# Northeast Trawl Advisory Panel

# Operations Manual & Orientation Document

Northeast Trawl Advisory Panel

July 3, 2023

# Outline/TOC

# Introduction

## Background

The Northeast Trawl Advisory Panel (NTAP) was formed in 2015 as a joint advisory panel between the New England and Mid-Atlantic Fishery Management Councils (NEMFC and MAFMC or the Councils) to bring commercial fishing, fisheries science, and fishery management professionals together to discuss regional fisheries research surveys and provide advice to the Councils and the Northeast Fisheries Science Center (NEFSC or the Science Center)[1]. NTAP focuses on the performance and data generated by the NEFSC's multispecies bottom trawl survey, including supplementing the survey with other platforms. NTAP also discusses issues of relevance to other fishery-independent surveys. The purpose of the multispecies bottom trawl survey is to monitor the relative abundance, distribution, and life history characteristics of fish species in the Northeast from Cape Lookout, NC to the Western Scotian Shelf in order to inform stock assessments and ecosystem research. NTAP provides advice and direction on the conduct of the trawl survey at the NEFSC and related efforts and NTAP provides recommendations to the Councils regarding the trawl survey and related efforts.

NTAP has guided multiple studies that have improved information used in stock assessments. NTAP research has improved catch efficiency estimates and has provided empirical evidence for using swept area on a tow-by-tow basis to calculate abundance. In addition, the regular meetings of the group have improved members' awareness of the challenges, limitations, and opportunities for regional fisheries research related to trawl surveys.

This document provides information for new and existing NTAP members pertaining to NTAP organization, operations, history, and accomplishments. This document should be updated routinely and after major changes in NTAP processes.

## Charter & Purpose

The NTAP charter is located on the NTAP webpage (https://www.mafmc.org/ntap).

There are three primary objectives for NTAP, as described in the charter:

1. Understanding the existing NOAA/NEFSC trawl survey gear performance and methodology.
2. Evaluating the potential to complement or supplement this and other regional research surveys.
3. Improving understanding and acceptance of NOAA/NEFSC trawl survey data quality and results.

NTAP is a joint advisory panel of the NEFMC and MAFMC and therefore reports to the Councils; however, feedback at NTAP meetings is heard directly by the NEFSC staff who participate as members on NTAP. The ability of NEFSC to enact NTAP recommendations is affected by human and fiscal resource limitations and statutory requirements, including the responsibility to ensure scientific integrity in the design and conduct of the research and analysis of data according to NOAA Administration Order 202-735D.2.

**Scientific Integrity**
The honest and transparent conduct and communication of science. Science is unbiased and free from political or personal opinions.

[1] NEFSC is a government-run national lab in the Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS or NOAA Fisheries).

NTAP discusses and recommends research priorities, and members frequently participate in recommended research projects as described in the NTAP Charter and Action Plan. NTAP prioritizes projects that improve the accuracy or precision of data collections that inform species-specific stock assessments.

# NTAP Organization

## Membership

### General

NTAP consists of 20 members drawn from the NEFMC and MAFMC, industry stakeholders, the Atlantic States Marine Fisheries Commission (ASMFC), non-federal scientists, and NEFSC, as described in the charter. Each Council appoints an equal number of members, stakeholders, and scientists. The list of current NTAP members is maintained on the NTAP webpage hosted by the MAFMC.

The panel Co-Chairs are current members of the NEFMC and MAFMC who are jointly responsible for conducting meetings and for coordinating with MAFMC and NEFSC staff to ensure that summaries and other meeting products are produced and distributed.

### Appointment Process

NTAP members are appointed for a term of one year. Per the Charter, the Co-Chairs "review membership annually or at any time that the primary focus areas are modified." Co-Chairs identify membership needs and recommend new members to the Council Executive Director (except for NEFSC members, who are appointed by the NEFSC Director). The Co-Chairs, Council Executive Directors, and Council Executive Committees can also recommend a full application process be conducted. New Council members can volunteer for NTAP during the fall committee-assignment process. Non-Council members can apply for membership during a full application process solicited by the Councils or by making their interest in NTAP known to the Co-Chairs.

Members are appointed either in place of a member who steps down, to meet a focus area need, or through a full application process. The full application process occurs when the Co-Chairs, Council Executive Directors, or Council Executive Committees request it and follows these steps:

- The NTAP Coordinator sends an email to existing NTAP members with a membership application.
- The Councils request nominations through a press release.
- Each Council reviews the applications and members are selected to represent NEFMC and MAFMC.

Applications may also be solicited through a broader Advisory Panel application process that the Councils initiate for multiple advisory panels.

Per the Charter, the NEFSC Director appoints four staff as members of NTAP who represent assessment and survey programs, including an NTAP NEFSC Lead Scientist. It is common for NEFSC to have additional staff present at NTAP meetings in various support roles.

A MAFMC staff scientist serves as the NTAP Coordinator and is responsible for coordinating NTAP meetings and communications.

## Member Responsibilities

NTAP members are expected to participate in a minimum of three NTAP meetings a year. Meetings of the full Panel and the Working Group are counted toward the meeting requirement. If a member misses a meeting, they should review the meeting minutes to be familiar with the material that was covered.

All members should have access to and familiarity with email, doodle polling, and phone and video conferencing. Members are encouraged to request support for training or accommodations from the NTAP Coordinator as needed.

Members should participate in meetings by being active participants in discussions, by updating other members on information relevant to NTAP, by helping to identify partnerships, and by thinking creatively about research ideas and opportunities. Members should also read NTAP email updates and respond to requests for doodle polls or other tasks. Members are encouraged to recommend agenda topics and email updates for the monthly NTAP email update.

## Code of Conduct

All NTAP members are expected to maintain high standards of ethical conduct. Council members and stakeholders appointed by either Council must comply with any applicable rules described in the relevant Council's Statement of Organization Practices and Procedures (SOPP), including, but not limited to financial disclosure and recusal requirements and restrictions on lobbying. NTAP members should also review the applicable Rules of Conduct for Members and Advisors of Fishery Management Councils.

## Media interactions

The NEFMC public affairs policy states that typically only the Council Chair, Executive Director, Oversight Committee Chairs, and Public Affairs Officer will speak for the Council. NTAP members are free to express themselves to the media, but they should be clear that they are speaking for themselves or their own institutions and not as a representative speaking on behalf of NTAP or the Councils.

## Removing Members

NTAP members may be removed or asked to step down by the Council Chair with just cause. Possible reasons for removal include, but are not limited to:

- Failure to attend meetings without giving adequate notification or reason to the NTAP Co-Chairs
- Violation of marine resource regulation or felony conviction
- Refusal to adhere to proper decorum by failing to show respect for other panel members, or the panel itself, as evidenced by frequent rude and disruptive behavior and/or an unwillingness to refrain from abusive treatment of other members and/or staff

If there is an issue, the Co-Chairs will discuss potential removal with the Executive Director of the Council that appointed the member. The Executive Director will in turn notify the Council Chair.

If a member would like to step down, it is recommended that the member inform the Co-Chairs, NEFSC Lead, and NTAP Coordinator.

## Roles & Responsibilities

### NTAP Coordinator

The NTAP Coordinator is a staff member of the MAFMC. The NTAP Coordinator handles travel cost reimbursement for non-federal government members of the NTAP, other administrative needs and costs associated with panel operations, communications, meeting and venue scheduling, meeting equipment support, and technical support for virtual meetings.

### NEFSC Lead

The NEFSC Lead develops a draft agenda for approval by the Co-Chairs, provides meeting summaries and/or reports, and provides analytical support as needed. The NEFSC Lead organizes the NEFSC NTAP Team. The NEFSC Lead reports to the NEFSC Director.

### Co-Chairs

The panel is co-chaired by representatives of the NEFMC and MAFMC. The Co-Chairs are jointly responsible for approving meeting agendas, facilitating meetings, and coordinating with NEFSC to ensure that summaries and other products from meetings are produced and distributed. The NTAP Co-Chairs report to their respective Councils at Council meetings.

## NTAP Working Group

NTAP also directs a working group to address issues in detail that are too specific or involved to be addressed in full panel meetings. In 2017, the working group was described as follows: "the working group [will] discuss agenda topics [and] develop recommendations to be considered to the wider NTAP Body" (3/5/2017 working group meeting notes). For example, an NTAP working group has worked to identify specifics of experimental design for a field comparison of net modifications.

According to the NTAP charter, "The Co-Chairs shall also appoint and annually review the NTAP working group membership." In practice, working group meetings have been organized by the NEFSC Lead or those identified as leads of the topic being addressed, with assistance from the NTAP Coordinator. Membership in the working group has to date been open to any member of NTAP on a voluntary basis. To join the working group, an NTAP member should express their interest during a meeting. If the NTAP member misses a meeting during which a working group was established, they should indicate interest in serving on the working group to the Co-Chairs, NTAP Coordinator, and NEFSC Lead after reviewing the meeting minutes.

The working group meets on an as-needed basis and reports progress during full panel meetings. Working group meetings are not required to be publicly noticed through the Federal Register.; however, all working group meetings will be posted on both Council websites. The working group is akin to a Council Plan Development Team (PDT) or Fishery Management Action Team (FMAT) in that the purpose is to perform technical work. Meetings may need to be held on an ad hoc basis, with little advance notice. Meetings are open to the public but may not have timely notice, and a working group may discuss issues listed on an agenda in any order or discuss other issues that the full panel has directed the group to discuss.

## NEFSC NTAP Team

The NEFSC staffs NTAP with scientists and leaders across four divisions. They coordinate themselves through an internal meeting typically organized monthly by the NEFSC Lead, open to NEFSC staff. The

purpose of the NEFSC NTAP Team (a.k.a. Center Working Group) is to provide coordinated Center support to facilitate NTAP objectives, including development of research agendas; to transfer information within and between the NEFSC, NTAP, and NTAP working groups; to discuss field and analytic experiments to improve understanding of survey performance, consistent with the NTAP charter; to provide a forum for information exchange across the divisions involved in NTAP; and to prepare communications for the Center Director.

### Funding

When NTAP was formed, the NEFSC agreed to provide funding for NTAP (need reference). NEFSC and MAFMC provide staff to support NTAP, including staff travel expenses. Meetings (venues and travel reimbursements) are typically supported via NEFSC funds administered by MAFMC. NTAP research projects can be supported by a variety of funding sources, including NEFSC funds.

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## NTAP Operations

The primary contact for NTAP is the NTAP Coordinator at the MAFMC. Information, including the contact information for the Coordinator, is maintained at the NTAP website (https://www.mafmc.org/ntap) hosted by the MAFMC.

NTAP communicates in two primary ways: email and meetings. All formal recommendations must be discussed and voted on at an NTAP meeting, but less formal communications can occur through email and at meetings where no formal recommendations are being made.

### Email and websites

NTAP endorsed a communication strategy of having two websites (the main website hosted by the MAFMC and a second by the NEFSC) and regular email status updates. At the December 17, 2018 meeting it was discussed that: "NTAP communications have been bolstered by continued email status updates from NEFSC and this remains the preferable mode of communication. In addition, the NTAP website will continue to be updated. NEFSC will provide additional information specific to how NOAA Fisheries is utilizing NTAP sponsored research to improve their science via a new website. NEFSC will ensure appropriate linkages between Council website and NOAA are made to avoid duplication and assure user needs are met" (12/17/2018 meeting summary).

- The NTAP website maintained by MAFMC serves meeting materials for upcoming meetings and archives meeting materials from past meetings. It is maintained by the NTAP Coordinator.
- The NEFSC NTAP website is more focused on project updates and scientific results, as well as how those results are being used. This website is maintained by the NEFSC Research Communications Branch and updated when requested by the NEFSC NTAP Team.
- Email updates on topics, activities, and announcements that are of relevance to NTAP are typically provided by the NEFSC Lead to the NTAP Coordinator for distribution. Email updates go to all NTAP members and a few additional interested parties on about a monthly basis. *All NTAP members are encouraged to suggest topics for the update email to the NEFSC Lead. NTAP members are also welcome to communicate with each other via the email list.*

## Meetings

### Frequency and Notice

The NTAP charter requires NTAP and/or an NTAP working group to "hold in–person meetings two to three times annually." Additional meetings may be conducted in person or via webinar if needed. Webinar meetings are typically hosted on the Webex platform. All decisions made by NTAP must be made in a public forum. At previous meetings, members have indicated that the preferred meeting schedule is "alternating between Mid-Atlantic and New England for biannual meetings. Full NTAP meetings would be held twice a year, one in May/June and another in November/December. The group agreed it may be beneficial to have NTAP meetings preceding or following Council meetings" (6/21/2019 Meeting Summary). At the end of an NTAP meeting it is common to discuss the timing and nature (in-person or virtual) of the next meeting.

As a standing advisory panel of the Councils, NTAP must comply with the applicable meeting notice requirements outlined in each Council's SOPP (NEFMC SOPP 2015; MAFMC SOPP 2021). NTAP complies with Council meeting notice requirements, including that meetings be published in the Federal Register about a month ahead of time.

### Meeting Planning

NTAP meetings are organized by the Co-Chairs who receive administrative support from the NTAP Coordinator and the NEFSC Lead. To the extent possible, the NTAP Co-Chairs identify timelines and ensure that meetings are scheduled such that the advisory panel can adequately inform decisions the Councils and the NEFSC are making. The typical process is as follows:

1. The Co-Chairs and NEFSC Lead identify an approximate time for a meeting (this is often done at a previous meeting).
2. Approximately two months before the meeting the NTAP Coordinator will send a Doodle poll to members to schedule a meeting time that works for most members.
3. Approximately two months before the meeting the NEFSC Lead drafts an agenda. Any NTAP member can recommend an agenda item to either or both Co-Chairs or the NEFSC Lead.
    - The NEFSC Lead contacts the Co-Chairs and NTAP Coordinator to discuss. Discussion can be done over email or by conference/video call.
    - The NTAP Coordinator submits a meeting notice to the Federal Register.
    - Two weeks before the meeting the NEFSC Lead sends the final agenda to NTAP Co-Chairs for edits or approval. Edits are returned to the NEFSC Lead within 5 days.
    - Ten days before the meeting the NEFSC Lead sends final agenda to NTAP Coordinator and Co-Chairs.
    - Within 5 days of receipt, Co-Chairs confirm the final agenda is ready for distribution.
4. Members will be informed of the meeting date and draft agenda at least one month before the meeting and the notice will be posted on the federal register by the NTAP Coordinator.
5. One week prior to the meeting, the NTAP Coordinator will email the members with the final meeting agenda and logistics. The agenda and materials for the meeting are posted to the website.
6. The meeting is held. It is commonly a half or full day meeting.

### Meeting Facilitation

The Co-Chairs determine who will run the meeting. The person running the meeting should:

1. Call the meeting to order by indicating to the group that the meeting will begin.
2. Run a roll call to determine if a quorum is present.
3. Ensure that the agenda is followed, recognize questions, and oversee any votes.
    a. If votes are being held, the NTAP Coordinator will confirm that a quorum is present.
4. Adjourn the meeting.

The person running the meeting can defer to the NTAP Coordinator for logistical and procedural support.

### Voting and Decision Making

Formal voting is rarely required, as most decisions are made by consensus. When needed, such as when NTAP is making a formal recommendation to the Councils or when consensus cannot be reached, the Co-Chairs coordinate a vote. Voting can be done by hand vote or by ballot. The recommendations are forwarded to the Councils by the Co-Chairs. The charter provides the following guidance regarding quorum requirements for voting:

> *"for a meeting that develops formal recommendations, at least 10 members are required to constitute a quorum. This total must include at least half of the designated representatives from each Council, the NEFSC, and the ASMFC. NEFMC/MAFMC representatives: 4 of 7 required for quorum; ASMFC representatives: 1 of 2 required for quorum; NEFSC representatives: 2 of 4 required for quorum; Total representatives: 10 of 18 required for quorum."*

The NTAP Coordinator is responsible for confirming there is a quorum. Meetings are still held and count toward the annual meeting requirement even if they are lacking a quorum.

### Post-Meeting Procedures

Co-Chairs may opt to have a debrief with the NTAP Coordinator and NEFSC Lead to follow up on next steps immediately after or within a few days of the meeting. The NEFSC Lead will prepare the meeting summary and send it to the NTAP Coordinator for distribution to the NTAP panel for any corrections. Members are typically given at least 1 week to review the meeting summary. The NEFSC Lead incorporates corrections, and the final meeting summary is then sent to the NTAP Coordinator for posting on the website. The NTAP Coordinator will assemble meeting materials such as meeting presentations. Lastly, the NTAP Coordinator sends an email to the members to let them know the final meeting summary and materials have been posted to the NTAP website (typically about 2-3 weeks after the meeting).

### Travel Reimbursement

For in-person meetings, non-federal members are eligible for travel reimbursement to attend the meeting. The NTAP Coordinator will provide instructions on the reimbursement process and the MAFMC website describes the travel guidelines.

## Publications

### Peer review of NTAP study designs

NTAP recommends various experiments and individual NTAP members support those experiments in various ways. In the past 5-10 years, NTAP as a panel has discussed experiments that the NEFSC has taken the lead on organizing. Those projects are discussed by the NTAP full panel and at working group meetings where NTAP members have weighed in on the experimental designs. The Councils may

request a given study go through a formal peer review process through the Councils' Science and Statistical Committees or the Center for Independent Experts. A recommendation to the Councils for a peer review of a study design can be requested by a vote at an NTAP Full Panel meeting. That recommendation is then forwarded to the Councils by the Co-Chairs for consideration and action.

### Peer review of NTAP study results

Technical reports regarding surveys and gear research done under the advice of NTAP are typically authored by NEFSC scientists or an individual NTAP member with other co-authors that may be NTAP members. In these cases, either a technical report or a peer-reviewed paper is written after an experiment's results are analyzed. Drafts of the reports or papers will be sent to the full panel prior to submittal to the technical report series or a peer-review journal so members can recommend editorial improvements and identify any concerns with how the results are being interpreted.

### Reports & minority reports

NTAP typically provides advice and recommendations to NEFSC and/or the Councils through letters or briefings by the Co-Chairs to the Councils (NTAP has not produced its own reports). Technical reports regarding surveys, gear research done under the advice of NTAP, and other topics of relevance to NTAP are more commonly authored by NEFSC scientists. NTAP members often participate in the creation of research that leads to published papers and the NTAP members are authors on those papers. Published papers are formal scientific reports that go through a peer-review process. Once they are published, they are considered final. Authors on a peer-reviewed paper are presumed to fully support the research methods, results, and conclusions.

If NEFSC produces a report with information that NTAP members object to, consider incorrect or misleading, or otherwise disagree with, the disagreement should be discussed with the Co-Chairs to determine if the topic should be addressed by the full panel. NTAP can recommend the Councils more formally comment on NEFSC reports. If there is a consensus reached that a minority of members would like to oppose, the meeting summary should highlight the discussion and any differences of opinion.

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## Key resources for members

- NTAP charter
- NTAP website
- NEFSC NTAP website
- MAFMC (Mid-Atlantic Fisheries Management Council). 2021. Statement of Organization Practices and Procedures (SOPP) rev. Feb 2021 and other Council Policies.
- MAFMC (Mid-Atlantic Fisheries Management Council). Travel Website and 2019 Guidelines. https://www.mafmc.org/travel
- NEFMC (New England Fisheries Management Council). 2020. Statement of Organization Practices and Procedures (SOPP) rev. 2015 and Operations Handbook rev. Feb 2020.
- NEFMC (New England Fisheries Management Council). 2022. Advisory Panel Operations Handbook rev. Feb 2022.
- NOAA Scientific Integrity Policy. 2021. NOAA Administration Order 202-735D.2
- Tables describing which stock assessments use the Rockhopper Catch Efficiency Study resultsare published by the NEFSC NTAP team and posted online: ;there is also a dashboard for NTAP members

- Marine Resource Education Program
- NEFSC Trawl Survey protocols (Politis et al., 2014)
- Overview of the stock assessment process
    - An overview of how the survey is used in assessments was presented to the NTAP in 2015 by Michael Martin
    - NEFSC Stock Assessment website
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- The NOAA Fisheries Event Calendar
- NEFSC e-news
- NAFO Annual Report: This report series provides a summary of NEFSC survey, research, and assessment activities by year.

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## Acknowledgments

This document was drafted by the NTAP Orientation Document Subcommittee (Dan Salerno, Mike Pol, Dustin Gregg, and Kathryn Ford) on behalf of NTAP. The document was reviewed by NTAP, NEFMC, MAFMC, and several volunteer reviewers who are former NTAP members.

# NTAP Orientation Document

## Background Information

This section contains information about the surveys and the history of NTAP that is relevant for NTAP members. If a member would like additional background, they are encouraged to reach out to the NTAP Coordinator and NEFSC Lead.

### NEFSC Fishery-Independent Surveys

A fishery-independent surveys utilize scientific methods within an experimental design in order to measure fish populations and vital rates. They are distinct from fishery-dependent surveys, which sample data from commercial and non-commercial fisheries. This section describes the major fishery-independent surveys that are or have been done at the NEFSC. NTAP addresses primarily the multispecies bottom trawl survey and it receives regular updates from the bottom longline survey, which was designed to augment the bottom trawl survey. The other fishery-independent surveys are described for awareness.

#### Multispecies Bottom Trawl Survey

The NEFSC has conducted a multispecies bottom trawl survey (BTS) monitoring fish abundance in the Northwest Atlantic since the 1940's. The BTS has used a routine, standardized single trawl survey since 1963 (fall) and 1968 (spring). From 1963 to 2008, the BTS was conducted on the 187-foot NOAA Ship Albatross IV, with a few seasons requiring the use of other vessels. Since 2009 the BTS has been conducted on the 206-foot NOAA Ship Henry B. Bigelow homeported in Newport, RI and accommodates 24-hour, multi-week survey legs. The Albatross IV was and the Bigelow is operated by the Office of Marine and Aviation Operations (OMAO) at NOAA (not within NOAA Fisheries). To sustain an unbroken time series, vessel and gear transitions over the course of the BTS have included the development of conversion factors for most species (Johnston & Sosebee 2014). The BTS is currently overseen by the Ecosystem Surveys Branch (ESB) within the Population and Ecosystems Monitoring and Analysis Division (PEMAD) based in Woods Hole, MA.

##### *Survey purpose*

The BTS monitors trends in abundance (biomass and recruitment), geographic distribution, biological parameters (age, growth, maturity, and mortality), ecosystem changes, and collects environmental data (salinity, temperature, oxygen, plankton). The survey was designed in the 1960's as major foreign fleets were being built capable of exploitation of northwest Atlantic fisheries. At that time, the failures of single-species management in Europe (e.g., plaice) resulted in a growing recognition of the need to focus on natural history, ecology, and multispecies assessments (Smith 2002). Coincident with the appreciation of those needs was the recognition that fisheries dependent surveys, which were dominant at the time, were insufficient for an ecosystem approach. The specific survey objectives were: "1. To monitor fluctuations in structure and size of fish populations—to provide a measure of the effects of fishing that is independent of commercial fishery statistics. 2. To assess the fish production potential of Atlantic coastal waters. 3. To determine environmental factors controlling fish distributions and abundance. 4. To provide basic ecological data on fishes (e.g., growth rates and food) necessary to understand interrelationship between fish and their environment" (Grosslein 1969). There

was an expectation that “these data may be of considerable importance in the long term as an ecological 'benchmark’ against which future changes in the composition of groundfish populations may be compared” (Graham 1966 as reported in Smith 2002).

The passage of the Magnuson-Stevens Act in 1976 introduced a management framework reliant on stock assessments, and by 1981 the major objective of the BTS was defined as “to provide an annual quantitative inventory of fish populations on the continental shelf off the northeast coast” (Azarovitz 1981).

The BTS data are used in three primary ways:

1. To create indices of abundance that are used with other data sources in population assessments for 40 species and 49 stocks, including transboundary stocks co-managed by the United States and Canada, and stocks managed by the NEFMC, MAFMC and ASMFC. The BTS also gathers data on sizes and ages of fish, fish condition and maturity, and stomach contents. These life history parameters are relevant to recruitment and reproductive potential and therefore critical for stock assessment. The stock assessments are generated by the NEFSC Population Dynamics Branch (PDB or “PopDy”) and are then used by management via the Councils to set catch limits or inform other management actions. A good overview of the BTS and how it is used in assessments is in this presentation made at the first NTAP meeting in 2015.
2. To provide information for ecosystem status reports for both the Mid-Atlantic and Northeast (e.g., National Marine Fisheries Service 2021 a, b) which are generated by the Ecosystem Dynamics and Assessment Branch (EDAB).
3. To provide data for a variety of scientific, management, and planning purposes related to biology, life history, and spatial distribution of species.

An excellent resource describing the value of fishery-independent fisheries surveys and what factors influenced the initiation of the BTS is available in “The Woods Hole bottom-trawl resource survey: development of fisheries-independent multispecies monitoring” (Smith 2002).

### *Bottom trawl survey gear*

The BTS uses a 4-seam, 3-bridle box-net with rockhopper gear on the NOAA Ship Henry B. Bigelow. The gear specifications and sampling methods used in the BTS are described in detail in the bottom trawl survey protocols (Politis et al., 2014). Catches in trawls can be affected by many variables. The BTS standardizes the gear and its deployment so that measured changes in abundance or ecosystem variables cannot be attributed to changes in gear type.

### *Bottom trawl survey design & timing*

The BTS occurs from Cape Lookout, NC to Nova Scotia, Canada (Figure 1). Some stations are in Canadian waters because the BTS pre-dates the EEZ (implemented in 1977) and was designed to encompass the range of each stock. The BTS uses a random sampling design, stratified by depth and latitude (for a description of the value of random stratified sampling, see Smith 2002). Since 2009, the survey stations have ranged in depth from 15 m – 366 m depth (8 fm – 200 fm). Stations are generally allocated proportional to the area of each stratum, with 377 planned

stations each season[2].

Sampling occurs September to November (fall) and from March to May (spring). Other trawl surveys have occurred in the winter (e.g., winter bottom trawl survey from 1992-2007) and summer (e.g., the Gulf of Maine northern shrimp survey from 1983 to present; summer bottom trawl survey from 1991-1995). These surveys are described in "History of the United States Bottom Trawl Surveys" (Johnston & Sosebee 2014) and the links above connect to the InPort metadata records for those surveys, where basic survey information and data access is described.

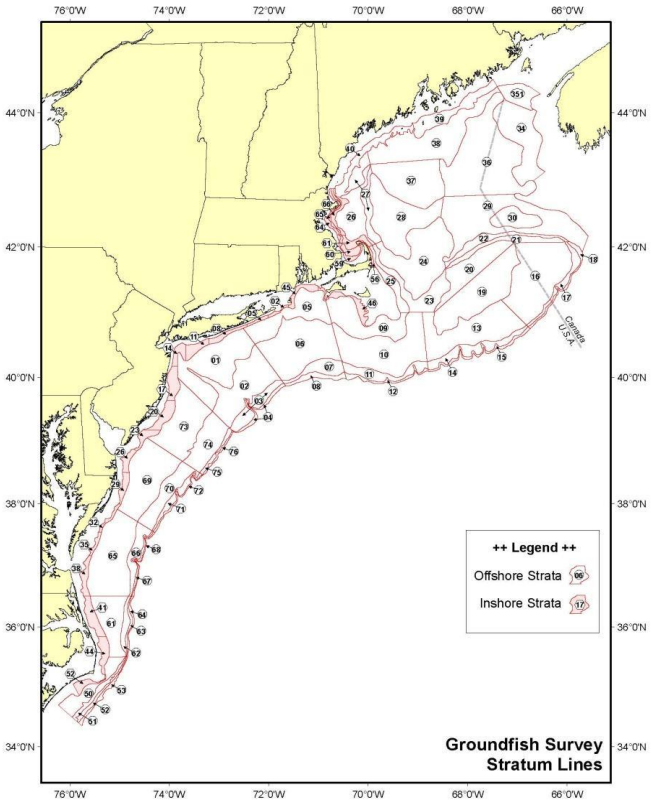


**Figure 1. The NEFSC Multispecies Bottom Trawl Survey strata.**

### *Survey timeline*

The survey has achieved remarkable stability over time; it is one of the longest fishery-independent time series in the world. It has been conducted in the following major phases:

- Spring/Autumn 1963 - 2008
    - September - November (Autumn survey) done from 1963-2008
    - March-May (Spring survey) done from 1968-2008
    - Survey originally focused on gadid species on Georges Bank and covered Nova Scotia to central New Jersey. The fall BTS was expanded southward to Cape Hatteras, North Carolina in 1967 and spring sampling was added in 1968. Sampling extended to South Carolina from 1978-1985. In 1986, the

[2] 377 stations as of 2009 (with 60 sea days per season). Prior to 2009 it was approximately 330 stations and 48 sea days. The 1992-2007 winter bottom trawl survey had approximately 150 stations and 24 sea days. Those sea days were combined into the current spring and fall surveys.

southernmost extent became Cape Lookout, North Carolina.
    - Fall survey extended to Daytona Beach, FL in 1972 for 1 year
    - Sampling extended to South Carolina from 1978-1985
    - In 1986, the southernmost extent became Cape Lookout and the target number of stations was 330 stations (48 sea days per season)
    - Primary Vessel/Gear: Albatross IV / Yankee 36 survey trawl with chain sweep
    - Offshore surveys and most inshore surveys have been conducted aboard NOAA Ships Albatross IV and Delaware II. A standard "36 Yankee" trawl has been used in all autumn surveys and in spring surveys conducted from 1968 to 1972 and since 1982, while a modified "41 Yankee" trawl was used in spring surveys from 1973 to 1981. Both trawls are equipped with a 1.25 cm (0.5 inch) stretched mesh liner in the codend and upper belly for sampling juvenile fish and roller gear to make them suitable for use on rough bottom (NEFSC 1988).
    - Tow direction is to next station
    - 3.8 kts target towing speed (SOG)
    - 30 minutes (winch lock to haul back) target tow time; 1.9 nm distance towed
- Spring/Autumn 2009 – Present
    - September - November (Autumn survey) and March-May (Spring survey)
    - 377 stations (60 sea days per season)
    - Primary Vessel: NOAA Ship Henry B. Bigelow
    - Sampling Gear: 4-seam, 3-bridle survey box net with rockhopper gear
    - Gear designed in collaboration with regional fishing industry
    - Use of tow evaluation software which validates tows based on Type, Operation, Gear, and Acquisition (T.O.G.A.)
    - Tow direction is along a bathymetric contour (instead of in direction of next station)
    - Tension-based auto-trawl system
    - 3.0 kts SOG
    - 20 minutes on-bottom time
    - 1.0 nm
    - Standard operating procedures (Politis et al., 2014)
- Summer: 1995 and earlier
    - South Carolina-North Carolina border (Cape Fear, NC) to Nova Scotia
    - Albatross III in 1948, 1949
    - Albatross IV in 1963- 1965, 1969, 1977-1980, 1994-1995
    - Delaware II 1980, 1981, 1991, 1993
- Winter: 1964-1966, 1972, 1978, 1981, 1992– 2007
    - Before 1981 – Albatross IV
    - 1981 – Delaware II
    - 1992 – Albatross IV and Delaware II
    - 1992-2007
        - February
        - ~150 stations (24 sea days)
        - NC to Georges Bank
        - Modified Yankee trawl with flat sweep
        - Targeted flatfish
- Survey changes that resulted in the development of conversion factors
    - Door change in 1985 (BMV to Polyvalent because BMV no longer available)

- Delaware II used for some years of time series
- Yankee 41 trawl used in spring surveys 1973-1981
- Vessel (Albatross IV to Bigelow) and gear (Yankee 36 with chain sweep to 4-seam box net with rockhopper) transition in 2009 (calibration experiment during 2007 and 2008)

#### *Survey history*

More information on the history of the survey is available in the following references: Groundfish Survey Methods (Grosslein, 1969a), Groundfish Survey Program of BCF Woods Hole (Grosslein, 1969b), A Brief Historical Review Of The Woods Hole Laboratory Trawl Survey Time Series (Azarovitz 1981), The Woods Hole Bottom-Trawl Resource Survey: Development Of Fisheries-Independent Multispecies Monitoring (Smith 2002), History of the United States Bottom Trawl Surveys (Johnston & Sosebee, 2014), and An evaluation of the bottom trawl survey program of the Northeast Fisheries Center (NMFS 1988).

For a more general history of the Science Center and trends in fisheries science since the mid-1800's, see this transcript of a lecture given by William F. Royce.

#### *Going on a NEFSC bottom trawl survey*

NTAP Members are welcome to participate on a Bigelow survey to get an in-person, hands-on view of how the survey operates. Members can participate on a leg or single day tours can be arranged. These can be requested through the NEFSC bottom trawl survey lead, the NEFSC NTAP Lead, or other NEFSC staff on NTAP.

#### *Data access*

A description of the survey and access to the data is available at the Bottom Trawl Survey InPort record.

### Gulf of Maine Cooperative Bottom Longline Survey

The BTS cannot efficiently sample rockier, rougher seafloor habitat (i.e. large boulder fields and ledges) or highly aggregated species. Nevertheless, the BTS has historically adequately captured species found in rocky habitat, particularly Atlantic cod, Atlantic wolffish, cusk, spiny dogfish, white hake, barndoor skate, thorny skate, and winter skate. However, as species abundance has declined, it has been hypothesized that those species are aggregating in habitats not well sampled by the trawl. To address this hypothesis, the Bottom Longline Survey (BLLS or LLS) was designed and implemented.

The LLS uses the same depth strata and timing as the BTS. It further stratifies the sampling strata by habitat type ("rough" and "smooth"). Two commercial fishing vessels simultaneously conduct the LLS in the spring (April-May) and fall (October-November) and maximizes spatial and temporal overlap with the BTS. A full description of the LLS is available in "Design, Implementation, and Results of a Cooperative Research Gulf of Maine Longline Survey, 2014-2017" (McElroy et al., 2019). The LLS spring survey was canceled in 2020 due to COVID but all other legs have sailed.

The LLS has found that "Although catch rates were higher on rough bottom, some species still showed a significant presence on smooth bottom including Atlantic cod, barndoor skate, cusk, haddock, little skate (*Leucoraja erinacea*), longhorn sculpin, red hake, spiny dogfish, thorny skate, and white hake" (McElroy et al., 2019). For more information about the LLS and cooperative research more generally, see the NEFSC Cooperative Research website.

A description of the survey and access to the data is available at the Gulf of Maine Cooperative Bottom Longline Survey InPort record.

## Other NEFSC & Partner Fishery Independent Data Surveys

Several other surveys are done or supported by the NEFSC. NTAP focuses almost exclusively on the BTS, but these surveys provide information for a variety of stock assessments and often address similar questions as the trawl survey. Links for the primary metadata records (i.e. the description of the survey and access to the data) for each are provided below.

### *Northern Shrimp Survey*

A trawl survey done annually in the summer on the R/V Gloria Michelle in the Gulf of Maine, since 1983. Shrimp InPort record.

### *Scallop*

A dredge and HabCam (towed optical) survey done annually in May and June on the UNOLS vessel R/V Sharp from Virginia to Georges Bank, since 1980. Scallop InPort record.

### *Clam*

A dredge survey done annually (a subset of strata sampled annually; the same strata sampled every three years) in August on the F/V Pursuit from Virginia to Georges Bank, since 1982. Clam InPort record.

### *Apex predators*

The Coastal Atlantic States Shark Pupping and Nursery survey (COASTSPAN) is done annually from May to August (1 week each month) on a NEFSC skiff in Delaware Bay, since 1998. COASTSPAN InPort record.

The coastal shark bottom longline survey is done every other year in the summer on the F/V Eagle Eye from Virginia to Georges Bank, since 1986. Coastal Shark Bottom Longline Survey InPort record.

### *NEAMAP*

The Northeast Area Monitoring and Assessment Program (NEAMAP) grew out of an Atlantic States Marine Fisheries Commission resolution in October 1997 to begin development of a coordinated fishery-independent sampling program in the Northeast region. NEAMAP includes three surveys that operate independently:

- the Southern New England/Mid-Atlantic Nearshore Trawl survey since 2006 (has been conducted by Virginia Institute of Marine Science on the F/V Darana R)
- the Massachusetts Division of Marine Fisheries Bottom Trawl Survey since 1978 (has been continuously conducted on the R/V Gloria Michelle
- the Maine/New Hampshire Inshore Trawl Survey since 2000 (conducted by Maine Department of Marine Resources on the F/V Robert Michael). Unlike the other fishery-independent data surveys described above, NEAMAP surveys are conducted by partners of the NEFSC and receive support from NEFSC.

| Survey | Gear | Notes |
|---|---|---|
| ME/NH | modified shrimp net with a 2-inch mesh in wings and 1-inch mesh liner in the cod end. Footrope and head ropes are | |

| | | |
|---|---|---|
| | 57' and 70' respectively, with 6-inch rubber cookies. The gear was designed to be very light on the bottom to minimize habitat disruption. | |
| MA | 3/4 size North Atlantic type two seam otter trawl (11.9 m headrope/15.5 m footrope) rigged with a 7.6 cm rubber disc sweep; 19.2 m, 9.5 mm chain bottom legs; 18.3 m, 9.5 mm wire top legs; and 1.8 X 1.0 m, 147 kg wooden trawl doors. The codend contains a 6.4 mm knotless liner to retain small fish | |
| VIMS | 400x12cm three-bridle, four-seam trawl with cookie sweep | Same net as NEFSC with cookie sweep (instead of rockhopper), light-duty floats (instead of heavy-duty), and does not incorporate a third top and bottom belly to 'ease the taper' from gilling in the wings of the net that was added to the NEFSC net |

Other states run trawl surveys and coordinate in various ways with the NEAMAP program, including New York, Rhode Island, Connecticut, and New Jersey.

#### *Other*

Other fishery-independent surveys conducted by the NEFSC include multiple protected species surveys (shipboard and aerial surveys), the EcoMon surveys that focus on plankton and oceanography, and the MArine Resources Monitoring, Assessment, & Prediction (MARMAP) program surveys (1977-1987).

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## NTAP History and Timeline

The NTAP is a relative newcomer to the history of the NEFSC Multispecies Bottom Trawl Survey, but it is strongly linked to decisions and panels that preceded it. An abbreviated timeline is provided here for reference.

### 1963-1976: Formation of Trawl Survey & Pre-EEZ period

- The fall BTS began in 1963 using the Albatross IV on the Atlantic Shelf from western Nova Scotia to just north of Hudson Canyon in depths ranging from 27 to 365 meters (15-200 fathoms). A more thorough description of the survey is provided above.
- The passage of the Fishery Management and Conservation Act of 1976, establishing the EEZ and creating eight regional fishery management councils.

## 1977-2000: EEZ to Trawlgate

- In 1977 the EEZ was implemented. By the 1980s foreign fishing vessels were prohibited from fishing in federal waters. Summer trawl surveys were conducted from 1977-1981 and 1991-1995 and winter trawl surveys were conducted from 1981-1985 and 1992-2007. Paired-tow experiments between the Albatross IV and Delaware II were done in 1982 to enable use of the Delaware when Albatross wasn't available from 1989-1991. Door testing was done in 1984 and 1991.
- In 1988 the NEFSC evaluated the precision of the trawl survey and made recommendations pertaining to the allocation of stations in the event of lost sea days, the importance of both spring and fall sampling, and estimates of the value of increased sampling intensity (NMFS 1988).
- The trawl winch on the Albatross IV was replaced in 1993 and the speed log in 1995 and the official tow speed was changed from 3.5 knots to 3.8 knots (speed log errors were demonstrated and it was shown that the survey was being conducted at 3.8 knots).
- In 2000, the 0.875" trawl wires were replaced with 0.91" wires.
- A digital data entry system replaced paper data entry in 2001.

## 2001-2002: Trawlgate

- A fisherman sailing on the Albatross IV identified trawl warps of different lengths in 2001. "The marks were not exactly at true 50-meter intervals over the first 1,000 meters of the warps. The difference in marks from the true values ranged between less than 1 inch to 38.4 inches. Also, some of the marks were not evenly matched between the port and starboard cables. This was discovered in September 2002" (Johnston & Sosebee 2014). "Information collected from dockside warp measurements indicated that the warp mis-calibration was related to the initial biased marking of the 50 meter intervals on one warp and was not due to progressive wire stretch" (NEFSC 2002a page 458).
- There were eight affected surveys (winter 2000, 2001 and 2002; spring 2000, 2001 and 2002; and fall 2000 and 2001).
- The error and the lack of acknowledgement of the error became popularly known as "Trawlgate."
- The NEFSC held a workshop to examine the issue with stakeholders (NEFSC 2002b) and conducted research into the potential effects on catchability, fishing power, and the potential for impact on stock assessments (NEFSC 2002a). Empirical studies and several analytical tests were used to test hypotheses around the potential impact that the different length warps could have on net geometry, fishing power, catchability, and the magnitude of impact on the stock assessments.
- The Workshop on Trawl Warp Effects on Fishing Gear Performance concluded "The trawl warp offset has had an effect on the survey trawl performance; however, at this time the workshop cannot determine the magnitude or scale of that effect" (NEFSC 2002b page 27).
- Several analyses conducted as part of the Groundfish Assessment Review Meeting (GARM) ultimately concluded "there is no indication of a systematic reduction in trawl survey fish catch efficiency due to the trawl warp offsets (NEFSC 2002a page 460) and "The overall management advice is robust to variations in recent survey catch rates" (NEFSC 2002a page 467).

- The Trawl Warp Workshop also concluded, "A working group that reflects the diversity of the fishing industry and other stakeholders should be established immediately" (NEFSC 2002b page 27).
- Trawlgate led to the development of a stakeholder advisory panel known as the Trawl Survey Advisory Panel (TSAP), which is also referred to as "the first NTAP."

### 2003-2008: TSAP

- From May 2003 to February 2008, the Trawl Survey Advisory Panel (TSAP) met with a primary focus on designing Bigelow trawl gear and the transition from Albatross IV to Bigelow. This panel successfully designed and tested the net currently used on the Bigelow and helped design the Albatross IV and Bigelow calibration. However, the panel dissolved under disagreements regarding decision-making processes and door selection (Johnson and McCay 2012).
- The Albatross IV/Bigelow paired tow experiment was conducted during 2007 and 2008 (Brown et al, 2007). The data from 636 usable paired tows were used to estimate a series of calibration factors to convert survey indices to 'Albatross IV/Polyvalent door' equivalents (Miller et al. 2010).

### 2009-2014: No panel

- In 2009, NOAA Ship Henry B. Bigelow became the primary survey vessel for NEFSC multispecies bottom trawl surveys.
- In this time period the NEFSC conducted several studies related to catch efficiency on the Bigelow. Catch efficiency between rockhopper gear and cookie sweep gear was studied in 2009 and 2010 using the Bigelow, finding that the cookie sweep was more efficient for catching flatfish. In 2014, a bridle efficiency study assessed bridle herding on flatfish and estimated the relative catch efficiency of the Bigelow standard trawl survey bridles for flatfish (Politis & Miller 2017). In this study, catches were compared of the standard survey bridle length, 36.6 m, to two longer bridle lengths, 58.2 m and 80.5 m. There was no evidence of a significant herding effect during the day for any of the flatfish species that were examined (Cadrin et al., 2017, Politis & Miller 2017). Also in 2014, paired tows with the Bigelow and the commercial vessel, the Hera, were done to estimate the relative catchability of flatfish between a commercial vessel with a yellowtail flounder net, the Bigelow trawl net, and HabCam (NEFSC 2022). The Hera caught up to 5 times as much flounder (by weight).
- To investigate the feasibility, costs and benefits of implementing an industry-based flatfish survey on Georges Bank, two commercial vessels and a net designed to catch yellowtail flounder were used to measure the abundance and distribution of flatfish on Georges Bank in August, 2013. Size and age distributions for yellowtail flounder were similar to the NEFSC 2013 fall survey but the pilot study could not be used to develop a population assessment for yellowtail flounder since only the U.S. side of Georges Bank was sampled (Martin & Legault 2014).

### 2015-present: NTAP

#### *Formation of NTAP*

- To increase understanding of the performance and methodology of the bottom trawl survey, in 2015, Dr. Bill Karp, NEFSC Director, requested the Councils re-form the trawl advisory panel. The Northeast Trawl Advisory Panel (NTAP) formed as a Council Advisory Panel with some TSAP members as well as new participants.

- NTAP has prioritized collecting taxa-specific information on trawl gear catch efficiency to gain insight into the relative abundance estimates for the survey trawl, with an aspiration of moving closer to a measure of absolute abundance, and as a means to gain greater confidence in stock advice (Miller et al., 2023).

*NTAP experiments*

- From 2015-2017 the Rockhopper Catch Efficiency Study with the F/V Karen Elizabeth (also known as "sweep-study efficiency work," "twin trawl sweep study," "sweep efficiency research," and "catchability study") was done. The study design was peer reviewed (Cadrin et al., 2017) and the study results were used in stock assessment models and published in the scientific literature (Miller et al., 2023).
    - Results: This study estimated the efficiency of the rockhopper sweep used on the Bigelow survey relative to gear with a chain sweep with a focus on flatfish, red hake, and skates (a cookie sweep was studied in 2009-2010).
    - Application of results: The estimated sweep efficiencies were used to scale up survey abundance indices to swept area abundance and biomass estimates. These were used in stock assessment models for yellowtail flounder, winter flounder, summer flounder, windowpane flounder, witch flounder, American plaice, and monkfish (Miller et al.,. 2023).
- In 2016 the auto trawl system was compared to fishing with equal warp lengths (Sirois 2016).
- From 2017-2019 a gear performance and catch efficiency study was done. It had 3 components: 1) a flume tank demonstration of the effects on net geometry of different net spreads in July 2019; 2) an assessment of different trawl doors that might improve the consistency of net spread at different depths in August of 2017 and 2019; and 3) a twin-trawl experiment to examine the impact of net spread on the catchability of flatfish in September of 2019.
    - Results: The flume tank provided useful measurements and visualization of trawl performance, indicating stable performance at many depths (Politis 2019a). The door testing compared 66" Thyboron Type IV doors (used on NEAMAP), Thyboron Type 21 Flipper doors, and Bison 9 doors. No door achieved the target spread in deep water with consistent, stable performance (Politis 2019b). The catchability study found that there were no significant differences in catchability at different net spreads. The study also found an increase in catch per unit effort with an increase in wingspread (Jones et al., 2021). In other words, the net spread did not affect the ability of the net to catch the species studied, but it did affect how many fish were caught per tow by increasing the area sampled.
    - Application of results: Since the doors that were tested did not improve performance, and because the twin trawl experiment did not find significant differences in catchability at different net spreads, the doors being used on the Bigelow (2.2² Poly-Ice Oval door at 550kg) were not changed. The catch efficiency study further supported the transition to the use of swept area biomass estimates. In December 2021, the Survey module within the StockEff assessment model that NEFSC assessment scientists use to generate stock

assessments was updated to use measured swept area instead of a standard tow to calculate abundance estimates for 35 stocks.

- In 2022, a restrictor rope paired tow study was conducted on the F/V Darana R using the VIMS NEAMAP gear configuration in the spring and fall. A restrictor rope is a possible way to improve standardization of bottom trawl surveys done on different vessels which is of interest primarily for wind farm studies. The study tested if the restrictor rope has an effect on catchability, therefore the study area was selected specifically for limited depth range and similar species compositions.
    - Results: gear metrics between the restrictor rope and no rope tows were minor. Given the relatively narrow depth range covered by the stations, we did not expect significant differences in performance. There were minimal impacts on species composition, catch weight, and catch lengths.
    - Application of results: the anticipated use of this information is to inform whether or not a restrictor rope should be further studied in order to standardize survey gear used in other groundfish studies. The study deliberately examined a narrow depth range and species composition, so additional work to understand impact on gear performance at multiple depths and in other biogeographic regions should follow.

### *Other related activities*

- The Moulton Groundfish Task Force was formed in 2015 at the request of U.S. Congressman Seth Moulton. The goal of the groundfish task force was to: (1) review the statistical strengths and weaknesses of bottom trawl surveys to determine which types of species it is best suited for vs. those that would benefit most from additional data sources, (2) Identify alternative data sources and sampling methods that would bolster efforts to assess groundfish stocks, and (3) build collaborations between industry and research scientists. The Moulton Groundfish Task Force report was released in 2019 (Grabowski 2019).
- The ICES Working Group on Northwest Atlantic Ecosystems Observations (WGNAEO) was established to develop a plan that coordinates the NEFSC's and the Department of Fisheries and Oceans Canada (DFO) Maritimes Regions spring bottom trawl surveys on eastern Georges Bank and Gulf of Maine. Materials are available at the ICES WGNAEO website.
- The NEFSC has been conducting an assessment of the impact of restratification on the bottom trawl survey to properly estimate variance. This work was first presented to NTAP on 9/29/2016, which included a handout. More work is currently underway about restratification as it pertains to survey coordination with Canada and related to offshore wind development.
- ICES held two workshops on unintended survey effort reduction (WKUSER) to examine best practices for addressing changes related to the inability to conduct a portion of a survey due to funding, weather, or mechanical issues. The first was held in January 2020 (ICES 2020) and the second in September 2022 (ICES 2023).
- The NTAP charter was updated in 2021 with an Action Plan. Both Councils approved the updated charter.

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