EMBARGOED:
Not for release until
1:00 PM Pacific Time/
4:00 PM Eastern Time
Thursday February 12th, 2004
Contact: Jessica Brown, #202-497-8375

SeaWeb
Leading Voices for a Healthy Ocean

# New Technologies Reveal Mysteries of Marine Megafauna

## High tech tools may help find solutions to animal-human conflicts in the sea

*Sea turtles, porpoises, albatrosses and tunas could see brighter days ahead*

How can scientists follow leatherback sea turtles that dive to crushing depths a half-mile below the surface and swim across 80% of the world's ocean? Or tunas that race faster than most boats? Or albatrosses that soar halfway across the Pacific without sleep or a meal -- unlike their human observers? Science is beginning to make all this possible with a series of leaps in tagging technologies. High tech tools such as small data storage tags equipped with micro-processors and satellite–linked GPS devices are providing new insights into the little known lives of large ocean animals.

Electronically tagged elephant seals now routinely "call home" via satellite transmission, regularly informing researchers of their whereabouts. Bluefin tunas are functioning as living submarines, collecting data on ocean temperatures, and transmitting information about their feeding, breeding and travel patterns. Perhaps most importantly, the technology is disclosing where the animals are running into problems - and providing new insights about how to alleviate them.

At a AAAS (American Association for the Advancement of Science) press conference on Thursday, February 12th at 1pm and in a scientific session on Friday morning, leading researchers will reveal how the latest technologies are allowing scientists to understand animals in the global ocean at a scale and resolution never before possible. Their findings are providing exciting, new opportunities to conserve these animals by working with fishermen and fisheries managers.

"The vastness of the open ocean is an incredibly important place biologically, and, unfortunately, it's in trouble. But normal people don't go out there and see it – they don't know that there are irreversible changes going on," says Elliott Norse of the Marine Conservation Biology Institute. "Some of these species face walls of hooks by the million each night, on lines that would stretch from Seattle to Tacoma. Some are targeted, but many are innocent bystanders—caught incidentally."

"The problems we face in the ocean are vast – unless we intervene soon, we're going to see a huge reduction in these species," says Andy Read of Duke University. "But with these new findings, we're going beyond just wringing our hands about these problems – we're finding new solutions. We used to count the number of albatross on an island each year. Then there would be a decline one year and we wouldn't know why. Now

we can track where they go when they leave the island, and see where they are coming in contact with longlining vessels or other dangers."

The new data allow scientists to discern patterns in marine animal movements: when and where they stay near the surface or swim in deeper waters, what temperatures they prefer, and what oceanographic conditions attract congregations of animals. This information is key to protecting these animals from inadvertent capture in fisheries, collisions with vessels, or harm from other human activities.

Scientists are not just getting the information on where these animals go – the animals themselves are playing the role of oceanic probes. As they go about their lives they are collecting oceanographic information that reveals detailed, three-dimensional maps of oceanic currents and temperature changes that have been unattainable in the past.

"On land, if you want to drive somewhere for vacation, you can pull out the map, find the highway to get you there and the natural landmarks along the way. But in the ocean, the roads and attractions don't always sit still. It's not just the animals, but the environment itself that moves," says Larry Crowder of Duke University.

For the first time, a coherent picture of the everyday lives of large ocean animals is emerging; this picture is portrayed in a dynamic, interactive mapping system. The insights gained from this 3D visualization are critical to understanding and managing marine resources, underscoring the need for scientists to share their findings with fishermen, managers, researchers and educators worldwide. A new, publicly accessible database developed under the Sloan Foundation's Census of Marine Life program will allow these stakeholders to see the distribution and movements of seabirds, sea turtles and marine mammals in open ocean environments (see www.obis.env.duke.edu).

*Resolving Conflicts*

One of the most interesting applications of this research is the potential creation of new options for reducing conflicts between human activity and animals. Sea turtles, sea birds, and marine mammals frequently run into problems with fishing gear - often far from land or at depths where it is impossible to directly observe. Following the lives of these animals in detail for months or years is helping scientists and managers understand where and when such inadvertent kills occur, and how to avoid them.

In the North Pacific, for example, longline fishermen inadvertently catch loggerhead sea turtles when fishing for swordfish - a situation that is undesirable for turtles and fishermen alike. New analyses show that the turtles tend to aggregate near temperature gradients on the edges of warm water masses in the ocean. Mapping the location and depth of these temperature transition zones, and how they move over the course of a day or season, can help identify turtle "hotspots" for fishermen to avoid. Such measures could greatly reduce bycatch of this threatened species without the potential social and economic costs of closing an entire fishery or large regional area.

In the Gulf of Maine and elsewhere in the North Atlantic, harbour porpoises can become entangled in nets set for bottom dwelling fish like cod and flounder. Unable to reach the surface to breathe, they suffocate and die. Fisheries managers have implemented a series of conservation measures in an effort to reduce the number of

porpoise deaths, including banning bottom-set nets from some areas. But, until recently, there has been no way to gather year-round information on the distribution patterns of these porpoises, making it difficult to design and assess conservation efforts. Now, by equipping porpoises with small satellite-linked transmitters, researchers can follow the movements of individual porpoises and evaluate how well current restrictions protect key foraging and breeding habitats for this species.

"Without these analyses we couldn't even examine the different possibilities for conservation," says Read.

*Protecting the Open Ocean*

Marine reserves are increasingly seen as a potent tool for conservation in coastal habitats that are fixed in time and space. While there are some fixed habitats offshore, such as seamounts and deep sea vents, many open ocean habitats are defined by dynamic properties such as currents or temperature that create blooms and bursts of food sources. Because of the interactions of different currents and water masses, certain locations have far more biological activity than others. Just like on land, there are migration corridors, biological hotspots and breeding grounds. Unlike their terrestrial counterparts, however, these areas of critical habitat are not static points on the map; they can appear, disappear and move.

"In a terrestrial system, you can just draw a boundary around an important place and you have a park – in the open ocean it's different. The habitats are 3D and moving," says Crowder.

In the open ocean, the vast distances covered by migratory species, and the shifting nature of these habitats has led some people to conclude that marine reserves cannot work. But tracking the movements of fishes, turtles, and mammals is helping scientists understand and map the most important areas, making their protection a possibility for the future.

"Open ocean reserves are the most difficult challenge in marine conservation, but they are essential to restore the integrity of our seas," says Norse. "Turtles and many other species are going to disappear in our lifetimes if we don't rise to the challenge."

###

MEDIA NOTE: The scientists will discuss their findings at a AAAS session titled, **New Approaches to Conserving Marine Animals in a Dynamic Ocean,** on Friday February 13th at 9:00 AM Pacific Time. For assistance contacting the speakers during AAAS please call Jessica Brown at #202-497-8375.


Larry B. Crowder
Duke University Marine Laboratory
*Through June 2004:*
NCEAS
Phone: (805) 892-2533
Fax: (805) 892-2510
Cell: (252) 241-2350
crowder@nceas.ucsb.edu

Elliott A. Norse
Marine Conservation Biology Institute
Phone: (425) 883-8914
Cell: (425) 985-6355
Fax: (425) 883-3017
elliott@mcbi.org

Andrew J. Read
Duke University Marine Laboratory
Phone: (252) 504-7590
Cell: (252) 241-1636
Fax: (252) 504-7648
aread@duke.edu