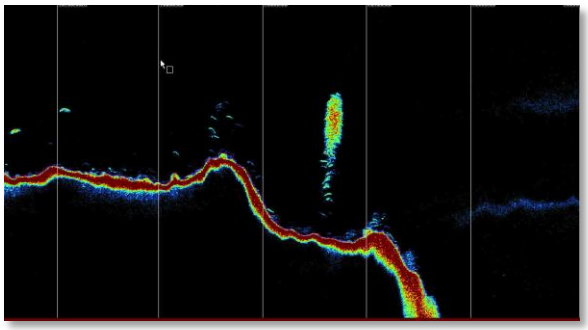
Seafloor Characterization of the U.S. Caribbean
2010 Field Season
March 18-April 6, 2010

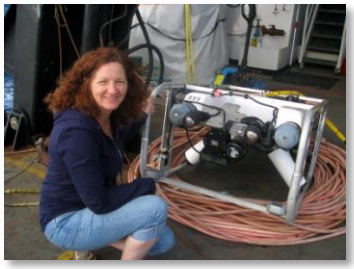
Day 18: April 3, 2010

Looking for Action:
While underway transiting west to Grammanik Bank, the crew and the science staff prepared for the moment we've all been waiting for (well, at least the moment the fish acoustic team has been waiting for)…spawning aggregations! Laura Kracker and Eric Ebert have been diligently working all week (along with ROV team Lance Horn and Glen Taylor) to fine tune the new equipment and software for an ROV retrofit that will enhance its sonar capabilities to account for fish aggregations…in the dark. Why, one might ask, are you trying to track groups of fish in the dark? Several species of reef fish, such as grouper, parrotfish, wrasses, snappers and surgeon fishes, form spawning aggregations. A spawning aggregation occurs when a large number of fish come together temporarily at specific sites to reproduce. Typically this behavior occurs at night. Seem simple enough? Maybe for the fish. Studying spawning aggregations from a scientist's perspective, however, is tricky business.

The first challenge to this science is knowing ***where*** to find the aggregation. Spawning aggregations tend to be predictable in location and time – often times they form at sites that are used year after year. It is important to understand more about these aggregations because they are thought to be the primary source of larvae that replenish reef fish populations.



The split scan sonar detects a "fish ball," or a group of fish on the shelf's edge.



Laura Kracker shows off the freshly installed high resolution sonar on the ROV (middle); the team waits patiently in the dry lab for an indicator that we have found an aggregation of fish (right).

Using existing data from local sources such as local researchers and fishermen can help narrow down the options of locations for scientists to start looking for spawning aggregations. Furthermore, using known life history and behavior information for the species being studied can help in determining where they might be congregating. In this case, we know that these fish species will often occur close to the shelf's edge and near open water, but in areas that have a reef close by. All the habitat mapping and groundtruthing information we've been collecting will come in handy in this context.

Another challenge to studying spawning aggregations is knowing ***when*** the aggregation will congregate. Luckily, for several reef fish species, this information is understood, at least within a temporal range. For example, the Yellow fin grouper (the fish that the team is trying to track on this mission) are thought to spawn 6-10 days after the full moon on an annual basis. The full moon was 6 days ago, so that is the cue to start our observations today!

So, if we know where these aggregations may occur, and we understand approximately when in the lunar cycle the event might take place, why have we yet to learn more about these aggregations? One of the major difficulties, logistically speaking, is that these events often occur at night. And, putting divers in the water at night to go look for a large group of fish whose location is hypothetical is like finding a needle in a haystack…blindfolded.

It's 7:45 pm and since lunch time, we've been using the acoustic sonar over a series of tight transects over the target range we've been told the Yellow fin grouper come to spawn. The plan is to deploy the ROV (with the new high resolution sonar capabilities) when the split-beam acoustic sonar indicates that we have found a large group of fish. The new high resolution sonar attachment on the ROV will use acoustic pings, much like those being used by the split-beam sonar on the bottom of the ship, to identify the size of the group of fish beyond what can be seen with the lights on the ROV (the lights will only illuminate about 6 feet in the dark).

No signs of any fish yet. The team hovers over the computer screens waiting for any sign of activity. "It's supposed to be 6-10 days after the full moon, so we may not have the right day, we may be early…" says scientist Eric Ebert. "So, if we don't see anything tonight, we'll try again tomorrow" he adds. But for now, they continue the search by having the boat continue over the same pattern of track lines with the split-beam sonar.

It's 9 p.m. and we have a sighting! The group confirms that it is in fact one lone Yellow fin grouper. It's not exactly an aggregation, but one fish is a start, right?

At 10:30 p.m. its time for me to turn in – but the science team continues to dive with the ROV in search of the mother-load of gravid groupers. The group continues through the night to dive along the transect of the shelf and the shelf's ledge where they have been surveying all day. Eventually they come across a larger group of fish, including approximately 15 Yellow fin grouper!

"It was a nice sized group of grouper, definitely not a spawning aggregation, but they looked nice and plump like they do before they spawn, so we are likely just off by a couple of days" remarks Ebert.

While the group will likely not be able to go back and survey this area again during this research mission, critical information was gained from this acoustic survey. First, it confirmed that Yellow fin grouper are indeed present at this site, so the site can be targeted for future studies. Additionally, Ebert explains that they learned that the track-lines they used as the survey course can help to identify where fish are moving within an area since they tracked the same course repetitively for 12 hours. Lastly, it was a good exercise using the high resolution sonar on the ROV to ensure that it works as a survey tool for this type of research. Tomorrow, the team will gear back up to look for more spawning aggregations off of a new site near St. John.

DID YOU KNOW …

• There are two main types of spawning aggregations:

Resident aggregations – Fish tend to live near the aggregation site and only have to travel a short distance to get to the site. Resident aggregations form on a regular basis and tend to be formed by smaller fishes such as wrasses.

Transient aggregations – Fish travel long distances to aggregation sites.

• Since spawning aggregations tend to be predictable in location and time, they are highly susceptible to overfishing. Fishermen are able to catch a large number of fish in a short time. Intense fishing on these aggregations can result in the disappearance of aggregations all together. The decline in spawning aggregations ultimately results in the reduction of the population because fewer and fewer fish are reproducing each year.

• To learn more about coral reef ecosystems, visit http://coralreef.noaa.gov

The ROV comes across a Yellow fin grouper. The scientists were hoping to find a much larger group that would indicate a spawning aggregation.

For more information about NOAA's Center for Coastal Monitoring and Assessment Biogeography Branch visit, http://ccma.nos.noaa.gov/about/biogeography/welcome.html