

INTERNATIONAL COLLABORATIVE RESEARCH SUMMIT

OCTOBER 1ST – 2nd, 2013

Village Inn and Conference Center
Narragansett, RI

SUMMARY REPORT



Organized and sponsored by:

Commercial Fisheries Research Foundation
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The Nature Conservancy

NOAA Fisheries, Northeast Fisheries Science Center

With additional support from:

The Walton Family Foundation



International Collaborative Research Summit

October 1-2, 2013
Village Inn and Conference Center
Narragansett, Rhode Island

Summary Report

Goals of summit:

- (1) Provide an educational opportunity for summit participants to learn about successful collaborative fisheries research efforts in other countries;*
- (2) Begin a discussion on how such methods and approaches can be applied in the New England region, with particular focus on industry involvement in data collection, timely data incorporation and analysis, and adaptive/responsive management.*

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April 23, 2014

Cover image: Lobstermen collecting biological data about their catch as part of the CFRF Lobster Research Fleet.
Visit <http://cfrfoundation.org/lobster-research-fleet> for more information.

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I. Executive Summary

The International Collaborative Research Summit was organized in partnership by the Commercial Fisheries Research Foundation (CFRF), The Nature Conservancy (TNC), and the NOAA Fisheries Northeast Fisheries Science Center (NEFSC). The purpose of the summit was to bring to New England scientists and fishermen from other countries who are working together collaboratively to improve the information upon which sustainable harvest levels of commercial fish species are determined. The main goals of the summit were twofold:

1. Provide an educational opportunity for summit participants to learn about successful collaborative fisheries research efforts underway in other countries, particularly those informing stock assessments; and
2. Begin a discussion on how such methods and approaches can be applied in the New England region, with particular focus on industry involvement in data collection, timely data incorporation and analysis, and adaptive/responsive management.

The summit was structured in an open format to encourage participant engagement and interaction, with generous time for questions and answers as well as group discussions. Over the duration of the 1.5 day summit, attendance ranged from 60 to 90 people. Attendees included academic scientists (University of Rhode Island, Roger Williams University, University of Massachusetts Dartmouth, University of Connecticut, University of Maine, Cornell University), state government scientists and managers (Rhode Island Department of Environmental Management, Massachusetts Department of Marine Fisheries, New Jersey Department of Environmental Protection, Maryland Department of Natural Resources), regional scientists and managers (Mid-Atlantic Fishery Management Council, Atlantic States Marine Fisheries Commission), environmental group representatives (The Nature Conservancy, Conservation Law Foundation, Environmental Defense Fund), private research institutions (Gulf of Maine Research Institute, Penobscot East Resource Center, Rhode Island Sea Grant), commercial and recreational fishermen from the Northeast (Maine to New Jersey) as well as Maryland, Florida, and Texas representing a variety of fishing sectors and gear types, and representatives of fishing industry support businesses (net makers, sector managers, fish processors and dealers).

The international case study representatives from Nova Scotia, the Falkland Islands, and Norway were also important participants. Although there were no federal employees in attendance, due to the federal government shutdown activated on October 1, 2013, the partners (CFRF and TNC) made every effort to acknowledge the role the NEFSC played in planning the summit and their desire to participate. Nevertheless, summit participants widely felt that the attendance of the NMFS NEFSC staff, particularly stock assessment scientists, would have been extremely beneficial. The diverse group of attendees and engaging agenda format encouraged participation by all representative groups. This open dialogue, including the questions and answer exchanges, was a major success of the event. In the end, a number of

central themes for moving forward with collaborative research in the Northeast United States were identified, including:

- Importance of involving fishermen in all aspects of the stock assessment process, including setting research priorities, on-the-water data collection, and active involvement in the assessment itself. This approach lays the foundation for building trust among all parties and co-ownership of data and results.
- Need to directly link collaborative/cooperative research results with the stock assessment process.
- Recognition that it is essential to create/support appropriate incentives for engagement in collaborative research.
- Value of exploring and learning from other US examples of collaborative research efforts.

II. Acknowledgements:

The International Summit was supported by funding from the National Oceanic and Atmospheric Administration (sub-awarded to the CCRF through NOAA Award # NAO8NMF4720595), the Walton Family Foundation, and The Nature Conservancy. The event would not have been possible without the generosity of these organizations. Many thanks are also owed to the primary summit facilitator, Paul De Morgan (Resolve Consulting), as well as the small group discussion facilitators (Bob Ballou, RIDEM; Bryan DeAngelis, TNC; Jonathan Labaree, GMRI). Finally, thank you to all the summit participants for their thoughtful questions, comments, and general enthusiasm throughout the course of the summit.

III. Opening Remarks

Summit proceedings were commenced with remarks from representatives of each organizing partner (CCRF, TNC, and NOAA NMFS) about the motivations for and value of the event. These opening remarks are provided below.

A. Margaret Petruny-Parker - Executive Director, Commercial Fisheries Research Foundation

As Paul stated, I am the Executive Director of the Commercial Fisheries Research Foundation based here in southern Rhode Island. For those of you who do not know about the Foundation, we are a small, private, non-profit research foundation founded and directed by members of the commercial fishing industry and those in support businesses. Our main mission is to provide support to teams of scientists and members of the fishing industry working together collaboratively on fisheries research projects important to the industry based in the southern New England region.

On behalf of the Foundation Board of Directors and its staff, I want to extend a warm welcome to all of you. We are excited to begin this 1.5 day summit. Of course the best laid plans do not always go as anticipated. When we planned this summit, we did not anticipate a federal government shut down. The NMFS NEFSC was a partner in planning this summit, spending numbers hours on that task, and now they cannot be here. But we did get a sense of this storm brewing last week and began to make plans in case a shutdown did occur. The summit will be video-taped, and one speaking slot on the agenda has been adjusted. The sponsoring groups of this summit will re-convene when we can, and the NMFS NEFSC will be briefed. And there is always the chance that this could be resolved today and they will be able to join us tomorrow.

But the Foundation is very excited that all of you have joined us. Some of you have traveled great distances to be here today – from as far away as the Falkland Islands, Norway, Nova Scotia. We have fishing industry representatives from the Gulf of Mexico and the Chesapeake Bay region, and others from in state and from other states here in the Northeast, all representing a wide variety of fishing gear types and fisheries, and fishery related businesses. We have scientists from private and academic institutions, state/regional management agencies, and staff from environmental organizations, all working in the fields of fisheries science and management.

All of you bring to this summit a wealth of experience and expertise. As I look out at you, I realize how diverse a group this is. That diversity is reflective of the organizations that came together to plan and sponsor this summit. It began as a simple idea coming from discussions within the Commercial Fisheries Research Foundation. As our work has evolved, improving information for stock assessments has emerged as a top priority. Better, more timely, more accurate, more site specific is needed to reduce uncertainties in stock assessments, and better understand climate change impacts and changing ecosystem dynamics, and industry involvement is needed. We recognized we needed to look around the world and see how this was being addressed elsewhere. The staff was directed to look into case studies and to develop a plan to bring that information to RI. And the Board voted to re-direct existing funding for this purpose. In the process of developing that plan, this caught the attention of Bill Karp at the NMFS NEFSC and he agreed this was a good idea and agreed to be part of organizing it. At the same time in conversations with staff from our local RI and MA offices of The Nature Conservancy, this summit idea was mentioned and they too thought it was a good idea. They offered to help plan and sponsor it. And we reached out to the Walton Family Foundation and they agreed to help with the costs of having members of the fishing industry participate. So a team was formed – and the agenda you have in front of you was the result.

What drew our organizations together was the recognition that good fisheries management is dependent on good information. Accurate, timely, site specific data is needed for reliable stock assessments. Too often the “best available science” simply is not good enough given the impacts of the decisions being made.

Let me conclude by saying I hope each of you learn a lot over the course of this summit. I hope you engage in meaningful and productive discussions, enjoy your conversations over breaks and meals, and most importantly, I hope that each of you leave here inspired - inspired to take what

you have learned and what you have heard in discussions and apply it as you move forward in your own work. We hope you stay engaged and good work results from this summit.

Again, on behalf of the Foundation Board of Directors and staff, welcome and thank you for being here.

B. John Torgan - Director, Ocean and Coastal Conservation, The Nature Conservancy Rhode Island

Welcome to Rhode Island, the beautiful ocean state. Rhode Island is known as a world-class fishery and fishing destination and we are honored to host such a distinguished group on this important topic. Thanks for coming!

I've worked in conservation in RI now for more than 20 years. I started fishing on Rhode Island's waters at the age of three with my dad, and it remains my passion- one I am lucky enough to share with my own kids today. If I had never fished, never hung around at the docks in Galilee, never worked on boats or at the Co-op, never seen the giant tuna, swordfish, sharks, whales, sea turtles and other incredible marine life in the waters off of Block Island, I'm sure I wouldn't have followed this path.

People who have put in decades on the water fishing can teach us all a lot about what lives out there beneath the surface. I've personally learned more from older fishermen and direct experience than any other sources.

The Nature Conservancy is a global organization working to protect the great places on land and water upon which all life depends- not just for the sake of the plants and animals, but for people too.

We work to achieve large-scale conservation results through land and watershed protection, habitat restoration, and through a strong science-based approach that emphasizes regional collaboration and real outcomes in nature.

This summit has been a privilege to plan and develop with our great partners at the Commercial Fisheries Research Foundation and the Northeast Fisheries Science Center. Together, we believe that the only way to achieve effective management, conservation, and balance in our fisheries is through good science and information, open dialogue, and a spirit of partnership and earned trust.

Our government and system of fisheries management depends on this- that people from different backgrounds and with divergent beliefs can come together around our common goals- having enough fish for the future. That's not happening today in Washington DC.

Many of you share our frustration that our federal partners and sponsors cannot be here today and cannot even participate in a summit they worked so hard to plan. I know they wish they could be here too.

So it's now even more critical that we seize this unique opportunity- to advance good science, to learn from fishermen, environmental groups, states, other nations, and universities in that spirit of collaboration and with a vision for sustainable, healthy fisheries into the future. I hope that we can come away from this with a clearer idea of what's possible- that we can translate these case studies and international success stories into real action right here in Rhode Island and New England. Please make every effort to give your full attention to the discussion portions of the agenda. This is your chance to be heard and make a difference. Thank you.

C. Bill Karp - Director, Northeast Fisheries Science Center, NOAA Fisheries

Note: Due to the government furlough, Bill Karp was not able to attend. Anna Malek presented these opening remarks on his behalf.

My agency colleagues and I deeply regret not being able to join you all at the International Collaborative Research Summit this week. We are very pleased with the outstanding agenda that has been prepared for this meeting and had looked forward to sharing our perspectives on cooperative research in the Northeast and learning from all of you about your experiences. My staff at the Science Center and I have been very pleased to have participated in the efforts to bring together such an excellent group of presenters for this Summit and we have every confidence that the work of this group will be a tremendous success.

In the Northeast, we have a long history of bringing together people from the industry and agency to combine efforts for cooperative research. The Science Center is quite proud of the progress that has been achieved to date, and John Hoey had looked forward to personally sharing some success stories from the Center's Northeast Cooperative Research Program. As you will hear from the other presenters, we have accomplished a great deal in the Northeast, and yet we still have much to learn from the collaborative research efforts in other parts of the world. This Summit provides a unique opportunity to examine our achievements in the Northeast in light of the progress made elsewhere around the world, and while not every experience from fisheries in other countries will automatically be applicable to the specific conditions in the Northeast, there certainly will be valuable lessons from the case studies that will help to fine tune our thinking and improve our process moving forward. We look forward to learning the advice that can be offered from industry, scientists and managers who have made great progress in obtaining industry participation in data collection.

Thank you to the CFRF staff and our colleagues at TNC for bringing together this excellent group of presenters and participants. I wish you all every success in the discussions and look forward to continuing to work with all of you on the next steps that emerge as a result of the productive engagement that will take place over the next two days.

IV. Background Presentations

The summit partners invited Robert Glenn (MA Department of Marine Fisheries), Jason Didden (Mid-Atlantic Fishery Management Council), and John Hoey (National Marine Fisheries Service Northeast Fisheries Science Center) to provide overviews of the American lobster fishery, short lived species management, and the status of federally-funded cooperative research in the Northeast, respectively. These presentations provided local context and background for the featured case studies.

A. Data Needs in Assessing and Managing the New England Lobster Fishery

Robert Glenn, Massachusetts Division of Marine Fisheries



Robert Glenn is the chief marine fisheries biologist at the Massachusetts Department of Marine Fisheries, where he oversees monitoring and assessment programs for the American lobster, *Homarus americanus*, among other species. Glenn is also a member of the Atlantic States Marine Fisheries Commission's American Lobster Technical Committee. In addition to extensive experience with the management of the Northeast American lobster fishery, Glenn is also actively involved in cooperative research projects investigating lobster settlement, reproduction, and population structure. For the International Summit, Glenn provided a general overview of the data that currently goes into lobster stock assessments, what is needed to better understand the status of the resource, and the current and potential contributions of cooperative lobster research. Glenn's full presentation and abstract can be found at <http://cfrfoundation.org/summit>. A brief summary is as follows.

- The New England lobster fishery is valued at \$400 million, with over 110 million pounds landed since 2010.
- The future of the lobster fishery depends upon accurate and reliable stock assessments for each of the three lobster stocks: Gulf of Maine, Georges Bank, and Southern New England.
- Lobster stock assessment requires a variety of data, including: fishery independent data, fishery dependent data, and life history parameters.
- Sources of fishery independent data include: trawl surveys, ventless trap surveys, and suction sampling surveys.
- Sources of fishery dependent data include: catch reporting, dealer reporting, sea-sampling, and port-sampling. The availability of these data varies widely by state.

- Life history parameters, such as growth rate, molt frequency, maturity, and migration, have important implications for biological reference points in stock assessment models, and are derived from lab and tagging studies, and maturity staging.
- Life history parameters are assumed to be constant in the current stock assessment models, although many of them may be influenced by temperature regimes, which undoubtedly have changed in recent years.
- There is a pressing need for enhanced fisheries dependent sampling in offshore areas and expanded ventless trap surveys to improve the resolution of the data used in the lobster stock assessment – this is where industry-based data collection could be an important asset.
- Stock assessments would also benefit from updated maturity studies on fine spatial scales, laboratory and tagging studies to update growth rates, and broad-scale tagging studies to better define lobster migration patterns, stock structure, and connectivity of all three stocks.

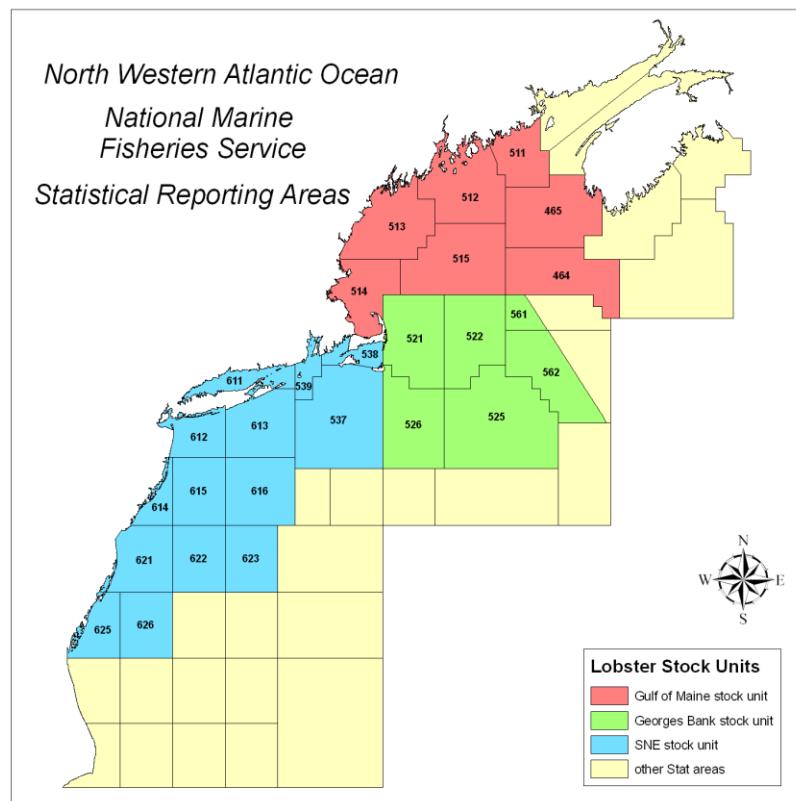


Figure 1. Distribution of lobster stock units and statistical reporting areas on the Northeast continental shelf. Figure courtesy of Robert Glenn, MA DMF.

B. Short-Lived Species: A Mid-Atlantic Perspective on Assessment and Management Challenges *Jason Didden, Mid-Atlantic Fishery Management Council*

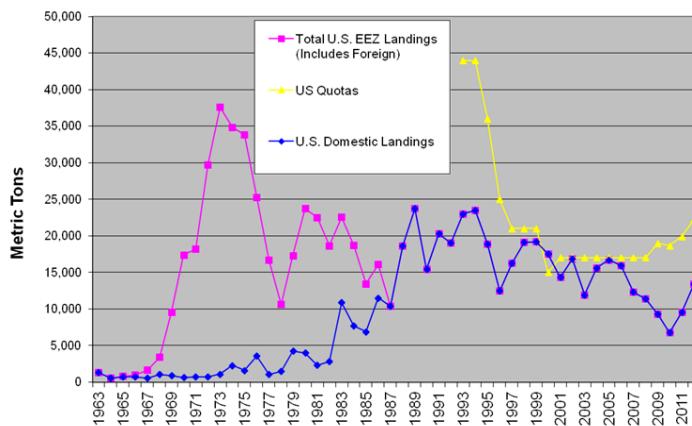


Jason Didden is a fishery management specialist for the Mid-Atlantic Fishery Management Council, where he coordinates the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan. The two species of squids (longfin and *Illex*) and butterfish included in this management plan have relatively short lifespans - less than a year for the squids and approximately 2-4 years for butterfish. Jason works closely with the fishing industry when evaluating potential changes to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan. For the International Summit, Jason provided an overview of the challenges associated with managing these short-lived species, the available information and data needs, the current stock assessment process, and the role that cooperative data collection could play in short-lived species management. Didden's full presentation and abstract can be found at <http://cfrfoundation.org/summit>. A brief summary follows.

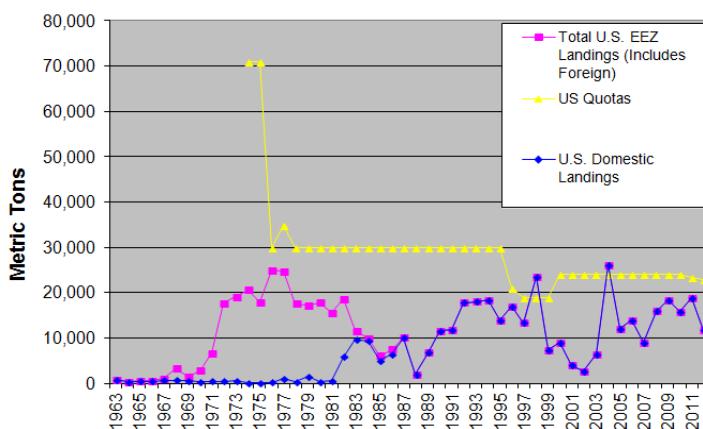
- The Mid-Atlantic Fishery Management Council manages two species of squid (Longfin squid, *Doryteuthis pealeii*, and Illex squid, *Illex illecebrosus*) and one species of fish (Atlantic butterfish, *Peprilus triacanthus*) that can be considered short-lived species.
- These species have presented the Council with a variety of management challenges, many of which relate to their short-lived nature and the difficulties that arise when assessing them.
- Traditional butterfish assessments have meant than management has been based on data that is at least three years old and lacks environmental context. Given that most butterfish do not live to three years of age and are sensitive to current environmental conditions, disconnects likely arise between contemporary quotas and the actual productivity of butterfish.
- Squid stock assessments are also based on spatially, temporally, and environmentally limited data. As a result, squid stock assessments are used as a guide rather than as an absolute basis for catch limits.
- The current lack of understanding of squid stock structure means that any quota could theoretically lead to overfishing or missed fishing opportunities in any given year. However, all available evidence suggests that current squid quotas are unlikely to lead to overfishing and may be conservative.
- Any move toward real-time management should consider the costs and potential gains related to the particular species and the relevant fishery. The potential to occasionally achieve higher quotas may not be worth the instability that real time management could result in.

- Managers should evaluate if assessment and management changes can accurately predict changes in productivity/biomass before implementing new procedures, and work closely with fishery participants if efforts toward real-time management are considered.

A) Longfin Squid Landings in U.S. Waters



B) Illex Squid Landings in U.S. Waters



C) Butterfish Landings in U.S. Waters

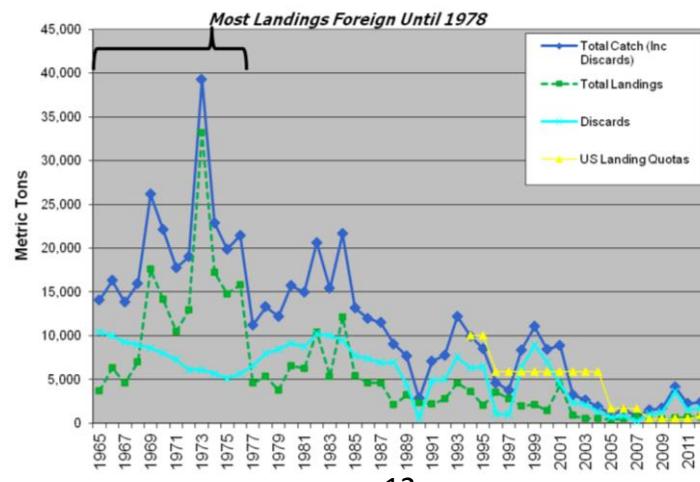
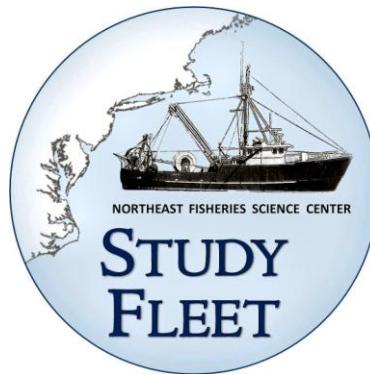


Figure 2. Historical landings of A) longfin (*Loligo*) squid, B) shortfin (*Illex*) squid, and C) butterfish in U.S. waters. Figure courtesy of J. Didden, MAFMC.

C. Cooperative Research in the Northeast: Fishermen Involvement in Data Collection

David Goethel, F/V Ellen Diane, Hampton, NH



Due to the federal government shut down, John Hoey was not able to attend the International Summit. David Goethel, owner and captain of the F/V Ellen Diane, filled in for Hoey and presented materials prepared in advance. John Hoey is the Director of the Northeast Cooperative Research Program, National Marine Fisheries Service Northeast Fisheries Science Center. Hoey oversees the Study Fleet Program, as well as a variety of other cooperative research projects. Goethel participates in the Study Fleet program, and has been an industry representative to the New England Fishery Management Council for many years. Hoey and Goethel's presentation and abstract can be found at <http://cfrfoundation.org/summit>. A brief summary is as follows.

- The NMFS NEFSC Study Fleet is a cooperative research program that encompasses a subset of fishing vessels which collect high quality, self-reported data on fishing effort, area fished, gear characteristics, catch, and biological observations.
- The Study Fleet program strives to provide several benefits to its commercial participants including the opportunity to: 1) directly participate in the scientific data collection process; 2) give input into the development of electronic reporting technology; 3) share ideas and observations with fisheries scientists; 4) gain insight into how environmental factors influence catch rates; and 5) receive financial compensation for time and effort involved for more detailed data collection.
- The Study Fleet program typically supports between 20 and 35 contracted vessels that are located from Maine to New Jersey.
- In addition to trip reporting requirements, participating vessels bring Study Fleet field scientists out to sea to perform biological sampling and collect age and growth samples.
- The Study Fleet team is currently working on initiatives to expand avenues for more fine-scale electronic data collection.

Additional comments added by J. Hoey outside of the summit proceedings:

- Study Fleet vessels concurrently collect temperature and depth data, which is supplied to oceanographic modelers to help improve the accuracy of bottom temperature

forecasts, which may ultimately lead to the improvement of species distribution and climate change models.

- One of Study Fleet's current objectives is to provide fishery-dependent data to be used by scientists in the stock assessment process. While this goal has yet to be fulfilled, some Study Fleet data has been used in working groups at the regional level.

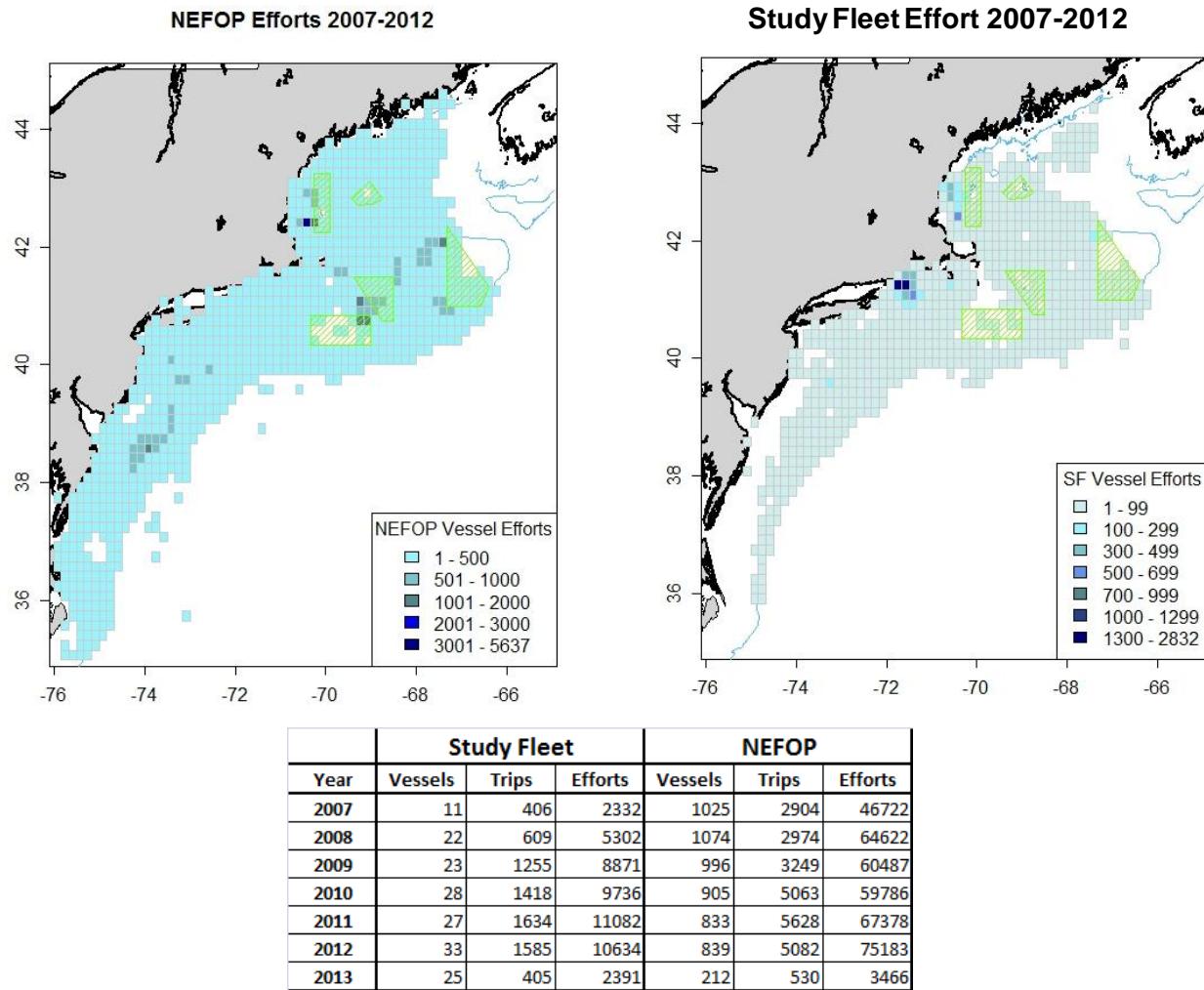


Figure 3. Spatial coverage and effort of Northeast Fishery Observer Program (NEFOP) and Northeast Fisheries Science Center Study Fleet from 2007 to 2012. Figure courtesy of J. Hoey, NEFSC.

Major Discussion Points: Background Presentations

The following list summarizes the major discussion points made in connection with the background presentations:

- There is a pressing need to directly link cooperative research results with the stock assessment process.
- It is important to include fishermen in all aspects of the assessment process, from setting research priorities to on-the-water research and engagement in the stock assessment itself.
- Developing a foundation for building trust among all parties should be a priority in the Northeast.
- It is essential to create/support appropriate incentives for engagement in cooperative research in the Northeast.
- The Northeast should look towards other examples of collaborative research efforts, such as in the Gulf of Mexico, for guidance in how to complete the process of integrating research results into the stock assessment process.
- A key step towards improved stock assessments is for assessment scientists to more actively advocate for finer resolution data.
- The science that guides the management of short-lived species in the Northeast (squid and butterfish) is deficient and lacks timeliness – industry involvement is crucial for addressing these issues.
- Scientists and managers need finer scale information (which fishermen can deliver) on the migration of species into new areas where they have not been traditionally fished. The MAFMC is starting to evaluate how to address shifts in species distribution and will convene a governance workshop around this issue.
- The study fleet could and should be a key fishery-dependent data collection program in the Northeast, but the application of study fleet data to stock assessments is lacking.
- Finding a way to “close the loop” to report back on how cooperative research data is used will be key to the continued participation by the fishing industry.
Bottom temperature data is very valuable to fishermen and could be used as an incentive to increase industry participation.



V. Case Study Presentations

The summit partners selected three examples of successful collaborative research efforts in other countries to be highlighted during the summit:

1. Lobster assessment and management in Nova Scotia;
2. Squid assessment and management in the Falkland Islands; and
3. Industry-based catch reporting in Norway.

Each of the case studies relates to a fishery in the Northeast that could benefit from improved collaboration between scientists, industry, and managers. Representatives from each case study were brought to Rhode Island for the duration of the summit to share their experiences and advice. Special attention was given to the voice of fishermen who have had positive experiences being involved in collaborative data collection programs and who were willing to share their experiences with summit participants. Overall, the case study presentations and discussions provided an opportunity for summit participants to ask questions and learn from other collaborative research initiatives that have been successful.



A. Collaborative Lobster Research (Nova Scotia, Canada)

Three representatives from Nova Scotia attended the International Summit: Patty King, John Levy, and John Tremblay. Patty King is the General Manager of the Fishermen and Scientists Research Society (FSRS), where she oversees a variety of cooperative research projects that supply data for stock assessments. John Levy is a commercial lobsterman and past president of the FSRS. Levy has been involved in a number of collaborative research projects, including the FSRS lobster recruitment survey. Levy also serves as an industry representative to stock assessment and management committees. John Tremblay is a fisheries scientist at Fisheries and Oceans Canada (DFO), where he is responsible for the lobster stock assessment, among other duties. Tremblay's work is often reliant upon fishery-dependent data provided by collaborative research. One of Tremblay's recent lobster stock assessment documents included an analysis of

the effect of temperature on the catch rate in traps. King's, Levy's, and Tremblay's presentations and abstracts can be found at <http://cfrfoundation.org/summit>. Brief summaries of their presentations are as follows.

Fishermen and Scientists Research Society: A Proven Model for Effective Collaboration
Patty King, FSRS General Manager



- FSRS is not a lobby group, but rather an independent research organization. It serves to facilitate communication between scientists and fishermen.
- A primary research focus for the FSRS is the American lobster, *Homarus americanus*, an extremely important species to the Canadian East Coast fishery.
- In 1999, the FSRS launched the Lobster Recruitment Index Project, for which fishermen use scientific lobster traps during the commercial lobster season to gather information about lobsters in their area.
- The Lobster Recruitment Index Project has participants in all Lobster Fishing Areas along the Atlantic coast of Nova Scotia, with over 180 fishermen in total (4-20% of the active fleet).
- For the Lobster Recruitment Index Project, participant fishermen record biological data (size, sex, eggs, v-notch) about the lobsters from their science traps and monitor bottom temperatures using a computerized temperature logger in one of their project traps.
- Fishermen are compensated for their data collection efforts by being able to retain the legal size catch from 2-5 extra science traps.
- Quality assurance and data validation is a necessary component of the lobster recruitment project. This is carried out by scientific staff at the FSRS.
- Participating fishermen are involved in setting data management policies, which specify that industry has equal rights to the data. This is key to the success of the project.
- Lobstermen would not have been involved with the Lobster Recruitment Index Project if they did not trust that the data would be used responsibly.

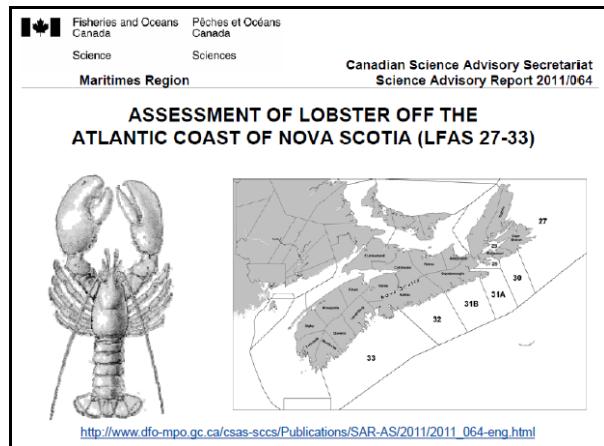
Remarks from John Levy, Commercial Lobster Fisherman and Past-President of FSRS



- Fishermen are the eyes and ears of the fishery and the marine environment; they are scientists in their own right.
- By working together, fishermen and scientists learn from each other and form a more accurate picture of what is happening in the marine environment.
- Scientists and fishermen have to use their knowledge in an honest and open way to build trust in each other. Only then will there be universal confidence in the collection and use of scientific data.
- It is a lot of extra work for fishermen to participate in collaborative research projects, but by being part of the science they are given assurance that the data is real and accurate.
- By being involved in the science, industry's confidence in assessment results is improved and disagreements between fishermen and scientists/managers are reduced.
- Sometimes a project that scientists wish to do may look good on paper but does not work in the real world. Fishermen's knowledge can and should be solicited to ensure that gear designs and research protocol are realistic.
- A major challenge is to achieve the mindset that fisherman and scientists are willing to work together as equals, that they both have an open mind.
- If fishermen believe that helping with science may end up coming back to bite them or be used against them, then they will not want to be involved.
- It is essential to have confidentiality of the data so that it cannot be traced back to an individual fisherman. By retaining access to the data, fishermen are more confident that it will be used for the right reasons.

FSRS Data Use in Assessments and Reviews

John Tremblay, Fisheries Scientist, DFO



- Stock assessments are meant to provide a review of the “health” of a fished population.
- Indicators, such as abundance, demography, and fishing pressure, are measurements of aspects of the population and fishery and are based on scientific data.
- Data can come from the fishery, from additional data collected by the fishery (such as the FSRS Recruitment Index project), or from fishery independent surveys.
- Additional data on ecosystem and habitat may also be used in stock assessments.
- The data collected by the FSRS Lobster Recruitment Index project is an essential component of American lobster assessments in the Canadian Maritimes.
- Specific examples of FSRS data use include: Abundance indicator for LFAs 28-32, Exploitation indicator for LFA 33, and Temperature-corrected abundance indicator for LFA 34.
- Time series become more valuable with each year, so it is important to continue projects such as the FSRS Recruitment Index. Unreliable funding, however, makes this difficult.
- Increased fisherman participation in the FSRS Recruitment Index project would benefit the stock assessment greatly by providing greater spatial and temporal coverage.
- It is essential to continue to educate fishermen about the importance of the data that they collect and why their involvement is important.
- If fishermen were not willing to participate in collaborative research, there would be far less data available and the lobster stock assessments would be poorly informed.
- While scientists want to bring forward any trends in data, fishermen sometimes do not want “negative trends” to be portrayed from data they collected. It is a continued challenge to find balance in these situations.

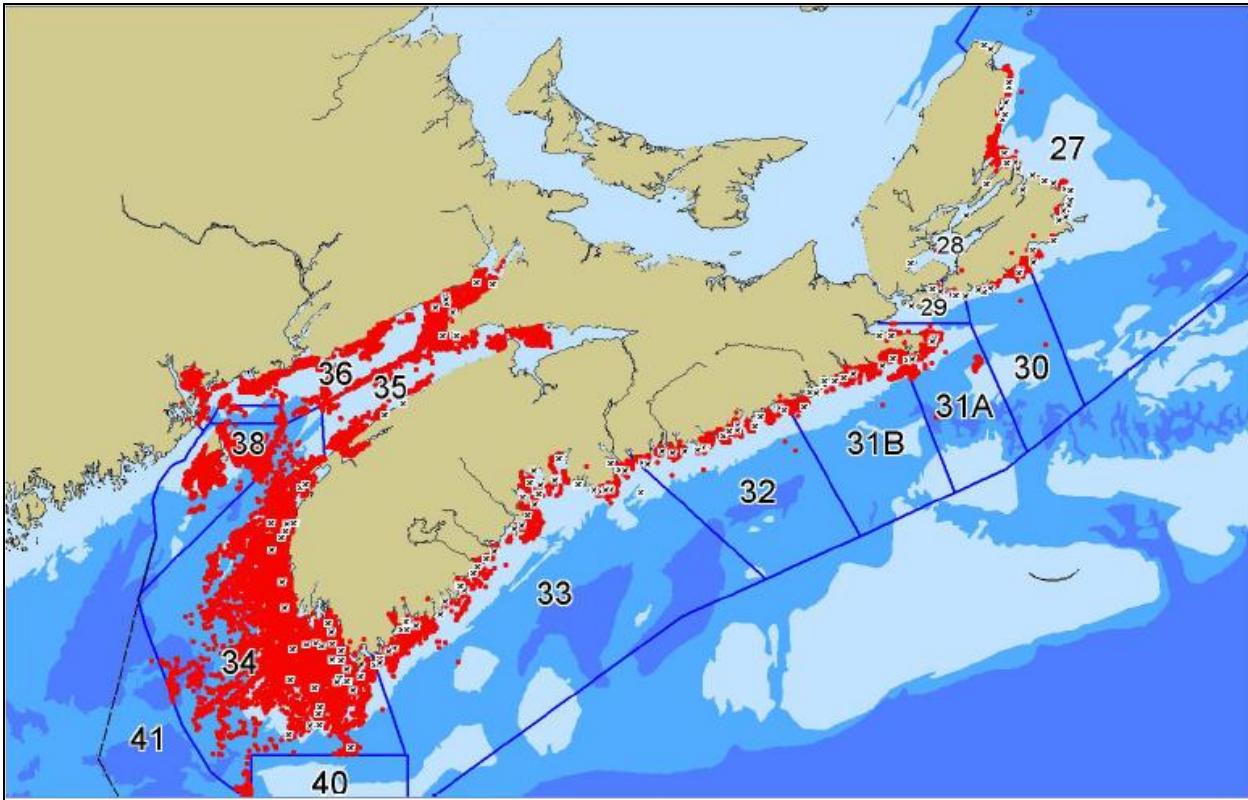


Figure 4. Map of locations of FSRS recruitment traps (blue crosses) and at-sea samples from commercial catch (red symbols) from 1976 to present. Figure courtesy of J. Tremblay, DFO.

Major Discussion Points: Collaborative Lobster Research (Nova Scotia, Canada)

- While the data from the FSRS Recruitment Index project was used right away, confidence has been building over time, both in terms of trusting each other and trusting the accuracy of data trends as time series are developed.
- Debates about population reference points are ongoing in Nova Scotia as well as the U.S.
- Ensuring the privacy and confidentiality of industry-collected data is essential.
- Industry's continued access to the data they collect is key to the Society's success – this may be a way to move forward in the U.S.
- There are still some challenges to a collaborative industry research fleet approach: the data is fishery dependent, there are changes in participation rates over time, support funding is not guaranteed, and industry representatives may not be in the position to store large data sets.
- Canadian industry participants are willing to “live by the results of the data” whether they are good or bad, because they have confidence that the data will be used responsibly. They also realize that less data leads to the precautionary approach (e.g. uncertainty) which limits the amount of fish that can be landed.

- Sometimes it takes adversity to initiate change – for example, the cod collapse was the impetus behind the formation of the FSRS.
- Although industry is very involved in stock assessments and management in Canada, the process is not fully transparent and political considerations still are a factor.
- The Nova Scotian case study highlights the importance of fishermen being equal participants in all aspects of data collection, analysis, and outcomes.

B. Short-Lived Species Science and Management – Squid (Falkland Islands)



Two representatives from the Falkland Islands attended the International Summit: Andreas Winter and Michael Poole. Andreas Winter is a fisheries scientist for the Falkland Islands Fisheries Department (FIFD), where he has been involved in the development and implementation of a collaborative approach to real-time assessment and management of longfin squid. Winter was also involved in the MAFMC squid assessment workshop in January 2013. Michael Poole is the Executive Secretary for the Falkland Islands Fishing Companies (FIFCA), which fosters communication between squid fishing vessels and the scientific staff at FIFD. Poole consults with squid fishing vessels regularly, giving him insight into the industry perspective on collaborative squid research. Winter and Poole's presentation and abstract can be found at <http://cfrfoundation.org/summit>. A brief summary of their presentation is as follows.

- The Patagonian longfin squid (*Doryteuthis gahi*, also referred to as Loligo squid) is a resident population in Falkland Islands waters and is targeted during two fishing seasons each year.
- All current Loligo squid fishing vessels (16 total) are large factory trawlers hailing from Spain. Each vessel operates under a 25-year term Individual Transferable Quota (ITQ), allocated by FIFCA.
- Because *D. gahi* has a short (1 year) life cycle, weak biomass-recruitment relationships, and large biomass fluctuations from year to year, it is assessed using depletion models which estimate the day-to-day abundance of the population in each season.

- Real-time management is conducted via pre-season surveys and tracking of daily predicted biomass using the depletion model.
- All squid fishing vessels are required to supply daily catch reports (via e-mail), which include biomass of squid caught, effort, position, and squid size distributions. There is an overlap between what data is required by the Falkland Islands government and what is required by the fishing companies' internal management.
- Industry is also involved in collaborative surveying and gear research.
- The squid fishing industry pays considerable fees to the Falkland Islands government to support the data collection, research, and management system for *D. gahi*, as well as general support services.
- In the *D. gahi* fishery, short chains of communication between science, management and industry allow effective cooperation in the interest of long-term sustainable exploitation.
- Management takes into account both scientific advice and industry recommendations through ongoing consultations before and during the fishing seasons.
- As a result of this cooperation, *D. gahi* is one of the best managed squid fisheries in the world with local fishing companies being amongst the largest and most profitable enterprises in the Falkland Islands economy.

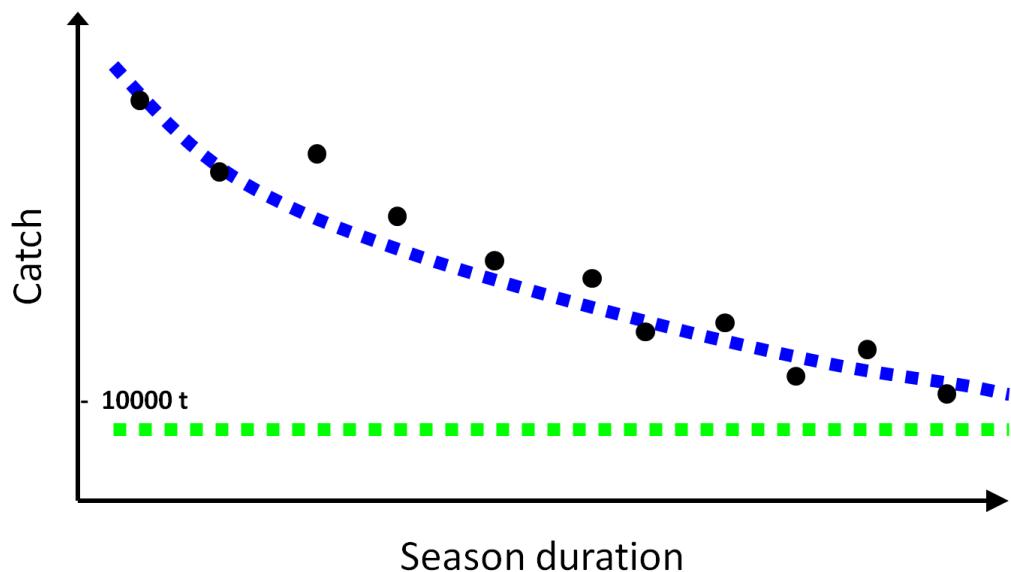


Figure 5. Schematic of the depletion model used for real-time, in-season squid management in the Falkland Islands. Initial conditions are defined by pre-season surveys and in-season data is provided by daily catch reports from squid fishing vessels. Figure courtesy of A. Winter, FIFD.

Major Discussion Points: Short-lived species science and management – Squid (Falkland Islands)

- Fishing represents a large portion of the Falkland Islands GDP (>60%), yet very few residents participate in fisheries-related activities. Thus, stakeholder conflicts and political pressures are minimal. This may change in the future as the Falklands Islands considers providing infrastructure (harbors and marinas) to support a small inshore domestic fishing fleet.
- Pre-season surveys are conducted at fixed sites as well as captain-selected tows – this has been a successful approach, as it incorporates industry knowledge while also maintaining a statistically robust design.
- Pre-season surveys have been key to learning about the location and timing of squid spawning in the Falkland Islands as well as providing a starting point for the depletion model.
- While some of the fishery's collaborative success relates directly to the small scale nature of the fishery and specific governance system, there are some lessons that can be applied to other fisheries such as the importance of strong communication, credible science, moderate and flexible management and support from all participants.

C. Industry-Based Catch Reporting – Norwegian Reference Fleet (Norway)

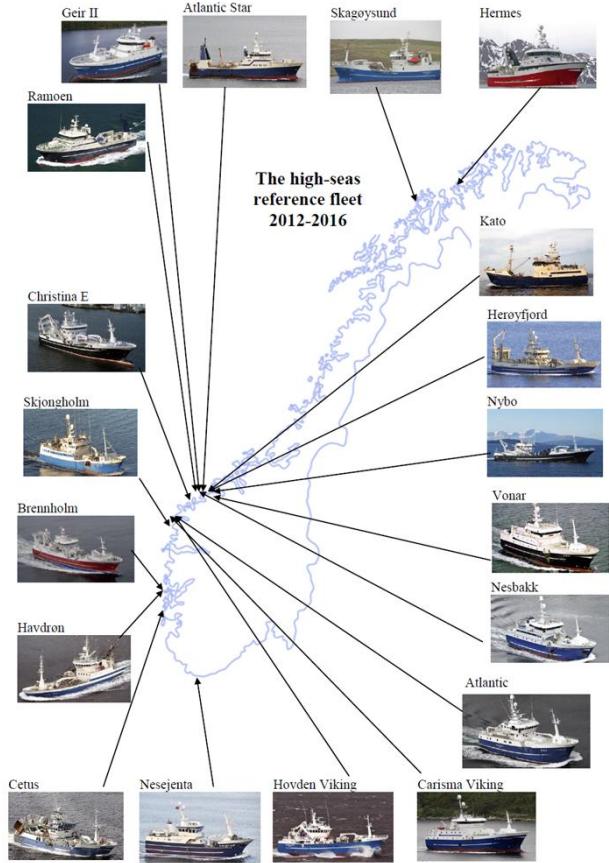


Two representatives from Norway attended the International Summit: Kjell Nedreaas and Stig Blø. Kjell Nedreaas is a principal research scientist at the Norwegian Institute of Marine Research (IMR), where he has worked since 1984. Nedreaas has extensive experience conducting research surveys and fish stock assessments, through which he has established close working relationships with the commercial fishing industry. Nedreaas was instrumental in developing the Norwegian Reference fleet, which is the focus of this case study. Stig Blø is the factory manager on the Norwegian Freezer Trawler *Ramoen*, which is part of the Norwegian Reference Fleet. In addition to his duties as factory manager, Blø is also responsible for collecting catch data and biological samples for IMR. Although a native to Norway, Blø has

fished all over the world. Nedreaas and Blø's presentations and abstract can be found at <http://cfrfoundation.org/summit>. A brief summary of their presentations is as follows.

- The Norwegian Reference Fleet is a small group of Norwegian fishing vessels that provide the Institute of Marine Research (IMR) with detailed information about their fishing activity and catches on a regular basis.
- The Reference Fleet aims to improve data collection and information flows to and from fishermen and scientists.
- A High-Seas Reference Fleet was established in the year 2000 and consists of 19 vessels (mainly freezer trawlers, larger than 28 meters in length).
- In 2005, a Coastal Reference Fleet was established, which is composed of 21 vessels (mainly gillnetters, and less than 15 meters in length).
- Each Reference Fleet vessel is equipped with an electronic fish sampling board, scales, an otolith sampling device, and a PC with specialized software for satellite communication.
- Crew members are trained to conduct self-sampling following IMR's protocols, and regular communication ensures sampling diligence.
- Every day, Reference Fleet vessels report their fishing location, trawl type, tow time, and depth.
- Every other day, Reference Fleet vessels collect catch composition data for commercial and bycatch species, including the length and weight of 30 individuals per species.
- Once a week, Reference Fleet vessels collect otoliths from 20 different species.
- During spawning seasons, Reference fleet vessels collect data on the sex and maturity of cod, haddock and saithe.
- Reference Fleet vessels also respond to requests for genetic samples, fish stomachs, contaminant and radioactivity samples, and tagging.
- It takes 2-4 hours per day for the Reference Fleet vessels to collect all of the required data, but industry feels it is worthwhile.
- Reference Fleet data is widely used in stock assessments, particularly for length and age-based modeling, conversion of catch in tones to catch in numbers, and as a tuning index for changes in stock abundance.
- Life history parameters, such as growth rate, maximum size, and age/size at maturity, are also derived from Reference Fleet data.
- Other applications of Reference Fleet data include studies of biodiversity, species distributions, discard dynamics, and species interactions.
- Public announcement every fourth year opens up for replacement of the fleet and motivates fishermen involvement.
- The Reference Fleet is self-financed by an allocation of Norwegian fish quotas for research purposes. The funding model, however, will be changed to a catch tax system in 2014.

High Seas Reference Fleet



Coastal Reference Fleet

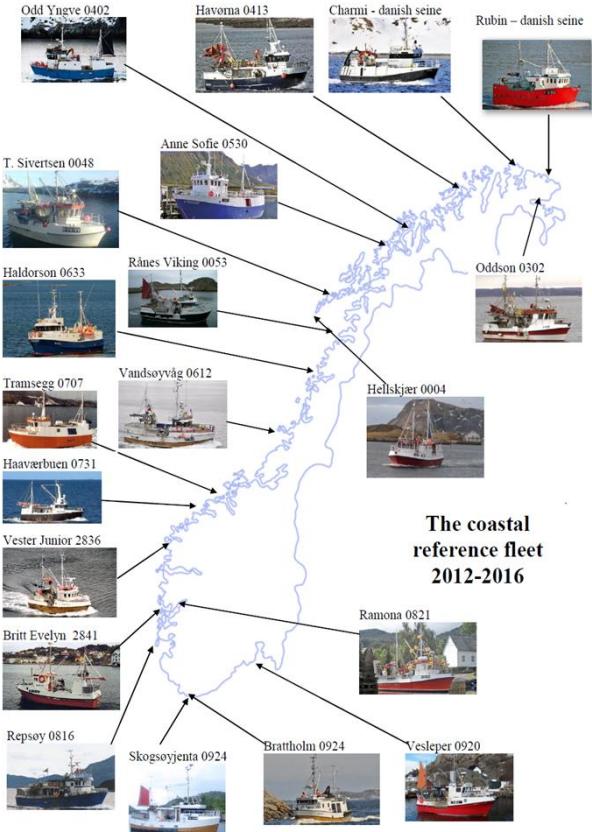


Figure 6. Distribution of participant vessels in the High Seas and Coastal Reference Fleets throughout Norway for the period of 2012-2016. Figure courtesy of K. Nedreaas, IMR.

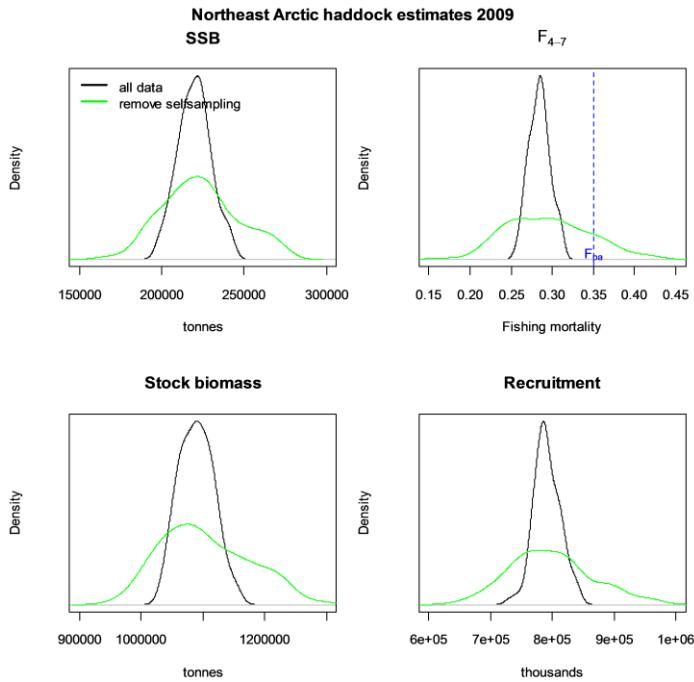


Figure 7. Improvement in the accuracy of Northeast Arctic haddock population estimates with the inclusion of data from the Norwegian Reference Fleet. Black curves represent model estimates including Reference Fleet data; Green curves represent model estimates excluding Reference Fleet data. SSB = Spawning Stock Biomass. F = Fishing morality. Figure courtesy of K. Nedreaas, IMR, Norway.

Major Discussion Points: Industry-Based Catch Reporting - Norwegian Reference Fleet (Norway):

- Trained industry data collectors have been shown to be as accurate as observers and in some cases provided better data, given that some fishermen fish differently with an observer on board.
- Reference Fleet data is owned and managed by the government, but provided to industry as requested. Industry is comfortable with this because they trust how the data is being used.
- Too few vessels participate (40 vessels out of 6000 total) to use the Reference Fleet as the sole source of fishery dependent data for all stock assessments, but the fleet does provide extremely valuable information, particularly about discards and bycatch which cannot be accurately captured via port sampling.
- Reference Fleet Catch Per Unit Effort (CPUE) is used as a tuning index for stock assessments and it seems reasonable for such an analysis of the U.S. study fleet data if and when the industry is concerned about stock assessment outcomes.
- Error often motivates progress - the Norwegian Reference Fleet was started after an inaccurate cod stock assessment that was based on sparse data.
- Every four years the IMR advertises for Reference Fleet participants via a government tender process. Typically 50% of the Reference Fleet changes over to new vessels, while 50% of the fleet is composed of returning vessels.

- Norwegian industry vessels are also used for fishery independent surveys, particularly in areas that research vessels cannot readily access or properly set gear.
- Vessel crews often feel empowered by their participation in the Reference Fleet - they feel a responsibility for the marine resources they rely upon, are aware of the threat of overfishing, and are proud to be part of the solution.
- In addition to financial compensation, Reference Fleet participants benefit from newfound awareness and knowledge of their catch and bycatch.
- Training, quality control, and continued outreach and communication are key to the success of the Reference Fleet.

VI. Discussion Sessions – Small Group and Plenary



During the last afternoon of the 1.5 day summit, small group and plenary discussion sessions were organized to provide an opportunity for summit participants to collectively reflect on the material presented over the course of the summit and begin to discuss how to apply it to the challenges being faced in the Northeast. This portion of the agenda was aimed at identifying the means for advancing collaborative research and its application to stock assessments in the Northeast. Discussion sessions were structured around four major questions. These questions and the major points made in response are summarized below.

What is your reaction to the information presented during the summit?

- There is a lot more trust between fishermen and scientists in the case study countries than the Northeast U.S. This trust is the first step towards successful collaborative research and improved stock assessments.
- Industry buy-in was, and continues to be, key to the success of each case study.
- The impetuses for collaborative research programs tend to be either a fishery crisis or a stock assessment or management action that contradicts what industry believes to be true.
- Fishermen greatly appreciated the openness of case study scientists to identify mistakes made in past assessments and work with fishermen to make improvements to model assumptions.

- Industry access to collaborative research data is necessary - it gives the fishing industry leverage.
- The case studies show that industry vessels can and should be involved in data collection for stock assessments, including landings, discards, and independent surveys. This approach has resulted in more accurate and reliable science in all three cases studies.

Given the situation in the Northeast, how do we benefit/learn from these case studies?

- Encourage honest and open communication by establishing forums to talk to (not at) one another about current issues in the fishery and ideas for improvement.
- Acknowledge that industry needs to take more of a leadership role. Collaboration with managers and government scientists is necessary, but industry may be relying too much on others to drive collaborative projects.
- Consider that there are two broad types of collaborative research: 1) annual surveys to create a time series (for an index of relative abundance), and 2) projects that address specific research questions (i.e. migration patterns, life history parameters). Different strategies are needed for each. It may be more effective to focus on the latter.
- Expand the use of collaborative research to develop mechanistic understandings of fish stocks/communities, rather than relying on retrospective analyses for stock assessments.
- Address a core problem with the current stock assessment approach in the Northeast which is that long-term surveys and retrospective landings do not keep pace with rapid changes occurring beyond fish extraction - most of which may be caused by environmental factors and changing ecosystem dynamics.
- Invest in industry research fleets which have been shown to be cost effective and produce good quality data.
- Direct industry data collection efforts to build on current data sets, not replace traditional data streams or traditional data gatherers.



What are the key lessons from the case studies that are applicable in the Northeast?

- The focus should be on willing industry participants; others will not collect good data. Collaborative research is not for everyone.
- Non-participants may not approve of collaborative work, but this is inevitable.
- There is a need for cohesive regional programs - part of the New England problem is that the programs are fragmented and funding levels fluctuate. This is one reason why collected data does not get used.
- Industry members will be motivated to be involved if they feel that the research will lead to better science and management that will reduce uncertainty and allow them to make informed business decisions.
- Both scientists and fishing industry members should be involved from the start, specifically the data end users (stock assessment scientists).
- All parties (i.e. members of the fishing industry, agency and outside scientists, and managers) must be considered equal partners.
- Government support is needed to ensure that projects can have consistency and permanence to develop time series, etc. and that collected data is valuable and will be used for stock assessments.
- Participants in collaborative research need to stay focused on addressing research questions, not controversies about management strategies or allocation decisions.



What are the next steps to enhance collaborative research in the Northeast?

Conceptual Next Steps:

- “Close the loop”- Create a best practice to always include participating fishermen, like any other research partners, in data review, analysis and conclusions.
- Bring together the many pieces already in place in the Northeast, in a comprehensive way. There is a core set of industry participants, private and academic institutes, foundations, and programs that do collaborative research, but the missing pieces are: 1) guaranteed funding sources; 2) involvement of the data end users; 3) broad

strategic/experiment design planning; 4) true collaboration in setting research priorities; and 5) input of these data into the stock assessment and management processes.

- Consider simpler assessment tools when data is lacking, while also working to obtain more data, including environmental parameters, to help evolve the models.
- Engage open-minded scientists who accept industry data as a reliable source for stock assessments to verify the value/applicability of collaborative research results.
- Work to build trust and reduce conflict between the fishing industry and fisheries scientists and managers via the following:
 - Fully involve industry in research, from experimental design through management application.
 - Achieve buy-in from all participants from the beginning - communication is key.
 - Make data collection and statistical analysis practices more transparent.
 - Acknowledge that trust and respect is a 2-way street and is needed to be successful.
- Make sure the lessons of this conference continue to be refined and shared with others.



Actionable Next Steps:

- Create a ‘Best Practices’ document that characterizes successful collaborative research.
- Establish forums that bring together fisheries scientists, managers, and industry representatives to discuss current issues in particular fisheries and ideas for improvement. Private research institutions may provide the best platforms for these discussions.
- Create an online listing of completed and ongoing cooperative research projects in the Northeast and elsewhere throughout the U.S.
- Establish an assessment Advisory Panel from which participants in Stock Assessment Workshops and Stock Assessment Review Committees could be drawn, as done in the Gulf of Mexico region.
- Improve the speed of data analysis and usage; do not rely on old data to manage modern fisheries. Leverage the Science and Statistical Committees to achieve this.

- Reinvigorate the Council's Research Steering Committee. Include stock assessment scientists and industry leaders , and use as a forum for high level research goals discussions.
- Involve fishermen in collecting environmental data to better understand climate change and fisheries ecology in the Northeast.
- Leverage the changes in leadership at regional NOAA offices to make progress towards a more collaborative approach to fisheries science and management in the Northeast.

VII. Wrap-Up Panel Discussion



For the final agenda item, a panel of representatives from the collaborative fisheries research community in the Northeast was asked to reflect on the items brought forth during discussion sessions and provide recommendations for moving forward with collaborative fisheries research in the Northeast. The panel consisted of: Peg Parker (Executive Director, Commercial Fisheries Research Foundation), David Goethel (Owner/Captain, F/V Ellen Diane), Sally McGee (Director of Northeast Marine Programs, The Nature Conservancy), and David Spencer (President, Commercial Fisheries Research Foundation and Owner of F/V Nathaniel Lee). The panel members provided the following suggestions for continuing the conversations and progress from summit proceedings.

- Set up a follow up meeting with Bill Karp and other NMFS NEFSC scientists, along with a subset of summit participants, to go over the major points made during the summit, receive their input and reaction, and explore further how the lessons during this summit can be applied in the northeast.
- Document the information shared during this summit in a summit report that can be used as a resource to help guide further efforts in the area of collaborative research to benefit stock assessments.

VIII. Poster Session

To provide summit participants with an overview of the collaborative fisheries research being conducted in the Northeast, a collection of poster presentations about industry-based data collection projects in the Northeast were displayed throughout the summit (see Appendix II for poster abstracts). The titles and authors of the poster presentations are as follows:

Piloting a Lobster Research Fleet Approach in New England - Working Towards a Sustainable Lobster Fishery Utilizing Fishermen Collected Data and New Technologies

Margaret E. Petruny-Parker, Executive Director, CCRF

David Spencer, President, CCRF, F/V Nathaniel Lee, Newport, Rhode Island;

Anna Malek, Program Administrator, Commercial Fisheries Research Foundation

Environmental Monitors on Lobster Traps: Building a Low-Cost Observing System with Help from Lobstermen

James Manning, Oceanographer, NOAA-NMFS Northeast Fisheries Science Center

Expansion of the MADMF Southern New England Ventless Lobster Trap Survey

Massachusetts Division of Marine Fisheries: Robert Glenn, Chief Marine Fisheries Biologist; Derek Perry, Marine Fisheries Biologist; Tracy Pugh, Marine Fisheries Biologist;

Mike Trainor, Fisheries Technician; Steve Wilcox, Assistant Marine Fisheries Biologist

Fishing Vessels & Captains: F/V Sherri & Deke, Capt. Arthur DeCosta; F/V Andrea C, Capt.

Aaron Cebula; F/V Cynthia Lee, Capt. Jarrett Drake

The Utility of Industry-Based Trawl Surveys for stock assessment: Examples from New England

Gregory DeCelles, Research Scientist, UMASS Dartmouth, SMAST

Replenishing Long Island Sound with Temperature Tolerant and Disease Resistant Lobsters

Mitch Sanders, Hans Laufer, Nicole Perlot, and Silvana Luongo, Lobstagen LLC

Electronic Monitoring in the Northeast

Glenn Chamberlain, Fishery Biologist, NOAA-Northeast Fisheries Observer Program

Developing a Tool for Collaborative Stock Assessment of Quahogs in Narragansett Bay

Dale Leavitt, Research Scientist, Roger Williams University

Eastern Gulf of Maine Sentinel Survey Fishery

Aaron Dority, Downeast Groundfish Initiative Director, Penobscot East Resource Center

iSnapper

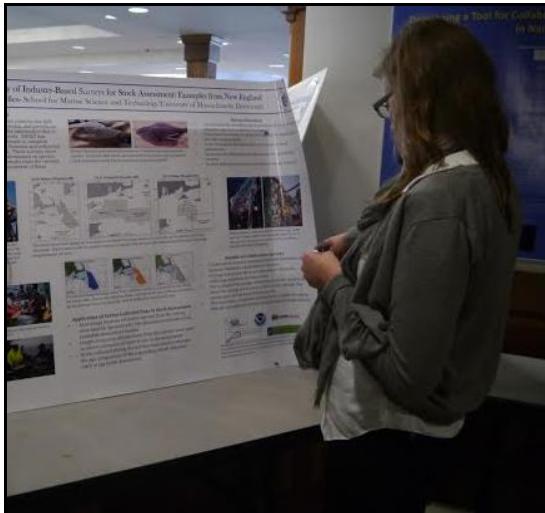
Michael Miglini, Great Sage LLC, Out to Sea LLC, Going Pelagic LLC, Charter Fisherman's Association, F/V Jaime, C/V Orion

Wicked Good Tuna: Partnering with Bluefin Fishermen Leads to a Wealth of New Biological Knowledge

Walter Golet, Research Scientist, University of Maine

Science Informing Management - How Fishermen and Scientists Lead the Way Towards a Sustainable Future for Atlantic Bluefin Tuna

Walter Golet, Research Scientist, University of Maine



IX. Reflection

The International Summit was an educational and inspirational event, thanks to an engaged group of participants, an accommodating agenda, and an overall sense of topical significance. The background presentations given by local scientists, fishermen, and managers laid out the many challenges facing Northeast fisheries, while the case study presentations identified key components of collaborative research that could help address these challenges. Compelling presentations led to industrious discussions, which resulted in a compilation of ‘next steps’ for moving forward with collaborative research in the Northeast.

Overall, the International Summit increased understanding of how the fishing industry, scientists and managers can better work together to collect better data in support of improved stock assessments. The international case studies provided proof of the ability and utility of the collaborative approach, and group discussions identified specific ways to move forward with collaborative research in the Northeast. Most importantly, the Summit provided an opportunity for participants to ask questions and learn from other collaborative research initiatives that have been successful, identify the key components of functional collaborative research, and be inspired by the success in other countries. An accomplishment of the International Summit that should not to be overlooked is the establishment of new connections between industry members, environmental organizations, scientists and managers, along with a renewed sense that collaborative research is a worthy pursuit. Hopefully, these connections will facilitate future partnerships in the Northeast and beyond.

APPENDIX I.

International Collaborative Research Summit

***"How Members of the Commercial Fishing Industry Assist with
Data Collection to Support Stock Assessments"***

AGENDA

Tuesday and Wednesday, October 1-2, 2013

Summit Objectives:

- Increase understanding of how the fishing industry, scientists and managers can better work together to collect data, and how this data can be used to improve stock assessments;
- Provide an opportunity for people to ask questions and learn from other collaborative research initiatives that have been successful;
- Provide networking opportunity for industry members, scientists and managers that may facilitate future partnerships;
- Gain a renewed sense of common purpose for working together to address the issues facing fisheries in the Northeast;
- Provide a written record of successful collaborative research examples to guide future work in the Northeast; and
- Identify next steps to enhance collaborative research in the Northeast.

Tuesday, October 1; 12:00 p.m. to 8:00 p.m.

12:00 – 1:00 Summit Registration and Coffee Available

1:00 – 1:30 Introductions and Overview of Summit Agenda

- *Peg Parker – Director, Commercial Fisheries Research Foundation*
- *Bill Karp – Director, NMFS Northeast Fisheries Science Center*
- *John Torgan – Director of Ocean and Coastal Conservation, The Nature Conservancy Rhode Island*
- *Video remarks from Senator Jack Reed and Senator Sheldon Whitehouse*

1:30 – 3:15 Setting the Stage: Northeast Regional Context for the Case Studies

- Data needs in managing the New England lobster fishery
 - *Bob Glenn, Fisheries Biologist, Massachusetts Division of Marine Fisheries*
- Challenges in providing stock assessments and management for short-lived species
 - *Jason Didden, Fishery Management Specialist, MAFMC*
- Where the Northeast stands with fishermen involvement in data collection
 - *John Hoey, Program Chief, Northeast Cooperative Research Program, NEFSC*

3:15 – 3:45	Break
3:45 – 4:30	<u>Setting the Stage: Introductory Overview of Case Studies</u> <ul style="list-style-type: none"> • <i>Anna Malek, Program Administrator, CFRF</i>
4:30 – 5:00	<u>Setting the Stage: Introduction of Case Study Representatives</u> <ul style="list-style-type: none"> • Collaborative Lobster Research (Nova Scotia, Canada) <ul style="list-style-type: none"> - <i>Patty King, General Manager, Fishermen and Scientist Research Society (FSRS)</i> - <i>John Levy, Commercial Lobster Fisherman & Past President of FSRS</i> - <i>John Tremblay, Fisheries Scientist, Fisheries & Oceans Canada</i> • Short-Lived Species Science and Management – Squid (Falkland Islands) <ul style="list-style-type: none"> - <i>Andreas Winter, Fisheries Scientist, Falkland Islands Fisheries Department</i> - <i>Michael Poole, Executive Secretary, Falkland Islands Fishing Companies Association</i> • Industry-Based Catch Reporting – Norwegian Reference Fleet (Norway) <ul style="list-style-type: none"> - <i>Kjell Nedreaas, Head of Demersal Fish Division, Institute for Marine Research, Bergen</i> - <i>Stig Blø, Demersal Freezer Trawler Factory Manager , F/T Ramoen</i>
5:00 – 6:00	<u>Cocktail Hour and Poster Session</u>
6:00 – 8:00	<u>Buffet Dinner and Conversation</u>

Wednesday, October 2; 8:15 a.m. to 4:00 p.m.

8:15 – 8:30	<u>Agenda Review</u>
8:30 – 9:45	<u>Case Study #1 – Collaborative Lobster Research - Nova Scotia, Canada</u> <ul style="list-style-type: none"> • Presentations and panel discussion
9:45 – 10:45	<u>Case Study #2 – Short-lived Species Science and Management - Squid - Falkland Islands</u> <ul style="list-style-type: none"> • Presentations and panel discussion
10:45 – 11:00	Break
11:00 – 12:00	<u>Case Study #3 – Industry-Based Catch Reporting - Norwegian Reference Fleet - Norway</u> <ul style="list-style-type: none"> • Presentations and panel discussion
12:00 – 1:00	Lunch

1:00 – 2:15 Small Group Discussion

Questions for Discussion:

- What is your reaction to the information presented during the summit?
- Given the situation in the Northeast, how do we benefit/learn from these case studies?
- What are the key lessons from the case studies that are applicable in the Northeast?
- What are the next steps to enhance collaborative research in the Northeast?

2:15 – 3:45 Plenary Discussion

- Synthesize small group feedback and identify ways to apply the lessons learned from the case studies in the Northeast
- Distill ideas for moving forward with collaborative data collection and data management in the Northeast
- Identify potential next steps to make collaborative data collection operational in the Northeast

3:45 – 4:00 Wrap-up and Appreciations

- Overview of lessons learned
- Acknowledgments

4:00 **Adjourn**



APPENDIX II.

International Collaborative Research Summit – Poster Session Abstracts

October 1-2, 2013

Piloting a Lobster Research Fleet Approach in New England - Working Towards a Sustainable Lobster Fishery Utilizing Fishermen Collected Data and New Technologies

*Margaret E. Petrunk-Parker, Executive Director, Commercial Fisheries Research Foundation;
David Spencer, President, Commercial Fisheries Research Foundation, F/V Nathaniel Lee;
Anna Malek, Program Administrator, Commercial Fisheries Research Foundation*

The American lobster fishery is a substantial and valuable fishery in the southern New England region, but there is agreement that the data used to manage the fishery is inadequate. Specifically, there is a marked mismatch between the location of primary lobster fishing grounds (>10 miles offshore), and the data used to assess the stock (<3 miles from shore). The natural history of this species and the impacts of climate change are also poorly understood. In response, the Commercial Fisheries Research Foundation has launched a collaborative pilot project aimed at developing an expedient, cost-effective way to fill these data gaps. Lobstermen use modern technologies such as Android tablets and digital calipers to efficiently and accurately record and transmit biological data (length, sex, eggs, shell-disease, V-notch) about retained and discarded lobsters, as well as the location (latitude/longitude), depth, and soak time of sampled trawls. Lobstermen are also able to make notes and record images using the tablets. State, regional, and federal managers and lobstermen worked together to develop the sampling protocol and data management policies. The potential exists to expand data entries to include environmental data. The pilot project involves 12 lobster vessels from the northeast coast (USA), and runs from January 2013 to June 2014. Feedback from participating lobstermen and scientists is encouraging, with other lobstermen in the area seeking to become involved. This pilot project can serve as a model for other fisheries, expanding fishermen involvement in data collection, and ultimately better informing resource management decisions.

Environmental Monitors on Lobster Traps: Building a Low-Cost Observing System with Help from Lobstermen

James Manning, Oceanographer, NOAA-NMFS Northeast Fisheries Science Center

Beginning in 2000, nearly a hundred New England lobstermen have been attaching internally-recording temperature probes to their traps. In 2001, several of these individuals also deployed Seabird Microcat salinity sensors. These time series are now being used to validate numerical model simulations. Beginning in 2004, surface drifters built by local students, have been deployed by lobstermen at dozens of locations along the coast. These units, equipped with low-cost GPS transmitters, have been used by approximately 50 different institutions since that time and have now collectively logged close to a million kilometers of ocean. In 2008, a set of low-cost bottom-current meters, recently developed by Vitalii Sheremet, have been installed on dozens of traps. It is now possible, therefore, to examine the variability of surface and bottom water conditions on hourly to inter-annual time scales at locations throughout the Gulf of Maine and along the Southern New England shelf. Time series and drifter tracks are available at www.emolt.org.

Year-to-year bottom temperature variations have been documented at most sites. Inter-annual differences of several degrees are attributed to both local climate and remote source water. While this signal is fairly coherent throughout the Gulf of Maine, other shorter-time-scale processes such as those due to local tide and wind are documented as well. The primary purpose of eMOLT data is to feed a set of numerical circulation models currently under development around the region. Given the observations of temperature, salinity, and current velocity, models can be initialized and validated. Natural processes potentially affecting the growth, survival, and ultimate fate of lobster and other marine species can be addressed using model output.

Expansion of the MADMF Southern New England Ventless Lobster Trap Survey

Robert Glenn, Chief Marine Fisheries Biologist, Massachusetts Division of Marine Fisheries

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The ventless trap survey that occurred in Buzzards Bay (MA state waters portion of LMA 2) has provided MADMF with a valuable tool for monitoring a historically productive region since 2006. However, as effort in the fishery has shifted progressively further from shore, the survey did not spatially overlap with the bulk of the current fishery, nor did it well represent the deeper habitat which the lobsters appeared to be occupying. Expansion of the survey into federal waters was conducted with the intent to accurately monitor the portion of the population on which the fishery currently operates, and to provide the only high resolution fishery-independent monitoring program in the Federal portion of LMA 2. This expansion added potential sampling stations in the federal portion of NMFS SA 538, as well as stations in the northern-most portion of SA 537, for a total of 42 sampling stations in 2011 and 2012. Results indicated that there were few lobsters within the shallow interior of Buzzards Bay, with legals and sublegals caught primarily in deeper waters outside the Bay. Ovigerous females in particular were extremely rare inside the Bay, but were captured in the new expanded area sampling stations. We concluded that the complete expanded survey area (including the original and new areas) was a more appropriate survey area for monitoring the lobster resource in this region. Additionally, the expanded area allows us to more effectively monitor commercially important bycatch species such as whelk and Jonah crabs, as well as any emerging fisheries.

The Utility of Industry-Based Trawl Surveys for Stock Assessment: Examples from New England

Gregory DeCelles, Research Scientist, UMASS Dartmouth, SMAST

Our experience with industry-based surveys demonstrates that forming collaborative partnerships between scientists and fishermen can greatly improve the results of surveys and stock assessments. In our research, involving members of the fishing industry during each stage of the survey design and planning process was critical for improving survey results. While planning surveys, we solicited

information from fishermen's experience to define our study areas, and to choose the most appropriate times of year to sample the resource. We collaborated with fishermen to define the survey objectives, design survey trawls, develop practical protocols, and interpret results. The greatest benefits from collaborating with the fishing industry have been realized during field work. Fishing vessels provide a cost-effective platform for fisheries-independent surveys. The local ecological knowledge of our industry partners allowed us to extend the sampling area to habitats that are difficult to trawl and are typically undersampled by research vessels. Fishermen's practical experience was also valuable for minimizing lost sampling time when problems arose, such as trawl damage. After field work and data analysis were completed, we found that it is important to share the results of the surveys with our industry collaborators, because their unique perspectives offered important insights into the results. By combining the skill sets of fishermen and fisheries scientists, collaborative industry-based surveys provide an important platform for collecting the information that is needed for accurate stock assessments.

Replenishing Long Island Sound with Temperature Tolerant and Disease Resistant Lobsters *Mitch*

Mitch Sanders, Hans Laufer, Nicole Perlot, and Silvana Luongo, Lobstagen LLC

The Southern New England (SNE) American lobster (*Homarus americanus*, H. Milne Edwards, 1837) stock is critically depleted, experiencing recruitment failure (Howell, 2012), and closed for the remainder of the lobster fishing season (Sept. 22-Nov. 14). The warmer than average water temperatures above 20°C caused respiratory and immune system distress of the mature and juvenile lobsters. This was compounded with a chronic wound infection referred to as epizootic shell disease (ESD) and other stressors that further depleted the stock in Long Island Sound (LIS, ASFMC, 2010). The warmer than normal water temperatures by the shoreline also caused the spawning females to migrate into deeper waters. This migration of spawning females and the mortalities due to ESD are hypothesized to account for the primary reasons why juvenile lobsters (stage 4) have lower than normal annual densities throughout LIS since 2001. The other concern is that the incidence of ESD is approaching 40% in Eastern LIS, making these lobsters completely unmarketable, and we are starting to see a higher incidence of ESD (although less than 3%) in Maine and Canada. Lobstagen LLC is a new start up in the Technology Incubation Program at University of Connecticut (UCONN TIP) located in Groton CT. Lobstagen LLC is dedicated to improving the sustainability and security of the American lobster through the development of innovative solutions to make lobsters temperature and epizootic shell disease resistant. The Lobstagen team have over 50 years experience in the lab studying the cell and molecular biology of the American lobster, host pathogen biochemistry and 20+ years experience in starting and growing successful companies- from product concept to commercialization. In addition, the management team has hired some very bright and energetic UCONN marine science graduates and compiled a world-class team of lobster expert consultants that cover all aspects of best practices in lobster aquaculture, disease management, and etiology. The purpose of this project is to develop ten novel biomarker assays to screen for lobsters that are temperature and epizootic shell disease (ESD) resistant. Lobstagen will use these biomarkers to develop a brood stock of temperature and disease resistant lobsters to replenish LIS and develop a world-class aquaculture facility for the American lobster.

Electronic Monitoring in the Northeast

Glenn Chamberlain, Fishery Biologist, NOAA-Northeast Fisheries Observer Program

The National Marine Fisheries Service's (NMFS) Fisheries Sampling Branch (FSB) of the Northeast Fisheries Science Center (NEFSC), is conducting a project in conjunction with Archipelago Marine Research Ltd., to investigate the utility of Electronic Monitoring (EM) technology as a monitoring tool in the Northeast Multispecies Fishery. The project relies on participating fishermen to collect high quality data using the EM system. Fishermen provide input to project staff on catch handling, vessel operations, and equipment performance throughout the study. Data collected by fishermen are compared to EM data and dockside monitor data during the study as well. Results of the EM study will be provided to fishery managers and policy makers to determine whether EM will be approved as a monitoring and data collection alternative.

Developing a Tool for Collaborative Stock Assessment of Quahogs in Narragansett Bay

Dale Leavitt, Research Scientist, Roger Williams University

Accurate stock assessment is important for keeping commercially fished resources at a sustainable yield. In Rhode Island, the bay quahog (*Mercenaria mercenaria*) is one of the most important commercial fisheries in Narragansett Bay. The state fisheries management agency assumes the job of stock assessment of these shellfish as part of their management process. However, due to increased responsibilities coupled with decreased staff, the RI Department of Environmental Management is hard pressed to undertake large-scale quahog stock assessments. The goal of this research is to improve the annual quahog stock assessment by establishing groundwork for cooperation between commercial bull rake fisherman and the RI DEM Marine Fisheries Division. We will work to determine a method to assess quahog standing stock through calibrating and standardizing the catch efficiency of a bull rake.

Eastern Gulf of Maine Sentinel Survey Fishery

Aaron Dority, Downeast Groundfish Initiative Director, Penobscot East Resource Center

Penobscot East Resource Center, in partnership with Dr. Yong Chen at the University of Maine, Orono and area fishermen is currently operating the fourth year of the Eastern Gulf of Maine Sentinel Survey Fishery. Participating fishermen fish with jig or longline gear for cod, cusk, haddock and other key groundfish stocks, gathering spatially-explicit catch data from a largely data-poor region of the Gulf of Maine to improve the stock assessment, and examine whether segmenting the assessment is warranted. This program augments data collected from both the spring and fall inshore trawl survey and the annual National Marine Fisheries Service survey by allowing access via fixed gear to areas that are untrawlable due to density of lobster trap gear and rocky bottom.

iSnapper

Michael Miglini, Great Sage LLC, Out to Sea LLC, Going Pelagic LLC, Charter Fisherman's Association

**Wicked Good Tuna: Partnering with Bluefin Fishermen Leads to a Wealth of New Biological knowledge
&
Science Informing Management - How Fishermen and Scientists Lead the Way Towards a Sustainable Future for Atlantic Bluefin Tuna**

Walter Golet, University of Maine, Research Scientist

Highly migratory species (tunas, billfish, sharks) are the most sought after fish in the sea. They are both valuable and an important source of protein and omega fatty acids for a large percentage of the worlds population. Despite decades of research into their life history, much of their basic biology is unresolved. This includes age, growth, migration patterns, reproductive strategies, and population structure. These biological attributes are key inputs for stock assessments models. Given the lack of data we have for these areas it is not surprising that stock assessments for highly migratory species contain high a high degree of uncertainty. This in turn makes management decisions very difficult, particularly since assessments are only done every four years. Gathering this biological information is not easy given these animal use most of the Atlantic basin each year to satisfy foraging and reproductive requirements. To adequately address these issues it is imperative to involve all sectors of the fishery. To that end, we have engaged the highly migratory species fishing community (recreational and commercial) in a comprehensive sampling program which allows us to sample Atlantic bluefin tuna (*Thunnus thynnus*) from Maine to Rhode Island with limited personnel. This program has proved highly successful, sampling at times up to 20% of the entire U.S. catch in the region. During the past three summers we have sampled over 1,300 bluefin tuna ranging in size from 68 to 310cm curved fork length. We have even trained individual fishermen to extract tuna otoliths themselves (no easy task). This program has provided samples to national and international scientists to better understand bluefin age, growth, population structure, contaminants, reproduction, distribution, and fisheries dynamics. The outputs from projects related to the collection of these samples will be used in the upcoming 2015 bluefin tuna assessment and should provide a more robust biological framework with which to build the assessment. It has resulted in the formation of significant partnerships between industry, science and management. The sampling model used for this project is currently being expanded to include many other highly migratory species along the eastern U.S. (yellowfin, bigeye, swordfish) and would be suitable for groundfish and other near coastal pelagic species.

APPENDIX III.

International Collaborative Research Summit - Participant List

October 1-2, 2013

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APPENDIX IV.

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