Scallop Survey Working Group (SSWG)

September 2022
Report and Recommendations

Council Meeting
September 27, 2022
Gloucester, MA
Report and Presentation Overview

- Background and Purpose
- SSWG organization, process, and membership
- Terms of Reference – Results and Recommendations
  - 1) Description of current system
  - 2) Coordinated strategy for scallop surveys
  - 3) Survey methods for changing environment, including offshore wind impacts
  - 4) Survey data products to support future stock assessments and projections
- SSWG Conclusions and Next Steps
Council established the SSWG in 2021 to address issues identified by:
- 2015 Scallop Survey Peer Review
- 2018 Scallop Stock Assessment Review Committee (65th SARC)
- 2019 Council Research Set-Aside Program Review
- Impacts from offshore wind development

Purpose of SSWG:
- Facilitate collaboration around integrated approaches to conducting scallop surveys that support stock assessment and management;
- Explore mechanisms for implementation of new approaches

SSWG recommendations can be considered as a roadmap for next steps
- Council, NOAA, and survey partners each have mechanisms to advance recommendations
Co-Chairs present SSWG recommendations to the Council

Scallop Survey Working Group
(Convened by the Council)

Council Considers Recommendations

NOAA Fisheries (NEFSC) Considers Recommendations

Council’s Scallop RSA Process
Scallop PDT Survey Analyses

RSA Supported Surveys

Annual Specifications (Fishery Allocations)

NEFSC Scallop Surveys
Approach to surveys and offshore wind
Database architecture
Research Track Assessment (2024)

Survey Strata

Updated Scallop Projection Model (GeoSAMS)
Organization and Membership

- Council solicited working group members with expertise across fields
  - Survey design and methods, statistics, data management, stock assessment, scallop biology, habitat, and management

- Contracted facilitators
  - 7 SSWG meetings
  - Multiple sub-groups

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Role and Sub-Group</th>
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<tbody>
<tr>
<td>Peter Chase</td>
<td>NOAA Northeast Fisheries Science Center</td>
<td>Co-Chair</td>
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<tr>
<td>Bill DuPaul</td>
<td>NEMFC Scallop Plan Development Team</td>
<td>Co-Chair</td>
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<td>Dave Bethoney</td>
<td>Commercial Fisheries Research Foundation</td>
<td>Member, Wind</td>
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<td>Han Chang</td>
<td>NOAA Northeast Fisheries Science Center</td>
<td>Member, Data</td>
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<td>Scott Gallager</td>
<td>WHOI/Coastal Ocean Vision</td>
<td>Member, Data</td>
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<td>Dvora Hart</td>
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<td>Chad Keith</td>
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<td>Paul Kostovick</td>
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<td>Andy Lipsky</td>
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<td>Member, Wind</td>
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<td>Amber Lisi</td>
<td>Maine Department of Marine Resources</td>
<td>Member, Data, Wind</td>
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<tr>
<td>Roger Mann</td>
<td>Virginia Institute of Marine Science</td>
<td>Member, Wind, Assessment</td>
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<tr>
<td>Drew Minkiewicz</td>
<td>Fisheries Survival Fund</td>
<td>Member, Wind</td>
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<tr>
<td>Tasha O'Hara</td>
<td>Coonamessett Farm Foundation</td>
<td>Member, Data</td>
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<tr>
<td>Jonathon Peros</td>
<td>NEFMC Scallop Plan Coordinator</td>
<td>Member, Data, Wind, RSA</td>
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<td>Dave Rudders</td>
<td>Virginia Institute of Marine Science</td>
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<tr>
<td>Liese Siemann</td>
<td>Coonamessett Farm Foundation</td>
<td>Member, Data, Wind</td>
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<td>Ryan Silva</td>
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<td>Kevin Stokesbury</td>
<td>School for Marine Science and Technology</td>
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<td>Paul Rago</td>
<td>MAFMC Science and Statistical Committee</td>
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<td>Fishery Applications Consulting Team</td>
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<td>Jessica Joyce</td>
<td>Tidal Bay Consulting</td>
<td>Facilitator</td>
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<tr>
<td>Sam Asci</td>
<td>NEMFC Scallop Plan Development Team</td>
<td>Staff Support</td>
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SSWG Process

- Initial task was to draft clear Terms of Reference focusing on:
  - Assessment of the current scallop survey system
  - Strategies for a more coordinated scallop survey system, including
    - Spatial coverage, sampling intensity, and sampling frequency
    - Data standardization, delivery, access, and storage
    - Automated detection of scallops
    - RSA survey priority setting and planning
  - Survey methods for a changing environment, including offshore wind impacts
  - Survey data needs to support future stock assessments
- Council and NEFSC approved [SSWG Terms of Reference](#) in April 2021
Term of Reference #1

- Describe the current survey system, including survey (dredge and optical) methods, design, and data products, as well as the process for determining annual survey coverage.

- Description of each survey (NEFSC and RSA-funded partners)

- Scallop Survey Metadata Catalog
  - Data fields collected from each survey
  - Useful to develop a data repository

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Definition</th>
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<tbody>
<tr>
<td>timestamp</td>
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<tr>
<td>imagename</td>
<td></td>
</tr>
<tr>
<td>lat</td>
<td>Latitude</td>
</tr>
<tr>
<td>lon</td>
<td>Longitude</td>
</tr>
<tr>
<td>heading</td>
<td>Vessel heading</td>
</tr>
<tr>
<td>alt1</td>
<td>HabCam height from the seafloor from 200kHz pinger</td>
</tr>
<tr>
<td>st_alt</td>
<td>HabCam height from stereo rectification</td>
</tr>
<tr>
<td>vehicle_depth</td>
<td>HabCam depth</td>
</tr>
<tr>
<td>pitch</td>
<td>Rotation of HabCam vehicle from horizontal front to back</td>
</tr>
<tr>
<td>roll</td>
<td>Rotation of HabCam vehicle from horizontal side to side</td>
</tr>
<tr>
<td>yaw</td>
<td>Rotation of HabCam vehicle from vertical side to side</td>
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</tbody>
</table>
Term of Reference #1

- Process to determine spatial coverage and sampling intensity
- RSA priority setting, proposal submissions and review, project selection
- RSA Pre-Award Negotiations
  - NOAA decision informed by RSA technical and management reviews
- NEFSC survey “fills the gaps”
  - Sampling focused in areas not extensively covered by RSA groups
Term of Reference #1 – NEFSC Parallel Project

- NEFSC project considered re-stratification of scallop survey strata
  - Dredge survey uses random stratified design based on shellfish strata
  - Re-stratify to better reflect scallop distribution

- Project evolved to consider new survey approach - GRTS

- SSWG considered NEFSC efforts and supported continued development of alternative sampling strategies and recommended that new approaches should be peer-reviewed and coordinated with all survey partners

Generalized Random Tessellation Stratified

- Addresses simple random and stratified random sampling issues
- Flexible with changing conditions
- More precise results
- Adaptable to issues at-sea
Describe and assess a coordinated strategy for sea scallop resource assessment surveys and investigate opportunities and methods for implementation. Address each of the following areas:

- Spatial coverage, including the Northern Gulf of Maine
- Sampling frequency and intensity within and between surveys
- Data standardization, delivery, access, and storage
- Automated scallop detection
- RSA survey priority setting process and long-term planning
Spatial Coverage, Sampling Intensity, and Frequency

Assess Current System

- Current system has supported science and management objectives but lacks a set of guiding principles

Describe New Approaches

- Identify survey coverage needs, sample types, sampling intensity and frequency
- Consider data analysis methods to produce data products that support management
- Develop mechanisms to ensure survey system meets science and management objectives

Recommendations and Implementation

- Implement Scallop Survey Guiding Principles
Benefits of the current system:

- Multiple independent surveys provide a mechanism to check and compare estimates of abundance, biomass, density, etc.
- The data needs of some resource areas benefit from redundant surveys that use different sampling designs and technologies (e.g., optical and dredge).
- The inclusion of multiple partners provides flexibility within the survey system and lowers risk of lost coverage under anomalous conditions (e.g., Covid).
- The competitive RSA program has promoted innovation and improvements.
- Alternative survey designs may be more adaptable and spatially balanced when applied for specific sampling tools.
- RSA survey cost efficiencies are aligned with management and industry expectations.
Scallop Survey Guiding Principles

- The Council and NEFSC adopt Scallop Survey Guiding Principles to inform survey-related decision-making, RSA priorities and program adaptations, and future science and management efforts and advice (Appendix 2).

Rationale:

- Ensure adequate survey coverage, sampling intensity, frequency, and sampling types
- Maintain flexibility in the survey system

Implementation:

- Living document that provides guidance for surveys and data products for long-term use
- Consider and apply to align with other SSWG recommendations
- Council and NEFSC determine appropriate application and administrative oversight
- Future modifications should be made in consultation with all survey partners
Data Standards, Storage, Access, Auto Detection

Assess Current System

- System has met objectives, but has more weaknesses than strengths
- No NEFSC dedicated funding or staff resources
- Lack of understanding of automated detection utility

Describe New Approaches

- Consider funding and resources to support data management
- Consider a public repository for survey data
- Consider ways to advance utility of automated detection

Recommendations and Implementation

- NEFSC prioritize resources for dedicated scallop survey data management
- NEFSC develop and maintain survey repository using data principles
- Conduct a review of automated detection technology
The NEFSC should prioritize scallop survey data management and provide resources for dedicated personnel for data/database management

**Implementation:**
- Prioritization to support URGENT, IMPORTANT, and STRATEGIC needs for scallop survey data management
- NEFSC should consider available and additional funding and staff resources
- Coordinate with all survey partners to identify efficiencies for scallop data management
- Assess risk and vulnerabilities to inform contingencies for data storage, access, delivery
The NEFSC should dedicate sufficient annual resources to develop and maintain an operational scallop survey data repository using FAIR data management principles.

Implementation:

- SSWG recommends this as an URGENT priority
- NEFSC develop a repository that includes standard data fields and QA/QC criteria that can be shared through web services in machine-readable format
- Must be operational beyond development phases and maintained in perpetuity
- Initial development with dredge data to inform structure, integration and interface tools
- Explore costs and develop mechanisms to add optical data and new surveys
NEFSC Dredge Data Format and Delivery

VIMS Dredge Data Format/Delivery

ME DMR Dredge Data Format/Delivery

NEFSC HabCam Data Format/Delivery

CFF & COV HabCam Data Format/Delivery

SMAST Drop Cam Data Format/Delivery

New Surveys Data Format/Delivery

URGENT: 2022 Data Format and Delivery

IMPORTANT: 2-3 years Repository Structure/API

STRATEGIC: 3-5 years Operational Survey Repository

Dredge Data Repository

HabCam Data Repository

Drop Cam Data Repository

Optical Data Standards

Scallop Survey Repository
  • Web-based data uploads
  • Data fields and QA criteria
  • Auto-population of data tables
  • Share through web-services
The NEFSC and Council should coordinate a review of automated detection technology

Implementation:

- SSWG recommends this as an URGENT priority
- Define review objectives, for example:
  - Determine status of technology and methods for application
- Identify appropriate reviewers
- Coordinate a peer-review style meeting
- Should not be conducted as part of the stock assessment process
SSWG highlighted the success of the Scallop RSA Program and emphasized the benefits of the RSA-funded scallop surveys:

- High level of data collection
- Multiple independent estimates
- Industry collaboration, trust, and buy-in
- Innovation and improvements for surveys

SSWG recognized that the program has worked well and focused on ideas for increased coordination.
SSWG objectives for RSA planning and coordination:

- Address the disconnect between priorities, proposals, and survey needs
- Increase flexibility to match surveys with science and management needs
- Ensure all survey partners (including NEFSC) have input in research objectives
- Better align RSA surveys with the NEFSC survey planning process
RSA Survey Strawman – Longer-Term Awards

- SSWG strawman proposal for longer-term RSA survey awards up to 5 years
  - Adaptation of current program that allows for 2-year awards
  - Iterative approach for implementation for broad scale regions
  - Maintain ability to make shorter awards for specific areas (e.g., rotation areas)

Following Awards for Long-Term Surveys

- Develop RSA Priorities
- Notice of Federal Funding
- RSA Reviews
- Proposals for Annual Surveys and Others
- Funding Decision for Annual Surveys and Others
- Feb/March: Awards & Survey Plan

Identify coverage needs for long-term surveys

Coordinated strategy to meet Survey Guiding Principles
RSA Coordination Recommendations

- NOAA should provide a report detailing the feasibility and legal requirements to revise the Scallop RSA Program to allow for longer-term survey awards (up to five years).

- Implementation:
  - NOAA provide a report to the Council detailing:
    - Allowable duration of survey awards with rationale
    - Administrative and programmatic changes required to support longer survey awards
    - Timeline to administer annual RSA Program, including Notice of Funding Opportunity, proposal solicitation, reviews, negotiations, and awards
    - Description of RSA Program administration and authority
  - SSWG recommended this as URGENT to be completed in advance of the 2023 RSA priority setting process (by February 2023)
NOAA and the Council should revise the Scallop RSA Program to allow for longer-term survey awards and collaboratively develop a rigorous, standard process to ensure coordination of annual survey spatial coverage and sampling intensity.

**Implementation:**
- Prioritize in 2023
- Inclusion in the 2023 Notice of Federal Funding for surveys beginning in 2024
- Adapt or develop review processes to determine annual survey coverage and intensity
  - Modifications to the technical and management review processes
  - Area coverage determination must avoid conflicts of interest from survey applicants
Term of Reference #3

- Identify survey methods, tools, and designs to monitor and assess the scallop resource in a changing ocean environment that includes offshore wind installations and changes in resource and fishery distributions.

- **NOAA Fisheries and BOEM Federal Survey Mitigation Implementation Strategy**

- SSWG identified impacts and potential mitigation approaches specific to scallop surveys
Term of Reference #3

- SSWG considered the scope and scale of offshore wind development
1. Preclusion

2. Statistical Design

3. Habitat Change

4. Sampling

- Gear/Vessel Operability
- Area Coverage
- Timing
- Random Design
- Patchiness
- Distribution Shift
- Sampling Rate
- Biological Samples
- Calibration
IMPACTS

1. Preclusion
2. Statistical Design
3. Habitat Change
4. Sampling

Bias/Error
Time Series
Biomass Estimates
Area Estimates
Cohort Tracking
Recruitment & Mortality
Model Capability
Projection Ability

ACT
Reduced
Loss of Flexibility
Area Management Uncertainty
Reduced Projection Ability
Increased Uncertainty (Overall Accuracy and Precision)
NOAA should implement the “NOAA Fisheries and BOEM Federal Survey Mitigation Implementation Strategy” including the Atlantic sea scallop survey.

Rationale:
- SSWG supported the NOAA/BOEM Strategy and emphasized need for dedicated new and additional annual resources
- Extensive spatial and temporal scales of offshore wind development
- Insufficient resources to maintain current scallop survey needs and develop a survey mitigation program
- Major change to marine user environment requires new dedicated resources
Simulation modeling should be conducted to characterize the impacts of wind energy development on the scallop survey system and assess the feasibility of alternative sampling methods.

**Implementation:**
- SSWG recommended this as an IMPORTANT priority to be developed over multiple years.
- NEFSC and Council should consider mechanisms to coordinate, fund, and conduct simulations.
- SSWG suggested simulations should consider, but not be limited to:
  - Assess impacts on the ability to support science and management.
  - Assess how wind installations may alter habitat and impact surveys.
- SSWG recommended including this as a 2023/2024 Scallop RSA priority.
Guidelines should be developed for offshore wind monitoring surveys to collect data and generate data products to supplement the scallop survey system

Implementation:

- Provide wind companies with the Scallop Survey Guiding Principles document
- Consider results from ongoing RSA projects and wind monitoring surveys testing data collection protocols and alternative scallop survey tools
- Council and NEFSC should coordinate with BOEM to identify key wind company personnel to assist in developing strategies for survey designs, data sharing, and mechanisms to leverage data collection efforts
- SSWG recommends that all data needs to be publicly accessible
The scallop survey enterprise should develop robust strategies that can be implemented over multiple timescales.

**Implementation:**
- Develop, test, evaluate, and implement new survey tools to supplement existing tools
- Consider other global systems and examples
- Consider all types of wind installations (e.g., fixed and floating arrays)
- Strategies should be developed iteratively as wind energy installations advance
Term of Reference #4

- Identify and catalog the survey data products needed to support stock assessment approaches in the future and outline a process for modifying the scallop survey system to collect identified data products.

- SSWG compiled a catalog of survey data products and survey collection methods to support future stock assessment and projection needs.
<table>
<thead>
<tr>
<th>Assessment Topic</th>
<th>Scallop Survey Needs</th>
</tr>
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<tbody>
<tr>
<td><strong>Age Samples and Aging Methods</strong></td>
<td>• Continued collection of age samples (shells) for laboratory analysis</td>
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<td></td>
<td>• Continue explorations of aging methods using resilium</td>
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<td></td>
<td>• Annual age samples are required to produce annually-specific age-length keys, survey and fishery ages, annual growth information</td>
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<tr>
<td><strong>Density-Dependent Effects</strong></td>
<td>• Integrate information from other resource surveys beyond scallops</td>
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<td></td>
<td>• Characterization of condition factor by examining shells at sea and in the laboratory</td>
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<tr>
<td><strong>Fecundity Estimates</strong></td>
<td>• Continued collection of gonad weights at sea (wet weights)</td>
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<tr>
<td></td>
<td>• Continue evaluation of wet and dry gonad weight ratios (in laboratory)</td>
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<tr>
<td></td>
<td>• Annual samples for biological reference points</td>
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SSWG Conclusions

The SSWG assessed the current scallop survey system and concluded that the overall system is one of the best data collection programs in the world:

- Multiple independent estimates of biomass, abundance, and density
- Ability to integrate estimates to meet science and management objectives

Recommendations for improvement focused on:

- Data and database management
- Increased coordination and collaboration among survey groups
- Guiding Principles to ensure standards and consistency
The SSWG considered future needs of the scallop survey system in a changing environment

- Aspects of the system may minimize impacts from offshore wind development
  - Range of tested and applied physical and optical survey tools
  - Ability to adapt to model-based survey designs
  - Methods to integrate multiple data streams
- Data needs for future assessment approaches have been developed
  - Scallop aging methods and estimates of fecundity

Recommendations for improvement focused on:
- Survey needs over multiple spatial and temporal scales, recognizing potential changes in resource and fishery distribution
Next Steps for Survey Partners

- Working Group effort has concluded, but members expressed continued commitment to assist in implementing the SSWG recommendations

- Consensus to adopt Scallop Survey Guiding Principles
  - Ensure spatial coverage and sampling intensity
  - Standards for data analysis and delivery

- Willingness to help with data repository development
  - Standard data fields
  - Provision of archived data

- Continued development of methods and technologies for wind energy areas
  - RSA priority
  - Data sharing from wind area monitoring efforts
Questions