

# Innovation in Fisheries Science at SMAST

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Innovation is part and parcel of scientific research. The School for Marine Science and Technology at the University of Massachusetts Dartmouth isn't unique in that respect. And in the Department of Fisheries Oceanography, innovation is directed to the understanding, well being, and sustainability of marine fisheries. Here are some examples.

## FISH BEHAVIOR AND CONSERVATION ENGINEERING

The work of Dr. Pingguo He is all about innovation. His Fish Behavior and Conservation Engineering Group (FBACE) studies the behavior of marine fishes and applies that knowledge to designing more selective fishing gear.

As He points out, "catching species is easy, avoiding species is not," but introducing more selective gear creates a win-win-win situation. It results in less discard, which is good for the fishery; it increases the economic value of the catch, which is good for the individual boat; and it cuts down on the amount of sorting necessary, which is good for the crew, especially in cold weather.

In the northern shrimp fishery, for example, He's group has introduced new size-sorting grids to exclude smaller shrimp, which in sea tests reduce counts of shrimp from 65 to the pound to 56 to the pound. As a result of this performance, nearly two dozen of the new size-sorting grids have been adopted into the fishery.

The FBACE group also designed a "topless" shrimp trawl that reduced herring bycatch by 87%, and total bycatch from 30% of the catch to less than 10%. Five of the topless trawls are now in fishermen's hands for use.

In addition to their work in the northern shrimp fishery, the FBACE group is currently involved in projects in the groundfish, silver hake, and longfin squid fisheries.

## BYCATCH REDUCTION PROGRAMS

Making progress on the bycatch problem doesn't always require innovative technology; sometimes it just takes innovative use of existing technology. Last year, SMAST launched the Yellowtail Flounder Bycatch Avoidance Program when bycatch threatened the harvest of the 2010 scallop allotment in the Nantucket Lightship fishing area: once the ceiling on yellowtail catch was reached, the harvest would be over, no matter how much of the scallop allotment remained on the sea floor.

The program is simple in concept. The scallop fleet voluntarily provides real-time yellowtail catch data through email, and SMAST posts on its website a composite of the fleet information and emails the locations of yellowtail "hotspots" back to the fleet. Such sharing of information can be extremely useful, but when, where, and how a captain fishes are his stock in trade. That the scallop fleet trusts SMAST with this proprietary information is a tribute to the cooperative relationship the two have built up over the years.

In 2010, only 32% of the yellowtail allocation was harvested from Nantucket Lightship, thus keeping the area open for the harvest of all of the lucrative scallop allocation. With twice the scallop allocation on the line in 2011, the bycatch avoidance program will be a key tool to avoid the catch of flounder.

SMAST has now expanded bycatch avoidance to include a program to reduce the bycatch of river herring and shad from the Atlantic herring and mackerel fisheries.

## SCALLOP SURVEY PRODUCES HIGH-RESOLUTION MAPS

The story is locally well-known of SMAST's role in the 1999 survey of U.S. sea scallop stocks that helped boost the fleet from a low point in its history. A lot has also been written about SMAST's non-invasive video survey system which does its work without affecting the population or disturbing the sea floor. But it's a spin-off of that work has the potential to help usher in a new era of fisheries management on Georges Bank.

After over a decade of survey, SMAST scientists compiled more than 60,000 photographic images of the Georges Bank seabed alone. From these, Bradley Harris and Kevin Stokesbury constructed a set of habitat maps 100 times more detailed than those previously available. Modelers are already using this data to predict the effects of fishing on the seabed.

## MODELING IN SERVICE TO FISHERIES

On January 26, 2007, the New Bedford fishing vessel *Lady of Grace* sank in Nantucket Sound. All hands were lost. The U.S. Coast Guard reconstructed the incident and reported the likely cause: loss of ship stability due to severe ice accretion.

To help prevent such tragedies, a team from SMAST and the Woods Hole Oceanographic Institution has developed the Northeast Coastal Ocean Forecast System, an integrated suite of ocean and atmosphere models that produces 3-day forecasts of weather conditions from the south of Long Island Sound to the north of the Nova Scotian Shelf. The system has shown good skill in predicting the conditions that caused the icing of the *Lady of Grace*.

This model system is now being transferred into an operational forecast system and is accessible from the SMAST home page ([www.smast.umassd.edu](http://www.smast.umassd.edu)).