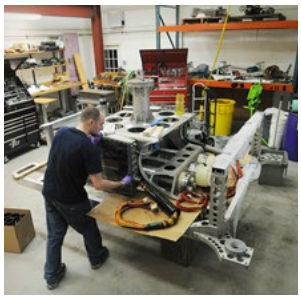
After Overhaul, *Jason* Is Stronger Than Ever

DEEP-SEA VEHICLE IS STRIPPED DOWN, REDESIGNED, AND UPGRADED

by Erin Koenig



Since it was first launched in 1988, the remotely operated vehicle *Jason* has been a workhorse for oceanographic scientists, hauling instruments, conducting experiments, collecting samples, and taking images in the depths.

In April 2015, Woods Hole Oceanographic Institution engineers began a yearlong $2.4 million upgrade of *Jason*—its first major overhaul since 2002. The team stripped *Jason* down to its base, replacing its frame and redesigning its systems to increase its payload and capabilities and streamline its operations.

During missions, pilots operate *Jason* in real time from a control van on a ship via a .842-inch-thick umbilical cable, while the vehicle sends back data and high-definition video from the seafloor. Until now, *Jason* has been operated as a two-

Eavesdropping on Whales off New York City

BUOY DETECTS WHALES AND ALERTS SHIPS TO SLOW DOWN

by Kate Madin

New Yorkers have been surprised to learn that a wide variety of whales are swimming in their watery backyard, cruising New York Harbor sometimes within sight of the Statue of Liberty.

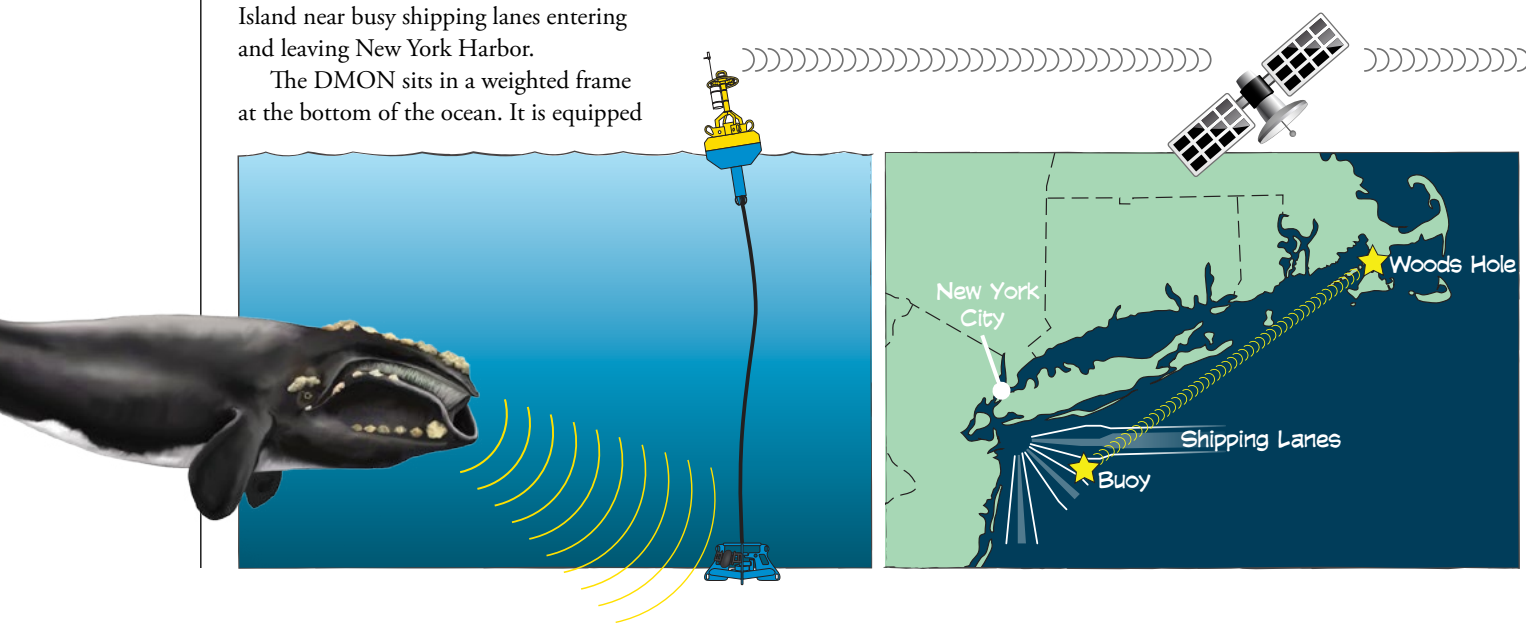
Sounds from humpback, fin, sei, and endangered North Atlantic right whales have been detected in New York waters by an ocean mooring developed at Woods Hole Oceanographic Institution. The instrument relays the signals via satellite in near real time to scientists and citizens. Signals have come in nearly every day since the buoy was deployed in 2016.

WHOI biologist Mark Baumgartner teamed up with New York's Wildlife Conservation Society to deploy a digital acoustic monitoring instrument, or "DMON," about 22 miles off Fire Island near busy shipping lanes entering and leaving New York Harbor.

The DMON sits in a weighted frame at the bottom of the ocean. It is equipped with underwater microphones called hydrophones that listen for whale sounds. "When it hears them, it transmits information about those sounds through a stretchable hose up to a buoy on the surface," Baumgartner said.

The signals are relayed to Baumgartner's lab at WHOI and analyzed every day by Julianne Gurnee at the National Oceanic and Atmospheric Administration's Northeast Fisheries Science Center in Woods Hole. Gurnee reviews the signals the same way a musician reads sheet music, and she can determine what species are present by the structure and patterns of signals.

"With this new technology, we will soon alert ship captains to the presence of the whales and help ships avoid lethal encoun-






body system with *Medea*, a smaller remotely operated vehicle above *Jason* that buffered it from surface ship movements and provided lighting.

The upgrade allows *Jason* to be decoupled from *Medea* so that it operates as a single-body system, said Matt Heintz, manager of the *Jason* program at WHOI. That decoupling, along with an enhanced winch and new launch-and-recovery system, makes launch-and-recovery operations "far less challenging and much faster," Heintz said. It also makes the vehicle more versatile.

The upgrade, funded by the National Science Foundation, also redesigned and replaced *Jason*'s equipment-carrying tool skid and enhanced its flotation to increase *Jason*'s lift capacity from 400 pounds to two tons of scientific samples and instruments. It also has a bigger and stronger cable tether that increases its break strength from 42,000 to 70,000 pounds. ▲

ters with whales," Baumgartner said. "We can give real-time information to the shipping industry, to suggest to them, 'Maybe you don't want to go through this area as fast with your boats as you might like to, because there are endangered whales there.' "

Cargo ships vastly outweigh whales, and ship strikes are a serious threat to whales. North Atlantic right whales are most at risk. They exist on a razor's edge with a small population that reproduces slowly, and individuals are particularly vulnerable to ships because they swim slowly and are often at the surface. Scientists have said that preventing even two deaths a year could help the species survive.

Baumgartner and WHOI engineers have also deployed DMON-equipped buoys off the Maine and Massachusetts coasts to eavesdrop on whales and learn more about their behavior. He has also used DMONs on battery-powered autonomous gliders, which can travel over broad areas searching for and detecting whales. And in 2017, he will test DMONs on wave gliders, which use wave and solar energy to move.

"We can send a glider out to do surveys for us, in advance of cruises, " he said. "So when I go to sea, I know exactly where the animals are."

Data from DMON buoys and gliders are available at Baumgartner's Robots4Whales website at robots4whales.whoi.edu ▲