Scallop Survey Working Group (SSWG)

September 2022

Report and Recommendations

Council Meeting
September 27, 2022
Gloucester, MA

New England
Fishery Management
Council

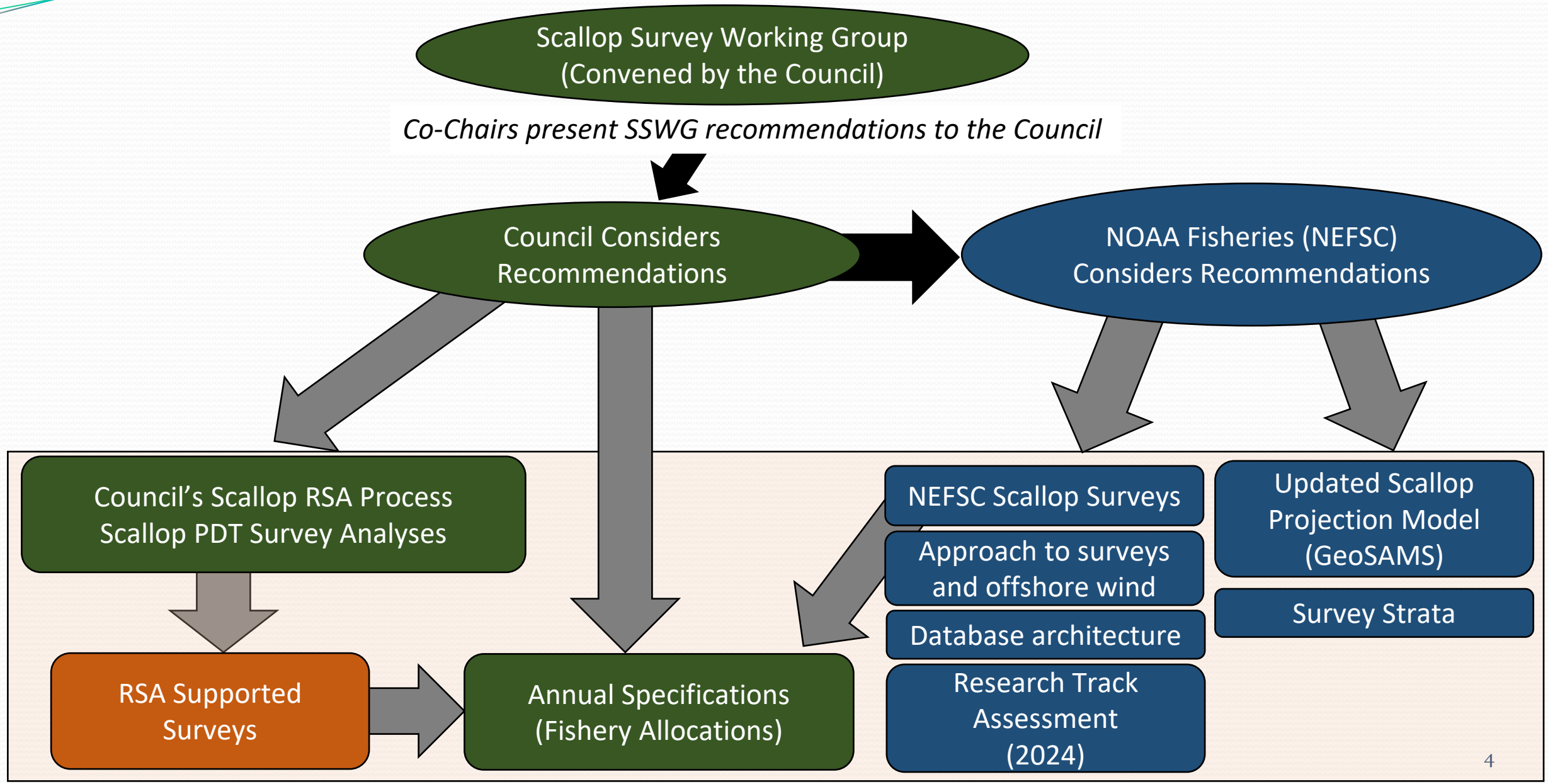
Report and Presentation Overview

- 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

Background and Purpose

- Council established the SSWG in 2021 to address previously identified issues:
  - 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, NMFS, and survey partners each have mechanisms to advance recommendations

SSWG Recommendations Roadmap



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

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

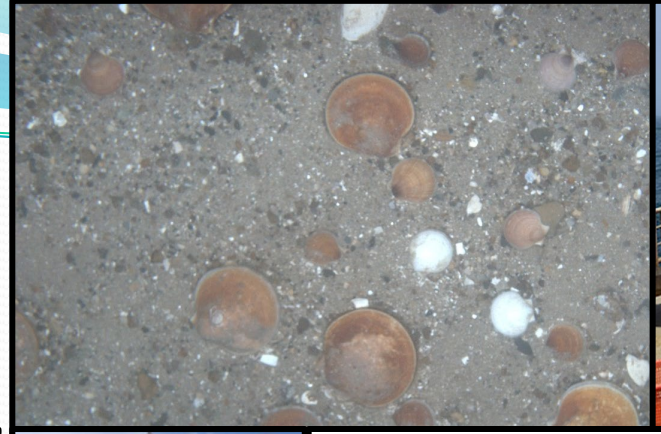
SSWG Process

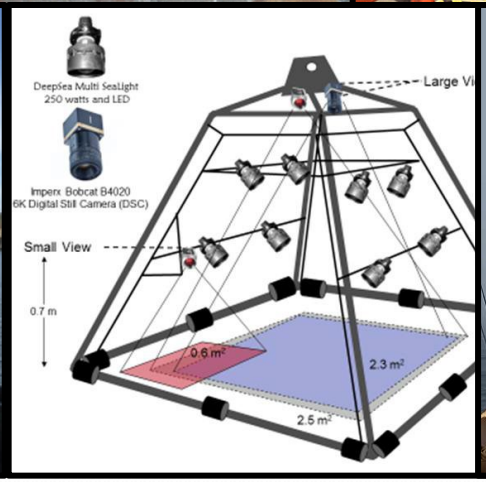
- Initial task was to draft clear Terms of Reference focusing on:
  - Assessment of the current scallop survey system
  - Strategies for a more coordinated scallop survey system, including
    - Spatial coverage, sampling intensity, and sampling frequency
    - Data standardization, delivery, access, 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
  - All data fields collected from each survey
  - May be useful to develop a data repository



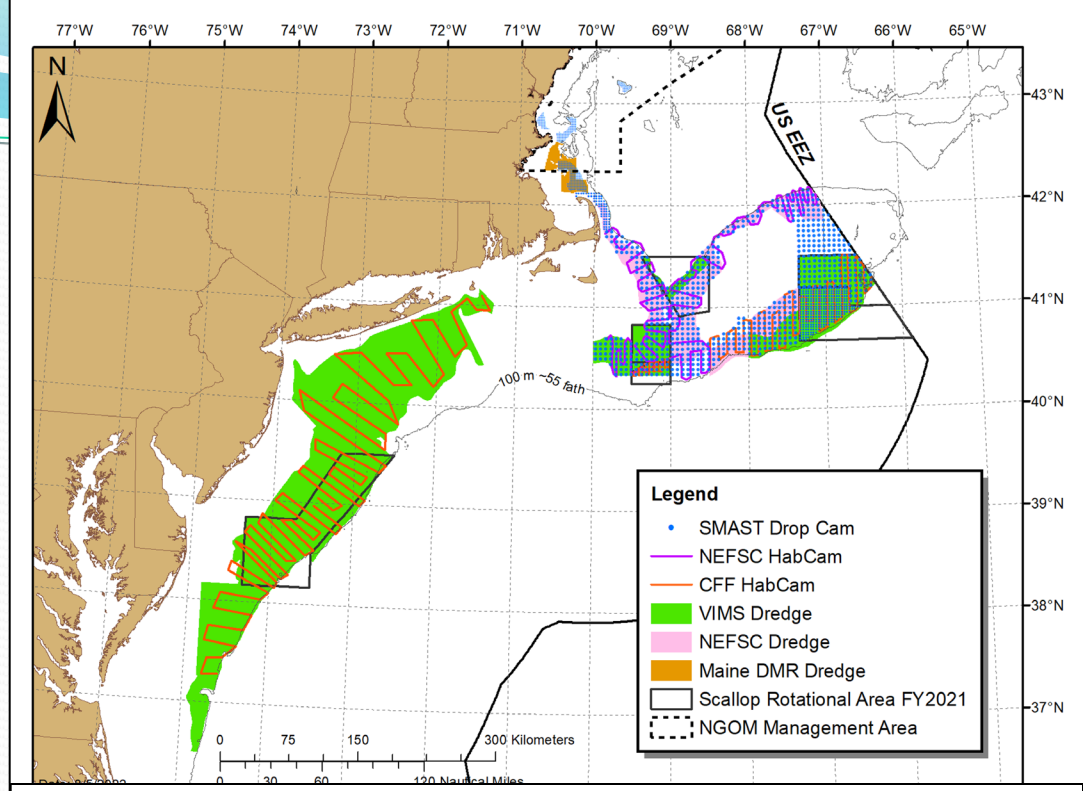


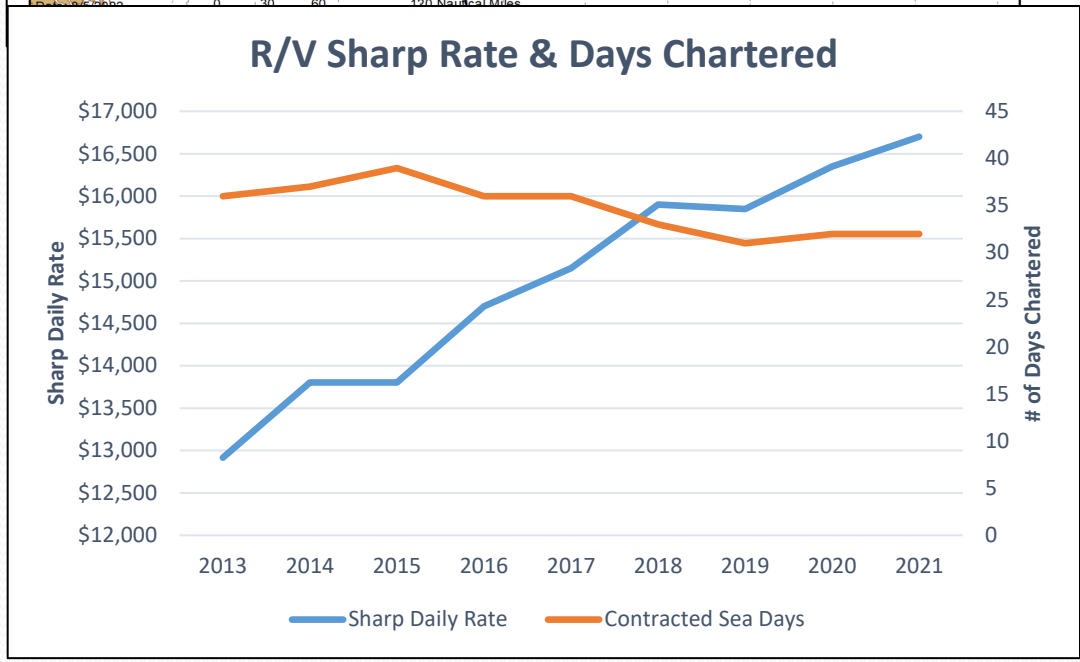
WHOI/COV Data Fields

Data Field	Definition
timestamp	
imagename	
lat	Latitude
lon	Longitude
heading	Vessel heading
alt1	HabCam height from the seafloor from 200kHz pinger
st_alt	HabCam height from stereo rectification
vehicle_depth	HabCam depth
pitch	Rotation of HabCam vehicle from horizontal front to back
roll	Rotation of HabCam vehicle from horizontal side to side
yaw	Rotation of HabCam vehicle from vertical side to side

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 dredge survey uses random stratified design based on shellfish strata
- Project to consider re-stratification, led to developing new sampling method
  - Generalized Random Tessellation Stratified (GRTS)
- SSWG supported continued development of alternative sampling strategies and recommended that new approaches should be peer-reviewed and coordinated with all survey partners

Addresses simple random and stratified random sampling issues by maintaining random sample selection and ensuring spatial coverage and distance between samples

Generates random samples, estimates inclusion probabilities, applies local variance estimator for spatial structure

Flexible with changing conditions, more precise results, spatially balanced samples, bridges systematic and random designs, reduces variance, adaptable to issues at-sea

Term of Reference #2

- **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 → Describe New Approaches → Recommendations and Implementation

- Current scallop survey system has supported science and management objectives for the scallop resource and fishery but lacks a set of guiding principles to ensure coordination, efficiency and transparency for spatial coverage, sampling intensity and sampling frequency

- 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

- Implement Scallop Survey Guiding Principles

Term of Reference #2

- 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 partner organizations provides flexibility within the survey system and lowers risk of lost spatial coverage under anomalous conditions (e.g., Covid)
  - The competitive nature of the 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 SSWG recommended that 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 → **Describe New Approaches** → **Recommendations and Implementation**

- System has met objectives, but has more weaknesses than strengths
- No NEFSC dedicated funding or staff resources
- No process for data merging, data sharing, reliable back-up
- Lack of understanding of automated detection utility

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

- 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

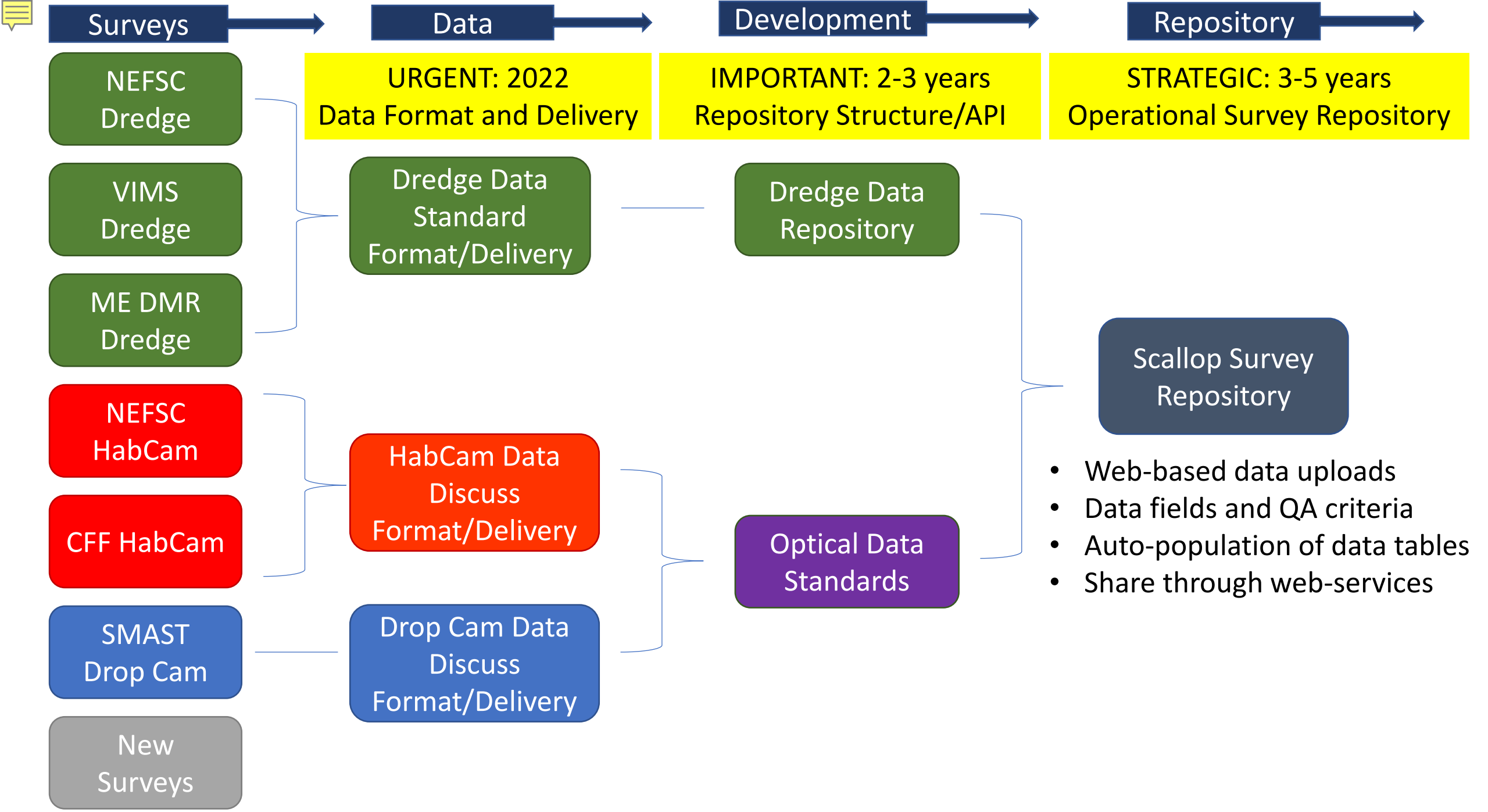
Data Recommendations

- The Northeast Fisheries Science Center 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

Data Recommendations

- The Northeast Fisheries Science Center should dedicate sufficient annual resources to develop and maintain an operational scallop survey data repository using FAIR data management principles

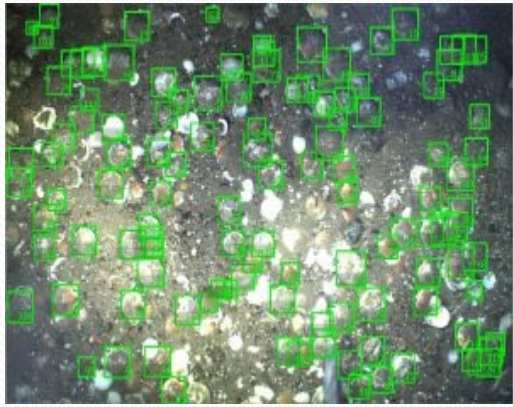
  - Implementation:
    - SSWG recommends this as an URGENT priority
    - NEFSC develop a repository that includes standard data fields and QA/QC criteria that can be shared through web services in machine-readable format
    - Must be operational beyond development phases and maintained in perpetuity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

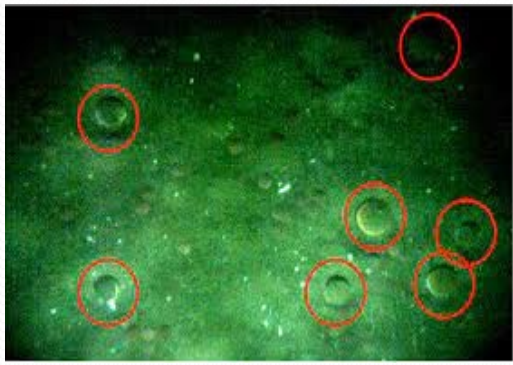

Surveys
Data
Development
Repository
NEFSC Dredge
VIMS Dredge
ME DMR Dredge
NEFSC HabCam
CFF HabCam
SMAST Drop Cam
New Surveys
URGENT: 2022 Data Format and Delivery
IMPORTANT: 2-3 years Repository Structure/API
STRATEGIC: 3-5 years Operational Survey Repository
Dredge Data Standard Format/Delivery
HabCam Data Discuss Format/Delivery
Drop Cam Data Discuss Format/Delivery
Dredge 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

Data Recommendations

- The Council and NEFSC 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



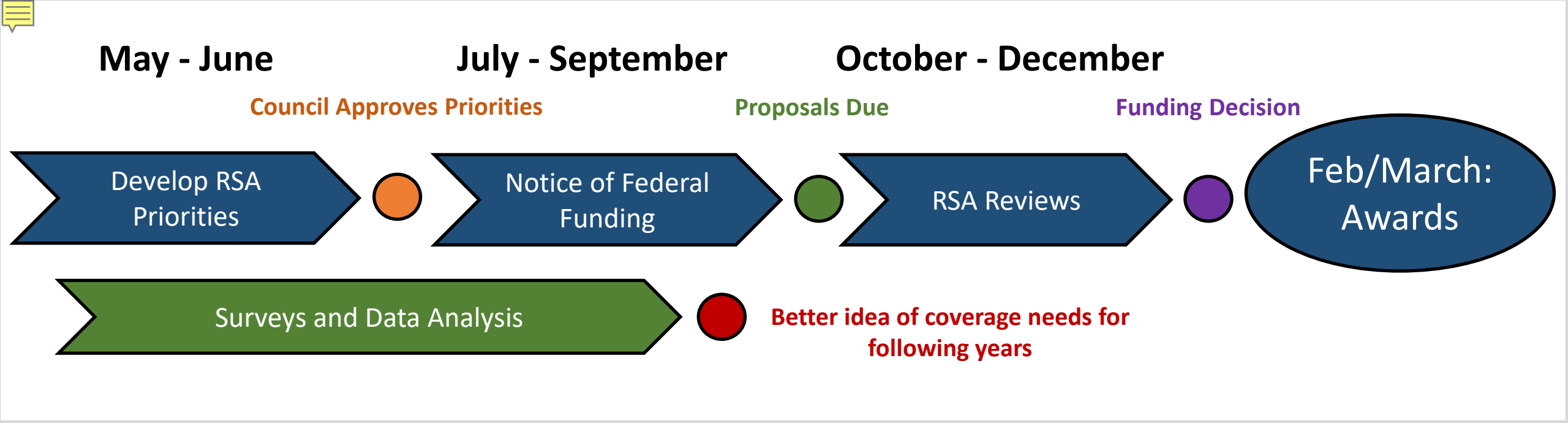


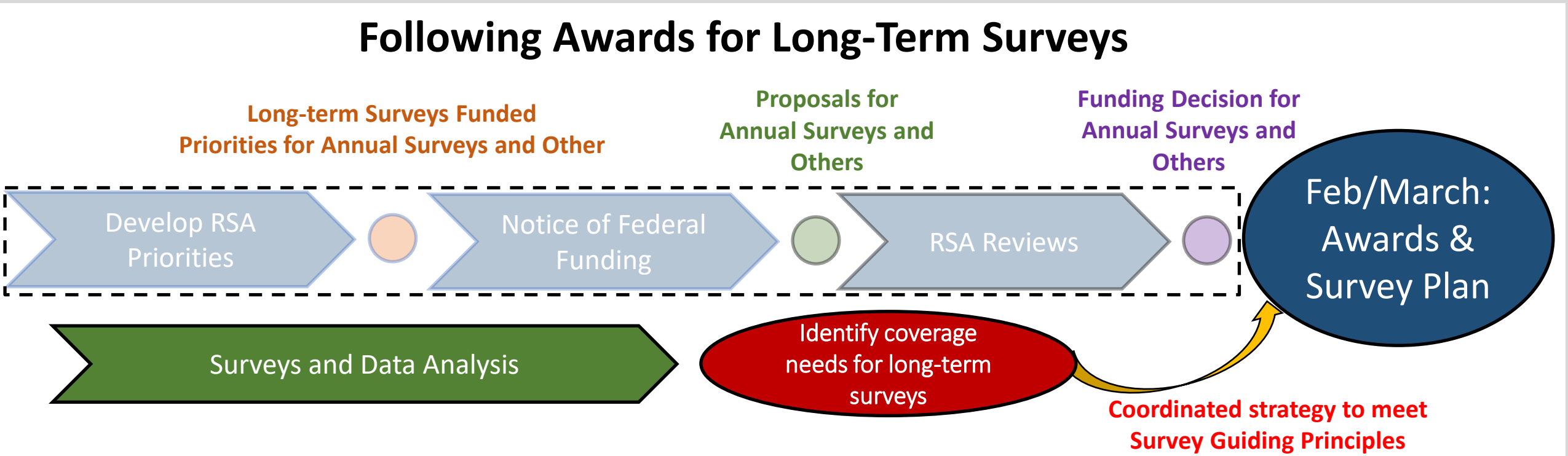
RSA Survey Priorities and Planning

- 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
  - Reduce resources required to support annual grants, including proposals and administration
  - Ensure all survey partners (including NEFSC) have input in research objectives
  - Support focused research efforts (e.g., area-specific topics, data collection of other species, habitat research, and environmental indicators, etc.)
  - Match survey tools to specific area conditions (e.g., habitat/gear constraints in survey areas, need for biological samples)
  - Better align RSA surveys with the NEFSC survey planning process (i.e., move away from “filling the gaps” approach)

RSA Survey Strawman – Longer-Term Awards

- SSWG developed a “strawman proposal” around concept for longer-term RSA survey awards for up to 5 years
  - Adaptation of current program that allows for 2-year awards
- Iterative approach for implementation for broad scale regions
  - Mid-Atlantic, Georges Bank, Gulf of Maine
  - Maintain ability to make shorter awards for specific areas (e.g., rotation areas)
- Requires rigorous process to determine annual spatial coverage and sampling intensity
  - Adapt the technical and management review process, AND/OR
  - Develop new formalized process including input from management, science, technical, and fishing industry experts to improve transparency


May - June
July - September
October - December
Council Approves Priorities
Proposals Due
Funding Decision
Develop RSA Priorities
Notice of Federal Funding
RSA Reviews
Feb/March: Awards
Surveys and Data Analysis
Better idea of coverage needs for following years


Following Awards for Long-Term Surveys
Long-term Surveys Funded
Priorities for Annual Surveys and Other
Proposals for Annual Surveys and Others
Funding Decision for Annual Surveys and Others
Develop RSA Priorities
Notice of Federal Funding
RSA Reviews
Feb/March: Awards & Survey Plan
Surveys and Data Analysis
Identify coverage needs for long-term surveys
Coordinated strategy to meet Survey Guiding Principles

RSA Coordination Recommendations

- The Council and NOAA should revise the Scallop RSA Program to allow for longer-term awards (up to 5 years) and collaboratively develop a rigorous, standard process to ensure coordination of annual survey spatial coverage and sampling intensity.

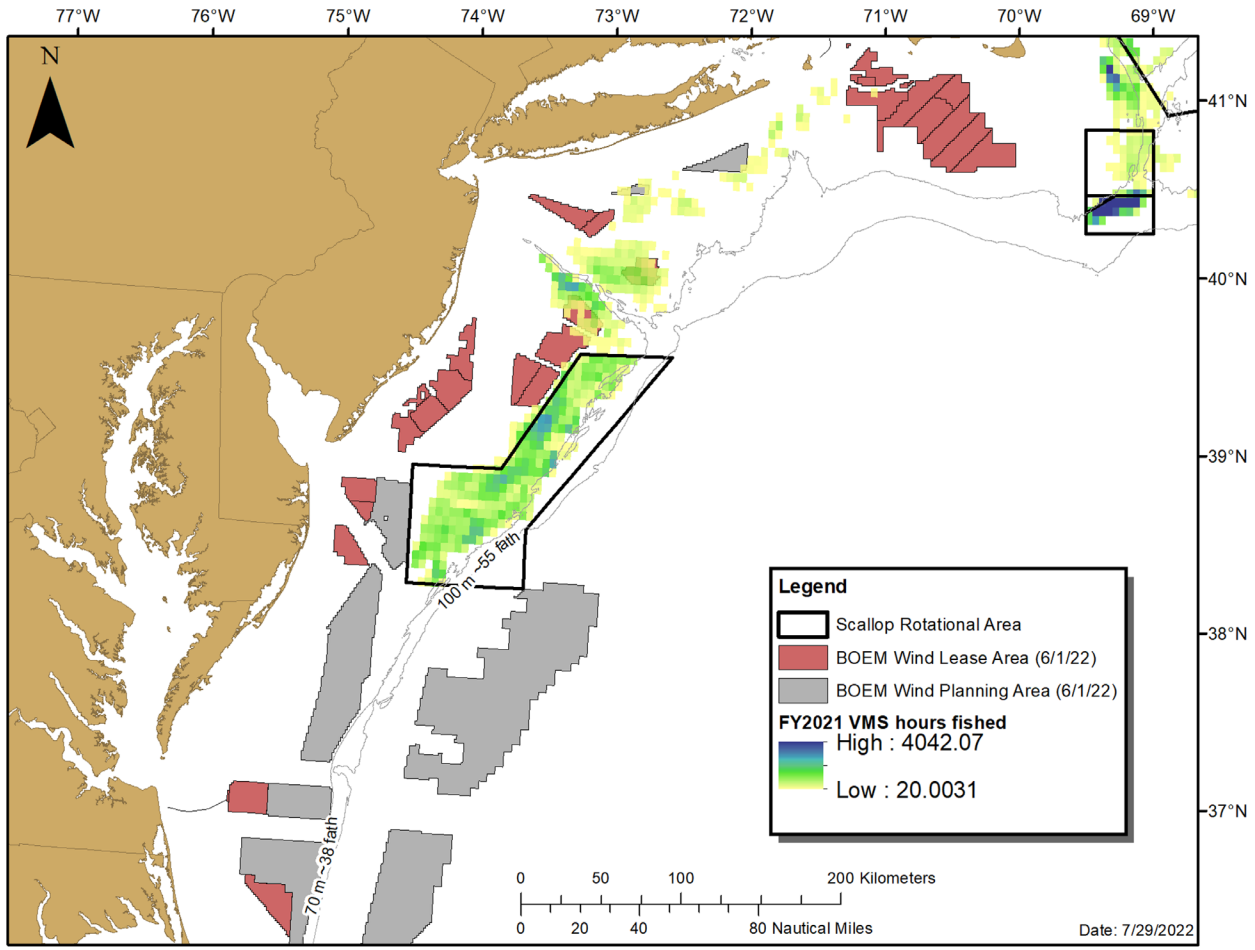
  - Implementation:
    - Inclusion in the 2023 Notice of Federal Funding for surveys beginning in 2024
    - Adapt or develop review processes to determine annual survey coverage and intensity
      - Modifications to the technical and management review processes
    - Area coverage determination must avoid conflicts of interest from survey applicants
    - Clarify administrative roles of the RSA program

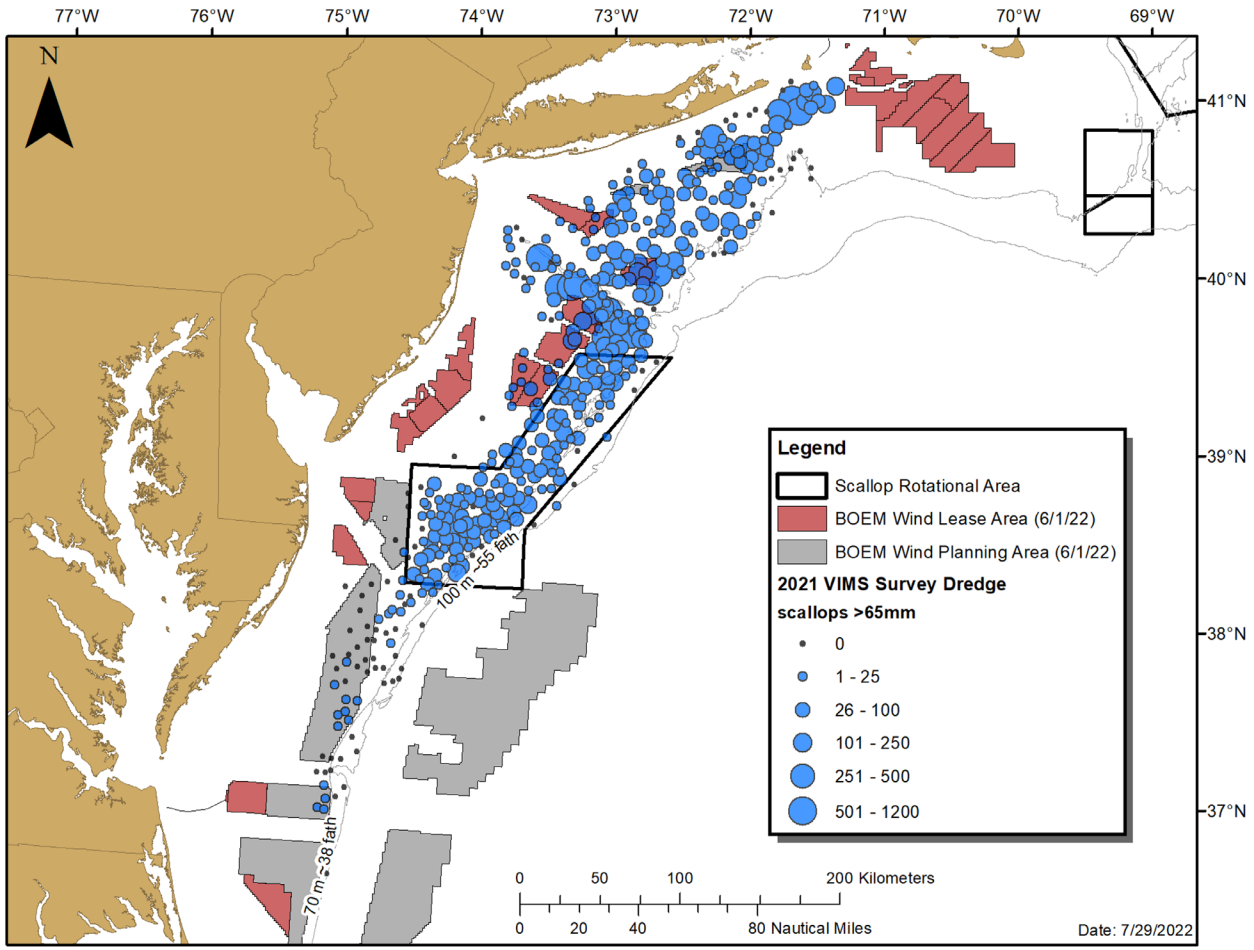
Term of Reference #3

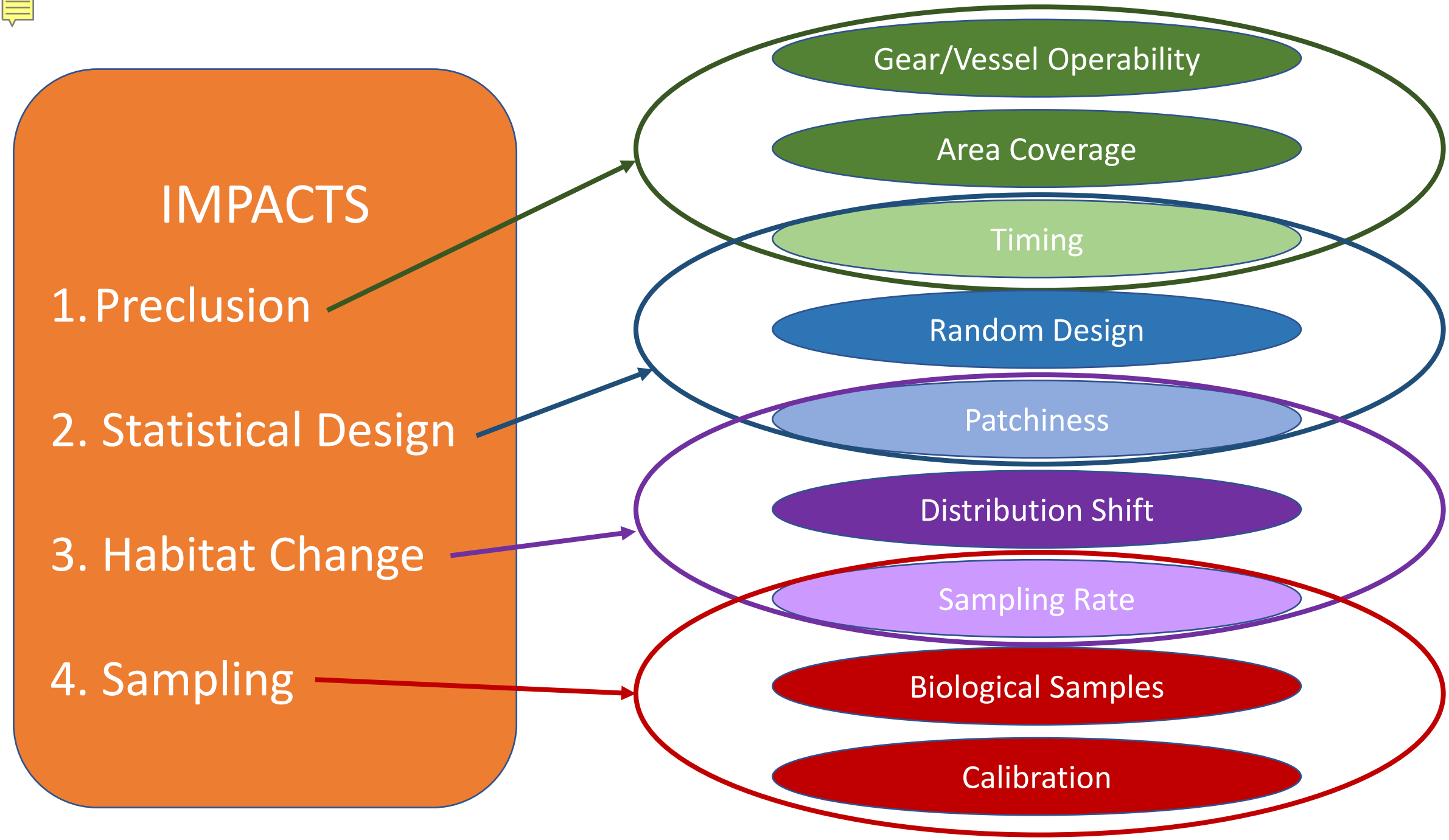
- **Identify survey methods, tools, and designs to monitor and assess the scallop resource in a changing ocean environment that includes offshore wind installations and changes in resource and fishery distributions.**
- *NOAA Fisheries and BOEM Federal Survey Mitigation Implementation Strategy*
- SSWG identified impacts and potential mitigation approaches specific to scallop surveys

Term of Reference #3

- SSWG considered the scope and scale of offshore wind development

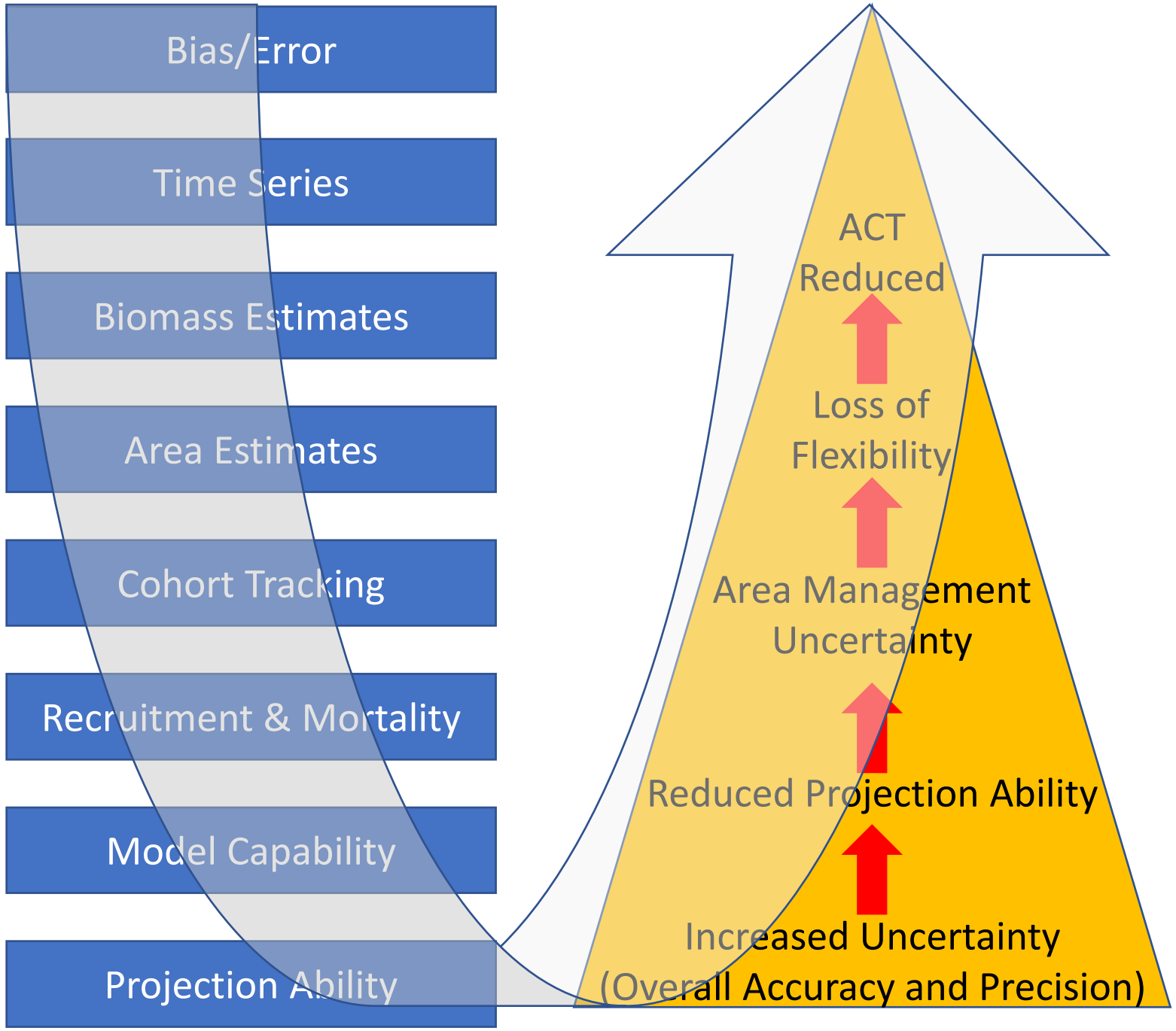





IMPACTS
1. Preclusion
2. Statistical Design
3. Habitat Change
4. Sampling
Gear/Vessel Operability
Area Coverage
Timing
Random Design
Patchiness
Distribution Shift
Sampling Rate
Biological Samples
Calibration

IMPACTS

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



Wind Recommendations

- Conduct simulation modeling 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

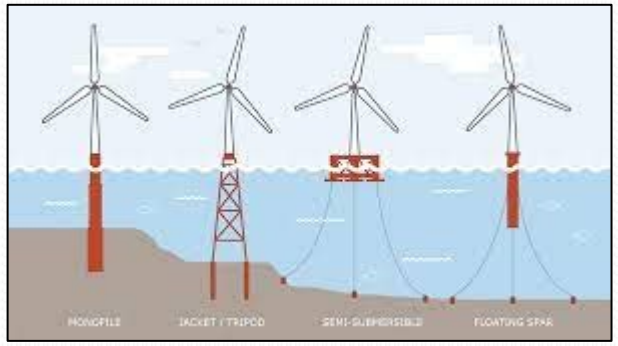
Wind Recommendations

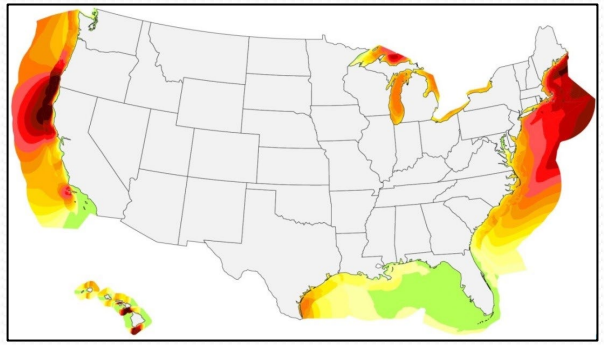
- Develop guidelines for offshore wind monitoring surveys to collect data and generate data products to supplement the scallop survey system

  - 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

Wind Recommendations

- 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

Assessment Topic	Scallop Survey Needs
Age Samples and Aging Methods	• Continued collection of age samples (shells) for laboratory analysis
	• Continue explorations of aging methods using resilium
	• Annual age samples are required to produce annually-specific age-length keys, survey and fishery ages, annual growth information
Density-Dependent Effects	• Integrate information from other resource surveys beyond scallops
	• Characterization of condition factor by examining shells at sea and in the laboratory
Fecundity Estimates	• Continued collection of gonad weights at sea (wet weights)
	• Continue evaluation of wet and dry gonad weight ratios
	• Annual samples for biological reference points

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

SSWG Conclusions

- 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

- Working Group effort has concluded, but members expressed continued commitment to assisting in implementing the SSWG recommendations
  - Consensus to adopt Scallop Survey Guiding Principles
    - Ensure spatial coverage and sampling intensity
    - Standards for data analysis and delivery
  - Strong 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