

DRAFT SSWG Stock Assessment Needs July 2022

TOR #4: Identify and catalogue 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.

Description:

- *This TOR will include, but not be limited to, the following items:*
 - *Description of survey data outputs needed to support potential changes to stock assessment models, including age samples and ageing methods, growth information and density-dependent effects, scallop meat weight sampling, and estimates of fecundity.*
 - *Consider survey data products and survey spatial scale needed to support a spatially explicit methodology for forecasting the abundance and distribution of sea scallops by incorporating spatial data from surveys, landings, and fleet effort.*

Background

The scallop stock is currently assessed with a length-based, dynamic, non-equilibrium model based on a forward simulation approach, called the Catch at Size Analysis (CASA) model. The scallop stock assessment approach also includes a Stochastic Yield Model (SYM) for calculating reference points and their uncertainty. Annual scallop management is supported by the Scallop Area Management Simulator (SAMS) model used to project scallop abundance and landings ([NEFSC, 2018](#)). The SSWG evaluated the data products from the current scallop survey system and concluded that the system collects the required information to generate data products to support the CASA and SYM assessment models and the SAMS projection model (Metadata catalogue - TOR #1).

In recent years, there has been interest in investigating an alternative assessment method for scallops using an age-based approach. An age-based model calibrates a length-based model and includes a description as to whether or not the age-length relationship is constant throughout the exploited range of the fishery and/or constant over time. It can also improve description of recruitment in species where age estimation for small/young individuals is difficult, and description of mortality where age estimation of large/old individuals is difficult, both of which are the case for scallops ([Mann et al., 2019](#)). There has also been interest in applying scallop gonad weight instead of adductor muscle (meat) weight to assess stock status and calculate biological reference points. Additionally, a geostatistical projection model (GeoSAMS) to characterize spatial variation in scallop distribution is under development. The SSWG considered the survey data requirements needed to support development of an age-based assessment approach, a fecundity-based approach, as well as a geostatistical projection model (Table 1).

The SSWG, which includes stock assessment, geostatistical modeling, and data analysis experts, provided recommendations for consideration by the Scallop Research Track Assessment Working Group. SSWG discussions of survey data needs to support future assessment approaches were integrated with comments related to the assessment Terms of Reference.

Table 1. Scallop survey data needs and requirements to support future stock assessment and projection models.

Assessment Topic	Scallop Survey Needs
<i>Age Samples and Aging Methods</i>	• Collection of age information at sea? Imaging of shells and resilium
	• Collection of age information in lab? Bring shells back from sea
	• Preferred aging method? Shells, resilium, combination?
	• How many samples per area?
	• Annual collection requirements?
	• Supplement survey data collection with fishery samples?
	• Is there enough information to inform age-based model?
	• What are the requirements for surveys moving forward?
<i>Growth</i>	• What is needed to support alternative assessment?
	• What survey tools can collect needed information?
	• How can surveys provide additional information in anomalous growth areas?
	• What are the requirements for surveys moving forward?
<i>Density-Dependent Effects</i>	• What additional information could surveys collect in high density areas? (plankton, water temp, substrate, etc.)
	• What survey tools can collect needed information?
	• How would additional information be used for assessment?
	• How could this inform projection models?
	• What are the requirements for surveys moving forward?
<i>Fecundity Estimates</i>	• Collection of gonad weight at sea?
	• Collection of gonad information in the lab?
	• How many samples per area?
	• Annual collection requirements?
	• Is there enough information to inform a gonad-based assessment?
	• What are the requirements moving forward?
<i>Spatial Scale</i>	• Survey data products from regions off Cape Cod, the Gulf of Maine, and the Northern Gulf of Maine management area are needed to support inclusion in scallop stock assessments
	• Sampling should link the Great South Channel to the Gulf of Maine
	• <i>Future surveys and assessments should consider changing distribution and geographic range of the scallop resource (Chang et al., 2021).</i>
Projection Model	Scallop Survey Requirements
<i>Geostatistical Approach</i>	• Autocorrelated data from HabCam– refer to Guiding Principles
	• What data needs from dredge and drop cam?
	• What other requirements from surveys moving forward?

Recommendations

1. Consider environmental data from scallop surveys to support future stock assessments.

Rationale:

The Research Track Assessment process identified generic Terms of Reference (TORs) that are applied for all stocks, including:

1. *Identify relevant ecosystem and climate influences on the stock. Characterize the uncertainty in the relevant sources of data and their link to stock dynamics. Consider findings, as appropriate, in addressing other TORs. Report how the findings were considered under impacted TORs.*

Implementation Strategies:

- The SSWG recommended that the NEFSC and Scallop Research Track Assessment Working Group consider environmental information collected by scallop surveys to identify relevant ecosystem and climate influences on the stock.
- Consider application of automated annotation tools to create “new” environmental data products from past survey data collections (e.g., changes in presence/absence of predators over time, changes in substrate composition).

2. Consider alternative modeling approaches in the Scallop Research Track Assessment process.

Rationale:

The SSWG highlighted ongoing RSA-funded research to evaluate aging methods from archived scallop shells, as well as methods to collect age data at-sea during annual surveys. The SSWG also noted that dredge surveys have been collecting gonad weights in recent years. These data may support development of new or alternative stock assessment methods for scallops.