

Large Whale Ship Strike Database

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Acknowledgments

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Introduction

Some human-related threats to endangered large whale species are diminishing, and a number of large whale populations are increasing in abundance. However, injuries and deaths resulting from ship collisions with whales remain a significant threat. In North Atlantic right whales, for example, ship strikes are a primary culprit in the slowed recovery of a highly depleted population.

Several papers provide accounts of mortality in large whales due to ship strikes (Laist et al., 2001; Best et al., 2001; Knowlton and Kraus, 2001). These papers review ship strike records through 2000, 1997 and 1999, respectively. We have built on these accounts by assembling a data base of all known ship strikes worldwide through 2002; a number of our records do not appear in previous accounts. Likely, many ship strikes go undetected or unreported as they may occur in remote areas or struck whales may drift out to sea. Thus, the actual number of strikes is undoubtedly much greater than reported here. Nonetheless, the information we provide is, to our knowledge, the most comprehensive set of data to date on this subject. In the geographic scope and in the range of species effected, the data base illustrates the extent of the threat to large whale species.

The intention of this report is to make accessible the known information on ship strikes to large whales world-wide. We have not attempted to provide an extensive analysis of such records herein, as a thorough discussion of a number of these records can be found in Laist et al. (2001). Rather, we have synthesized ship strike reports to large whales into a comprehensive database to

centralize the knowledge base of such incidents. These records indicate that collisions between whales and ships are a world-wide phenomenon which warrants attention.

Materials and Methods

This database is based on a public request for information that NOAA Fisheries received for large whale ship strike records from 1975 to present (2002). Agency staff from NOAA Fisheries' Northeast, Southeast, Northwest, Southwest, Alaska, and Hawaii Fisheries Science Centers and Regional Offices contributed records to this report. In addition, NOAA Fisheries Office of Law Enforcement regional offices provided records of ship strike based on agency investigations (pending cases excluded). Many agency staff worked to the best of their abilities to fulfill this request, but it is possible that some records were overlooked and thus are not included.

In compiling this database, records of ship strikes were drawn from ship reports, marine mammal stranding reports, and NOAA Office of Law Enforcement reports. Following the initial set of data received, additional ship strike records were sought for the purposes of this synthesis through personal communications and a review of the literature on this issue (in particular, Laist et al., 2001; Best et al., 2001). Our records include information through October 2002.

Direct reports from ships, crew and captains are the most reliable source of information on an actual ship strike incident. In these cases, wherein the ship's crew was aware of

the strike, it is often possible to obtain information on ship speed, damage to a ship, and relative degree of severity of the strike to the animal. Ship strike information can also be determined from stranded or floating dead whales in which definitive evidence of a massive internal or external trauma is documented (i.e., lacerations from propellers, fractures, hemorrhaging). However, these data are not always definitive as to whether the strike occurred pre- or post-mortem. In such cases, there generally is no information on how, when, or where the strike actually occurred. A dead stranded whale may drift considerable distance from the site of the actual impact. In the absence of a confirmed location for a ship strike incident, we have listed the site of stranding or site of discovery of the floating animal as the collision location in our database.

Another type of record is the occurrence of a ship entering port with a whale carcass draped across its bow. Generally, in these instances the ship's crew was unaware of the strike. Most often this occurs with large container, tanker and cruise ships, and a collision is only determined after the event when the whale is noticed pinned to a ship's bow by a pilot boarding the vessel or lookouts posted for harbor entry. In 42 of the known or probable cases of ship strike in our database, evidence of a collision was only noticed when a whale was brought into harbor on the bow of a large vessel. In certain rare instances, time and location of impact can be estimated by back-calculating to correlate with a previously unexplained decrease in vessel speed.

Given that crew of large vessels often do not detect the impact of striking a whale, animals may be hit and passed over without observation. Likewise, operators may be aware of a strike but choose not to report it. Therefore, as noted above, it is likely that far

more collisions actually have occurred than the number reported here.

For the purposes of this report, evidence of injury or mortality is defined as blood noted in water; animal seen with cuts, propeller gashes or severed tailstock; animal observed sinking after strike indicating death; fractured skull, jaw, vertebrae; hemorrhaging, massive bruising or other injuries noted during necropsy of animal.

Results

The data base contains a total of 292 records of confirmed or possible ship strikes to large whales (Table 1). Where available, we have noted ancillary information such as vessel type, extent of injury, and vessel speed at time of impact.

Ship Strikes by Species

Eleven species were confirmed victims of ship strikes: blue, Bryde's, finback, gray, humpback, killer, minke, North Atlantic right, sei, southern right, and sperm whales (Figure 1). Finback whales are the most often reported species hit (75 records of strike), followed by humpback (44 records), North Atlantic right (38 records), gray (24 records), minke (19 records), southern right (15 records), and sperm whales (17 records). Far fewer reports exist of strikes to blue (8 records), Bryde's (3 records), sei (3 records) and killer whales (1 record). Several collision incidents were identified as general balaenopterid (3 records of strike), while a large proportion of reported strikes were not identified to species (42 unknown records). We note that coastal species (e.g., right and humpback whales) may be over represented in our data base, due to a greater likelihood of near-shore detection of a ship struck carcass than individuals that may have died

at great distances from shore.

Geographic Distribution of Strikes

Ship strikes to large whales occur world-wide. In our records (and those compiled by others), large whale ship strikes were recorded in waters off Antarctica, Australia, Brazil, Canada, the Canary Islands, France, Japan, Mexico, New Zealand, Panama, Peru, Puerto Rico, and South Africa; in the Caribbean, Mediterranean, and Yellow Seas; and in the Indian and South Pacific Oceans. Our records indicate that ship strikes are most common in North America (Figure 2), but this is almost certainly biased due to sources of data from North American stranding records and enforcement reports. This finding may also be related to the volume of ship traffic along North American coasts. Furthermore, our (the authors) northern hemisphere location increases the likelihood that we learn of reports from North America more readily than elsewhere.

Collision incidents in waters off the United States are recorded from almost every coastal state: Alaska, California, Delaware, Florida, Georgia, Hawaii, Maine, Maryland, Massachusetts, New Jersey, New York, North Carolina, Oregon, Rhode Island, South Carolina, Texas, Virginia, and Washington. Collisions also occurred in three National Marine Sanctuaries (NMS): Stellwagen Bank NMS (humpback, fin, and right whales), Channel Islands NMS (gray and several unidentified whales), and the Hawaiian Islands Humpback Whale NMS (humpback whales).

Records indicate that collisions between vessels and whales in U.S. waters are most common along the east coast, followed by the west coast and Alaska/Hawaii (Figure 3). Collisions were least common in the Gulf of Mexico.

Severity of Strike

Of the total 292 large whale ship strike reports, 48 (16.4%) resulted in injury to the animal and 198 (68.0%) were fatal. Thus, a total of 246 (84.3%) records indicate that whales that were hit or bear evidence of ship strike were in fact injured or killed by the interaction (Figure 4). In most cases the fate of injured whales is not known. Additionally, in 39 collision reports (13.3%), the impact to the whale was unknown, while in 7 reports (2.4%) there appeared to be no sign of injury.

It should be noted that the high injury and mortality figures for all whales in the database include numerous records of stranded or floating animals found dead. Injuries on a whale's dorsal side indicate that the animal was alive when hit, as dead whales generally float belly-up and are thus more likely to be injured ventrally if hit post-mortem. Although strong evidence indicates ship strike in the records included in this database (i.e., propeller marks, bruises, fractures, hemorrhaging, severed flukes), fatalities due to ship strike cannot always be confirmed because it is difficult or impossible to determine in some of these cases whether the strike occurred to the animal pre- or post-mortem. In addition, because many of our records come from dead stranded whales (as opposed to reports from mariners involved in or observing the striking), the database is weighted toward ship strikes resulting in death.

Vessel Type

Collisions between ships and whales are associated with a wide variety of vessel types. From our database, 134 of 292 cases of ship strike include information on vessel type, while in 158 cases the type of ship was

unknown. Of the 134 cases of known vessel type, there are 23 reported incidents (17.1%) of Navy vessels hitting whales, 20 reports (14.9%) of ship strike for container/cargo ships/freighters, 19 (14.2%) reports of ship strike for whale-watching vessels, and 17 reports (12.7%) for cruise ships/liners (Figure 5). Sixteen reports of ship strike (11.9%) are attributed to ferries. Nine cases of ship strike (6.7%) are reported for Coast Guard vessels and eight cases (6.0%) for tankers.

Recreational vessels and steamships were each responsible for seven collisions (5.2%) in the database, while fishing vessels were responsible for four records (3.0%) of strike. One collision (0.75 %) was reported from each of the following: dredge boat, research vessel, pilot boat, and whaling catcher boat.

Although these data provide valuable information regarding the wide range of vessels involved in collisions, care should be taken in interpreting these numbers. As noted earlier, captains of large ships, such as container ships, tankers, and cruise ships may not be aware that a collision with a whale has occurred and thus do not report the incident. It is also likely that captains of ships of all sizes who are under no obligation to report, in fact, do not, out of apathy or fear of enforcement consequences.

It should be carefully noted that the relatively high incidence of Navy and Coast Guard collision reports may be largely a factor of standardized military and government reporting practice rather than an actual higher frequency of collisions relative to other ship types. These two federal agencies are actively involved in large whale protection programs and reporting struck or dead whales to the National Marine Fisheries Service is now a part of standard operating practices.

Ship Speed

Vessel speed at the time of strike was reported for 58 (19.8%) of the 292 cases in our database (Figure 6). The range of speeds at which vessels were operating when a whale was hit was 2–51 knots; and the mean speed was 18.1 knots. The mean vessel speed which resulted in injury or mortality to the whale was 18.6 knots. Of the 58 cases, 19 (32.8%) resulted in injury to the whale and 20 (34.5%) resulted in mortality. Thus, a total of 39 incidents of ship strike (67.2%) with speed associated are known to have resulted in injury or mortality to the animal. When all 58 reports are grouped by speed, most vessels were traveling in the ranges of 13–15 knots, followed by speed ranges of 16–18 knots and 22–24 knots.

Vessel Damage and Mariner Safety

Thirteen records indicate damage to the vessel (as reported by the vessel), ranging from minor to extreme, as a result of impact with a whale. All of the incidents of vessel damage for which speeds were recorded were from collisions at an operating speed equal to or greater than 10 knots.

Many of these ships report cracked hulls or damaged propellers, propeller shafts and rudders. In one case, an 8 m recreational Bayliner traveling at 12 knots cracked its hull when it hit a humpback whale outside Juneau, Alaska. A 126 m Navy vessel sustained a 1.6 m tear in the leading edge of a propeller blade when it struck an undetermined whale species off southern California. By far the most extreme example was that of a 24 m high-speed Navy vessel, which hit an undetermined whale species at a speed over 40 knots off Key West, Florida, and reported severely damaged port and starboard aft strut actuators, broken steering arms, a warped

hull, and ruptured seawater piping which flooded the gas turbine (pers. comm. T. Tucker in Laist *et al.* 2001).

In addition to vessel damage, ship strikes to large whales can also pose a hazard to human safety. In several cases, particularly with small vessels and fast-moving vessels (e.g., ferries), passengers have been knocked off their feet or even thrown from the boat upon impact with a whale. Hazards can be even more severe; Andre *et al.* (1997) in Laist *et al.* (2001) reports a case in the Canary Islands in which a high-speed ferry collided with a sperm whale at 45 knots, killing it and reportedly killing one passenger as well.

Discussion

Many ship strike fatalities almost certainly go undetected, so our database provides a minimum count of such occurrences. In fact, our records may represent only a fraction of the actual number of strikes. Nonetheless, they illustrate the scope and magnitude of the threat of ship strikes to endangered large whale species.

Ship strikes affect at least ten large whale species. Given the low abundance of North Atlantic right whales relative to other species, the frequency of occurrence of ship strikes to right whales suggests that the threat of ship strikes is proportionally greater to this species.

Ship strikes occur in all oceans and off nearly all continents. The small number of collision records from areas outside the United States is undoubtedly due to the much reduced likelihood that such strikes were made known to us. The geographic distribution of our records from North America may, in part, be attributed to the disproportionate amount of collision reporting among different regions,

as well as a function of high shipping traffic volume in some locations. All vessel classes are represented in our database, but it appears generally that relatively large and relatively fast moving vessels are most often involved.

For a variety of reasons, certain vessel classes are likely over-represented in our data. As noted, federal vessels are more likely to report a strike than commercial vessels due to their standardized reporting practice. In addition, awareness that an animal has been struck may depend upon the number of people on board. Federal ships carry substantial crew, a number of whom are generally on the bridge at any one time (bridge crew on Navy vessels often consists of a half dozen individuals or more). Such crews are more likely to spot a whale and/or register that a collision has occurred than a container ship or tanker with only one or two individuals at the helm. This may also be true for whale watch vessels that have passenger witnesses on board, and thus are more apt to report strikes than those vessels for which a collision may not be witnessed by parties other than captain and crew.

Numbers of ship strike reports in our database that appear high for Navy and Coast Guard vessels may also be factor of size and vessel configuration. A ship must register that a whale has been struck in order to report the incident. Most federal ships are smaller than those used for commerce and thus register impact when large ships may not (i.e., a 10,000 ton Naval ship has a greater likelihood of recognizing that a collision has occurred than does a 40,000 ton container ship). Smaller vessels are also more likely to notice collisions by nature of the location of a forward bridge. The bridges of tankers and container ships are generally located hundreds of feet aft and are high above the water; this can result in a line

of sight well beyond the bow that obscures the direct view in the immediate path of the vessel.

Finally, reporting may also be a factor of geography. Navy operations, for example, are often conducted along continental shelf areas, in the same regions where large whale species are likely to aggregate in pursuit, for example, of prey concentrated there. Thus, the frequency of these reports may be more a factor of geographic overlap than vessel class or mariner behavior. The same is likely true for whale watching vessels which are generally the only vessel class in the vicinity of whales expressly because the whales are there.

Figures reported here for death and injury to whales as a result of ship strike may not accurately reflect the true results of impact. Death as a result of a strike was much more common than injury in our database, but this could be an artifact of most records originating with dead/stranded whales. Likewise, records may not indicate the final condition or status of an injured whale. As an example, if an animal was seen bleeding after impact, dove and was not re-sighted, it was classified as an 'injury' in our database. The whale, in fact, may have died subsequently from the injury, but a lack of information in such cases prevents a final assessment of collision impact. In any case, death or injury, such impacts are capable of delivering significant trauma to the animal.

The factors that contribute to ship strikes of whales are not clear, nor is it understood why some species appear more vulnerable than others. Nonetheless, the number of known ship strikes indicate that deaths and injuries from ships and shipping activities remain a threat to endangered large whale species, right whales in particular. We believe the compilation and presentation of these data

will help in defining measures to reduce the incidence of such occurrences.

In an effort to use this database as an effective tool in its protection and stewardship of marine mammals, NOAA Fisheries intends to continue adding to the existing information contained in this report as additional ship strike incidents occur. If you have data to contribute relating to a large whale ship collision, please contact:

Large Whale Conservation and Recovery Program *or*
Marine Mammal Health and Stranding Program
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910
301-713-2322

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Best, P.B., J.L. Bannister, R.L. Brownell Jr. and G.P. Donovan (Eds). 2001. Report of the workshop on the comprehensive assessment of right whales: a worldwide comparison. J. Cetacean Res. Manage. (Special Issue) 2:1-60.

Knowlton, A.R. and S.D. Kraus. 2001. Mortality and serious injury of northern right whales (*Eubalaena glacialis*) in the western North Atlantic Ocean. J. Cetacean Res. Manage. (Special Issue) 2:193-208.

Laist, D.W., A.R. Knowlton, J.G. Mead, A.S. Collet and M. Podesta. 2001. Collisions between ships and whales. Marine Mammal Science, 17(1):35-75.

Figure 1. The occurrence of ship strikes in eleven whale species.

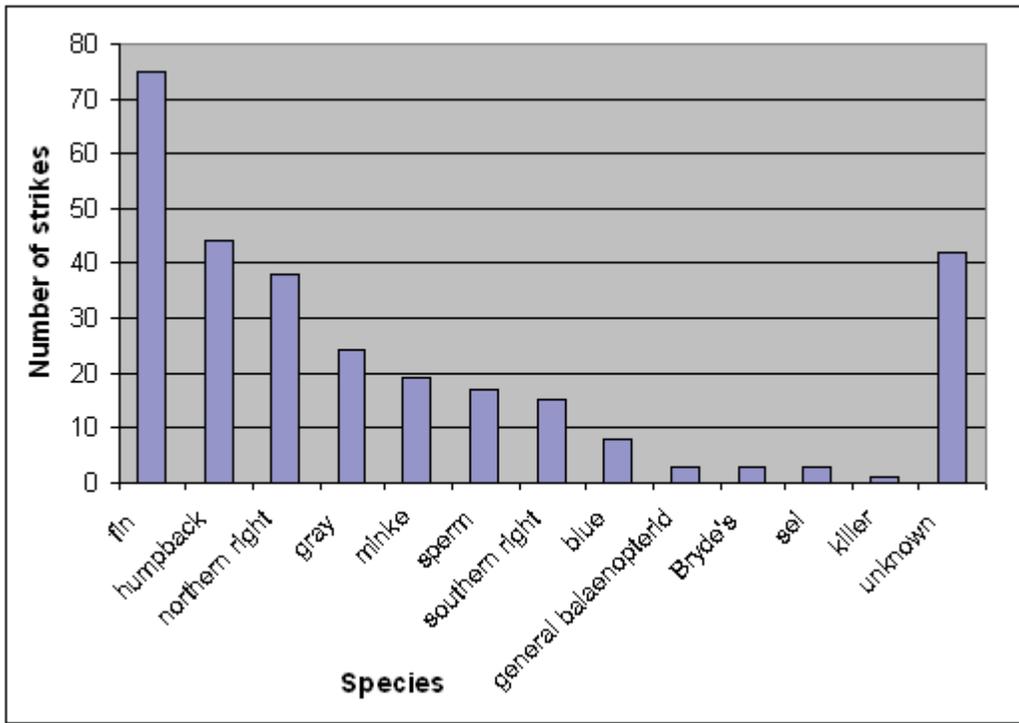


Figure 2. The geographic distribution of ship strikes to large whales world-wide.

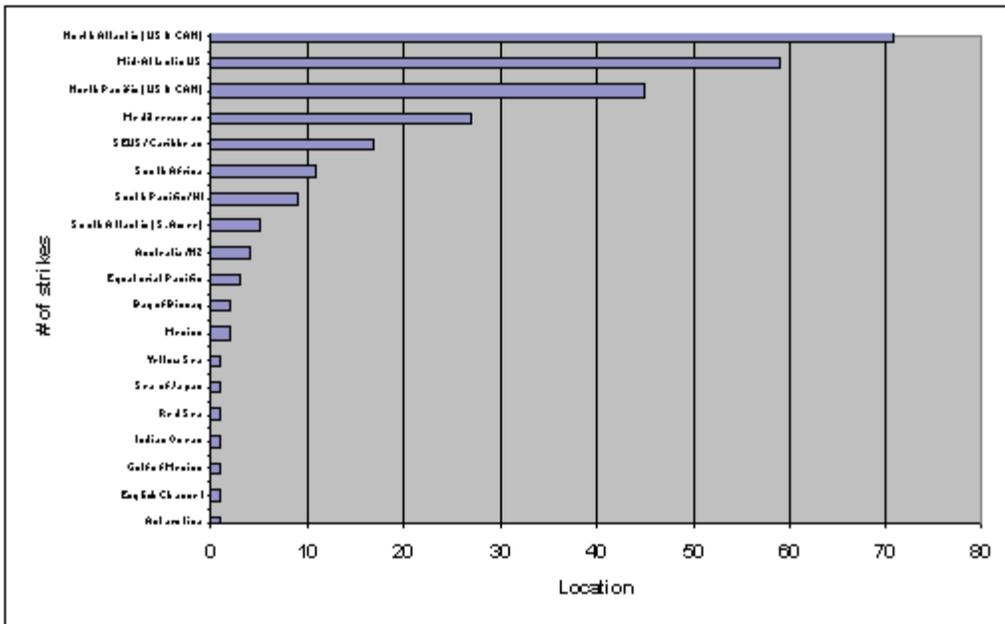


Figure 3. Distribution of vessel strikes to large whales in North America.

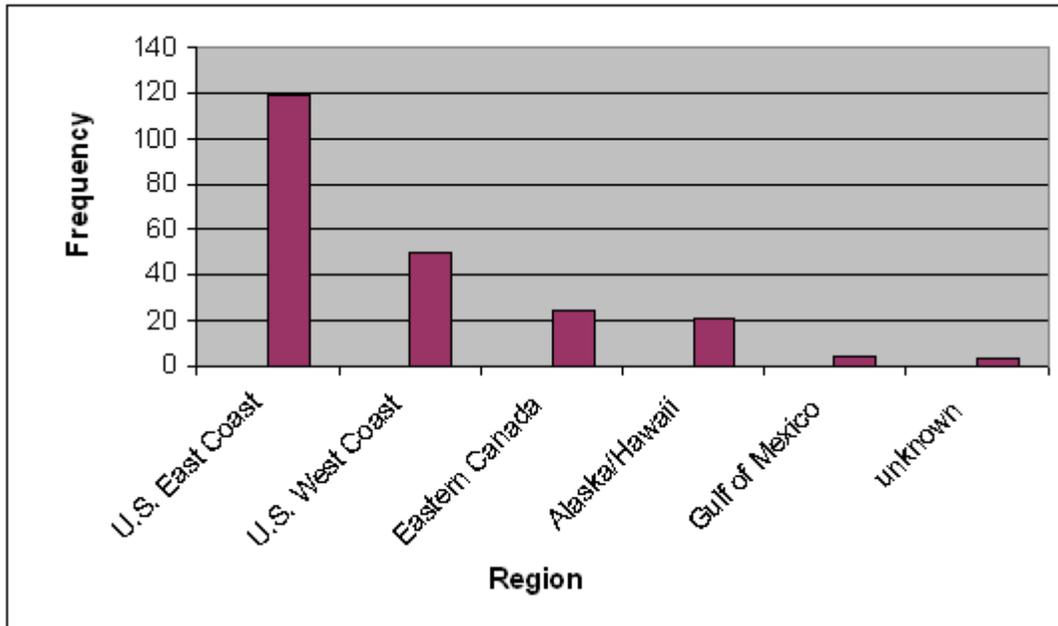


Figure 4. Result of ship strike to large whales.

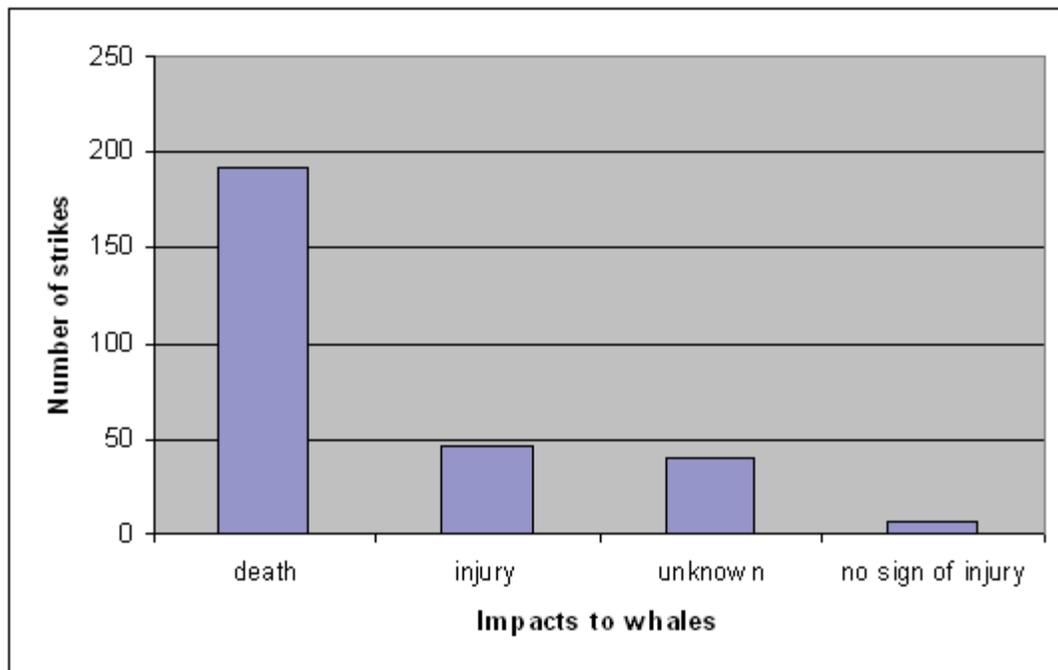
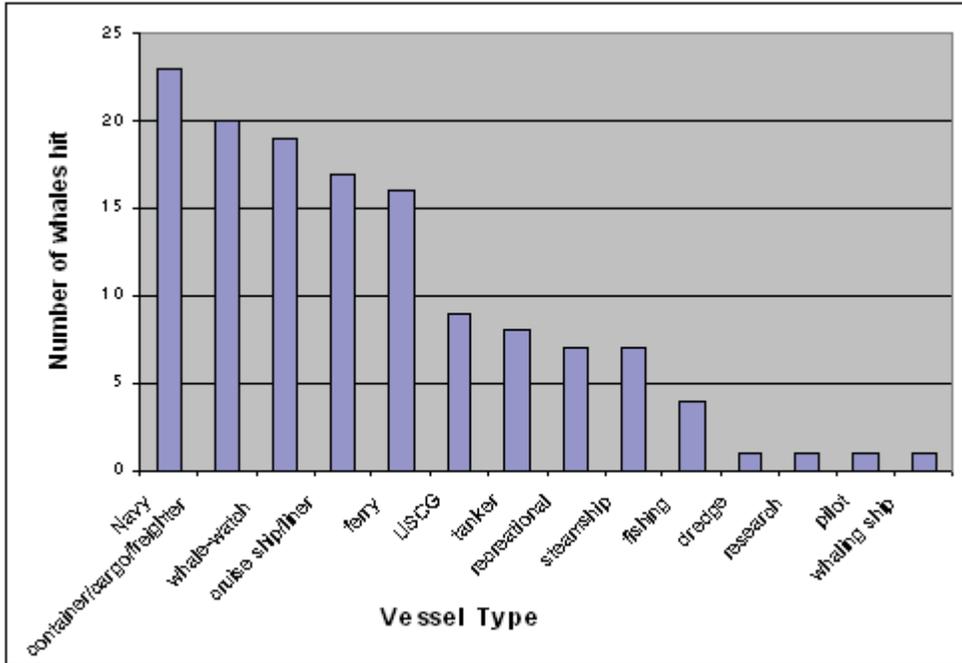
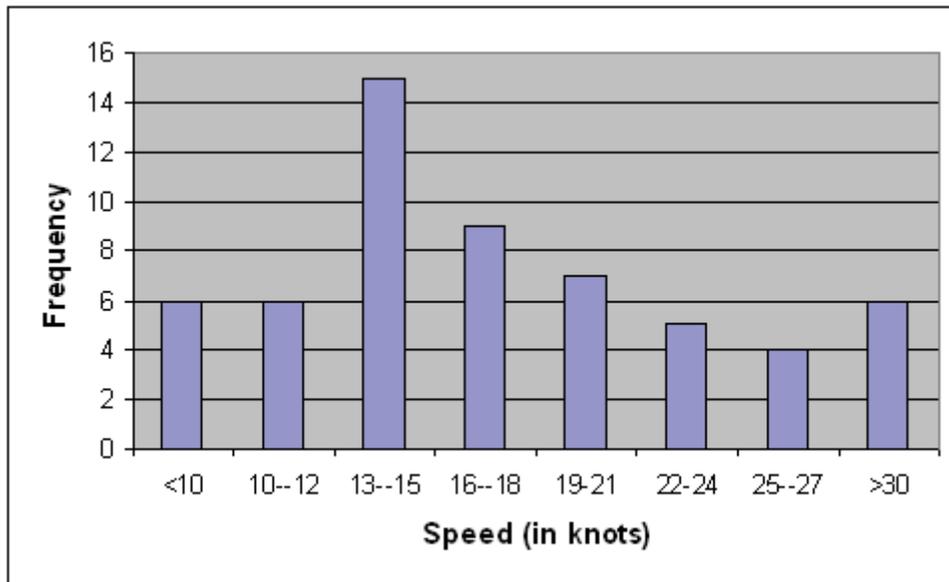


Figure 5. Types of vessel involved in collisions with large whales (where vessel type is reported).



Note: The high occurrence of Navy reports may reflect military and government reporting practice rather than an actual higher frequency of collisions relative to other ship types. Reporting struck or dead whales to NOAA Fisheries is now a part of standard operating practices for Navy and USCG.

Figure 6. The frequency of occurrence of ship speed in ship strike incidents in which ship speed was known.



Source codes and abbreviations for ship strike spreadsheet records:

* = from *Laist et al.* 2001

BO = NOAA Fisheries Biological Opinion

IML = Institute de la Mer et du Littoral, La Rochelle, France

kts = knots

MMC = Marine Mammal Commission

NEFSC = NOAA Fisheries Northeast Fisheries Science Center

nm = nautical miles

NMS = National Marine Sanctuary

NP = National Park

NWFSC = NOAA Fisheries Northwest Fisheries Science Center

NWR = National Wildlife Refuge

OLE = NOAA Fisheries Office of Law Enforcement

SICDD = Smithsonian Institute Cetacean Distributional Database

USCG = U.S. Coast Guard

Vessel names available upon request.

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/ Injury	Field ID
US East Coast							
02/08/02	humpback			Cape Henry, VA		mortality	
10/04/01	humpback			Approx. 5 nm NW of Stellwagen Bank, MA		injury	
06/29/01	minke/small sei		7.6	30 nm southeast of Cape Cod, inbound Boston traffic lane, MA	41-30N, 069-27.5W	mortality	
03/17/01	right			Assateague Is, VA		mortality	
02/01/01	finback			Port Elizabeth, NJ Berthing Channel		mortality	
01/02/01	finback			New York Harbor		mortality	
12/11/00	finback	F	10.8	New York Harbor		mortality	
12/04/00	humpback	M	8.5	0.5 nm offshore Cape Lookout, NJ		mortality	
07/29/00	humpback			Stellwagen Bank NMS, MA		unknown	
05/16/00	sperm			Block Canyon, NJ	39-45N, 71-07W	unknown	
05/14/00	humpback			Stellwagen Bank NMS, MA		unknown	
11/06/99	finback			Port Elizabeth, NJ		mortality	
06/23/99	minke		6 est	Near reserve channel, Boston Harbor, MA	42-19.8N, 70-60W	mortality	
04/20/99	right (Staccato)	F	13.7	6 miles N of Griffin Island, Wellfleet, MA	41-54.3N, 70-9.7W	mortality	
02/10/99	finback	M	15.5	False Cape State Park, VA	36-47N, 75.5W	mortality	
12/12/98	minke			Cape Cod Bay, MA		injury	
10/07/98	right			NC/VA state line		mortality	
09/12/98	minke		6	Barnstable, MA		mortality	
08/02/98	humpbacks			Stellwagen Bank NMS, MA		unknown	
06/07/98	2 humpbacks			Boston Harbor, MA		unknown	
05/24/98	minke			6 nm N of Race Pt, MA	42-14N, 70-10W	injury	
03/21/98	finback			Approx. 7.5 nm off Cape Henry, VA	36-5N, 75-48W	mortality	
03/21/98	finback	F	16.9	Salvo, NC	35-28.4N, 75-29W	mortality	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
				OLE report	
whale-watch vessel		11.7		NEFSC	animal came up under keel of vessel, abrasion 1.5 ft long by 1 in wide seen anterior to dorsal fin
Navy	253	15	N	ship report	crew heard impact and felt shudder, gray and white whale observed lodged on bow, whale sank after ship backed up
				OLE report	
				OLE report	
				OLE report	
				NEFSC	from necropsy: abrasions, bruising, large hemotoma, 4 broken ribs and broken vertebral processes
				NEFSC	from necropsy: many focal hematomas on left side along ribs, but no pattern and no broken bones
				OLE report	
				OLE report	
				OLE report	
				OLE report	
				NEFSC	badly decomposed whale floating in harbor, carcass towed out to sea by MA Environmental Police
				NEFSC	mortality attributed to ship strike, necropsy points very strongly to traumatic incident that fractured the mandible
				NEFSC	from necropsy: large wound on dorsal peduncle ridge, hemorrhaging, fractured vertebrae indicative of ship strike
whale-watch vessel				NEFSC	body of whale seen in wake of whale watching vessel, blood reported
				OLE report	
whale-watch vessel	24	25	Y	NEFSC	whale swam under bow, impact felt, surfaced w/deep, bleeding gash, dead carcass sighted immediately afterward
whale-watch catamaran	36	18.3		NEFSC	whale surfaced in front of vessel, massive, fresh, bleeding wound across back from flipper to flipper
				OLE report	
				NEFSC	
				NEFSC	
				NEFSC	large hematoma evident from necropsy

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/ Injury	Field ID
03/03/98	blue			approaching Narragansett Bay, RI		mortality	
01/03/98	right			Georgia	30-50.7N, 81-9.6W	injury	
08/10/97	unknown			Stellwagen Bank NMS, MA		unknown	
12/10/97	humpback			Beaufort Inlet, NC	34-39N, 76-39W	mortality	
07/20/97	humpback			Cape Cod Bay, MA	42-09.6N, 069-12.9W	unknown	
06/07/97	minke			Sandy Hook Natl. Seashore, NJ	40-28N, 73-59.7W	mortality	
05/12/97	finback		12 est	Boston Harbor, MA	41-23N, 71-02.8W	mortality	
03/21/97	finback		12 est	7.5 nm off VA Beach, VA	36-50N, 75-48.3W	mortality	
11/03/96	humpback	M	8.4	Carrituk, NC	36-18N, 75-48W	mortality	
07/15/96	minke			Off Race Pt., MA		no sign of injury	
07/14/96	finback	M	13.5	Elizabeth Channel, NJ	40-41N, 74-09W	mortality	
05/09/96	humpback	F	7.3	Cape Henelopen State Park, DE	38-36.68N, 75-4.4W	mortality	
04/02/96	humpback	F	7	Cape Story Beach, VA Beach, VA	36-54N, 76-03W	mortality	
03/25/96	right	M		Wellfleet, MA		mortality, stranded	
03/09/96	right	M		MA		mortality	
02/26/96	finback	F	18 est	9 nm off Sandy Hook, NJ	40-18N, 73-46W	mortality	
01/30/96	right		13.7	10 nm east of Sapelo Island, GA		mortality	
11/14/95	finback	F	10	Below Old Cooper River, Charleston, SC	32-48N, 79-56W	mortality	
10/09/95	minke			185 km E of Cape Cod, MA		unknown	
08/13/95	right	F	adult	Gulf of Maine		unknown	
08/01/95	finback		17	48 km SE of Cape Cod, MA		mortality	
06/10/95	minke	F	3.7	Piney Point, MD	38-8N, 76-31.5W	mortality	
06/04/95	humpback	M	8.8	5 nm off Rudee Inlet, VA Beach, VA	36-49N, 75-52W	mortality	
02/01/95	unknown (right?)			Off NC		unknown	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
bulbous bow tanker	148			Ford, pers comm	whale found draped across vessel's bow by port pilot, hemorrhaging indicated whale was alive when struck
				NEFSC	entire left fluke lobe extending beyond dorsal notch severed by propeller, wound healed, status good
				OLE report	
				NEFSC	probable ship strike
USCG	82.3	20	N	USCG BO 6/8/98	humpback observed 5-10 ft under surface, thump heard, ship felt shudder, whale struck on starboard, not re-sighted
				NEFSC	from necropsy: severely decomposed, spine broken, likely ship strike
				NEFSC	floater, moderate decomposition, possible ship strike
				NEFSC	ship strike account in initial report
				NEFSC	acute trauma to skull, blunt trauma to left peduncle, likely ship strike
ferry (?)		15		NEFSC	whale hit, re-surfaced, no sign of injury
				NEFSC	ship strike (pre/post undetermined), adjacent to Maersk Shipping
				NEFSC	ship strike (pre/post undetermined)
				NEFSC	from necropsy: stranded, fractured left mandible, possible ship strike
				NEFSC	from necropsy: prop cuts along back, damaged baleen, thick area of skull broken indicating ship strike
				Best et al 2001	broken skull and 3.3 m long gash on back
				NEFSC	floater, possible ship strike
				Navy BO 5/15/97	hemorrhaging, massive cranium fracturing, cervical vertebrae broken, indicates blunt trauma w/large vessel
				NEFSC	from necropsy: fractures to skull and hemorrhaging indicative ship strike
USCG	64	15	N	NEFSC	whale sighted off starboard, thud and shudder felt, not re-sighted
				Best et al 2001	cut 60-90 cm deep on right side of head below rostrum and into lower lip, orange cyamids on tail and lip edge
bulbous bow cruise ship	173			SICDD*	vibration felt while ship underway off Cape Cod, whale found on ship's bow in Bermuda with broken spine and extensive bruises
				NEFSC	stranding, large cut through skin on dorsal thorax, likely brought 12 mi up Potomac by ship
				NMFS memo	several major lacerations indicative of collision with a propeller, deepest 27cm., whale likely bled to death
Navy				Laist et al 2001	whale breached in front of submarine, struck bow, slid down vessel's starboard, may have been injured on right side

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/ Injury	Field ID
11/17/94	sei		15 est	Charlestown Harbor, Boston, MA		mortality	
08/15/94	minke		2	Hampton Roads, Chesapeake Bay, VA	37N, 76-21.4W	mortality	
08/04/94	right			Gulf of Maine		unknown	
07/19/94	humpback			Stellwagen Bank NMS, MA		unknown	
04/18/94	finback			Penns Grove, NJ		mortality	
04/10/94	humpback			Ocracoke, NC		mortality	
03/12/94	finback	F	16 est	Cape Henry, Chesapeake Bay, VA Beach	36-56N, 76-01.6W	mortality	
02/22/94	right whale calf			FL		mortality (presumed)	
12/31/93	right	F		East of Cape Charles, VA		mortality, floater	
12/06/93	right	M	12--22	NC/VA border, off False Cape		mortality, floater	
12/06/93	right	F		VA		mortality	
10/07/93	humpback			2 km off Atlantic City, NJ		injury	
10/01/93	minke			Sandbridge, VA		mortality	
09/27/93	minke	M	4.3	Ocean City, NJ	38-26N, 75-04.1W	mortality	
Aug-93	finback		15	Boston Harbor, MA	41-23N, 71-03W	mortality	
03/31/93	minke		7.5	New York Harbor, Staten Island, NY	40-39N, 74-03W	mortality	
01/05/93	right whale calf			In transit between Mayport and Ft. Pierce, FL	30-02.44N, 81-16.04W	mortality	
10/09/92	humpback	F	8.7	Metompkin Island, VA	37-46N, 75-32W	mortality	
07/31/92	finback	M	17	Port Newark, NJ	42N, 74.09W	mortality	
06/02/92	finback	F	15.6	Beach Haven Crest, NJ	39-36N, 74-12.5W	mortality	
04/22/92	humpback	F	9	Hatteras National Seashore, NC	35-11.4N, 75-46W	mortality	
04/16/92	humpback	F	9	Assateague National Seashore, MD	38-10N, 75-10W	mortality	
03/15/92	minke	F	6.8	St. Johns River, FL	30-21.1N, 81-18W	mortality	
03/10/92	humpback	F	10.6	Hatteras Natl. Seashore, NC	35-20N, 75-21W	mortality	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
container ship				NEFSC	vessel collision, came in on bow of container ship
				NEFSC	lower jaw broken, had begun to heal, possible ship strike
				OLE report	
				OLE report	
				Laist et al 2001	floating in Delaware River, broken vertebrae, blunt trauma to right pectoral fin and surrounding area
				Laist et al 2001	hemorrhaging in mandible and ventral to left pectoral
				NEFSC	flukes cut off, propeller marks in caudal area
				Best et al 2001	several deep cuts on head and lower lip regions, probable propeller cuts on both sides of dorsal flukes
				NEFSC	
				stranding report	scar on leading edge of fluke near tip and line scar along right side of mid-body, may have been pre-mortem
				Best et al 2001	carcass floating belly up w/large straight gash running from right ventral to right lateral surface anterior to flukes
sport-fishing vessel	10	>10	Y	SICDD*	animal hit while vessel accelerating, 15 min later animal observed "wobbling" while diving, blood seen in water
				Laist et al 2001	left mandible broken
				NEFSC	stranding, possible ship strike, pre/post mortem undetermined
				NEFSC	whale carried into harbor, likely ship strike
Navy				NEFSC	brought in on ship bow, reported to government as ship strike
USCG	25	15	N	Navy BO 5/15/97	calf hit, lacerations observed, carcass found 4 days later w/ 2 series of large propeller cuts from twin engine
				NEFSC	stranding, extensive bruising on right side, internal hemorrhaging on left flank, ship strike
				NEFSC	from necropsy: moderately decomposed, fractured vertebrae mid-section, death due to ship strike
				NEFSC	stranding, several fractured vertebrae, possible ship strike
				NEFSC	stranding, internal damage extensive, possible ship strike
				NEFSC	stranding, skull disarticulated, blunt trauma left side, possible ship strike
				NEFSC	propeller wounds from large vessel
				NEFSC	stranding, net scars on caudal peduncle, possible propeller wounds on fluke

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/ Injury	Field ID
02/14/92	humpback	M	8.6	Floating in mouth of Chesapeake Bay, Virginia Beach, VA	36-59N, 76-08W	mortality	
11/08/91	humpback	M	9	Island Beach State Park, NJ	39-50N, 74-05W	mortality	
08/08/91	unknown			25 nm south of Martha's Vineyard, MA		unknown	
07/06/91	right whale calf		4.6	East of Delaware Bay, DE	38-21.30N, 73-06.30W	mortality	
06/21/91	humpback			Stellwagen Bank NMS, MA		injury	
03/12/91	right	F	2 years	Off FL		mortality	
02/11/91	right	F	calf	Southeast US		injury	
11/25/90	finback	F	13	Curtis Bay, Baltimore, MD	39-40N, 76-40W	mortality	
06/08/90	humpback			Stellwagen Bank NMS, MA		unknown	
02/05/90	humpback		11	S of 18 m marker, Nags Head, NC	35-56.5N, 75-36.5W	mortality	
07/14/89	finback			North Kingstown, RI		mortality	
05/13/88	minke			Duxbury Beach, MA		mortality	
05/13/88	sei			Baltimore, MD		mortality	
05/04/88	finback			Deal, NJ		mortality	
01/15/88	finback			Marshfield, MA		mortality	
08/18/87	finback			Boston, MA		mortality	
02/14/87	right	F	calf	Southeast US		injury	
08/07/86	right	F	1 year	Massachusetts Bay, MA		mortality	
07/02/86	finback			Delaware River, NJ		mortality	
05/06/86	finback			Hoboken, NJ		mortality	
08/27/85	finback			Montauk, NY		mortality	
07/13/85	finback			Stellwagen Bank NMS, MA		unknown	
Aug-84	finback			Stellwagen Bank NMS, MA		injury	
03/07/84	finback			Baltimore, MD		mortality	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
				NEFSC	floater, propeller wounds, fractured mandible and eye socket, possible ship strike
				NEFSC	3 propeller cuts observed on head, one cut fractured the right occipital condyle
				OLE report	
USCG	84	22	Y	Navy BO 5/15/97	2 whales 50 yds off bow, calf rolled out from ship w/propeller gashes on body, sank rostrum up, obviously dead
whale-watch vessel	14	5-10		Sullivan and Young*	bow struck and rode up over whale, fresh nick observed between nares and dorsal fin, subsequently re-sighted healthy
				Best et al 2001	from necropsy: shattered skull from ship strike
				Best et al 2001	series of 3 propeller cuts, maximum 1.2 m long x 15 cm deep on left flank
				NEFSC	apparent boat/ship collision, whale likely killed shortly before being found, ship strike mark mid-lateral left side
				OLE report	
				NEFSC	broken mandible, head damage
				SICDD*	stranding record, fractured lower jaw
				SICDD*	stranded, one large gash and three smaller gashes
				SICDD*	brought in on bow of ship, damaged skull
				SICDD*	boat hit, found floating
				SICDD*	identified as possible ship collision
				SICDD*	folded in half forward of dorsal fin on right side, likely brought into port on bow of ship
				Best et al 2001	series of 5 propeller cuts approx 30 cm long and 8 cm deep on left fluke tip
				Best et al 2001	2 propeller cuts, max. 4.5 m long x 1 m deep running longitudinally along body, severed spine
container ship				SICDD*	reported as struck by container ship
cruise ship				SICDD*	brought into port on bow of ship
				SICDD*	floating with propeller slashes, possible ship strike
				OLE report	
whale-watch vessel	28	16		Weinrich*	whale surfaced immediately in front of vessel, after collision whale was not resighted but blood seen in water
				SICDD*	brought into port on bow of ship, bruising evident

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/ Injury	Field ID
10/14/83	finback			Fire Island, NY		mortality	
07/31/83	finback			Manhattan, NY		mortality	
02/21/83	right	M	2 years	New Jersey		mortality	
01/24/83	finback			Norfolk, VA		mortality	
01/25/83	finback			Norfolk, VA		mortality	
08/02/82	finback			Elizabeth City, NJ		mortality	
03/31/81	finback			Norfolk, VA		mortality	
08/13/80	right	M		In transit between Mayport and Ft. Pierce, FL		injury	
05/25/80	right	M		Great South Channel, MA		injury	
10/18/79	finback			Baltimore, MD		mortality	
03/05/79	right	M	juv	NY		mortality	
11/05/76	right			ME		mortality	
04/15/76	right	M	calf	MA		mortality	
07/08/75	minke			Boothbay, ME		mortality	
winter 1972	right (possibly)			Approx 97 km E of Boston, MA		mortality	
Aug-52	unknown		15	139 km of Montauk, Long Island, NY		unknown	
1940-45	sperm			North Atlantic		mortality	
1940	baleen whale			Off Cape Hatteras, NC		mortality	
1926	unknown			North Atlantic		mortality	
1912-1915	unknown			Off U.S. East Coast		mortality	
1906	unknown			Off Chatham, MA		injured?	
1896	sperm whale?			Off Sandy Hook, NJ		mortality	
1885	unknown			32 km E of Nantucket, MA		injury	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
				SICDD*	slashes on ventral side, possible ship strike
				SICDD*	brought into port on bow of ship
				Best et al 2001	severed tail
				SICDD*	brought into port on bow of ship, bruising evident, reportedly hit off New York
				SICDD*	floating near harbor, bruising evident
				SICDD*	brought in on bow of ship, hit off Boston, MA
				SICDD*	brought into port on bow of ship, later determined to have been hit off Atlantic City, NJ
				Best et al 2001	series of 8 propeller cuts running along left flank and over back, max. 1.2 m length x 15 cm deep
				Best et al 2001	cut along back crossing spine, 1.5 m long x 15 cm deep
Russian cruise ship				SICDD*	brought into port of bow of ship
				Best et al 2001	tail severed
				Best et al 2001	severe lacerations observed on back
				Best et al 2001	large area of bruising observed behind skull, noted as probable ship collision
				Laist et al 2001	stranded, body heavily bruised
bulbous bow container ship	207	21-23		Murphy II*	noticed whale draped across ship's bow in harbor, realized slow speed during night due to impaled animal
Navy	93	14	Y	in Laist et al 2001	whale seen off port, submerged a few seconds before impact, severe damage to vessel
Navy				Slipjer 1962*	
tanker				Burgess 1940*	
ocean liner				Laist et al 2001	
steamship				Laist et al 2001	
steamship				Laist et al 2001	
ocean liner				Laist et al 2001	
pilot boat		13	N	Laist et al 2001	vessel's port bow collided w/whale, whale then seen rolling as if in distress

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/ Injury	Field ID
Eastern Canada							
09/27/97	humpback			St. Lawrence Estuary, Canada		injury	
08/19/97	right	F		Bay of Fundy, Canada		mortality	
09/27/00	right	F		Bay of Fundy		injury	
07/23/00	finback				41-52N, 71-22W	unknown	
07/08/00	right	M		Bay of Fundy, Canada		unknown	
10/19/95	right	M		Bay of Fundy, Canada		mortality	
09/26/95	minke			Bergeronnes, St. Lawrence Estuary, Canada		unknown	
09/16/95	right	M	4 years	Bay of Fundy, Canada		injury	
08/14/94	finback			Tadoussac, St Lawrence Estuary, Canada		injury	
07/29/93	finback			Bergeronnes, St. Lawrence Estuary, Canada		injury	
09/05/92	right	F	adult	Bay of Fundy, Canada		mortality	
06/20/92	finback			Tadoussac, St. Lawrence Estuary, Canada		injury	
08/28/87	right			Browns Bank, Canada		injury	
07/09/87	right	M	juv	Nova Scotia		mortality	
08/14/86	right	F		Bay of Fundy, Canada		mortality (presumed)	
08/05/84	right			Browns Bank, Canada		mortality	
10/09/67	unknown		15-18	Gaspe, Quebec, Canada		mortality	
Jul-67	unknown			South of Halifax, Canada		mortality	
1913	unknown			Off Newfoundland, Canada		unknown	
1910	unknown			North Atlantic		mortality	
1908	sperm			Off Newfoundland, Canada		mortality	
1908	unknown			Off Newfoundland, Canada		mortality?	
1904	unknown			Atlantic Ocean		mortality	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
whale-watch vessel				Menard*	vessel struck humpback after it surfaced off bow, whale much less active and appeared injured after collision
				Best et al 2001	from necropsy: 6 m long haematoma on left side and broken right mandible, no external sign of injury
				NEFSC	seen in July quite healthy, re-sighted in September with deep wound on left side of head
				OLE report	
				NEFSC	seen repeatedly w/ large deep gash on back, wound appears to be from ship strike between 09/99--07/00
				Best et al 2001	4.8 m long gash in back, broken vertebral disks
whale-watch vessel	11	>30		Laist et al 2001	rigid-hulled pneumatic craft collided w/whale, captain could not see directly in front due to high bow
				Best et al 2001	series of propeller cuts, max. 1 m long x 8 cm deep on tail stock and tail, fishing gear through mouth
whale-watch vessel				Laist et al 2001	vessel reported colliding w/whale, hull vibrated, wound seen on animal
whale-watch vessel				Menard*	whale surfaced and struck bow of vessel, wound subsequently observed on animal's back
				Best et al 2001	necropsy revealed internal haemorrhaging from impact w/ship, no external sign of injury
whale-watch vessel				Menard*	vessel collided w/whale while whale-watching, wound visible on animal's back in front of dorsal
				Best et al 2001	1 m of right fluke tip missing, severed by propeller
				Best et al 2001	2-3 propeller cuts on left flank, 20-25 cm deep, shallow gash and swelling on right flank
				Best et al 2001	1 m diameter necrotic wound approx 1 m behind blowholes
				Best et al 2001	series of 5 propeller cuts, approx 60 cm long x 10 cm deep on left flank and near spine
passenger ship	232			in Laist et al 2001	whale observed impaled on ship's bow, animal nearly cut in half as vessel backed to dislodge
Navy	219			Cummings*	whale stuck on bow after vessel speed registered too slow, whale sank when vessel backed down to remove it
cargo ship				Laist et al 2001	
steamship				Laist et al 2001	
ocean liner				Laist et al 2001	
ocean liner				Laist et al 2001	
steamship				Laist et al 2001	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/Injury	Field ID
1903	unknown			Placenta Bay, Newfoundland, Canada		unknown	
US and Canada West Coast							
11/04/02	finback	M	16	Off Waldron Island, WA		mortality	
10/02/02	finback		18.5	Cherry Point, WA		mortality	
08/09/02	finback		17	Elliot Bay, Seattle, WA		mortality	
07/17/02	blue		22-25	8 mi NW of Point Benito, San Fran, CA		mortality	
10/10/01	balaenopterid		15	4.5 mi south of San Nicolas Is., CA		mortality	
08/21/01	balaenopterid	F	15	Los Angeles Harbor		mortality, stranded	
08/20/01	unknown			Channel Islands, 25 nm off San Clemente Is., CA	32-23.5N, 118-50.3W	injury	
08/15/01	unknown			Channel Islands off San Clemente Island, CA	32-34N, 118-25W	injury	
07/28/01	unknown			10 mi off Solana Beach, San Diego, CA		unknown	
01/09/01	gray		3.6	3 mi offshore Montana de Oro State Park, CA	35-20N, 120-56W	injured	
05/28/00	humpback	F	12	Fiddler's Cove, south of Pescadero State Beach, CA		mortality, stranded	C 124
03/19/00	gray	M	12	2 mi W of Orick, Redwood National Park	41-15N, 124-00W	mortality, stranded	VM 2388
12/19/99	gray	M	12	Muir Beach, Golden Gate National Recreation Area		mortality	C 101
05/05/99	unknown			3 nm offshore, Davenport, CA	36-56.8N, 122-05.08W	unknown	
04/30/98	gray	F (juv)	12	Stinson Beach, Marin County, CA		mortality, stranded	C 84
04/28/98	gray		6 est	En route to San Diego, CA	32-43N, 117-24W	mortality	
04/24/98	gray		9 est	CA	31-58N, 118-35W	mortality	
01/02/98	gray		12 est	San Pedro, LA county, CA	33-14N, 118-08W	injury	
01/23/99	gray		7.6	Off N Coronado Is, 5 mi from west end, CA		unknown	
01/07/98	gray calf	F	4.5	Crescent City Harbor, CA		injury	C 79
08/31/97	unknown			Dixon Entrance, Canadian waters		unknown	97045
03/25/97	gray		6 (w/o head)	Vandenberg Airforce Base, 1.5 mi N of Purisma Pt., CA		mortality, stranded	VAFB 97-01

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
steamship				Laist et al 2001	
				<i>San Juan Islander</i>	necropsy indicated blunt trauma through massive hemorrhaging, symmetrical fractures, displaced spine
tanker	46,100 gr tons			NWFSC	ship was en route from Valdez, AK, strike was pre-mortem
container ship	75			NWFSC	whale brought in on bow of ship, gored, strike was pre-mortem
				NOAA Fisheries	four dorsal propeller gashes, animal eviscerated by encounter
freighter				stranding report	animal initially sighted w/2 other whales prior to vessel collision w/freighter
				stranding report	carcass floating on back, 35 ventral grooves visible, large gash in gular region
Navy	57.3			stranding report	diving whale observed off starboard, shudder felt, blood observed in water, whale not resighted
Navy	153.9			stranding report	whale rolled over after collision, disappeared under ship, blood observed in water, whale not resighted
Navy	133	21		stranding report	prior to strike, whale observed 30 yds. off bow, after strike whale surfaced off port bow and swam away, no blood observed
				stranding report	animal sighted thrashing at surface, flukes completely severed, bleeding, final status unknown
				stranding report	skull smashed, suspect ship strike
				stranding report	large gouge on dorsal surface behind blowhole, blood on palate and coming from blowhole
				stranding report	carcass first found floating under Golden Gate Bridge on 12/18/99, rumor of boat strike
USCG				stranding report	ship hit whale and it breached 2-3 times, no blood observed, no animal found on revisitation of site
				stranding report	blood pouring from mouth in surf, then stranded on beach w/massive hemorrhage in thoracic cavity
Navy	153.9	22	N	stranding report	whale sighted at 2000 yds, 10 min later ship shuddered, whale observed wrapped around upper bow stem, then sank
Navy	172.8	14		stranding report	whale sighted 1 nm off bow, 1.5 hrs later whale found wrapped around bow, ship backed down, whale sank
USCG	25			stranding report	collision resulted in six 1-ft gashes in animal's side, final status unknown
				stranding report	eyewitness account; animal appeared stunned after collision but no blood observed, animal swam away
				stranding report	calf bleeding profusely on dorsal side, believed to be propeller wound
cruise ship	214			stranding report	called in by passenger, audible sound of boat strike as whale surfaced directly in path of vessel
				stranding report	apparent clean cuts indicating vessel collision, head and left flipper missing

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/ Injury	Field ID
02/15/97	unknown			11 mi off Catalina Island, CA		injury	
02/11/97	finback		7.6	LA harbor, CA	33-44.30N, 118-17.00W	mortality	JEH 483
09/17/96	finback		14.5 est	Huntington Beach, CA		mortality	
03/07/95	gray			2.5 mi SE of Point Loma, San Diego, CA		unknown	
03/05/95	humpback		15	Westminster St., Venice, CA		mortality, stranded	JEH 465
01/02/95	gray			Off Anacapa Island, Channel Islands, CA		unknown	
05/14/94	gray		7.6 est	Pismo Beach, San Luis Obispo, CA	35-00N, 120-30W	mortality, stranded	MZH 0005
08/02/93	blue	F	24.4	San Nicolas Island, west end, Ventura County, CA		mortality, stranded	TDL 169
04/06/93	gray			En route from San Diego to Dana Pt, CA		injury	
08/12/91	finback	M	13.5	LA harbor, CA	33-44N, 118-16W	mortality	JEH 434
08/06/91	gray		10.7	8 mi off Oceanside, San Diego County, CA	33-08N, 117-31W	mortality	
04/13/91	gray	F (juv)	9.6 est	Point Richmond, East Bay Regional Park, CA	37-55N, 122-21W	mortality, stranded	JC 1
04/03/91	gray	M	12	Hamilton Air Force Base, Marin County, CA	38N, 122W	mortality, stranded	RLD 382
04/17/91	gray	F	11.4	San Francisco Bay NWR, north of Dunbarton Bridge, CA	37-31N, 122-06W	mortality, stranded	
06/15/90	unknown			Open water S of Clemente Island, Channel Islands, CA	32-39N, 117-47W	unknown	
05/31/90	unknown		12	Open water S of Clemente Island, Channel Islands, CA	32-48.2N, 118-44.7W	mortality	
late 1980's	finback		20	Seattle, WA		mortality	
06/11/89	blue		20	Tacoma, WA		mortality	
03/05/88	gray			Outside Los Angeles Harbor, CA		unknown	
01/11/88	gray	F	8 (juv)	Towed to NMFS dock, Marin County, CA		mortality	RLD 266
08/03/87	blue	F	14	Long Beach Pier J container terminal, CA		mortality	JEH 360
05/02/87	gray	F	11.5	Ft. Baker, Sausalito, Marin County, CA		mortality	RLD 187
02/14/87	gray	M	4.3	SE side of Ventura River, CA		mortality	87-2
01/24/85	unknown			Off southern CA		injury	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
rubber inflatable	6	34.8		stranding report	blood in water after collision, injury assumed
freighter or container				stranding report	carcass brought in on bow of unknown freighter or container ship, head and tail missing
freighter				stranding report	animal brought in to harbor on bow of freighter
24-ft runabout, private				stranding report	eyewitness account, animal hit in tail stock area, no apparent injuries
				stranding report	boat collision
whale-watch vessel				stranding report	eyewitness account, whale initially exhibited erratic behavior when hit, then swam away, no blood observed
				stranding report	possible propeller marks
				stranding report	large hematoma on lower right jaw & gular region, 3-5 cuts through ventral pleats indicated propellers, apparent ship strike
Navy	19.8	22	Y	OLE report	whale received 7 x 3-4 in slice along back, circled after collision, bleeding profusely, rolled over, stopped moving
American President Line				stranding report	whale hit by ship north of LA harbor and brought in draped across bow
Navy				stranding report	animal suffered 7 x 3 x 4 in gash on dorsal surface from propeller, bled profusely after collision, then floated belly-up
				stranding report	6-7 fresh cuts on back, appeared to have been made by propeller
				stranding report	5 cuts on right side and dorsal, appear to have been made by propeller
				stranding report	possible vessel collision
Navy				stranding report	vessel collided w/whale, large blood pool observed, survival not probable
Navy	133.5			stranding report	ship struck left side of whale, large portions of whale's remains floated at surface in large pool of blood, then sank
container ship				Ford, pers comm	ship en route from Japan arrived in harbor with whale draped across bow
container ship				Ford, pers comm	whale found draped across bow of ship arriving from southern California
tanker				Laist et al 2001	pod of whales seen directly ahead, dove to avoid ship, last whale to dive was hit, ship did not change course or speed
				stranding report	whale killed by large ship's propeller which severed spinal cord dorsally at skull's occipital
container ship	176			stranding report	hit in Santa Barbara Channel, pushed into harbor
				stranding report	evidence of vessel collision, wound from large ship's propeller
				stranding report	propeller lacerations (4) through dorsal vertebra and base of tail
Navy	126		Y	Tucker in Laist 2001	crew noted back and tail of large whale, large pool of blood astern, increase in aft vibration

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/ Injury	Field ID
10/24/80	blue		18	North Pacific		mortality	
01/22/75	gray			Off Pt. Loma, CA		mortality	
12/26/73	orca		calf	Strait of Georgia, B.C., Canada		injury	
11/29/65	sperm			200 km W of San Francisco, CA	37-30N, 123-31W	injury	
Alaska and Hawaii							
04/04/02	humpback			Several nm off Maalaea Harbor, Maui, HI		no sign of injury	
07/16/01	humpback	F		Glacier Bay NP, AK		mortality	
06/19/01	humpback			Dixon Entrance, AK	54-40N, 130-49W		
02/13/01	humpback		5--6	1.5 nm E of Olowalu Pt, Maui, HI	20-46.74N, 156-35.96W	injury	
02/08/01	humpback			2-3 nm S of Club Lanai, HI		injury	
08/16/00	finback			Uyak Bay, AK	57-38.5N, 153-55.9W	no sign of injury	
11/02/99	humpback			Metlakatla, AK		unknown	
07/28/99	humpback		10.6-13.7	Stephens Passage, 60 nm S of Juneau, AK		mortality	
06/04/99	finback		20	Vancouver, Canada		mortality	
03/06/99	humpback		calf	Waters between Maui and Lanai, HI		injury	
02/16/99	humpback		juv	2 mi S of Magregor Point, Maui, HI		injury	
09/24/98	humpback		18	North Pass, outside Juneau, SE AK		unknown	
08/11/98	humpback			North Pass, outside Juneau, SE AK		no sign of injury	
03/30/98	unknown		3.6	Near Pearl Harbor, HI	21-18.01N, 157-57.51W	unknown	EN-98-06-OH
10/12/97	sperm		12-15 est	60 mi SW of Middleton Is, Prince William Sound, AK		no sign of injury	
07/12/97	humpback			NW Shelter Is, outside Juneau, AK		injury	
05/30/97	unknown			Resurrection Bay, Prince William Sound, AK		unknown	
05/20/97	gray	F	10.9	1/4 mi S of Kah Shakes Cove, AK	55-02.00N, 13-00.00W	mortality	
05/16/96	unknown			Blying Sound, Gulf of Alaska, AK	59-23N, 145-09W	injury	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
bulbous bow freighter	174			Laist et al 2001	whale drifted free of bow upon arrival in harbor, thought to have been on bow for at least 5 days
Navy	72 tons	51	Y	Laist et al 2001	ship hit whale, vessel came to dead stop w/i 30 m, next day dead whale w/severed tail stranded near collision site
commercial ferry	152	15-18	N	Ford et al 1994*	crunch heard at ship's stern, blood in wake, bull, cow and 2 calves, 1 calf bleeding profusely from visible prop slashes
whale catcher boat	41		Y	Cummings*	vessel approached cow/calf pair, female dove and was hit while surfacing, thrashing whale seen in boat's wake
whale-watch catamaran	19.8		N	OLE report	vessel in neutral, whale surfaced underneath and lifted right stern of vessel several inches
				OLE report	
USCG	33.5	12		stranding report	whale surfaced 10 ft in front of vessel, ship backed down and came to all stop, crew heard thump
whale-watch catamaran	19.7	17	N	OLE report	bump felt on starboard, vessel heeled slightly, young whale surfaced 75 yds away in wake, no blood observed
whale-watch inflatable raft	13.2	15.6	N	OLE report	whale surfaced in front of vessel and was struck by keel, dove and swam away, blood seen in water
USCG	33.5	17		stranding report	whale surfaced and vessel came down on top of it, animal appeared to be uninjured and swam away
Bayliner pleasure craft				stranding report	vessel struck whale while underway, skin left on bow, status unknown
cruise ship	243.8	19	N	stranding report	vibration felt while underway, whale observed wrapped around ship's bow, came loose and sank when ship slowed down
cruise ship	259.7			Ford	ship arrived in harbor en route from Alaska, carcass draped across bow, captain and crew unaware of strike
high speed ferry	16.8			OLE report	vibration from strike felt on vessel, blood in wake as calf surfaced and disappeared, adult whale surfaced and dove
Bertram fishing charter	9.4	12	N	OLE report	boat made contact w/whale, animal surfaced w/blood in water then dove, cut observed on back behind dorsal fin
Bayliner	7.3	12	Y	stranding report	whale surfaced under bow as boat crossed its back, spasmed and dove, knocked vessel and cracked its hull
whale watch catamaran	23.8	2 (rev idle)		stranding report	whale surfaced under catamaran while idling, no evidence of injury
Navy	110.3	8	N	Navy report	whale crossed 20 ft in front of ship's bow back and forth, vessel struck animal on 2nd crossing, animal swam away
fishing vessel		6	N	stranding report	captain reported whale hit on tail, seemed unharmed, went back to feeding
skiff				stranding report	whale hit skiff, turning it over and dumping two people into water
whale-watch vessel	18	20	Y	NMFS memo	large whale surfaced in front of vessel, captain throttled down but whale hit hard, not seen after collision
				stranding report	deep gash on top of head indicative of vessel strike injury
USCG	115	15	N	NMFS memo	whale surfaced 50 yds off vessel, attempt to turn unsuccessful, impact felt, blood in water, no carcass

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/ Injury	Field ID
01/16/96	humpback			Off Kihei, Maui, HI		no sign of injury	
06/01/95	unknown			Summer Sound, Southeast AK		injury	
US Gulf Coast							
04/10/99	right			Unknown		unknown	
10/23/98	sperm			Ocean Shore Blvd, Ormond, FL	29-21.1N, 81-4.5W	mortality	
07/22/97	minke					unknown	
12/20/96	finback	M	14	Floating at port dock	32-07.3N, 81-07.9W	mortality	
02/19/94	humpback		8.2	Gulf, Gordon Pass, FL	26-8N, 81-48W	injury	
04/09/90	sperm	F	8.4 est	Grande Isle, LA	29-15N, 89W	mortality	
04/16/91	unknown			Off Key West, FL		unknown	
30-Jan	right		calf	Texas		mortality	
International							
08/07/02	sperm		9	30 nm south of Marquesas	23-56.3N, 82-06.5W	injury	
07/22/02	southern right	M	adult	Argentina		mortality	
06/18/01	sperm			20 mi south of Puerto Rico, Caribbean Sea		mortality	
02/28/01	humpback			Off Enterprise Island, Antarctic Peninsula, Southern Ocean		no sign of injury	
02/01/00	humpback	N/A		Off Antarctic Peninsula, Southern Ocean		injury	
01/11/00	Bryde's	N/A	12.4	SW of Bonaire, Caribbean Sea		mortality	
08/05/98	unknown	N/A		Mediterranean, Nice Harbor, France		unknown	
07/10/98	southern right	F	calf	Die Dam, Quoin Point, S. Africa		mortality	
1997	sperm	F	cow/calf pr	Canary Islands	28-11N, 15-32W	mortality	
08/09/97	sperm			Ischia, Campania, Italy		mortality	
07/31/97	minke			Genova, Liguria, Italy		mortality	
02/24/97	finback	M	5.2	Mediterranean Sea, Marseille		mortality	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
whale-watch catamaran	25	9	N	OLE report	vessel came down on top of whale (three in close pod)
fishing vessel	27	9	N	Laist et al 2001	vessel struck whale head-on along port bow, whale observed swimming in circles before contact w/animal lost
				OLE report	
				NEFSC	head detached, possible boat propeller scar
Navy	169.5			Navy memo	
				NEFSC	found on ship's bow
				NEFSC	propeller wounds, seen from 2/19-2/21 swimming normally, likely ship strike
				NEFSC	deep cuts on dorsal surface indicate the ship strike was probably pre-mortem
Navy	24	<40	Y	Tucker*	ship struck whale, extensive damage to vessel, cost \$1 million
				Best et al 2001	body severed approx 1 m forward of tail stock
				USCG	whale's pectoral fin cut in half, swimming slowly, fate unknown
				NMFS	
Navy	154	27	N	MMC letter	commanding officer felt shudder on impact, large blood slick in ship's wake, found dead whale upon circling back
inflatable zodiac	5.8	13-15	N	ship report	two whales surfaced immediately in front of zodiac, one hit just below dorsal fin, no sign of blood in water or injury
passenger ship	118	14.3	N	Wikander*	2 whales surfaced 14 m off bow, 1 came up directly under bow and was hit w/loud thud and shudder, blood in water
cruise ship	214	22	N	De Meyer*	harbor master observed whale on ship's bow, time/location of collision determined from decrease in speed during night
high-speed ferry		30	Y	Collet*	vessel hit unidentified whale
				Laist et al 2001	tail cut off
commercial ferry	100	25		Andre*	cow/calf pair resting at surface, loud sound heard, bodies of both animals observed behind vessel amidst blood
				Laist et al 2001	stranded, 3 deep wounds
				Laist et al 2001	stranded w/fractured skull
				Laist et al 2001	stranded, large hematoma on right side of thorax, possible ship strike

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/ Injury	Field ID
01/24/97	sperm			Messina, Sicily, Italy		mortality	
07/28/96	southern right		14.6	Scarborough, Cape Peninsula, S. Africa		mortality	
07/26/96	finback	M	14	Mediterranean Sea, between France and Corsica		mortality	
09/26/95	finback	F	18	Mediterranean Sea, Fos sur Mer		mortality	
05/25/95	finback			Livorno, Tuscany, Italy		mortality	
06/17/95	blue			Approaching Hauraki Gulf, New Zealand		mortality	
06/17/95	finback			Shearness Harbour, Kent, United Kingdom		mortality	
11/10/94	southern right		10.7 juv	Shell Bay, St. Helena Bay, S. Africa		mortality	
10/31/94	unknown			22 km W of Niigata, Japan, Sea of Japan		injury	
09/22/94	southern right		11 juv	Kabeljoubank, Breede River, S. Africa		mortality	
07/19/94	finback	M	14.5	Atlantic Ocean, English Channel, Le Havre		mortality	
05/20/94	finback			Cagliari, Sardinia, Italy		mortality	
1994	sei			Approaching Hauraki Gulf, New Zealand		mortality	
10/10/93	southern right	F	calf	Lekkerwater, De Hoop, S. Africa		mortality	
Oct-93	southern right			Rio Grande do Sul, Brazil		mortality	
09/09/93	finback			Mediterranean, St. Tropez, France		mortality	
09/09/93	finback	F		Mediterranean, Toulon Harbor, France		mortality	
08/16/93	southern right		calf	Between Long Beach and Koppie Alleen, S. Africa		mortality	
1992	southern right			Rio Grande do Sul, Brazil		unknown	
05/15/92	bryde's		12	Bass Strait, Australia		mortality	
04/04/92	unknown			19 km W of Callao, Peru		injury	
Feb-92	sperm			Canary Islands	27-56N, 14-34W	mortality	
1991	southern right			Rio Grande do Sul, Brazil		mortality	
05/13/91	finback	M	18.8	Atlantic Ocean, Bay of Biscay, Donges		mortality	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
				Laist et al 2001	stranded w/propeller wounds, fractured skull
				Laist et al 2001	broken rostrum and missing skull bones
ferry				Laist et al 2001	brought into port on bow of ship
merchant ship				Laist et al 2001	brought into port on bow of ship
				Laist et al 2001	brought into port on bow of ship, fractured jaw and other wounds
container ship				Ford, pers comm	ship entered Auckland harbor with whale on bow
container ship				Ford, pers comm	whale found wrapped around bow in harbor, pre- or post-mortem strike undetermined
				Laist et al 2001	diagonal slashes across genital aperture
high speed jetfoil ferry	31			Honma et al. 1997*	after collision, tissue and bone indicative of marine mammal removed from waterjet suction pipe at vessel stern
				Laist et al 2001	cuts across back
merchant ship	190			Laist et al 2001	brought into port on bow of ship
				Laist et al 2001	stranded w/propeller wounds on right side, fractured right flipper
container ship				Ford	ship entered Auckland harbor with whale on bow
				Laist et al 2001	tail cut off
				Best et al 2001	whale stranded w/4 propeller cuts on tail stock
				Laist et al 2001	hit by ship, seen floating at sea
bulbous bow ferry	159	20		Collet*	crew felt shock and strong vibrations, decrease in vessel speed, 3 hrs later observed whale caught on bow in harbor
				Laist et al 2001	tail cut off
				Best et al 2001	trawler reported striking a right whale
bulbous bow container ship	121	14		Wapstra*	whale found draped around hull upon entering harbor, necropsy indicated whale alive when hit
research vessel	89	14	N	Ainley*	shudder was felt, blood seen in ship's wake, numerous whales seen in area nearby
high speed ferry	20	45		Andre et al. 1997*	collision resulted in death of one passenger
				Best et al 2001	two halves of right whale found approx 1/2 mile apart
tanker				Laist et al 2001	brought into port on bow of ship, broken jaw

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/ Injury	Field ID
04/30/91	finback			Genova, Liguria, Italy		mortality	
28-Apr	finback			Porto Torres, Sardinia, Italy		mortality	
1989	southern right		juv	Rio Grande do Sul, Brazil		mortality	
05/20/89	finback			Olbia, Sardinia, Italy		mortality	
09/07/88	southern right	M	14.1	7 km outside Port Elizabeth Harbor, S. Africa		mortality	
01/16/88	sperm			Cagliari, Sardinia, Italy		mortality	
05/22/87	finback			Olbia, Sardinia, Italy		mortality	
04/27/87	sperm			Savona, Liguria, Italy		mortality	
11/06/86	finback		16	Mediterranean Sea, Fos sur Mer		mortality	
06/28/86	finback			Livorno, Tuscany, Italy		mortality	
06/23/86	finback			Livorno, Tuscany, Italy		mortality	
01/21/85	finback	M	18	Mediterranean Sea, Port La Nouvelle La Franqui		mortality	
10/16/84	southern right		7.2 calf	East London Harbor, S. Africa		mortality	
02/08/84	southern right			Jakkalsfontein, S. Africa		mortality	
07/27/83	southern right		14.3 adult	Beachview, Port Elizabeth, S. Africa		mortality	
09/19/82	finback		13.5	Mediterranean Sea, Villeneuve les Maguelonnes		mortality	
07/05/80	blue			64 km W of Ensenada, Mexico		mortality	
10/19/76	finback	F	12.5	Atlantic Ocean, Bay of Biscay, France		mortality	
04/03/76	finback	M	14.3	Mediterranean Sea, Toulon		mortality	
1974	unknown			Cook Strait, N.Z.		injury	
09/10/74	finback		15	Mediterranean Sea, between Menton and Antibes		mortality	
04/23/74	unknown			<2 km off Baja Peninsula, Mexico		injury	
Oct-73	unknown			Bay of Bengal, Indian Ocean		mortality	
08/30/73	finback		15	Mediterranean Sea, between France and Corsica		mortality	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
ferry				Laist et al 2001	brought into port on bow of ferry
				Laist et al 2001	struck by ship 1.5 mi from port, seen alive w/deep wound on back, found dead a day later
				Best et al 2001	stranded w/propeller cuts on head
ferry				Laist et al 2001	struck by ferry near entrance to harbor
twin screw ferry				Laist et al 2001	impact with whale felt, blood in water, three days later whale stranded w/propeller gashes and damaged rostrum
				Laist et al 2001	stranded w/propeller wounds
				Laist et al 2001	brought into port on bow of ship
				Laist et al 2001	stranded w/propeller wounds
tanker				Laist et al 2001	hit by tanker, brought into port on bow of ship
				Laist et al 2001	floating offshore with propeller wounds on back
				Laist et al 2001	floating 5 mi offshore with propeller wounds on back
				Laist et al 2001	stranded, large propeller cuts on back, probable ship strike
Hopper dredge	110			Best et al*	cow/calf pair surfaced in front of dredge, calf took full brunt of impact, struck by propeller as ship passed, stranded, died
				Laist et al 2001	major damage around midlength seen from air
				Laist et al 2001	five apparent propeller gashes
				Laist et al 2001	stranded, cut through middle of back, probable ship strike
tanker	203 m	21		Patten et al. 1980*	whale w/broken spine floated off ship's bow in LA harbor, collision location inferred from decrease in speed
				Laist et al 2001	stranded, large propeller cuts on back, probable ship strike
merchant ship				Laist et al 2001	brought into port on bow of ship, several ribs and cervical vertebra broken
commercial ferry	4,000 tons	17	N	in Laist et al 2001	struck and possibly killed whale, blood noticed in water after vessel passed
				Laist et al 2001	cut through middle, seen floating offshore
private motor yacht	18	10.5	N	in Laist et al 2001	boat shook & veered to port, large whale surfaced at stern w/deep propeller gashes down mid-section, pool of blood seen
Navy	133		N	Cummings*	vessel collided w/large whale at night and sustained no damage
ferry				IML*	brought into port on bow of ship

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Date	Species	Sex	Length (m)	Location (where struck, if known; if not, where found)	Coordinates	Mortality/Injury	Field ID
09/03/72	finback	M	12.6	Mediterranean Sea, Nice		mortality	
07/05/72	finback	M	18	Mediterranean Sea, off Calvi		mortality	
Mar-72	unknown			Las Perlas Islands, Panama, Pacific Ocean		injury	
1963	unknown			Equatorial Pacific		injury	
Sep-61	unknown			Caribbean Sea		injury	
02/01/60	unknown			W of Cape Reinga, North Island, New Zealand		injury	
03/22/55	sperm		10	89 km W of Cape Gardafui, Canary Islands		mortality	
12/25/54	unknown			11 km off Kaikoura, South Island, New Zealand		unknown	
fall 1953	unknown			N Yellow Sea		mortality	
1950	Bryde's			Red Sea, Egypt		mortality	
1930's	unknown			Near Raratonga, South Pacific		mortality	

NOAA Fisheries Confirmed and Possible Ship Strikes to Large Whales

Vessel Type	Vessel Size(m)	Speed (kts)	Vessel Damage	Source	Comments
ferry				IML*	brought into port on bow of ship
ferry				Laist et al 2001	hit by ferry, seen floating at sea
Boston whaler	4	>25		Cummings*	boat struck whale and rode directly over the animal, after collision animal seen thrashing w/bloody wound
passenger ship	14,000 tons	18	N	Cummings*	whale in front of vessel was struck, small amount of blood in water, whale appeared to swim away slowly
cargo vessel	8,000 tons	14		Laist et al 2001	whale first sighted lying at surface, then seen thrashing in wake w/blood in water after collision
passenger ship	13,000 tons			Cummings*	vessel shuddered and slowed when propeller struck whale, animal then seen thrashing w/back sliced and bleeding
steamship	144	17		Slipjer 1979*	whale struck on head and body and became lodged on bow below water line
passenger ship	133	18	Y	Cummings*	vessel collided w/large whale and sustained damage
Navy	169	~20	N	Cummings*	shudder was felt, object on bow identified as whale, ship backed down to dislodge whale which then sank
tanker				Laist et al 2001	
steamer	131	15		Cummings*	ship collided w/large whale and almost cut it in half