lower than had previously been reported as being frequented by Risso's dolpins, with a December 1986 mean temperature at the Bonilla Island Shorestation of 8.2° C, and a January 1987 mean temperature of 7.8° C. These mean temperatures were over 1° C higher than the mean temperatures for those months based on 26 years of data from the Bonilla Island Lighthouse. Risso's dolphins have been previously recorded at temperatures as low at 10° C (Leatherwood et al., 1980); hence this record in colder water is quite unusual.

Albert Shepard making life size cast of Dall's Porpoise

OTHER USES FOR STRANDED CETACEANS

Dead-stranded cetaceans can also be used for educational purposes in anatomy dissection labs and school courses, and to provide skeletons for displays and lectures.

Artists can also make use of stranded cetaceans. In November 1987, Albert Shepherd of The Whale Museum, Friday Harbor, Washington, made castings from a Pacific white-sided dolphin and a Dall's porpoise to produce fiberglass replicas. Whale art is presently very popular, and strandings can provide models for artists.

As the above illustrates, significant data and use can be generated from each stranded cetacean. It is important that strandings be reported promptly and that investigators be familiar with sampling techniques and know which samples are needed. The Stranded Whale and Dolphin Program of B.C. is currently reviewing collection techniques and data requests, and is in the process of preparing data sheets, protocol lists, and a list of contact personnel. There is a definite need for a coordinated effort along the B.C. coastline among veterinarians, biologists, wildlife officials and the general public. Participation in the program is encouraged and welcomed. People living in isolated areas are especially encouraged to assist, as records from these areas are more difficult to obtain but often--especially in northern areas--are very important. If you would like to assist in this program, please write or phone the authors of this report.

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