Testimony for the U.S. House Committee on Natural Resources
Oversight Hearing: The danger of deception: Do endangered species have a chance?
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The North Atlantic right whale currently numbers less than 400 animals, making it one of the most endangered of the large whales. In the western North Atlantic, individual right whales have been observed from the Gulf of Mexico to the Gulf of St Lawrence, but most are found seasonally in one of five known habitats. The only calving ground is in the coastal waters of the southeastern U.S. during the winter months. The migratory corridor for all right whale mothers and calves is the coastal zone of the U.S. between Florida and Massachusetts. In the spring, aggregations of right whales are present in the Great South Channel (east of Cape Cod) and in Cape Cod and Massachusetts Bays. In the summer and fall, right whales are observed in the Bay of Fundy, between Maine and Nova Scotia, and in an area 50 km south of Nova Scotia called Roseway Basin. Aerial surveys also have recently discovered winter-time aggregations in the middle of the Gulf of Maine.

Historically, this species was hunted to near extinction, and, despite protection for 70 years, the right whale population remains at very low numbers. Today the primary reasons for the population's slow recovery are the accidental kills by ships and fishing gear. Since 1999, at least 30 right whales have been hit by ships, leaving 15 dead, 4 seriously injured and likely to die, and 11 with injuries (Table 1). Another 37 right whales have been entangled in fishing gear, of which 6 were fatal, and 6 caused potentially fatal injuries. In addition to the documented deaths, an average of 6 animals per year (range: 1 – 11) have disappeared from the population and are presumed dead, adding to total mortality rates.

Shipping and entanglement deaths are added to natural mortality, and several population models have shown that this population was declining during the 1990's (*Caswell et al*. 1999; *Fujiwara and Caswell* 2001). Fujiwara and Caswell's projections indicated that those trends would drive the North Atlantic right whale to extinction in approximately two centuries. However, those same models suggested that saving just two females per year could reverse this trend. These circumstances confirm that this is a critical period for right whales and that focused and dedicated efforts will be required if we are to assure the recovery of the North Atlantic right whale population.

The NOAA National Marine Fisheries Service (NMFS) requirement for recovery is a population increase for a period of 35 years at an average rate of increase equal to or greater than 2% per year. Preliminary analyses indicate that this group of right whales has had an average growth rate over the last two decades of about 1%. Recent calf counts have increased slightly, although increases in mortality in recent years may have offset those gains.

The Department of Commerce's National Marine Fisheries Service is the responsible agency for right whale conservation under the ESA and the MMPA. The agency is working hard with the research and fishing communities to solve the problem of entanglements in fishing gear, and more work is needed in this area. However, the problem of ships killing whales is well-defined, and the NMFS proposal to slow ships is a solution that will work. There have been a number of questions about the science posed by the OMB, the OIRA, and the World Shipping Council, including questions posed directly to a colleague on my staff by the Council of Economic Advisors. I would like to address these questions briefly.

Evidence that High Ship Speeds Kills Whales

Many scientific studies have been done to assess the role of speed in ship kills of large whales, and 5 studies have specifically evaluated this for right whales. These studies (*Vanderlaan and Taggart* 2007; *Pace and Silber* 2005: *Laist et al*. 2001: *Kite Powell, et al*., 2007; *Vanderlaan et al.*, 2008) used different analytical approaches, but all reached the same conclusion that vessel speed plays a role in the level of severity of a strike. In addition, a *Knowlton et al* (1998) report titled *The Hydrodynamic Effects of Large Vessels on Right Whales: Phase Two* concluded that in none of their simulations was there a situation where a slower moving ship increased the risk of collision. A slower ship has lower hydrodynamic forces and is thus safer for a whale trying to take avoidance action.

To summarize the results of all of these studies, I have provided a single graph from each of the four quantitative papers in the following pages, and offer a summary statement from many of the papers on whales and shipping here. **The cumulative results of these multiple studies are conclusive – no matter which technique is applied, increased shipping speed carries increased risk of death and serious injury to all large whales.**

Laist et al., 2001 "Collision accounts compiled here suggest that serious injuries to whales may occur infrequently at vessel speeds below 14 kn and rarely at speeds below 10 kn."

Jensen and Silber, 2003 "All vessel classes are represented in our database, but it appears generally that relatively large and relatively fast moving vessels are most often involved."

Pace and Silber 2005 "We found strong evidence (P=0.0025) that the probability of death or serious injury increases rapidly with increasing ship speed (Figure 1)."

Vanderlaan and Taggart 2007. "Notably, it is only at speeds below 11.8 knots that the chances of lethal injury drop below 50% and above 15 knots the chances asymptotically increase toward 100%."

Kite-Powell, et al., 2007 "Model results suggest that more than half of right whales located in or swimming into the path of an oncoming ship traveling at 15 knots or more are likely to be struck even when they do take evasive action."

Vanderlaan and Taggart, 2008 "Only the reduced vessel-speed option will decrease the likelihood of a lethal injury should an encounter occur."

In the following graphs, scientists have used the existing data to model the probability of lethal injury to a right whale from ships going at different speeds. In the first one, *Vanderlaan and Taggart* (2007) show that the probability of fatal injury rises rapidly after 8-10 knots and approaches 100% above 18kts. In the second (*Vanderlaan et al.*, 2008), they add the probability of a whale-ship encounter to the original data to show the combined likelihood of a fatal collision (in color, where red is bad (fatal), and blue is good (not fatal)).

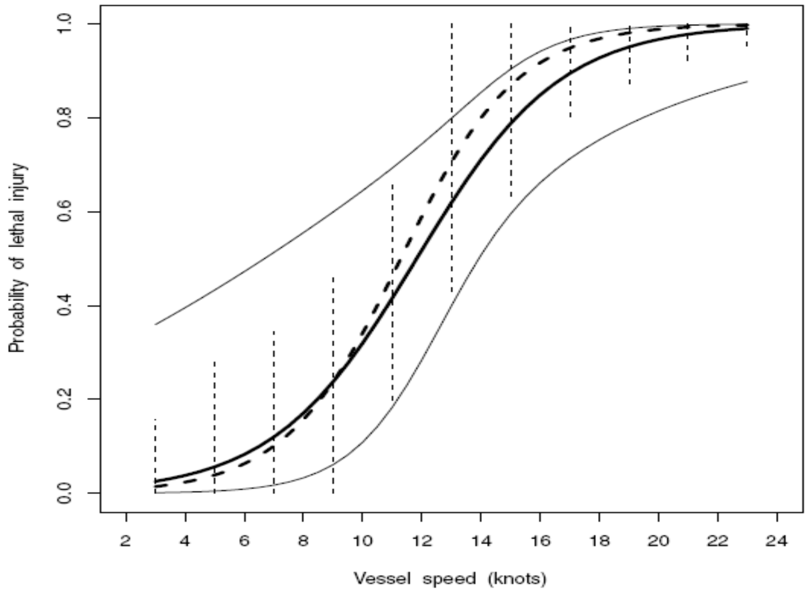

Figure 3. Probability of a lethal injury resulting from a vessel strike to a large whale as a function of vessel speed based on the simple logistic regression (solid heavy line) and 95% CI (solid thin lines) and the logistic fitted to the bootstrapped predicted probability distributions (heavy dashed line) and 95% CI for each distribution (vertical dashed line) where each datum (Δ) is the proportion of whales killed or severely injured (*i.e.*, lethal injury) when struck by a vessel navigating within a given two-knot speed class. There are no data in the 4–6 knot speed class.

Above: From Vanderlaan and Taggart, 2007.
Below: From Vanderlaan et al., 2008

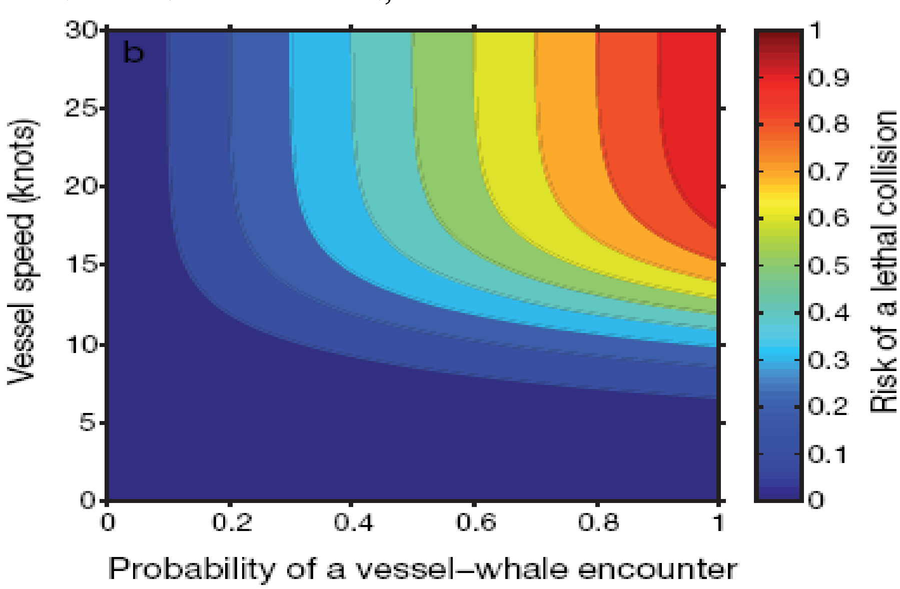

Fig. 2. Nomograph illustrating the risk of a lethal collision as a function of speed (from Vanderlaan et al. 2008) given a vessel–whale encounter.

In the next graph, Pace and Silber (2005) modeled a slightly larger dataset without binning into speed categories, and obtained nearly the same results as Vanderlaan and Taggert (2007)(shown above). Their analysis shows that the probability of mortality or serious injury increases dramatically above 7 knots.

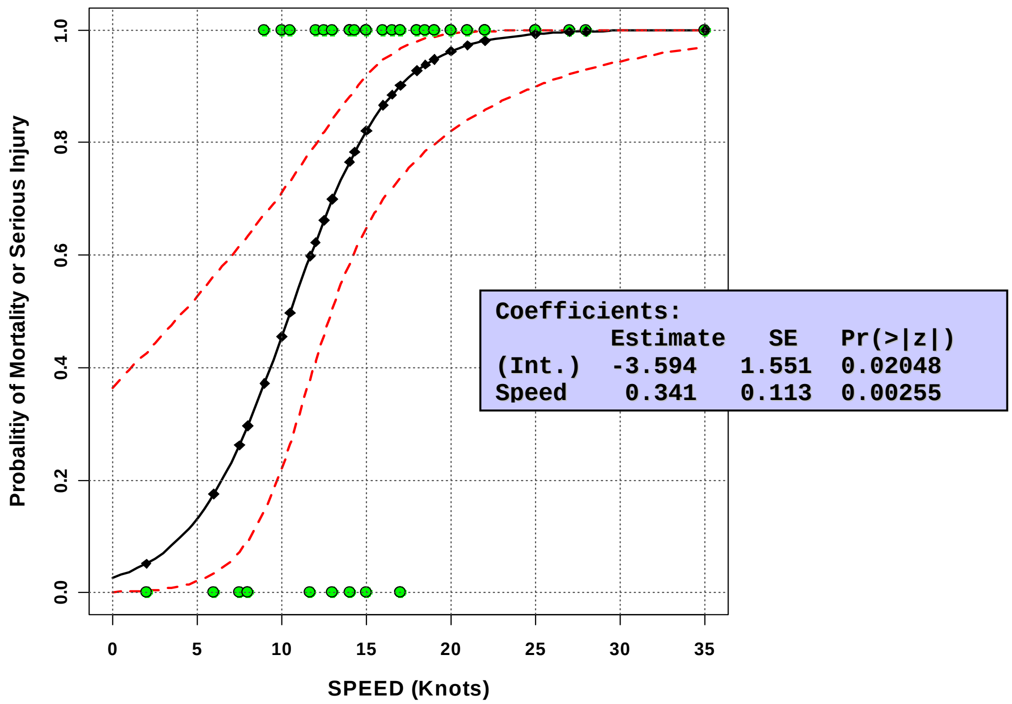

Figure 1. Fitted logistic regression showing the relationship between serious injury and vessel speed. (Green dots are observed, black diamonds are predicted and red-dashed lines are the 95% CI about the individual predicted values. From Pace and Silber, 2005

Despite some confusion on the part of the World Shipping Council and the CEA, ship mass does not matter much when the difference between the ship and the whale is large. From a shipping perspective, most ships are much more massive than a whale (5000 - 100,000 DWT vs 40 DWT). As C. Taggart points out (*in lit. Aug 31 2007 to S.E. Dudley OIRA*) the situation is similar to a vehicle colliding with a song bird. Whether the vehicle is a motorcycle, a car, a bus, or a train, the bird will probably survive a collision of 5-10 miles per hour. However, in a collision with any of those vehicles at 20-30 miles per hour, the bird is highly likely to die.

Thus mass (size) does not matter as long as the difference between the animal and the vehicle is large. The severity of damage to a whale in the event of a collision with a large vessel is primarily a function of speed. Therefore, regardless of ship size, speed reductions will reduce the risk of fatal collisions between ships and large whales.

Note that most of the results discussed above are predicated upon passive whales, in other words, a whale that does not attempt to move out of the way of a closely approaching ship. However, Kite-Powell et al. (2007) analyzed close approaches (less than 500 m) of ships to right whales, and found that a majority of whales do attempt evasive actions. Although the sample size is limited, evasive actions increased as proximity to the ship increased. Taking whale behavior into account, Kite-Powell and colleagues modeled ship/whale encounters at various speeds and produced the following graph, which shows the probability of collision given different speeds and different ships. Although this does not predict fatal injuries, it is consistent with the previous models which show that the risk of collision between ships and whales increases with speed. These results indicate that slowing ships to a speed of ten knots gives whales an increasing amount of time to avoid collisions by taking evasive action.

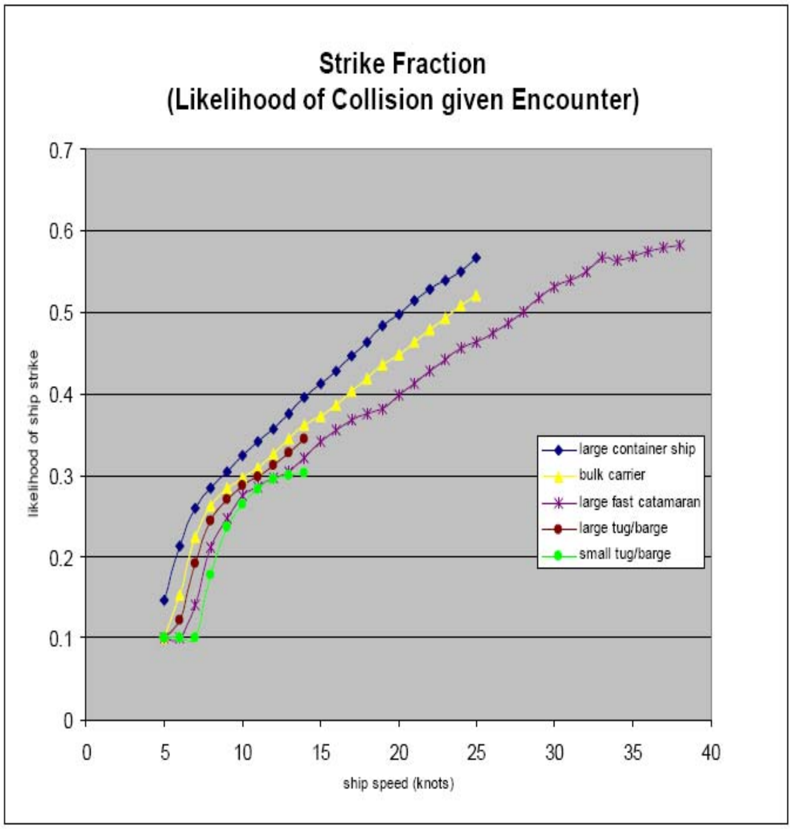

Figure 2: Strike fraction for different ships as a function of speed

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From Kite-Powell et al. 2007

Evidence that all Ship Types are Involved

Jensen and Silber (2003) provide detailed information of the vessel types involved in strikes worldwide. "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."

These data confirm that all types of vessels are involved in collisions with whales, although care should be taken in interpreting these numbers. Large ships (e.g. 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. Captains of ships of all sizes are under no obligation to report collisions and may not do so due to apathy or fear of legal consequences. The high percentage of Navy and Coast Guard collision reports is likely due to standardized military and government reporting practice rather than an actual higher frequency of collisions relative to other ship types. Both federal agencies are actively involved in large whale protection programs and reporting struck or dead whales to the National Marine Fisheries Service are standard operating procedures.

Evidence that Ship Kills are Impacting All Large Whales

NMFS has done a thorough job of keeping track of serious injury and mortality events (Nelson, et al. 2007). From 2001-2005, NMFS verified 292 large whale mortalities and determined that 26 were due to entanglements and 27 were the result of ship strikes. The cause of death could not be determined for 223 (76%) of the carcasses (Nelson 2007), since animals floating at sea are typically not retrieved for a necropsy (except right whales). Because of the endangered status of right whales, NMFS has supported the retrieval and necropsy all right whale carcasses when feasible. From 2001 through 2007, a total of 31 right whale carcasses have been documented. Fourteen of these carcasses were towed to shore, 10 were found on the beach, and seven were unretrievable. Of the 14 carcasses retrieved, nine (64%) died as the result of ship strike. If we applied this percentage to all large whale carcasses that were not retrieved (223 animals), there may have been as many as 142 large whales that died as the result of a vessel strike in that five-year timeframe. This suggests that all large whale species in the near coastal waters of the U.S. are at risk from ship strikes and would be afforded protection from this rule.

What NMFS needs to carry out its mandate under the ESA for right whales

NMFS has the statutory obligation under the Endangered Species Act to take actions that enable the recovery of right whales. The NMFS proposed rule has the weight of multiple independent scientific studies behind it. Other agencies should review the proposed rule for economic and other consequences, but should not attempt to second guess the science.

Reducing right whale deaths is critical to protecting the species, yet federal funding for right whale research was halved in 2006, eliminating support for necropsies, entanglement mitigation, acoustic surveys, and photo-identification surveys, thereby negating the ability to monitor population health, survival and reproduction. Without these ongoing research efforts, it will be impossible to determine how many animals are being lost to human activities, which management measures are working, and what can be done to support the recovery of the species. This data loss is a disservice to the industries that are being regulated to reduce human-caused kills of this species, and it will hamper NMFS' ability to assure the recovery of the North Atlantic right whale under the Endangered Species Act.

Conclusion

Fast ships kill large whales. Slowing ships will 1) reduce the probability of a fatality should an encounter occur, and 2) give whales the time to evade oncoming vessels. Ship strikes of whales involve all ship types, all species, and occur in all waters of the east coast. NMFS, as the agency responsible for mitigating right whale mortality by law, has taken the appropriate approach in using the 10- knot speed limit. This speed limit considers economic impacts, safe navigation, and benefit to right whales in a fair and well-researched manner**. There is no scientific justification for further delays in the proposed rule to seasonally slow ships in right whale habitats and migratory corridors along the east coast of the U.S.**

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Table 1. Summary of North Atlantic Right Whale Vessel Strikes, 1999-2008

Compiled using data obtained from the National Marine Fisheries Service, the Provincetown Center for Coastal Studies, the New England Aquarium, and Woods Hole Oceanographic Institution.

For more information on individually identified whales, go to http://rwcatalog.neaq.org/.

Information Current as of April 2008

	Sex	**Date**	**Location First Reported**	**Status***	**Cause of Death**
1	Female (adult) #1014 “Staccato”	4/20/99	MA (Cape Cod Bay)	Dead	Vessel strike
2	Male (unknown age) #2820	7/07/00	Canada (Bay of Fundy)	Serious injury	Vessel strike
3	Female (adult) #1160	1/29/01	FL (Northeast coast)	Injury	Vessel strike
4	Male (calf)	3/17/01	VA (Assateague)	Dead	Vessel strike
5	Female (calf)	6/18/01	NY (Long Island)	Dead	Vessel strike
6	Male (unknown age)	7/01	Newfoundland (St. Theresas)	Dead	Probable vessel strike (numerous broken vertebra)
7	Female (juvenile)	8/22/02	MD (Ocean City)	Dead	Vessel strike
8	Female (unknown age)	9/25/02	Canada (Bay of Fundy)	Injury	Vessel strike

	Sex	Date	Location First Reported	Status*	Cause of Death
	#2430				
9	Female (calf) #3317	1/26/03	FL	Injury	Vessel strike
10	Male (calf) #3301	8/14/03	Canada (Bay of Fundy)	Injury	Vessel strike
11	Female (adult) #2150	10/2/03	Canada (Bay of Fundy)	Dead	Vessel strike
12	Unknown age and sex #3450	1/1/04	GA	Injury	Vessel strike
13	Female (adult, pregnant) #1004 "Stumpy"	2/7/04	VA (Virginia Beach)	Dead	Vessel strike
14	Female (adult, pregnant) #1909	11/24/04	NC (Ocean Sands)	Dead	Vessel strike
15	Female (adult, pregnant) #2143 "Lucky"	1/12/05	GA (Cumberland Island)	Dead	Infection from previous vessel strike
16	Female (juvenile) #2753	1/27/05	FL	Injury	Vessel strike
17	Female (adult) #2425	3/10/05	GA (Cumberland Island)	Serious Injury	Vessel strike
18	Female (adult) #2617	4/28/05	MA (Monomoy Island)	Dead	Vessel strike
19	Unknown age and sex #3380	6/9/05	MA (Great South Channel)	Injury	Vessel strike
20	Unknown (calf)	12/11/05	FL (Miami)	Serious injury	Vessel strike or entanglement
21	Female (juvenile)	1/8/06	FL (Northeast coast)	Injury	Vessel strike
22	Male (calf)	1/10/06	FL (off Jacksonville)	Dead	Vessel strike
23	Male (juvenile) #3522	3/11/06	GA (off Cumberland Island)	Serious Injury	Vessel strike
24	Unknown (CT50)	4/14/06	MA (Cape Cod Bay)	Injury	Vessel strike
25	Female (calf)	7/24/06	Canada (Bay of Fundy)	Dead	Vessel strike
26	Female (adult)	8/24/06	Canada (Roseway Basin, Nova Scotia)	Dead	Vessel strike
27	Male (juvenile)	12/30/06	GA (off	Dead	Vessel strike

	Sex	Date	Location First Reported	Status*	Cause of Death
	#3508		Brunswick)		
28	Female (juvenile) #3503 “Caterpillar”	3/12/07	MA (Cape Cod Bay)	Injury	Vessel strike
29	Male (calf)	3/30/07	NC (off Avon)	Dead	Entanglement, possible vessel strike
30	Unknown (1 year old)	8/5/07	Canada (Bay of Fundy)	Injury	Vessel strike

* Events were categorized as ship-strike serious injuries if, following the appearance of a linear laceration or large gouge, a living whale exhibited a marked decline in appearance, including skin discoloration, lesions near the nares, fat loss, or increased cyamid loads. (Glass AH, Cole TVN, Garron M, Merrick RL, Pace RM III. 2008. Mortality and serious injury determinations for baleen whale stocks along the United States eastern seaboard and adjacent Canadian Maritimes, 2002-2006. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 08-04; 18 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.)