

NEW ENGLAND FISHERY MANAGEMENT Council

Scallop Survey Advisory Panel

STATUS

- A. Meetings: The Advisory Panel met on May 21, 2008 in Taunton, MA. The SSAP reviewed and discussed plans to conduct survey calibration of the new survey dredge on the RV Sharp using a combination of methods. Dr. Hart gave an overview of new bottom survey technology and its potential integration into the annual survey protocol. The SSAP also discussed potential augmentation of the annual survey with data from other surveys in areas that have not been traditionally sampled.
- B. The SSAP Terms of Reference are:
1. Provide guidance on sampling technologies and platforms to continue to provide data that will be directly input into science advice for management. This includes sampling at different spatial scales, e.g. site specific, stock wide.
 2. Provide advice on the development and application of new and existing technologies and platforms to advance the science advice from single stock biological information to advice at the ecosystem level.

COUNCIL ACTION

- A. No Council action is required at this time.

INFORMATION

1. May 21, 2008 meeting summary

#1

New England Fishery Management Council
Scallop Survey Advisory Panel
DRAFT Meeting Summary
May 21, 2008

The Scallop Survey Advisory Panel met in Taunton, MA to discuss plans for conducting the 2008 scallop survey on the RV Sharp and the plans to calibrate the new survey dredge and vessel to the old survey. The panel also discussed evaluation and eventual incorporation of new photographic and audio bottom survey technologies into the regular survey. Gaps in survey coverage where scallop fishing effort had occurred and how they might be filled in with other state or academic surveys was also discussed.

Advisory panel members present were David Simpson (NEFMC, chair), Dennis Spitsbergen (MAFMC), Dr. Dvora Hart and Victor Nordahl (NEFSC), Richard Taylor, Ron Smolowitz, Kevin Kelly (ME DMR), Kevin Stokesbury (SMAST), and Dr. DuPaul (VIMS). Also present were Andrew Applegate and Sarah Pautzke (NEFMC), Alex Banermeister (EDF), Russel Brown (NEFSC), Jerry Cygler, Mark Biron, Ray Starvish, Chuck Adams, Michael Marino, Cate O'Keefe, and Brad Harris.

Dr. Hart gave an overview on the status of survey technology and on calibration plans for the new survey dredge deployed on the RV Sharp. Dr. Hart's presentation made the following points:

Dredge surveys

- There has been a close correspondence between scallop survey and commercial landings in the Mid-Atlantic region. The dredge survey also tracked increases in Georges Bank scallop biomass in the groundfish closed areas.
- The dredge survey has been useful for tracking trends in abundance of large scallops and recruitment. There is a larger maximum size (L_{∞}) of Georges Bank scallops, and more 140+ scallops than found in the Mid-Atlantic region. On Georges Bank, there has been a lack of recent recruitment, but no trend is apparent. It appears that cyclic pattern possibly occurs with Georges Bank recruitment, so if true a good year class is due.
- There are some valid criticisms of the dredge survey. Conducting a dredge survey is very labor intensive, particularly with recent increases in abundance.
- But it provides a good broad-based survey that tracks the scallop biomass well and provides a good index of recruits. It also provides good information about benthic organisms and limited habitat type data.
- The sampled area is fairly large compared with other types of surveys. The total towed area is about 4500 m²/tow, so over 300+ tows it samples about 2.25 million m².
- The survey catches represent a relative index, scaling factor dredge efficiency applied to estimate total abundance. And the survey covers most, but not all of the fishable resource.

Drop camera survey

- This type of technology was developed by Dr. Stokesbury and SMAST. The survey began in closed areas in 1997 with a fine-grid survey, and the data were used in combination with the

dredge survey to estimate biomass in access areas and set TACs. More recently the SMAST survey was expanded to include nearly all of the resource on Georges Bank and the Mid-Atlantic regions with a coarser grid survey. The data were used in the last scallop assessment as a second survey index.

- Measures absolute abundance subject to observation error. Sampling efficiency of the equipment is assumed to be 100%.
- The drop cam system has small footprint, which may under-sample in areas having patchy scallop distributions.
- The resource-wide camera survey is often conducted over 54 sea days, 20,160 m² of area is sampled on over ~1800 stations, arranged as a grid. The survey exhibits a scallop size measurement error, and even though some measurement protocol improvements have been recommended there is still some evidence of measurement error which introduces a bias into the biomass estimates.

Towed video survey

- The towed camera (Habcam) can measure absolute abundance and habitat over a larger area. It provides direct counts and habitat information. The sampling design also captures information about scallop patchiness at various scales.
- But the Habcam system captures too much data to be hand processed. Automated processing and calibration is applied. It estimates scallop size measurement and may have some of the same measurement error as the drop camera system, but it does not appear to introduce as much error.
- Automated scallop identification is about 80% accurate and improvements are being made. Some hand measurement and counts are likely to be required to validate the images over various bottom types and backgrounds.

Dr. Hart made the observation that sampling efficiency varied across the three survey types, but the quality of information within the sampled area also varied:

- Survey dredge (NMFS) samples 108,000 m²/day
- Drop camera system (SMAST) samples about 560 m²/day
- Towed video survey (HABCAM) samples about 259,200 m²/day

Survey dredge calibration

There is a planned transition to RV Sharp using reconfigured survey dredge, which would conduct the 2008 survey.

Four types of calibrations are planned:

- Direct calibration ~50 stations in Closed Area I and Nantucket Lightship Area, duplicated by the Sharp.
- The RV Sharp will duplicate 84 stations sampled in 2007 in the Delmarva Area, Closed Area I and Closed Area II.

- Habcam comparison, shadow survey on Albatross stations in 2007 and shadow survey on Sharp in 2008. Provides inferences about survey dredge efficiency, using paired comparisons
- Commercial dredge shadow surveys (VIMS)

NMFS has not adopted a timeline for adopting and incorporating new survey technology into the standard survey, but Dr. Hart thought a schedule to develop new technology in 2008-2010 made sense. The new technology could be formally implemented in 2010, supplemented by dredge captures for size frequency and measurement of other biological parameters (spawning condition, etc.).

Comments:

Dr. Stokesbury had questions about role of SSAP in deciding technology to be used and time line. He suggested another approach which would rely on the SMAST survey to bridge the gap in survey coverage until the new technology was developed and adopted, instead of relying on a series of survey dredge calibrations, each with their own error sources.

Mr. Smolowitz asked about the time frame for having accurate abundance data after completion of the survey, should be a key consideration in which technology was preferable. He also expressed concern about dependence on RSA funding to do survey research, which is administered by the Center who have an investment in the dredge survey.

Dave Simpson recommended that a peer review of calibration research should be conducted, possibly associated with the next stock assessment or using an SSC review. Also final reports for RSA research are available for review during the peer review.

Dr. DuPaul highlighted the importance of collecting real time data on shell height meat weight to calculate biomass estimates, which was a favorable attribute of dredge surveys.

Vic Nordahl followed with a presentation and overview of RV Sharp transition plan and gear issues

In summary, there are 36 sampling days budgeted for 2008, 2 legs are scheduled. Eighty-five stations in closed areas will be reoccupied and sampled at same speed, scope and duration as occurred in 2007 on the Albatross. Unless a decision is made not to use turtle chains, some work will be done to evaluate turtle chain configuration

Mr. Nordahl reviewed some of the accomplishments of SSAP to define a modified prototype dredge and fine tune its performance during 2007 RSA projects to test dredge modifications. He reviewed the changes and specifications of new dredge which will be used in the 2008 survey. The new gear specifications have been documented in diagrams and stored in a computer file.

During the trials, they found that fewer chains (a 5 x 3 rather than a 7 x 4 configuration) reduces dumping problem, causing catches to differ by about 15%.

Comments

Dr. Hart stressed importance of using the same gear on the commercial shadow vessels as was used in 2007, to use a suitable protocol for calibration. Doing so would allow comparisons and a bridge between research in 2007 and research in 2008.

A person asked whether actual bottom time would be monitored in a variety of habitat types, since bottom contact may vary. Mr. Nordahl replied that the survey dredge has a sensor which measures time that the dredge is in contact with the bottom.

SSAP Discussion of turtle chain configuration

Mr. Smolowitz suggested that chains should not be used on the survey dredge, except in particular hard bottom. Chains affect dredge efficiency and catch of 'trash' components. Dr. DuPaul agreed that the survey dredge should not use chains, because it adds another source of variability and operates differently in various types of habitat. However, there are places that rock chains reduce the probability of bad tows and reduce safety risk where large rocks are caught without rock chains.

Dredge tow comparison data (handout provided) showed significant differences in catch of scallops and other species on tows conducted on soft bottom in the Mid-Atlantic region. Other species hang up on chains and affect dredge performance. Turtle/rock chains cause variability in catches which depend on bottom conditions and non-scallop catches.

More detail needed on indirect calibration and specifications on gear used in the calibration.

The SSAP consensus is to deploy turtle/rock chains only in strata that have been deemed to have problems due to large boulder habitat. Turtle chains should not be used on soft or sand bottoms, or anywhere in the Mid-Atlantic region.

SMAST video survey – Dr. Stokesbury

Dr. Stokesbury summarized the SMAST video survey and reviewed sampling plans for 2008. He also spoke about sampling problems on dredge surveys, including variable selectivity and efficiency. Mid-Atlantic and central Georges Bank will be sampled by the SMAST survey in 2008, and he expected the survey to be finished by mid-July.

Dr. Stokesbury said that the protocol for correcting the length frequency data was no longer in use because the relationship between precision and bias cancel out. On-bottom measurement removes variability due to selectivity characteristics of a dredge or removal sampling method.

Dr. Stokesbury questioned the validity of dredge calibration, each with a certain amount of error. Is the continuation of the NOAA time series valid, he asked?

He felt that the Habcam system may not be ready for deployment as a survey device. Issues of controlling attitude and automated identification accuracy have not yet been resolved or are still in the testing phase.

Dr. Stokesbury said that he did not understand why an agency decision had already been made and referred to a letter from Dr. Thompson, which identifies the Habcam technology as the way forward for NOAA surveys.

He offered a question about accuracy of the Habcam system in areas of low abundance. The SMAST survey has four replicates per station, which in total samples 13 m². At this sampling level, an average of one scallop observation per station would be a very low density. Furthermore the grid can be sampled at different scales, he suggested. At high densities, the SMAST survey observed an average of 8.2 scallops/13 m² in the Elephant Trunk Area. In other areas with low abundance, the average number of

scallops was around 1-2. Sampling error at low densities is addressed by sampling a large number of stations.

Someone asked about the accuracy of distinguishing live scallops from clappers. Dr. Stokesbury answered that this problem was often addressed via oblique cameras and varying lighting during the photographic capture process. Multiple images can be reviewed to identify clappers moved due to water motion during the sampling process. He thought that the SMAST system did not suffer from a problem of wrongly identifying clappers as live scallops.

Habcam synopsis – Richard Taylor

The data visualizing procedures were developed by Norman Vine, in a Google-Earth like process.

The Habcam continuously samples a 1-1.5 m wide strip, generating about one terabyte of data per day. The system is designed to rectify the image for variation in distance, pitch, and yawl. The image identification is done by a segmentation algorithm, a mathematic model to detect edges. There is however an error rate that requires correction, particularly in silty areas like those found in the Elephant Trunk Area. Therefore there is a need to hand count a small proportion of images to determine error rate to apply to the automated identification system.

Comments:

Mr. Smolowitz questioned whether dredge/fishing tracks were observable in the Habcam images. Mr. Taylor replied that few dredge tracks had been observed, some effects seen when crossing the RV Albatross dredge stations during the shadow surveys.

Mr. Taylor added that the Habcam/dredge 'catch' comparisons include differences due to dredge efficiency and also positioning error. Therefore direct comparisons do not represent only dredge efficiency.

Dr. Hart pointed out that transect data are subject to autocorrelation and must be analyzed accordingly, using model-based estimation. The best sampling design has not been determined, but techniques exist to estimate optimal sampling design using transects.

Mr. Taylor said that the next phase of testing would be done in combination with synthetic aperture sonar. The 2008 RSA proposal included provisions for the following sampling program:

- 100 comparative transects over Sharp scallop survey tows
- Closed area 1 survey
- Great South Channel HAPC area
- Northern Edge HAPC

State of Maine scallop survey – Kevin Kelly

Kevin Kelly gave an overview of the Maine scallop fishery, prosecuted as a seasonal fishery in state waters

Maine began fishery independent survey in 2002, 2003 (coastwide), 2005, 2006. In 2007, Maine began sampling using a rotational basis. Most scallops in state waters are in Cobbscott Bay, Downeast Maine which is where sampling took place in 2007.

The survey includes a stratified random design, 13 strata. 2 ½ rings unlined, 7' sweep, 3-4 minute tow at 3 knots. Maine conducts the survey via contracts with commercial fishing vessels, via an RFP process.

State landings reports were not required until 2007 and there are lots of direct sales to consumers, restaurants, or small wholesalers.

In 2008, there are plans to survey federal waters in northern Gulf of Maine (N of 42°20'; where a 200 lb. daily possession limit & TAC apply in federal waters). Maine submitted an RSA proposal to conduct the federal survey in the northern Gulf of Maine.

Sampling coverage

Mr. Applegate gave an oral report on the correspondence between commercial fishing activity by vessels using VMS and the NMFS survey coverage. Although there was little or no recent limited access scallop fishing in the Gulf of Maine, there were significant amounts of general category effort offshore of NH and northern MA. General category fishing effort was also evident further inshore off NJ and SE of Block Island, both in areas not surveyed by the Albatross. Limited access effort also was noted on Cultivator Shoals, Little Georges Bank, and offshore of NJ where no NMFS sampling was conducted. Some of the areas were sampled by the SMAST survey, however. As the FMP transitions to quota-based management, surveying these areas would become more important if absolute biomass estimates were required to set catch limits even though these areas represented a relatively small proportion of the total resource.

The SSAP discussed whether a routine or adaptive sampling design was needed for these areas, which have not always been fished. There was a clear deficiency in the inshore Mid-Atlantic region, to at least 40 m, or possibly shallower areas.

The SSAP agreed that some expansion of the survey to more shallow areas in the Mid-Atlantic region was warranted, but that for other areas which see sporadic fishing activity the adaptive sampling program in the Draft Amendment 10 document should be revisited.

Dr. Hart reported that some additional sampling is scheduled in the NMFS survey and there were RSA proposals to derive more precise estimates of total biomass in the rotation management areas. She thought it was important to enhance the survey data in the Delmarva Area and Elephant Trunk Area, in particular.

Dr. Stokesbury commented that there appeared to be an incredible amount of work being planned to calibrate and validate the trawl survey. He suggested that the SSAP and NMFS should consider not doing the survey dredge calibration and focus their efforts on designing a new survey with modern technology. In lieu of doing the survey dredge calibration, he thought that the money could be used to fund the SMAST survey to bridge the survey needs.

Dr. Hart replied that a considerable amount of calibration work had already been done and the RV Sharp survey is already scheduled and funded. She added that the scallop fishery is too valuable not to undertake a federal survey of the resource. This program has a secure source of funding, rather than rely on earmarked funds as the sole source supporting data for assessment and management purposes.