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Commercial Fisheries News



Steve Kirk of CFF, left, and crewman Patricio Rubio sort the catch from a bycatch survey tow aboard the *Regulus*. (Coonamessett Farm Foundation photo)

GB yellowtail, scallop study biggest ever

NEW BEDFORD, MA – An ongoing study to document seasonal fluctuations in yellowtail flounder bycatch in the Closed Area I and Closed Area II scallop access areas on Georges Bank is beginning to produce some eye-opening results.

The research is critically important to scallopers, who have been working diligently for years now to reduce groundfish bycatch, especially of yellowtail, which is under an extremely restrictive quota.

But the work also is giving people a whole new understanding about scallops themselves as investigators probe deeper into the nuances of spawning cycles, gonad conditions, and meat weight changes.

It's broadening industry's appreciation for improved dredge performance, both in terms of bycatch reduction and enhanced scallop catch efficiency.

And it's offering new insights into discard mortality rates for yellowtail and winter flounder, as well as generating baseline information about a yellowtail flounder fungal disease first seen on Georges during 2011's cruises.

"This research has provided an amazing wealth of data," said Ron Smolowitz of Coonamessett Farm Foundation (CFF), a principal investigator in the work.

According to several people involved, what is most remarkable about this multifaceted study is its sheer scale and scope, as it involves three institutions and roughly a dozen commercial scallop vessels. Participants say the undertaking is unlike any other carried out in the Northeast so far for scallops. And that's really saying something given the scallop industry's longstanding commitment to cooperative research.

The current work began in 2010 and will continue through 2012 – all supported by the industry-funded scallop research set-aside (RSA) program.



Coonamessett Farm Foundation photos

Researchers work the deck aboard the *Regulus* in an August 2011 bycatch survey trip.

Below, catch from the turtle deflector dredge aboard *Resolution* during the scallop bycatch survey work in September 2011.

One of the purposes of this was to get out there in the winter months. Now we're getting a really good idea of how things are fluctuating as far as bycatch goes.

—Kat Goetting

The University of Massachusetts Dartmouth's School for Marine Science and Technology (SMAST) and the Virginia Institute of Marine Science (VIMS) have partnered with CFF to carry out the science side of the study.

And, a total of 11 scallopers – Celtic, Arcturus, Westport, Liberty, Endeavor, *Regulus*, *Resolution*, Ranger, Horizon, Wisdom, and Venture – had all made one or more trips so far. Additional vessels are expected to help out this coming year.

In mid-April, industry/research teams were at sea on their 14th trip of the



series, adding to the copious inventory of information obtained during the previous 13 expeditions.

Each trip has covered roughly 80 stations between Closed Area I and Closed Area II combined. Trips have taken place over the full calendar year, including during the up-to-now data-poor winter and spring months. This broad time span is one of the project's strengths, according to Dave Rudders of VIMS, another of the project's principal investigators.

"It's a really unique data set because we've been able to get fishery independent information almost on a monthly basis," he said.

Access-area timing

Throughout this project, research teams have been striving to reduce yellowtail bycatch by testing and tweaking innovative scallop dredge designs and by identifying times of the year and areas where yellowtail bycatch is minimal.

Under the fishery's rotational area management program, scallopers currently are allowed to fish in scallop access areas, including Closed Area I and Closed Area II, from June 15 through Jan. 31.

But many scallopers have questioned the appropriateness of these dates, arguing that yellowtail flounder bycatch is often lower in the spring than at certain times in the fall.

The Fisheries Survival Fund, which represents the vast majority of full-time scallopers from Maine to Virginia, has been urging the New England Fishery Management Council for some time to revisit the issue and better align access-area openings with

periods when yellowtail bycatch is lower.

Yet the situation is a Catch-22. The council has had very little catch data to justify a change, but it hasn't had that data because scallopers aren't allowed to fish in access areas from Feb. 1 through June 14.

Many hope the ongoing RSA work will fill the void.

"One of the purposes of this was to get out there in the winter months," said Kat

Scallop meat weight fluctuates significantly during the year, and seasonal changes occur when energy reserves are reallocated from the adductor muscle – the meat – to the gonad.

—Susan Inglis



Coonamessett Farm Foundation photo

An August 2011 survey trip. In the front, from left, Regulus crew Ed Lee and Monica Rubio. Standing, from left, Regulus crewman Patricio Rubio, Kat Goetting of CFF, Adam Barkley of SMAST, Steve Kirk of CFF, and Katherine Thompson of SMAST.

Goetting, a supervisory research biologist with Coonamessett Farm Foundation. "Now we're getting a really good idea of how things are fluctuating as far as bycatch goes."

Ron Smolowitz concurred, saying he believes the new data will significantly advance the discussion.

"We've got solid information that the scallop plan development team (PDT) is going to be able to act on," he said.

The New England council's scallop committee, which is in the process of

developing Framework Adjustment 24 to the scallop plan, is prepared to consider alternative access-area dates in the framework.

One problematic factor, however, is that the issue goes beyond scallops, said PDT Chair Deirdre Boelke, the council's scallop plan coordinator. Changing the scallop access-area dates would require a "joint action" with the groundfish committee because of potential

implications for spawning groundfish.

The existing scallop access-area dates were originally selected to help reduce impacts on groundfish, including yellowtail, she explained, so the groundfish committee would need to analyze whether shifting the dates would unduly impact groundfish.

The groundfish PDT and committee have been mired in their own work this year. Not only are both bodies under extraordinary pressure to address troubling new assessment updates for a number of stocks, including Gulf of Maine and Georges Bank cod, they also are now in the midst of conducting a comprehensive review of all existing groundfish closed areas.

Given this already significant workload, groundfish PDT Chair Tom Nies warned that it's possible the groundfish PDT may not have time enough to carry out the analyses needed to accompany a change to scallop access-area dates by November, which is when Framework 24 is scheduled to be completed.

A delay in action surely would come as a blow to scallopers, but Rudders said that, either way, the industry is making headway by stockpiling the very type of information the council will need to make an informed decision, whenever that may be.

"It's obviously a very complicated

situation,” he said. “But you can’t make any sort of assessment without the data, so that’s the first step. And we’re collecting the data.”

Gonads, spawning

While yellowtail flounder is at the heart of this multiyear investigation, researchers say a second, intertwined aim is to identify periods when scallop meats are at their peak.

Therefore, the project’s broader goal is to “optimize the harvest of scallops while minimizing impacts to the yellowtail flounder stock,” said investigators.

Scallop fishermen know all too well that meat quality is poorest immediately following spawning events, and some try to minimize fishing activity during such periods.

To get a better handle on spawning occurrence and associated meat weight impacts, a number of researchers on the study team have been looking at different indicators using whole scallops, scallop gonads, and scallop shells.

Katherine Thompson at SMAST has been heading up the gonad work. She receives both frozen and preserved gonad samples from each at-sea trip and then analyzes those samples through a variety of visual and microscopic methods. She also uses a gonadosomatic index, better known as GSI, to help determine whether gonads are in “ripe” condition, “developing,” “partially spent,” or “completely spent.” She even has produced an illustrated Sea Scallop Gonad Guide to help people better understand differences in gonadal stages (see photos page next page).

Thompson said the focus of her work is to determine whether spawning in Closed Area I and Closed Area II happens on an annual basis, as is currently assumed, or whether it’s a semiannual event.

As it turns out, it appears to be semiannual – at least that’s what happened on Georges Bank in 2011. Preliminary results from Thompson’s work indicate that a springtime spawning event occurred in both Closed Area I and Closed Area II, which, she noted, could have important management implications.

Furthermore, it seems that a spring spawning event is on track to happen again this year.

“Macroscopically, I’m already seeing big, ripe gonads from the March trip,” she said.



Coonamessett Farm Foundation photo

Aboard the Resolution during a September 2011 bycatch survey trip, crewmen and researchers pick the piles of scallop catch.

Reflex Action Mortality Predictors (RAMP) used to estimate yellowtail discard mortality

Reflex	Description
Resistance	Resistance to being restrained
Mouth	Resistance to the forced opening of the mouth
Operculum	Resistance to the forced opening of the operculum
Gag	Response to insertion of probe into the throat
Fin control	Response to a brushing stimulus on the fins
Natural righting	Attempts to dorso-ventrally right itself within 5 seconds
Evade	Attempts to actively swim away after reflex testing

At press time in mid-April, the April 2012 trip was underway, and Thompson was at sea on it.

“I really want to see what’s going on myself,” she said prior to departure.

Thompson is working on a master’s thesis at SMAST titled “An Investigation of the Atlantic Sea Scallop (*Placopecten magellanicus*) Reproductive Cycle in Closed Areas I and II on Georges Bank.”

Reproduction vs. growth

Susan Inglis, a research associate at SMAST, is focused on spawning, too, chemically analyzing shell samples from monthly trips in Closed Areas I and II in order to age scallops and determine whether they originated from a spring or fall spawning event.

She’s also looking at whole scallops to determine how seasonal variations in their “energy reserves” affect meat weights.

Inglis explained that researchers can get valuable information about the condition and recruitment potential of scallops by examining the amounts of glycogen and lipids they contain. These are the scallops’ carbohydrate and fat contents respectively. She additionally tests for protein, water, and ash.

Collectively, these compounds help her determine when energy reserves are being used primarily for meat growth or for reproduction. She’s also looking at how moisture levels in scallop meats change seasonally.

“Scallop meat weight fluctuates significantly during the year, and seasonal changes in meat weight occur when energy reserves are reallocated from the adductor muscle, which is the meat, to the gonad,” Inglis explained.

In short, a scallop that has put its energy into gonad formation and spawning may not have a lot of resources

left over for meat growth. So, the more researchers can learn about spawning occurrence and timing, the easier it will be for scallopers and managers to use that information to determine optimal harvest periods when scallop meats are at their best.

The study team also has been looking at shell height-to-meat weight ratios to help determine which months of the year typically produce better meat yields.

So far, the team has found that meat yields in the fall – generally around September, October, and November – have been poorer, while meat weights peaked around June.

This, said Dave Rudders, makes sense because scallops typically spawn in the fall.

Backing up Inglis' point, he said, "When they're putting a lot of energy into spawning, the meats tend to suffer."

Notably, the study teams found that yellowtail bycatch tended to be highest in the fall during some of those same periods of less-than-optimal scallop meat conditions.

Discards

Adam Barkley, a fisheries research technician at SMAST, has been heading up the project's groundfish discard mortality work.

Using a method known as RAMP, which stands for "Reflex Action Mortality Predicators," Barkley tested reflex impairment levels of yellowtail flounder and winter flounder caught during 2011 trips in both Closed Area I and Closed Area II. He scored each fish's response to seven different reflexes, which covered everything from "resistance to being restrained" to the fish's ability to "actively swim away after being tested" (see table at left).

Previous studies have shown that RAMP scores are good indicators of whether fish will survive after being released – or become "discard mortality." The methodology proved to be useful for the 2011 work in Closed Areas I and II as well.

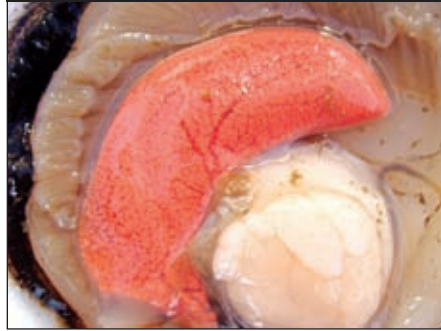
Interestingly, said Barkley, "Our results didn't show much of a difference in the discard mortality rates by season, which was a little bit of a surprise to us."

Researchers had expected that mortality rates would be greater during the summer, when water and deck temperatures are higher, but that didn't turn out to be the case.

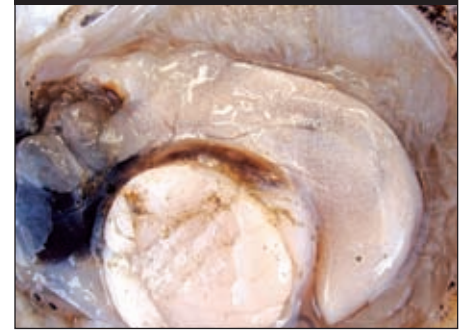
Overall, results showed that discard mortality for yellowtail flounder ranged from a low of 78% in October to a high of 90% in March. As for winter flounder,

Sea scallop gonadal stages of development

Developing female.



Developing male.



Ripe female.



Ripe male.



Partially spent female.



Partially spent male.



Completely spent female.



The source.
Read. Respected. Real.

discard mortality rates were much lower, on the order of 30%.

Even though researchers sampled far fewer winter flounder than yellowtail because there just weren't as many winter flounder in Closed Areas I and II, Barkley said the two species were fundamentally different.

"Yellowtail just aren't as sturdy as winter flounder," he said.

Scientists already are making good use of the yellowtail discard data. Previous stock assessments for yellowtail assumed that discard mortality was 100%. A new assessment for Southern New England yellowtail, due to be completed this summer, may consider using a 90% discard mortality rate based on the latest findings.

The future

With the discard mortality work coming to a close, Barkley's focus for the 2012 trips will be shifting, and he'll be working with others to develop "area swept biomass estimates" for yellowtail.

Researchers will calculate pounds of yellowtail caught vs. the amount of sea floor towed – the "area swept" part – to get an estimate of yellowtail flounder biomass for a given area.

"It's another stream of information that we'll have at our fingertips," said Barkley.

Tows will be conducted with scallop dredges, and the results will help determine whether a long-term yellowtail bycatch survey could be conducted with dredges in conjunction with traditional scallops surveys.

The CFF/SMAST/VIMS/industry



Coonamessett Farm Foundation photo

Aboard the Regulus in August 2011, crewmen and researchers sort the catch.

team will continue to work on dredge performance in 2012 through further testing of both the Coonamessett Farm Turtle Deflector Dredge and a slightly modified standard New Bedford-style dredge. And, they'll continue to collect extensive data related to scallop biology, growth, and energy reserves.

Furthermore, work will intensify to better identify the occurrence of that worrisome yellowtail flounder fungal infection first seen in 2011 on Georges, which made the livers of some yellowtail flounder look like cottage cheese.

A few of the parameters of the overall work plan will change. For example, teams will conduct two trips per quarter this year instead of one every month, although one of the fall trips may involve two boats. And, people's research focuses may change slightly.

But the mission, said participants, remains the same: Collect data, collect data, collect data. In the end, it will make a difference, both in the science world and in the management arena.

Said Rudders, "We have so much more information now for these two areas, not only in the amount but in the very nature of the data that's being collected. We're getting a whole fresh look at things."

Janice M. Plante



Coonamessett Farm Foundation photo

Jude Wilber, working with Coonamessett Farm Foundation, measures scallops aboard the Regulus in March 2011.



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