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*Boating a giant bluefin in Canada in 2008. (Paul Murray photo)*



# LPRC, Lutcavage move to Hodgkin's Cove lab

GLOUCESTER, MA – After years of pioneering work to better understand the lineage, food habits, and migration patterns of bluefin tuna, swordfish, and sea turtles, the Large Pelagics Research Center (LPRC) has landed on solid ground.

In mid-June, the center staff, led by LPRC Director Molly Lutcavage, moved into the University of Massachusetts (UMass) Marine Station at Hodgkin's Cove in the Bay View neighborhood of Gloucester.

Walking through the newly refurbished waterfront facility just before move-in day, Lutcavage looked around her with evident excitement.

"What I see here is possibility," she said.

The marine lab is planted near the end of a massive pier built long ago to accommodate the shipping of locally quarried granite blocks. It had stood vacant since the 2008 death of its previous occupant, the famous UMass food science researcher Herbert Hultin.

While the outside of the building was still in dire need of a good scrape-and-paint job in late May, the inside sported freshly painted walls, new floors, new ceiling panels, updated wiring, a fair amount of lab and office space, and spectacular views of Ipswich Bay.

But the feature that triggered Lutcavage's greatest enthusiasm was a huge walk-in freezer ready to be filled.

"Guts and gonads. Stomach contents. That's what we'll store in here," she said, yanking open the heavy insulated door. "This makes it a real fish lab."

That kind of hands-on passion has characterized Lutcavage's work throughout her career. In every conversation, she exudes a zeal for getting to the truth of the question at hand.

Right now, a big priority on the LPRC's agenda is developing fishery-independent approaches for determining bluefin abundance. Lutcavage has been doing variations of this kind of work since her days at the New England Aquarium when, in 1993, she launched



Anne Rearick photo

*LPRC Director Molly Lutcavage, with the center's spectacular view of Ipswich Bay in the background.*



*The Large Pelagics Research Center at Hodgkin's Cove in the Bay View neighborhood of Gloucester.*

LPRC photo

lasting partnerships with fishermen, spotter pilots, and other researchers to conduct groundbreaking aerial surveys. But today, new collaborations and technologies are taking that research to a whole new level.

In part with funding through a Northeast Consortium development grant, Lutcavage and her team are working with other scientists and industry people and acoustic engineers at the University of New Hampshire (UNH) Center for Coastal and Ocean Mapping (CCOM) to better gauge how many bluefin actually are in schools documented from the air.

She explained that CCOM Director Larry Mayer, an expert in sonar-imaging and advanced applications of 3-D visualization to ocean mapping problems, was not only interested in geophysics but also had a family member with a passion for harpooning bluefin tuna.

Together, the partners are perfecting strategies to synchronize sonar images of fish schools taken on the water with photographs of the same schools taken from the air. Because of the high-resolution of the sonar and the

expertise of the participants in understanding the images, the scientists can count not just the fish on the surface of the school, but all the way down to the bottom.

The advances have the potential to revolutionize fishery-independent survey methods and give scientists at the National

Marine Fisheries Service (NMFS) and the International Commission for the Conservation of Atlantic Tunas (ICCAT) higher quality data on which to base stock assessments.

"We've imaged hundreds of schools," Lutcavage said. "We're going to show NMFS and ICCAT not only that we can do this but that we can do it well."

ICCAT has identified development of this kind of fishery-independent survey as a priority as part of its Atlantic-wide Grande Bluefin Tuna Year Program, which is a coordinated effort to improve understanding of Atlantic bluefin throughout its range.

## Tagging studies

The work that the LPRC is doing covers all phases of the bluefin lifecycle with the goal of advancing understanding of bluefin stock structure.

In addition to food habit and genetic studies, LPRC projects have built on Lutcavage's prior work using all kinds of tags – conventional plastic ID tags, implanted archival tags, and pop-up satellite tags – to better document bluefin behavior and migration.

Over the years, LPRC-affiliated researchers have had to follow the ever-changing movements of the fish, tagging giants in the western Gulf of Maine through 2005 before shifting their efforts to Canada for several years and, then, last year, to the US side of Georges when the fish moved there. They've also tracked the surge of juvenile and adolescent size classes in the Gulf of Maine in recent years.

"We had to be nimble enough to go where the fish are and fine-tune our research to the new realities," Lutcavage said. "In addition to our giant tagging work in Canada, our goal now is to learn more about juveniles."

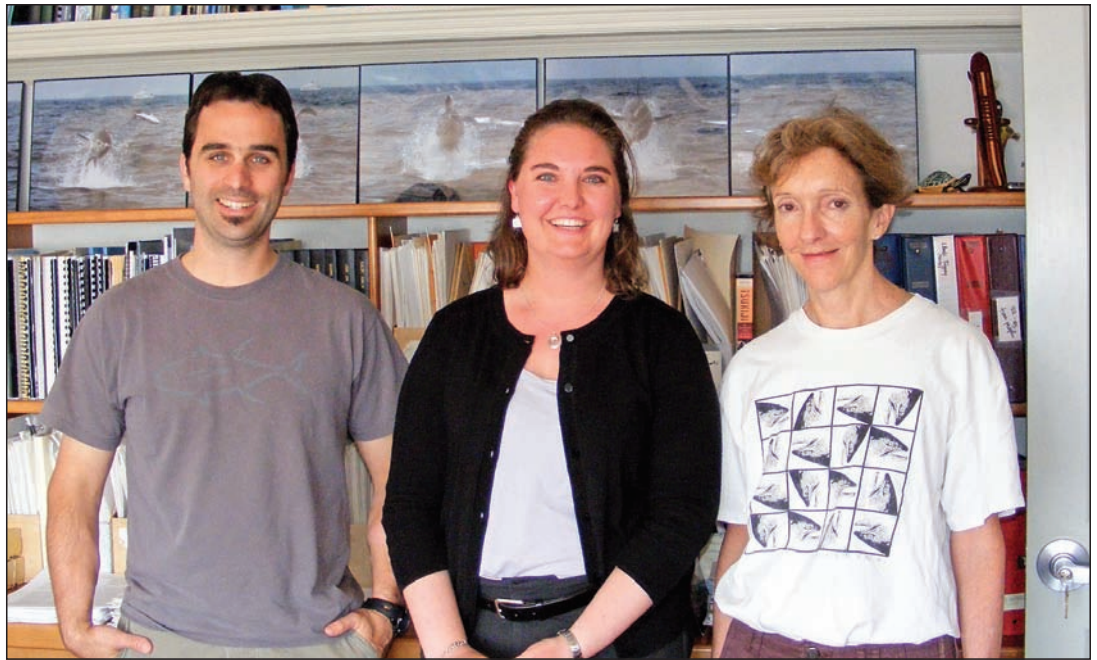
The LPRC launched its "Tag A Tiny" program in 2006 to study the annual migration paths and habitat use of juvenile bluefin, working with The Billfish Foundation, which provided tags. To date, 885 recreational fishermen have helped put conventional plastic tags on 1,006 bluefin, mostly juveniles from one to four years old, and some mediums measuring nearly 70". Additionally, the researchers implanted about 150 archival tags and, in 2007, shifted to pop-up satellite tags.

All this work has helped to document what experienced fishermen long believed but some scientists and ICCAT negotiators doubted and even disputed – that bluefin tuna regularly travel across the Atlantic, spending time in both eastern and western ICCAT management areas.

Other tagging project results strongly suggest that bluefin either do not spawn every year or that there are additional spawning grounds beyond those identified in the Mediterranean Sea and the Gulf of Mexico. Lutcavage thinks the latter scenario is more likely.

The tag work has further raised questions about age at maturity, meaning how old bluefin are when they are able to spawn. Conventional wisdom holds that Mediterranean spawners reach maturity between the ages of three and five and that western fish reach spawning age between eight and 12 years.

Yet scientists agree the growth rates of both eastern and western fish are the same. LPRC researchers are sampling fish year-round from both populations to



Lorelei Stevens photo

*From left, LPRC staff members Ben Galuardi, research scientist; Emily Chandler, program manager; and Molly Lutcavage, director.*

determine spawning condition and try to get to the root of this discrepancy.

Finally, the body of tagging work allows the LPRC to document where bluefin are most likely to be, making the fishery-independent sonar/aerial survey work practical.

"The surveys are feasible because we can identify where it makes sense to look for the fish. We have the data on where the fish are, particularly when they are beyond the reach of the fleet. Our tagging studies have shown us where to go," Lutcavage said, pulling up a clear computer map of documented locations of juvenile bluefin at specific times of the year.

### Seeking funding

All of this work barely scratches the surface of what Lutcavage and her small staff – Emily Chandler, program manager, Ben Galuardi, research scientist, and three PhD candidates, Kara Dwyer Dodge, Jessie Knapp, and Gilad Heinisch – make happen.

LPRC scientists have a long history of doing basic research on leatherback turtles and currently are studying localized movements, migration, habitat use, and feeding patterns. Additionally, they are working with other organizations to investigate leatherback distribution, health, and bycatch in fixed-gear fisheries.

Bluefin scientists from all over the world have been traveling to Gloucester

for meetings in the LPRC's temporary quarters on the city's waterfront to lay plans for future collaborations and discuss the implications of the LPRC's work.

And Lutcavage is excited about opportunities to collaborate with swordfish longliners on a number of studies in the coming years.

While the LPRC has managed to accomplish a lot over time with very modest financial support, the center has reached the point where it is in need of substantial funding.

Now a part of the UMass Amherst College of Natural Sciences' Department of Environmental Conservation, the LPRC also is a component of the Massachusetts Marine Fisheries Institute. But while those affiliations are providing the facilities and infrastructure for the LPRC to grow, funding for actual research has been elusive in recent years.

Lutcavage anticipates seeking out donors to help support center projects. She also hopes that the research done at the center will convince federal and state funders that the LPRC's work is worth funding.

"We always want to be the people who deliver," Lutcavage said. "The LPRC already is doing world-class work. Now we have a premier facility. We're going to look at what's next and get the science done."

More information on the LPRC is available online at <[www.tunalab.org](http://www.tunalab.org)>.

Lorelei Stevens