Atlantic Sea Scallop Survey Working Group
Report: Appendix 2

Scallop Survey Guiding Principles
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Background
The Scallop Survey Working Group (SSWG) recommended that the New England Fishery Management Council (Council) and Northeast Fisheries Science Center (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. The Guiding Principles were developed to ensure adequate survey coverage, sampling intensity, frequency, and sampling types needed to generate data products to support annual scallop management, while maintaining flexibility in the system to continue the provision of independent estimates from survey partners. This is intended to be a living document that provides guidance for surveys and data products for long-term use. The guidance may be considered and applied to align with SSWG recommendations related to survey coordination, data standardization, and impacts from offshore wind energy development. The Council, Scallop Plan Development Team (PDT), and NEFSC should determine appropriate implementation and administrative oversight related to the guidelines. The SSWG recommends that future modifications to Survey Guiding Principles should be made in consultation with all scallop survey partners.

Survey Coverage:

• The entire scallop resource and spatial distribution of the fishery should be surveyed annually. The overall resource survey will consist of multiple survey partners, including the NEFSC and RSA-funded organizations, using dredge and optical tools. The primary objective of these surveys is to provide length frequencies, abundance, and biomass estimates for use in science and management by the Scallop PDT.

• Specific resource areas (e.g., rotational management areas, areas of identified recruitment, areas with anomalous biology or mortality, and areas of importance to the fishery) should be covered with redundant surveys that use different sampling technologies (e.g., optical and dredge) to provide multiple independent estimates of abundance, biomass, and density.

• Areas outside of the currently known scallop resource and spatial distribution of the fishery that could potentially support scallop biomass should be surveyed regularly on a longer-term time step. New survey areas should be informed by data and identified by the Scallop PDT, scallop survey partners, and the scallop fishing industry.

• The Northern Gulf of Maine management area and Gulf of Maine resource area should be included in regular survey coverage.

• Efforts should be made to match appropriate sampling tools, designs, and methods with specific conditions of survey areas (e.g., habitat type, gear conflict regions, wind farms).

• Survey coverage determination should consider areas of current and future offshore wind energy development.

• The annual decision process for integrating the changing patterns of NEFSC and RSA survey designs and coverages should be documented and stored in the data repository.
**Sampling Intensity and Frequency**

- Underlying conditions of survey areas should be considered to determine required sampling levels (e.g., schedule of rotational management areas, recruitment and cohort tracking, abundance and density, condition factor, disease and predator prevalence).
- Surveys should be conducted on multiple spatial scales with higher sampling intensity directed to priority areas.
- HabCam survey annotation rates and data delivery expectations should be identified and agreed to during RSA negotiations and established in RSA awards.
- Sampling objectives should be considered in the pre-survey planning phase (e.g., optical track allocation, dredge sampling locations within strata), as well as post-survey analysis phase (e.g., estimates of precision, accuracy, and bias).

**Types of Sampling**

- Samples required from all resource and fishery areas to support annual management, stock assessment, and science include scallop counts, measurements, and biological samples. The overall scallop survey system includes, but is not limited to, collection of meat and gonad weight, age and growth samples, reproductive state, sex, disease documentation, and meat quality. Each survey method collects different types of samples that are integrated to support scallop science and management.
- Collection of additional biological and environmental information should be conducted, and efforts should be made to increase utilization of data products that are not directly applied to scallop science and management (e.g., ecosystem monitoring, habitat mapping, predator abundance and distribution estimates, etc.).

**Data Analysis**

- Analysis of survey data should generate data products to support annual scallop management for each SAMS/survey area, as identified by the Scallop PDT, including biomass, abundance, density, average meat/gonad weight, and length frequency.
- Data analysis in support of annual specification setting should be based on standardized criteria defined by the Scallop PDT (e.g., area-specific shell height to meat weight (SH:MW) equations, defined size classes for pre-recruits, recruits and adults, dredge efficiency, commercial dredge selectivity).
- The process for HabCam surveys to check for autocorrelated data for model-based estimation methods includes:
  - Aggregate the annotated data by 750m segments
  - Calculate Moran’s I statistics for only the positive aggregated data points for each area to check whether the data are spatially autocorrelated using reviewed methods (e.g., ArcGIS, QGIS, R function in Moran.I in library ape)
  - If data are not spatially autocorrelated (p>0.05), review potential reasons for the lack of correlation with NEFSC and Council staff (e.g., too few images were annotated, or spatial structure is absent)
  - In the absence of autocorrelation, the NEFSC will recommend appropriate methods to generate biomass estimates to the Scallop PDT (e.g., stratified mean estimation Chang et al., 2017).
Data Delivery

- Survey data products must be available in August of the year the survey is conducted.
- Survey data delivery format should follow guidelines for standardization, as defined by the Scallop PDT in coordination with the NEFSC. Data delivery elements include data submission to the NEFSC based on standardized fields and formats, as well as data submission to the Council through Survey Short Reports, which should include descriptions of survey specifications (e.g., survey dates, survey gear type, mesh size, liner presence, camera resolution, annotation rate, pixel to mm measurement ratio, etc.).
- Survey data from all survey partners should be made accessible upon request, as defined by the RSA Data Sharing Plan requirements.