



New England Fishery Management Council

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MEETING SUMMARY

Research Steering Committee

Hilton Garden Inn, Boston, MA

March 23, 2017

The Research Steering Committee (RSC) met on March 23, 2017 in Boston, MA to: 1) discuss the purpose of the RSC; 2) conduct a management review of several recently-completed research projects; 3) develop input on Council research priorities; and 4) conduct other business.

MEETING ATTENDANCE: Mark Alexander (Chairman), Vincent Balzano (Vice Chair), Bill DuPaul, Bill Gerencer, Jake Kritzer, Richard McBride, Chris McGuire, Matt McKenzie, Mike Pol, Ryan Silva, and Graham Sherwood. The RSC was supported by NEFMC staff: Rachel Feeney (RSC Coordinator), Chris Kellogg, and Jamie Cournane (Groundfish Plan Coordinator). About 11 members of the public attended, including participants of the research projects discussed.

SUPPORTING DOCUMENTATION: Discussions were aided by the following documents:

1. Meeting cover memo
2. Meeting agenda
3. RSC-related excerpts of the Council's *Operations Handbook*
4. Final report: *Small mesh fishery bycatch reduction in the southern New England/mid-Atlantic windowpane stock area* (Hasbrouck)
 - a. Presentation slides
 - b. NEC technical evaluation #2
5. Final report: *Determining the post-release mortality rate and best capture and handling methods for haddock discarded in Gulf of Maine recreational fisheries* (Mandelman)
 - a. Final report addendum
 - b. Presentation slides
 - c. NEC technical evaluation #2
6. Final report: *Assessing recreational haddock discard mortality on Jeffrey's Ledge through an industry-led collaborative mark-recapture tagging program* (Bradt)
 - a. NEC technical evaluation #1
 - b. Presentation slides
7. Final report: *Mapping the distribution of Atlantic cod spawning on Georges Bank using fishermen's ecological knowledge and scientific data* (DeCelles/Cadrin)
 - a. NEC technical evaluation #1
 - b. NEC technical evaluation #2
 - c. Presentation slides
8. Final report: *Northeast multispecies fishery flatfish bycatch and market analysis* (Cadrin)
 - a. Presentation slides

- b. NEC technical evaluation #2
- 9. Final report: *Identifying offshore spawning grounds of Gulf of Maine winter flounder* (Fairchild)
 - a. NEC technical evaluation #1
 - b. Presentation slides
- 10. Final report: *Synoptic acoustic and trawl survey of winter-spawning cod in Ipswich Bay, western Gulf of Maine* (Sherwood)
 - a. Presentation slides
- 11. Northeast Consortium's final technical evaluation criteria
- 12. Council's *Research Priorities and Data Needs for 2017-2021*, draft as of February 2, 2017

KEY OUTCOMES

- The RSC discussed seven research projects and made recommendations on the use of project outcomes in management.
- Regarding the Council's draft list of research priorities and data needs for 2017-2021, the RSC recommended that the word "priorities" be struck from the title and that a smaller list of priorities be developed by the RSC, a subset of the larger list.

INTRODUCTIONS AND AGENDA REVIEW

The meeting began at 9:30 a.m. Chairman Mark Alexander welcomed all to the newly reconstituted RSC. There were no agenda changes (though later in the meeting, the discussion of one project got postponed to a subsequent meeting).

REVIEW RSC-RELATED SECTIONS OF THE COUNCIL'S OPERATIONS HANDBOOK AND DISCUSS PURPOSE OF THE RESEARCH STEERING COMMITTEE

The Chairman gave an overview of the history of the RSC and its charge as outlined in the Council's *Operations Handbook*. He reviewed several tasks, as outlined, including helping identify research needs, review completed projects, improve collaborations between fishermen and scientists, and to serve on proposal evaluation teams (contact Ryan Silva if interested).

Dr. Kritzer commented that the Scientific and Statistical Committee (SSC) often grapples with immediate information needs, so his interest in switching to serving on the RSC is, in part, to help shape longer term research needs – a stronger relationship between the SSC and RSC would be beneficial, because the SSC's long-term recommendations are often overlooked.

Mr. McGuire commented that fostering collaborative research is very important. Administration of collaborative research is changing in the region, with the Northeast Fisheries Science Center (NEFSC) involving more industry in surveys and with the recent programmatic review. The Council and RSC could be involved in shaping the changes in a positive way. Chairman Alexander indicated that discussing the programmatic review could be a future agenda topic, once the review and NEFSC response is made public, but at least an update will be provided at the April Council meeting from the NEFSC. Dr. McKenzie agreed with both comments; perhaps the RSC could have a role in communicating findings of the trawl Advisory Panel and help shape future trawl survey projects. Mr. Balzano commented that the Council always has data gaps, and research tends to be reactionary rather than proactive. He wasn't sure how to get to a proactive approach though. Mr. Pol noted that our current approach to identifying Council priorities results in an overabundance of ideas, which are not priorities. Vague priorities are not helpful for the research community. The projects being discussed today stemmed from very specific priorities, which the RSC helped set, which is a great approach. The RSC should build off that model of

developing more precise priorities. Chairman Alexander noted the current draft priorities are too long. Mr. Gerencer agreed with the first two comments; he would like the RSC to focus on management needs rather than reviewing. Asking RSC members to write written comments in advance of a review is helpful to make the discussion more efficient. There are pressing needs for data and assessments to reduce uncertainty.

Dr. DuPaul commented that the research priorities coming out of a PDT can be fairly specific, but through the Council process, can get more abstract. It would help if the funding sources be more specific and narrow in their Request for Proposals (RFPs). Then it's up to the researchers to respond. Chairman Alexander noted the role of the RSC to weigh in on RFPs. Mr. Sylva indicated that the RFPs are program-specific. RSA priorities are set through the Council process, but programs like the national Bycatch Reduction Engineering Program (BREP) tend to be general. There's been some discussion about better integrating regional priorities in BREP though. Chairman Alexander wondered if the RSC could time a meeting to give input on RFP priorities. Mr. Silva indicated that BREP, RSAs, and the Saltonstall-Kennedy (S-K) program are issuing RFPs consistently. BREP and S-K have competitions in the fall, so perhaps the RSC could be involved. There's periodically a national competition for cooperative research, and there's awareness of Council priorities.

Mr. Sylva commented that there is a void in understanding where a project goes after it has been discussed by the RSC and asked if the RSC could help determine the impacts collaborative research has had in assessments or management. Chairman Alexander is unaware if there has been a retrospective look at how the RSC recommendations have been acted upon, but agreed that it would be worthwhile. Mr. McGuire commented that the RSC could meet with more frequency, seeing how the agenda had to get pared down, and there's a lot of interest in a deliberative process to develop priorities. He'd like to broaden meeting opportunities for the RSC. Mr. Pol indicated that RSC ideally provides "value added" management review, but sometimes gets weighed down in doing technical peer reviews when that hasn't been completed.

MANAGEMENT REVIEW OF FINAL RESEARCH REPORTS

Chairman Alexander outlined the management review process in the *Operations Handbook* and asked Dr. Chris Glass to explain the technical review used to evaluate the projects being discussed today – those funded in 2014/2015 through a Council contract with the Northeast Consortium (NEC). Dr. Glass explained how he organized a proposal review committee and followed through on an ongoing basis. The NEC strives to have each final report technically reviewed by two or three experts who do not have a conflict of interest with the project, and ideally familiar with the Northeast region (small universe of people). To date, the NEC has not received all the technical reviews yet, but will continue to submit them to the Council as they come in. Additionally, any RSC comments on the projects will be noted in the NEC's final report to the Council.

Chairman Alexander asked the RSC to consider the sufficiency of the technical review and how that bears on the RSC's consensus recommendations to the Council. The written comments submitted by RSC members will be part of the review (Appendix I). He referred to the policy in the *Operation's Handbook* regarding the criteria for using alternative gears in B Days-at-Sea program and the steps of the process. Mr. Sylva noted that the requirements drive a lot of gear research, though perhaps there could be an evaluation of this standard. Perhaps the RSC could have a role in evaluating this standard.

Chairman Alexander introduced the subsequent management review discussion by recalling that in 2013, Executive Director Tom Nies identified some extra funds, and the Executive Committee

decided to use it fund groundfish research. In 2014, the RSC develop specific research topics (e.g., closed area access, increase haddock catch without impacting other groundfish), and the Northeast Consortium was contracted to administer the research funding. A supplemental RFP in 2015 was focused on groundfish spawning research.

Project: “Small mesh fishery bycatch reduction in the southern New England/mid-Atlantic windowpane stock area”

Mr. Emerson Hasbrouck presented a summary of the project, with collaborator Dr. Patrick Sullivan in support. This project evaluated a large mesh belly panel for bycatch reduction in small mesh fisheries in Southern New England. The panel reduced windowpane flounder bycatch (numbers and weight). There was also a reduction in target catch (scup), but most of reduction was of sub-legal sized fish. This gear innovation has a dual purpose: it could be adopted by industry to avoid exceeding bycatch limits, or could potentially be approved as a gear usable in the Southern Windowpane Flounder Accountability Measure (AM) Areas.

Dr. Kritzer asked if there has been an estimate of the impact of adopting this gear fishery-wide: if the small reduction in legal scup could be offset by allowing the industry to avoid triggering the AM. Mr. Hasbrouck noted that the scup reduction was really more the sub-legal catch. Dr. Kritzer also asked why the panel had greater reductions of sub-legal rather than the larger scup. Mr. Hasbrouck was initially surprised at this result as well, but the industry partners indicate that scup stratifies by size within a school, with the smallest scup located closest to the bottom. The higher the net will open, the larger the scup they will catch. Dr. Kritzer asked for the rationale for using a diamond-shaped mesh, if having a horizontally elongated mesh would better release flounders and retain scup. Mr. Hasbrouck indicated that the mesh shape has been tested over several projects with industry and that’s easy and cost-effective to insert a large mesh belly panel into a net. An earlier project sponsored by the Commercial Fisheries Research Foundation provided vouchers to get a free drop chain and/or large mesh panel.

Dr. Courneane reminded the RSC of a January 2017 Council motion to ask the Greater Atlantic Regional Office (GARFO) to consider any and all remediation measures for a one-year exemption to the pending Southern Windowpane Flounder AM. The Groundfish PDT is working on an economic analysis of what the most recent estimate revenue for specific fisheries that will be impacted. For scup, it’s a \$600,000 impact. Dr. DuPaul noted that, using this panel, there might need to be more effort (longer tows) to offset the loss of legal scup. Mr. Hasbrouck noted that he could better highlight the results for legal scup.

Dr. McBride asked if having the control mesh panel temporarily sewn onto the experimental net to serve as a control net impacted the performance of the control net (smaller effective mesh openings). Mr. Hasbrouck noted that the large mesh panel is 32” mesh, so would probably have little impact on the 5” mesh, but that wasn’t specifically tested. Dr. McBride asked if there was sufficient testing by water depth or bottom type. Mr. Hasbrouck indicated that depth and habitat were randomized during the project. Further, the study was not designed to test these factors. The goal was to co-locate flounder and scup. Dr. Sullivan noted the limited number of tows may hinder looking at depth and habitat for this project, but perhaps there could be a meta-analysis.

Mr. McGuire noted that the “brass ring” of gear research is to reduce bycatch while retaining target catch. This project was a big success in that regard, yet the report undersells it. Lead with the (minor) change in kept catch. He also asked how popular the CFRF voucher program was and if fishermen today want to adopt this gear. Mr. Hasbrouck agreed and said that many fishermen took advantage of the voucher program for the sweep and panel.

Mr. Pol asked if the gears already approved for the AM could be adopted by industry. Mr. Hasbrouck indicated that many fishermen don't have the gear (e.g., Rhule trawl), and installing a large mesh panel is a simple, inexpensive solution.

Mr. Balzano agreed that the results for marketable catch should be highlighted. On the net design, the connection between the sweep and foot rope is tight (maximum bottom contact). The results may be further improved if there is a raised drop chain or adding discs in the sweep. Scup swim higher in the water column and flounders are on bottom, so finding ways to raise the gear may help. He also noted that sub-legal release is common with bigger mesh. Dr. Courneane asked for information about other groundfish of concern (e.g., yellowtail flounder and winter flounder), which wasn't detailed in the report. Mr. Hasbrouck indicated that he would need to look at the data.

Dr. Sherwood was interested in the behavior patterns of different sized scup, wondering if video or acoustics would be helpful. Mr. Hasbrouck indicated that they tried video in prior study, but it was ineffective because of the sediment cloud.

Chairman Alexander noted that written RSC comments have generally reflected the discussion (Appendix I), that it was a good project that reduced bycatch substantially. Mr. Sylva noted that in the past, the RSC has made recommendations to the Council about gear approval, but was not sure how the bycatch reduction standard would be applied if the primary bycatch is not a species of concern.

The RSC developed the following consensus statement:

Consensus Statement #1: The RSC recommends that the Council ask NMFS to consider approving the large mesh belly panel for use in the Southern Windowpane Flounder Accountability Measure Areas (as a reactive AM). During the approval process, the RSC recommends additional consideration of the impacts on other groundfish species and scup kept catch. This gear could also be considered for a proactive AM to avoid triggering the AM.

Project: "Determining the post-release mortality rate and best capture and handling methods for haddock discarded in Gulf of Maine recreational fisheries"

Dr. John Mandelman presented a summary of the project. Funds from the Council/Northeast Consortium and the S-K program were used to partner scientists and recreational fishermen to estimate the discard mortality (DM) rate of Gulf of Maine haddock caught on rod-and-reel groundfish fishery. Biological, environmental, and technical data pertaining to the recreational fishery were collected. A subset of haddock was tagged with acoustic transmitters and released into a passive array. By evaluating vertical and horizontal movement patterns, mortality was determined. The project identified capture-related variables most influential on mortality (temperature, fish length) and a set of best practice guidelines was generated. The project determined a preliminary discard mortality rate of about 56%, though analyses continue.

Dr. Kritzer thought this work was excellent, but asked if additional work is needed to validate the models. Dr. Mandelman clarified that a tagging project can be ongoing to wait for tags, so a line has to be drawn to analyze the data. The study identified best practices broadly (e.g., hook better than jig), but additional work would be needed on the details (e.g., hook type). Outreach also needs to continue, following through on grant commitments.

Dr. DuPaul was surprised by the conclusion that physical condition is not a predictor of mortality, rather season and size. Does physical injury predict time to depth or survival rate? Dr. Mandelman was also surprised. For injury, jig created more injury than hook. Reducing injury is

a goal, because that has impacts that aren't accounted for. Mr. Balzano asked how the fish that aren't returned are treated. Dr. Mandelman said that the t-bar tags were secondary for the project, so not imperative to the function of the study.

Mr. McGuire asked about the spacing of the receivers, if the spacing could be larger and capture the same amount of movement, and also why tag returns were so successful. Dr. Mandelman said that the spacing could probably increase, but there's a trade-off, and they wanted to be consistent with prior studies. With respect to tagging, Nate Ribblett was a vital partner due to his fishing and knowledge and networking in the region. He was key to the project's success. Also, tags need to be released early in the fishing season to allow for recaptures.

Dr. Kritzer urges researchers to pay attention to management process and timelines, and it seems like this is being considered here, but having more detail in the report would be helpful. Changing a DM rate is one of the acceptable changes for an assessment update. Dr. Mandelman agreed and said that he talked to recipients of the data in management before the study began to ensure that the results could be applicable. Dr. Sherwood noted that this project and the Brandt project (low tag returns) worked with the same industry partners, so maybe there was another difference. Dr. Mandelman said that the acoustic tags had a \$50 reward and passes to the New England Aquarium. The t-bar tags had Dunkin Donuts gift cards and passes to the aquarium. He noted that the specific captain was key (Nate was very proactive), and was puzzled by the difference in return rates.

Dr. Cournane noted that the earliest assessment updates will likely be in July. Prior to that, there's an assessment oversight panel meeting, where the project could be discussed. Dr. Mandelman said that the project could be concluded in time. There will also be a submission to a peer-reviewed journal, with a review process that may influence the analysis. Dr. Kritzer noted that for the purpose of applying science in management, publication is about perception, and processes like this are more important. Chairman Alexander thought this work reinforces the current assumed DM and identifies best practices for the fishery. Dr. Kritzer suggested that the SSC review the work; its members with stock assessment expertise could give insight into the applicability of the work for assessment.

The RSC developed the following consensus statement:

Consensus Statement #2: The RSC recommends that the results of this project be considered in determining the recreational discard mortality rate during the upcoming GOM haddock stock assessment. The RSC also recommends that the SSC review this work if there is time to consider it prior to the assessment process. Several aspects of this project (e.g., recreational seasons, gear) may help inform the setting of recreational measures and should be considered by the Groundfish PDT.

Project: "Assessing recreational haddock discard mortality on Jeffrey's Ledge through an industry-led collaborative mark-recapture tagging program"

Dr. Gabriela Bradt intended to present a summary of the project (via conference call). However, Chairman Alexander postponed discussion of this project to a subsequent meeting, because the RSC was getting behind on its agenda. He noted that the lack of tag recaptures hindered use of the data for calculating a discard mortality rate, but that in their written comments, RSC members indicated other potential uses for the project information. Chairman Alexander apologized for the inconvenience, took comments, and asked staff to forward the RSC comments to Dr. Bradt for consideration.

Dr. DuPaul asked if the project results could be framed within the context of the prior project. Dr. Mandelman said that there may be some possibility, but it will be difficult with inconsistent methods. Dr. Cournane said that information on the recreational cod and haddock fishery is limited (e.g., where fish were caught, fish size). It would be helpful to know about the composition of catches. Dr. Glass noted that a major difference in methods. They both used Eastman's boats, but Bradt's project trained crew members to do the tagging, and he wasn't sure if Dr. Bradt went back to do quality control after the training. Double tagging fish could also help, as it's common for t-bar tags to fall out.

Project: "Mapping the distribution of Atlantic cod spawning on Georges Bank using fishermen's ecological knowledge and scientific data"

Dr. Greg DeCelles presented a summary of the project, with collaborators Dr. Steve Cadrin (via conference call) and Dr. David Martins in support. Fishermen's Ecological Knowledge (FEK) and traditional scientific data were used to develop a more holistic understanding of cod spawning on Georges Bank (GB). Data from historical reports, trawl surveys, fisheries observers, and ichthyoplankton surveys were used to describe the spatial and temporal distribution of cod spawning activity. Semi-structured industry interviews gleaned fine-scale spatial and temporal knowledge of cod spawning, and identified 210 spawning grounds on Georges Bank and Nantucket Shoals. The spawning seasons and locations identified by fishermen generally agreed with information from traditional scientific data, but it was evident that seasonal scientific surveys lack the spatial and temporal resolution needed to fully characterize the distribution of cod spawning activity. Results may help future research and management measures intended to promote stock rebuilding.

Dr. McKenzie felt that the work was magnificent, particularly the interview methods. He asked if the identified spawning grounds be weighed by effort. There were fewer areas identified offshore, but was that proportional to the amount of effort offshore. Dr. DeCelles noted that having spawning locations identified on Nantucket Shoals wasn't surprising, as that area was critical to New Bedford fishermen in 70s and 80s and a lot of the fishermen interviewed were from there. They tried to spread the interviews out, but there was better coverage closer to New Bedford. Fishermen active today are avoiding cod, so there's less ecological knowledge now. He would like to use this technique for different questions. Dr. DuPaul is a fan of using FEK, though the methods need to be really well thought out, and this was great work.

Dr. Kritzer asked about what management actions may emerge from the project. Dr. DeCelles wasn't sure where management should take the results. The project identified a rich mosaic of historic spawning grounds, but it was hard to identify which grounds are still active. This project may help develop a more fine-scale approach to protecting spawning grounds. A number of the sites are closed to fishing now. He's not sure that time-area closures are effective, and there would need to be more work (dedicated survey) to identify current spawning grounds.

Mr. Pol asked about the results for Eastern Georges Bank. Dr. DeCelles shared his opinion that cod on eastern GB should be managed as a discrete stock (western GB cod should be part of the GOM stock). A few of the U.S. fishermen fished east of the Hague Line early in their careers. He hoped that interviewing the Canadians would help fill in some gaps, but they are using haddock separator trawls and also avoiding cod at all costs. Also, the Canadian fishery is closed during spawning season. Getting Canadian data was difficult.

Dr. Sherwood felt that this project would be very important for understanding GB spawning, similar to how the Ames paper was informative. He asked for elaboration on the color and shape

differences between fish on eastern and western GB. Dr. DeCelles noted that fishermen can tell where the fish came from, perhaps due to their diet (herring offshore, sand lance inshore) (fishermen have told him that for winter flounder too). Eastern GB are lighter, and have a better, flakier fillet quality.

Mr. McGuire asked if the MADMF trawl survey would be informative. Dr. DeCelles said that the survey isn't well-timed with spawning. Nantucket Shoals is not well sampled by the NMFS survey, and it's too far offshore for the MADMF survey. It's a very difficult area to fish, with strong current and dangerous narrow channels between shoals. Mr. McGuire said that perhaps it's a good place for a longline survey.

Chairman Alexander suggested many uses for the data, such as posting on the Northeast Data Portal [subsequent to the meeting, the RSC agreed that this may be appropriate once the data are translated into spawning cod EFH]. It was pointed out that because of confidentiality concerns, the depiction any FEK-derived spawning areas would be limited to those areas that were identified by three or more fishermen. Dr. Kritzer noted that the Sherwood project identified spawning on a very discrete site, whereas this was a more broad characterization. He wondered if Sherwood's approach could help groundtruth the sites identified. Dr. Sherwood noted that his project sites (and several other projects) were also informed by FEK. Mr. Gerencer supports avoiding fishing on spawning fish, but felt that some of the spawning protections are not focused on that, rather ensuring that "the pain" is equally distributed across the industry.

The RSC developed the following consensus statement:

Consensus Statement #3: The RSC recommends that this project be considered in the upcoming cod stock structure workshop. It may also be helpful in the ongoing clam habitat framework (e.g., for citing access areas for the clam fishery). This project is a shining example of using Fishermen's Ecological Knowledge. The data could help inform revisions to EFH for Georges Bank cod. Additional research would be needed to determine if spawning closures need to be reconfigured to match current spawning locations.

Project: "Northeast multispecies fishery flatfish bycatch and market analysis"

Dr. Steve Cadrin presented a summary of the project, with Dr. Cate O'Keefe, and Cassie Canastra in support (all via conference call). Recent groundfish landings from Georges Bank have been far below catch allocations, because the fishing industry was not able to efficiently target and catch healthy stocks. The team met with groundfish industry members to consider possible approaches for designing a bycatch avoidance program for flatfish and other species. However, the industry indicated that such a program is not practical under the current status of the fishery. With industry input, the project objectives were revised to focus on understanding the market constraints for yellowtail flounder, and to identify possible mechanisms to rebuild the market and increase economic viability for the groundfish fleet. Market analysis indicated that the yellowtail flounder market has collapsed because of the limited supply, fluctuations in landings and leasing prices, as well as public opinion. Market demand for yellowtail flounder is not expected until the species is consistently landed; it cannot currently compete with Pacific substitutes.

Dr. Kritzer felt the team was remarkably adaptive when it was clear that the original objectives may not be met. He noted a potential contradiction. The project focuses on yellowtail, because it's a "choke stock" – a poorly defined term, but to Kritzer, it means a stock that is actively avoided, because reaching its quota would trigger constraints on more abundant stocks.

However, it seemed like the project was investigating the potential for yellowtail to be a target species with a market to be developed. The SSC has recommended that optimum yield for a choke stock should be as low as possible, such that bycatch avoidance strategies should be probed more deeply. The report didn't detail why a bycatch avoidance program wouldn't be helpful. Dr. Cadrin agreed that there's a contradiction and noted the ambiguity of terms. Choke stocks are typically fully harvested, yet the yellowtail utilization was much lower than normal, likely due to market factors. He noted that yellowtail used to be one of the principal groundfish stocks, and that rebuilding a fishery and its market go hand in hand. Dr. O'Keefe noted that a flatfish bycatch avoidance program isn't feasible, because most fishermen are already avoiding it. One goal was to see if the assessment projections are too high or if there are market forces driving down landings.

Dr. DuPaul reflected on the collapse of the yellowtail market in the 1990s when Closed Area 2 was open. At that time, there was talk of scallop vessels targeting yellowtail; he asked how far back the study went. Dr. Cadrin noted that the data they used went back to the year 2000.

Mr. Gerencer indicated that yellowtail flounder is absolutely a choke stock. Processing the entire ACL would take one processor just three days, so lack of market is understandable. As of last week, the industry has caught just 21mt of the 247mt allocation, so we have already figured out how to avoid yellowtail. He noted that landings might go up at the end of the year, if someone leases in the remaining quota and fishes it. However, he felt that the project demonstrates that fishery-dependent data as a stock assessment tool is borderline useless if fishermen are getting this good at avoiding it. He felt that fishing behavior has so drastically changed over the last 30 years.

Dr. McKenzie asked how these results mesh with fishery-independent data. Dr. Cadrin said that the project focused on understanding markets, but when there is such little catch, the assessments are almost entirely dependent on fishery-independent data, which are noisy. When there is scientific equivocation, market dynamics could be informative. Dr. McKenzie noted that after the decline of the haddock fishery in the 1940s-60s, there was a market analysis prompted by the belief that foreign imports were making a market glut. Lynch and Dreheim (1961) found both market and biological reasons for the decline. Dr. McKenzie noted that low landings do not mean scarcity unless tested with other information. Dr. O'Keefe said that no one is likely disputing the biomass decline here, but the project focus was on understanding markets.

Mr. Sylva said that the most interesting part of the project was the decision to move on from a bycatch avoidance program; this is an opportunity to identify whether a network would be effective. Lessons learned are not included in the report. Dr. Cadrin indicated that participation, buy-in, and sense of urgency are key. For the scallop program, that's waned. Dr. O'Keefe noted the recommendation to develop guidance, and that they weren't aware that there are just two vessels targeting yellowtail. Also, if a fleet is also avoiding a stock to the best of their ability, adding an additional layer isn't needed. Mr. Gerencer is a fan of bycatch avoidance, but perhaps the fishermen should be asked directly what they are doing to avoid yellowtail. The voluntary scallop bycatch avoidance program was developed by fishermen and SMAST and had a big improvement in bycatch reduction.

Mr. Pol noted that for the RedNet project, what builds a market is consistent supply – which can be driven by Council decision. Mr. Alexander agreed that there are unintended consequences of management. Dr. McBride recommended more rigor in the discussion about the ability to substitute flatfish, noting disparities in west coast flatfish in terms of meat quality. Are all flatfish the same? More could be explored here. Dr. Cadrin said that the consumer is less picky on flatfish, with the exception of grey sole.

Dr. Cournane noted a question for the SSC sub-group for yellowtail flounder. The SSC wondered if price data could inform catch advice. Dr. Cadrin said that price could be looked at and praised the Mid-Atlantic approach of having advisory panels give regular, annual input on market dynamics. She noted that the TRAC meets in July on yellowtail, which kicks off the management process.

The RSC developed the following consensus statement:

Consensus Statement #4: The RSC recommends that it would be useful to forward this project to the PDT and SSC for consideration of the economic and market responses and consequences that result from management actions, especially those that affect a steady supply of product. This project suggests that bycatch avoidance networks are not necessarily effective for all fisheries.

Project: “Identifying offshore spawning grounds of Gulf of Maine winter flounder”

Dr. Elizabeth Fairchild presented a summary of this project to determine where and when winter flounder in the GOM are spawning offshore by studying winter flounder populations during the spawning season at three offshore sites identified by industry: southern Jeffreys Ledge, Bigear, and the southwest corner of Stellwagen Bank. A total of 1,384 winter flounder were caught by trawl, measured, sexed, and assessed for reproductive stage. This is the first study to document that non-Georges Bank winter flounder spawn offshore.

Dr. McBride asked about the impact of postponing dredge projects due to winter flounder spawning. Dr. Fairchild was unsure, but every project must work around the closure. Dr. Kritzer noted that, during his service on the Boston Conservation Commission, dredge projects weren't substantially impacted. However, Dr. Fairchild has been asked to lobby against closures (though she has remained neutral on the issue). Mr. Pol said that the closures are a concern for small towns which share a dredge. Dr. Kritzer noted that the prevailing wisdom is that winter flounder spawn in estuaries, but have they ever? Dr. Fairchild noted that UNH and Normandeau Assoc. regularly sample New Hampshire estuaries, but have never caught a pre-spawning winter flounder, though estuaries are important nursery grounds – though it may have been important historically. Dr. Kritzer said that it's an important question about if a spawning component ever existed in estuaries and if they could return. Dr. McKenzie noted that Bigelow and Schroeder noted estuarine spawning. Dr. McBride noted evidence of estuarine spawning in areas to the south (Long Island Sound). Mr. Gerencer said that fishermen say that inshore spawning stopped with chlorine influx from sewage treatment plants.

Dr. DuPaul asked if this offshore spawning is an annual event. Dr. Fairchild said that the fishermen said that's where we'd find fish, and the team has captured pre-spawning winter flounder offshore from these sites for other projects. Very seldom did they catch running ripe fish. Tagging work suggests site fidelity. Mr. McGuire asked about why fish needed to be sacrificed, and if a portable ultrasound would be helpful to assess spawning condition. Dr. Fairchild said that ultrasound may be helpful, but not necessary as there are external characteristics of spawning stage. Just 0.03% of the fish were sacrificed in this project to validate methods of assessing spawning condition. Dr. DeCelles felt that this study could be very informative for the assessment to help interpret the results of surveys.

The RSC developed the following consensus statement:

Consensus Statement #5: This study contributes to the scientific evidence that Gulf of Maine winter flounder spawn offshore. RSC recommends that this project may be useful for refining EFH for winter flounder and may be useful as background for the next assessment. Future work would be helpful on spawning

site fidelity and the contributions and trends of the inshore vs. offshore spawning component to the total stock.

Project: “Synoptic acoustic and trawl survey of winter-spawning cod in Ipswich Bay, western Gulf of Maine”

Dr. Graham Sherwood presented a summary of this project which aimed to expand knowledge of Gulf of Maine cod winter spawning activity by conducted an acoustic and trawl survey of ‘The Cove’ which lies to the east of Ipswich Bay, a location which holds spawning cod in the late fall and early winter. The results showed a peak in trawl-caught biomass in mid-December. This was accompanied by peaks in the proportion of cod in spawning condition (ripe and ripe/running) and gonadal somatic index values in early December. All spawning indicators decreased to unequivocally low values by early February. Acoustic results show cod using a broader range of depths than indicated by the trawl survey, but both surveys showed cod aggregating near the southern half of the survey area. The existence of cod “stacks” (putative spawning aggregations) and spawning condition cod caught in trawls over primarily shallow habitat (< 60m) suggests that spawning takes place in shoal water. The high-end estimate of biomass (249 mt over entire survey area) represents 11% of assessed biomass for the entire Gulf of Maine stock (2,225 mt in 2014) and suggests that The Cove is an important contributor to overall stock performance.

Mr. Pol asked about mesh size and if having smaller mesh would help inform the acoustic data. Dr. Sherwood said that standard trawl gear was used (may need to correct the report). The focus was on mature cod, so standard gear was appropriate, and that they can acoustically remove small fish post-processing. Dr. McBride wondered if spawning started in October. Dr. Sherwood said that the acoustics showed high numbers of fish earlier. Maybe there were maturing fish staging in the area, so the question is how big of a buffer is needed to protect the staging event? Dr. McBride suspected that prespawning behavior started in October. He asked if the larger older fish were spawning longer than the younger fish. Dr. Sherwood noted a wider range in spawning age in the spring.

Chairman Alexander wondered if fishing could disrupt the stacking behavior. Dr. Sherwood indicated that stacks are a behavior that is associated with spawning, but that there is a need to be cautious with interpretations. Mr. Gerencer asked about the number of size of stacks. Dr. Sherwood said that they saw dozens of stacks. Mr. Gerencer said that there’s a lot of good research that could spin off from this, such as validating the stack size. Closed areas need to follow actual spawning, and this may be a way to verify what’s actually there. Dr. Sherwood said that cod have site fidelity and abundance estimates could be made elsewhere too. When cod aggregate, they are easier to count.

Mr. McGuire said that his recent work with MADMF and SMAST (winter spawning just west of Stellwagen) had similar results in terms of timing and the cod industry-based survey may have useful data. Dr. Sherwood said that there are likely similarities and that current genetic work may help. Dr. Kritzer asked for a recommendation on balancing trawl vs. acoustic survey methods. Dr. Sherwood said that it’s not trivial to coordinate two vessels, and it may not be practical or efficient. It may be worthwhile to have a targeted survey with trawl and acoustics (species verification is essential), though analyzing acoustic data is time consuming. Dr. Kritzer wondered if at new sites, trawls could verify species. Mr. Sylva asked if acoustics and trawl could be done with the same vessel. Dr. Sherwood said yes, but here, the fishing vessel wasn’t optimized for acoustics, and that it would be interesting to add acoustics to the Mass Bay study. The NEFSC collects acoustic data, but it hasn’t been analyzed.

The RSC developed the following consensus statement:

Consensus Statement #6: The RSC recommends that this project be used in identifying/improving/refining the timing of spawning closures within Area 132. This method may be useful to identify other spawning areas (e.g., those mapped as historical spawning sites on the basis of Fishermen’s Ecological Knowledge in the project by DeCelles et al.).

REVIEW DRAFT 2017-2021 COUNCIL RESEARCH PRIORITIES AND DATA NEEDS AND DEVELOP INPUT

Chairman Alexander asked the RSC for any input on the Council’s draft research priorities. Mr. McGuire felt that this is a really important question that deserves more time than the group has late in the day. He asked about potentially delaying this item to a future RSC meeting. Dr. Feeney informed the RSC of the Council’s timeline to approve research priorities in April, and that the list has been developed over the last year. Dr. Kritzer felt that the scope for changing the priorities is likely limited at this point. Dr. McKenzie lamented that research priorities are usually considered in a rushed fashion at the end of meeting days; while he worries about substantial changes, though Committees haven’t put a lot of effort in. Mr. McGuire felt that this discussion could get postponed until June, and that the RSC could meet for a fuller discussion. Mr. Pol asked about the point of developing priorities. Dr. Feeney clarified that it’s primarily a communication tool, and that the Executive Committee may have to approve a delay in approval. Mr. Sylva noted that the MSA requires setting 5-year research priorities; they are informative, but for specific competitions, RFPs get more specific. Mr. Gerencer said that he is on the RSC for one reason, that to find a better way to assess fish stocks is our way out of many problems. He has a vision of how to get there, and that the RSC should be focused on steering research, with less focus on review completed work. Something really important should not be at the end of an agenda. This list is a wish list, not priorities. Stock assessment and the awareness of spawning activity should be top priorities to him. Dr. Kritzer appreciated the comment. He felt that the list is probably fine, but agreed that it is much too long. He suggested that there be dedicated RSC meeting time to prioritize this list. Dr. McBride proposed that “priorities” be struck from the title. Mr. Sylva noted the push-pull between whether the RSC or species committees should lead priority setting, but the process could benefit from a targeted list. Dr. McKenzie noted that species committees respond to the crises du jour, but that the RSC could take a longer, bigger perspective.

Consensus Statement #7: The RSC recommends that “priorities” be struck from the title of the document: “2017-2021 Council Research Priorities and Data Needs,” as this document is a catalogue of broader research needs rather than a targeted and ranked list of true research priorities. The Council and research community could benefit from a more targeted list. The RSC would like to devote time at its next meeting developing a targeted list, and recommends an annual review of the targeted list.

Mr. Sylva suggested that the RSC discuss what can be done to address those needs (e.g., trawl advisory panel). Mr. McGuire noted lessons learned today on research methods, and that the RSC could help improve use of research dollars.

OTHER BUSINESS – PLANNING FUTURE MEETINGS

Chairman Alexander asked staff to review the list of ideas for future meeting agendas, including the ideas that RSC members provided today. In no particular order, ideas include:

- Identify the topmost research priorities from the Council’s master list.

- Develop input on research priorities for specific, future RFPs (e.g., S-K, BREP).
- Identify best practices for research methods from completed projects.
- Identify how projects reviewed by the RSC have been acted upon to better evaluate the applicability of research results and effectiveness of communication channels.
- Evaluate the standards for approving gear that reduces bycatch.
- Discuss the program review of the NEFSC Northeast Cooperative Research Partners Program and develop recommendations for improving collaborative research.
- Conduct management reviews of completed projects:
 - MADMF EFP on reducing groundfish bycatch in small mesh fisheries (may help develop 2018 specifications).
 - Completed RSA projects
 - Coonamesset Farm project on “extended link” (may be useful in 2017 for the Council priority to revisit flatfish AMs and protect small scallops)
 - RedNet and GearNet

The RSC would like to meet more frequently than in recent years, and would like to meet between the April and June 2017 Council meeting to carry today’s momentum forward.

ADJOURN

The meeting adjourned at 6:15 p.m.

APPENDIX I - RSC WRITTEN MANAGEMENT REVIEWS OF COMPLETED RESEARCH

In preparation for the March 23, 2017, Research Steering Committee, RSC members were asked to prepare for the management review of research projects by considering in advance the 11 questions guiding a management review relative to the final reports to be discussed. Each RSC member was assigned three projects to be a lead reviewer for, but was encouraged to prepare comments on additional projects too.

This appendix to the meeting summary compiles all written comments from individual RSC members. These comments should not be considered the consensus of the RSC. Duplicative comments have been removed.

PROJECT: “SMALL MESH FISHERY BYCATCH REDUCTION IN THE SOUTHERN NEW ENGLAND/MID-ATLANTIC WINDOWPANE STOCK AREA” (HASBROUCK)

1) Has there been a sufficient technical review of the project results and, if so, is that information available to the Research Steering Committee?¹

- No. A review has been made available, but it seems to have overlooked a number of important deficiencies in the report.
- Yes. NEC technical review was available and sufficient, very positive in the area of experimental design, methods and data analysis, which was helpful.

2) Did the project accomplish all of its stated goals and objectives?

- Yes
 - Although some of the results are not as strong as expected. Catch of commercial size scup are somewhat reduced in the experimental net. It could have described better the range of tow areas, depths, and bottom types (see their objective bullet #6).
 - The project did seem to accomplish these, although the use of ‘small mesh trawl’ is confusing. In this case, a 5” scup trawl was evaluated, and the results were very encouraging, but the project was silent about the potential use of this trawl design for smaller mesh trawl fisheries (e.g. squid/butterfish/whiting). Not clear if these fisheries are impacted by the WP AM or not. If so, this would be an important area of future research. Also, it would have benefitted the project to include a goal of having the trawl approved as a selective gear type that can be used in the AM areas. This issue is addressed in the Future Research section, but it is not clear how many additional tows will have to be conducted in order to meet this goal.
- Partially. Their objective “complete an applied experiment across a wide range of strata and conditions including: areas, depths, bottom type, and times reflective of the small mesh scup fishery” was only partially addressed (time of day was analyzed).
- Unclear.
 - The overall objective of the project seems to be inconsistently stated or understood. For example, in the Abstract and in “Objectives and Scientific Hypotheses”, the intent of the testing seems to be to reduce windowpane catch in the directed scup fishery. However, in

¹ By the time of the March 23, 2017, RSC meeting, one technical evaluation of this project had been submitted by the Northeast Consortium, though not all RSC members had read it prior to conducting their review.

the Introduction, it seems to be to provide an alternative gear choice once the AM measures are triggered. (“The approved gear modifications [that is, Ruhle, haddock separator, and rope trawl – reviewer’s insertion] are not favorable to catching and retaining groundfish.”). Later, at the end of the report, (“Future Research”), the intent again appears to be to for use “in designated areas when AMs are triggered.” This distinction is important as it affects the appropriate study design.

- Their objective “validate these results for fishery managers and fishermen” is unclear, so it is difficult to judge if it was accomplished.

3) Are project deliverables available and formatted for use by the Council and its technical committees?

- Yes
 - The final report is adequate for evaluation. Project description, experimental design and results of the experimental gear performance is clear. Project results are clearly presented and useful in understanding the data. The report contains sufficient data and analysis for consideration by the PDT as a bycatch reduction approach.
 - As highlighted by the technical reviewer, the report was well written, of high quality and supported with high quality figures and data analysis. The results are presented in a way that should be easily translated to the Council and its committees. However, some clarification of what additional work will be needed, so that the Agency can approved this gear for use in the AM areas, is needed.
- Uncertain. This criterion is hard to evaluate. A number of the figures could be substantially improved to allow a more accurate and informative analysis of the data. The data are not included, and are reportedly delivered to the NEC, but they are not currently available. See http://nec.who.edu/jg/serv/nec/inventory_rs2.html.

4) Does the project address an immediate management need or contribute to a long-term strategy to rebuild and sustain stocks?

- Yes
 - ACL’s for windowpane flounder are being exceeded. The long term strategy of using gear modifications to address accountability measures is a reasonable approach to the problem.
 - This project addresses the windowpane bycatch accountability measures as a whole, specifically as it relates to the scup fishery, which is 17.5% of the total southern windowpane ACL.
 - Addresses a need for a technological solution to bycatch reduction of windowpane flounder.
 - This project speaks directly to the challenge of developing trawl modifications to reduce bycatch and retain access to the fishing grounds for the region’s fleets and was performed and presented in a highly professional manner.
- Uncertain. It isn’t clear whether this design is offered as an alternative to gears approved for use once AMs are triggered, or to avoid triggering AMs. Reduction of windowpane bycatch may be a management need if there is sufficient quota to be accessed of target species.

5) Does the project support past work and/or provide new information?

- Yes
 - The use of large mesh belly panels in small mesh fisheries has been shown to be of merit in preventing unwanted bycatch. In the present case, additional “tweaking” and gear

testing may be useful in solving the loss of commercial size scup. However, the dramatic reduction in the catch of windowpane flounder in the experimental net may be sufficient to counter windowpane ACL's and allow the small mesh fishery to continue to operate.

- The PIs inform us that this work builds on other projects focusing on reducing winter flounder bycatch in the whiting and squid fisheries. Not sure why that work would not also provide access to these fleets to the windowpane AM areas, as noted above.
- Uncertain. This criterion cannot be judged as no assessment of prior work (other than by the PIs) is made. Prior work in the area using this gear modification has been done by others, but is not referenced.

6) Does it point to a management action not in place now, or offer an innovative solution to a problem?

- Yes.
 - The use of gear modifications to address bycatch issues are a reasonable solution as opposed to area closures. The rigor of gear testing is a critical aspect to consider changes for a management action. This project was well executed with the use of two vessels to test the performance of two different nets. The resulting comparisons are presented clearly.
 - This project will (eventually, depending on how many additional tows are needed) increase access to large AM areas by demonstrating a significant reduction in windowpane bycatch without a loss of scup of legal size.
 - It points to a potential management action. The reductions of windowpane of all sizes and undersized scup is a very positive outcome that is likely to be helpful in addressing the AM issue for unallocated stocks such as northern and southern windowpane flounder. However, the verb tense used in the final report is confusing as to whether management actions have taken place or not, already. It appears that no action has been taken. The approach is sound but not particularly innovative, since this is testing a gear modification that has already been tested before. It would have helped if the discussion outlined past gear modifications in the fishery from previous testing, specifying whether these gear modifications were voluntarily implemented by the fishery or implemented through regulations, and the resulting reductions in bycatch and outcomes for flatfish AM.
 - This gear may be useful as a pro-active or reactive accountability measure with respect to windowpane flounder management.
- Possibly. Implementation as an innovative solution would require additional testing.

7) Did the project elucidate other information not specifically stated in the goals and objectives?

- Yes.
 - The inclusion of size frequency distributions of scup and windowpane flounder is useful information that is not always included in bycatch reduction research.
 - The net appears to not only reduce the catch of windowpane flounder, but also reduce the catch of sub-legal scup (target species).
- Possibly. It offered a possible mechanism for why size selectivity occurred for scup and not windowpane, based on the behaviors of scup.
- No. Reviewer was left with a couple of questions.

8) Is there a need for further work or follow-on research such as wider field-testing?

- Yes

- It does seem that additional tows will be needed before the gear can be listed as ‘approved’, although how much more work needs to be performed is not clear.
- The gear also appeared to reduce the catch of legal-size scup (the target species). The extent of this reduction needs to be better quantified and modifications to reduce this need to be explored.
- Possibly. As stated, the loss of commercial size scup in the experimental net may be considered a problem for some. However, additional research or field testing could be an issue of diminishing returns. Gear testing occurred within an area of co-distribution of these two species, at a time of seasonal abundance.

9) Who is the appropriate end-user and are there recommendations/caveats about how this information should be used?

- The fishing industry - for the design and performance of large mesh belly panels.
- NEFMC/Groundfish Committee & PDT – windowpane flounder AM
- MAFMC Scup FMAT/Demersal Committee – ditto
- GARFO

10) Overall rating based on the above criteria: excellent, very good, good, fair, or poor.

- Fair. A more accurate assessment of the results is possible.
- Very good.
 - The tables and figures were very clear and the images were quite nice. A projection would be helpful of whether such a gear modification in the scup fishery alone could solve the overage (or come close to) in windowpane AM in any recent year (see #9). It is unclear if there is a difference in net designs reported on pages 49-50; if so, the difference should be highlighted.
 - This report did not use these new data to predict the annual reduction of windowpane in the scup fishery and see if that would have lowered the windowpane AM in any of the last three years. Such an analysis would have tipped this report from very good to excellent.

11) Additional comments.

- The report has two major issues:
 - The authors in several places make unsubstantiated claims about the impact on the size distribution of scup by the gear modification, obscuring the effect on larger sizes of scup. On p. 35, the statement “The large mesh belly panel is reducing the windowpane flounder catch across all size intervals” is false, based on the LF figures: For windowpane of 14, 17, 19, and possible 33 cm, more windowpane was caught in the experimental gear. Similar statements in the Impacts and Applications section cannot be substantiated.
 - LF figures would be better if plotted on the same figure.
 - A stronger analysis would be if t-tests were run on binned LFs, or if Holst-Revill comparative size selection (GLMM, with haul as a random variable) was conducted, as is standard in the field. These methodologies would also incorporate between haul variation in one form or another. The report gives no indication whether the observed differences in size were heavily influenced by one or many tows.
 - Reduction of catch of small scup only benefits the stock if they survive.
 - Figure 27 (actually a table) obfuscates the differences in size of scup caught between gears.

- If the intent of the project is an alternative AM measure, then the testing would best occur in the AM areas.
- Other comments
 - A difficult project to execute.
 - “Objectives” section indicates seeking to better understand the “specific reaction behavior of target and non-target species”, which the report and the study design do not address.
 - The description of the side-by-side testing is very confusing. My best interpretation is that the vessels themselves switched sides every two tows, but the point of this switching is not clear. Nets did not appear to be switched from vessel to vessel.
 - No plot of actual tow location is provided. No distribution of tow types between vessels is provided. No investigation or analysis of possible vessel effect is provided, nor is a comparison of the alternate tow pairing vs. parallel tow pairing is provided.
 - It is not stated whether the differences reported in the text are pooled or paired. Also, it is not described whether one or two-sided hypotheses were tested – one-sided would be most appropriate.
 - A p-value of 0.013 would be characterized by nearly all researchers as “highly significant” not “marginally significant”.
 - No description of the effects on any species other than windowpane and scup is described. It would be interesting to know the effect on other flatfish of the LMBP.
 - It is not clear why an ANOVA was not performed on catch weight v. loss of windowpane.
 - “Currently, CCE has not published or submitted any papers or reports or newsletters relative to this project other than those required by the Northeast Consortium.” Does the use of “Currently” imply that this will be published possibly?
 - On pages 33-34, the author goes to some length to quantify the catch reduction sub-legal scup in the experimental net, arriving at a reduction of 68%. Conspicuously missing is a similar quantification of the reduction of legal-sized scup that is small but noticeable in Figure 26. That reduction, and whether it is statistically significant or not, is an important consideration in adopting this gear as a bycatch reduction approach.

PROJECT: “DETERMINING THE POST-RELEASE MORTALITY RATE AND BEST CAPTURE AND HANDLING METHODS FOR HADDOCK DISCARDED IN GULF OF MAINE RECREATIONAL FISHERIES” (MANDELMAN)

1) Has there been a sufficient technical review of the project results and, if so, is that information available to the Research Steering Committee?²

- No
 - There is the possibility of additional tag returns which may alter discard mortality rates.
 - As noted by the PI in his letter to NEC, the work has not yet undergone extensive technical review, either through the publication process or by a technical body such as the SSC. The only review available to date is a brief but quite complimentary NEC review.

2) Did the project accomplish all of its stated goals and objectives?

² By the time of the March 23, 2017, RSC meeting, one technical evaluation of this project had been submitted by the Northeast Consortium, though not all RSC members had read it prior to conducting their review.

- Yes
 - All stated goals and objectives were accomplished with a high level of success.
 - The research team was able to expand upon the goals of the study by securing significant additional funding.
- Partially. Objective #4 has not yet been accomplished, and \$5 was accomplished for cusk.

3) Are project deliverables available and formatted for use by the Council and its technical committees?

- Yes.
 - The report is a very detailed and well-written document which clearly describes research methodology, statistical analysis, model building and discussion of results. Information presented in graphs and tables is easily understood. The technical approach to the methodology used for the field work is well detailed and easily understood.
 - The discussion of the project results is clearly articulated, with sufficient description of methods and results, with supporting tables and figures.
 - The technical report links the work with current stock assessment protocols to increase the likelihood that the outcomes will be utilized in management.
- Not entirely. The section on stock assessment and management implications (4.5) is somewhat light. More attention could have been given to current assessment and management timelines, how the work can feed into those, how the expected timeline additional steps (including continuation of the research/analysis and technical review) align with those assessment and management timelines, other management measures or other actions (e.g., angler education) that are not currently being considered but should be, and how best to effectively communicate the results, drawing upon the impressive communication strategy already implemented.

4) Does the project address an immediate management need or contribute to a long-term strategy to rebuild and sustain stocks?

- Yes.
 - The project addresses the discard mortality rate in the haddock recreational fishery which is currently assessed at 50% for management purposes. This estimate really had no good science based support, but was a popular consensus by fishery participants with some previous information from field studies. This project calculated a discard mortality rate of 56% which reasonably confirms the current rate used for management. The project report offers several strategies to contribute to the sustainability of the haddock stock in the G of M including seasonal adjustments in the fishery and best handling practices that can be adopted by recreational fishermen. The report only covers the area of Jeffreys Ledge which some may claim to be a geographical bias, but the data obtained from such a large number of tagged fish and substantial efforts to reduce bias in fish catching and post-catch handling should blunt complaints.
 - Having size and season specific DM estimates could inform the haddock assessment and recreational fishing measures. Information could also inform recreational fishing practices.
 - The project provides an estimate of haddock discard mortality in the recreational fishery. It also provides very useful information with which to educate the public on how to minimize discard mortality for this species.
 - Estimates or assumptions about discard mortality rates can have critical effects on assessment and management outcomes, and are often a source of controversy in scientific

and management arenas. Therefore, the study is certainly topical. Long-term strategies to rebuild and sustain stocks should be improved through better information and development of more effective handling and release approaches.

5) Does the project support past work and/or provide new information?

- Yes.
 - The project clearly identifies previous research in developing methodologies in the field work to reduce sampling bias and advancing the use of acoustical tags. The modeling of field data resulted in identifying 11 candidate covariates that were used in the discussion of the project results.
 - The project builds nicely on a recent series of related studies on post-release/discard mortality by the authors and others, but applied to a new species and fleet.
 - The discard mortality estimate from this project (56.4%) was similar to the currently assumed rate (50%). The project provides new and management-useful information on factors that influence the realized discard mortality rate.

6) Does it point to a management action not in place now, or offer an innovative solution to a problem?

- Yes.
 - The project clearly points to altering the seasonal aspects of the fishery as a potential management action. Additional measures could include using baited hooks vs jigging but angler education would probably be more effective in promoting best fishing practices.
 - The results suggest that season (temperature) and fish size are important factors in discard mortality of haddock, as well as the types of hooks used.
 - The report identifies the assessment, rec. fishing measures, and rec. fishing practices as benefiting from research results.
 - The most likely application of the results seems to be improvement of stock assessment methodologies, and development of more effective catch limits as a result. It is not clear whether new actions or innovative solutions will emerge, although that remains a possibility.

7) Did the project elucidate other information not specifically stated in the goals and objectives?

- No
- Yes.
 - Improvement in the originally proposed receiver array deployment strategy and a refinement of the analytical techniques to identify mortality events.
 - The results not only provide an improved point estimate of DM needed in stock assessment models, but provide important texture, including effects of fish size, environmental conditions, and others, and the behaviors post-release that lead to either survival or mortality.

8) Is there a need for further work or follow-on research such as wider field-testing?

- No. Not for haddock; the results appear to be very conclusive. This approach could be used for other species, at least those that tend to stay in one place for a while.
- Yes.
 - This approach is being applied to additional species. The report identifies the need to further evaluate gear specific effects for haddock.

- Further work is ongoing, and should continue since it has been funded. However, for the purposes of stock assessment, the project has been successful in providing a more empirically-grounded DM estimate. It is likely that the work is approaching a point of diminishing returns, so significant additional investment is probably not warranted in light of the many competing research needs for fisheries management.

9) *Who is the appropriate end-user and are there recommendations/caveats about how this information should be used?*

- Fishery management agencies.
- Other researchers working on discard mortality.
- NEFMC/Groundfish Committee & PDT – For considering modifications to recreational management measures for haddock.
- Recreational fishermen – for discard mortality reduction, especially in terms of education related to choices of hook type and best handling practices.
- NEFSC/Population Dynamics Branch - stock assessment scientists who can use the improved DM estimates in their models.

10) *Overall rating based on the above criteria: excellent, very good, good, fair, or poor.*

- Excellent. Given the breadth, quality, and relevance of the work, success in securing additional funding to expand the scope, and the strong science-industry partnership.

11) *Additional comments.*

- The acronym “PRM” appears in four places, but is not defined. In the places that it is used, it almost seems that it was originally used in place of the acronym DM, but incompletely purged from the document.

PROJECT: “ASSESSING RECREATIONAL HADDOCK DISCARD MORTALITY ON JEFFREY’S LEDGE THROUGH AN INDUSTRY-LED COLLABORATIVE MARK-RECAPTURE TAGGING PROGRAM” (BRADT)

1) *Has there been a sufficient technical review of the project results and, if so, is that information available to the Research Steering Committee?*³

- No
- Yes. The technical review was informative and fair.

2) *Did the project accomplish all of its stated goals and objectives?*

- Goal #1 (tag haddock):
 - Partially. Less than the target numbers of fish were tagged. The goal was 20,000 haddock. Tagging just over 16,000 in 339 recreational trips is admirable).
- Goal #2 (database):
 - Perhaps. Excel is not typically used for multidimensional databases, so without further information, the success of this objective cannot be judged.
- Goal #3 (Calculate DM rate):
 - No.

³ By the time of the March 23, 2017, RSC meeting, one technical evaluation of this project had been submitted by the Northeast Consortium, though not all RSC members had read it prior to conducting their review.

- The number of tag returns was not sufficient for analysis to calculate a discard mortality rate.
- Additional discussion on the returns would have been helpful (e.g., where, when, by what fishing gear)
- It would have been helpful to further explain what would constitute sufficient returns to conduct analysis.
- Reference and comparison to other similar tagging studies would have helped gauge the study design and issues encountered.
- Goal #4 (collaborate with rec fishermen):
 - Perhaps.
 - It seems like the industry participants were not particularly vested in the study, which undermined project success.
 - There is little description on how well the trained crew followed tagging protocol, problems encountered, etc... For example, did they follow the handling time protocols, was the live well sufficient to prevent injury and undue stress?

3) Are project deliverables available and formatted for use by the Council and its technical committees?

- No. Results are available to be used by the Council or technical committees.
- Uncertain.
 - PI Bradt maintains an active tagging database for this project and will make this available upon request. It is hard to assess whether the data are in a usable format for use by the council as there was little description of the results in the report.
 - Due to the problems encountered with tag returns, there is limited information that could be used to support management of the assessment. Some of the results anecdotally support the findings of the acoustic study, particularly lower DM for larger fish.
 - It would be interesting to see if there were indications of seasonality of the returns (i.e., more returns for fish tagged early in the season).

4) Does the project address an immediate management need or contribute to a long-term strategy to rebuild and sustain stocks?

- No.
 - The management need to assess discard mortality in the recreational haddock fishery has been identified (this value is currently assumed as 50%). Traditional tagging and recovery methods are difficult to execute and results are difficult to understand.
 - Low tag returns hindered the applicability of results. As such, there is no new information to update the currently assumed value, except to suppose that it might be lower than 50% (given the 0.5% tag return rate).
- Partially. The project addresses a need, but the results and lack of analysis will not be of much value. Anecdotal findings and lessons learned have some value for informing future research.

5) Does the project support past work and/or provide new information?

- No.
 - No (or very few) previous haddock tagging studies (or gadids generally) are referenced, although they did mention that they had anticipated 5-10% recapture rates, but it was unclear what is this based on.
 - It provides some new information (the lack of returns) that is hard to interpret.

6) *Does it point to a management action not in place now, or offer an innovative solution to a problem?*

- No. It is unclear how this study will contribute to a management action.

7) *Did the project elucidate other information not specifically stated in the goals and objectives?*

- Yes. The method is not an optimal approach for determining discard mortality. The project highlights some of the logistical challenges of implementing such a tagging program.
- No. The project has very little data to draw on for conclusions but they might have delved further into habitat issues.
- Perhaps.
 - The database of 16,000+ recreational caught haddock may be useful for examining habitat/distribution/CPUE/length distributions issues.
 - Some findings may corroborate the New England Aquarium haddock DM study.

8) *Is there a need for further work or follow-on research such as wider field-testing?*

- Yes.
 - Further work is needed to address the objective.
 - There is need to assess and understand all potential variables for a tag and release program.
 - This project begs the question – why do haddock do so poorly when caught and released? Perhaps further work can be done to assess discard mortality through a range of capture/handling/discard methods. The apparent high discard mortality rate could also be assessed by acoustic tagging means.
- No.
 - The question of haddock recreational discard mortality was suitably addressed in other work.
 - In light of the findings of the New England Aquarium study, it does not appear so. The program should continue to conduct some outreach to support tag returns.

9) *Who is the appropriate end-user and are there recommendations/caveats about how this information should be used?*

- Not applicable
 - The information cannot be used, unless a great deal of tags are suddenly returned.
 - This worked will be shelved for the moment and used by future researchers to approach haddock tagging with caution (i.e., without any expectation of high return rates).
- Those who awarded the project – project not adequately designed to answer the research question.

10) *Overall rating based on the above criteria: excellent, very good, good, fair, or poor.*

- Poor
- Fair.
 - The project tagged a great deal of haddock, and creatively used collaboration to do so (likely inexpensively) but experimental design and tag returns were inadequate to achieve the most important objectives.
 - Additional discussion on the returns would have been helpful (e.g., where, when, by what fishing gear). It would have been helpful to further explain what would constitute sufficient returns to conduct analysis. Reference and comparison to other similar tagging

studies would have helped gauge the study design and issues encountered. Additional discussion on how well the trained crew followed tagging protocol, problems encountered, etc... would have been very helpful. Did they follow the handling time protocols? Was the live well sufficient to prevent injury and undue stress?

11) Additional comments.

- Potential improvements to the report.
 - Provision of more data on sizes, numbers, condition scores, and locations of haddock caught and tagged. Possibly a table of sample records could be added. Also, was there verification that these fish were actually tagged, or is false reporting of releases possible?
 - Provide information (e.g. time a large, capture location) on the tag returns that were received.
 - Improvement of interpretation of the causes of low returns would likely result from reference to prior haddock tagging studies (McCracken 1960; Beamish 1966; Jones 1959; Rudolph 2009; Brodziak et al. 2008; Parker et al. 2004) and haddock escape survival from other gears (Main and Sangster 1990; Farrington et al. 1998; Sangster et al. 1996; Ingolfsson et al. 2002; Hislop and Hemmings, 1971). Some studies had very high survival rates and returns (>30%). Additional description of possible effects of barotrauma or other sources of mortality would strengthen the report.
 - Additional explanation of how tags were faulty, and why fish assessed as in good condition died upon release would improve (page 9) would also strengthen the report.
 - The report cites reduced effort in recreational haddock fishing, but some evidence or data would help validate the statement.
 - Expand discussion of tagging studies in general (haddock and other species) and why haddock might experience high post-release mortality.
- Potential improvements to methods.
 - Tagging studies should typically include examination of shedding rates and post-tagging survival through holding/caging.
 - A visit to the NMFS MRIP website indicates length frequency data contra what is mentioned on page 3.
- Other improvements. The website does not have the information described (i.e. it is not possible to see all returns (or it is not easy to do so); and the UNH site does not have the GIS Story Map; a search of this site (<https://seagrant.unh.edu>) using “haddock” or “story map” did not reveal it.

PROJECT: “MAPPING THE DISTRIBUTION OF ATLANTIC COD SPAWNING ON GEORGES BANK USING FISHERMEN’S ECOLOGICAL KNOWLEDGE AND SCIENTIFIC DATA” (DECELLES)

1) Has there been a sufficient technical review of the project results and, if so, is that information available to the Research Steering Committee?⁴

- Unknown. Probably internal SMAST reviews
- Yes. The supplied NEC technical reviews seem thorough and complete.

2) Did the project accomplish all of its stated goals and objectives?

⁴ By the time of the March 23, 2017, RSC meeting, two technical evaluations of this project had been submitted by the Northeast Consortium, though not all RSC members had read it prior to conducting their review.

- Yes. The synthesis of complex multiple data sources with fishermen’s ecological knowledge (FEK) was very successful and resulted in the accomplishment of all stated goals and objectives.
- Partially.
 - Because fishermen generally no longer target cod in areas of high abundance on GB/NS, discerning long-term shifts in the distribution of spawning activity using FEK could not be addressed as hoped.
 - This project set out with ambitious goals and for the most part achieved all of them. The project did an excellent job compiling all the available scientific data on cod spawning to create “hotspot” maps for spawning. They also did an excellent job of designing, executing and reporting the FEK results. The only goal that was difficult for the authors to achieve (by their own admission) was to examine shifts in spawning activity. That said, a lot of the contemporary data seem to match well with the historical data on major spawning areas on Georges Bank.

3) Are project deliverables available and formatted for use by the Council and its technical committees?

- Yes.
 - Although the report is long, it is compartmentalized into discrete and easily understood sections which were well synthesized leading to a clear set of conclusions for further discussion and potential management actions.
 - This seems to be a very useful compilation of GB/NS historical spawning information. The tables and figures, and presumably the GIS data layers, should be of use by the PDT and Council.
 - The authors provide an impressive collection of maps that should be of use.

4) Does the project address an immediate management need or contribute to a long-term strategy to rebuild and sustain stocks?

- Yes.
 - The current management of cod stocks is a highly emotional topic. The information provided in this report could lead to a different set of smaller scale and seasonal management measures. The information on cod spawning grounds and the impact of commercial clam fishing was interesting.
 - It provides information that would help substantiate a biological basis for re-characterizing stock boundaries.
 - The project points to some potential spawning areas that are not currently protected by spawning closures or year-round closures; although closed area II coincides with the bulk of spawning on eastern Georges (US side). This project will be of greatest use for guiding more directed studies on spawning grounds such as those conducted in the Gulf of Maine which ultimately led to spawning closures.

5) Does the project support past work and/or provide new information?

- Yes.
 - The project gathers various sources of information on the timing and location of cod spawning and supports existing knowledge and assumptions about the topic but in much greater detail and certainty. The excellent use of FEK and interviewing protocol added new and fine scale information in spawning location that could be used in future management considerations.

- This project does an excellent job collating all of the available scientific information on cod spawning on Georges Bank. A lot of this information is limited in scope though due to sampling constraints (e.g., timing of trawl surveys). To fill this gap, this project also provides new information on cod spawning through FEK which expands the range of observation to all seasons and identified areas of spawning that weren't obvious from the scientific survey data.

6) Does it point to a management action not in place now, or offer an innovative solution to a problem?

- Yes.
 - The use of the fine scale information could be used to move fishing effort away from spawning areas without the use of large scale closures.
 - The work suggests that the Council should consider options for protecting spawning aggregations on GB/NS, and that further work needs to examine stock connectivity and identity.
 - This project could ultimately guide a spawning closure strategy for Georges Bank but this will likely require more focused on specific spawning grounds that were identified in this study.

7) Did the project elucidate other information not specifically stated in the goals and objectives?

- Yes.
 - The information gained during the FEK interviews revealed several common themes about the changes in fish distribution, the adverse impacts of clam fishing on spawning habitat, the impact on cod stocks caused by seals and the advances of fishing technology. The information gathered in the FEK process can be very useful if the structure and intent of the interviews is proper. In this case, it was very well done.
 - FEK can be a valuable resource and aging fishermen hold some very valuable information that should be taken advantage of before it is lost.
 - No. The goals were fairly comprehensive and thus were hard to expand on.

8) Is there a need for further work or follow-on research such as wider field-testing?

- Yes
 - Probably it would be a useful exercise to develop some small-scale management area/time based on the information contained in this report.
 - The report cites FEK work done in the GOM (Ames 1998, 2004). Perhaps this approach could replicated to update that work and target the WGOM. This could identify additional areas for exploration via acoustic surveys like the Sherwood study.
 - This project should lay the groundwork for more targeted studies on cod spawning on Georges Bank.

9) Who is the appropriate end-user and are there recommendations/caveats about how this information should be used?

- Scientists - who have an interest in FEK research
- Groundfish PDT and wider scientific and management community.
- This project and the paper that was also submitted will form the go-to reference for cod spawning on Georges Bank. This information was much needed given that our state of knowledge was more than 10 years behind that of the Gulf of Maine. In much the same way that Ames 2005 paper on Gulf of Maine cod spawning and stock structure became *the* source

for the Gulf of Maine this work will be the starting point for a lot of discussions and studies on Georges Bank cod spawning.

10) *Overall rating based on the above criteria: excellent, very good, good, fair, or poor.*

- Excellent

11) *Additional comments.*

- Gathering FEK is not as easy as it first appears, but this project did it very well.
-

PROJECT: “NORTHEAST MULTISPECIES FISHERY FLATFISH BYCATCH AND MARKET ANALYSIS” (CADRIN)

1) *Has there been a sufficient technical review of the project results and, if so, is that information available to the Research Steering Committee?*⁵

- No.
 - Technical review is not quite sufficient to date, or at least it is difficult to determine whether sufficient review has been conducted. The only review provided is a brief, albeit useful, NEC review. The work has been presented by the authors at a series of venues, but it is not clear whether those provided meaningful feedback and review.
 - Given the wealth of information and insight contained within this report, and the potentially significant implications of the findings and recommendations, a more thorough review is likely warranted.
 - Notably, the collaborators include two regional scientific experts, but no established experts in market analysis. Therefore, additional review should certainly include experts in that field or related ones.

2) *Did the project accomplish all of its stated goals and objectives?*

- Yes – as revised
 - The initial goals of this project were determined to be not achievable so the objectives were redirected. The initial goal was to investigate if a bycatch reduction program for yellowtail flounder could be developed. This was deemed unachievable largely because of the collapsed market makes prices unstable and too few boats catch yellowtail flounder to share useful information about avoiding the fish in specific areas and at specific times. The approved, redirected objectives – to understand more about the market collapse and ways to rebuild it – was accomplished adequately.
 - The collaborators decided to alter the goals and objectives in response to feedback from industry members that the original goals were unlikely to be relevant or useful. This was an understandable decision, given that the project’s success was likely to be limited without industry buy-in and input.
 - The shift in focus by the collaborators was defensible given the importance of industry contributions. That shift no doubt compromised the research planning, execution, analysis, and interpretation, and the authors are to be commended for the adaptiveness they have shown in still asking relevant questions and producing useful information.
 - No
-

⁵ By the time of the March 23, 2017, RSC meeting, one technical evaluation of this project had been submitted by the Northeast Consortium, though not all RSC members had read it prior to conducting their review.

- The authors could have made important contributions by sticking closer to their original goals, either wholly or in part. The original framing of the study cast yellowtail flounder as a “choke stock”, which implies a stock that fishermen are trying to avoid in pursuit of more abundant and/or valuable stocks. However, the study as modified takes the very different perspective that yellowtail is, or at least should be, a valuable target species. This shift occurs far too casually. The study, as conducted, build from a premise that seems counter to the conventional wisdom that was the premise of the original study, and those different perceptions are not reconciled.
- The study could have provided a valuable service by probing the concept of a “choke stock” more deeply, proposing a set of characteristics that define one, and outlining the implications more clearly. It is a term that is widely used but rarely defined, yet seems to hold considerable sway in fisheries management debates and decisions.

3) Are project deliverables available and formatted for use by the Council and its technical committees?

- Not really.
 - The deliverable is an extensive review of the demise of the yellowtail flounder fishery and market collapse. Some conclusions could be extracted but most of these are already common knowledge. Some interesting observations on the historical performance of individual yellowtail flounder fishing vessels offer a history lesson as to why certain management measures (sectors and quotas) may have been a contributing factor to unstable landings and prices which led to a market collapse.
 - The technical report provided to the RSC, is dense and at present, more of an information clearinghouse than a complete synthesis with resultant recommendations. The document is presumably available, although it is not clear whether the current format makes it truly useful for the Council and its technical committees. It is less useful for the former, but perhaps more useful for the latter.
- Yes.
 - The final report is adequate for evaluation.
 - The project report tables, figures, and analysis provide unique access to data that is not ordinarily available for socio-economic analysis.

4) Does the project address an immediate management need or contribute to a long-term strategy to rebuild and sustain stocks?

- No.
 - Management needs for the yellowtail founder resource are fairly well articulated in the framework of bycatch issues, gear selectivity and declining stocks. No new suggestions of a strategy for rebuilding and sustaining stocks.
- Yes.
 - This project addresses the bycatch accountability measures of northeast flatfish, focusing on the demise of the yellowtail flounder fishery and how its stock as transformed from a targeted species with a steady market to a ‘choke’ species in the last 10 years.
 - The project report and analysis provide useful insights into how management strategies and regulations can affect the economics of a fishery. These insights should be considered in future impact analyses.
 - It is not clear that the study addresses a management concern or contributes to long-term stock rebuilding. However, the information will likely be useful for management planning, especially by technical teams trying to understand fishermen incentives and

behaviors, and therefore likely responses to alternative management measures. Also, the information will almost certainly be useful for fishermen, buyers, and other supply chain actors in developing business plans and marketing strategies, which can help generate more value from whatever harvest is allowed.

5) Does the project support past work and/or provide new information?

- Yes.
 - Information on the performance of individual yellowtail flounder vessels is of interest and offers the basis for the need to stabilize catch in order to sustain a market/demand structure.
 - This project references several previous biological and economic studies, including documentation of industry letters to the NEFMC SSC and discussions from four project scoping meetings with fishing industry participants.
 - It provides a new perspective and insights using heretofore inaccessible data.
 - This report documents three trends in the yellowtail fishery since 2000: 1) reduced fishing effort by both number of active boats fishing and the resultant landings in a response to guard bycatch quota until the end of the fishing year, 2) fluctuation in landings and prices in relation to regulatory actions such as opening up a closed area or the instability of prices under current conditions with sector management, and 3) public opinion and marketing. While the general trends were not news, the level of detail was quite fascinating and should be of interest to others.
- Limited. The literature cited does not seem to delve too far into market dynamics and strategies. The study's primary contribution is likely to be pulling together a vast array of information distributed among different sources (individual fishermen, auctions, other business, agencies) toward a more complete synthesis in the future.

6) Does it point to a management action not in place now, or offer an innovative solution to a problem?

- Yes.
 - The analysis offers insights into the potential unintended consequences of fishery management actions and the impediments to restoring a market for a species.
 - The document points to problems created by pent-up sector quota allocations of yellowtail flounder used at the end of the fishing year as a bycatch buffer to allow more fishing effort to be directed at other fish stocks. The document points to the seasonal destabilizing effect on the market/demand for yellowtail flounder which may have a management based solution.
- No.
 - It does not seem to point to a management action, and it is unclear whether or not it offers an innovation solution. The study identifies factors hindering marketing of yellowtail flounder, but it is not clear whether current conditions allow those factors to be overcome and for a more productive market to emerge.

7) Did the project elucidate other information not specifically stated in the goals and objectives?

- No really.
- Yes.
 - It offers an appreciation for how fishery management action(s) can cause difficult to recover from perturbations in the fishery marketplace.

- The industry feedback that there are too few active yellowtail flounder vessels for an effective cooperative avoidance program seemed to be accepted too easily. Why is the number too small? What is the needed number? Why should an avoidance system only involve vessels targeting the species? Why is the temporal constraint of active targeting an impediment to avoidance? Are there feasible behavior changes that could make an avoidance program workable?
- The reduced role of yellowtail flounder in the current groundfish market raises question about the optimal harvest strategy. Specifically, should the stock be targeted, or is the best approach to make all efforts at avoidance in order to maximize the harvest of more abundant stocks? These questions were at the heart of the original intent within the “choke stock” framing. Despite the shift in focus, the best approach toward yellowtail flounder in the light of the status of other stocks could have remained, albeit with a shift from fishing behavior to market dynamics.

8) *Is there a need for further work or follow-on research such as wider field-testing?*

- No. It appears the original proposal to develop an industry based groundfish avoidance program will not be pursued.
- Yes.
 - There was still potential to pursue at least some of the original lines of inquiry and to merge those with the questions that were ultimately pursued.
 - Further exploration of this data to identify other market responses (good or bad) to fishery management actions.
 - Further work seems to be warranted to follow through on many of the unanswered questions outlined above, and to produce a more complete market evaluation with associated recommendations.

9) *Who is the appropriate end-user and are there recommendations/caveats about how this information should be used?*

- NEFMC members & staff - background reading, assessing regulatory options who need to understand incentives and behavioral responses to proposed management measures. The fishery participants are speaking about factors that affect price stability and about how a ‘measured’ approach to rebuild or possibly re-vision processing and markets should go hand in hand with rebuilding trends in a stock.
- Fishery economists and sociologists - tasked with identifying the economic impacts to fishery management actions not just for yellowtail flounder and groundfish, but other species as well.
- Supply chain actors - from fishermen onward to consumers

10) *Overall rating based on the above criteria: excellent, very good, good, fair, or poor.*

- Good. With three important caveats that might argue for a higher rating. First, the significant change in focus presented very real challenges. Second, the value of the study might become clearer when actions are taken or follow-up studies are conducted as a result. Third, these topics are a bit outside of my core expertise, so my comments should be taken with a grain of salt.
- Very good. Overall the story was very interesting but some further revision would have made a stronger case. It was not possible to evaluate if ‘Landings...increased substantially from the access program [in 2004, p. 10], because the referenced table (Table 5) begins year 2004. The section on Factor 1 (pp 10-20) was difficult to follow, even though the patterns were

clearly evident in the tables and figures, and it was not clear how representative the data was (e.g., are sales order in Table 13 all the data for that boat, a random selection, or some other selection?). The section on Factor 2 was not quite compelling and seems to need more rigor to the analysis. The section on Factor 3 was quite interesting, particularly the commentary on the difference between filet and whole fresh fish markets, and the issues of how Canadian markets and fishery history are informative even it not the same as the US. Still, this section would be stronger with more data regarding other months, flatfish species, and information such as coefficient of variation. The link to Pacific flatfish substitutes is relevant but not well developed. Additional proof reading would have helped: 1) The text claims that minimum prices in 2005 did not drop below \$0.30/lb [p. 7], but it did drop below that threshold in both June and July for the small category [compare to smalls in 2004, Table 2]); 2) 2005 in Table 16 should be 2015; 3) more labeling on Table 19 is needed.

- Excellent. Gaining access to the display auction's data and identifying the market issues related to yellowtail flounder was very innovative.

11) Additional comments.

- When the focus of the study changed, adding one or more new collaborators with expertise in economics, business planning, market dynamics, etc., might have been worthwhile.
- The threshold needed to re-establish a fish's market was confusing, which is variously stated as being an ACL of 2,000 MT, at least 2,000 lbs per week (for American plaice), or 2,000 lbs/day (pp. 7, 9, p. 25).

PROJECT: "IDENTIFYING OFFSHORE SPAWNING GROUNDS OF GULF OF MAINE WINTER FLOUNDER" (FAIRCHILD)

1) Has there been a sufficient technical review of the project results and, if so, is that information available to the Research Steering Committee?⁶

- No.
- Yes. The technical review was informative and thorough.

2) Did the project accomplish all of its stated goals and objectives?

- Partially.
 - Conclusions could have been strengthened if more animals had been sacrificed to verify spawning stages. Table 2 offers some information on misclassifications, but offers no level of significance.
 - The project did characterize the occurrence and seasonality of winter flounder spawning in three offshore sites in the GOM. The objective of how offshore spawning relates to habitat was addressed in only a few general statements unsupported by any identified data or citations.
 - The main goal of establishing that winter flounder spawn at offshore sites was met. The goal of relating spatial distribution of spawning fish to habitat was not addressed in a thorough manner. It seems a much more thorough sampling design would be needed to accomplish this objective, and include more complex hard bottom and rocky habitats.

⁶ By the time of the March 23, 2017, RSC meeting, one technical evaluation of this project had been submitted by the Northeast Consortium, though not all RSC members had read it prior to conducting their review.

3) *Are project deliverables available and formatted for use by the Council and its technical committees?*

- Yes.
 - The figures and tables contained in the report should be of use.
 - The seasonality of spawning at sampling locations is clear. Some of the assumptions in the conclusions and data analysis need to be better founded. Such as flounder at the sampling locations would not likely migrate to inshore areas to spawn.
- Somewhat. A version of Table 1 with tow-by-tow data, in might be useful to the PDT.

4) *Does the project address an immediate management need or contribute to a long-term strategy to rebuild and sustain stocks?*

- Yes.
- Possibly.
 - The project report is very terse and lacks an introduction and problem statement. There is no explanation of why offshore spawning of winter flounder is a relevant management consideration.
 - Increased understanding of winter flounder spawning locations may lead to a long-term strategy for managing this species, but it is unclear whether this project meets an immediate management need.
 - This project provides information on winter flounder spawning dynamics. Building on these results could support long term winter flounder management strategies.

5) *Does the project support past work and/or provide new information?*

- Yes. Past work suggested that all winter flounder spawning took place inshore. This project provides new information showing that at least some of the spawning also takes place offshore. The question then becomes, how widespread is this offshore spawning and what percentage of individuals use the offshore?

6) *Does it point to a management action not in place now, or offer an innovative solution to a problem?*

- No. Limited closures are already in place.
- Yes
 - This work could potentially lead to a spawning closure strategy for winter flounder.
 - The report notes that findings could be used to inform winter flounder management through protecting offshore spawning populations.

7) *Did the project elucidate other information not specifically stated in the goals and objectives?*

- No. The report was focused on characterizing spawning status of sampled fish, consistent with their primary objectives.

8) *Is there a need for further work or follow-on research such as wider field-testing?*

- Yes
 - Is there large scale inter-annual variation in the strength of the offshore spawning event.
 - The habitat component of this work could be developed further. How widespread is offshore spawning and over what types of habitats?
 - These findings raise questions on the spatial scope of winter flounder spawning, and the spatial/temporal stability of spawning activity.
- No. Nothing was identified.

9) *Who is the appropriate end-user and are there recommendations/caveats about how this information should be used?*

- NEFMC Groundfish Committee, PDT
- Scientists interested in the spawning biology of winter flounder.
- NEFSC/Population Dynamics Branch

10) *Overall rating based on the above criteria: excellent, very good, good, fair, or poor.*

- Fair/good. The work seemed well done, but a compelling need for it was not apparent in the narrative. Additional effort on correlating spawning activity with habitat would have been helpful.

PROJECT: “SYNOPTIC ACOUSTIC AND TRAWL SURVEY OF WINTER-SPAWNING COD IN IPSWICH BAY, WESTERN GULF OF MAINE” (SHERWOOD)

1) *Has there been a sufficient technical review of the project results and, if so, is that information available to the Research Steering Committee?*⁷

- No. The research has not yet been presented or published, and no independent reviews (e.g., by NEC) have been provided. Therefore, additional review is a high priority.

2) *Did the project accomplish all of its stated goals and objectives?*

- Yes. Working around winter weather, this project completed a synoptic acoustic and trawl survey during the period of winter cod spawning in an area (“The Cove”) of the western Gulf of Maine where a cod spawning aggregation was suspected. They provide ample evidence that this region in fishing area 132 holds a winter cod spawning aggregation.
- Partially
 - The following objective was met for one year - to provide up-to-date info on where and when of peak spawning for a portion of the WGOM winter cod spawning complex, using hydro-acoustic techniques couple with trawl sampling
 - There is potential to extract more relevant insight from the work.

3) *Are project deliverables available and formatted for use by the Council and its technical committees?*

- Yes. The project report (description of the methods and results and the data and figures) are concise and well-written, sufficient to support use by the PDT and Council.

4) *Does the project address an immediate management need or contribute to a long-term strategy to rebuild and sustain stocks?*

- Yes.
 - There are many historical cod spawning areas in the Gulf of Maine, and up-to-date knowledge about current spawning areas will help protect this stock when it is particularly vulnerable. Cod on spawning grounds are vulnerable not only because of direct mortality on concentrations of individuals (seasonal aggregations) but also because

⁷ By the time of the March 23, 2017, RSC meeting, no technical evaluations of this project had been submitted by the Northeast Consortium, though not all RSC members had read it prior to conducting their review.

fishing in the area will disrupt spawning behavior of those that are not caught in fishing gear, thereby reducing the reproductive potential of the spawning stock.

- The project makes a reasonable case that the western portion of 30-minute square 132 should have a Nov-Dec cod spawning closure. It also makes a case that winter spawning is not an isolated occurrence in the WGOM and that further research should be conducted to identify other such winter spawning aggregations.
- Potentially contributes to rebuilding and sustaining of GOM cod stock by identifying location of a spawning aggregation. In the absence of a directed cod fishery, does not increase bottom impact by diffusing effort to areas of lower CPUE. Possibly increases costs for fishermen to access other stocks.
- With GOM cod as historically low biomass levels, and both stock and ecosystem dynamics in flux due to climate change and other stressors, more fine-grained information on the distribution, behavior, and reproduction, including spatial and temporal variability in all aspects, is critical. Studies of this type have the potential to implement more nuanced management strategies that attend to the behavioral and life history complexities of the species.

5) Does the project support past work and/or provide new information?

- Yes.
 - This project is comparable to similar work targeting spring-spawning cod aggregations in the western Gulf of Maine. These spring-spawning aggregations are fairly well studied now, and have received some measure of protection by spawning closures.
 - It reinforces the notion of the importance of winter spawning, and identifies an area that should be considered for a winter spawning closure.
 - The project does both. Spawning cod observed in two different years in this location at this time of year by PIs.
 - The project builds upon a growing knowledge base on the spatial structure of cod in New England waters, corroborating the general picture of considerable spatial (and temporal) complexity and adding up to date insights. The focal area of the study is especially important as it is within the WGOM sub-region where the stock is now primarily concentrated and the fishery is primarily prosecuted.

6) Does it point to a management action not in place now, or offer an innovative solution to a problem?

- Yes.
 - Having identified a new cod spawning aggregation, this report recommends expanding Gulf of Maine cod spawning closures to protect this winter-spawning aggregation (western half of Area 132).
 - The study argues for a winter spawning closure in the focal location, although the report does not point to the specific vehicle(s) for doing so (e.g., a groundfish action? Habitat omnibus? State or other non-Council actions? Etc.).
 - There is potential to extract more general insights from the research experience on the most effective and efficient ways to identify the timing and locations of localized spawning events, and changes in those. The results of this study are important, but relate to one spawning group/location at one time, and seemed labor-intensive to generate. Documenting the attributes of other spawning events, and changes through time in any, would be helped by proposing a cost- and time-efficient monitoring strategy, utilizing industry collaboration as was done effectively in this study.

7) *Did the project elucidate other information not specifically stated in the goals and objectives?*

- Yes.
 - Depending on which end of the range of the study area biomass estimates are reliable, the results suggest that the spawning aggregation studied either is a significant portion of the WGOM biomass, or the most recent estimate of WGOM biomass is underestimated.
 - Used hydroacoustics to estimate amount of SSB of GOM in the area.
 - The study provided valuable methodological insights, and information on the local abundance of cod relative to other species.

8) *Is there a need for further work or follow-on research such as wider field-testing?*

- Yes
 - Additional work is needed to ground-truth and further refine the art of interpreting the acoustic echograms with regard to identifying and quantifying cod, especially the so-called “stacks”. Once that is perfected, additional areas should be explored.
 - Generating similar insights for other spawning groups/locations and changes through time will be critical in achieving stock-wide benefits and ensuring that management measures remain appropriate under changing conditions.
 - The interpretation of the acoustic echograms needs to be refined before biomass estimates can be considered reliable.
- No. Wider field testing is not immediately necessary unless further confirmation of spawning aggregation is necessary.

9) *Who is the appropriate end-user and are there recommendations/caveats about how this information should be used?*

- NEFMC (groundfish and Habitat Committees) and States - for planning spatial/temporal closures to protect spawning cod as part of the overall management of groundfish.
- The Groundfish PDT – to consider the need for a Nov-Dec closure of 30-min square 132.
- Other biologists - to compare these results to what is known about the spring-spawning aggregations, which may lead to more robust generalizations about cod natural history, perhaps to exploring more spawning aggregations, and to predict conditions necessary for rebuilding extirpated spawning areas.
- Fishermen - to adopt voluntary protection and avoidance measures.

10) *Overall rating based on the above criteria: excellent, very good, good, fair, or poor.*

- Good/very good/excellent.
 - The acoustic data is messy and built on many assumptions, but this is a nice complementary approach. The trawl provides specific demographic metrics of spawning (size, age, maturity class) and the acoustic data provides an independent and scaled up estimate of the temporal and spatial distribution of cod, and it calculate a first approximation of the size of the aggregation in a general relation to the spawning stock estimate for the entire stock area.
 - The methods and execution were sound, the industry collaboration is important and laudable, and the outcomes are relevant and usable. A higher rating would be given if the results been used to develop larger scale and longer term insights and recommendations.

11) *Additional comments.*

- Table 3 is unclear. Catch units are not identified but they are discussed as if they are numbers of fish, and CPUE is specified as number/km². The total survey area is 82.6 km² (p. 10), but CPUE cannot be calculated from catch and the total survey area, knowing the number of tows or some other measure of effort is necessary.
- Several figures are mentioned in the text, but they don't have a number assigned (e.g., p. 9, 10). Cod and pollock are indistinguishable in Fig. 7. The assignment of age is unclear; fish are referred to in whole numbers as well as 'plus groups' without definition, presumably another year was not automatically added at January 1. The use of GSI and macroscopic maturity classification on frozen fish is crude. It is a shame that tissue was not sampled with histology; this could have been very informative about the ascent and descent of spawning and specific spawning activity during the peak. Distinguishing the two blues in Figs. 9, 10, 12, 13 was difficult and did not make sense for spent fish, but it looks like the February samples are immature age 1 or 2 cod (as stated on p. 14).
- In the DeCelles study, several fishermen noted that they identify spawning cod aggregations on their sounders. Perhaps such "Fishermen's Ecological Knowledge" may be a useful source of information in resolving what the observed "stacks" on the echograms represent.
- Figure numbering should be reviewed for the entire document – some don't appear to indicate the appropriate figure. For example, reference to Figure 7 on p.14 is likely meant to be Figure 27. Figure numbers are missing elsewhere (p. 10).
- I would have liked to have seen more discussion of the utility of the two methods. Discussion describes conflicting information between the two, which may be due to small cod. Beyond identification of cod spawning, which was a result of trawl sampling, hydroacoustics did not contribute much, if anything, to the findings. Hydroacoustic data and trawl data appeared to conflict for several months. Figure 29 shows large inconsistencies in counts of cod between trawling and acoustics. If this difference is due to selectivity of the gear, suggests that a smaller mesh gear should have been used.
- The extrapolation of the acoustic abundances to the GOM seems to be selective. Do a similar extrapolation of the trawl CPUE in the interest of fairness and curiosity.
- The conclusion says that the area should be closed. Are we at a point where we would close areas based on repeated observations of cod spawning? What are the broader consequences to the fishery of such a closure?
- In regard to mesh sizes, under 4. Methods, trawl is described as 6.5 inches (which is 165 mm). On page 8, under Abundance and Biomass Estimation, trawl is described as 15.2 cm (152 mm), which is closer to 6 inches. Which is correct? Are these codend mesh sizes? Are they actual measurements? Perhaps it was the smaller mesh, as it was surprising that Age 1 fish were caught (e.g., recruited to the fishery). This could be an artifact of binning of lengths – it is not described whether the 30 cm bin includes 25-30, 27.5-32.5, or 30-35 cm fish.
- Were the tows long enough to capture larger fish? Greatest age observed was only 5. Also, acoustic observations of "smaller individuals" suggest mesh size used was too large.
- Page 7: the estimated trawl spread is 30 m, but there is no basis for this estimation provided, even in the reference. This estimate is important because of the use of trawl CPUE as kg/m².
- Page 14 ascribes a discrepancy between peak trawl biomass and peak acoustic biomass to patchiness and small-scale differences in sampling tracks. Availability to the gear could also be a factor, specifically behavioral effects that decrease the vulnerability of cod.
- The description of the change in cold water regime (bottom, page 3) needs a reference.
- The first sentence under Section 6.7 is not proper English.
- This work is especially timely given the expected resumption of the cod stock structure process that began in 2012 and has lain mostly dormant since.