



Right Whales In The Wrong Place -- No Bones About It

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DURHAM, N.H. – “There are so few North Atlantic right whales today,” says Igor Tsukrov, associate professor of mechanical engineering at the University of New Hampshire, “that marine biologists who track them have names for each of them. So, when one dies, it is as if a friend has been lost.”

Tsukrov hopes his research may someday help save the North Atlantic right whale from extinction.

Protected from commercial exploitation since 1935, and declared an endangered species since 1974, the North Atlantic right whale population, nevertheless, continues to decline. Once numbering in the hundreds of thousands, only 300-350 known individuals remain along the continental shelf of North America, making the species the most rare of all whales.

One reason for the lack of population recovery is that the small population size makes breeding difficult. Another cause for concern, however, is that many mother whales and their calves have been accidentally killed en route from their breeding grounds off the Florida coast to Cape Cod, where they cut across Boston Harbor’s international shipping routes to the Gulf of Maine, looking for food.

Six North Atlantic right whales were accidentally killed in 2006—four of them by ship collisions, or strikes. Measuring as much as 55 feet long and weighing up to 70 tons, the North Atlantic right whale is one of the largest mammals on earth. Unfortunately, the lumbering sea giant is no match for cargo ships weighing as much as 500,000 tons bearing down on them at 20 knots in the open sea. That would be comparable to an 80,000-pound semi-truck running through a six-pound toy poodle at 23 miles per hour.

Changing speeds by even a few knots, or altering routes, could cost the shipping industry \$50-150 million per year in lost time and extra fuel costs. Before any changes to regulations can be made, clear data proving the speeds and forces on impact of ship collisions that kill whales are needed. In walks Tsukrov and his UNH colleagues, who were funded by the National Oceanic & Atmospheric Administration (NOAA) to determine the precise bio-mechanics of what happens when a ship strikes North Atlantic right whales.

“Whale bones are unlike any other mammal bones,” says Tsukrov. “Whales float in water in a zero-gravity state and do not need the bone rigidity to support them the way that land mammals do. As a result, whale bones have less bio-mineral density, making them spongier and lighter than land mammal vertebra.”

Last year, NOAA took a big step toward protecting North Atlantic right whales by proposing changes in the Boston Harbor Traffic Separation Scheme (TSS). The NOAA recommendations involved a 12-degree shift in the northern leg of the TSS and narrowing the two shipping traffic lanes by approximately one-half mile each during whale migrations. The International Maritime Office, representing the interests of the international shipping industry, endorsed the proposal in December, 2006, which became effective July 1, 2007. NOAA calculates the realignment is expected to provide a 58% reduction in ship strike risk to migrating North Atlantic right whales.

Meanwhile, a government plan for lowering the shipping speed limit to 10 knots (11.5 miles per hour) during whale migrations was proposed by NOAA in June, 2006. The World Shipping Council, whose 28 members carry an estimated \$500 billion worth of goods into and out of U.S. ports each year, has blocked speed limits, arguing in a letter to the White House budget office that "there is no meaningful scientific bases to conclude that the chosen action will protect whales."

Contrary to the World Shipping Council claims, Tsukrov says, "The results of our three years of research clearly show that in the case of a ship strike higher ship speeds result in more damage to a whale and a substantial increase in the probability of whale mortality."

Tsukrov will submit the final UNH research results to Woods Hole Oceanographic Institute (WHOI) in December, 2007. WHOI is expected to officially present their report to NOAA, including Tsukrov's data, in January, 2008.

Working with marine biology specialists Michael Moore and Regina Campbell-Malone of the WHOI, Tsukrov's UNH collaborators include professor Ken Baldwin (Director of the Center for Ocean Engineering) and civil engineering professor David Gress.

HIGH RESOLUTION PHOTO:

<http://www.ceps.unh.edu/images/whale.jpg>

UNH mechanical engineering undergraduate research team (L-R, Prof. Igor Tsukrov, Matthew Packard, Alexander Unrein, and Robert Marsella) performing experiments on the right whale mandible.

