MASSACHUSETTS MARINE FISHERIES INSTITUTE

Accountability Measures for Northeast Fisheries: A Workshop to Examine Best Practices

November 2nd – 3rd, 2017
New Bedford, MA

WORKSHOP REPORT

Summary:
A workshop was hosted by the Massachusetts Marine Fisheries Institute (MFI) with additional funding from the Scallop Research Set-Aside (RSA) program to identify success and challenges associated with current Annual Catch Limit (ACL) and Accountability Measures (AM) management practices and to propose solutions to meet the sustainability objectives of Fishery Management Plans in the Northeast.

The 2006 Magnuson-Stevens Fishery Conservation and Management Reauthorization Act included a requirement to "*establish a mechanism for specifying annual catch limits… at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.*" National Standard 1 Guidelines introduced Accountability Measures as management measures "*to prevent Annual Catch Limits from being exceeded, and to correct or mitigate overages of the Annual Catch Limit if they occur*" through in-season or subsequent season measures, and provide for application of sector-ACLs, in which a sector is a "*distinct user group(s) to which separate management strategies and separate catch quotas apply*." Allocation policies for sector-ACLs, or sub-ACLs, as well as AM policies vary widely within and among Fishery Management Plans in the Northeast. As a result, bycatch management has become more complex and challenging under the sub-ACL system. It has been difficult to monitor and precisely estimate uptake of relatively low sub-ACLs, and the focus of AMs has been on catch accounting rather than bycatch reduction.

The workshop focused on understanding the legal requirements of AMs in comparison to the application of AMs in the New England region, including defining what AMs are, who they apply to, and how have they performed. Experts from regional fisheries organizations were invited to present examples of the current ACL/AM system, alternatives to AMs specific to bycatch management, ways to address scientific uncertainty in the ACL/AM system, and the economic impacts of AMs. Recommendations for system improvement were generated through panel and plenary discussions that covered a range of topics including equity in accountability among fishery participants, tiered accountability depending on stock status, and incorporating incentives in the development of AMs.

Objective:
The objective of the workshop was to develop recommendations for best practices in developing and implementing AMs for ACLs and sub-ACLs in the Northeast region. To meet this objective, the workshop focused presentations and discussions on several overarching theme questions related to AMs:

1) What is an Accountability Measure?
2) Who is being held accountable and for what?
3) When are sub-ACLs with associated AMs required and for what purpose?
4) How do AMs perform in relation to scientific uncertainty?

Recommendations:
The following recommendations resulted from workshop plenary discussions and are proposed by the workshop organization committee through the Massachusetts Marine Fisheries Institute. The recommendations are not consensus statements and should not be considered as endorsements by any participating individual or organization.

1) As a default:
   - ACTs should be used as AMs, defined in advance as part of the FMP.
   - To account for discards in all fishery components, estimated discards should be included in the management uncertainty buffer that reduces ABC to ACL.
2) As an alternative to the default (Recommendation 1):
   - Proactive and reactive AMs and within year accounting for discards should be applied, if doing so increases the expected value of fisheries to the Nation, taking account of scientific and management uncertainty, additional costs of within year quota monitoring, and feedback between uncertainties and AMs.
3) Evaluations of the science and management system should be a routine component of the AM plan. When an ACL is exceeded and an AM is triggered, an evaluation should be prompted to determine if the system needs to be modified to improve performance and effectiveness, considering the following:
   a. Determine the factors that caused the overage.
      i. What level of uncertainty is associated with the stock assessment and catch projection?
      ii. Was there a significant change in fishery operations or behavior?
      iii. Is the stock rebuilding?
   b. Determine the outcome of the overage.
      i. Is overfishing occurring?
      ii. Did exceeding the ACL cause overfishing or cause the stock to become overfished?
   c. Evaluate the performance of existing alternatives.
      i. Has there been a previous overage?
      ii. Have previous AMs been triggered?
      iii. Did multiple fishery components exceed catch limits?
      iv. Did previous AMs correct or prevent subsequent overages?

4) Evaluate how the system performs under alternative management procedures (Management Strategy Evaluation).
    - Examine the trade-offs of AMs in terms of costs, signal to noise ratio, and instabilities relative to frequency of overfishing and obtaining optimum yield.
    - Consider implications of varying levels of monitoring and catch accounting, frequency and quality of stock assessments, and reliability of projections.
5) Explore a pilot project to develop bycatch strategies in place of AMs.
    - A short-term project for an emerging bycatch conflict (e.g., thorny skate or southern whiting species) could demonstrate alternative approaches.

Identified Themes:

Over the two-day workshop, several themes frequently came up in the presentations and discussions. The following statements aim to capture the collective conversation, though they may not represent the views of all workshop participants. The majority of identified themes were specific to the ACLs, sub-ACLs, and AMs associated with the Northeast Multispecies FMP and the impacts on the groundfish fishery and other fisheries that are managed by those measures.

- Generally, there is regional dissatisfaction with the implementation of the National Standard 1 Guidelines related to AMs. The current approach is costly in terms of time involved in the process to determine AMs, foregone fishing opportunities, perception of inequity among fishery participants, and unintended consequences. In spite of this dissatisfaction, there has not been a formal evaluation of the performance of the system in terms of preventing overfishing and achieving optimum yield, or proposed alternatives to the current system.

- National Standard 1 Guidelines offer flexibility in the ways that AMs can be developed and implemented, depending upon the status of the stock and the nature of the fishery. New England has implemented a range of AMs for different fisheries, including ACL reductions, gear modifications, time-area closures, and ACTs. However, further evaluation of the performance of these AMs may reduce foregone fishing opportunities and improve stakeholder satisfaction.

- The current system employs standardized methods to account for scientific uncertainty related to stock assessments and management uncertainty associated with monitoring and process. However, managing and monitoring sub-ACLs can be challenging because of uncertainty in assessments and uncertain levels of accuracy and precision associated with monitoring.

- AMs are triggered when an ACL has been exceeded, but the operational issue that led to the trigger is often unknown or ignored. Rebuilding stocks with low allocations that rebuild faster than expected may have an increased likelihood of triggered AMs. In these cases, best scientific information available should be assessed to determine if overage adjustments, or no adjustments, are needed to mitigate the effects of the overage.

- AMs are being applied as bycatch mitigation tools, but may not be the most effective strategy for bycatch management. Minimizing bycatch may be better achieved through a holistic

approach focused on prevention, rather than measures that are implemented after bycatch targets have been exceeded. Bycatch reduction objectives may be achieved by matching incentives with the regulatory requirements.

- The implementation of AMs in New England has created a perception of inequity among stakeholder groups. There are disparate impacts on different stakeholders, depending upon their reliance upon specific resources. There could be ways to redesign AMs to better match fishery performance and needs.

- There are economic consequences of AMs, and the management system should continue to consider how to measure the trade-offs in the current system compared to alternative approaches.

Outcomes:
The workshop brought together over 40 fisheries stakeholders from the Greater Atlantic region, including harvesters, dealers, and representatives from fishing and seafood businesses, academic and environmental organizations, as well as state agencies, New England and Mid-Atlantic Fishery Management Council (NEFMC and MAFMC), Greater Atlantic Regional Fisheries Office (GARFO), Northeast Fisheries Science Center (NEFSC), and NOAA staff members. Following the workshop, NEFMC staff provided feedback and additional input that is included in the recommendations, themes and outcomes.

The workshop included an overview of the ACL/AM management system as implemented under National Standard 1 Guidelines, including the legal and regulatory requirements and performance standards. Presentations from regional fisheries management agencies highlighted the ways that ACLs, sub-ACLs, and AMs have been applied in several fisheries management plans throughout the region. There were also presentations on alternative bycatch reduction strategies that help fishermen or fleets to avoid triggering AMs. Workshop participants discussed the tradeoffs associated with AMs, including how to address scientific uncertainty, desired levels of risk tolerance, equity among fishery stakeholders, and ways to incentivize better accountability. The workshop concluded with participants forming a set of recommendations for alternative management strategies for ACLs and AMs.

Outcomes for the workshop were intended to support the objective of recommending best practices by addressing each of the theme questions. The following section includes a summary of workshop presentations and discussions related to the theme questions. Complete presentations are included in the appendix of this report.

What is an Accountability Measure?
NOAA staff reviewed the requirements for ACLs and AMs as described in the Magnuson-Stevens Act and National Standard 1 Guidelines. The various types of AMs, including in-season (preventative) and post-season (corrective) were described, and it was noted that sub-ACLs are encouraged for all components of a fishery, when possible, and that an Annual Catch Target (ACT) can be used as an AM. Workshop participants discussed the possible use of a multi-year

evaluation of catch against an ACL prior to triggering an AM. As noted by NOAA staff, the Guidelines allow for a three year average of catch against the ACL to determine whether AMs should be triggered, in specific instances where there are insufficient data upon which to compare catch to the ACL and with an annual evaluation of the moving average catch to the average ACL. Additionally noted was the specific guidance that if catches exceed the ACL more than once in four years, the system of ACLs and AMs should be reevaluated and modified to improve performance and effectiveness.

NMFS Regional Office (GARFO), Mid Atlantic Council (MAFMC) and Massachusetts Marine Fisheries (SMAST and MA DMF) staff members provided presentations on specific AM policies for Mid-Atlantic and New England species. Presentations highlighted the differences among regions and fisheries, specifically noting differences in AM policies for targeted and bycatch species. Staff from the MAFMC described how their plans apply a consistent AM policy for all managed stocks; including in-season closures, reactive paybacks, and ACTs. For recreational fisheries, there is a tiered AM system related to stock status with more severe AMs associated with overfished stocks. In New England, the scallop and herring fisheries have AMs for the target species as well AMs for sub-ACLs managed through the Northeast Multispecies plan. The Sector system in the groundfish fishery built in AMs as part of the management structure. As described at the workshop, a groundfish Sector must stop fishing once they have harvested their full quota, and quotas are reduced in the following year if the Sector cannot acquire fish to cover overages. Information about the implementation of the ACL/AM system in the North Pacific region highlighted that in-season quota adjustments and bycatch avoidance have been utilized to maximize harvest under bycatch constraints.

Workshop participants discussed the various approaches for ACL/AM management in different regions and different fisheries. In-season catch accounting relies on relatively intense fisheries monitoring and near real-time management, both of which have been challenging in New England. Participants noted that there are years when a full quota has not been harvested and could be averaged with several years of catch information to determine if catch limits are being exceeded over time or resulting in overfishing. Participants also noted that monitoring levels and management oversight is variable among fisheries, which is problematic when trying to determine if an ACL with several sub-ACL components has been exceeded. All of these challenges in determining catch against ACLs were cited as potential AM triggers that may not result in benefits to stocks or fisheries.

Participants also discussed consistency in the definitions of AMs and suggested that more logical and consistent terminology to describe the various types of AMs could be useful across plans. Several categories of AMs were described with suggestions to standardize the terminology for each:

- **Proactive AMs** are Annual Catch Targets (ACTs), which reduce the ACL to account for management uncertainty, and input controls, which manage effort to reduce the risk of exceeding an ACL (e.g., preventative time-area closures, gear modifications, and trip limits).

- **Preventative AMs** close fisheries when the projected catch approaches the ACL (e.g., in-season closures and incidental limits).
- **Reactive AMs** are measures that are implemented when the ACL has been exceeded. These measures may be predetermined in a management plan (e.g., reactive time-area closures and gear modifications) or may be specified after an ACL overage is realized (e.g., analysis of allocation decisions and consideration of scientific information related to stock status).
- **Corrective AMs** are designed to correct or mitigate negative impacts on a stock from exceeding an ACL (e.g., quota reductions and paybacks).

Who is being held accountable and for what?

Workshop participants discussed who is affected when AMs are triggered and how those effects can impact both conservation and socioeconomic objectives. As described in several of the fishery-specific presentations, rebuilding plans require risk-averse ACLs that may not reflect stock trends. If a stock is trending upwards under a rebuilding plan, it is possible that bycatch may exceed sub-ACLs. In this situation, there could be corrective AMs that are triggered with minimal conservation benefit and significant economic impact. This scenario was presented as a possibility for windowpane flounder, a bycatch-only species, in which the AMs impact the scallop and large and small mesh groundfish fisheries. Another example of minimal conservation benefits compared to significant economic impacts was presented for the haddock bycatch cap in the herring fishery. In this case, the herring fishery has both preventative and corrective AMs for a bycatch allocation of haddock. As presented by GARFO and MA DMF staff members, the herring fishery closes in-season when they reach a bycatch cap, and any overage of the cap is reduced from the subsequent year's allocation. Despite record high haddock biomass, portions of the herring fishery have closed in-season in recent years while the directed haddock fishery has harvested less than 30% of its quota.

Equity in accountability among fishery participants was raised several times throughout the workshop. As described by members of the groundfish fishery during the industry panel discussion, AMs can be implemented for groundfish Sectors when other fishery components that do not have a sub-ACL with associated AMs cause an ACL overage. Bycatch in other fisheries, state water harvest, and recreational catch can cause groundfish ACLs to be exceeded without the directed fishery exceeding their allocations. In these situations, corrective AMs may decrease the overall quota in a subsequent year and impact all stakeholders. It was noted that despite potential challenges of managing several allocations for individual stocks, accountability should be more equitable across all fishery components. Participants also raised concerns that AMs have disparate impacts on different stakeholders depending on their reliance on specific resources and cited the costs of monitoring ACLs as a major challenge to the region. There was a suggestion to match AMs to fishery performance and needs rather than impose constraints.

When are sub-ACLs with associated AMs required and for what purpose?

Presentations on the scallop and herring fisheries provided examples of sub-ACL management in New England. Sub-ACLs have been implemented to limit and account for the amount of groundfish bycatch in the non-groundfish fisheries. As described by NOAA staff, sub-ACLs are not

required, but encouraged for components of a fishery, and AMs should be specified for all sub-ACLs. Participants noted that there is a lack of consistency in determining and implementing sub-ACLs and AMs for non-target fisheries. For example, the herring fishery is allocated a small percentage of the overall haddock ACL as a bycatch allowance, whereas the scallop fishery is allocated sub-ACLs of flatfish stocks based on historical catch or projections of scallop fishing effort. Alternatively, the skate and monkfish plans do not include sub-ACLs or AMs for bycatch. MAFMC staff explained that sub-ACLs are not used to manage bycatch in the majority of MAFMC plans.

Participants voiced concerns that the use of sub-ACLs with prescribed AMs has reduced incentives to minimize bycatch and discarding. Members of the scallop fishery noted that despite implementing several measures that have significantly reduced bycatch of flatfish over the last decade, AMs are still required, which could result in negative economic impacts. Similar frustration was voiced from members of the herring fishery related to haddock bycatch. Workshop participants noted that the negative impacts associated with AMs may be disincentivizing stewardship, resulting in ineffective bycatch management. Some participants suggested relaxing AMs when a fishery has been proactive in reducing bycatch. Other participants questioned the purpose of AMs for bycatch sub-ACLs when overfishing is not occurring or an overall ACL is not exceeded. It was noted that there may be no value added to the management system when corrective AMs are applied subsequent to a bycatch overage.

Two presentations on bycatch avoidance systems in the scallop and herring fisheries concluded that it is critical to consider economic incentives in the design and implementation of bycatch AMs. The scallop fishery employed a voluntary bycatch avoidance system for flatfish in rotational access areas to reduce the likelihood of triggering in-season fishery closures. After flatfish AMs were redesigned to trigger in subsequent fishing years, the fleet stopped participating in the avoidance program and lost the incentive to minimize bycatch in real-time. Alternatively, the herring fishery has maintained in-season measures to mitigate bycatch of river herring and the fishery continues to utilize a bycatch avoidance system to prevent closures of large fishing areas. Both examples concluded that the immediate negative economic impacts associated with in-season closures provide incentive to minimize bycatch and discarding, and that AMs focused on preventing overfishing may not be the most appropriate tool for bycatch mitigation.

How do AMs perform in relation to scientific uncertainty?

A presentation on scientific uncertainty provided an overview of the Overfishing Limit (OFL), Acceptable Biological Catch (ABC), ACL and AM system in the context of uncertainty and risk. The presentation highlighted the "buffers" that are applied to account for both scientific and management uncertainty and noted that ACLs are typically set at levels with a low risk of resulting in overfishing. However, quantifying uncertainty can be difficult for some stocks. Several scenarios for the design and implementation of AMs in relation to scientific uncertainty were suggested, including triggering AMs only if the overall ACL or ABC has been exceeded, prioritizing an evaluation of the quality of stock assessments if AMs are triggered repeatedly, and consideration of projection uncertainty for multi-year allocations. The presentation concluded that AMs are an

important component of the entire system, and their performance needs to be evaluated in the context of the region's management objectives.

Several concerns were raised about scientific uncertainty related to ACLs, sub-ACLs, and AMs. Many workshop participants felt that inaccurate stock assessment results were responsible for current low ACL levels and potential to trigger AMs. Discussion of reprioritizing benchmark stock assessments when ACLs are consistently exceeded led to suggestions that accountability needs to be applied to the entire science and management system. Participants suggested tiered AM implementation based on the quality of assessments in terms of data availability, model performance, and frequency of updates and benchmarks.

Further discussion on this topic raised questions about triggering AMs when an ACL is exceeded. Participants noted that the purpose of AMs is to prevent overfishing, but can be triggered at levels below the overfishing limit. Some noted that precautionary science and management in setting catch limits is often applied in the face of uncertainty and that triggering AMs on risk-averse ACLs may not add conservation value. It was noted that the high uncertainty associated with stock projections can produce negative results for both resource sustainability and the fishing industry. For some stocks, ACLs have not been exceeded, but updated information suggests overfishing was occurring and AMs were not triggered. Alternatively, there have been several instances of underutilized quotas that are not considered in multi-year static projections. Workshop participants suggested a multi-year evaluation of average catch compared to a moving multi-year average ACL prior to triggering AMs and potential opportunities for in-season adjustments to sub-ACLs. As previously described, National Standard 1 Guidelines allow for multi-year measures when data is unavailable, but require an annual evaluation of the catch compared to the average ACL. Participants noted that groundfish ACLs can be set three years in advance of the current fishing year based on data from the year prior, and that multi-year averaging may increase stability for the fishing industry and reduce the signal to noise issue in our short-term projections.

Another source of scientific uncertainty identified was related to fishery monitoring and accuracy of catch estimates. Several workshop participants noted that the Standardized Bycatch Reporting Methodology (SBRM) may not be the best method to accurately account for bycatch. Members of the herring industry noted that monitoring levels for the fishery are low due to a low overall bycatch ratio, which can result in a single large bycatch incident driving catch extrapolations for the full fishery. It was noted that AMs have potentially increased the observer effect in the groundfish fishery, which is not emphasized in the current design of SBRM. The use of At-Sea Monitoring (ASM) was suggested as a potential tool to address this shortfall, with consideration of costs and benefits. Participants suggested an evaluation of the precision of catch estimates prior to triggering AMs, as well as increased monitoring across fisheries.

Problem Statements:

On the second day of the workshop, participants formulated two problem statements by consensus based on the presentations and discussions from Day 1. The statements were intended to form a basis for recommendations related to sub-ACL and AM management and could be considered by the NEFMC as rationale for future actions.

1) New England's interpretation of the Guidelines related to reactive AMs to prevent or mitigate ACL overages may have disincentivized proactive behavior across fisheries.
2) New England's use of AMs as a tool to ensure accountability for bycatch allocations may not be the most appropriate method to achieve effective, low cost, bycatch reduction objectives and optimum yield.

Conclusions:

The workshop identified critical challenges associated with the current AM management system in New England and proposed recommendations for alternative strategies to address bycatch mitigation and mandated catch accounting. Workshop presentations covered a wide range of AM implementation strategies from the region, and participants provided candid testimony and constructive feedback about pitfalls of the current system. However, a general theme identified throughout the workshop was that despite regional dissatisfaction with the implementation of the National Standard 1 Guidelines related to AMs, there has not been a formal evaluation of the performance of the system in terms of preventing overfishing and meeting optimum yield, or proposed alternatives to the current system. A general conclusion from the workshop was that the ACL/AM system, which was designed to prevent overfishing, may not be an appropriate mechanism for managing bycatch, and that the region may need to refocus on provisions of National Standard 9: "*Conservation and management measures shall, to the extent practicable, (a) minimize bycatch and (b) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch*." Continued discussion and future prioritization of a Management Strategy Evaluation of the AM system may result in more desirable management alternatives to meet sustainability objectives of Fishery Management Plans in the Northeast.

Acknowledgements:

We gratefully acknowledge the contributions of the workshop chair, organizing committee, presenters, and participants. The workshop was sponsored through funding from the Massachusetts Marine Fisheries Institute, a partnership between the University of Massachusetts Dartmouth's School for Marine Science and Technology (SMAST) and the Massachusetts Division of Marine Fisheries (MA DMF) and the Scallop Research Set Aside Program (NA15NMF4540063). NEFMC, MAFMC, GARFO and NOAA staff provided valuable insights and assistance towards presentation materials and recommendations. We thank the Executive Director of NEFMC for providing thoughtful feedback on the Workshop Report.

Workshop Organizing Committee:

Dr. Michael Sissenwine, Workshop Chair
MFI Distinguished Senior Scientist

Dr. Steve Cadrin
MFI Education Director

Dr. Cate O'Keefe
MFI Policy Director
For questions, please contact Cate O'Keefe: Catherine.O'Keefe@state.ma.us

Accountability Measures for Northeast Fisheries: A Workshop to Examine Best Practices

SMAST East
836 South Rodney French Blvd.
New Bedford, MA
November 2-3, 2017

Objective:
Develop recommendations for best practices in developing and implementing Accountability Measures (AMs) for bycatch Annual Catch Limits (sub-ACLs) in the Northeast region

Background:
The 2006 Magnuson-Stevens Fishery Conservation and Management Reauthorization Act included a requirement to "*establish a mechanism for specifying annual catch limits… at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.*" National Standard 1 guidelines introduced Accountability Measures as management measures "*to prevent Annual Catch Limits from being exceeded, and to correct or mitigate overages of the Annual Catch Limit if they occur*" through in-season or subsequent season measures, and provide for application of sector-ACLs, in which a sector is a "*distinct user group(s) to which separate management strategies and separate catch quotas apply*". Allocation policies for sector-ACLs, or sub-ACLs, as well as AM policies vary widely within and among Fishery Management Plans in the Northeast, and bycatch management has become more complex and challenging under the sub-ACL system. This workshop is hosted by the Massachusetts Marine Fisheries Institute with additional funding from the Scallop Research Set-Aside (RSA) program to identify success and challenges associated with current sub-ACL management practices and propose solutions to meet the sustainability objectives of Fishery Management Plans in the Northeast.

Approach:
- Review current AMs in the Northeast and other regional Fishery Management Plans
    - How are sub-ACLs determined?
    - What approaches are considered for AMs?
    - What AMs are currently in place (e.g., examples from different plans and regions)?
- Consider successes, challenges, strengths and weaknesses of each approach
    - How often have AMs been triggered? How often have sub-ACLs been exceeded?
    - How robust have AMs been to changes in scientific or management advice?
    - Do the AMs meet conservation and utilization objectives?
- Develop recommendations that are robust to the variety of fishery conditions in the Northeast
    - Consider alternative AM approaches and scientific uncertainty
    - Integration of the Council's Risk Policy in AM development
    - Inclusion of socioeconomic impact analysis of AMs
    - Consider consistency across multiple plans in sub-ACL and AM development and implementation

MASSACHUSETTS MARINE FISHERIES INSTITUTE

Thursday November 2, 2017

Meeting Room: SMAST East – Room 101/102

8:30 – 10:00 am **Registration/Coffee** *(Atrium/Room 103)*

10:00 – 10:15 am **Opening Remarks and Introductions**

- Opening remarks
  ***Cate O'Keefe**, MFI Policy Director, Marine Science and Policy Analyst Massachusetts Division of Marine Fisheries*
  ***Steve Cadrin**, MFI Education Director, Chair and Professor Department of Fisheries Oceanography, School for Marine Science and Technology (SMAST)*
  ***Steve Lohrenz**, MFI Co-Chair, Dean SMAST*
  ***David Pierce**, MFI Co-Chair, Director Massachusetts Division of Marine Fisheries*
- Participant and presenter introductions

10:15 – 11:00 am **Accountability Measures Overview**

- Workshop Objectives and "Trigger Questions"
  ***Mike Sissenwine**, MFI Distinguished Senior Scientist, Marine Fisheries Consultant*
- Legal Requirements – Magnuson-Stevens Act and National Standard 1
  ***Deb Lambert**, Fishery Policy Analyst, NOAA Fisheries Office of Sustainable Fisheries*
  ***Erin Schnettler**, Fishery Policy Analyst, NOAA Fisheries Office of Sustainable Fisheries*
- Discussion

11:00 – 12:30 pm **Session A: Current Examples of Sub-Annual Catch Limits and Accountability Measures**
(Moderator: Mike Sissenwine)

- Mid-Atlantic Fisheries Examples
  ***Kiley Dancy**, Fishery Management Specialist, Mid-Atlantic Fishery Management Council*
  ***Julia Beaty**, Fishery Management Specialist, Mid-Atlantic Fishery Management Council*
  ***Matt Seeley**, Fishery Management Specialist, Mid-Atlantic Fishery Management Council*
  ***Emily Gilbert,** Fishery Policy Analyst, NOAA Greater Atlantic Regional Fisheries Office*
- Scallop Fishery Examples
  ***Cate O'Keefe,** Scallop Plan Development Team Member*
  ***Travis Ford**, Fishery Policy Analyst, NOAA Greater Atlantic Regional Fisheries Office*
- Groundfish Fishery Examples
  ***Greg DeCelles**, Stock Assessment Specialist, Massachusetts Division of Marine Fisheries, Groundfish Plan Development Team Member*
  ***Sarah Heil**, Groundfish Team Supervisor, NOAA Greater Atlantic Regional Fisheries Office*
  ***Emily Keiley**, Fishery Policy Analyst, NOAA Greater Atlantic Regional Fisheries Office*

- Herring Fishery Examples
  ***Carrie Nordeen**, Fishery Policy Analyst, NOAA Greater Atlantic Regional Fisheries Office*
  ***Brad Schondelmeier**, Biologist, Massachusetts Division of Marine Fisheries, Herring Bycatch Avoidance Program*

- Other Regional Examples
  ***Mary Beth Nickel-Tooley**, O'Hara Corporation, past New England Fishery Management Council Member*
  ***Cate O'Keefe**, Marine Science and Policy Analyst, Massachusetts Division of Marine Fisheries*

- Discussion *(Moderated by Steve Cadrin)*

12:30 – 1:30 pm **Lunch** *(Atrium/Room 103)*

1:30 – 3:30 pm **Session B: Alternative Accountability Measures Proposals** *(Moderator: Cate O'Keefe)*

- Bycatch Avoidance – Herring and Scallop Fisheries
  ***Dave Bethoney**, Research Faculty, SMAST, Herring Bycatch Avoidance Program*
  ***Brad Schondelmeier**, Biologist, Massachusetts Division of Marine Fisheries, Herring Bycatch Avoidance Program*
  ***Cate O'Keefe**, Marine Science and Policy Analyst, Massachusetts Division of Marine Fisheries, Scallop Bycatch Avoidance Program*
  ***Brooke Wright**, Fisheries Research Technician, SMAST, Scallop Bycatch Avoidance Program*

- Scientific Uncertainty
  ***Steve Cadrin,** Chair and Professor Department of Fisheries Oceanography, SMAST*

- Discussion *(Moderated by Steve Cadrin and Cate O'Keefe)*

3:30 – 3:45 pm **Break** *(Atrium/Room 103)*

3:45 – 5:00 pm **Session C: Trade-Offs of Accountability Measures** *(Moderator: Steve Cadrin)*

- Industry Panel Discussion
  ***Vito Giacalone**, Volunteer Chair of Governmental Affairs, Northeast Seafood Coalition*
  ***Eric Hansen**, F/V Endeavor, Scallop Advisory Panel Member*
  ***Mary Beth Nickel-Tooley**, O'Hara Corporation, past New England Fishery Management Council Member*
  ***Gerry O'Neill**, Cape Seafoods, Herring Advisory Panel Member*

- Discussion *(Moderated by Steve Cadrin)*

6:00 – 9:00 pm **Reception and Dinner** *(Waterfront Grille Restaurant, New Bedford)*

MASSACHUSETTS MARINE FISHERIES INSTITUTE

Friday November 3, 2017

Meeting Room: SMAST East – Room 101/102

8:00 – 9:00 am **Coffee/Snacks** *(Atrium/Room 103)*

9:00 – 10:30 am **Plenary Discussion: Recommendations for Best Practices** *(Moderators: Mike Sissenwine and Steve Cadrin)*

- Trigger Questions
- Trade-offs
- Performance metrics

10:30 – 10:45 am **Break** *(Atrium/Room 103)*

10:45 – 12:30 pm **Closing Discussion: Recommendations for Best Practices** *(Moderators: Mike Sissenwine, Steve Cadrin and Cate O'Keefe)*

- Develop Recommendations
- Timeline and deliverables
- Workshop Survey

Workshop Steering Committee

***Mike Sissenwine**, Workshop Chair*
***Cate O'Keefe**, Workshop Organizer*
***Steve Cadrin**, Workshop Organizer*

The Massachusetts Marine Fisheries Institute, a cooperative venture between UMass Dartmouth's School for Marine Science & Technology and the Massachusetts Division of Marine Fisheries, promotes sustainable fisheries by providing timely information needed to protect, conserve, and manage Massachusetts marine and coastal resources in a manner that balances the economic, environmental, and cultural interests of the citizens of the Commonwealth.

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November 2-3, 2017

New Bedford, MA

Accountability Measures for Northeast Fisheries: A Workshop to Examine Best Practices

School of Marine Science and Technology
New Bedford, MA
November 2-3, 2017

Michael Sissenwine
Massachusetts Fisheries Institute
Woods Hole Oceanographic Institution
New England Fishery Management Council

OVERVIEW OF PRESENTATION

- Mandates for accountability measures
- Questions about AMs:
  - Why?
  - Who?
  - What?
- Plan for the workshop

FCMA → MFCMA → MSFCMA → SFA
Three Eras

- Americanization: 1977-1996
- Rebuilding: 1997-2007
- Accountability: 2008- present

Accountability: 2008- present

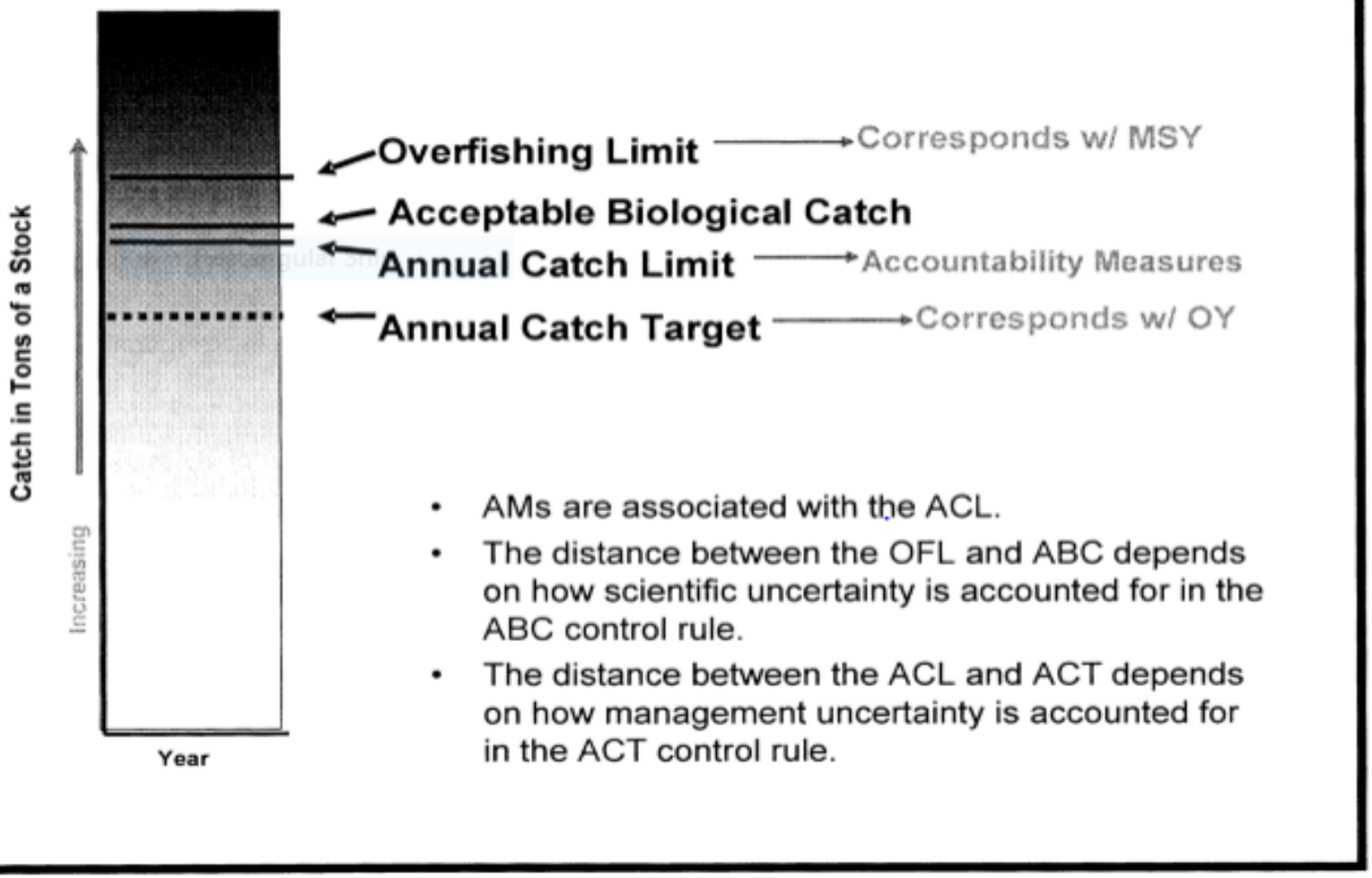
- Interpreted as requiring annual catch limits (ACLs)
- Interpreted as requiring accountability measures if ACLs are exceeded
- Strengthen the role of Scientific and Statistical Committees (SSCs).

Legal Mandate

(Magnuson-Stevens Act section 303(a)(15))

FMPs shall establish a mechanism for "…specifying annual catch limits in the FMP (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability. "

NS1 Guidelines



- AMs are associated with the ACL.
- The distance between the OFL and ABC depends on how scientific uncertainty is accounted for in the ABC control rule.
- The distance between the ACL and ACT depends on how management uncertainty is accounted for in the ACT control rule.

FIGURE 2.2: Relationships between various catch levels and limits
SOURCE: draft National Standard 1 Guidelines.[50]

National Standard 1 Guidelines

"Where practicable, all sources of mortality including that resulting from bycatch, scientific research catch, and all fishing activities should be accounted for in the evaluation of stock status with respect to reference points."

"Accounted for" not necessarily regulated within a fishing year

National Standard 1 Guidelines

- Annual catch limit (ACL) is a limit on the total annual catch of a stock or stock complex, which cannot exceed the ABC, that serves as the basis for invoking AMs.
- A Council may, but is not required to, divide an ACL into sector-ACLs. If sector-ACLs are used, sector-AMs should also be specified.

National Standard 1 Guidelines (pre-active)

Inseason (pre-active) AMs-

- Whenever possible, include inseason monitoring and management measures to prevent catch from exceeding ACLs.
- Inseason AMs include annual catch targets (ACTs), fishery and/or area closures of a fishery, changes in gear, changes in trip size or bag limits, …

National Standard 1 Guidelines

- ACTs are recommended in the system of AMs so that ACL is not exceeded.
- An ACT is an amount of annual catch that is the management target of the fishery, and accounts for management uncertainty in controlling the catch at or below the ACL.

National Standard 1 Guidelines
(*Reactive AM)*

AMs for when the ACL is exceeded (reactive)-

- Councils determine if an ACL was exceeded.
- If an ACL was exceeded, AMs must be implemented to correct:
  - the operational caused, and/or
  - any biological consequences

National Standard 1 Guidelines

"For stocks and stock complexes in rebuilding plans, the AMs should include overage adjustments that reduce the ACLs in the next fishing year by the full amount of the overage, ***unless the best scientific information available shows that a reduced overage adjustment, or no adjustment, is needed to mitigate the effects of the overage***"

1. AMs: who's accountable and for what?

- Who- fishers, scientist, managers?
- What- overfishing, illegal activity, imperfect science, imperfect monitoring, …

2. AMs: What are they?

- Are ACTs pre-active AMs?
- Must AMs be automatic or can they be analysis based?
- For scallops, can closures of rotational areas be a pre-active AM if they reduce expected discards?

3. AMs: When are they good enough?

- For pre-active AMs, how much should the expected catch be reduced?
- For re-active AMs, how much of the over-catch should be paid back-
  - All of it?
  - Enough to punish?
  - Enough to mitigate for overfishing?

4. Sub-ACLs: Why Sub-ACLs (and implicitly AMs for sub-ACLs)?

- Prevent overfishing? Isn't this achieved by ACL?
- Incentivize compliance?
- Maintain shares?
- Prevent "derby fishing."

Benefits of Sub-ACLs vs. Monitoring costs

5. Accountability for discards?

- Take it of the top- ACL reduced by estimate of discards.
- Within year discard management.
  - Means more AMs (e.g., flatfish AMs in the scallop fishery)
  - Incentivizes bycatch avoidance
  - Increase cost of monitoring
  - **Exacerbate signal to noise ratio problem**

6. Uncertain information: How do AMs perform?

What if the catch is under-estimated and/or stock size is over-estimated?

- AM probably not implemented
- F higher than expected

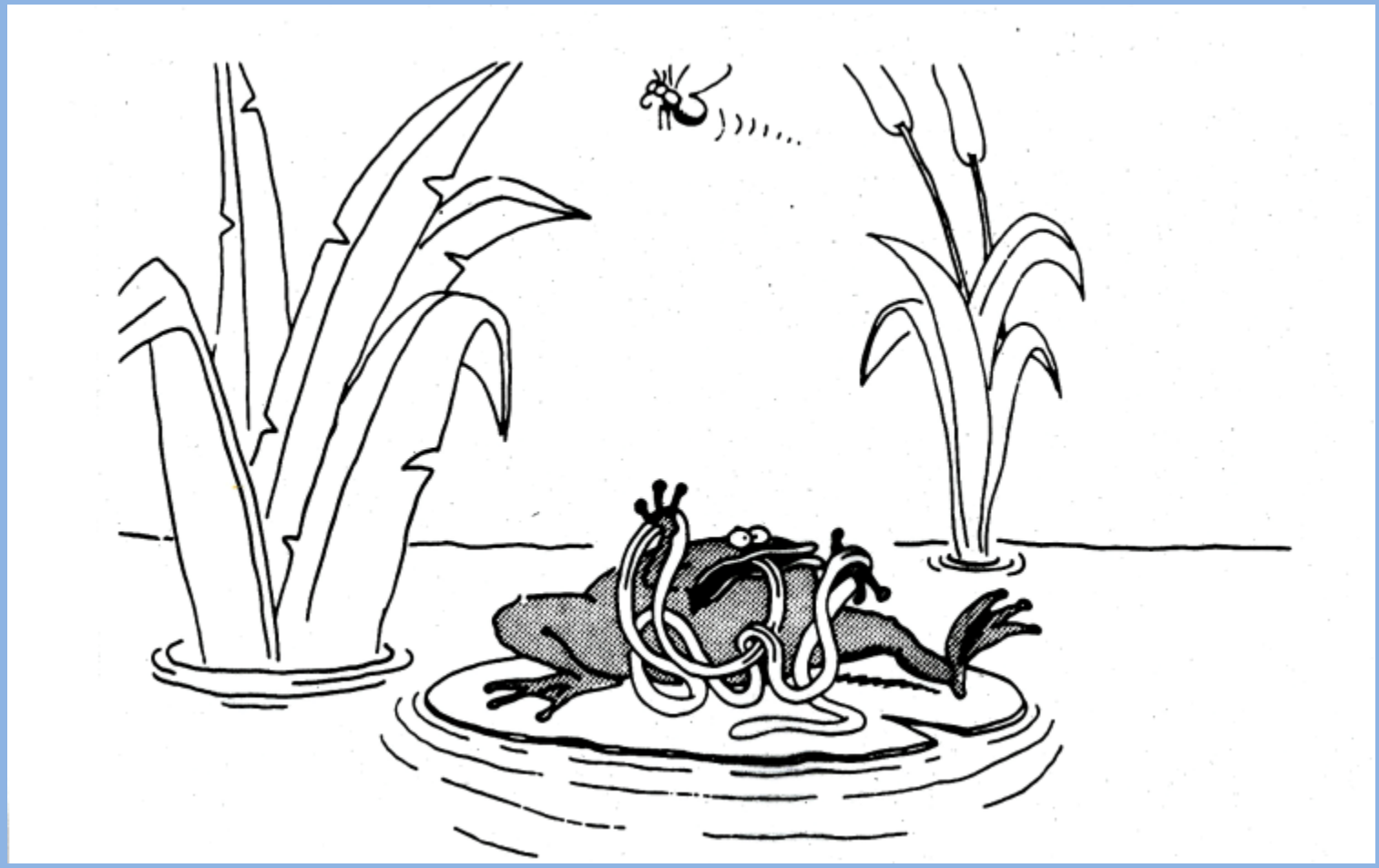
What if the catch is over-estimated or stock size is under-estimated?

- AM probably implemented
- F will be lower than expected

Workshop Plan

- Agency legal perspective
- Review of experience with AMs
- Panel of stakeholder perspectives
- Discussion over dinner and drinks
- Plenary Discussion- How to achieving accountability without creating unreliable gadgets!

Lets not create gadgets that are unreliable!



Blasted recoil unit !!!!

NOAA FISHERIES

Sustainable Fisheries

ACL and AM requirements

Massachusetts Marine Fisheries Institute AM Workshop

Debra Lambert
November 2, 2017

Outline

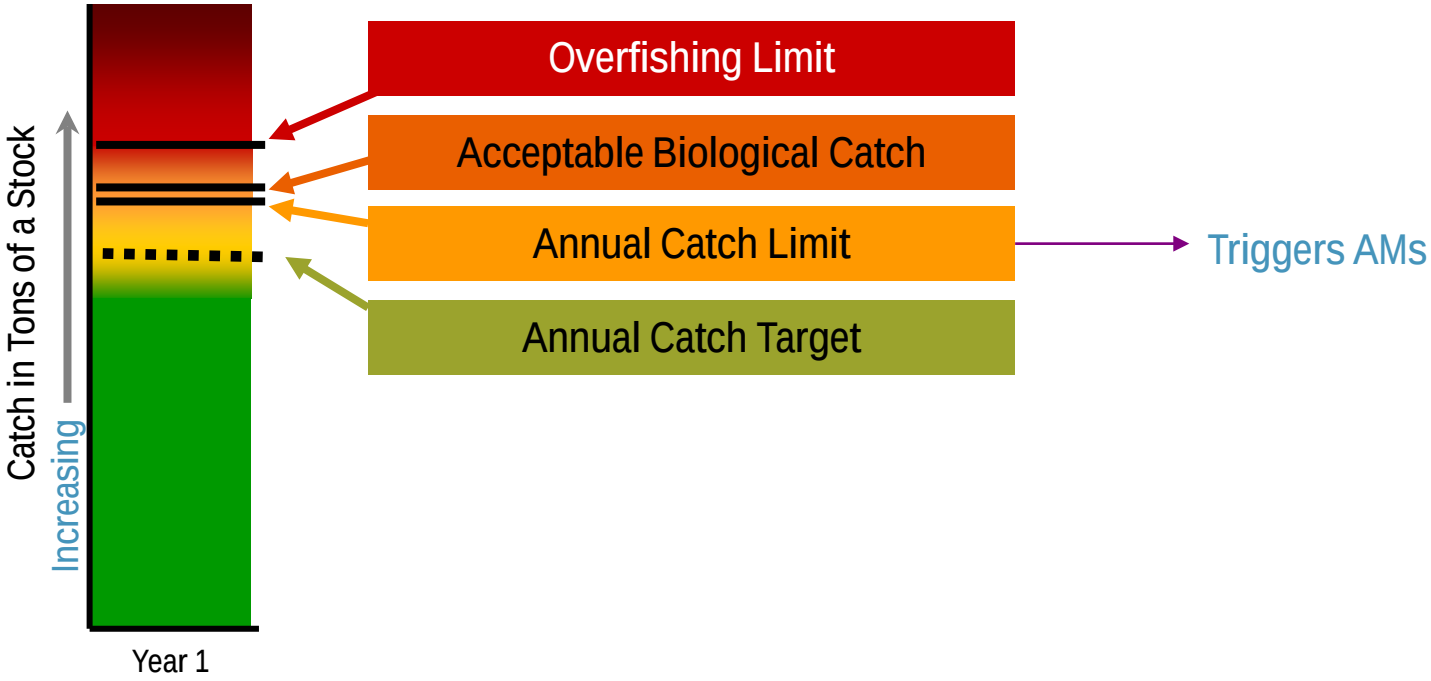
- MSA requirements
- ACL Framework
- AMs
  - Inseason
  - When ACL is exceeded
- Sub-ACLs and AMs
- Additional guidance

MSA Requirements

- Fishery management plans shall "establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability."

MSA 303(a)(15)

ACL Framework



Accountability Measures (AMs)

- Management controls to prevent ACLs from being exceeded, and to correct or mitigate overages of the ACL if they occur.
- Should address and minimize the frequency and magnitude of overages, and correct the problem that caused the overage in as short a time as possible.
- 2 types:
  - In-season AMs
  - AMs for when ACL is exceeded

Inseason Accountability Measures

- Prevent catches from exceeding ACLs.
- Examples: annual catch target (ACT), closure of a fishery, closure of specific areas, changes in gear, changes in trip size or bag limits, reductions in effort, or other appropriate measures.

AMs for when ACL is exceeded

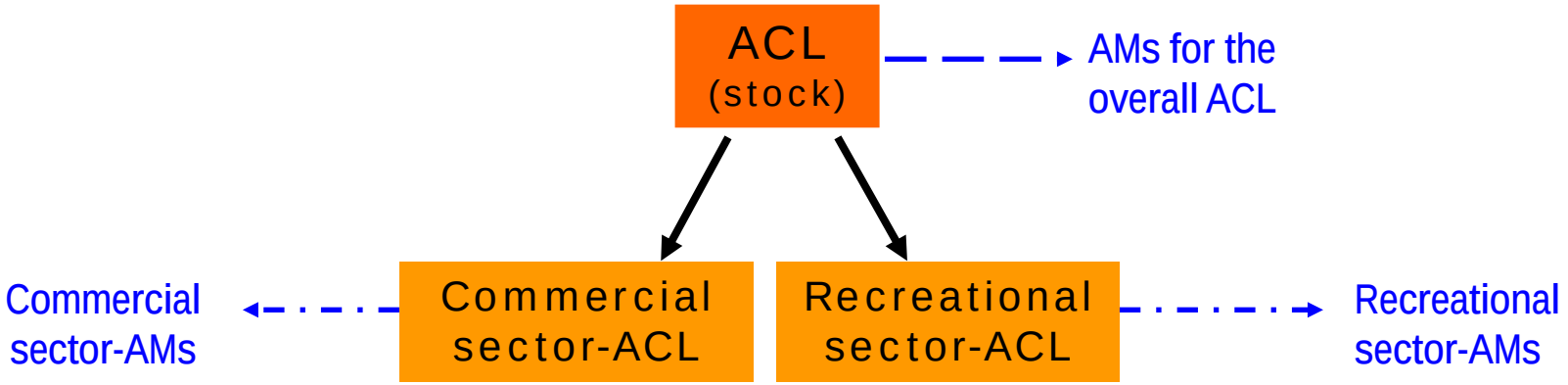
- Should be implemented as soon as possible.
- Correct operational issue that caused the overage.
- Address biological consequences to the stock when it is known.
- Examples: modifications of inseason AMs, the use or modifications of ACTs, overage adjustments.
- Type of AM will likely vary depending on:
  - sector of the fishery, status of the stock, degree of the overage, recruitment patterns of the stock, or other pertinent info.

AMs for stocks in rebuilding plans

- AMs should include overage adjustments that reduce ACLs in the next fishing year by full amount of overage
  - unless the BSIA shows that a reduced overage adjustment, or no adjustment, is needed to mitigate the effects of the overage.
- This will increase the likelihood that the stock will continue to rebuild.

ACLs & AMs for a Fishery Sector

- Optional to sub-divide a stock's ACL into "sector-ACLs".
- "Sector-AMs" should be specified.
- AMs at the stock level may be necessary.



AMs based on multi-year data

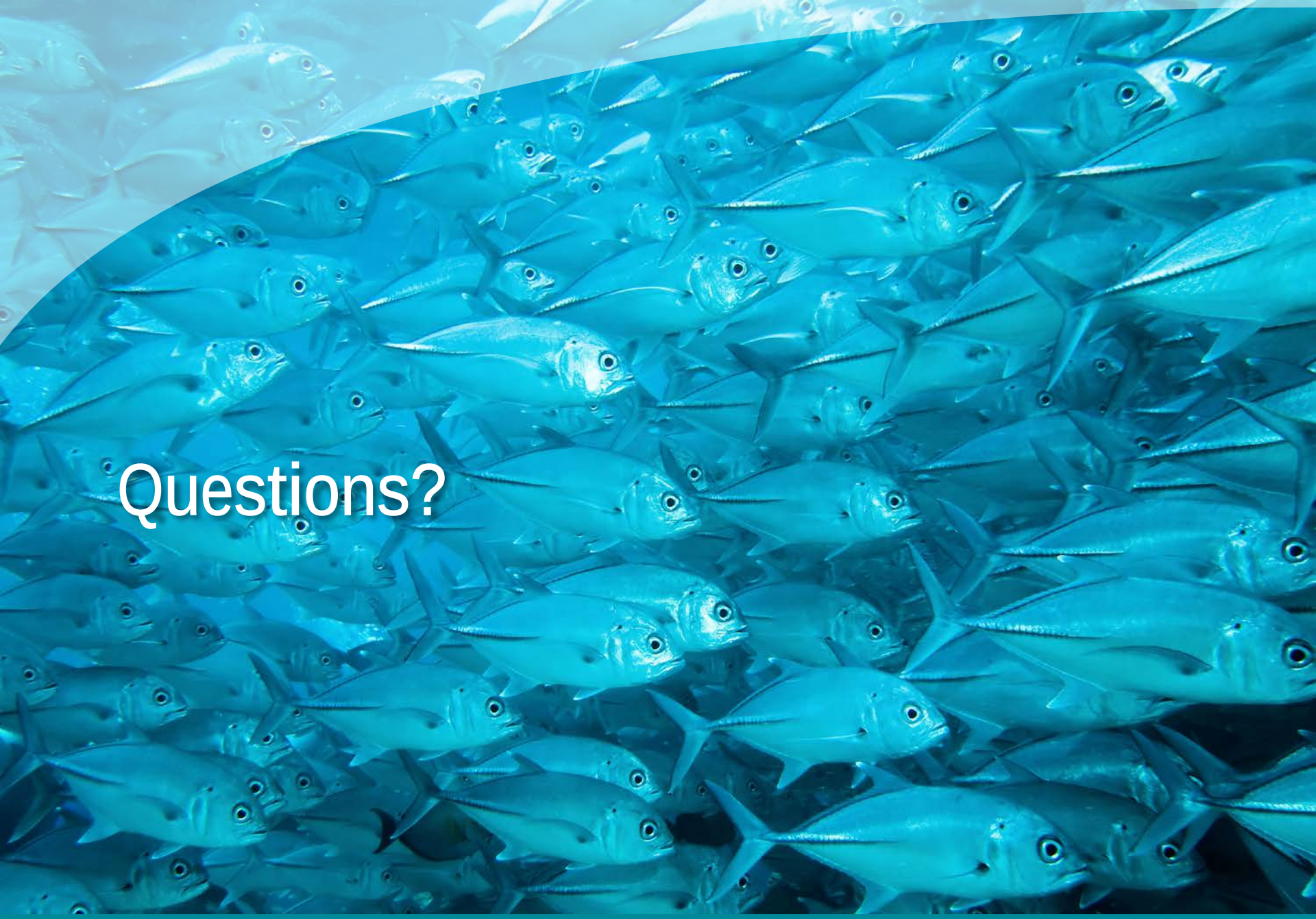
- AMs can be based on a comparison of average catch to average ACL over a three-year moving average period.
- Must evaluate annually.
- May be appropriate in fisheries that have highly variable annual catches, or lack reliable inseason or annual data on which to base AMs.

Performance Standard

- If catches exceed the ACL more than once in the last four years, the system of ACLs and AMs should be reevaluated, and modified if necessary, to improve its performance and effectiveness.

Summary

- System of ACLs and AM should prevent overfishing.
- NS1 Guidelines provide for:
  - AMs for when ACL is exceeded
  - Inseason AMs
- ACL may be divided into “sector-ACLs.”
- In which case, “sector-AMs” are recommended.


Questions?

MID-ATLANTIC
FISHERY MANAGEMENT COUNCIL

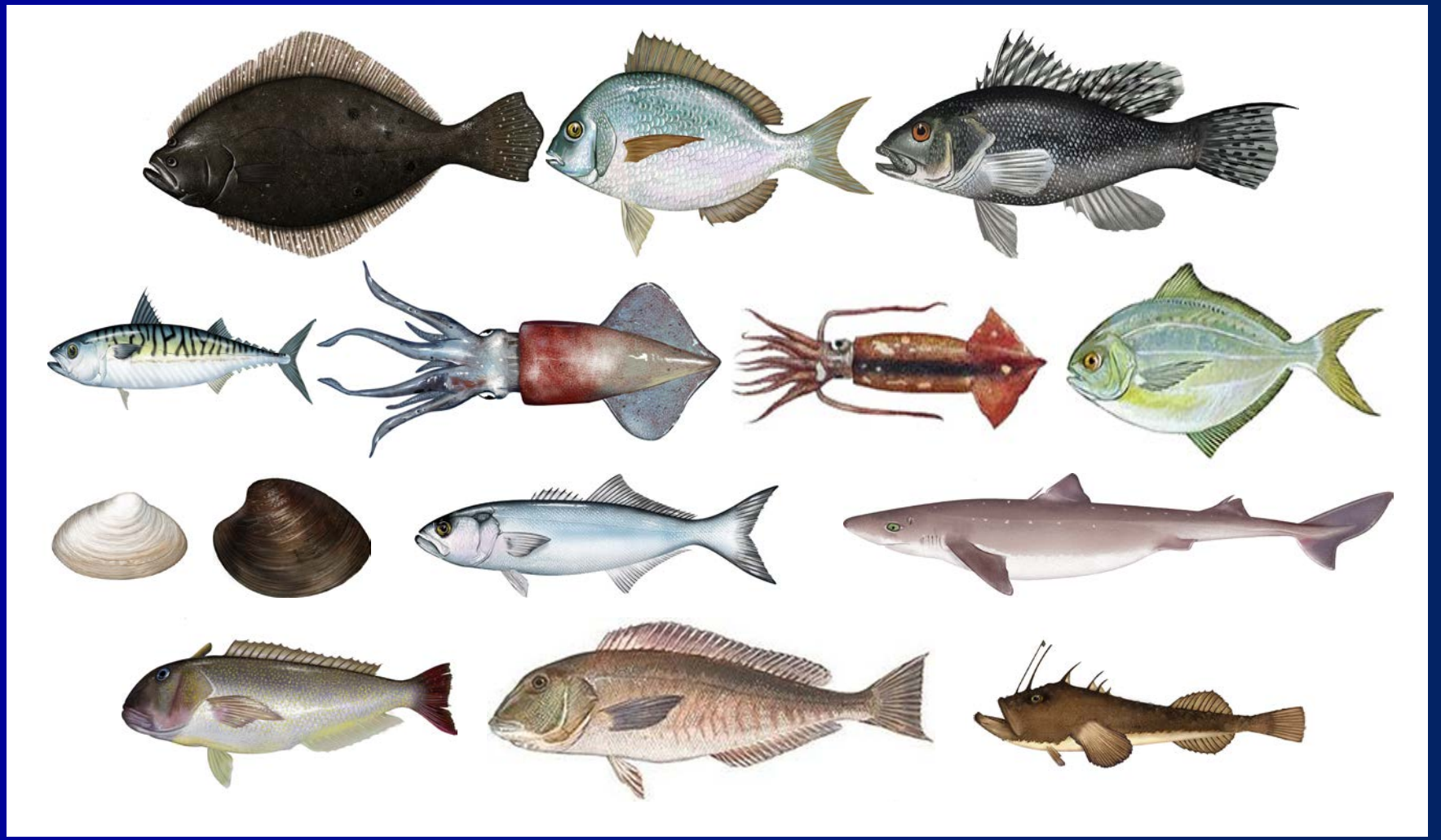
MAFMC Accountability Measures

MFI Accountability Measures Best Practices Workshop

November 2, 2017

Kiley Dancy, Matt Seeley, Julia Beaty

MAFMC Managed Fisheries



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2011 Omnibus ACL/AM Amendment

- Omnibus action to implement MSA-required ACLs and AMs for all species at once
- Alternatives developed specific to each species
- Outcome: Similar overall approach for each species; some slight differences by FMP

2011 Omnibus ACL/AM Amendment

- ACL structure varies by fishery
  - Generally ABC=ACL, no sub-components
  - Summer flounder/scup/black sea bass: ABC = rec. ACL + commercial ACL
  - Bluefish: ACL split into rec. and comm. ACTs
  - Otherwise, no “sub-ACLs” used

OFL

ABC

Landings portion

Discards portion

Projected comm. discards

Projected rec. discards

Commercial ACL
78% of ABC

Recreational ACL
22% of ABC

Commercial ACT

Recreational ACT

Commercial Quota
ACT minus projected discards

Recreational Harvest Limit
ACT minus projected discards

Winter I Quota

Summer Quota

Winter II Quota

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FISHERY MANAGEMENT COUNCIL

2011 Omnibus ACL/AM Amendment

- AMs implemented were both:
- *Proactive* (prevent exceeding ACL)
  - In-season closures for projected overages
  - Optional buffer from ACLs to ACTs to address management uncertainty
- *Reactive* (response to exceeding ACL)
  - Generally pound-for-pound paybacks

MAFMC Commercial AMs

- In-season monitoring and closure authority (landings)
- Single year catch vs. ACL evaluation (most recent complete data year)
- Pound-for-pound paybacks in a subsequent year if necessary (next slide)

MAFMC Commercial AMs

- Fisheries with state or ITQ allocations:
  - Landings overages deducted from state or ITQ holder allocation in subsequent year (regardless of whether ACL is exceeded)
  - ACL payback occurs if ACL overage is not accommodated through existing landings-based AMs

MAFMC Recreational AMs: Initial

- Pre-2013 AMs (2011)
  - In-season closure authority if projected landings overage
  - 3-year moving average evaluation of rec. ACL to rec. catch
  - Direct deduction (pound-for-pound payback) of ACL overage in a subsequent year if necessary

MAFMC Recreational AMs: Modified

- 2013 Omnibus Amendment modified all recreational AMs
- Why?
  - Better account for uncertainty in recreational data
  - Lessen severity of AMs on non-overfished/overfishing stocks

MAFMC Recreational AMs: Modified

- 2013 Changes:
  - (Unchanged: 3-year average catch to average ACL evaluation)
  - Removed in-season closure authority for rec. fisheries (lag and uncertainty)
  - Tied ACL overage response to stock status (next slide)

MAFMC Recreational AMs: Modified

	Rec. Catch > Rec. ACL AND *Total catch* < ABC	*Rec. Catch* > Rec ACL AND *Total catch* > ABC
Above target (B/B_{MSY} >1)	Adjust bag, size, season	
Below target; not overfished (1 > B/B_{MSY} > ½) not in rebuilding	Adjust bag, size, season	Single-year payback scaled based on B/B_{MSY} Payback amount = (overage amount) * $(B_{msy}-B)/½\ B_{msy}$
Overfished (½ > B/B_{MSY}) or in rebuilding	Pound-for-pound payback of full ACL overage amount	

Monitoring

- If ACLs exceeded more than once in a 4 year period:
  - Monitoring Committee reviews fishery performance; recommends changes in measures to ensure ACLs are not exceeded as frequently

Implementation

- Data Requirements
  - Work with GARFO and NEFSC annually in ACL evaluation to confirm final catch

MAFMC Commercial AMs: Possible Changes (Ongoing)

- Currently considering modifications to summer flounder/scup/black sea bass commercial AMs
  - Tie to stock status, like rec. AMs?
  - Scaled paybacks based on B/B_{MSY} ratio?
  - Account for discard estimate uncertainty - perhaps using multi-year averaging?

Science, Service, Stewardship

Comparison of New England and Mid-Atlantic Accountability Measures

Emily Gilbert
Policy Analyst
Sustainable Fisheries Division
Greater Atlantic Regional Fisheries Office

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Differing Approaches to Implementing ACLs and AMs

Mid-Atlantic Fishery Management Council

- Omnibus approach to ACL framework resulted in similar accountability measures (AMs) across all fishery management plans (FMPs)

New England Fishery Management Council

- FMP-specific approach to developing ACLs and AMs

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Use of Sub-ACLs

Mid-Atlantic Fishery Management Council

- Sector sub-ACLs (e.g., recreational and commercial), but not bycatch sub-ACLs

New England Fishery Management Council

- Sector sub-ACLs and bycatch sub-ACLs

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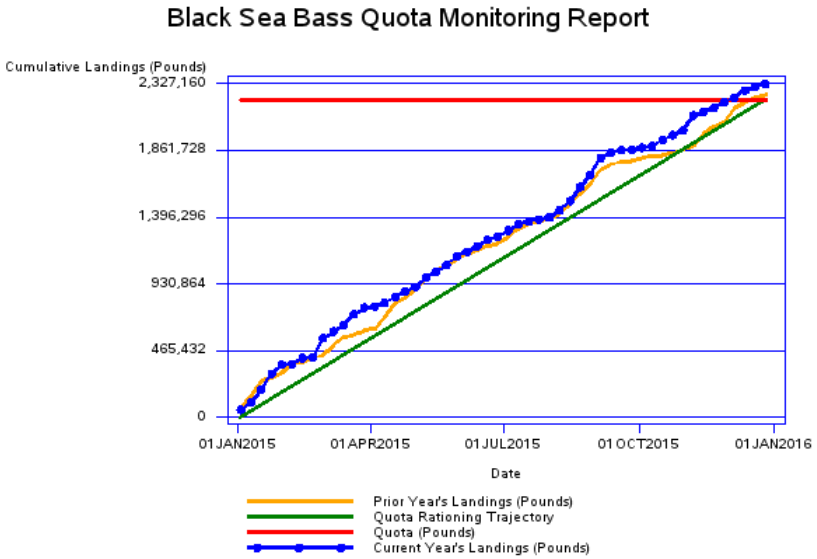
Complexity of Accountability Measures

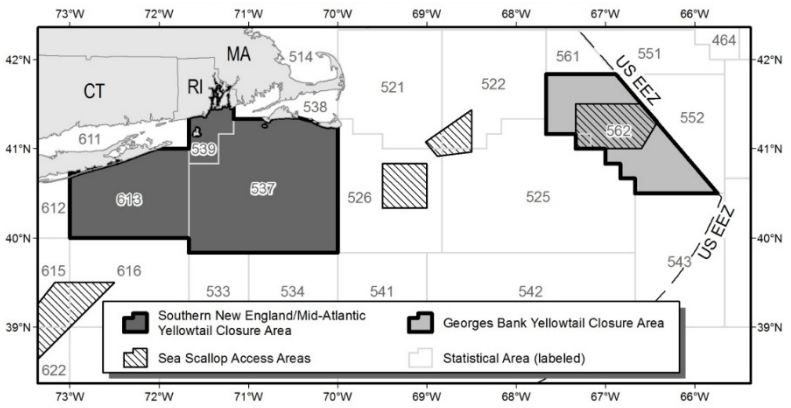
Mid-Atlantic Fishery Management Council

- AMs uniformly applied to fleets (e.g., overage repayments, fishery-wide closures, etc.) are relatively consistent across FMPs.



New England Fishery Management Council

- Each FMP has wide range of different AMs (e.g., seasonal, gear-based, area-based) that impact multiple FMPs (governed by more than one Council)



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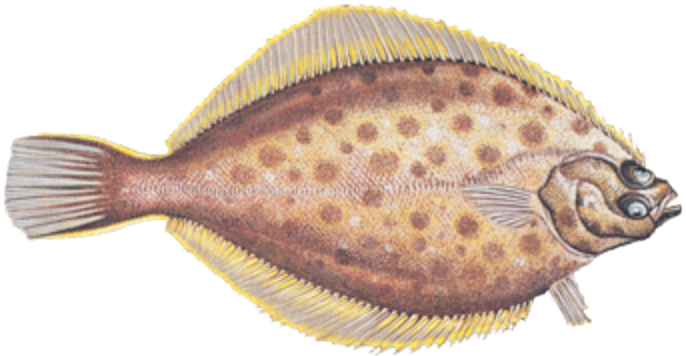
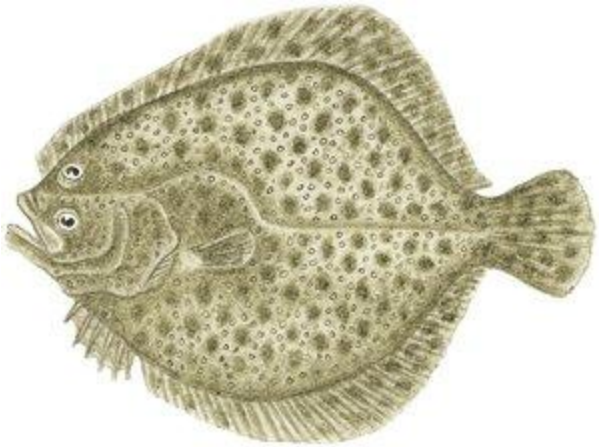
QUESTIONS?

Accountability Measures in the Scallop Fishery





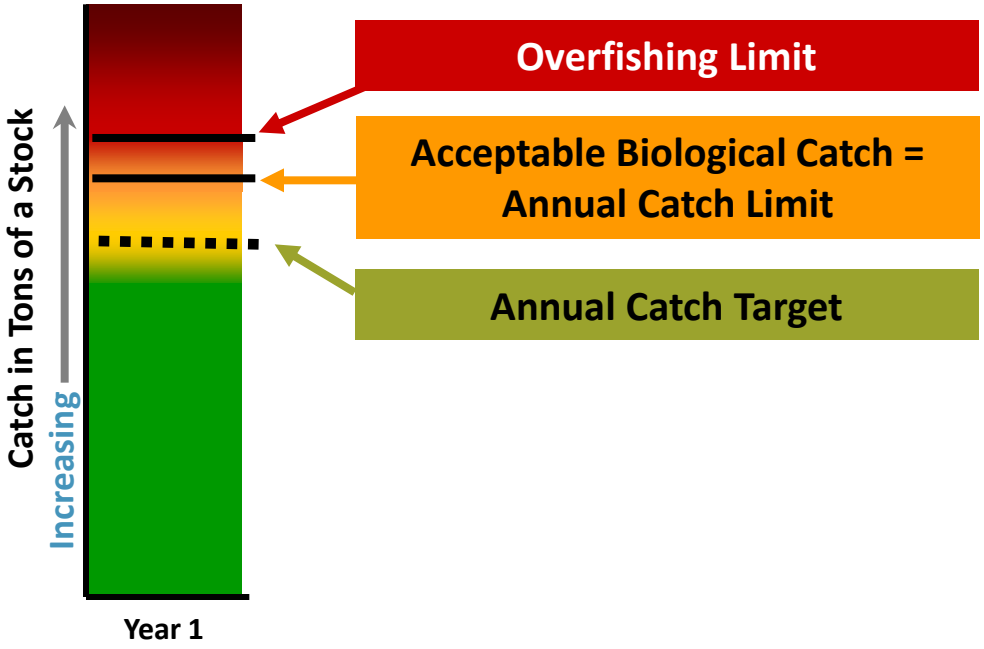
Cate O'Keefe[1], Travis Ford[2]

[1]Massachusetts Division of Marine Fisheries

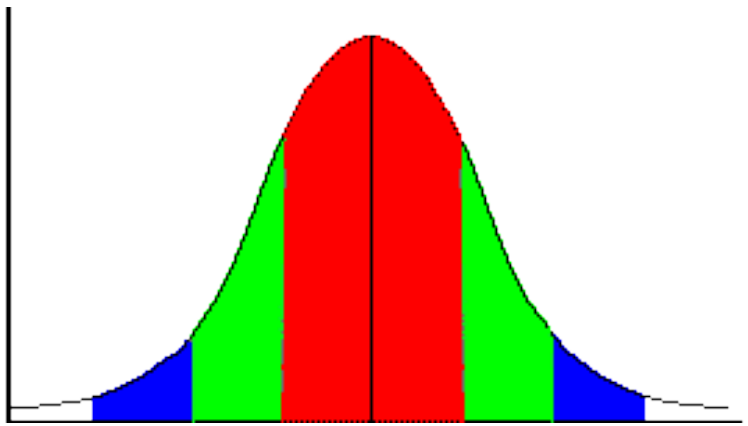
[2]Greater Atlantic Regional Fisheries Office

Amendment 15 (2011)

- Scallop Annual Catch Limits
  - Use of Annual Catch Target (ACT) to account for management uncertainty
  - ACT = F that has a 25% probability of exceeding ABC



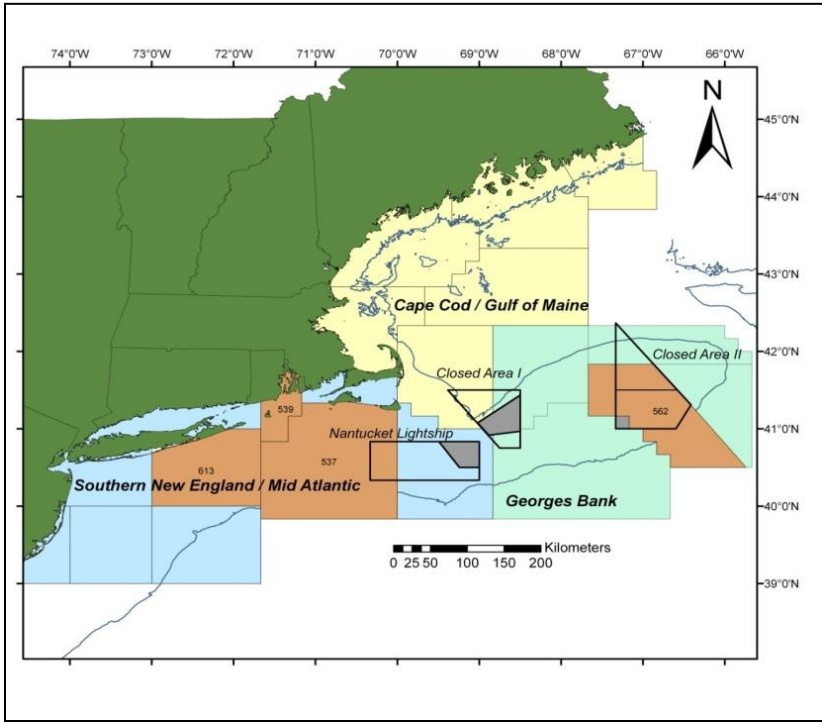
- Accountability Measures
  - Reduction in Days-At-Sea in subsequent year
  - EXCEPTION PROVISION
    - AM will not be triggered if realized F was less than one standard deviation below the overall F associated with ACL

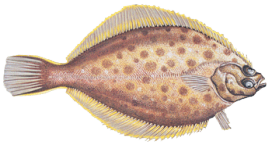


Amendment 15 (2011)

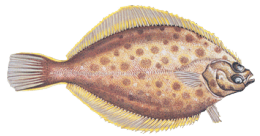
- Yellowtail Flounder sub-Annual Catch Limits
  - Georges Bank and Southern New England stocks
  - Sub-ACLs determined by the Northeast Multispecies Plan (Groundfish)
    - 90% of projected need to fulfill scallop allocations
      - Projections included recent bycatch rates, flounder stock projections
      - Mandatory landings of yellowtail flounder

- Accountability Measures
  - Limited Access fleet only
  - Time/area closures
    - Time: monthly blocks with duration dependent on level of overage
    - Area: statistical areas with high levels bycatch in the scallop fishery
      - Two schedules for CAII – open or closed
  - AM Trigger
    - Scallop fishery exceeds sub-ACL
  - Implementation timing
    - Next year - determination by January 15

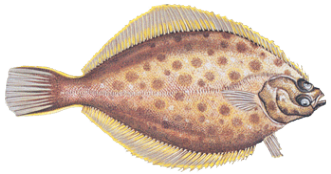




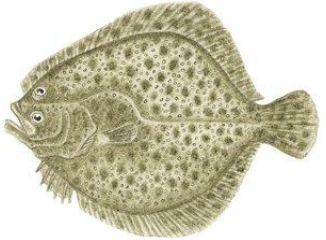
Frameworks 23/47 (2012)



- Re-allocation of yellowtail sub-ACL (FW47)
  - NMFS projection of scallop fishery catch January 15
  - <90% of sub-ACL, re-allocate to groundfish fishery in-season
- Revision to yellowtail AMs (FW 23)
  - AM Trigger (FW47)
    - Entire ACL is exceeded and scallop exceeded its ACL, **OR** scallop exceeds its ACL by ≥50% (regardless of overall ACL)
  - Implementation timing (FW23)
    - NMFS determination by January 15
    - Adjustment in next year – re-evaluation after updated data



Framework 48 (2013)



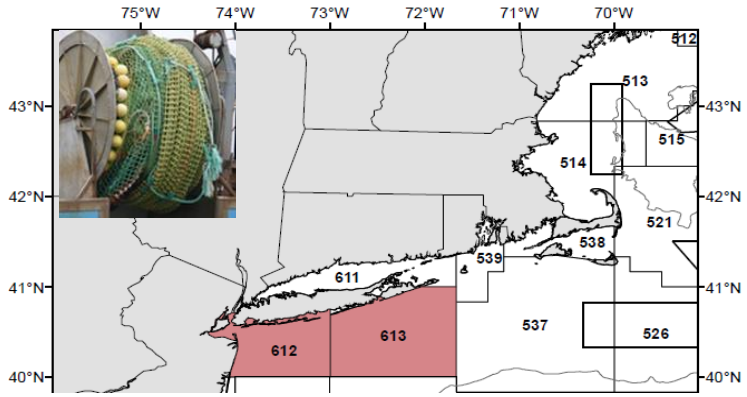
- Added Southern windowpane sub-ACL
  - Sub-ACL for windowpane based on catch history = 36%
- Re-estimation of yellowtail sub-ACL
  - Sub-ACL for Georges Bank based on catch history = 16%

Calendar Year	Landings (metric tons)	Discards (metric tons)	Catch (metric tons)	Scallop Discards (metric tons)	Scallop Landings (metric tons)	Scallop Discards As Pct of Catch
2002	2,476	53	2,529	29	0.2	1.2%
2003	3,236	410	3,646	293	0.1	8.0%
2004	5,837	460	6,297	81	3.0	1.3%
2005	3,161	414	3,575	186	8.1	5.4%
2006	1,196	384	1,580	251	2.6	16.1%
2007	1,058	493	1,551	120	1.5	7.8%
2008	937	409	1,346	128	0.3	9.5%
2009	959	759	1,718	170	1.9	10.0%
2010	654	289	943	8	0.2	0.9%
2011	904	192	1,096	104	8.6	10.3%

Yellowtail TAC applied only to Closed Area II (10% of US TAC), which was shut down in-season due to reaching yellowtail TAC with only 82% of scallop target harvested

Framework 24/49(2013)

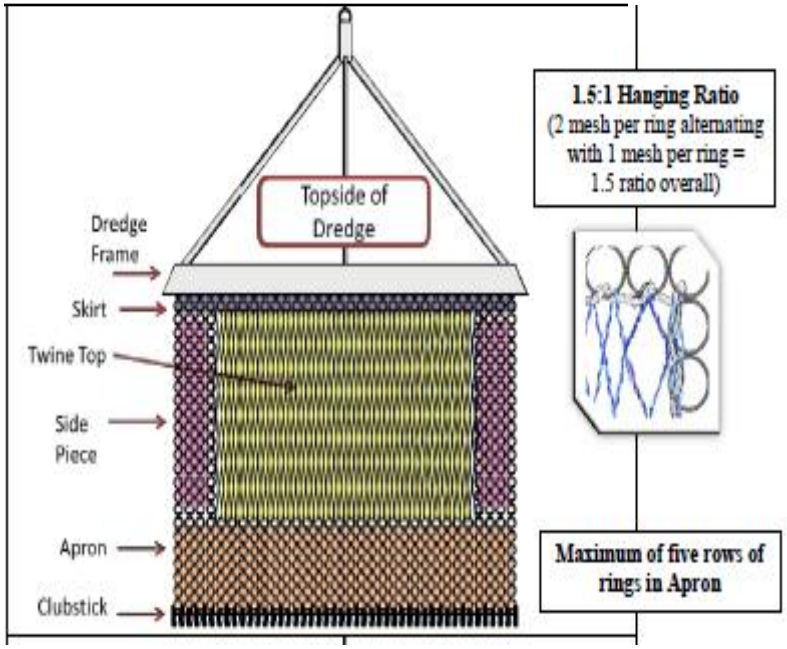
- Revision to yellowtail Accountability Measures
  - Implementation timing
    - NMFS determination by January 15
    - Adjustment in next year – re-evaluation after updated data
    - Year 3 implementation with all available fishing year data
  - Proactive AM for Georges Bank
    - Seasonal closure of Closed Area II August 15-November 15
  - General Category Accountability Measures added
    - Southern New England only
    - gear-specific (dredge and trawl)
    - time/area closures

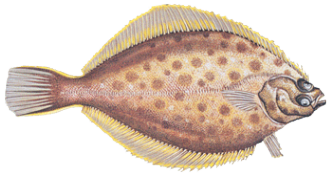


Frameworks 25-26 (2014/15)

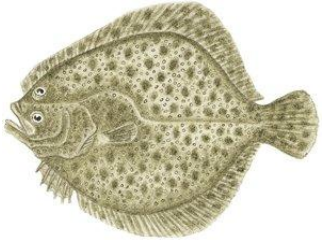
- Added Southern Windowpane AMs
  - Limited Access and General Category fleets
  - Gear modification

	Gear	Time	Area
Reactive AM (FW25)	5-row apron, 1.5:1 hanging ratio	1 or 2 months depending on overage	West of 71°W longitude
Proactive AM (FW25)	7-row apron	All year	West of 71°W longitude
Proactive AM (FW26)	7-row apron	All year	All fishing areas



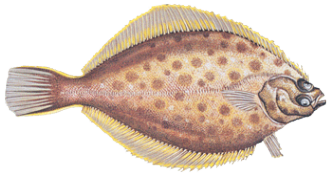


Framework 56 (2016)

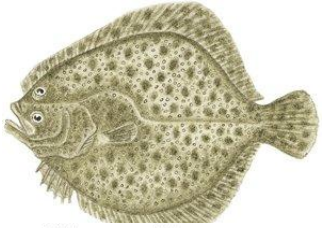


- Added Northern windowpane sub-ACL
  - Sub-ACL for windowpane based on catch history = 21%
- Revised trigger for Georges Bank yellowtail and northern windowpane AMs
  - Entire ACL is exceeded and scallop exceeded its ACL
  - Remove ≥50% provision
  - 2 year sunset (2017-2018)

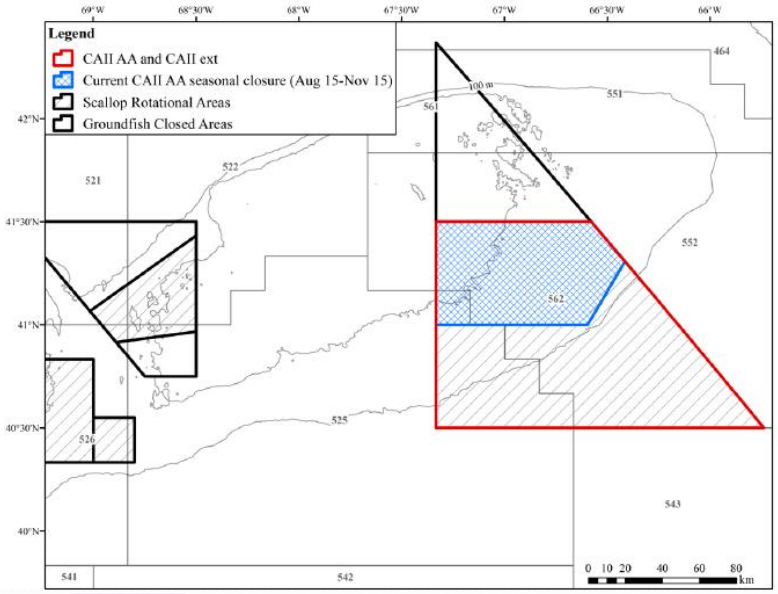
	GB Yellowtail	SNE Yellowtail	S. Windowpane	N. Windowpane
2017 sub-ACL	32	34	209	38
Projected Need	63	11	78	103
% of sub-ACL	198%	31%	37%	272%

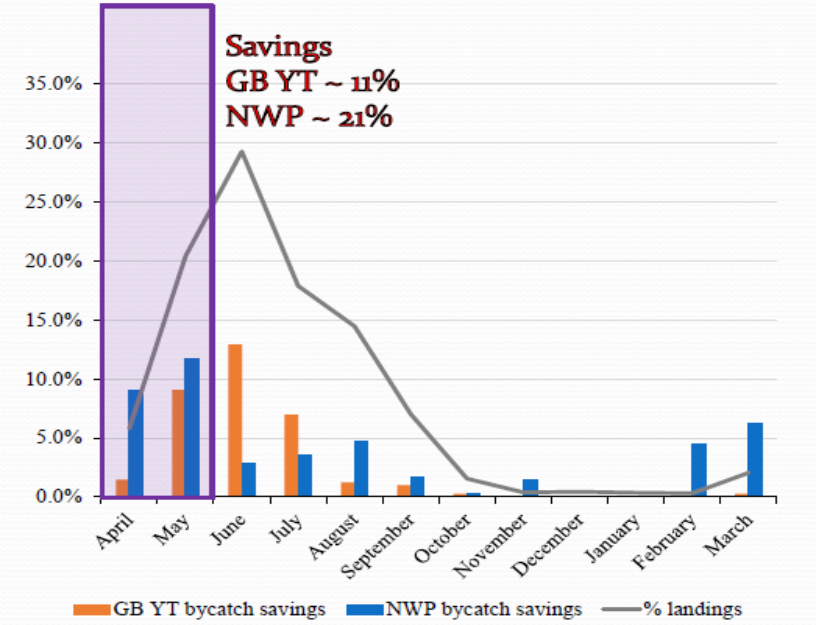


Framework 29 (2018)

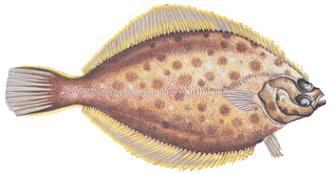


- Alternatives:
  - Consistent with Southern windowpane AMs
    - Add Northern windowpane AMs
    - Revise yellowtail AMs
  - Time/area gear modifications
  - Bycatch “savings”

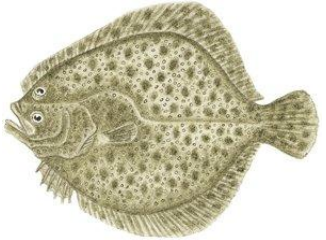




NEFMC, 2017 – Draft FW29




Monitoring

DATA

- NEFOP (tow level, Lat/Long):

- Dealer (trip level, stat area):

SAFIS eDR
a web-based dealer reporting application

- VTR (trip level, stat area):

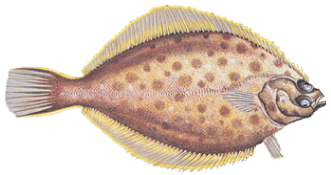
- VMS (Discards and K-all, management area)

CATCH ESTIMATION

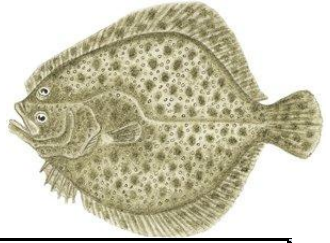
- Cumulative Method
- Ratio of observed discards to observed K-all
- Separate rates
  - Limited Access and Gen. Category
  - Dredge and trawl
- Stratified
  - Open areas – stat areas
  - Access areas

$$\left(\frac{\text{Observed discards}}{\text{Observed K-all}} \times \text{Dealer K-all}\right) + \text{Dealer K-flatfish}$$

= Total flatfish catch

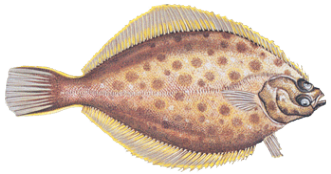



Performance

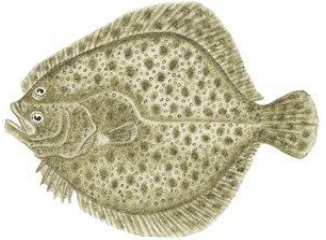



Stock	2012	2013	2014	2015	2016	2017 (8/26/17)
Georges Bank Yellowtail	105%	90%	116%	99%	94%	143%
Southern New England Yellowtail	43%	111%	98%	79%	64%	17%
Southern Windowpane		71%	77%	115%	40%	40%
Northern Windowpane						62%

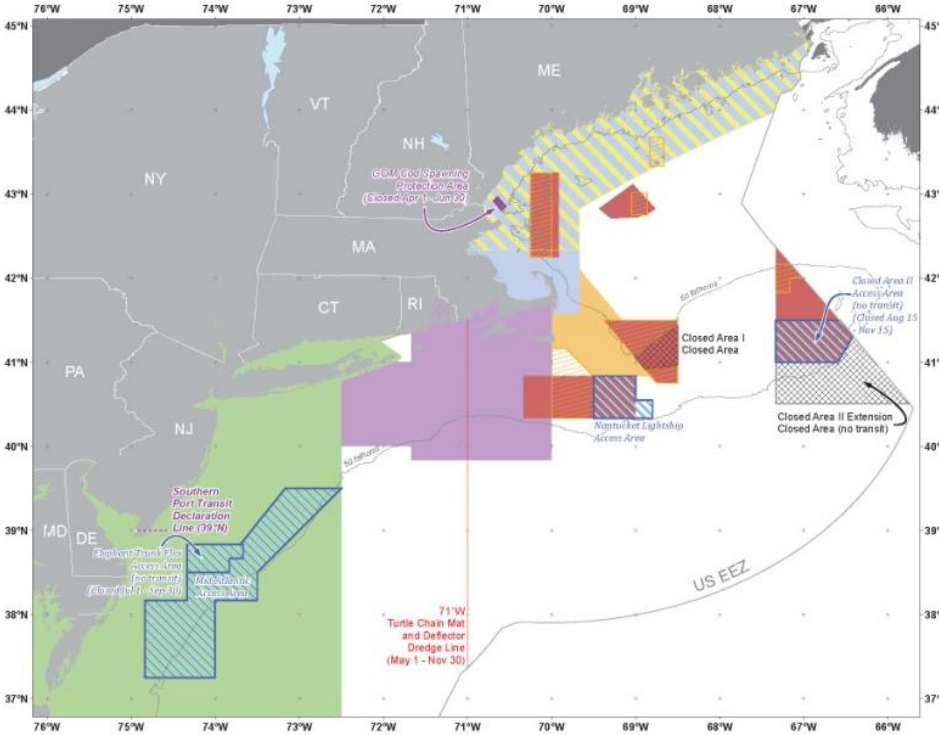
- AM triggered once – Southern windowpane
- Transfer provision to groundfish fishery implemented multiple times
- 150% trigger prevented AMs
- Several iterations and changes
- 2017 Georges Bank yellowtail



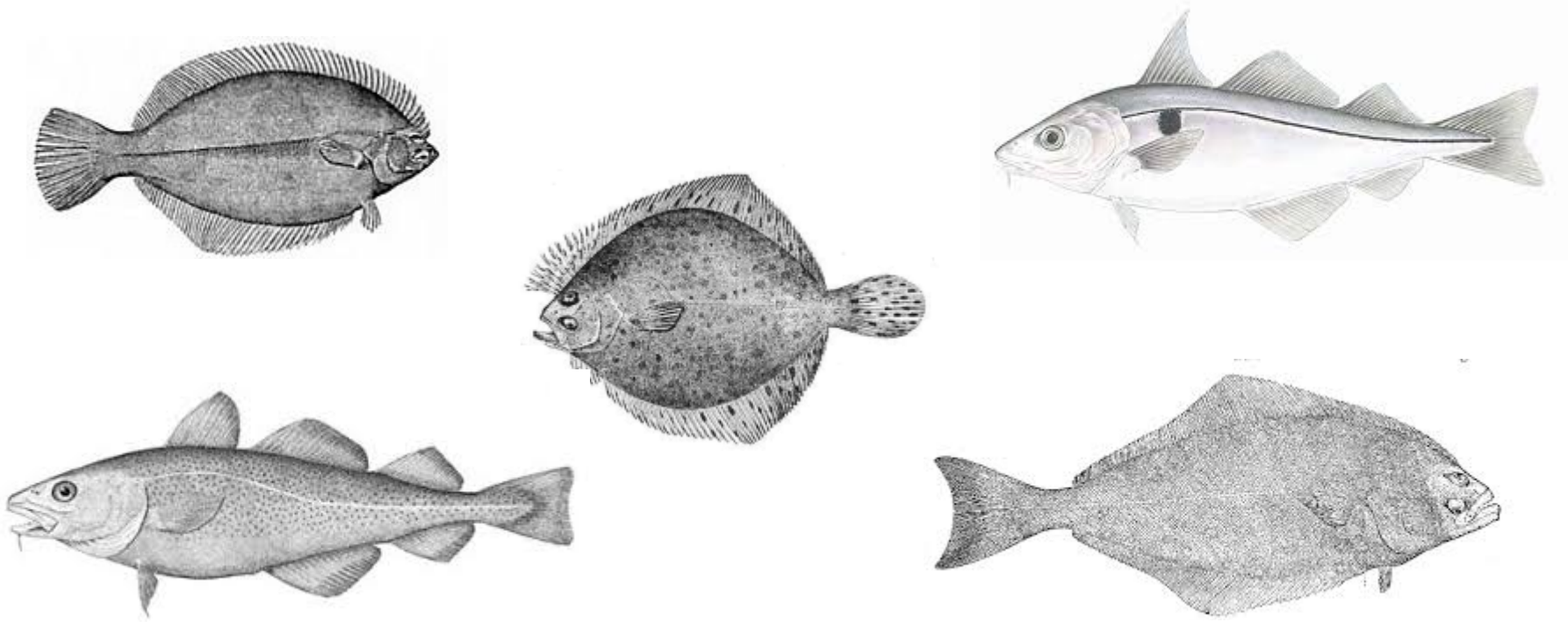

Challenges

- Bycatch projections differ from sub-ACLs
  - Rotational management
  - Changing stock conditions
  - Behavior in scallop open areas
- Need additional impact analysis
  - Lack of cost-benefit analysis
  - Unclear objectives for AMs



Accountability Measures in the Groundfish Fishery

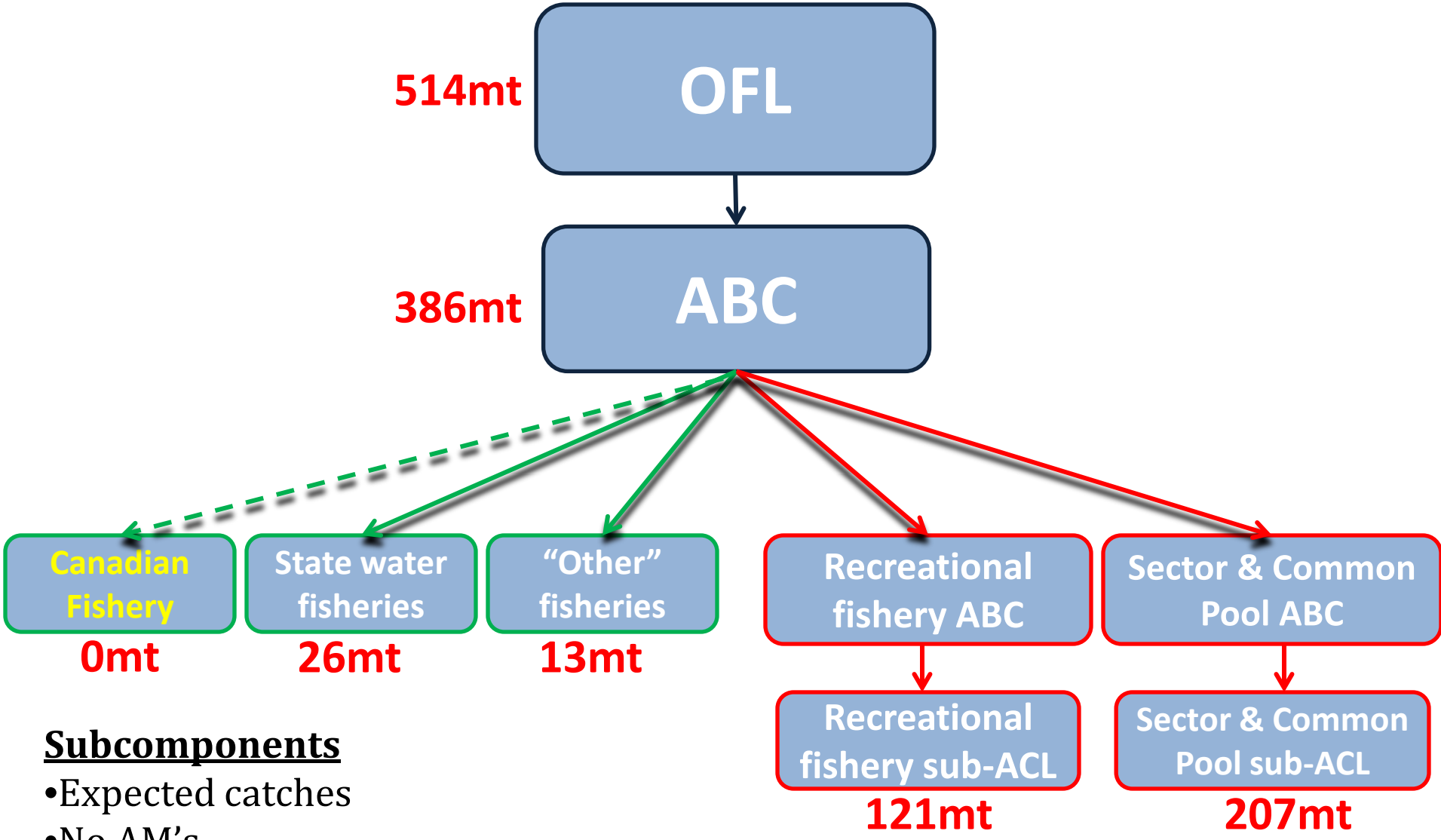


Greg DeCelles[1], Sarah Heil[2], Emily Keiley[2]

[1]Massachusetts Division of Marine Fisheries

[2]Greater Atlantic Regional Fisheries Office

Quota allocation– Gulf of Maine Cod (FY2015)



Subcomponents

- Expected catches
- No AM's
- No adjustment for management uncertainty

Sub-ACL's

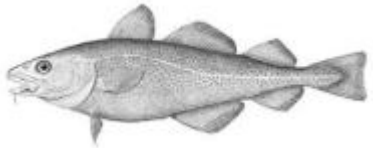
- Subject to AM's
- Management uncertainty adjustment

Data and Monitoring Requirements

- Sector and Common Pool
  - Landings monitored through VTR, dealer reports, and weekly sector reports
  - Discards monitored through SBRM
- Recreational Fishery
  - Landings and discards monitored by MRIP
  - Vessel Trip Reports from the for-hire fishery
- Scallop fishery
  - Groundfish discards monitored through SBRM
- Herring fishery
  - Groundfish discards monitored through SBRM and dockside sampling
- State waters
  - Landings tracked through trip reports and dealer reports submitted to state agencies
- Other fisheries
  - Landings tracked through VTR and dealer reports
  - Discards monitored through SBRM

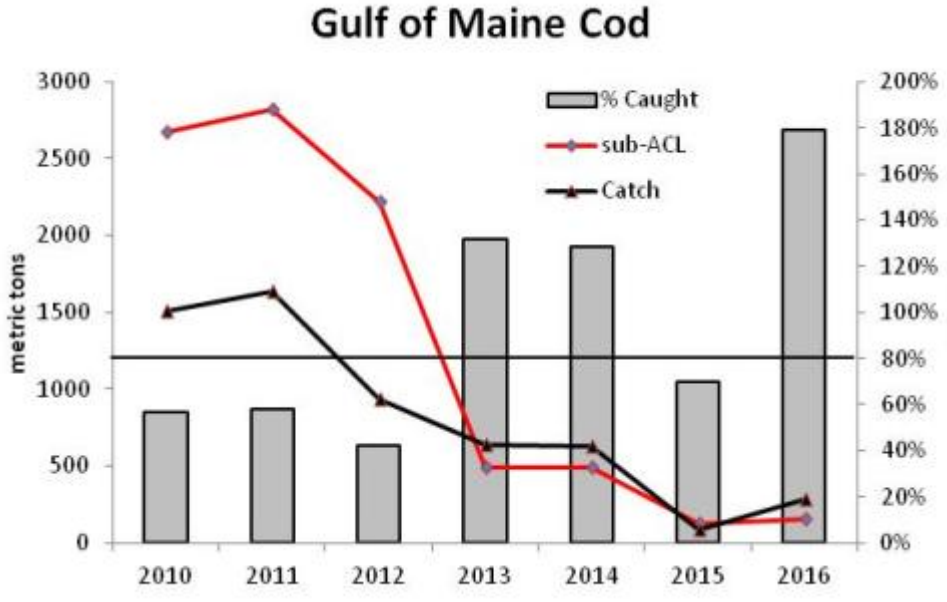
Sector AM's – Allocated Stocks

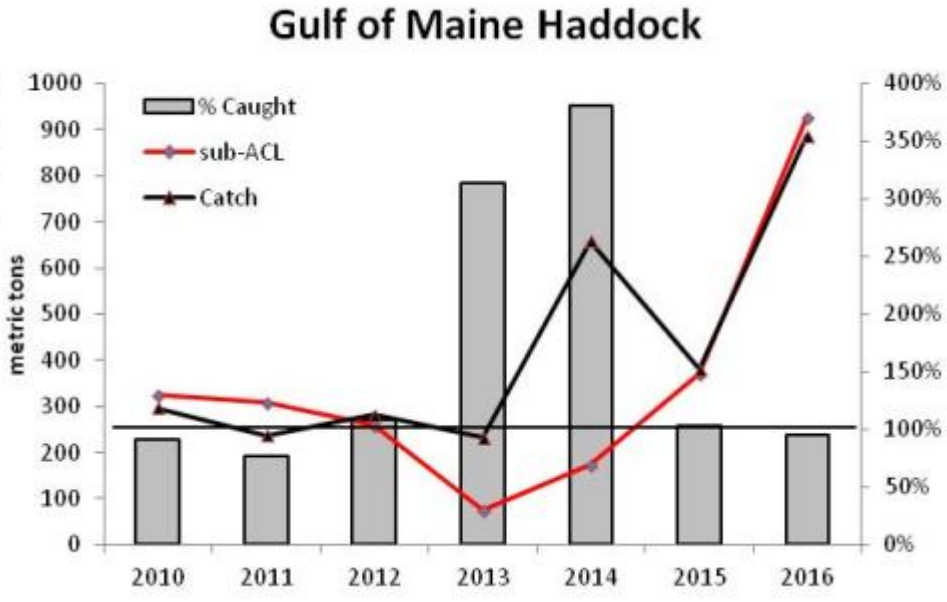
- Annual Catch Limits (ACL) are set with uncertainty buffers.
- Annual Catch Entitlements (ACE) are allocated to individual sectors .
- Sectors are required to monitor their catches in-season, as outlined in their operations plan.
  - Weekly catch report submitted to NMFS.
  - Sector maintains database of VTR, dealer, and observer reports.
  - Sector must notify NMFS when they approach their allocation.
- Sector must stop fishing once their ACE is reached.
  - Sectors can trade for additional ACE to keep fishing.
- **A sector's ACE is reduced in the following year if the sector cannot acquire quota to cover their overage.**



Recreational AM's

- Gulf of Maine cod and haddock are allocated to the recreational fishery.
- AM's are triggered if recreational catches exceed the sub-ACL.
- Amendment 16 established reactive AM's.
  - 3 year average of catch vs. sub-ACL .
- FW48 established <u>proactive AM's</u>: adjustments to the fishing season, minimum fish size, or bag limits before the start of the fishing year.
  - Catches are estimated using in-season MRIP estimates.
  - AM's can be different for private and for-hire vessels.





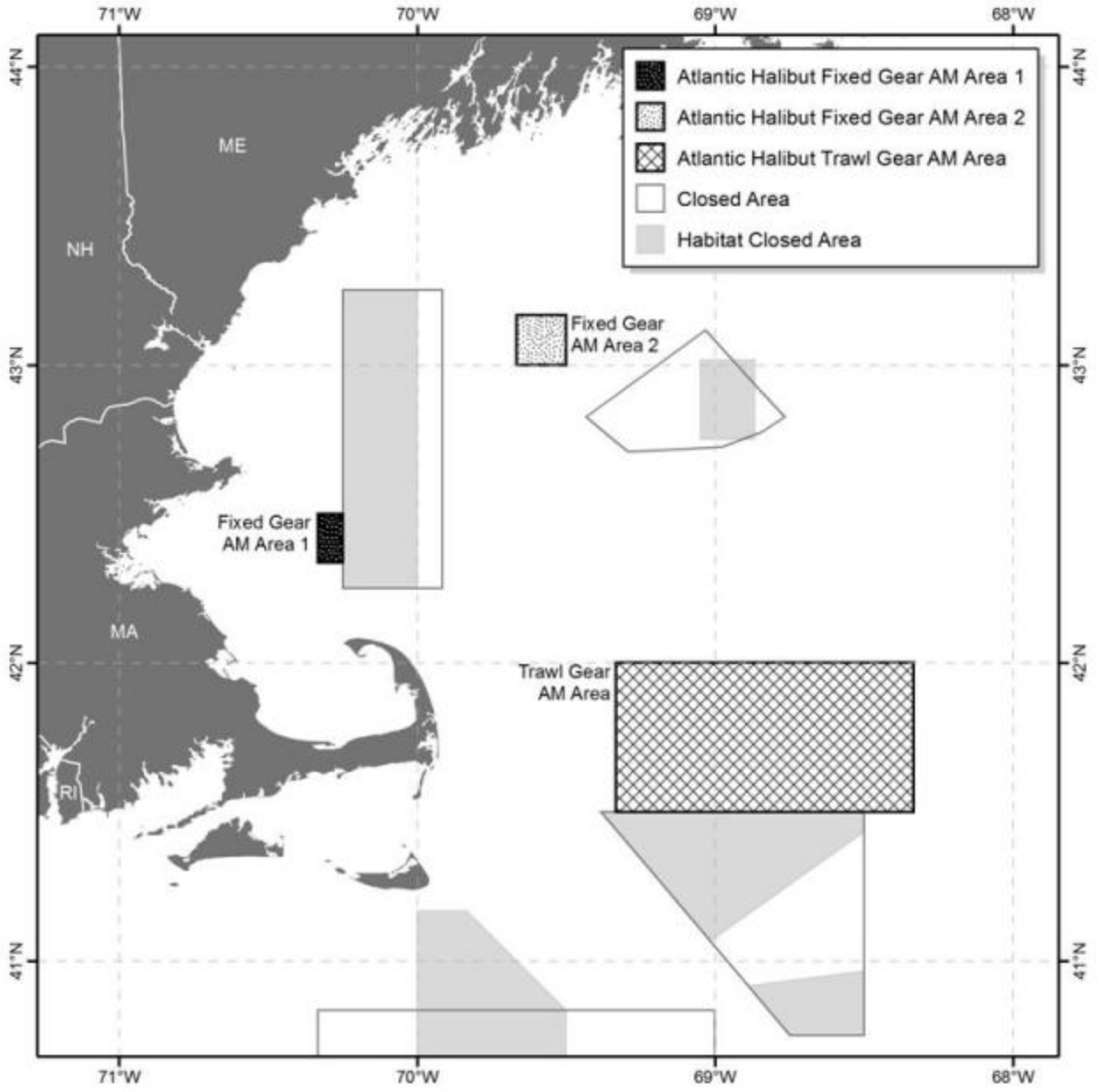
Atlantic Halibut

- Halibut is not allocated to sectors.
- The stock assessment model was rejected in 2015.
- Dichotomy between state and federal fisheries management.

- 34mt set aside for Canadian fishery in 2016

Year	Total ACL (mt)	Groundfish ACL (mt)	% to Groundfish	State Water component (mt)	% to State-Water fishery	Other (mt)	% to Other
2011	**76**	33	43%	39	51%	4	6%
2012	**83**	36	43%	43	52%	4	5%
2013	**96**	52	54%	40	42%	5	4%
2014	**106**	57	54%	44	42%	5	4%
2015	**97**	64	66%	30	31%	3	3%
2016	**119.5**	91	76%	24.8	21%	3.7	3%

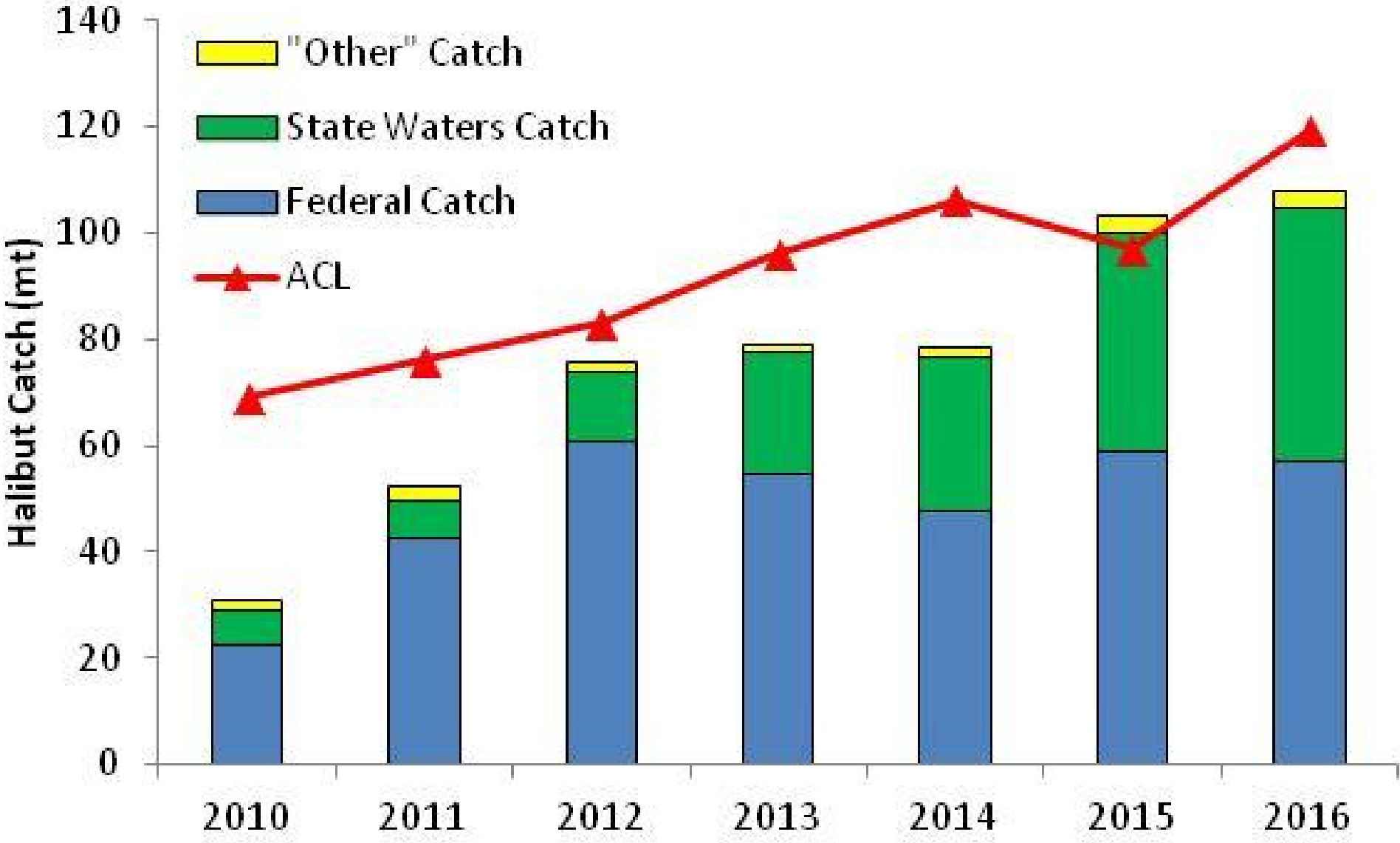
Halibut Accountability Measures



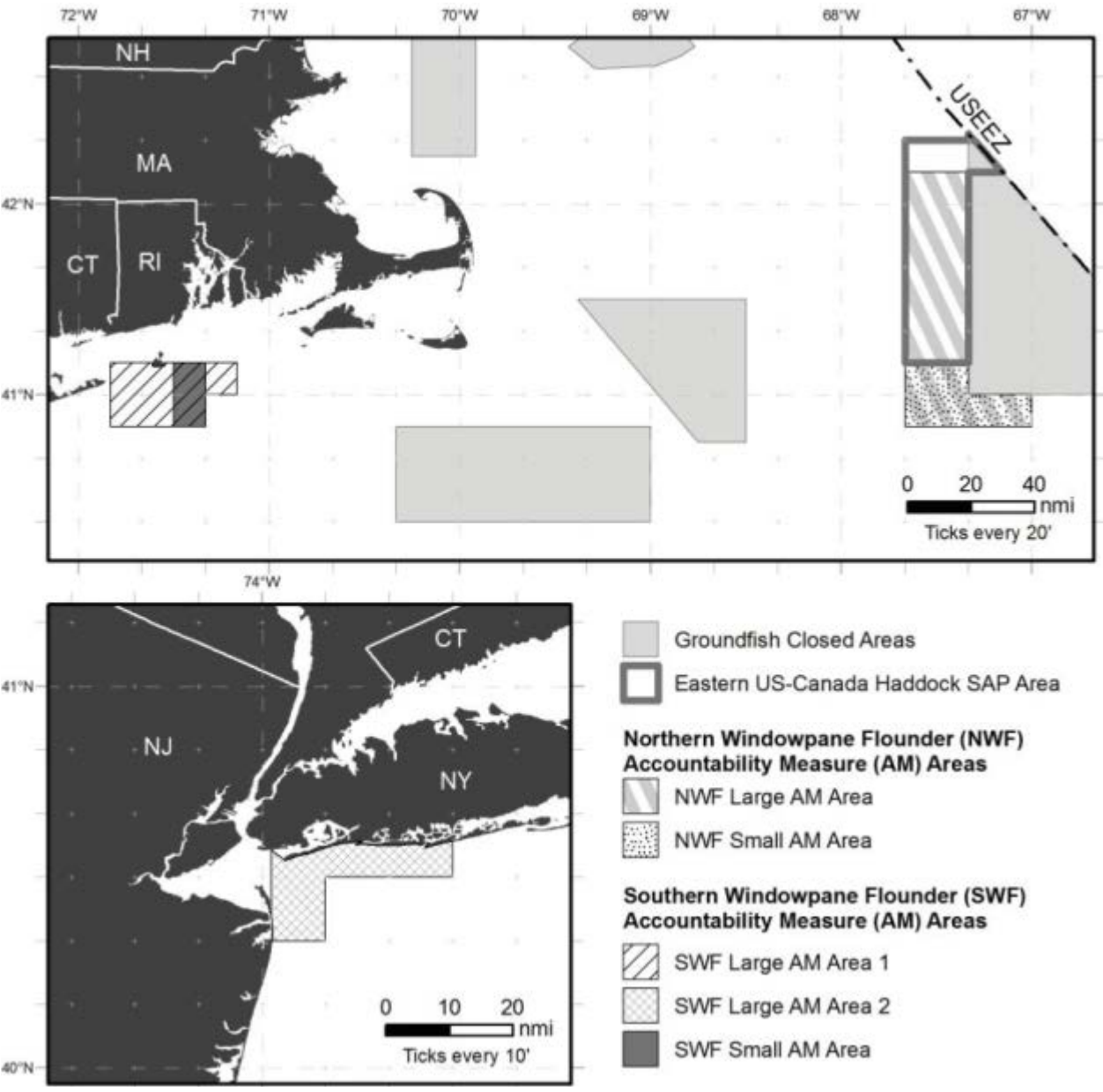
AM Details:

- No possession and gear restricted areas
- Triggered in Y2 or Y3 depending upon data availability
- Only the federal fishery is accountable for the overage
- Estimated economic impact = $6.5 million

Halibut Catches



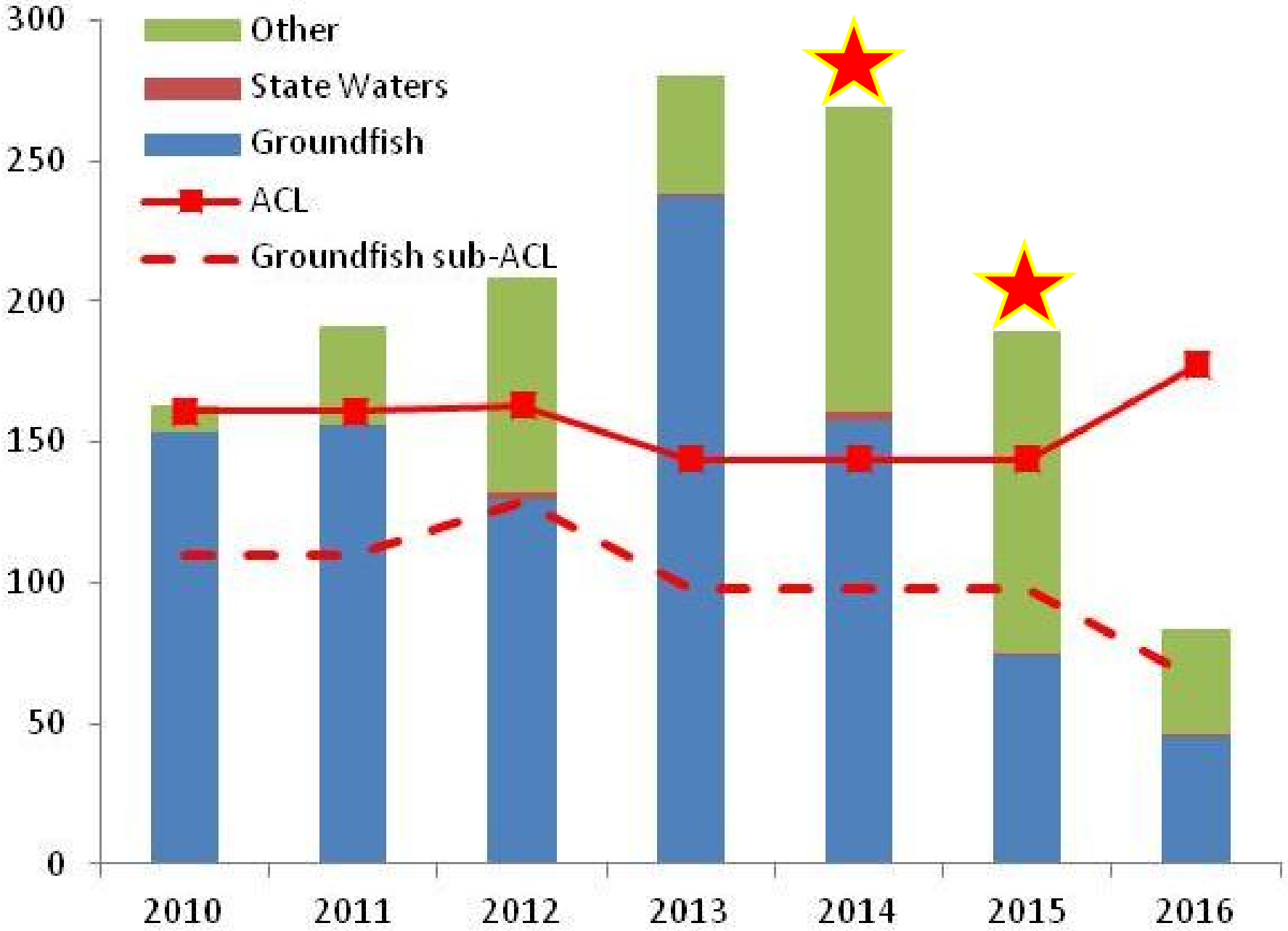
Windowpane Flounder AM's



- **Non-allocated stock**
- Groundfish AM = gear restricted area for trawl fishery
- AM not applicable to gillnet and longline fishery
- AM's typically triggered in Year 3 following overage
- Amount of the overage determines the size of the AM area

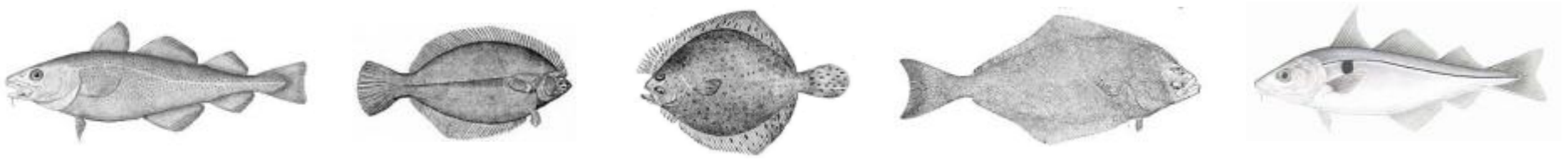
- FW52 – allows reductions in the size or timing of the AM under certain conditions (only for groundfish)

Catch History – Northern Windowpane



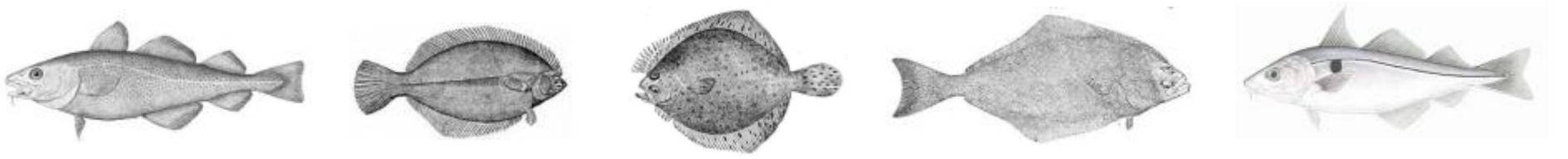
Complications with Groundfish AM's

- Low and/or decreasing quotas are a major challenge.
  - Some AM's were developed when ACL's were much higher, and problems were not foreseen
- Disparity in how quota is allocated to sub-components for different stocks.
  - Groundfish got 76% of N. windowpane ABC, but only 18% of the S. windowpane ABC
  - Projected need, average of historical catches, etc…
- Federal groundfish fishery is often held accountable for catches in other subcomponents.
- AM's do not always address the reason for the overage.
  - Example: state-water halibut catches, recreational catches of Georges Bank cod



Complications with Groundfish AM's

- In-season closures only apply to sectors and common pool vessels.
  - Exception is haddock AM for mid-water trawl fishery
- Different AM triggers between fisheries and stocks.
- AM's can have adverse economic impacts, displace fishing effort, and may cause foregone yield of healthy stocks.
- Changes in stock status with updated assessments



Accountability Measures in the Atlantic Herring Fishery

Carrie Nordeen[1] and Brad Schondelmeier[2]

[1]NOAA Fisheries Greater Atlantic Regional Office

[2]Massachusetts Division of Marine Fisheries

Atlantic Herring Fishery

- History of Management
  - First FMP in 1978
  - New England Council and Atlantic States Marine Fisheries Commission FMPs in 2000
- Gear Used in Fishery
  - Midwater trawl (single and paired), purse seine, and bottom trawl
- Type of Permits
  - Limited access = 100
  - Open assess = 2,000
  - Vessels with A and B permits (less than 40) harvest over 95% of the herring
- Reporting Requirements
  - Daily VMS catch reports
  - Weekly VTRs
  - Weekly dealer reports

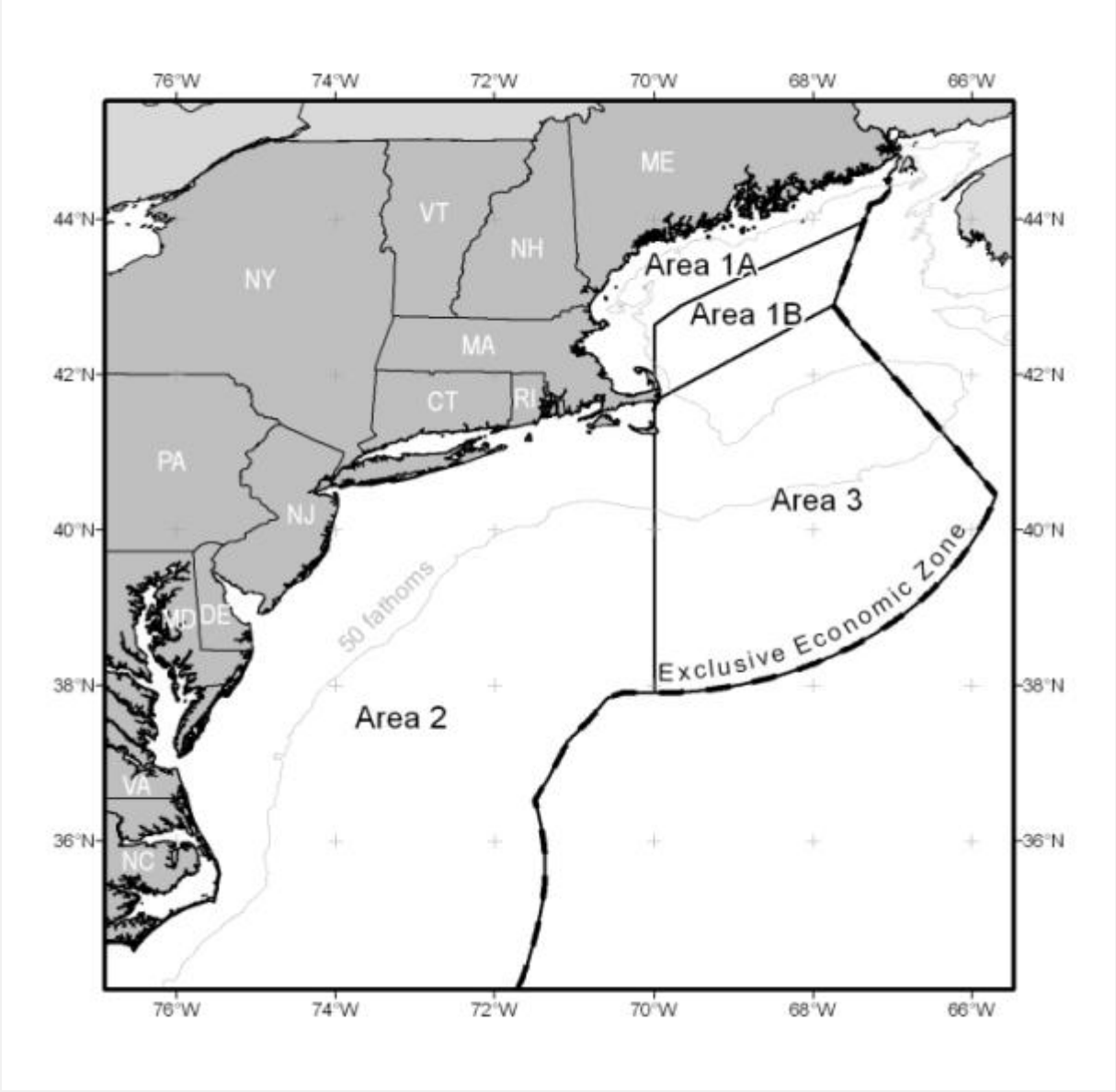
Amendment 4 (2011)

Harvest Limits

- OFL – Scientific Uncertainty = ABC
- ABC – Management Uncertainty = ACL
- ACL = Sum of Management Area Sub-ACLs

Accountability Measures

- Herring Management Area Sub-ACL
  - Sub-ACLs based on herring stock component mixing
  - Trigger = 95% of sub-ACL harvested
  - Response = 2,000-lb herring limit inseason
  - Response = lb for lb overage deduction in a subsequent year
- Haddock Catch Cap
  - Trigger = 100% of cap harvested
  - Response = 2,000-lb herring limit inseason
  - Response = 0-lb haddock retention inseason
  - Response = lb for lb overage deduction the following year



Haddock Catch Caps

GF Framework 43 (2006)

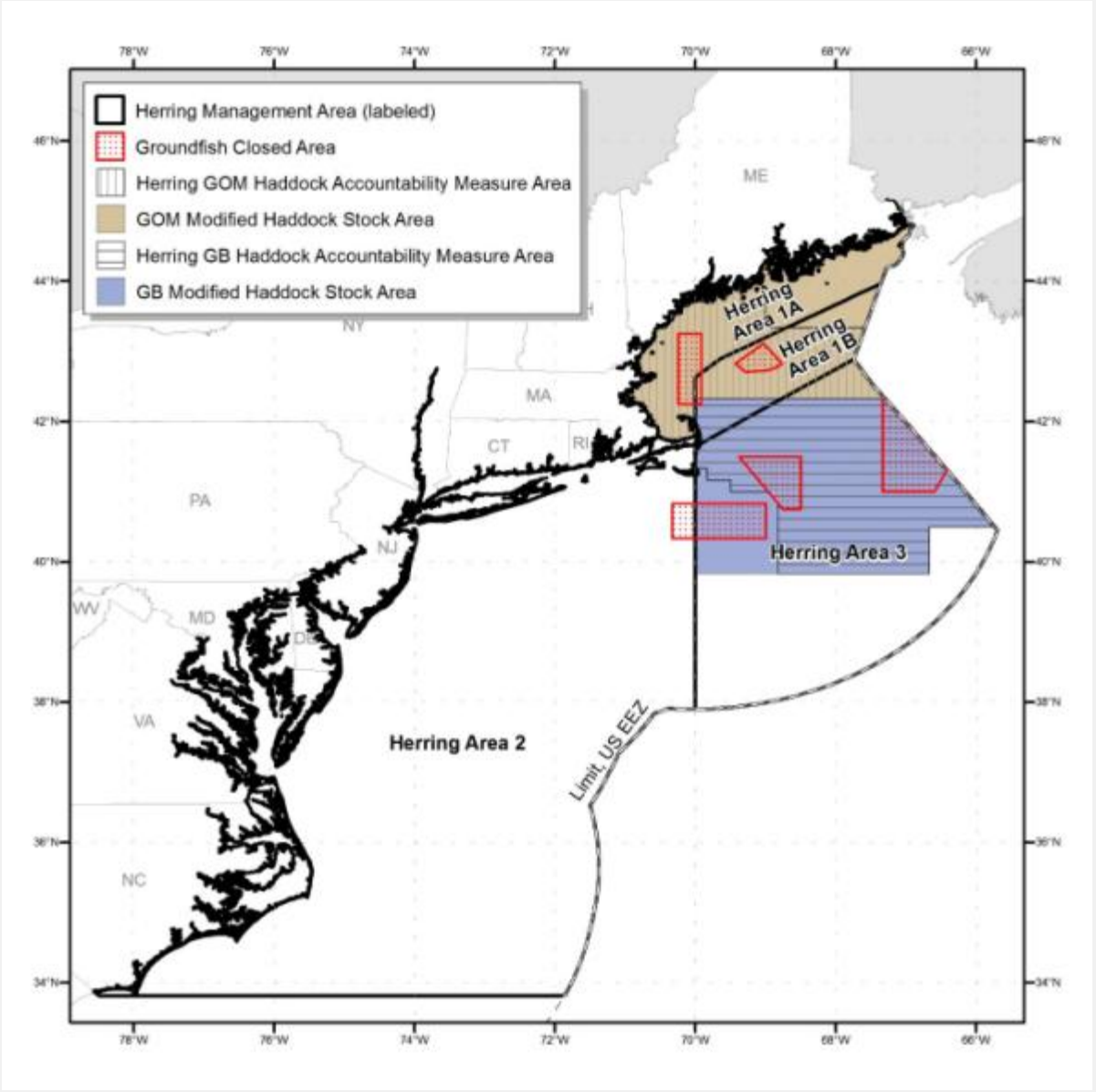
- Established haddock catch cap
  - Cap = 0.2% of US Haddock TAC

GF Framework 46 (2011)

- Established GOM and GB catch caps
  - Cap = 1% of GOM or GB Haddock ABC

GF Framework 56 (2017)

- Increased GB cap
  - Cap = 1.5% of GB Haddock ABC

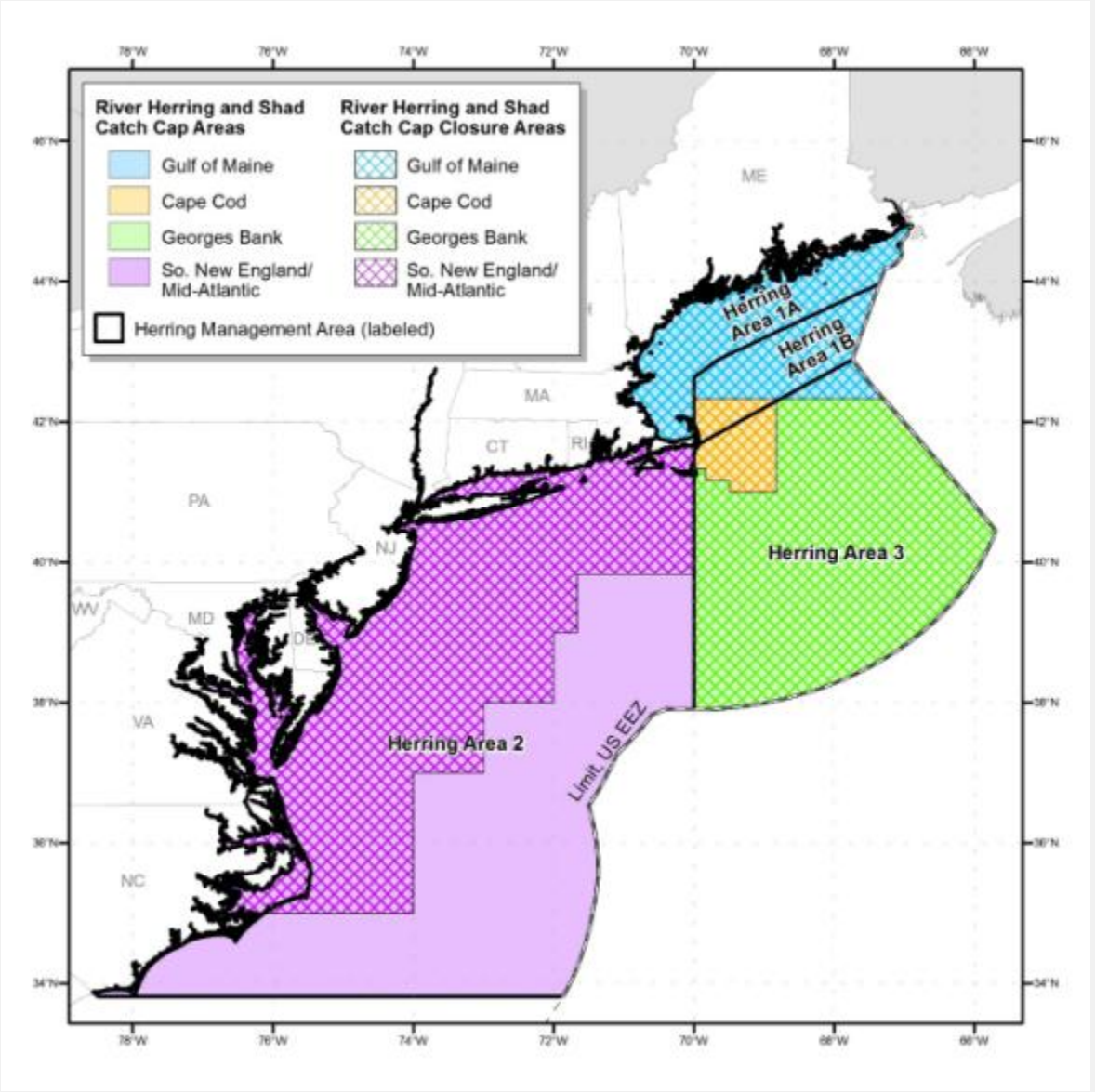


Framework 3 (2014)

- Established RH/S catch caps
  - Amount of cap based on historical catch
  - Caps by gear and area
  - Trigger = 95% of cap harvested
  - Response = 2,000-lb herring limit inseason

2013-2015 Specifications

- Adjusted AM for Management Area Sub-ACLs
  - New trigger = 92% of sub-ACL harvested
- Established new AM for ACL
  - Trigger = 95% of ACL harvested
  - Response = 2,000-lb herring limit inseason



Monitoring – Data and Catch Estimation

Source: NOAA NEFOP

VMS Catch Reports

- Herring Management Area
- Estimate of kept fish (all species)

VTR and Dealer Reports

- Estimate of kept fish (all species)
- Statistical Area

Observer Data

- Herring Discards by Management Area
- Catch composition data for catch caps

Herring Management Area Sub-ACLs - Match VMS, VTR, Dealer Reports

Fishery Catch Caps - Ratio of Catch (kept + discards)/Kept Fish (all species)

Performance of AMs for Herring Sub-ACLs/ACL

Year	Area 1A	Area 1B	Area 2	Area 3	ACL
2011	105%*	81%*	68%	97%*	92%
2012	88%*	158%*	102%*	103%*	99%
2013	100%*	53%	92%	90%*	92%
2014	100%*	153%*	68%	92%*	90%
2015	96%*	59%	47%	74%	72%
2016 (preliminary)	91%*	127%*	47%	44%	60%
* = 2,000-lb herring possession limit triggered					

Source: NOAA NEFOP

Performance of AMs for Haddock Catch Caps

Year	Georges Bank	Gulf of Maine
2011	32%	1.7%
2012	100.9%	0.6%
2013	106.2%	0%
2014	70.1%	0%
2015	103.9%*	0%
2016	23.2%	5.7%
* = Possession limits triggered		

GB Haddock Cap AM Triggered in 2015

- Georges Bank AM Area
  - October 22, 2015 – April 30, 2016
    - 2,000-lb herring limit
    - 0-lb haddock retention limit
- Georges Bank AM Area = Area 3
  - 26% of Area 3 sub-ACL unharvested in 2015
  - 56% of Area 3 sub-ACL unharvested in 2016
- < 20% GB haddock ACL harvested in 2015
- Framework 5 considered revising AM
  - Council recommended no action

Performance of AMs for RH/S Catch Caps

Source: NMFS

Year	GOM - MWT	CC - MWT	SNE - MWT	SNE - SMBT
2015	13%	5.4%	51.6%	113%
2016	0.2%	37.3%	32.5%	43.6%
2017 (data thru 11/1)	0.3%	84.6%	19.5%	11.5%
GOM = Gulf of Maine; CC = Cape Cod; SNE = Southern New England/Mid-Atlantic				

Herring, Haddock, and RH/S Sub-ACLs and AMs

Strengths

- Prevents overharvest (overage paybacks)
- Catch reporting is (usually) sufficient to monitor ACLs and catch caps
- Informative GARFO website to monitor catch, good outreach and responsiveness
- Provides some flexibility for fishing industry

NOAA FISHERIES River Herring/Shad: Herring Catch Cap Monitoring

Atlantic Herring | Haddock Catch Caps

Report Run on: 2017-10-25
Quota Year: **2017** *(January 1, 2017 to December 31, 2017)*

Catch Cap	Quota (mt)	Cumulative Catch (mt)	Percent Quota Caught
Cape Cod Mid-water Trawl	32.4	28.8	88.9%
Gulf of Maine Mid-water Trawl	76.7	0.2	0.3%
Southern New England Bottom Trawl	122.3	14.1	11.5%
Southern New England Mid-water Trawl	129.6	25.3	19.5%

Source: GARFO

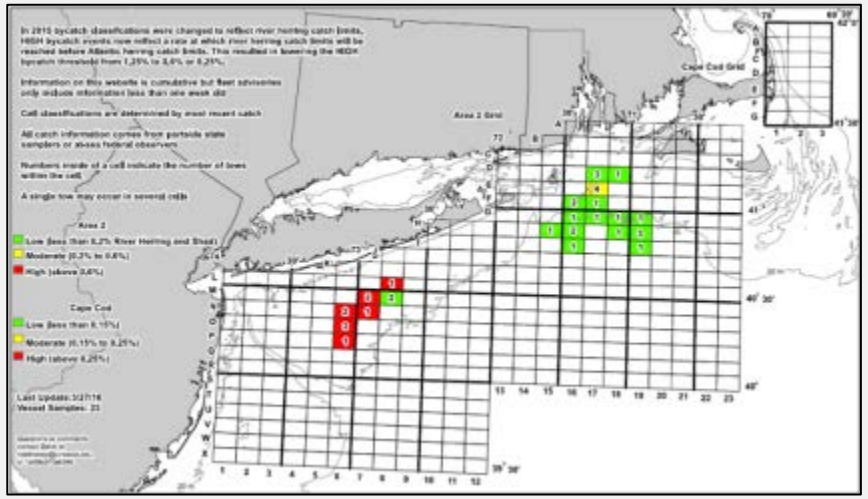
Limitations

- Layered management → lowers the chance to harvest ACLs
- High (and variable) catch rates can make forecasting 92% herring sub-ACLs difficult
- Fishery catch caps can be difficult to monitor
  - Low SBRM coverage → High CVs
- Fishery catch caps lack biological significance
  - RH/S caps have no link to abundance
  - GB Haddock ACL significantly underused
- Sub-ACLs can't react to shifting fish distribution
  - North/south, inshore/offshore, in GFCAs
- Entire fishery punished for actions of single vessel

Herring, Haddock, and RH/S Sub-ACLs and AMs

General Effects on Fishing Industry

- Creates “race to fish” when low sub-ACLs available
- Prevents overharvest (overage paybacks)
- Impact of observer coverage (highly variable)
- Trust in voluntary bycatch avoidance program
- Effort redistribution based on catch cap status
- Reliance on pacts or industry-wide agreements



Source: SMAST

Questions ?

NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

ANNUAL CATCH LIMITS AND ACCOUNTABILITY MEASURES

Congress chose to model language in the 2006 reauthorization of the Magnuson Stevens Fishery and Conservation Act on the North Pacific Fishery Management Council's (NPFMC) use of total allowable catch limits for groundfish in the Bering Sea /Aleutian Islands; and the Gulf of Alaska .

- The NPFMC sets ACLs on an annual basis for:
  - All groundfish species in BSAI and GOA
  - BSAI and GOA Crab species (AK in-season management)
  - BSAI and GOA scallops (AK in-season management)

The NPFMC does not set ACLs/AMs for most prohibited species in federal fisheries:

Halibut – managed by the IPHC

Salmon – managed by AK (current action for small change)

Forage Fish (herring) – managed by AK

- The Alaska Region manages 104 TACs in the BSAI and GOA composed of over 50 individual species
- The OY for BSAI and GOA target species is a range that can be harvested. The OY for groundfish in the BSAI iis 1.4 million to 2.0 million mt. The OY for groundfish in the GOA is 116,000 to 800,000 mt.
- In 2017, the BSAI ABCs totaled 4,013,993 mt which is 2,013,993 mt above the 2 million mt OY. In the GOA, the combined ABCs are usually lower than the OY. In 2017, the GOA ABCs totaled 667,877 mt

ANNUAL CATCH LIMITS: GROUNDFISH FMPS (BSAI AND GOA):

- Annual Catch Limits (ACL) set equal to existing ABCs.
- ABC Control Rules are based on a Tiered System, 1-6 that reflects the quality of the available information and provides a conservative buffer below OFL
- The lowest information tier (Tier 6) employs a straight 25% buffer on the OFL to accommodate uncertainty in ABC-setting.
- TACs (sub-ACLs) are further allocated by area, season, gear, and processing sector (mothership, catcher/processor
- 'Ecosystem Component' (EC): 'Forage Fish' category and all Prohibited Species are all mnaged under this EC category.

IN-SEASON MANAGEMENT – A TOOL TO ACHIEVE OPTIMUM YIELD AND ACCOUNTABILITY MEASURESN IN BSAI/GOA GROUNDFISH

In-season management is the primary tool to achieve Opimum Yeild and limit catch in groundfish management. The FMP allocates species by gear and sector: bottom trawl, midwater trawl, longline and fixed gear; catcher vessels and catcher processors under this FMP.

The system is flexiable moving fish around based on usage and year to year varib]ability.

- In the BSAI, 15% of each TAC is set in reserve, with the exception of allocations to catch share programs.
- The reserves support allocations to the Community Development Quota (CDQ) program; and the non-CDQ portion functions as a common pool to supplement particular species.
- The system provides flexibility to respond to yearly fluctuations in catch rates and maximize OY. NMFS has the authority to increase an individual TAC, as long as the ABC and OY are not exceeded.

- NMFS compiles catch and production data from at-sea catcher/processor vessels, motherships, shore plants, and groundfish observers, which is used by the Inseason Management Branch to monitor the catch and allocations.
- Inseason Management Branch determines the amount of an individual TAC necessary as the incidental catch allowance (ICA) in other target fisheries.
- After deducting the ICA, the remaining TAC is the directed fishing allowance, which allows vessels full retention of the target species or species group.
- A fishery closure limits retention of that species to a percentage of the retained catch of other species open to directed fishing.
- If the total TAC of a species is caught before the end of the year then retention of that species is prohibited

- If the ABCs reached and the incidental catch indicates the OFL may be approached, area closures are imposed. To prevent reaching the OFL, specific fisheries may be closed. If the rate of catch is not sufficiently slowed, then closures expand to other fisheries. Overfishing level closures are rare.
- In the catch share and CDQ fisheries, allocations are granted to particular groups. In exchange, the recipients actively monitor their fisheries and limit their catch rather than Inseason Management Branch issuing fishery closures.
- The Inseason Management Branch closes a fishery if a PSC limit of halibut, crab, salmon, or herring is taken.

OTHER MEASURES TO ACHIEVE OY

In addition to regular ACL in-season management, NMFS has defined protocols to rollover TAC from one sector to another.

Example: If the longline fishery is not projected to attain their TAC of pacific cod by a date certain a portion will roll to the Amendm,ent 80 sector.

NMFS also has ther ability to release non allocated quota for species with limited TACs to catch share fisheries with approved agreements to limit catch.

IN CONCLUSION

- A management system developed to achieve OY
- Blessed by healthy target fisheries
- Limited by prohibites species limits
- An example of another way to manage ACLs and AMs

Effects of the voluntary river herring avoidance program in the mid-water trawl fishery

MA DMF

Brad Schondelmeier
Nicole Ward
Bill Hoffman
Mike Armstrong

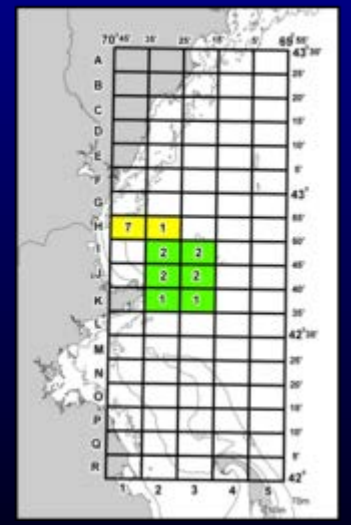
SMAST

Dave Bethoney
Travis Lowery

Midwater Trawl Fishery Participants

Presentation Overview

- Background
  - The mid-water trawl fishery
  - Program overview
- Program Performance
  - Prior to bycatch limits
  - With bycatch limits
- Future



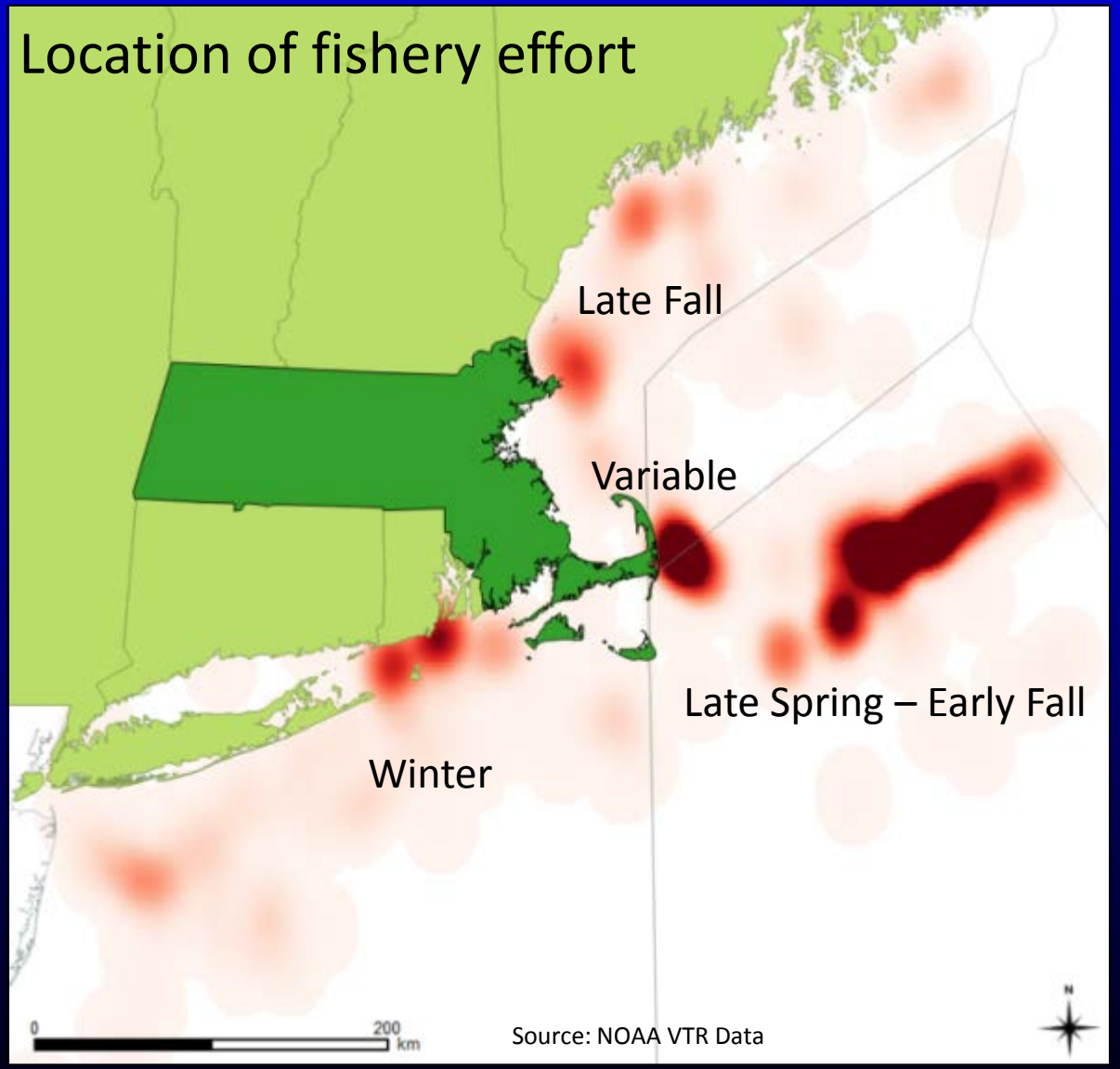
The Fleet and Fishery

Mid-water Trawl Fleet

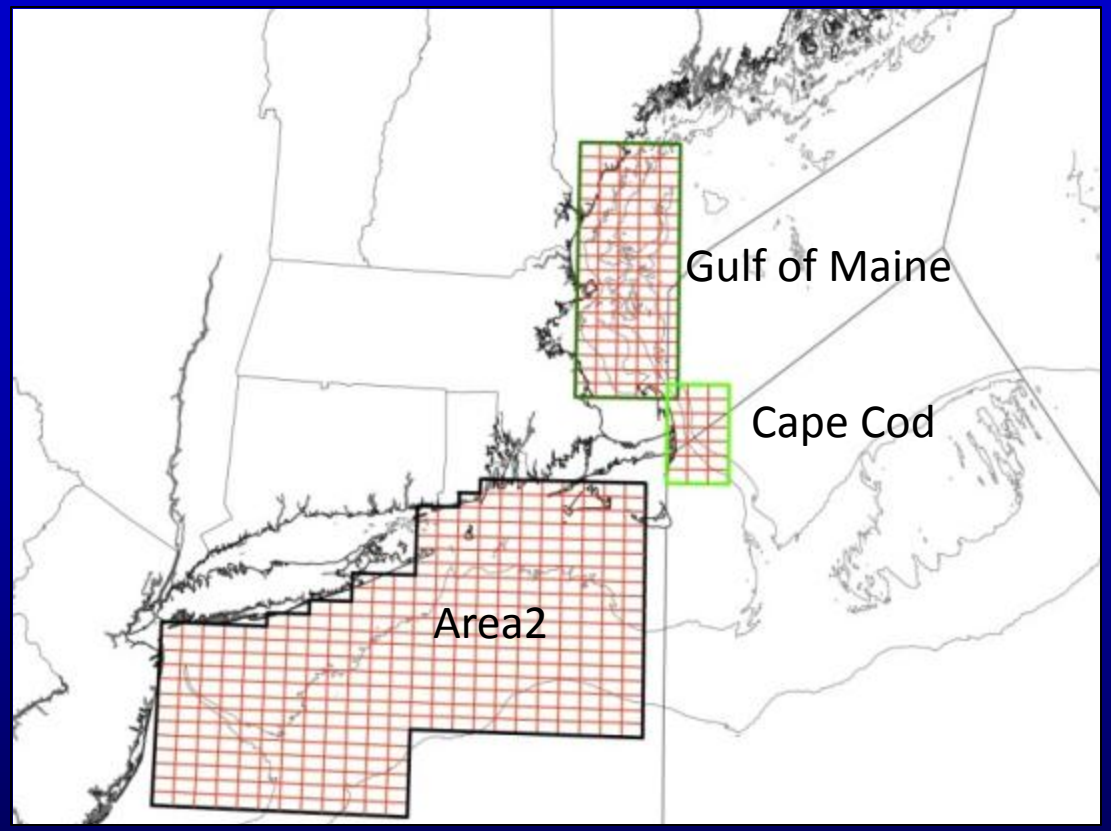
- 8-12 Pair and Single Vessels
- 100-165 feet long
- 120-450 metric ton (mt) capacity
- Vessels make 20-60 trips/year
- Crews of 3-7

Herring/Mackerel Fishery

- Landings AVG ~60,000mt/year, from NJ to ME
  - Gloucester, New Bedford, Portland
- 2-5 hauls/trip
- Pump fish from net into RSW tanks
- 4 Herring Management Areas
- 1 coast-wide Mackerel quota
- Effort shifts seasonally



Bycatch

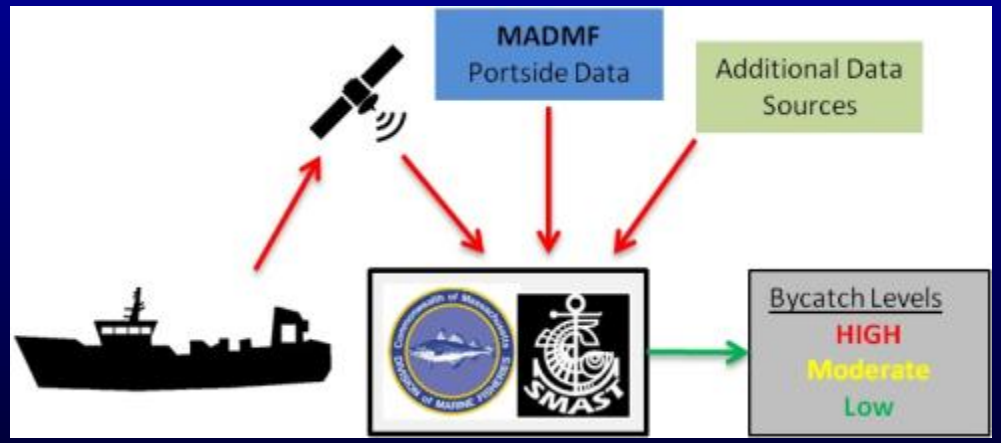


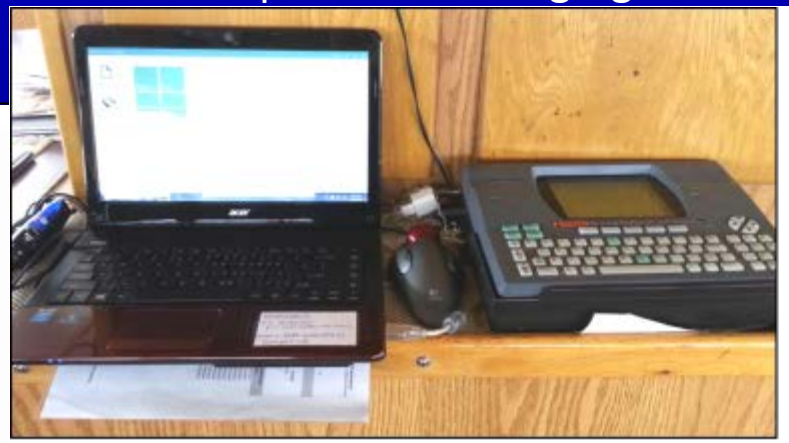
Bycatch Thresholds	Gulf of Maine	CapeCod/521	Area 2 Mid-water	Area 2 Bottom trawl
HIGH	**>1.00%**	**>0.25%**	**>0.60%**	**>1.00%**
Moderate	1.00-0.30%	0.25-0.15%	0.60-0.20%	1.00-0.50%
Low	<0.30%	<0.15%	<0.20%	<0.50%

Bycatch Avoidance

Rapid Communication

- Data sources: MA DMF portside sampling
  - Incorporate NEFOP (10%), NOAA Study Fleet (3%), Maine portside samples (2%)
- Increase at-sea communication and accountability
  - Laptops, BTVessel program and BT Forms
  - BTConnect® access and a Responsible Fishing Agreement





To: MWT Herring Fleet
From: Sea.herring@state.ma.us

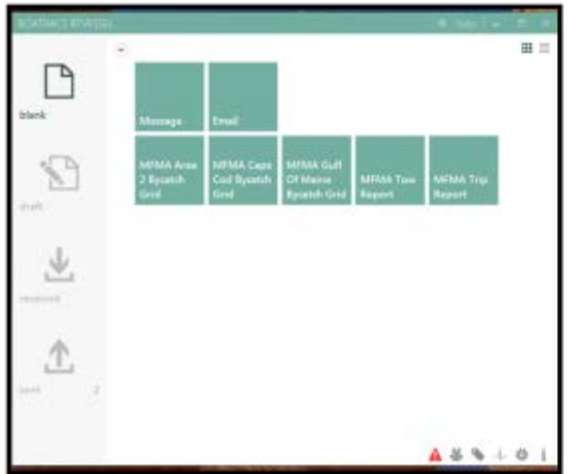
Immediate Bycatch Alerts

"Recent sampling has indicated HIGH bycatch (>0.6%) in Area2 grid cells J14, J15. Please be advised "

OR

Weekly Sampling Summaries

"For week ending 2/14/15- 7 trips sampled, avg RHS= 0.15% in Area2 grid. [Your vessel] had 2 trips sampled, avg RHS=0.35% "



Funding

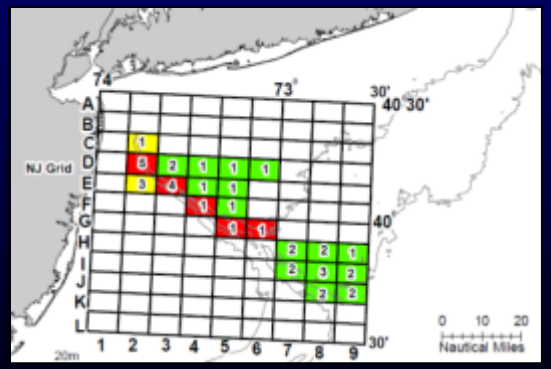
Start Up

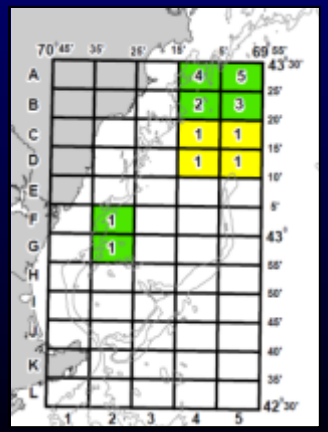
National Fish and Wildlife Foundation

Portside Sampling: 15% → 50% in MA ports

Establish and Grow River Herring Bycatch Avoidance Program

2010 2011 2012 2013 2014 2015 2016 2017





Funding

Supplemental/Transitional

Atlantic Herring Research Set Aside

Maintain River Herring Bycatch Avoidance Program

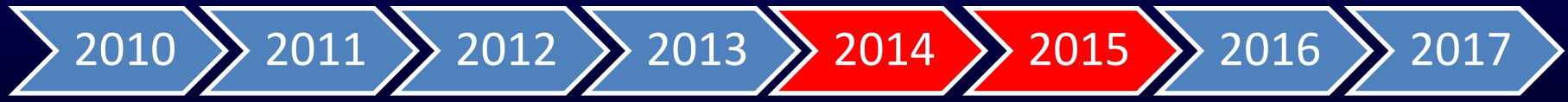
The Nature Conservancy

Maintain Portside Sampling

Maintain River Herring Bycatch Avoidance Program

Atlantic States Marine Fisheries Commission

Maintain Portside Sampling



Funding

Continual?

Atlantic Herring Research Set Aside

Maintain/Advance River Herring Bycatch Avoidance Program

Maintain Portside Sampling

3% of Atlantic herring quota set aside for research

Research priorities specific to fishery

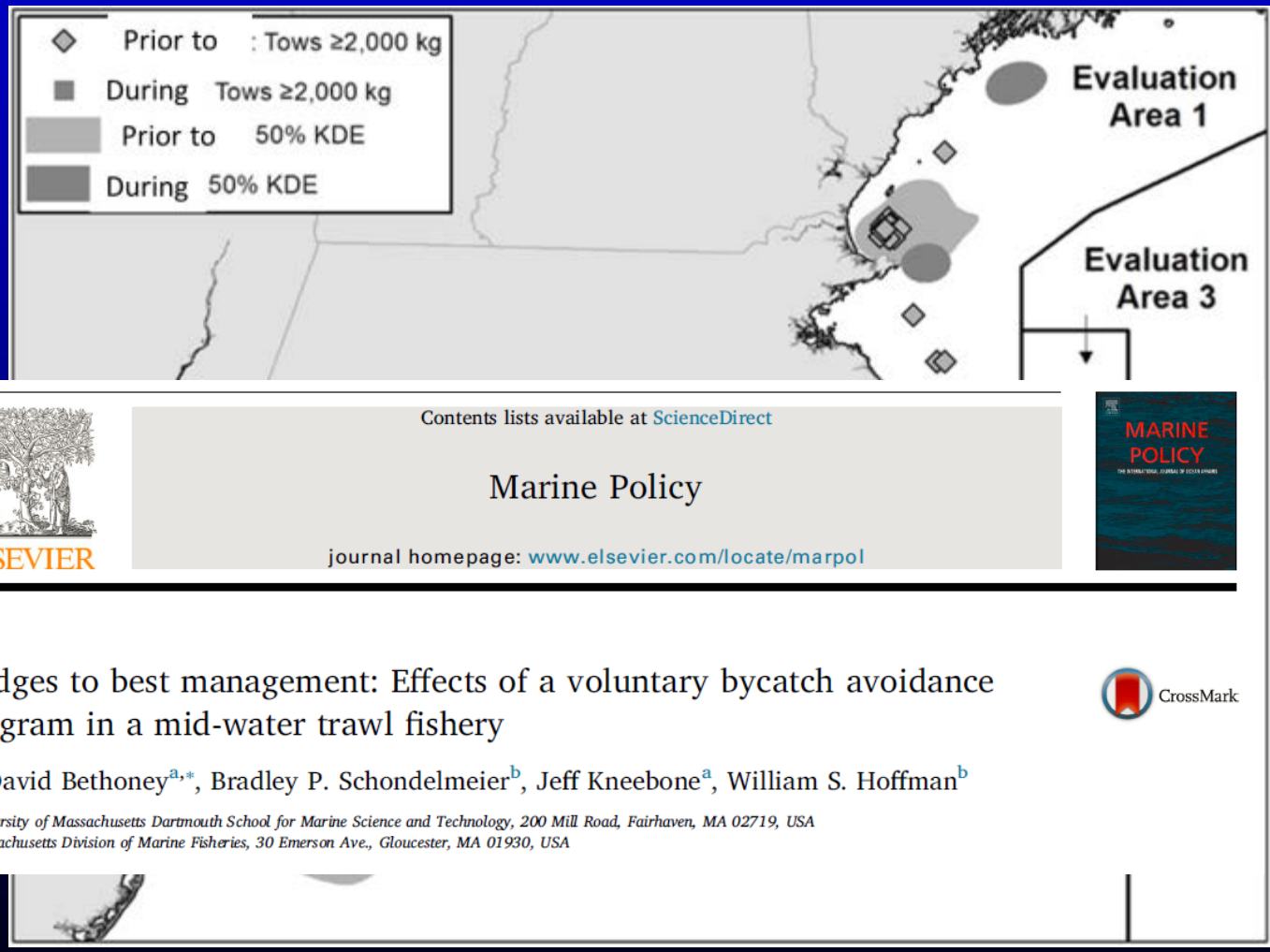
Successful proposals allocated tons of herring

Funds split

Program Performance

Prior to bycatch limits

- Management Impact
  - Amendment 5 preferred alternative
  - Increased data
- Increased communication, accountability
  - Sustained participation
  - Over 100 bycatch advisories sent
    - Weekly and Immediate (for high events)
  - Responsible Fishing Agreement
  - Evidence of behavior changes
- Bycatch Reduction
  - Bycatch before vs. during
    - 60% decrease in weight
    - 20% decrease in ratio
    - Evidence program played a role



Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/marpol

Bridges to best management: Effects of a voluntary bycatch avoidance program in a mid-water trawl fishery

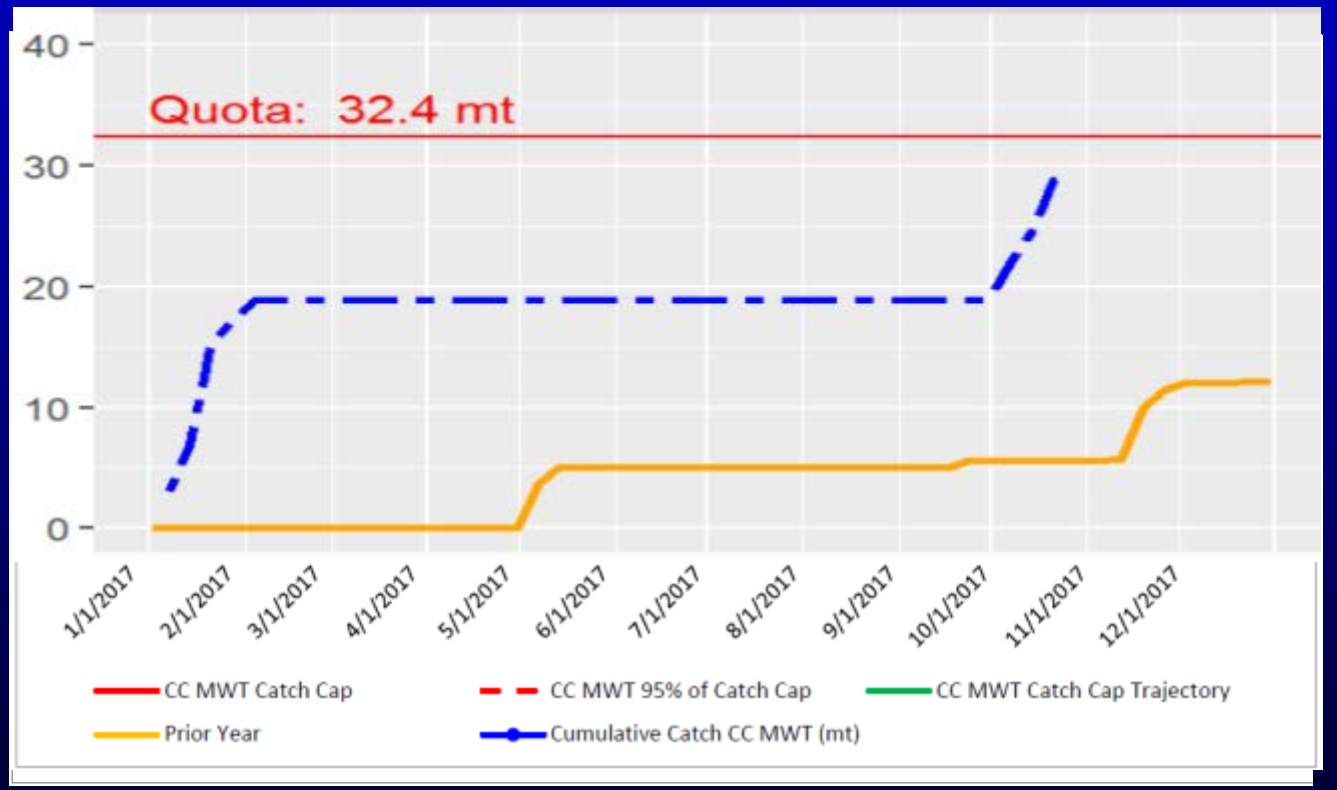
N. David Bethoney[a,*], Bradley P. Schondelmeier[b], Jeff Kneebone[a], William S. Hoffman[b]

[a] University of Massachusetts Dartmouth School for Marine Science and Technology, 200 Mill Road, Fairhaven, MA 02719, USA
[b] Massachusetts Division of Marine Fisheries, 30 Emerson Ave., Gloucester, MA 01930, USA

Program Performance

With bycatch limits

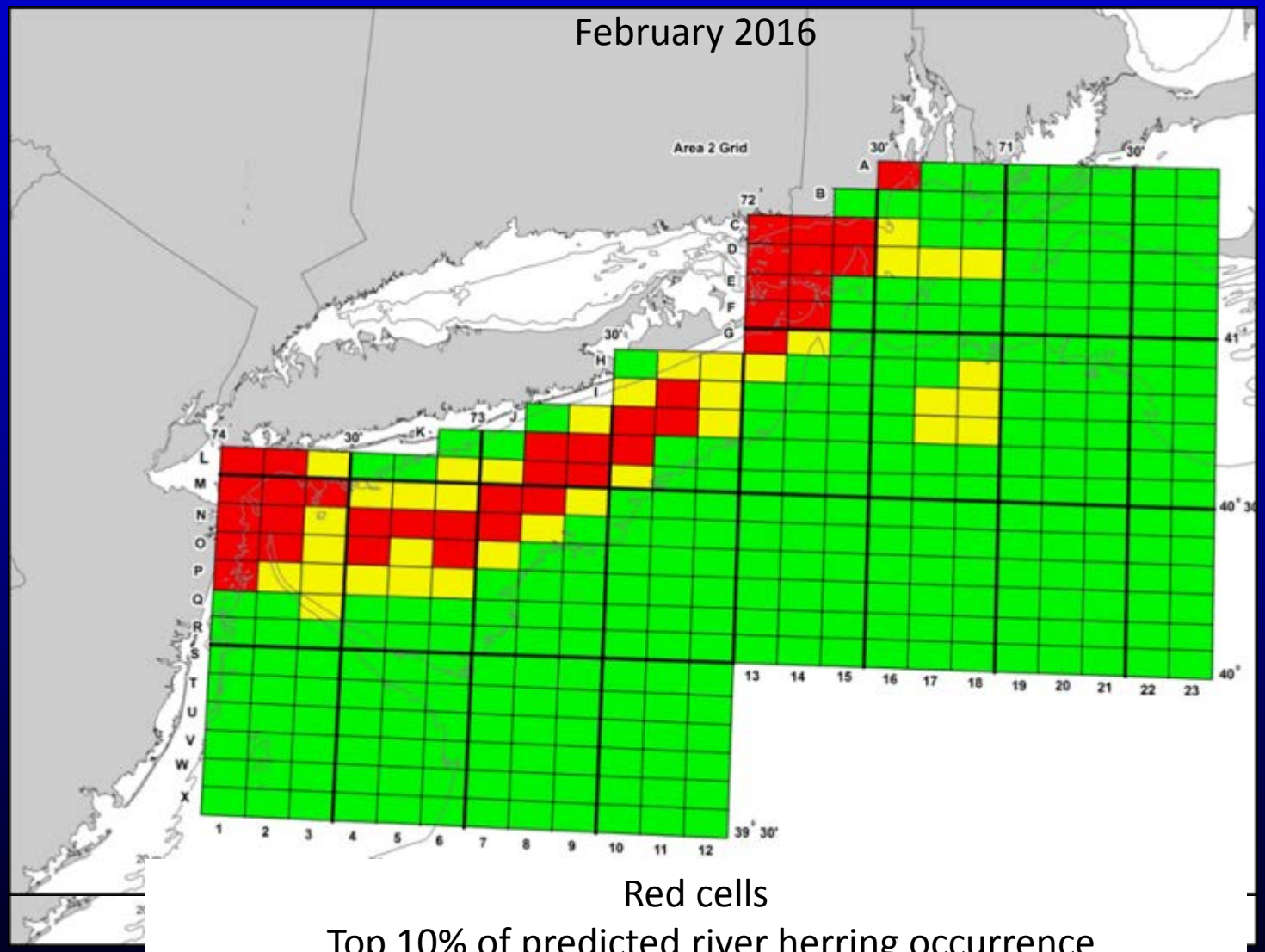
- Clarify and lower thresholds
- Shift in focus
  - Reduce bycatch → Stay under catch limit
  - Bycatch management
- No mid-water trawl catch limits exceeded
  - Evidence program played a role
  - Cape Cod 2017



Advisories
Impact of observed trips
Catch remaining at current rate

Future Directions

- **Sustain communication network**
  - Atlantic herring RSA?
- **Expand to haddock**
  - **Currently track catch limit**
- **Proactive Program**
  - Forecast bycatch hotspots
  - Bycatch Reduction Engineering Program



Red cells

Top 10% of predicted river herring occurrence

Contained 6 of 7 high bycatch events

Acknowledgements

Thanks to: Participating captains, vessel managers, shoreside staff, NMFS Observer Program, NOAA Coop. Research, Maine DMR, AIS, Inc., *MarineFisheries* FDI project…

Funding

Questions

Bethoney ND, Schondelmeier BP, Kneebone J, Hoffman WS. Bridges to best management: Effects of a voluntary bycatch avoidance program in a mid-water trawl fishery. Marine Policy 83: 172-178

www.umassd.edu/smast/bycatch/

www.mass.gov/service-details/herring-portside-sampling-and-bycatch-avoidance

Evaluation of the incentive-based SMAST Bycatch Avoidance System for the Scallop Fishery

Cate O'Keefe,
Brooke Wright, and Steve Cadrin

Massachusetts Division of Marine Fisheries
School for Marine Science and Technology

Acknowledgements

- Scallop fishery program participants
- Scallop Research Set-Aside Program
- SMAST Fishermen's Steering Committee
- Greg DeCelles, Kevin Stokesbury, Dan Georgianna
- Dvora Hart, Chad Keith, Ryan Silva

Rotational Fishery with Bycatch Limits

- Bycatch managed in Georges Bank access areas with Total Allowable Catch (TAC) starting in 1999
- Areas closed when limit was reached, regardless of scallop catch

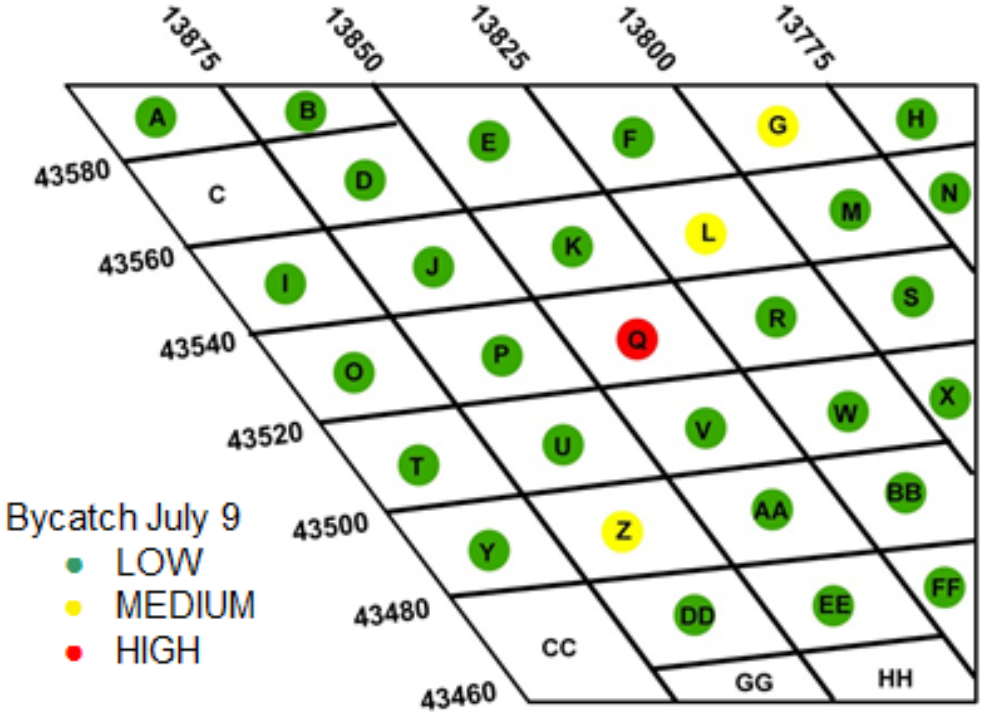
	2006	2006	2008	2009
Area	Nantucket	Closed Area II	Nantucket	Closed Area II
Days Open	36	84	57	15
% Yellowtail TAC Caught	178 %	103 %	98 %	81 %
Scallop target	78 %	82 %	75 %	61 %
Foregone yield	$16,500,000	$19,000,000	$11,000,000	$14,000,000

- Economic impacts – foregone yield ~$60 million
- Time lag in availability of accurate spatial data to inform fishing decisions and influence behavior

2010 Real-Time Communication

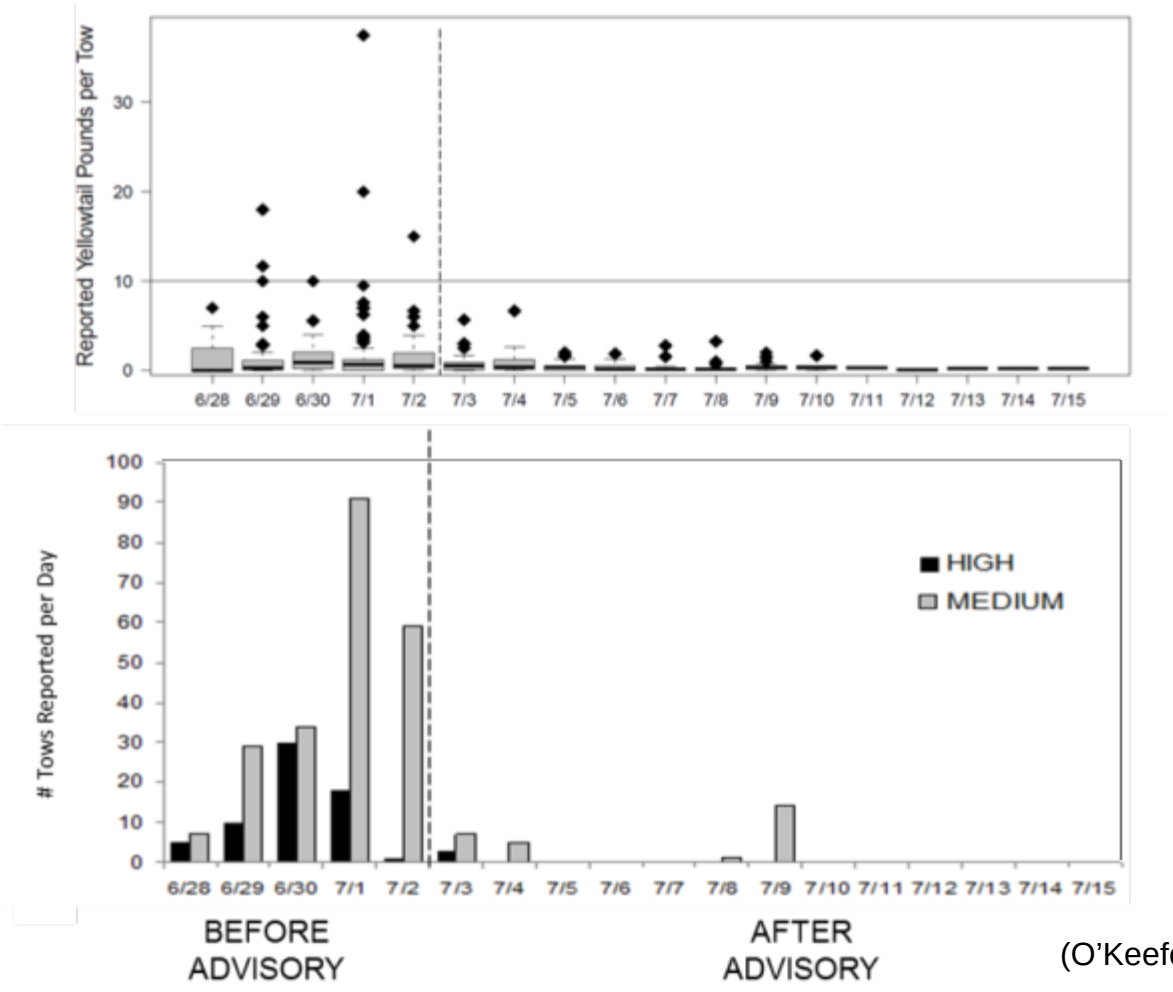
- Fishing areas divided into cells based on Loran C lines
- Fishermen report once every 24 hours about bycatch

1. Data compiled
2. Cells classified
3. Advisory sent back to fishing fleet



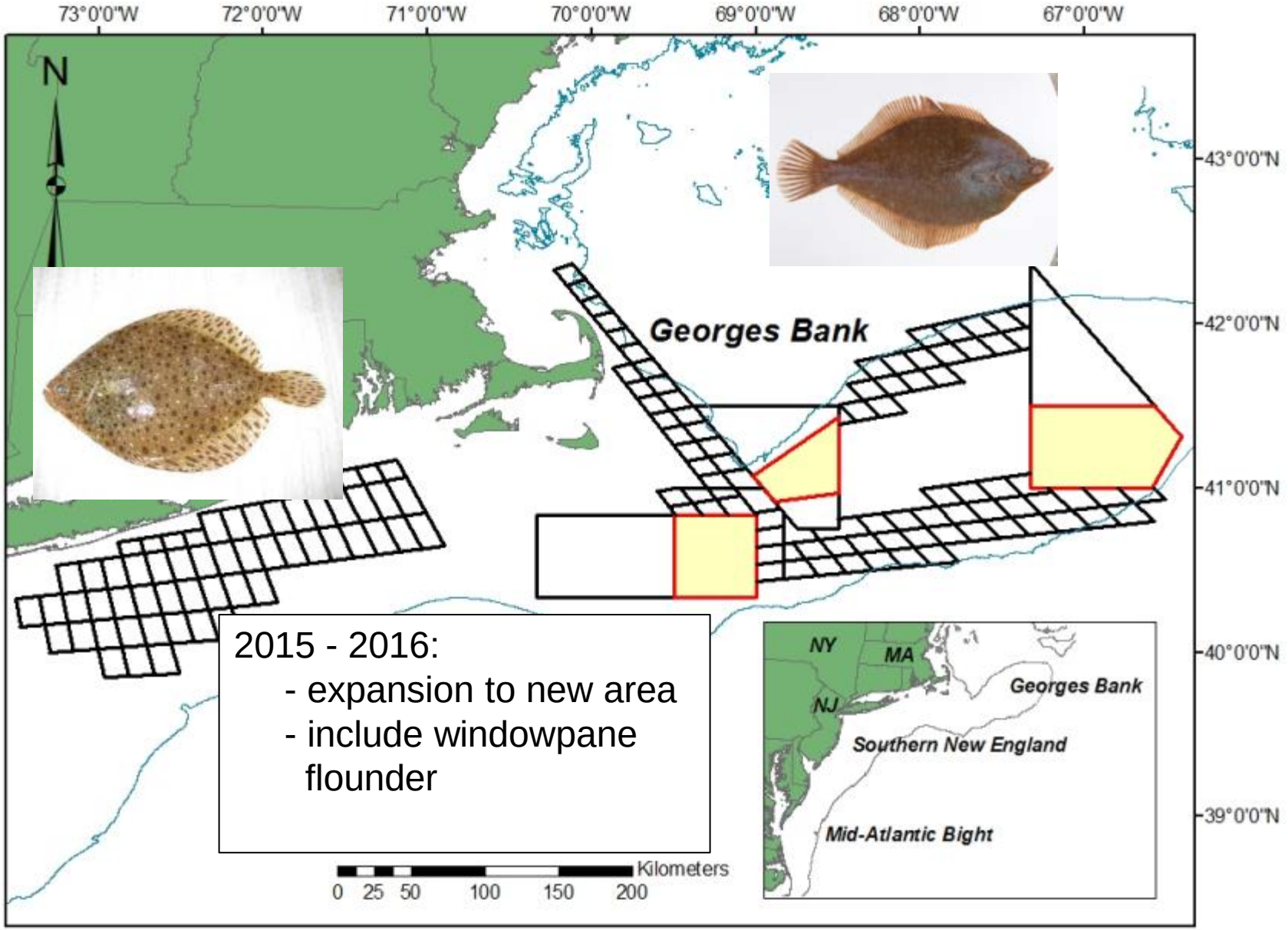
Cell:	**Q**
# Tows:	**6**
Yellowtail Pounds:	**55**

2010 Program Evaluation



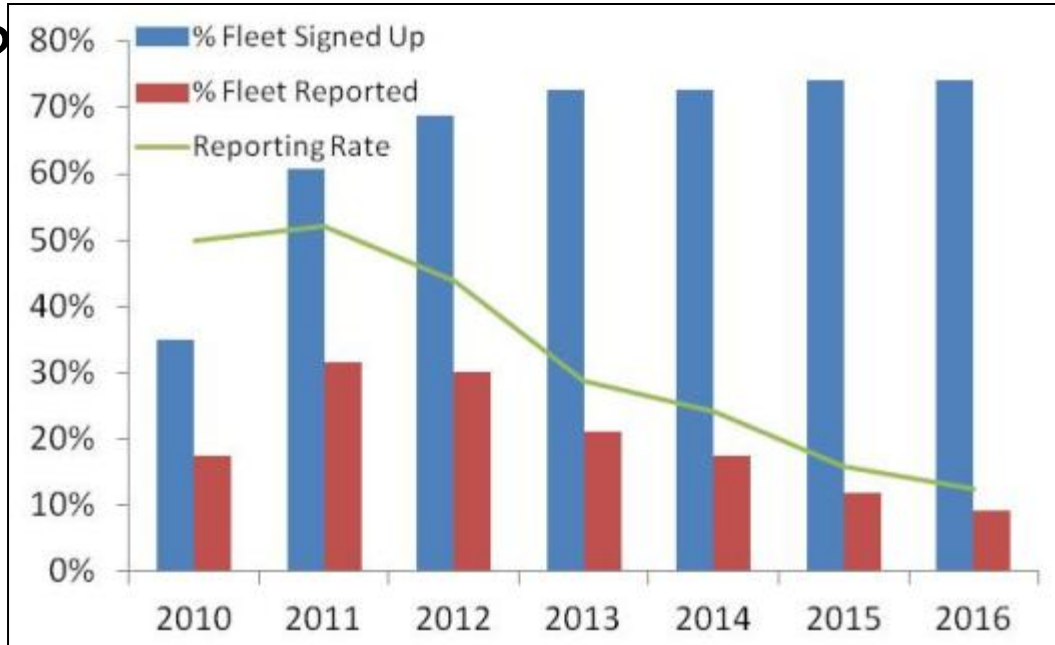
(O'Keefe and DeCelles, 2013)

Continuous updating of bycatch locations allowed vessels to change fishing behavior and avoid hotspots


73°0'0"W
72°0'0"W
71°0'0"W
70°0'0"W
69°0'0"W
68°0'0"W
67°0'0"W
N
43°0'0"N
42°0'0"N
41°0'0"N
40°0'0"N
39°0'0"N
Georges Bank
2015 - 2016:
- expansion to new area
- include windowpane flounder
NY
MA
NJ
Georges Bank
Southern New England
Mid-Atlantic Bight
Kilometers
0 25 50 100 150 200

Changing Incentives

- Annual Catch Limits with Accountability Measures were implemented for yellowtail bycatch in mid-2011
- AM triggers in subsequent fishing years, not in-season
- Reduced participation in avoidance program
- Program effectiveness?
  - Level of information
  - Accuracy of information
  - Fishing behavior
  - Objectives
    - Future application
    - Funding



2015-2017 Program Evaluation

- Objective:
  - Assess the effectiveness of real-time communication as a bycatch avoidance tool in the scallop fishery and inform future applications of the system

- Terms of Reference:
  - 1) Evaluate behavioral changes and movement of scallop vessels as a result of SMAST bycatch advisories
  - 2) Evaluate the effectiveness of the SMAST Bycatch Avoidance System for maximizing scallop harvest within bycatch constraints

Program Evaluation Methods

- Methods:
  - Data from the SMAST avoidance program and NEFOP
    - Closed Area II – 2011-2014
    - Nantucket Lightship – 2012-2014
    - NEFOP data - vessels that did and did not participate in the avoidance program, analyzed separately
  - Models to test for relationship between fishing location and SMAST bycatch advisory program classification
    - Was vessel fishing location influenced by SMAST Bycatch Avoidance Program?
    - Longlinear models with selection criteria

Program Evaluation Results

- Terms of Reference:
  1) Evaluate behavioral changes and movement of scallop vessels as a result of SMAST bycatch advisories
     - Avoidance Program self-reported information was similar to NEFOP data for program participants; different from NEFOP data from non-participants
     - Behavior was significantly influenced by the advisories in 2010-2013, avoidance of advised hotspots
     - Effectiveness for influencing behavior diminished, 2013-2017

  2) Evaluate effectiveness of the Avoidance Program for maximizing scallop harvest within bycatch constraints
     - Constraining AMs (triggers and implementation) influenced the incentives for Avoidance Program participation and effectiveness
     - Less restrictive trigger points and implementation timelines diminished incentive for behavioral changes in real-time

2015-2017 Program Evaluation

★ Indicates Significant Result

Fishing Year	Stock	AM	Trigger	Implement	Avoidance Area	Avoid SMAST	Avoid NEFOP (Part)	Avoid NEFOP (Non-Part)
2010	SNE YT	Closure	10% cap in access areas	In-Season	NLCA	★		
2011	GB YT	Closure	>100%	Next Year	CAII	★	★	
2012	Both YT	Closure	All ACL + >100% or ≥150%	Next Year	CAII	★	★	★
					NLCA	★	★	
2013	GB YT	Pro - Closure	All ACL + >100% or ≥150%	Year 3	CAII			
	S WP	Gear Mod	>100%		NLCA	★		
2014	S WP	Pro - Gear	All ACL + >100% or ≥150%	Year 3	CAII	★	★	★
		Gear Mod			NLCA			
2015	All	Proactive Gear			Open Areas	Not tested		
2016	GB YT & N WP	Closure	All ACL + >100%	Year 3	Open Areas	Not tested		
2017-2018	N WP	Gear or Closure	All ACL + >100%	Year 3	CAII	Not tested		
	Both YT	Gear Mod						

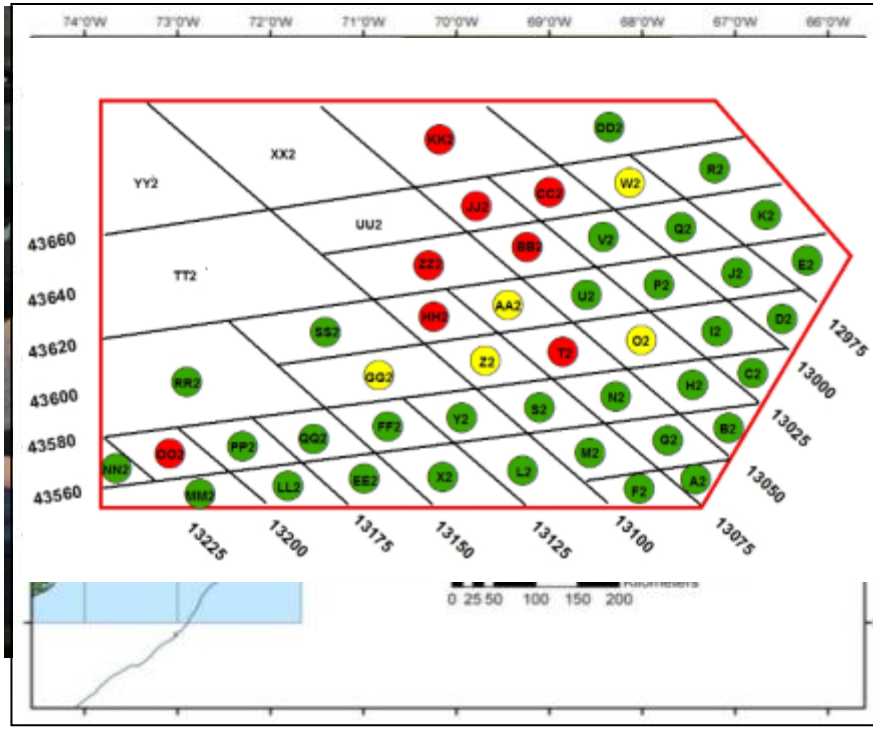
KEY

- Incentives
- Neutral
- Disincentives

- Avoidance
- Marginal Avoidance
- No Avoidance

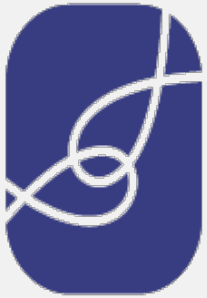
Outcomes

- Collaborative, iterative approach to flounder bycatch avoidance was effective in changing fishing behavior in early program years
  - Fine-scale spatial management to assist in maximizing yield under bycatch constraints
- Status of fishery “crisis” influenced participation levels in program
- Program was most effective under restrictive bycatch caps and area closures
  - Bycatch mitigation strategies need to match management scenarios



Recommendations

- Suspend implementation and funding of the SMAST Bycatch Avoidance System
  - Currently not an effective tool for influencing fishing behavior to avoid bycatch hotspots
- Need to consider incentives when designing voluntary programs
  - Changing from in-season to subsequent year closures reduced incentives to voluntarily alter fishing behavior
- Need to consider the objective of Accountability Measures in the design
  - Prevent overfishing, reduce bycatch, penalties, target fishery opportunities



MASSACHUSETTS MARINE FISHERIES INSTITUTE

Scientific Uncertainty

Steve Cadrin

MFI Education Director

School for Marine Science & Technology

UMass Dartmouth

SMAST

Avoiding Overfishing

- Magnuson-Stevens Act - "*establish a mechanism for specifying* ***annual catch limits*** *in the plan, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.*"
- Interpretation - "***Acceptable biological catch*** *(ABC) is a level of a stock or stock complex's annual catch, which is based on an* ***ABC control rule that accounts for the scientific uncertainty*** *in the estimate of OFL, any other scientific uncertainty, and the Council's risk policy*." (NOAA 2016).

Magnuson-Stevens Fishery Conservation and Management Act

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

71858 Federal Register / Vol. 81, No. 201 / Tuesday, October 18, 2016 / Rules and Regulations

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 600

[Docket No. 120416013–6270–03]

RIN 0648–BB92

Magnuson-Stevens Act Provisions; National Standard Guidelines

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule.

SUMMARY: This final action revises the guidelines for National Standards (NS) 1, 3, and 7 of the Magnuson-Stevens Fishery Conservation and Management Act (MSA or The Act) and to the General section of the NS guidelines. This action is necessary to improve and clarify the guidance within the NS guidelines. The purpose of this action is to facilitate compliance with

I. Overview of Revisions to the NS Guidelines

The MSA serves as the chief authority for fisheries management in the U.S. Exclusive Economic Zone (EEZ). The Act sets ten national standards (NS) for fishery conservation and management, and requires that the Secretary of Commerce (the Secretary) establish advisory guidelines based on the NS to assist in the development of fishery management plans. Guidelines for the NS are codified in subpart D of 50 CFR part 600. This final action amends the General section of the NS guidelines and the guidelines for NS1, NS3, and NS7.

Since 2007, fisheries management within the U.S. has experienced many changes, in particular the development and implementation of annual catch limits (ACLs) and accountability measures (AMs) under all fishery management plans to end and prevent overfishing. Due to a number of concerns raised during the implementation of ACLs and AMs, NMFS initiated a revision of the NS guidelines in 50 CFR 600.305–.350

proposed revisions to seven of the
Regional Fisheries Management
Councils (Councils) and held one p
meeting on March 25, 2015 (Silver
Spring, Maryland). NMFS received
than 102,000 comments on all aspe
the proposed revisions. Many of the
comment letters were form letters or
variations on a form letter. In general
the fishing industry and the Councils
supported the majority of the provisio
in the proposed action meant to provi
flexibility within the current statutory
limits but stated that many of the new
provisions required additional guidan
in the final action. In general, the
environmental community opposed th
proposed revisions, stating that they
would reverse recent successes in U.S.
fisheries management and did not
address pertinent issues such as
ecosystem-based fisheries management
(EBFM), forage fish, and climate change

II. Major Components of the Proposed Action

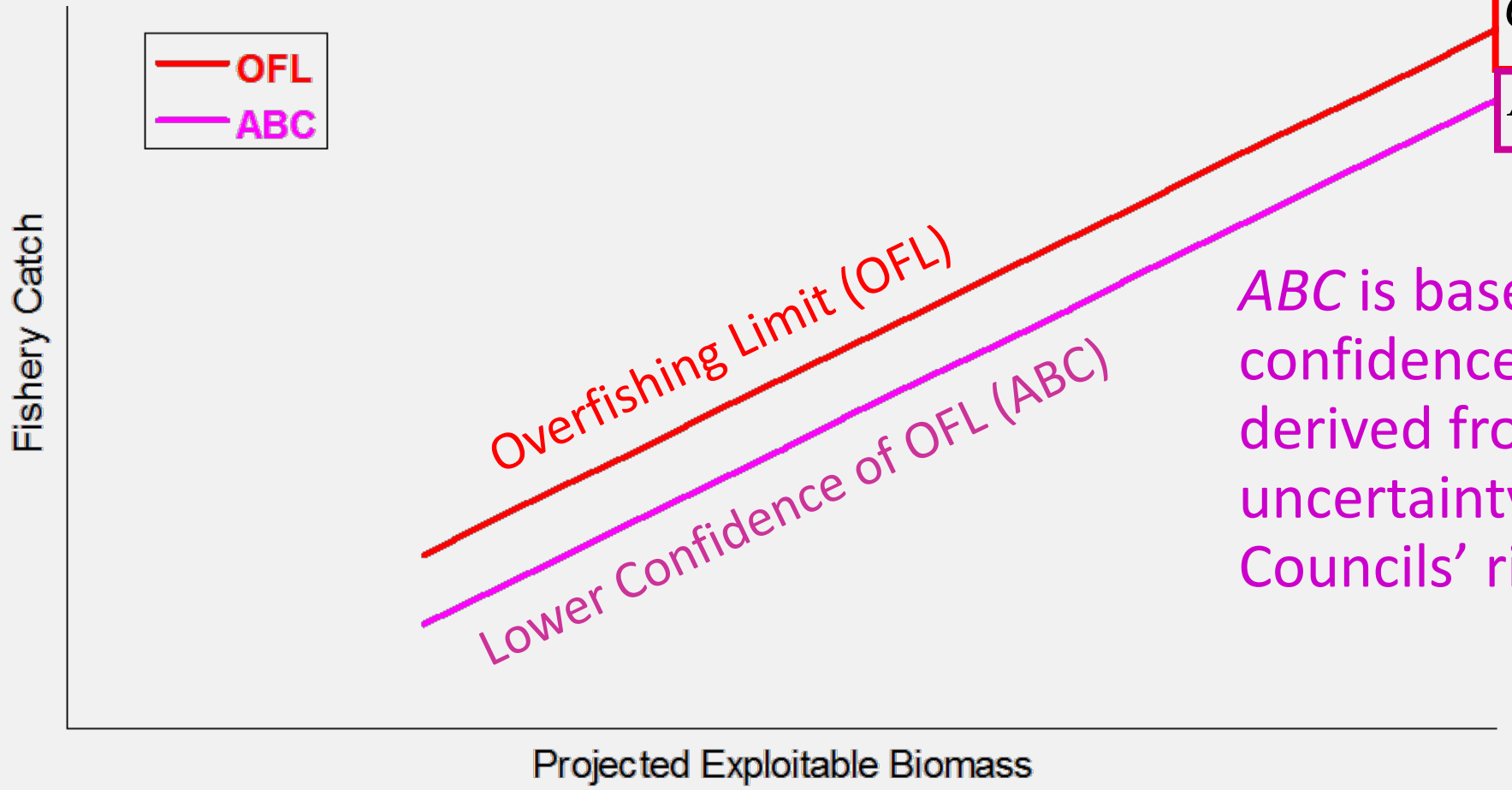
Some of the major items covered in
the proposed guidelines included th

Acceptable Biological Catch (simple example)

National Standard guidelines suggest that *ABC* should account for scientific uncertainty in the overfishing limit *OFL*, which is the product of projected stock size (*B*) and the fishing mortality rate at Maximum Sustainable Yield (F_{MSY}).

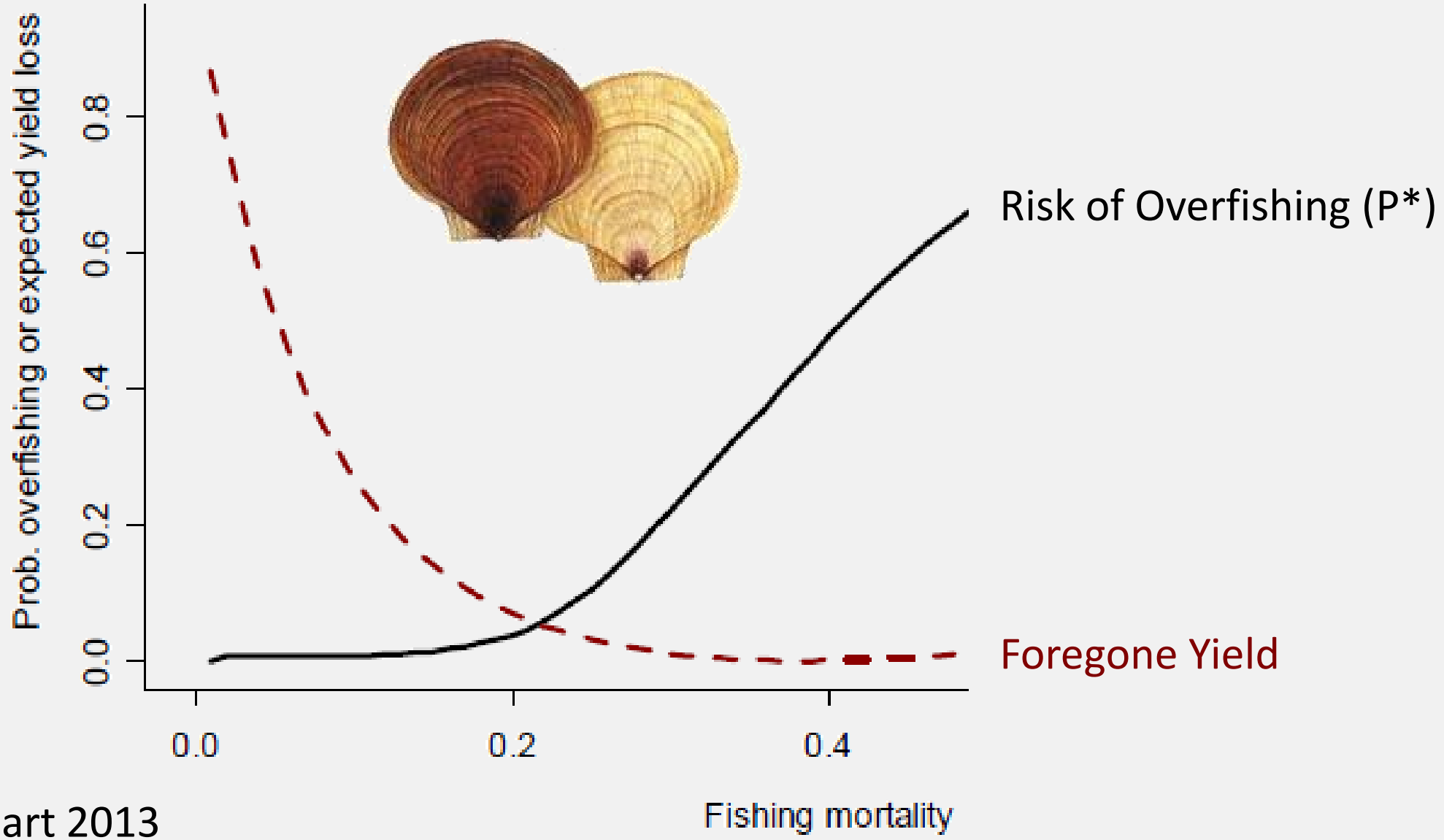
$$OFL \cong B_{projected} \cdot F_{MSY}$$

$$ABC = OFL - \sigma_{OFL} z_{P^*}$$



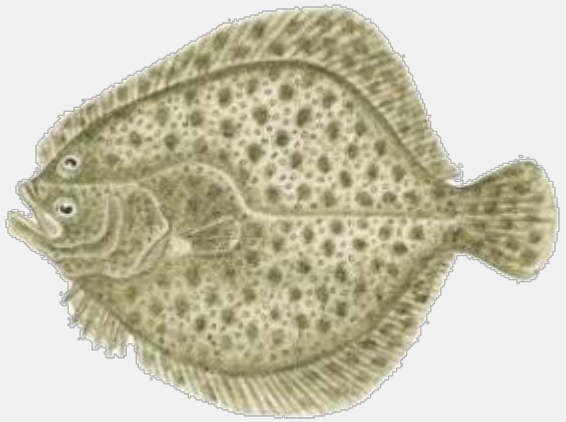
ABC is based on a lower confidence limit of the *OFL* derived from scientific uncertainty (σ) and the Councils' risk tolerance (*P**)

Tradeoff Between Overfishing Risk and Yield



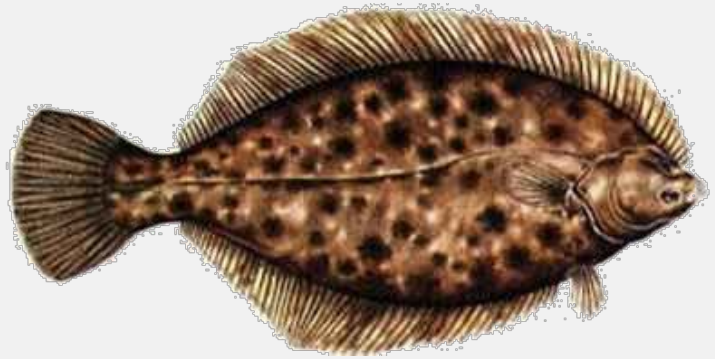
Hart 2013

ABC Control Rules for NE Groundfish



- The OFL-ABC system is intended to account for scientific uncertainty, but quantifying uncertainty is difficult for some stocks.
- Some Acceptable Biological Catch rules are not based directly on probability of overfishing and scientific uncertainty.

- New England groundfish:
  - ABC~75%OFL (F_{ABC}=75%F_{MSY}) based on NS1 guidelines for stocks that are not rebuilding on schedule.
  - ABC=x% x survey biomass – empirical approach



- Such approaches are typically applied when probability of overfishing cannot be reliably quantified (in which there is usually greater scientific uncertainty).

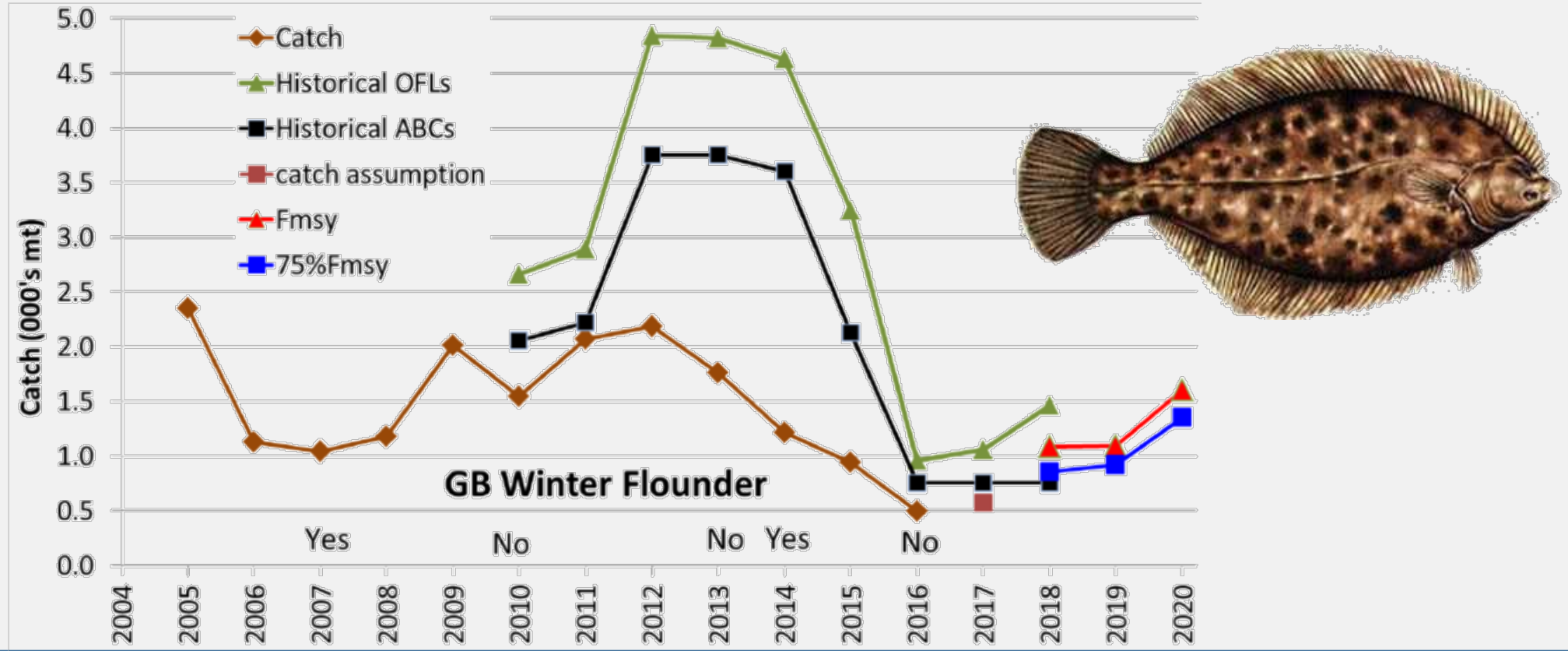
Annual Catch Limits

- Annual Catch Limits should be based on an estimate of the catch that results in overfishing and uncertainty in the estimate, and ACL cannot exceed Acceptable Biological Catch (NOAA 2009, 2016).

- *"Annual catch limit (ACL) is a limit on the total annual catch of a stock or stock complex, which cannot exceed the ABC, that **serves as the basis for invoking AMs**. An ACL may be divided into sector-ACLs. If sector-ACLs are used, sector-AMs should also be specified"* (NOAA 2016)

Projection Uncertainty

- We account for overages with accountability measures.
- We don’t account for underages. In multi-year projections, full uptake of ABC (or OFL) is assumed (even when we don’t expect it), and the underage is not carried forward into the next year.



Systematic Accountability Measures

"annual catch limits in the plan, at a level ***such that overfishing does not occur*** *in the fishery, including measures to ensure accountability."* (MSA 2006)

1. 'Sector' catch exceeds a bycatch sub-ACL
2. Did all sectors exceed their subACL?
   - Yes – AM may be needed – may want to prioritize a stock assessment update or benchmark
   - No – some sectors not accountable
3. Did total catch from all sectors exceed the Annual Catch Limit?
   - Yes - AM may be needed
   - No – AM may not be needed (late-season or retrospective re-allocation?)
4. Did overfishing occur ($F>F_{MSY}$)?
   - Yes - AM is needed
   - No – AM needed?
     - NS1 guidelines - Yes
     - Scallop Fishery Management Plan (if $F<F_{ACL}$-1SE) – No

System Performance (Science & Management)

- Accountability measures are an important component of the entire management procedure:
  - **Fishery and resource monitoring (data rich or data limited?)**
  - **Stock assessment model (MSY estimated? Bias? Precision?)**
  - **Stock assessment frequency (annual? 2-years?, >2-years?)**
  - **Acceptable Biological Catch Control Rule (risk-based or ad hoc?)**
  - Annual Catch Limit (single fleet or sector sub-ACLs?)
  - Proactive Accountability Measures (Annual Catch Targets, closed areas, …)
  - Reactive Accountability Measures
- Management Strategy Evaluation can evaluate the performance of alternative AMs for meeting Council's objectives in the context of scientific and management uncertainty.
  - Frequency of overfishing within decided risk tolerance
  - Economic yield, stability, economic distribution, food production, recreational opportunities, protection of marine ecosystems, …

Accountability Measures for Northeast Fisheries: A Workshop to Examine Best Practices

November 2-3, 2017

New Bedford, MA

Current AM Approaches

- Preemptive, Reactive, Corrective
- Paybacks
- Gear modifications
- Area closures
- ACT
- Trip limits

- Scaled AM conditional on stock status, extent of overage
- Multi-year averaging
- In-season, Next year, Year 3

Current AM Issues

- Data requirements
- Allocation decisions
- Incentive systems
- Uncertainty
- Complex
- Lack of analysis
- Inconsistent, inequitable
- Unidentified objectives

Problem Statement

- AMs are mandated to prevent or mitigate overfishing
- AMs in NS 1 guidelines are required to prevent or mitigate ACL overages
- AMs in NE are being used as a tool to insure accountability for bycatch allocations
- AMs may not be the appropriate tool for achieving NS 9 bycatch reduction objectives
- Bycatch mitigation tools have proven to be more effective, less costly and less constraining for achieving OY than the ad hoc application of Ams
- Interpreting the mandate as requiring a reactive AM can disincentivize proactive AMs

Trigger questions

1. Who's accountable, for what?
2. What's an AM?
3. When is an AM good enough?
4. When should there be sub-ACLs and AMs?
5. How should bycatch be taken into account (i.e., thus how does it influence AMs?
6. How do AMs perform in the face of scientific uncertainty?

Recommendations

- The use of an ACT. Defined in advance as part of the plan.
- If there is an ACL overage:
  - Determine factors that caused the overage
    - is overfishing occurring?
    - did exceeding the ACL cause overfishing or cause the stock to become overfished?
  - Performance evaluations of pre-defined alternatives
    - avoiding or correcting overages of the ACL (ACLs designed to prevent overfishing; re-evaluate if exceeded more than once in 4 years)
    - economic impacts
    - monitoring requirements
- Explore a pilot project that chooses a stock to develop a bycatch management strategy
  - define objectives for bycatch stock and target stocks
  - considering best practices in bycatch management

- Explore how the system performs under alternative approaches
  - subACLs and AMs (groundfish)
  - “take it off the top”, annual management (skates, monkfish)
  - Management Strategy Evaluation
    - When is an AM good enough?
    - When should there be sub-ACLs and AMs?
    - How should bycatch be taken into account (i.e., thus how does it influence AMs?
    - How do AMs perform in the face of scientific uncertainty?