



NOAA Teacher at Sea
Margaret Flanagan
Onboard NOAA Ship OSCAR ELTON SETTE
June 12 – July 12, 2007

NOAA Teacher at Sea: Maggie Flanagan

NOAA ship OSCAR ELTON SETTE

Mission: Lobster Survey

9 July 2007

Necker Island

Project Log – Interview with Meaghan Darcy, scientist

Meaghan Darcy, from Rhode Island, is a research technician for our lobster survey. We spend our days helping with lobster traps, but in the evenings our science work includes sampling the many species of bottomfish in the Hawaiian Islands. Meaghan is a Ph.D. candidate working with the Fisheries Center and Department of Zoology at the University of British Columbia in Vancouver, Canada, specializing in Hawaiian bottomfish. Meaghan has always been interested in biology, but a semester of study in the Caribbean included research with fisherman and inspired her to pursue the science of fisheries.

What is the focus of your current research?

Meaghan is working on a management strategy evaluation for the Hawaiian bottomfish fishery. The bottomfish fishery targets about 13 different species across 3 designated zones, which are fished at depths of 50 to 600+ feet using hydraulic hand lines with up to 10 hooks per line. The targeted bottomfish include several snappers (ehu, opakapaka, onaga, kalekale, gindai, and lehi), grouper (hapu`upu`u), and jacks (kahala, butaguchi, and ulua). One reason bottomfish are popular as a commercial product is that they don't feed much on reefs, and so are less likely to carry ciguatera poisoning, however, kahala has been associated with ciguatera and is no longer highly sought after. The first step in evaluation is to use a simulation model to simulate the data gathering process (i.e., simulate catch and effort data that would be similarly collected for the commercial fishery). Meaghan will then use an estimation model to estimate bottomfish abundance



Meaghan Darcy with a 70.2cm opakapaka (*Pristipimoides filamentosus*).

relative to a target abundance using the simulated catch and effort data. Based on the results from the assessment model, a management policy is set and applied to the simulation and estimation models to determine the policies impact. Using this approach, the potential success of a variety of different possible fishery management strategies can be evaluated. Meaghan will also apply this approach using the Hawaiian bottomfish commercial fishery data and her conclusions will offer insight on best management practices for the Hawaiian bottomfish fishery.

What are the challenges in your research?

The Hawaiian bottomfish is a multi-species fishery, where several different species may come up on the same line. This simultaneous capture makes scientific evaluation of the fishery more difficult. The reported catch per unit effort (CPUE) data is not species specific, and this grouping ignores differences in the life histories and catchabilities of different species. Different habitats preferred by juveniles and different ages of maturity and breeding lumped together in management may influence decline of one bottomfish species, while not another.



Teacher at Sea Maggie Flanagan with a 71.2cm hapu`upu`u (*Epinephelus quernus*)

Some of the management strategies have drawbacks along with potential benefits. Currently in the Main Hawaiian Islands, the bottomfish fishery is being managed under a **seasonal closure** policy during peak spawning periods (May 15, 2007 – October 1, 2007) to maximize the number of fish breeding. Over the next couple of years Hawaii is moving towards a quota system where a **total allowable catch (TAC)** will be set. Under a quota system when the TAC is reached, the fishery is closed for the remainder of the year. In practice, TAC can produce a “race for the fish” which encourages competition at the expense of conservation while fishing. **Quotas** can be effective, but require the infrastructure for widespread monitoring in real time and making annual assessments. **Size limits** are another possible strategy, which could be complicated by the multi-species nature of the fishery. Another possible strategy would be to establish **marine protected areas**,

where commercial fishing isn't allowed. This may lead to increased pressure on other marine areas, if fishing effort isn't reduced, but just forced to relocate. Now that the North West Hawaiian Islands have become part of the Marine National Monument, commercial fishing is being phased out of those waters and the management strategies evaluated in Meaghan's thesis will be mainly relevant to the Main Hawaiian Islands, which already suffer from overfishing.

Through acknowledging these challenges in her research, Meaghan is developing novel approaches to management strategy evaluation. Her objectives include modeling the fishermen's behavior to better understand how they will respond to different management strategies, and identifying effective management tactics for the multi-species nature of this fishery.

What inspires you about your work?

Meaghan is excited to be working on real issues in fisheries, where her efforts are applied to real situations. She's interested in quantitative expertise and population dynamics as tools for her work. Hawaii has recently begun expanding management of the bottomfish fishery, and recommendations through Meaghan's evaluation will be very relevant for developing policy.

Personal Log

Besides teaching me about the Hawaiian bottomfish fishery, Meaghan also taught me how to work the fishing gear. She is a wonderful role model for women in science, and a great crewmate!