New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
John F. Quinn, J.D., Ph.D., *Chairman* | Thomas A. Nies, *Executive Director*

MEMORANDUM

DATE: September 10, 2018

TO: Groundfish Committee

FROM: Groundfish Plan Development Team

SUBJECT: **Progress on Amendment 23/Groundfish Monitoring**

The Groundfish Plan Development Team (PDT) met on July 31, 2018, in Gloucester, MA and August 22, 2018, by webinar. The PDT 1) discussed the draft alternatives for Amendment 23 (A23)/Groundfish Monitoring, and 2) discussed and reviewed analyses for Amendment 23.

Overview

This memorandum summarizes revisions to the draft Amendment 23 (A23) alternatives, which incorporate recommendations from the Groundfish Committee (Committee). The PDT developed these draft alternatives in Section 4.2.1 Groundfish Monitoring Program Revisions, based on the outcomes of the recent Committee meeting on June 1, 2018. The PDT raised questions to the Committee to help with further development of these draft alternatives.

Additionally, this memorandum summarizes progress on analyses the PDT is working on to address Committee motions on A23 alternatives development. The analyses are underway, and the Committee will receive a progress report at its September meeting.

Lastly, the PDT discussed a glossary of definitions for key terms for A23 it has developed. This memorandum provides a brief description of the glossary.

Draft Amendment 23 Alternatives

The PDT revised the draft A23 alternatives incorporating input from the following Committee motions from its meeting on June 1. Revisions to the draft alternatives focus on Section 4.2 Commercial Fishery Measures, based on Committee recommendations. Draft alternatives are provided as **Attachment #1**.

Committee Motion #4:

> *Move to have the Plan Development Team develop alternative methodologies to the coefficient of variation (CV) standard for determining the target monitoring coverage level. This could include fixed target coverage levels (e.g., an annual target coverage level 25%, 50%, 75%, and 100% of sector trips).* Carried 10/0/0.

Committee Motion #6:

To task the Plan Development Team to develop an alternative for a dockside monitoring program (at e.g., 50% and 100% coverage levels) for the commercial groundfish fishery with two options: 1) a mandatory option or 2) an option for sectors to use as part of their sector monitoring plans. Carried 9/0/1.

Based on these recommendations, the PDT developed the following draft alternatives:

4.2 Commercial Fishery Measures

4.2.1 Groundfish Monitoring Program Revisions

4.2.1.1 Monitoring Coverage Levels

- **Fixed Total Monitoring Coverage Level**
  - Based on Committee Motion #4, the PDT is developing an analysis of a range of fixed annual target coverage levels – 25 percent, 50 percent, 75 percent, and 100 percent of sector trips. The PDT's approach to this analysis is described in the next section, and initial analysis to develop this alternative is provided in **Attachment #2**.
  - Based on the motion's rationale (to achieve a monitoring coverage level that ensures precise and accurate catch (landings and discards) estimation and minimizes the potential for biases in the estimates), the PDT is taking an approach to the analysis that accounts for bias when analyzing fixed target coverage levels.
- **Alternative Methodologies to Using a CV Standard to Determine Annual Total Monitoring Coverage Level**
  - The PDT has not yet developed analyses to address this recommendation, but plans to develop ideas for alternatives methodologies to the CV standard in time for a future Committee meeting.

4.2.1.2 Dockside Monitoring

- **Develop a mandatory dockside monitoring program for the commercial groundfish fishery (sectors and common pool), at either 50 percent or 100 percent coverage.**
- **Develop a dockside monitoring program as an option for sectors to use as part of their sector monitoring plans.**
  - Based on Committee Motion #6, the PDT is discussing design options for a dockside monitoring (DSM) program for the commercial groundfish fishery. The PDT's approach to this analysis is described in the next section, and initial ideas on development of this alternative are provided in **Attachment #3**.
  - The **PDT** has outlined several different concepts for a DSM program based on different objectives, and **requests clarification from the Committee on the intended objectives of a DSM program**, which is a necessary first step to designing a DSM program.

- Based on the motion's rationale (to allow accurate landings), the goal is landings verification. **Is the Committee's intent that the DSM program is to ensure accurate reporting by dealers and to prevent illicit activity circumventing the dealer regulations (e.g., unreported offloads)?**
    - **If so, is the Committee willing to consider a DSM program as a dealer responsibility, rather than a vessel or sector responsibility?**
- The PDT is seeking further clarification on the Committee's intent for a DSM program "as an option for sectors to use in their sector monitoring plans**." Is the Committee's intent that the voluntary DSM program in A23 would be in lieu of another requirement, or would grant some exemption or additional benefit to a sector adopting the voluntary DSM program?**
    - Currently, any sector could opt to implement a dockside monitoring program, but none have elected to do so.
    - The regulations prohibit the Regional Administrator from granting exemptions from reporting requirements, including monitoring requirements, except for DAS and SAP reporting requirements, VMS requirements for HA vessels, and DSM requirements. Thus, A23 will have to specify whether a DSM program would be in lieu of another reporting requirement.
- Based on a review of the previous DSM program, there are **several questions and issues requiring further consideration:**
    - Should dealers be required to use certified scales and have monitors confirm the weights reported match the scale?
    - Should the dockside monitor travel with certified scales and directly weigh catch?
    - DSMs will need access to the dock, which might not belong to, or be controlled by, the vessel or dealer.
    - DSMs need access and egress to vessels.
    - DSMs need workspace at the dealer.
    - Does a DSM program have any novel insurance requirements?

Amendment 23 Analyses

The PDT is working on analyses to develop alternatives following the above recommendations from the Committee, provided as attachments to this memorandum:

Attachment #2 – Analysis of Alternative Methodologies to the CV Standard

The PDT discussed an approach to the Committee's request to "analyze fixed annual target coverage levels (25 percent, 50 percent, 75 percent, and 100 percent) of sector trips." The PDT identified one approach would be to look back at each of the sector years and determine what the realized CVs would have been for each stock under each of the fixed annual coverage levels and compare to the CVs realized under the current CV30 standard for determining total monitoring coverage levels.

However, based on previous PDT analysis and discussion, the PDT is concerned that this approach would not address the issue of bias in the groundfish fishery, which the PDT has identified as a substantial source of uncertainty in monitoring the fishery. As discussed in previous analysis on Sector Monitoring CV (see PDT memo to Committee re additional analyses for Amendment 23/Groundfish Monitoring, dated May 29, 2018 (revised June 6, 2018)), the PDT notes that large observer effects (bias) concerns will likely make the use of CVs to predict monitoring coverage invalid.

Therefore, the PDT discussed an approach to analysis of a range of fixed target coverage levels that would simulate levels of bias, in an effort to relate estimates of bias at different fixed coverage levels to changes in estimates of total catch. This analysis is provided as **Attachment #2,** with an explanation of the approach which details a number of assumptions and caveats.

The PDT plans to continue developing this analysis of a range of fixed annual target coverage levels. Additionally, the PDT is working to develop additional alternative methodologies to the CV standard for determining total monitoring coverage levels.

Attachment #3 – Ideas to develop Dockside Monitoring

The PDT discussed its approach to developing DSM, and felt that the first step is to determine the goals and objectives of a DSM program.

The PDT outlined the potential development of several different DSM program designs which would have differing objectives. Additionally, the PDT raised questions it has for the Committee on which of these types of DSM programs would be most in line with the Committee's recommendations.

Additional A23 analyses

The PDT also addressed a request from the Committee to analyze groundfish fishing activity west of 72 degrees 30 minutes west longitude to see if it would be appropriate to exempt vessels from at-sea monitoring and dockside monitoring (if implemented):

Committee Motion #2:

> *To task the Plan Development Team to analyze groundfish fishing activity west of 72 degrees 30 minutes west longitude to see if it would be appropriate to exempt vessels from at-sea monitoring and dockside monitoring (if implemented).* Carried 9/0/1.

The PDT examined groundfish catches west of 72 degrees 30 minutes west longitude (analysis provided in **Attachment #4**). Catches (landings and discards) of groundfish west of 72 degrees 30 minutes west longitude (from 2010 - 2017) are generally low overall but vary by stock. While some stocks have little to no catch in this area (expected given their distributions), stocks with notable catches west of 72 degrees 30 minutes west longitude include Georges Bank cod (west), southern windowpane flounder, Southern New England/Mid-Atlantic (SNE/MA) yellowtail flounder, ocean pout, witch flounder, and SNE/MA winter flounder.

The PDT notes that it may be difficult to determine whether it would be appropriate to exempt certain vessels from at-sea monitoring and DSM (if implemented) until after there is a clearer

sense of what changes may occur to groundfish monitoring through A23, and that this may depend on the objectives of both at-sea monitoring and DSM (if developed).

A23 Glossary of Key Terms

The PDT developed a glossary of definitions for key terms for A23 (provided as **Attachment #5**). The purpose of this glossary is to provide clarification to managers and the public on key terms commonly used in discussions of monitoring, and to insure the PDT is using these terms consistently across its work. The PDT will update the glossary as necessary. The glossary will be incorporated into the draft EIS.

Next Steps

The PDT will continue to develop analyses and alternatives for A23. Staff will compile draft alternatives, glossary of key terms, summary of scoping comments, and background information to be included as appendices, into the draft EIS for A23.

4.0 DRAFT ALTERNATIVES UNDER CONSIDERATION

4.1 Fishery Program Administration

4.1.1 Sector Administration Provisions

The management measures proposed in this section relate to sector administration policies established in Amendment 13 and Amendment 16.

The alternatives for modifying the current sector administration provisions are described below. The following alternatives will consider changes to the administration of the groundfish sector program designed to improve the operation of the system. The goal is to reduce reporting redundancies, reduce the burden on sector managers for reporting data, increase flexibility for sector participants with business planning, and improve the quality and timeliness of data processing. Additionally, there are alternatives to establish additional funding source options for the groundfish at-sea monitoring program.

4.1.1.1 Sector Reporting Requirements

4.1.1.1.1 Option 1: No Action

Sectors are required to report all landings and discards by sector vessels to NMFS on a weekly basis. Additionally, there is a requirement that sectors submit annual year-end reports (Amendment 13 and Amendment 16). Current regulations require that approved sectors must submit an annual year-end report to NMFS and the Council, within 60 days of the end of the fishing year that summarizes the fishing activities of its members, including harvest levels of all species by sector vessels (landings and discards by gear type), enforcement actions, and other relevant information required to evaluate the performance of the sector. More information on sector reporting requirements and the NMFS year-end report guidance can be found in Attachment 1 (Background Information on the Groundfish Monitoring Program).

Option 1/No Action would continue to require sectors to report all landings and discards to NMFS on a weekly or daily basis, and would continue to require that sectors submit annual year-end reports to NMFS and the Council.

4.1.1.1.2 Option 2: Streamline Sector Reporting Requirements

This measure would grant the Regional Administrator authority to revise the sector monitoring and reporting requirements currently prescribed in the regulations [648.87(b)(1)(v) and (vi)] to streamline the sector reporting process. For example, this could include eliminating the requirement for sectors to submit weekly and daily reports in lieu of the agency providing monitoring summaries for the sectors to use while continuing reconciliation to confirm accuracy.

In Amendment 16, the Council required sectors to report all landings and discards by sector vessels to NMFS on a weekly basis. At the time this was developed, the expectation was that sectors would use real-time information from their vessels to monitor catch. In practice, NMFS provides sector managers with a weekly download of official trip data (dealer and VTR landings data, observer discard data, and calculated discard rates for unobserved trips), and most sectors then use the weekly downloads to update their sector accounting and then submit a weekly report to NMFS. Other sectors use data collected directly from vessels in their reports. Data reconciliation occurs regularly between the sectors and NMFS

to improve monitoring accuracy.

A more efficient process might be developed that would still involve timely monitoring and reconciliation of data sources between sectors and NMFS. If deemed sufficient by the Regional Administrator, an alternative to the process currently prescribed in the regulations may satisfy the need to:

- Summarize trips validated by dealer reports;
- Oversee the use of electronic monitoring equipment and review of associated data;
- Maintain a database of VTR, dealer, observer, and electronic monitoring reports;
- Determine all species landings by stock areas;
- Apply discard estimates to landings;
- Deduct catch from ACEs allocated to sectors; and
- Determine sector catch and ACE balances.

Additional changes to streamline sector reporting could include such items as[1]:

- Using NMFS reconciled data to determine when the trigger for sector daily catch reporting has been reached (required when 90 percent of any ACE has been caught), rather than using sector self-reported data. As described above, sector data is not any timelier and the reconciled data is more accurate, so using NMFS reconciled data would be more efficient and reliable than relying solely on sector reports.
- Modifying trip end hails to accommodate catch reporting and to eliminate redundancy.

Rationale: Streamlining the sector reporting process would reduce reporting redundancies, provide flexibility to sectors and sector managers, and improve timeliness of data processing.

4.1.1.2 Knowing Total Monitoring Coverage Level at a Time Certain

4.1.1.2.1 Option 1: No Action

The timeline for when total monitoring coverage level information is available has varied throughout the years of the groundfish monitoring program (Table 1). Currently, NMFS publishes the total monitoring coverage level once the necessary analysis is completed. Typically, analysis to determine the at-sea monitoring (ASM) coverage level is available sooner than the Standardized Bycatch Reporting Methodology (SBRM) analysis used to determine the Northeast Fisheries Observer Program (NEFOP) coverage level.

Current regulations set December 1 as the deadline for sectors to submit preliminary rosters, but give NMFS flexibility to set other dates. For example, in FY 2013, managers asked for a later date, and they agreed on March 29, 2013. Beginning in FY 2014, NMFS established a standard deadline of four weeks after potential sector contribution (PSC) letters are sent out, although in several years, there have been agreed-upon extensions.

[1] These items were initially included in a letter from NMFS to the Council: "Bullard to NEFMC re sector reporting streamlining", dated August 14, 2013 (see Attachment 2).

Table 1 - Target and realized observer (NEFOP and ASM) coverage levels for the groundfish fishery and dates when analyses to determine coverage rates available for Fishing Years 2010-2017 (GARFO 2017). "n/a" indicates that the information is not available.

Fishing Year	NEFOP target coverage level	ASM target coverage level	Total target coverage level	Realized coverage level	Date analysis posted by GARFO to determine total coverage rate	Date ASM coverage rate announced	Date sector rosters were due
FY 2010	8 %	30 %	38 %	32 %			
FY 2011	8 %	30 %	38 %	27 %			12/1/2010
FY 2012	8 %	17 %	25 %	22 %			12/1/2011
FY 2013	8 %	14 %	22 %	20 %	4/12/2013	3/14/2013	3/29/2013
FY 2014	8 %	18 %	26 %	25.7%	2/21/2014	2/18/2014	3/6/2014
FY 2015	4 %	20 %	24 %	19.8%	3/2/2015	2/26/2015	2/25/2015
FY 2016	4 %	10 %	14 %	11.1%	5/6/2016	3/22/2016	3/15/2016
FY 2017	4 %	12 %	16 %	n/a*	3/15/2017	3/15/2017	3/16/2017
FY 2018	5%	10%	15 %		1/25/2018	1/25/2018	3/26/2018

*Realized coverage not available; fishing year still underway.
Source: Summary of analyses conducted to determine at-sea monitoring requirements for multispecies sectors, FY2018, GARFO; and personal communication with GARFO staff

Option 1/No Action would continue the current process of making the total monitoring coverage level available once the necessary analysis is completed.

4.1.1.2.2 Option 2: Administrative Measure for Knowing Total Monitoring Coverage Level at a Time Certain

This measure would consider alternatives that facilitate knowing the target monitoring coverage level at a specific date in advance of the start of the fishing year to facilitate business planning by permit holders and sectors. Groundfish fishery participants need this information in advance of the fishing year in order to decide whether to participate in sectors for the upcoming year and to finalize their business planning. The feasibility of setting a fixed date is related to the method used for setting coverage rates and the desired timeliness of the underlying data used in the analysis.

Certain alternatives for determining target monitoring coverage levels may not require extensive analysis to determine target coverage levels for the upcoming fishing year. For example, alternatives for fixed target coverage levels would provide sectors a clear understanding of the target monitoring coverage level for upcoming years. However, alternatives that base the coverage rate on an analysis of past years' data must trade off timeliness of the data available in time to complete the analysis by the deadline.

Rationale: Knowing the target monitoring coverage level at a specific date in advance of the start of the fishing year would provide flexibility to groundfish fishery participants by making the necessary information available for participants to decide whether to participate in sectors for the upcoming year

and to finalize their business planning.

4.1.1.3 Funding for the Groundfish Monitoring Program

4.1.1.3.1 Option 1: No Action

Beginning in 2012, Amendment 16 required that the at-sea monitoring program would be industry funded. However, since then NMFS has had sufficient funding to be able to pay for all or some of the sampling costs of the groundfish at-sea monitoring program. From FY 2012 through FY 2014, NMFS fully covered the sampling costs of the at-sea monitoring program. In FY 2015, NMFS fully covered sampling costs for the at-sea monitoring program until funds were expended in March 2016, at which point industry became responsible for the cost of at-sea monitoring. From July 2016 through April 2018, NMFS partially reimbursed sector participants for at-sea monitoring costs through a grant with the Atlantic States Marine Fisheries Commission.

In 2018, Congress directed NOAA to fully fund at-sea monitoring and allocated funds to do so. NOAA is currently reimbursing industry for 100 percent of its at-sea monitoring costs for fishing year 2018, and has set aside additional funds for industry reimbursement for future years. It is anticipated that once these appropriated funds are used, sampling costs of at-sea monitoring would be fully paid for by industry, unless additional funds are appropriated by Congress.

Option 1/No Action would continue to require industry to fund at-sea monitoring costs.

4.1.1.3.2 Option 2: Additional Options for Industry-Funded Costs of Monitoring[2]

[2] The Groundfish Committee passed a motion at its May 9, 2018 meeting to move Section 4.1.1.3.2 (Option 2: Additional Options for Industry Funded Cost of Monitoring) to considered and rejected.

4.2 Commercial Fishery Measures

4.2.1 Groundfish Monitoring Program Revisions

Sectors are responsible for developing and implementing a monitoring program, described in their operations plans, that satisfies NMFS and Council requirements for monitoring sector catch and discards (Amendment 13, Amendment 16, FW 45, FW 48, and FW 55).

The primary goal of the groundfish sector at-sea monitoring program is to verify area fished, catch, and discards by species, by gear type; and meeting these primary goals should be done in the most cost effective means practicable (FW 55). All other goals and objectives of groundfish monitoring programs at §648.11(l) are considered equally-weighted secondary goals.

The goals and objectives of the groundfish monitoring program, are as follows:

Goal 1: Improve documentation of catch

Objectives:
Determine total catch and effort, for each sector and common pool, of target or regulated species. Achieve coverage level sufficient to minimize effects of potential monitoring bias to the extent possible while maintaining as much flexibility as possible to enhance fleet viability.

Goal 2: Reduce cost of monitoring

Objectives:
Streamline data management and eliminate redundancy.
Explore options for cost-sharing and deferment of cost to industry. Recognize opportunity costs of insufficient monitoring.

Goal 3: Incentivize reducing discards

Objectives:
Determine discard rate by smallest possible strata while maintaining cost-effectiveness. Collect information by gear type to accurately calculate discard rates.

Goal 4: Provide additional data streams for stock assessments

Objectives:
Reduce management and/or biological uncertainty.
Perform biological sampling if it may be used to enhance accuracy of mortality or recruitment calculations.

Goal 5: Enhance safety of monitoring program

Goal 6: Perform periodic review of monitoring program for effectiveness

The following sections describe options to adjust landing and discard monitoring for sector vessels. These options may replace existing monitoring and reporting requirements, or may be implemented in addition

to existing programs to improve data collection (e.g., improved discard monitoring systems, dockside monitors for landings, etc.). The range of alternatives considered by the Council includes the current system (No Action) as well as the options proposed below.

4.2.1.1 Monitoring Coverage Levels

4.2.1.1.1 Option 1: No Action

Amendment 16 specified a coverage level standard for sectors and required industry-funded ASM beginning in 2012. This requirement focused on the coefficient of variation (CV) of discard estimates, a measure of the precision of discard estimates, but also noted that other factors could be considered when determining coverage levels:

"For observer or at-sea monitor coverage, minimum coverage levels must meet the coefficient of variation in the Standardized Bycatch Reporting Methodology. The required levels of coverage will be set by NMFS based on information provided by the Northeast Fisheries Science Center (NEFSC) and may consider factors other than the SBRM CV standard when determining appropriate levels. Any electronic monitoring equipment or systems used to provide at-sea monitoring will be subject to the approval of NMFS through review and approval of the sector operations plan. Less than 100% electronic monitoring and at-sea observation will be required. In the event that a NMFS-sponsored observer and a third-party at-sea monitor are assigned to the same trip, only the NMFS observer must observe that trip.

Assumed discard rates will be applied to sectors unless an at-sea monitoring system (such as a sector's independent monitoring program, a federal monitoring program, or other program that NMFS determines is adequate) provides accurate information for use of actual discard rates."

Currently, a system for fishery performance criteria is used in setting groundfish sector coverage levels (FW 55). Application of the CV standard is filtered consistent with existing goals for the monitoring program, such that stocks that meet the performance criteria are not drivers for the annual coverage level. More information on the fishery performance criteria can be found in Attachment 1 (Background Information on the Groundfish Monitoring Program).

If Option 1/No Action is adopted, groundfish monitoring coverage level requirements would remain as defined in Amendment 16 and subsequent framework actions (FW 48 and FW 55). Currently, the target at-sea monitoring/electronic monitoring coverage level must meet the CV precision standard specified in the Standardized Bycatch Reporting Methodology (currently a 30 percent CV) for discard estimates at the stock level for all sectors and gears combined. Additionally, sector coverage levels are based on the most recent 3-year average of the total required coverage level (based on realized stock level CVs) necessary to reach the required CV for each stock, and are set using fishery performance criteria so that stocks that meet the performance criteria (not overfished, with overfishing not occurring according to the most recent available stock assessment, and that in the previous fishing year have less than 75 percent of the sector sub-ACL harvested, and less than 10 percent of catch comprised of discards) are not drivers for the annual coverage level.

4.2.1.1.2 Option 2: Fixed Total Monitoring Coverage Level

Adequate coverage (combined NEFOP, ASM and EM) is required to generate accurate discard estimates with a known level of precision. All of the options below – including requirements for coverage adequate for the accuracy and precision of estimates - would be interpreted and applied consistent with the overarching goals and objectives of the sector monitoring program.

Currently, the target at-sea monitoring/electronic monitoring coverage level must at least meet the coefficient of variation (CV) specified in the Standardized Bycatch Reporting Methodology (currently a 30-percent CV) for discard estimates at the stock level for all sectors combined (see Section 4.2.1.1.1).

Four levels of at-sea monitoring coverage are analyzed which, if chosen, would replace the current CV standard. The Council would select one of these coverage levels.

- *Sub-Option 2A* – A range of fixed target coverage levels – an annual target coverage level of 25 percent, 50 percent, 75 percent, or 100 percent - of all sector trips.

Rationale: The goal is to achieve a monitoring coverage level that ensures precise and accurate catch (landings and discards) estimation and minimizes the potential for biases in the estimates.

4.2.1.1.3 Option 3: Alternative Methodologies to Using a CV Standard to Determine an Annual Coverage Target

There are alternatives to a precision standard for determining target coverage levels that focus on other factors such as accuracy of discard estimates or encouraging compliance. [To be developed.]

Rationale: The goal is to achieve a monitoring coverage level that ensures precise and accurate catch (landings and discards) estimation and minimizes the potential for biases in the estimates.

4.2.1.2 Dockside Monitoring Program

4.2.1.2.1 Option 1: No Action

There is currently no requirement for dockside monitoring for the groundfish monitoring program. Amendment 16 established a dockside monitoring program in the groundfish fishery, in order to verify landings of a vessel at the time it is weighed by a dealer and to certify the landing weights are accurate as reported on the dealer report. The dockside monitoring requirement was later eliminated (FW 48). More information on the previous dockside monitoring program can be found in the PDT Dockside Monitoring Discussion Paper [in the process of being finalized, to be included as an appendix in the DEIS].

Option 1/No Action would continue to maintain no requirement for dockside monitoring for the groundfish fishery.

4.2.1.2.2 Option 2: Dockside Monitoring Program

The following measures will consider changes to how landings are monitored in the groundfish fishery. The goal is to improve the reliability and accountability of landings.

The following measures would create a dockside monitoring (DSM) program for the groundfish fishery that would focus on monitoring landings by either independently weighing landings or verifying landed catch is weighed and accurately reported by dealers. The goal of a DSM program system is verify landings by providing an independent landings data stream that may be compared to dealer-reported

landings in order to ensure accurate accounting for/estimation of landings.

- *Sub-Option 2A* – Develop a mandatory dockside monitoring program for the commercial groundfish fishery (sectors and common pool), at either 50 percent or 100 percent coverage. The Council would choose one of these coverage levels.

- *Sub-Option 2B* – Develop a dockside monitoring program as an option for sectors to use as part of their sector monitoring plans.

Rationale: The goal is to establish a dockside monitoring program that allows for verification of accurate landings for the entire groundfish fishery.

5.0 DRAFT ALTERNATIVES CONSIDERED AND REJECTED

5.1 Fishery Program Administration

5.1.1 Sector Administration Provisions

5.1.1.1 Funding for the Groundfish At-Sea Monitoring Program

5.1.1.1.1 Option 2: Additional Options for Industry-Funded Costs of Monitoring

Under Amendment 16, sectors must develop and fund their own monitoring programs. Sectors are still expected to bear the costs of the monitoring program changes adopted in Amendment 23.[3]

Funding source ideas

The costs of additional monitoring can be considerable. This action will consider regulatory changes that will help offset the cost of monitoring for sectors. Ideas to offset monitoring costs include:

- Quota auctions and quota set-asides, where a portion of the ACL for key stocks could be auctioned off annually to fund monitoring. This is done in some Fishery Management Plans (FMPs), where a portion of the quota is reserved as a set-aside and auctioned off annually to provide additional catch opportunity and a source of funding for management priorities like research. Section 208 of the Magnuson-Stevens Act (MSA) established a Fisheries Conservation and Management Fund, which may be funded through quota set-asides, appropriations, states or other public sources, and private or nonprofit organizations. This fund may be used to expand the use of electronic monitoring.

This measure will establish the necessary infrastructure for a quota auction.[4]

Rationale: Quota auctions may offset the cost of monitoring for sectors. This measure would consider regulatory changes to establish a quota auction.

Rationale for not including 5.1.1.1.1: After reviewing the work to date, the Groundfish Committee had concerns that an option to set up a quota auction or quota set-aside would further reduce available quota at a time while the groundfish fishery continues to operate under historically low annual catch limits. Therefore, the Committee did not recommend this action for further development.

[3]The Council recently adopted the IFM Amendment. The IFM Amendment discusses that the existing groundfish monitoring program is excluded from the newly adopted IFM approach. The PDT is aware that there are provisions in the IFM Amendment that will need to be considered for determining how the adjusted groundfish monitoring program in Amendment 23 fits into the IFM approach, and plans to explore this concept further. At present, the PDT does not expect that the IFM approach would apply to the adjusted groundfish monitoring program.

[4] The PDT is exploring potential limitations to setting up a quota auction for the groundfish sector program. One question is whether the Council can provide a quota auction system outside of Limited Access Privilege Programs (LAPPs). Additionally, even if it is determined the Council can establish a quota auction system for the groundfish sector program, the funds collected would go into the Limited Access System Administration Fund established by section 305(h)(5)(B) of the MSA and would be subject to annual appropriations.

Attachment #2

Groundfish catch estimation under various levels of observer coverage and bias

Daniel W. Linden, NOAA/NMFS/GARFO

12 September 2018

The Groundfish Plan Development Team was asked to examine how various levels of observer coverage (25–100%) would influence the estimation of groundfish catch. In the absence of bias, an increase in sampling will result in a subsequent increase in precision and, with a random sampling scheme, an increase in accuracy. In the presence of bias, precision is a less useful measure of accuracy. When observed trips are not representative of all groundfish trips, bias is manifested by having estimates of discards that different from the truth (inaccurate).

We simulated how inferences regarding annual catch (landings + discards) for groundfish stocks would be affected under various levels of observer coverage, and what happens in the presence of observer bias. Here, we assumed that observer bias results in the true discard rate on unobserved trips being some inflated factor of the observed discard rate (e.g., truth = observed × 10). As coverage increases to 100%, the effective bias shrinks to zero as the number of unobserved trips reduces to zero. Therefore, observer bias is expected to be most problematic at low levels of observer coverage.

Methods

We used the observed and estimated discards on all groundfish trips from 2010–2017 to serve as the population of actual discards during this period. Note, discards in this case refer to any discarded fish as recorded by the observer (e.g., sub-legal, legal-sized unmarketable fish [LUMF], illegal). While illegal discarding of legal-sized fish can and has been observed, its occurrence is relatively rare in the observer data. For this reason, the observer data cannot provide any context for the amount of illegal discarding that may occur on unobserved trips and how that affects total catch estimation.

For each combination of 5 levels of coverage (10%, 25%, 50%, 75%, 100%) and 4 levels of bias (1×, 2×, 5×, 10×), we re-sampled the trips 500 times using a non-parametric bootstrap to estimate total discards. The "sampled" trips were assigned their perceived discard quantity (whether originally observed or projected according to a rate) while the unsampled or unobserved trips were assigned a discard quantity that inflated their perceived quantity according to the bias level for the given simulation. For example, if a trip had an observed/projected discard quantity of 100 lbs for haddock, that quantity would be inflated to 100 lbs (1× = no bias), 200 lbs (2×), 500 lbs (5×), or 1000 lbs (10×). The bias levels we explored were arbitrarily chosen – ongoing work is attempting the quantify the potential bias that may exist.

This simulation exercise produced 2 quantities for each stock: total *estimated* discards and total *true* discards. The *estimated* discards were a summation of the sampled and projected (based on sampled rate) discards on observed and unobserved trips, respectively. The *true* discards were a summation of the sampled and inflated discards on observed and unobserved trips, respectively. In the absence of bias, the mean estimated discards – across all 500 simulations – are equivalent to true discards and uncertainty is dictated by coverage. In the presence of bias, estimated discards are no longer representative of the truth. Therefore, it is more useful to examine how true discards vary as the ratio of observed/unobserved trips changes with coverage rate.

Total catch (estimated and true) was then calculated as the summation of discards and landings. Due to differences in the relative magnitude of catch across stocks, and even within stocks across years, comparisons can be difficult to make depending on the scales being portrayed. We present the results in 2 phases:

1) effects of coverage rate (no bias) on the precision of estimated catch
2) effects of coverage rate & bias on the true catch

The variation in total catch (both estimated and true) across all 500 simulations is expected to be lowest for highly utilized stocks with total catch comprising mostly of landings (e.g., winter flounder, cod) and highest for those comprising mostly (or entirely) of discards (e.g., halibut, windowpane).

To allow for better illustration of relative differences, the results for estimated catch are displayed for only the past 3 years (2015–2017). True catch is displayed for all sector years (2010–2017) so that relative variation by coverage rate and bias level is displayed within the context of temporal differences.

Results

Figure 1 displays the variable uncertainty (95% confidence) in *estimated* catch across all 22 stocks (20 stocks plus 2 management units) as observer coverage is varied, in the scenario where there is no bias. Mean estimated catch is the same across coverage rates within a year, but means vary across years and uncertainty increases with decreasing coverage.

Figures 2-23 display the simulated *true* catch (with 95% confidence intervals) separately for each stock from 2010–2017, with 4 panels for each level of bias and colored lines for each level of observer coverage. The lowest coverage levels are plotted last and will obscure higher levels when they match closely. Note that uncertainty intervals are often very small and appear absent.

It is clear that for highly utilized stocks where catch is comprised mostly of landings, the effects of observer coverage and bias are relatively low. For all stocks, with no bias present (bias = 1×) the mean estimated catch is not affected by level of observer coverage. Under high levels of bias (10×) and low levels of coverage (10–25%), simulated true catch for some stocks was significantly inflated over the true catch that occurs with no bias.

Figure 1

Total estimated catch (with 95% confidence intervals) under varying observer coverage

Figure 1 (cont.)

Total estimated catch (with 95% confidence intervals) under varying observer coverage

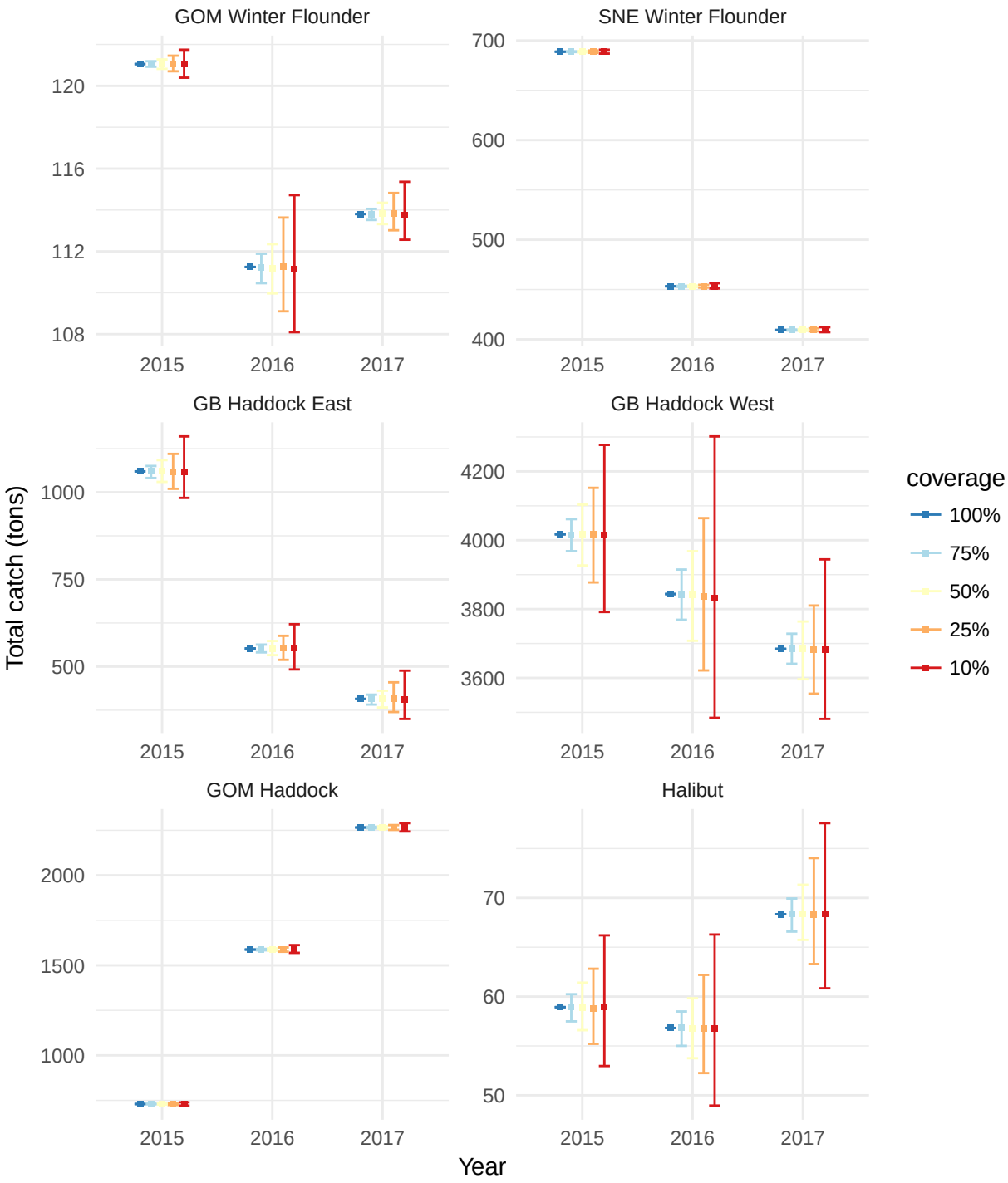


Figure 1 (cont.)

Total estimated catch (with 95% confidence intervals) under varying observer coverage

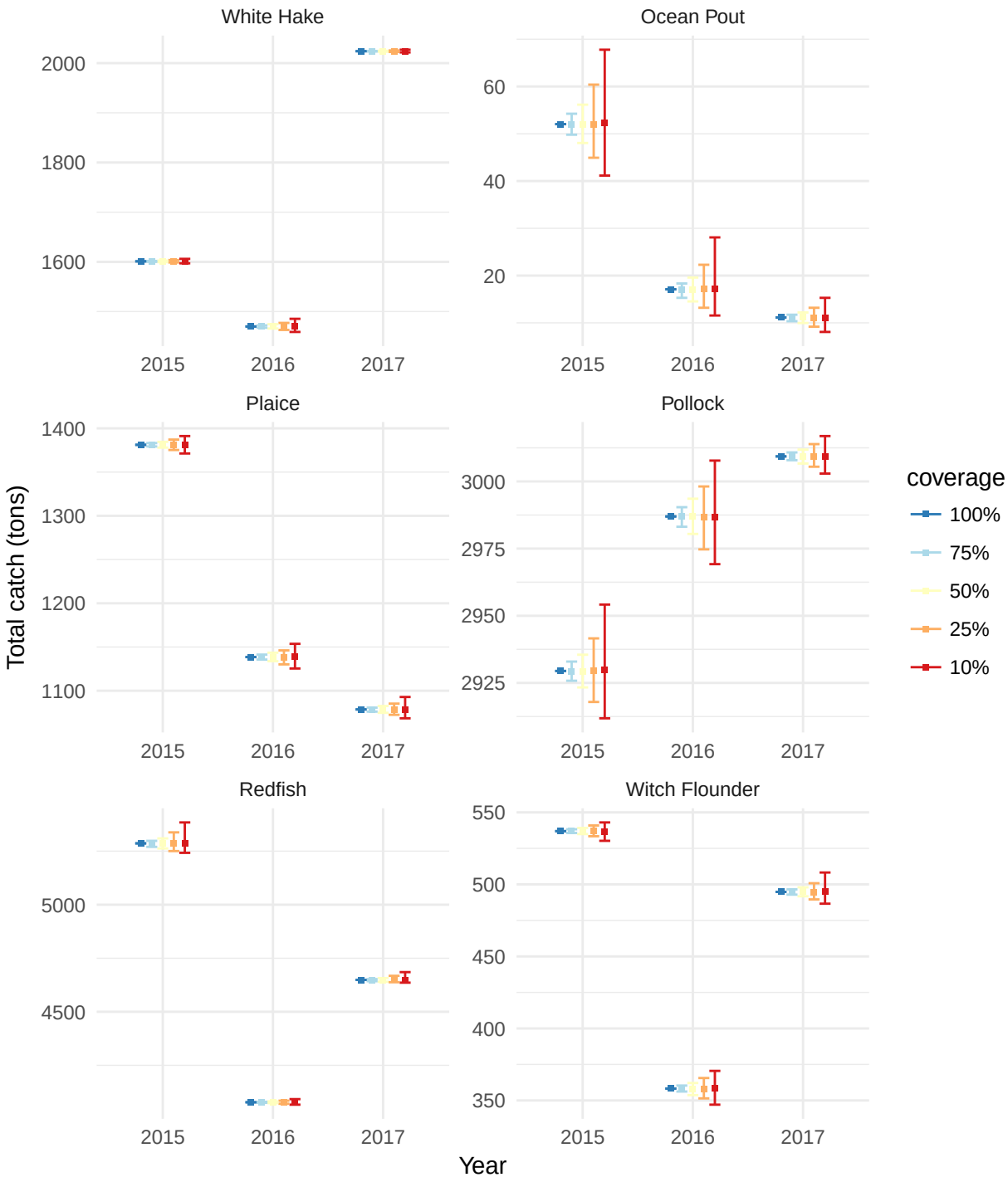


Figure 1 (cont.)

Total estimated catch (with 95% confidence intervals) under varying observer coverage

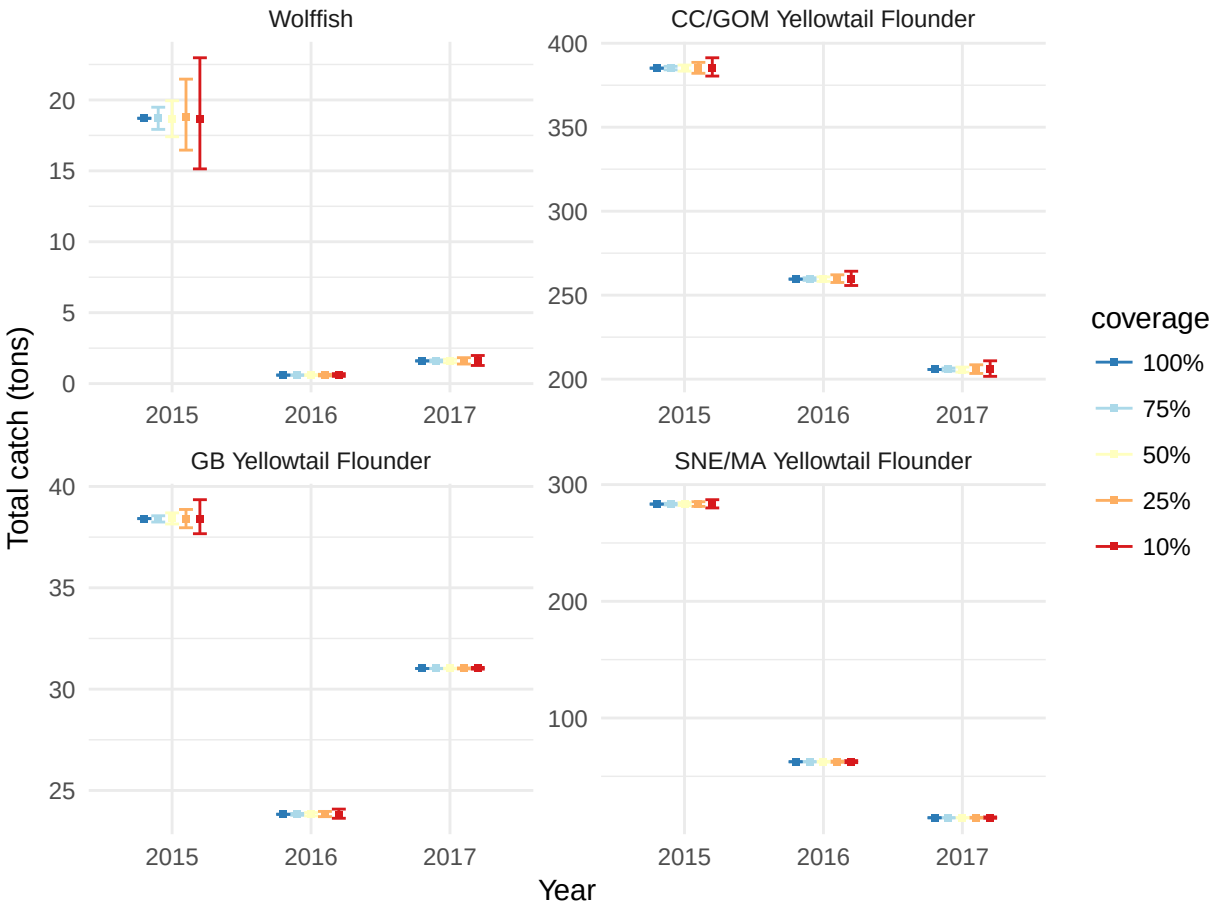


Figure 2: GB Cod East

Total 'true' catch under varying observer coverage and bias

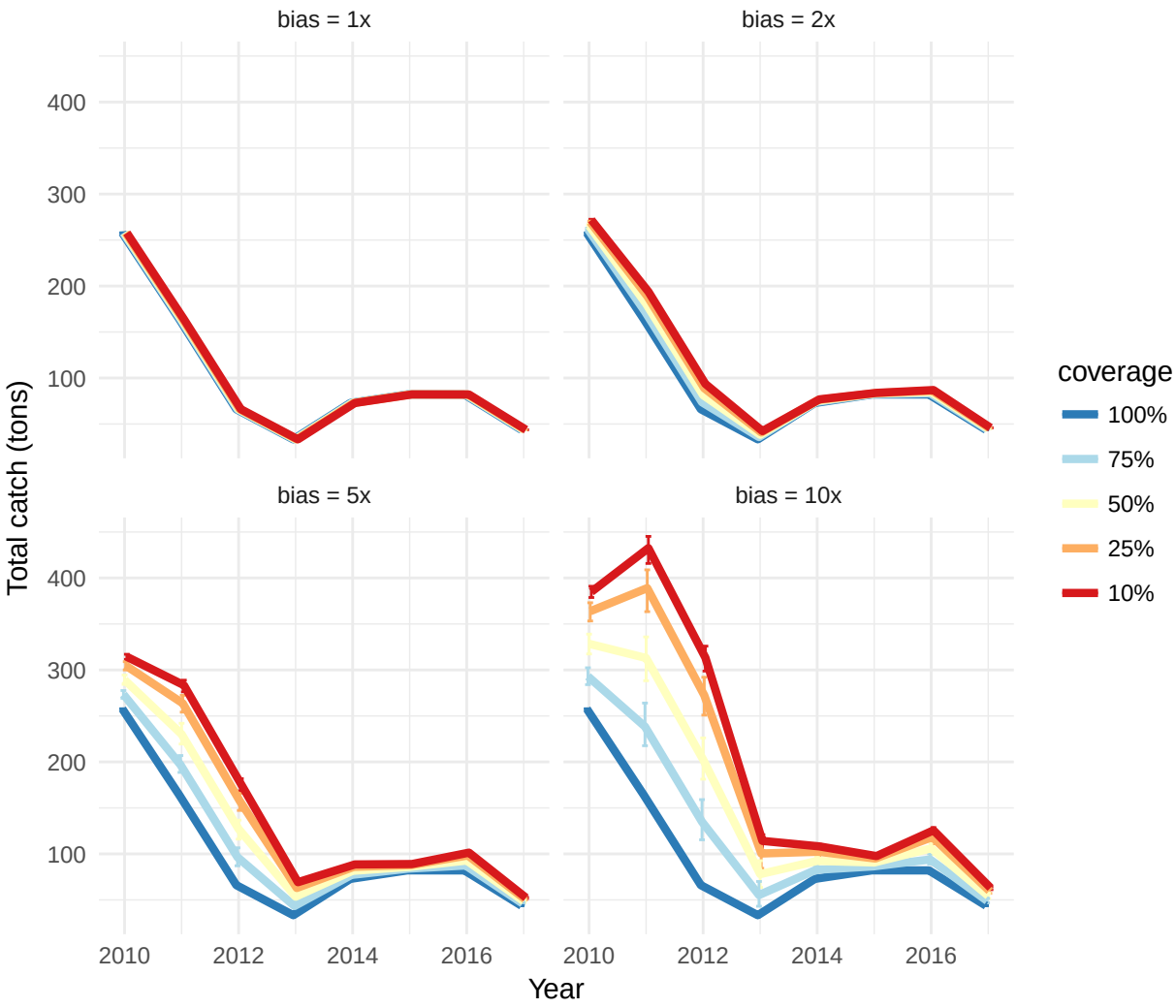


Figure 3: GB Cod West

Total 'true' catch under varying observer coverage and bias

Figure 4: GOM Cod

Total 'true' catch under varying observer coverage and bias

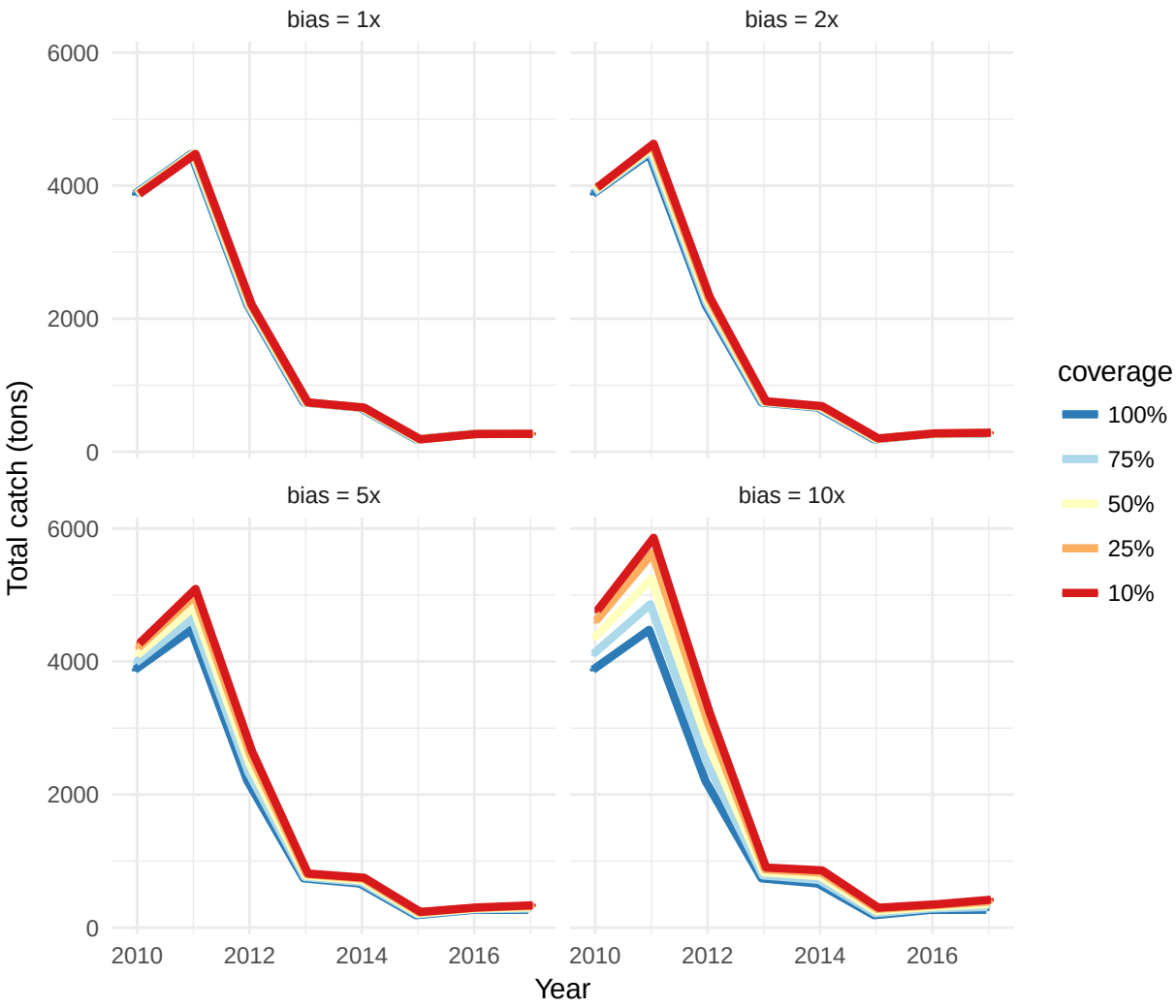


Figure 5: Southern Windowpane

Total 'true' catch under varying observer coverage and bias

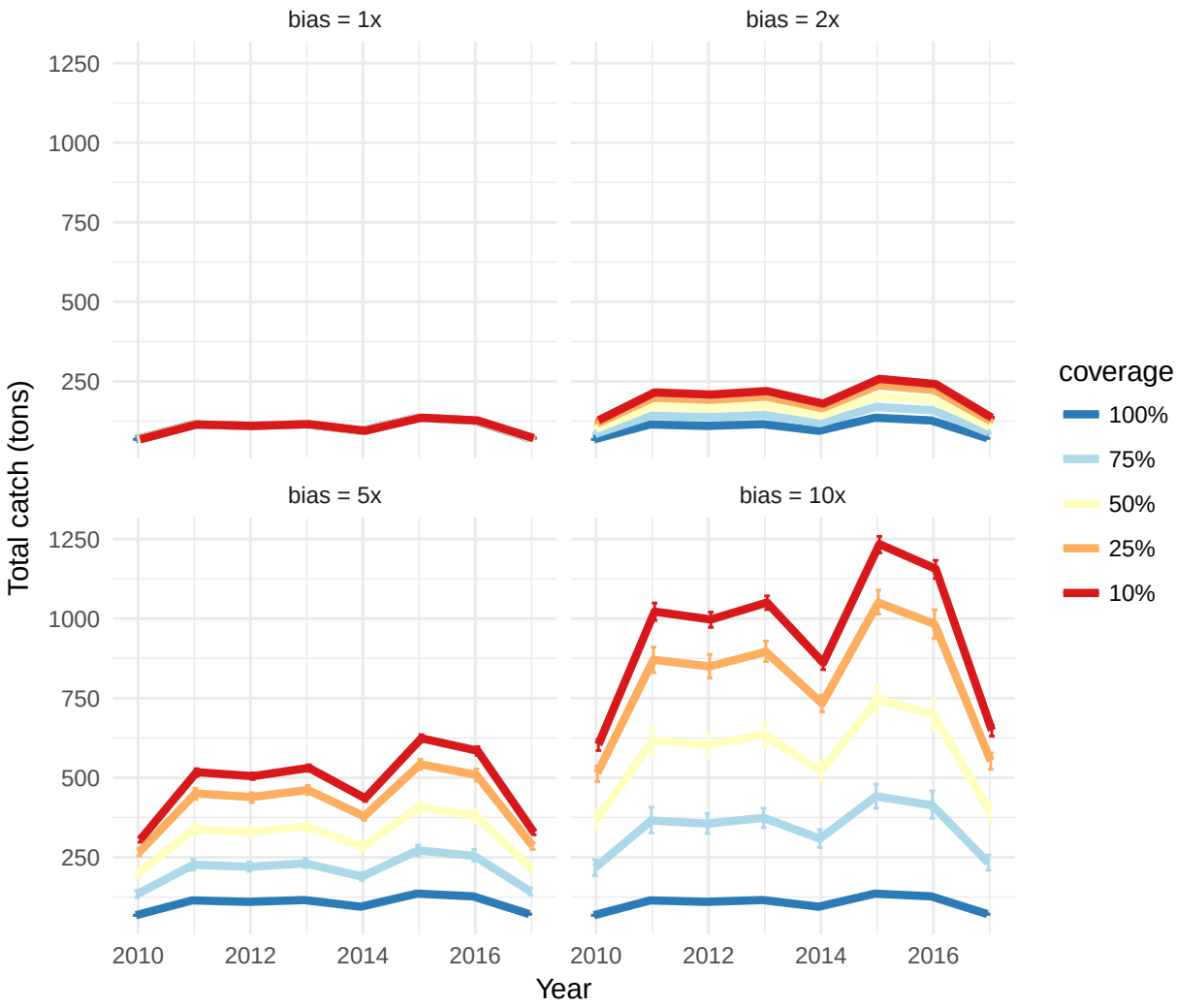


Figure 6: Northern Windowpane

Total 'true' catch under varying observer coverage and bias

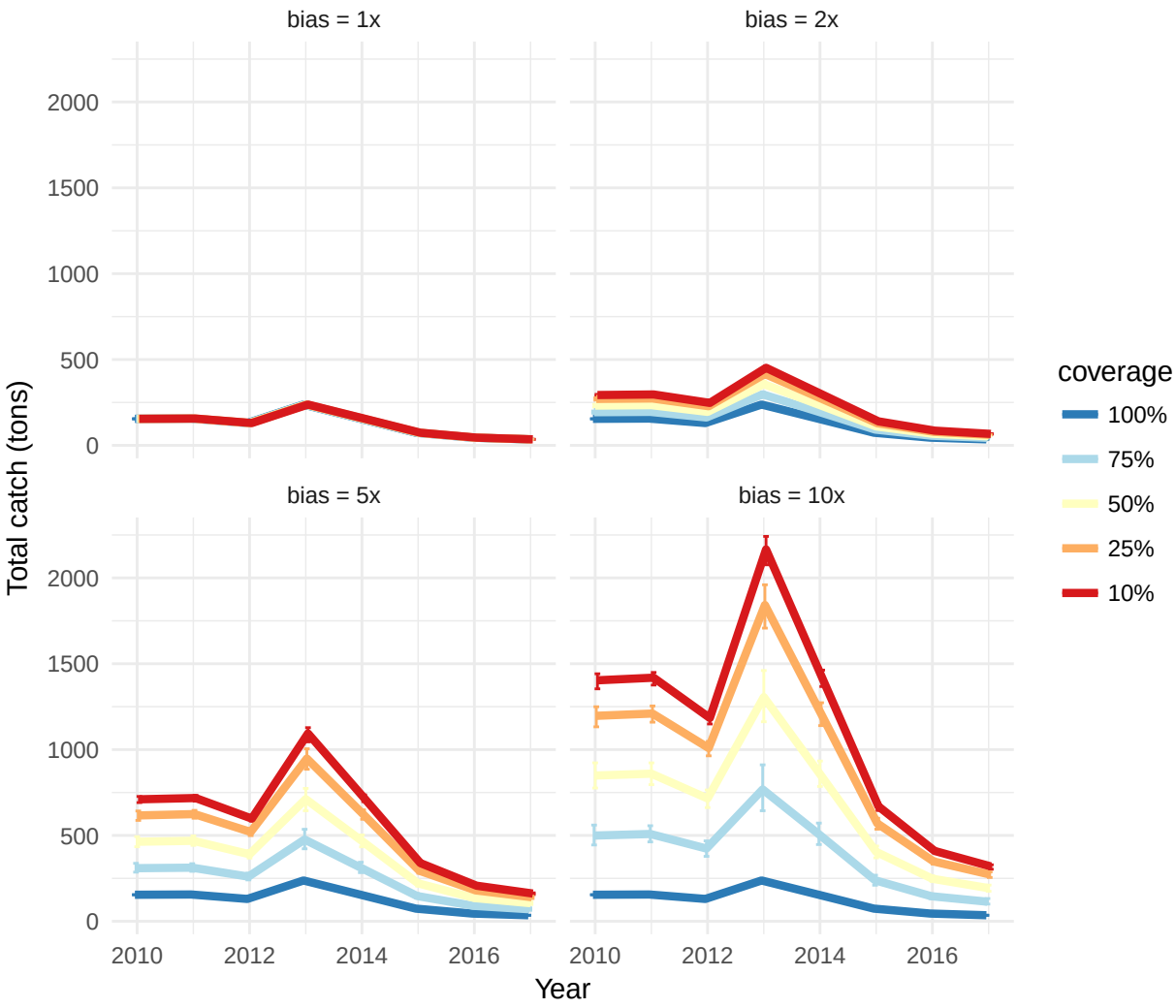


Figure 7: GB Winter Flounder

Total 'true' catch under varying observer coverage and bias

Figure 8: GOM Winter Flounder

Total 'true' catch under varying observer coverage and bias

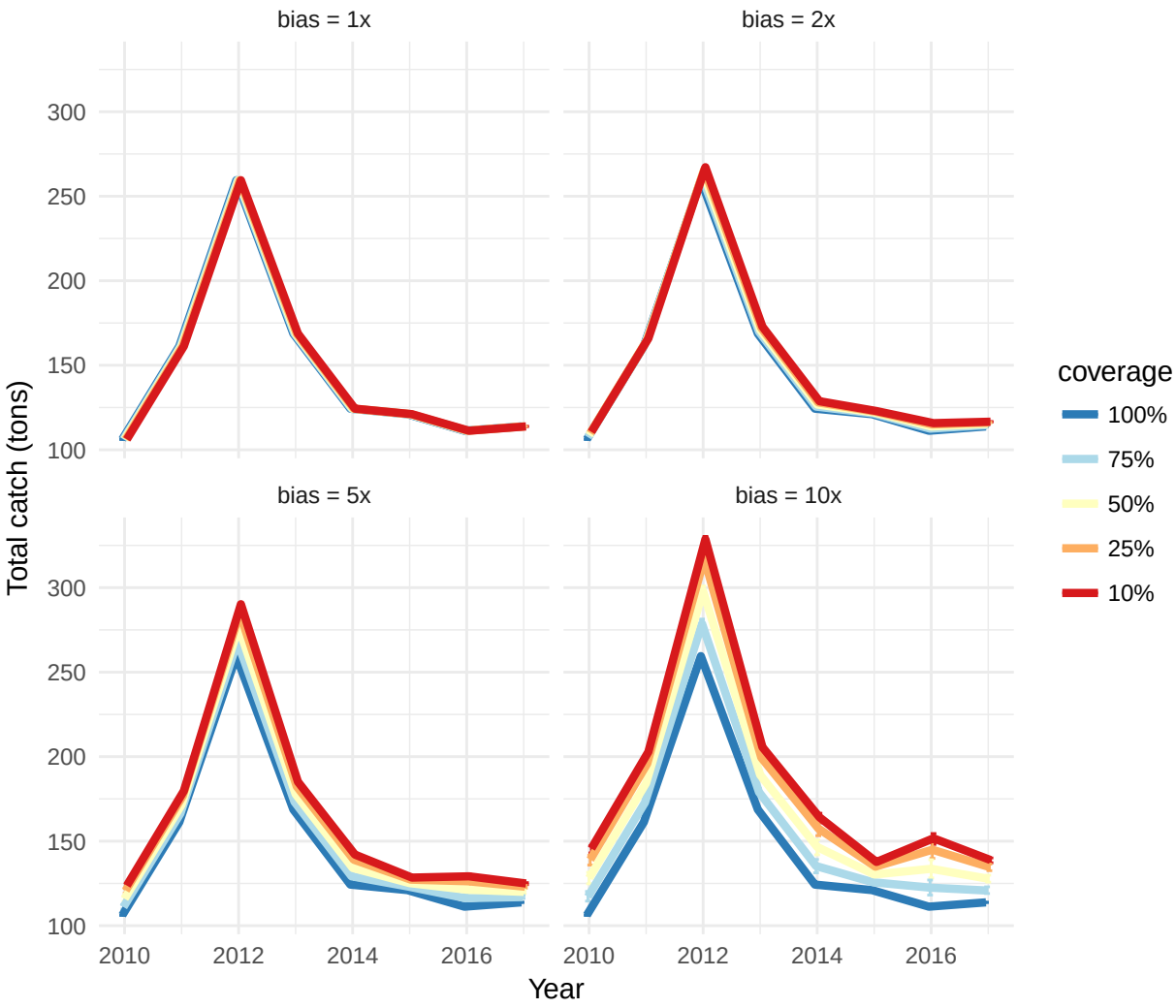


Figure 9: SNE Winter Flounder

Total 'true' catch under varying observer coverage and bias

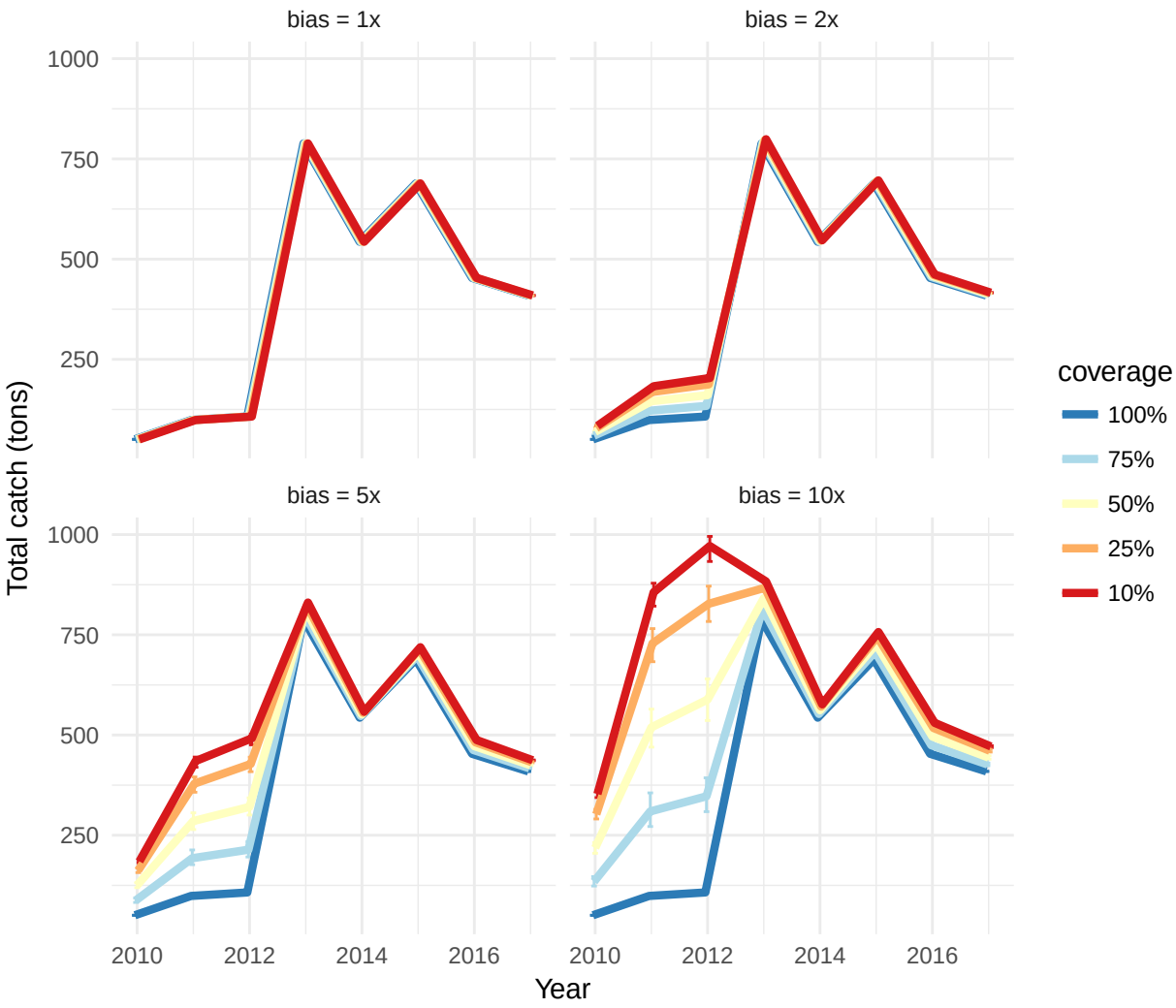


Figure 10: GB Haddock East

Total 'true' catch under varying observer coverage and bias

Figure 11: GB Haddock West

Total 'true' catch under varying observer coverage and bias

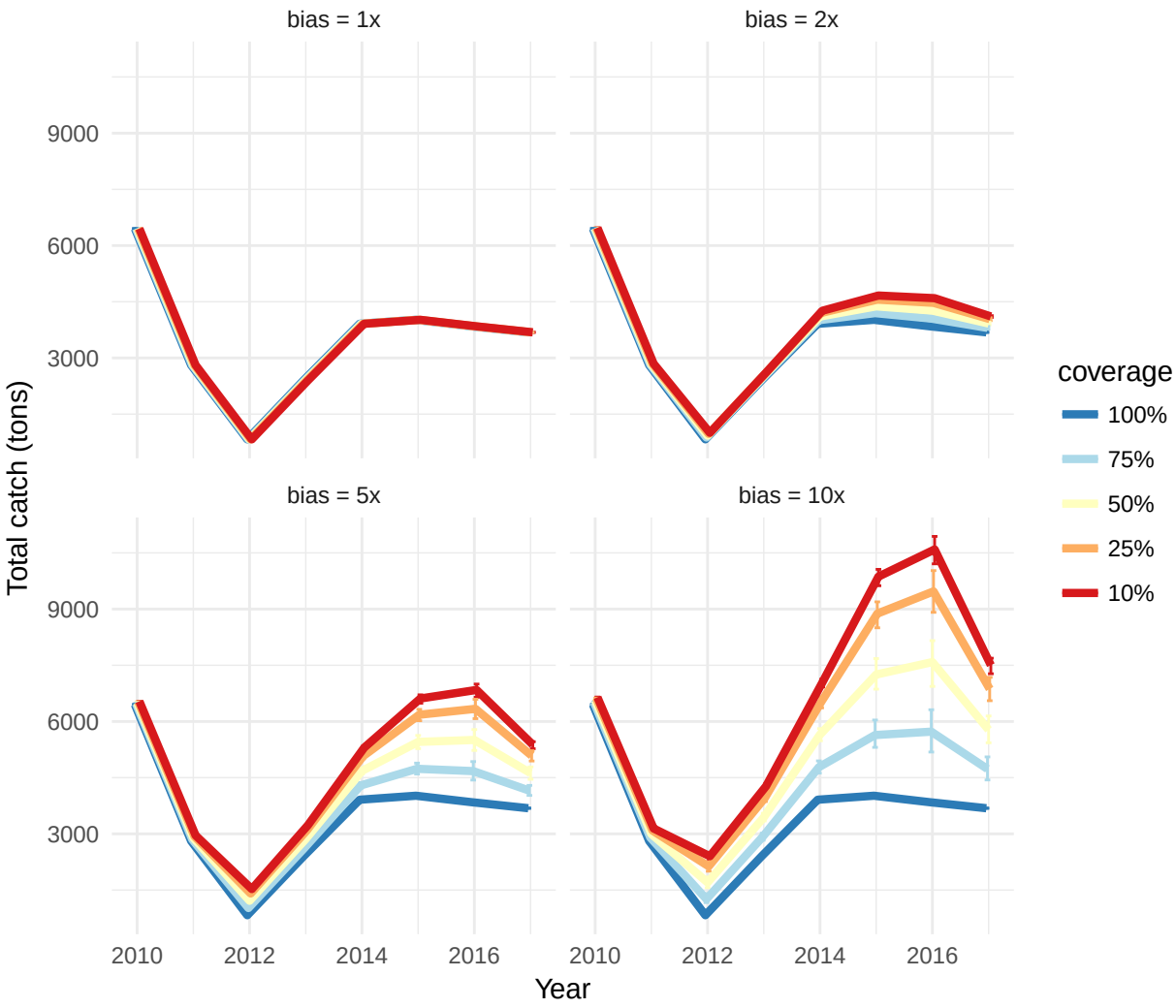


Figure 12: GOM Haddock

Total 'true' catch under varying observer coverage and bias

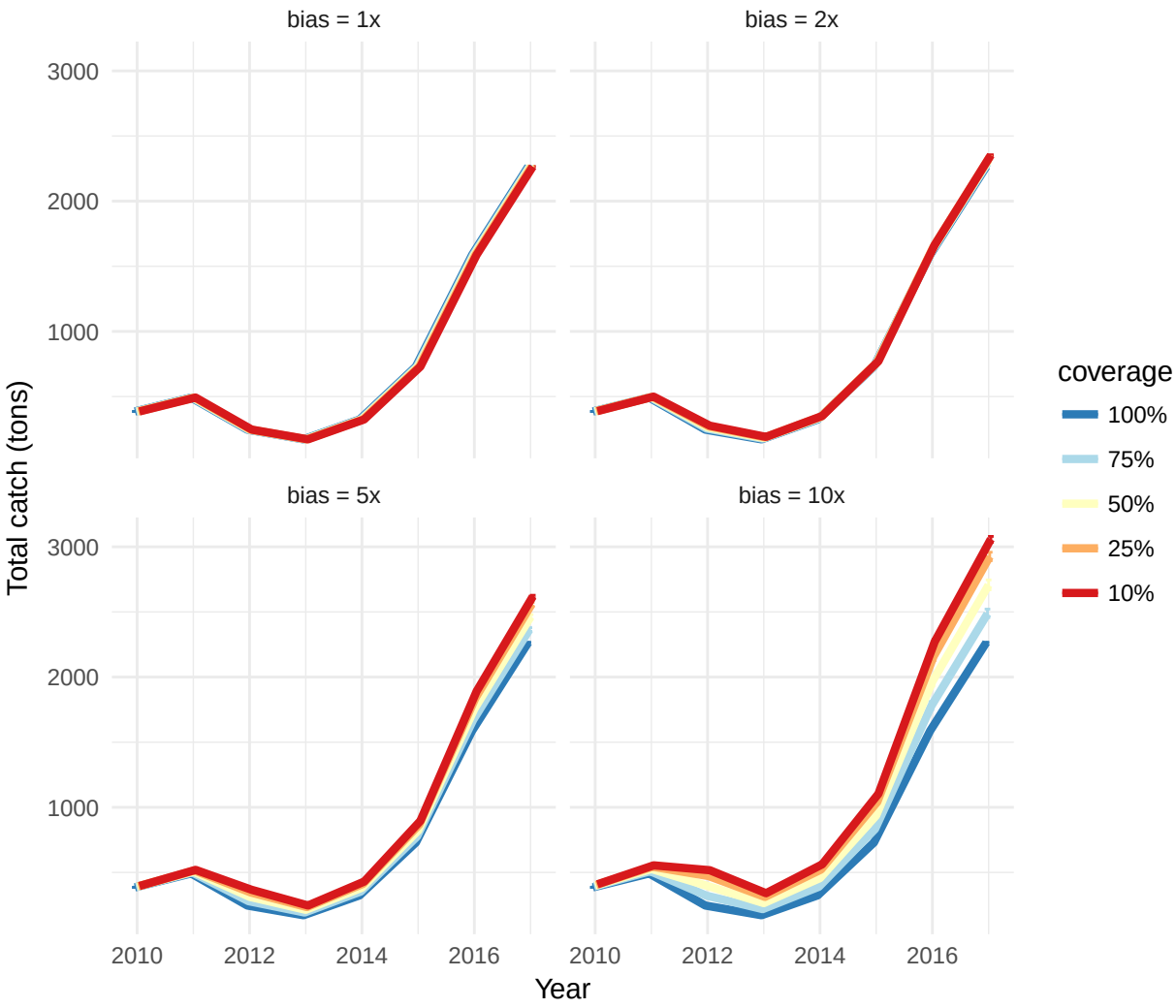


Figure 13: Halibut

Total 'true' catch under varying observer coverage and bias

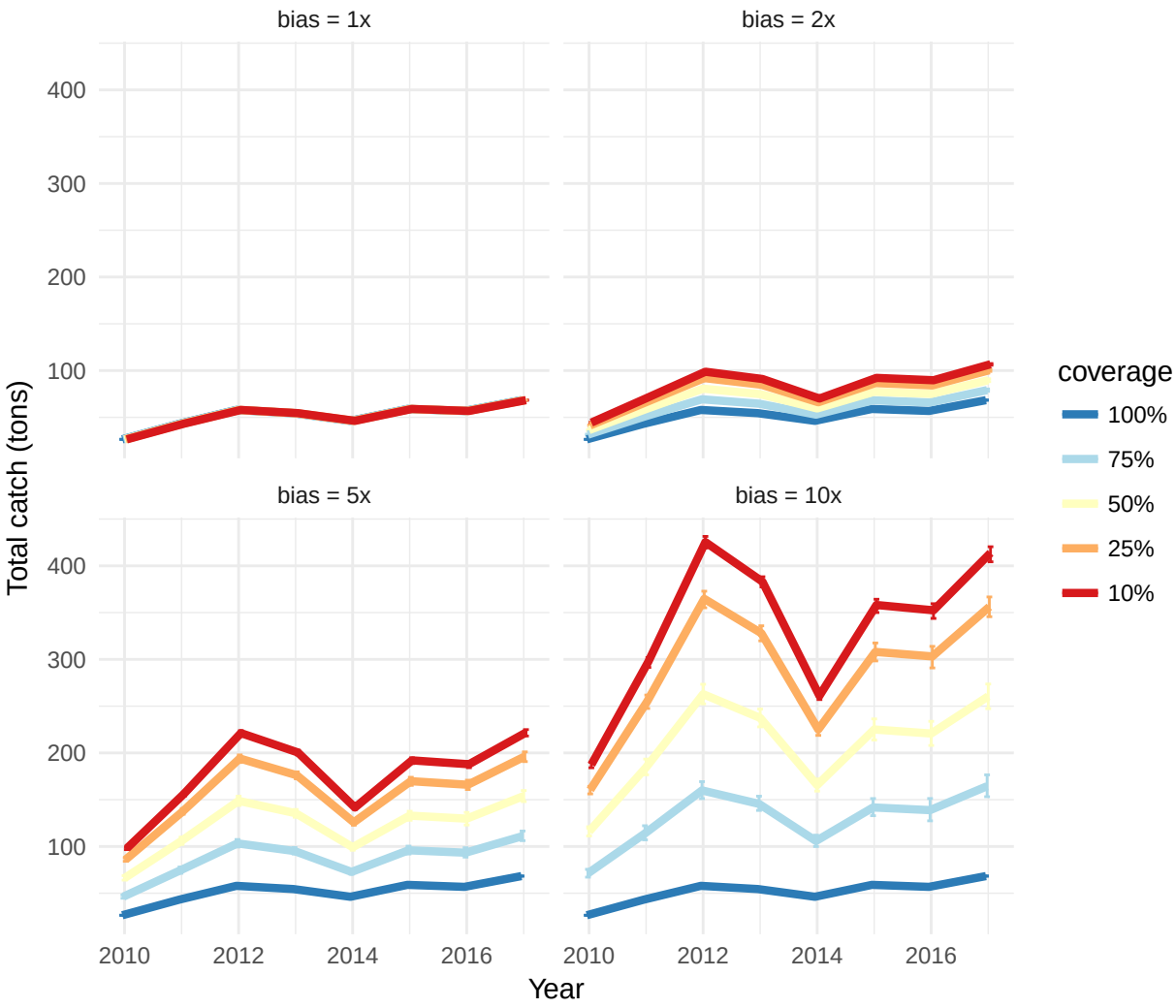


Figure 14: White Hake

Total 'true' catch under varying observer coverage and bias

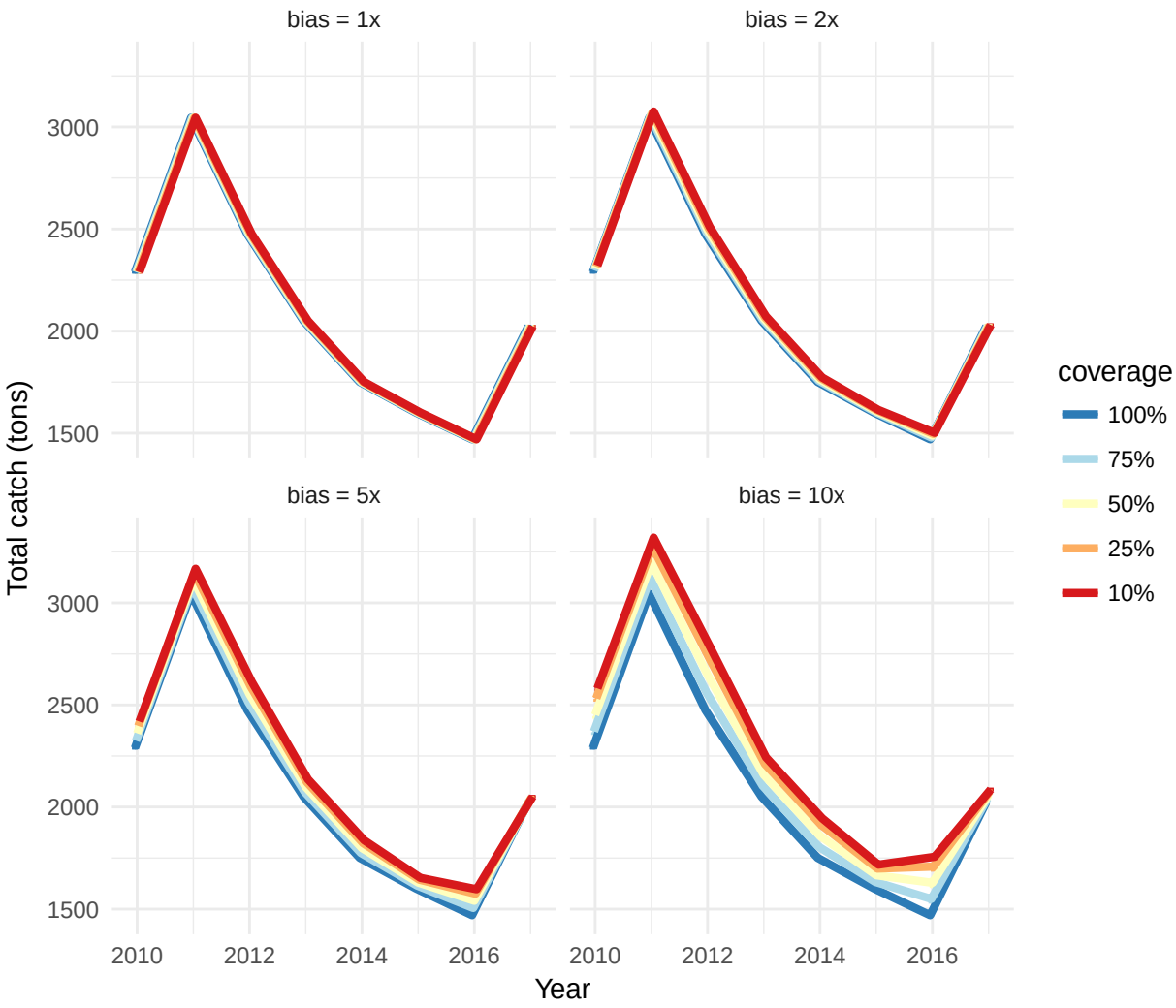


Figure 15: Ocean Pout

Total 'true' catch under varying observer coverage and bias

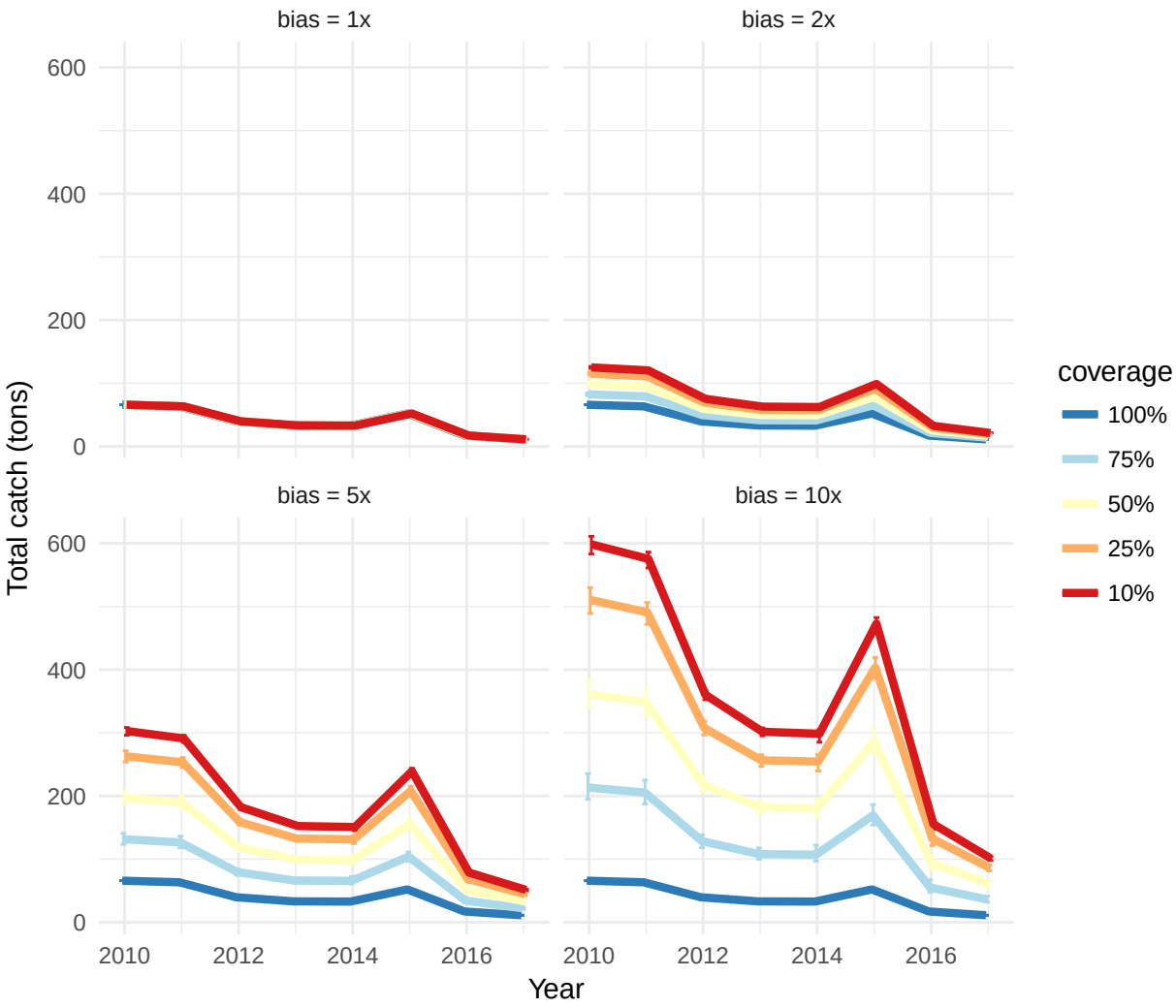


Figure 16: Plaice

Total 'true' catch under varying observer coverage and bias

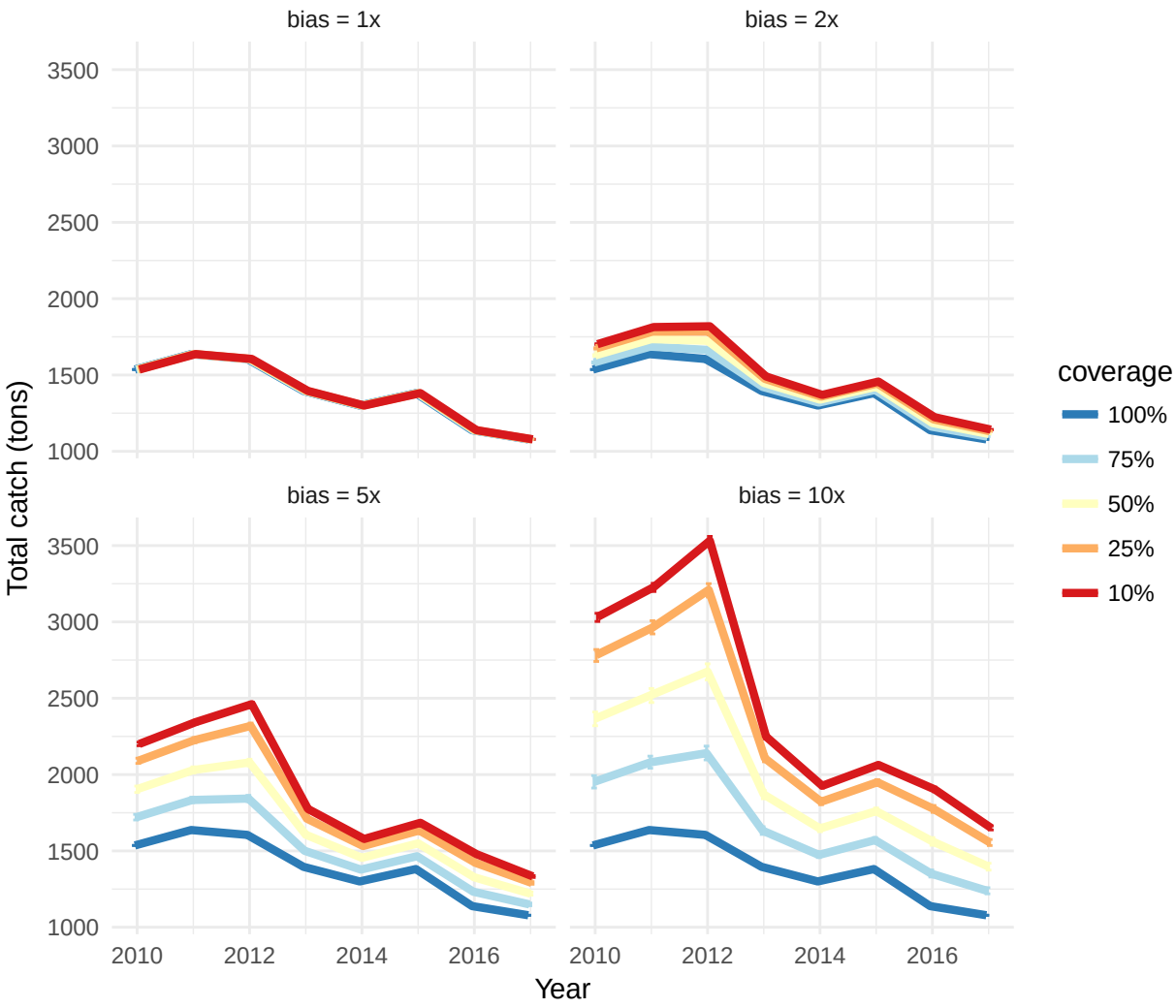


Figure 17: Pollock

Total 'true' catch under varying observer coverage and bias

Figure 18: Redfish

Total 'true' catch under varying observer coverage and bias

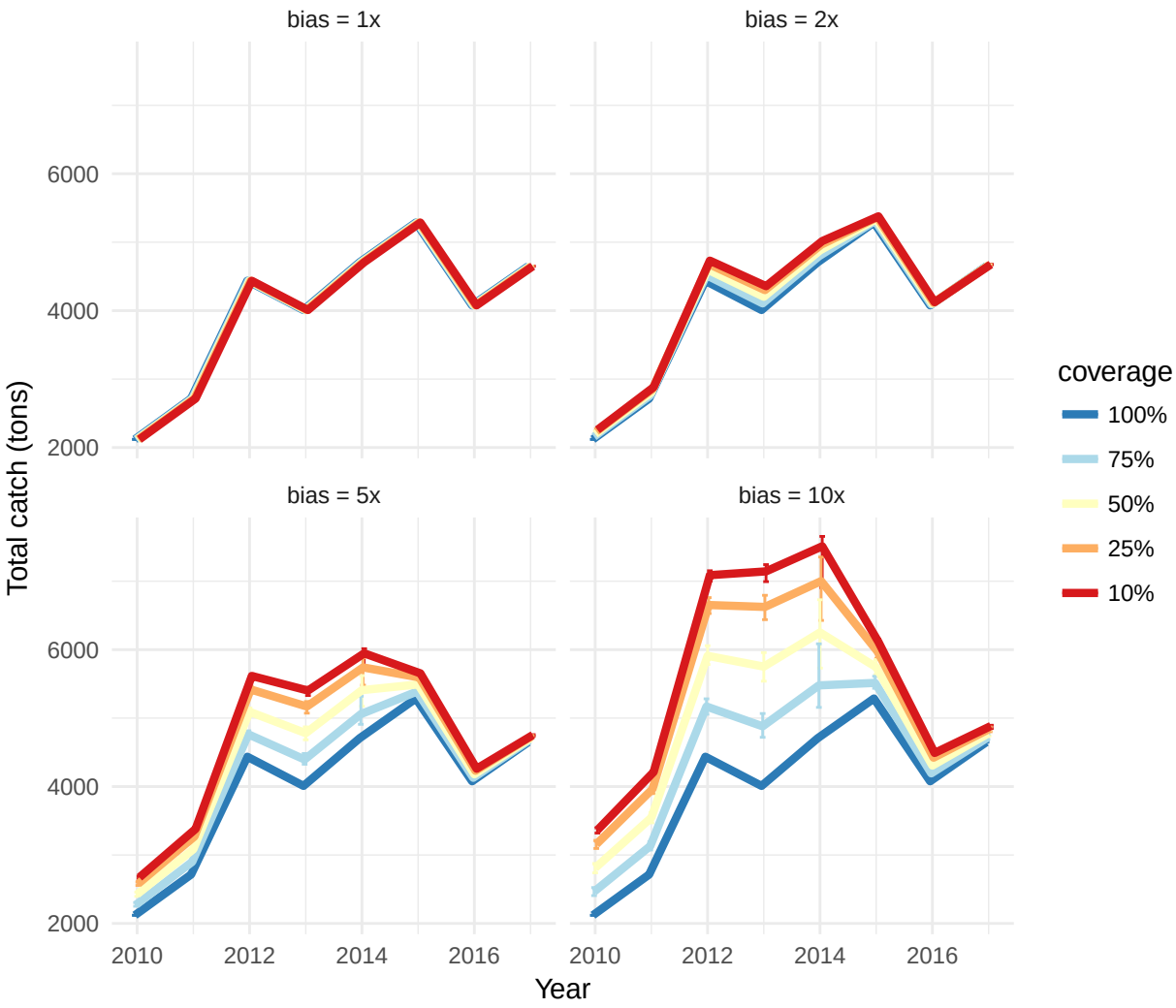


Figure 19: Witch Flounder

Total 'true' catch under varying observer coverage and bias

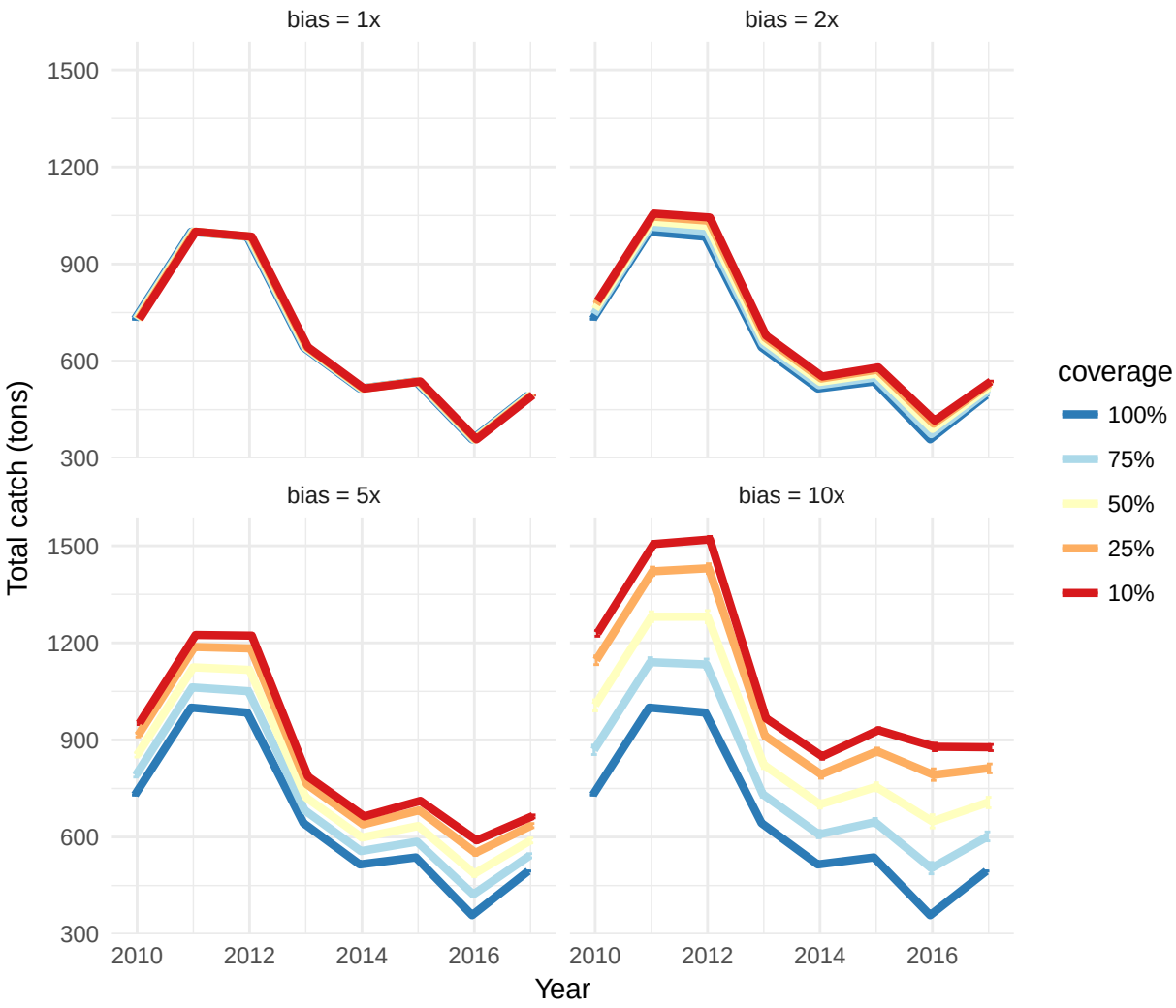


Figure 20: Wolffish

Total 'true' catch under varying observer coverage and bias

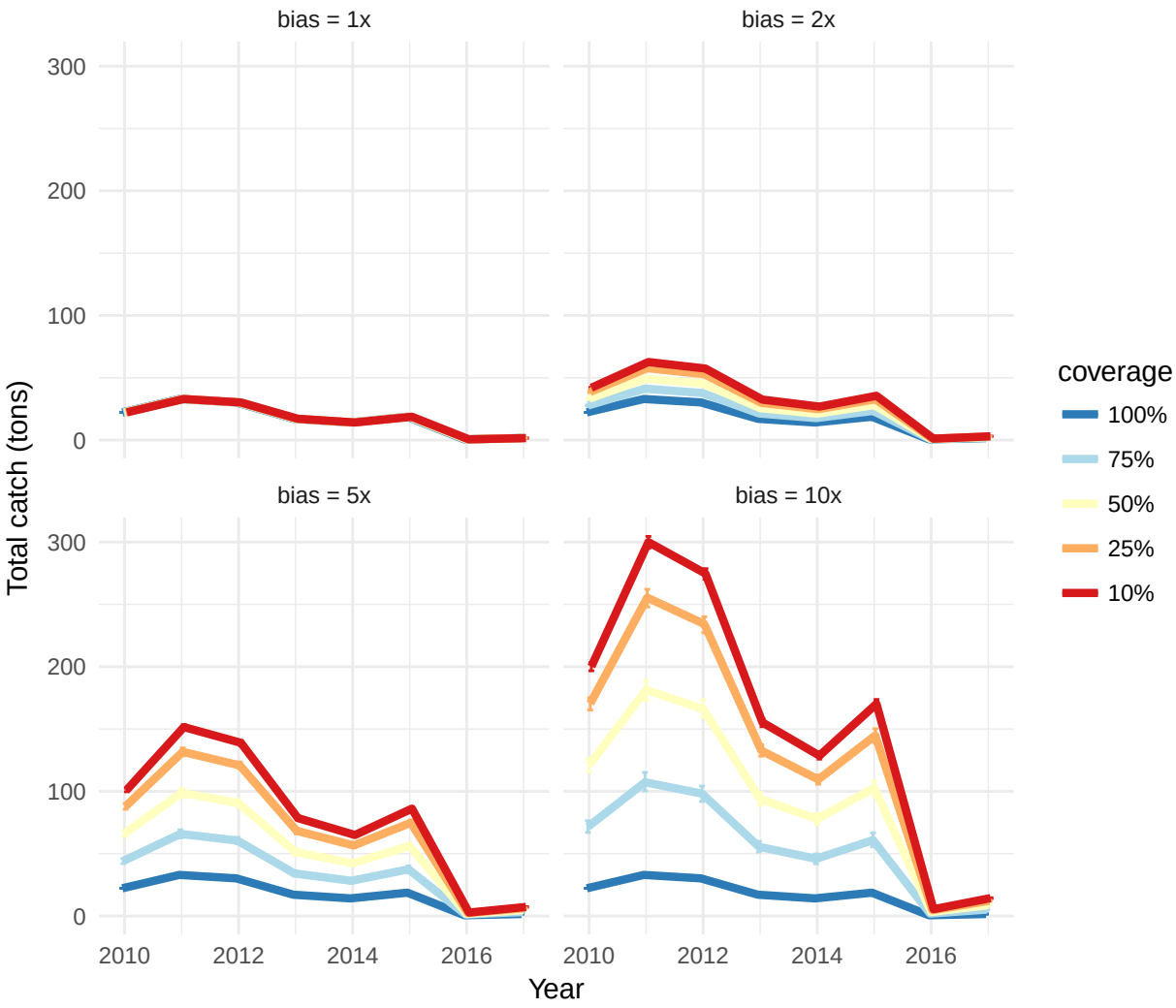


Figure 21: CC/GOM Yellowtail Flounder

Total 'true' catch under varying observer coverage and bias

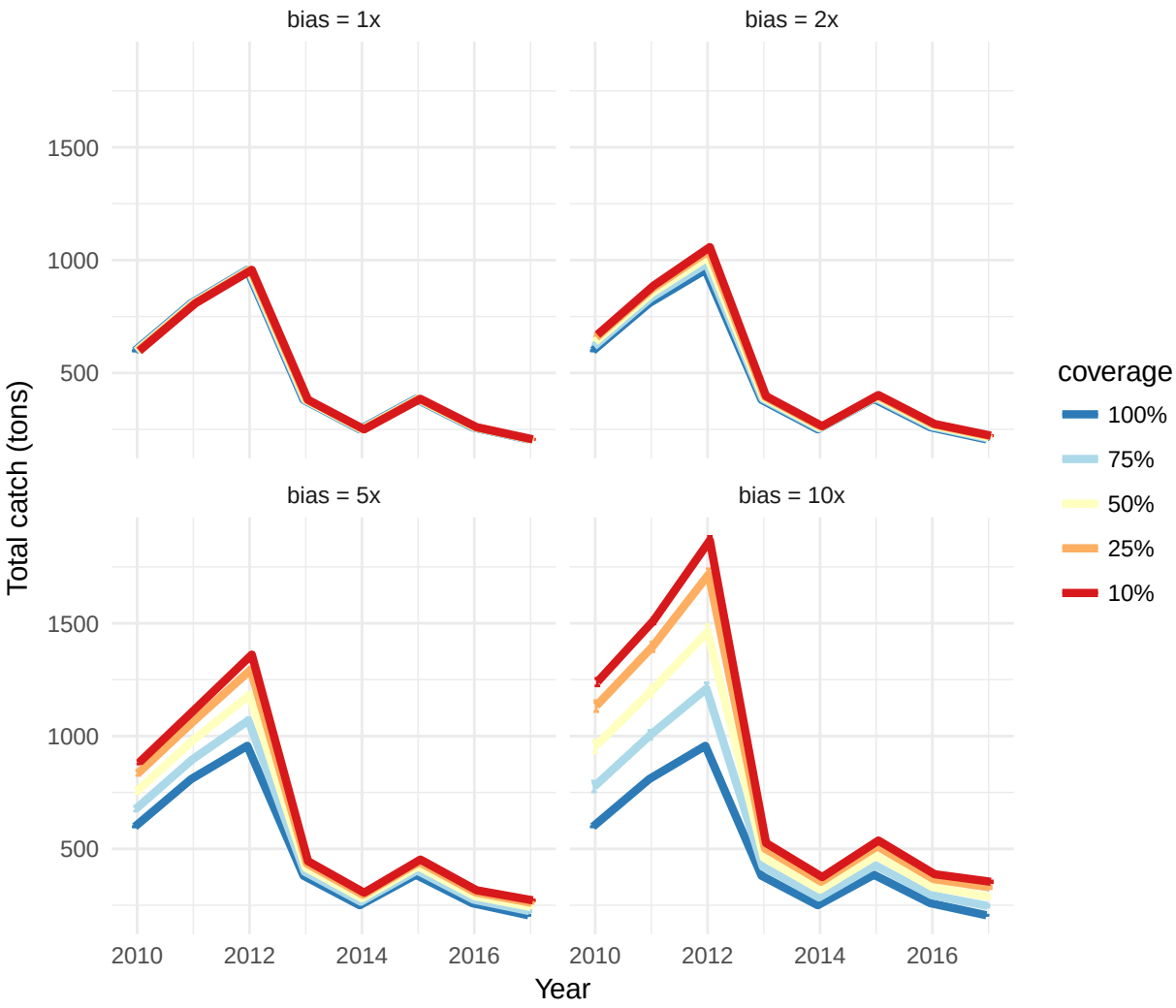


Figure 22: GB Yellowtail Flounder

Total 'true' catch under varying observer coverage and bias

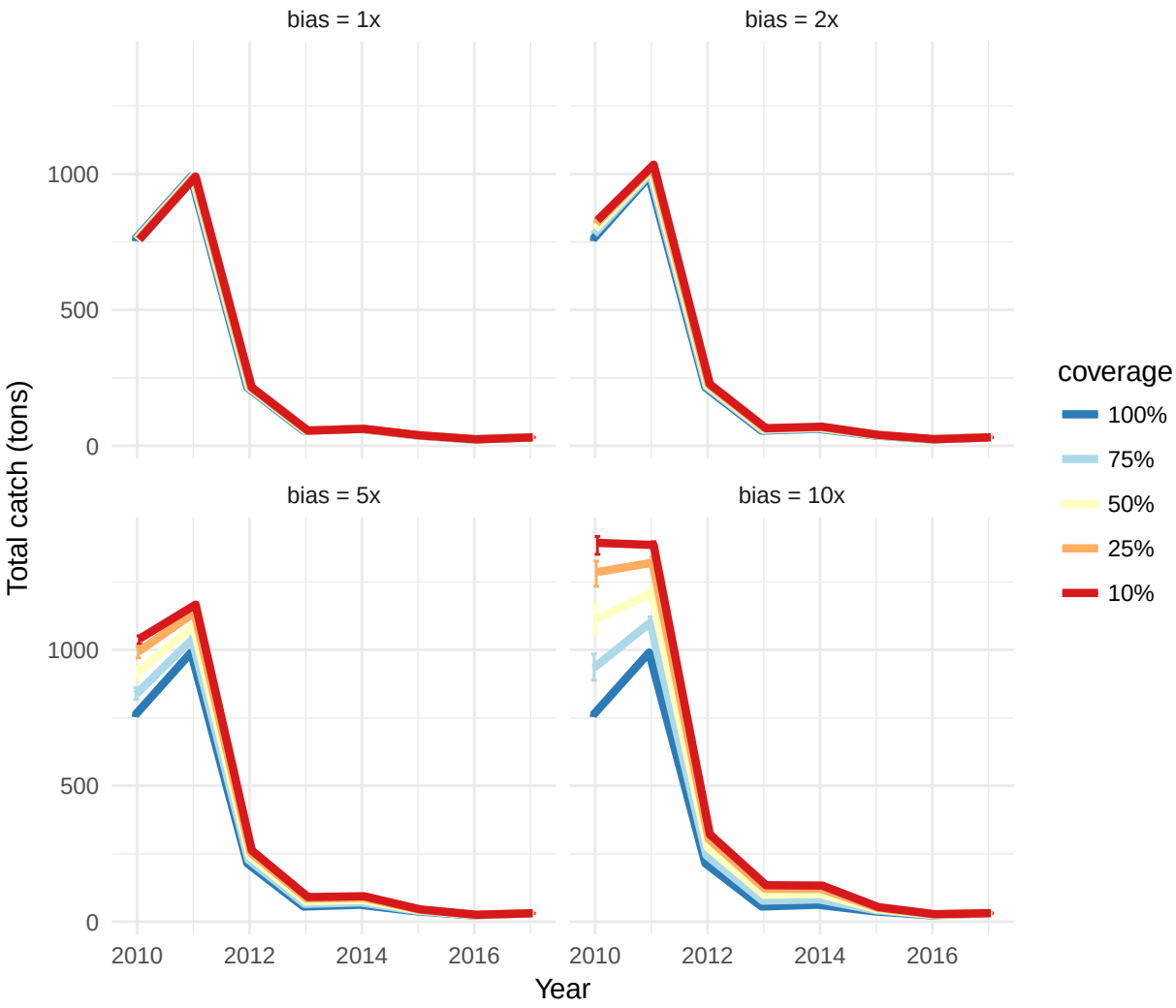


Figure 23: SNE/MA Yellowtail Flounder

Total 'true' catch under varying observer coverage and bias

Development of Dockside Monitoring

The PDT discussed its approach to developing dockside monitoring (DSM), and felt that the first step is to determine the goals and objectives of a DSM program. The PDT outlined the potential development of several different DSM program designs which would have differing objectives. Additionally, the PDT raised questions it has for the Groundfish Committee on which of these types of DSM programs would be most in line with the Committee's recommendations. These questions are included in the memorandum from the PDT to the Committee.

4.2.1.1 Dockside Monitoring Program

4.2.1.1.1 Option 1: No Action

There is currently no DSM requirement in the groundfish monitoring program, but any sector could choose to develop and implement a DSM program as part of its operations plan. Amendment 16 established a DSM program in the groundfish fishery, in order to verify landings of a vessel at the time it is weighed by a dealer and to certify the landing weights are accurate as reported on the dealer report. The DSM requirement was later eliminated in Framework Adjustment 48. More information on the previous DSM program can be found in the PDT Dockside Monitoring Discussion Paper [in the process of being finalized, to be included as an appendix in DEIS)].

Option 1/No Action would continue to maintain no requirement for dockside monitoring for the groundfish fishery.

4.2.1.1.2 Option 2: Dockside Monitoring Program

The goal of a dockside monitoring program for the NE multispecies fishery is to verify landings. Therefore, the program objectives are to ensure accurate reporting by dealers, prevent illicit activity circumventing the dealer regulations (e.g., unreported offloads), and improve the reliability and accountability of landings. A DSM program will achieve the goal and objectives by providing an independent landings data stream that may be compared to dealer-reported landings in order to ensure accurate accounting for/estimation of landings.

The following measures would create a DSM program for the groundfish fishery that would focus on monitoring landings by either independently weighing landings or verifying landed catch is weighed and accurately reported by dealers.

- *Sub-Option 2A* – Develop a mandatory dockside monitoring program for the commercial groundfish fishery (sectors and common pool), at either 50 percent or 100 percent coverage. The Council would choose one of these coverage levels.

- *Sub-Option 2B* – Develop a dockside monitoring program as an option for sectors to use as part of their sector monitoring plans.

Rationale: The goal is to establish a dockside monitoring program that allows for accurate landings for the entire groundfish fishery.

A mandatory dockside monitoring program for the NE multispecies fishery would be a dealer

responsibility, rather than a vessel or sector responsibility, because the focus is on ensuring dealer reporting and preventing circumvention of dealer reporting requirements. Thus, the program would become a condition of a Federal dealer permit. In effect, any Federal dealer purchasing groundfish must comply with the DSM program. Federally-permitted NE multispecies vessels may only sell groundfish to a Federal dealer. One question is whether the coverage rate would apply at the dealer level, or at the port level, and whether this option, as it is presently written, would preclude the use of less frequent spot checks at remote ports.

However, a sector-specific voluntary dockside monitoring program would need to be an obligation of the sector, rather than becoming a requirement for all Federal dealers, similar to the program established by Amendment 16.

Dockside Monitoring Program Considerations:

How to conduct dockside monitoring in small, remote ports [PDT Dockside Monitoring Discussion Paper Discussion Point #1]:

A tiered dockside monitoring system, as in the Canadian Maritimes Region DSM Program, may be considered for the New England groundfish fishery. Landings at high volume groundfish ports could be monitored at a high coverage level (50 percent or 100 percent). Landings of smaller quantities or landings at ports with lower volumes, could be randomly assigned dockside monitors at lower coverage levels. Because vessels already submit trip end hail reports as part of their trip level reporting, the dockside monitor can compare the trip end hail report to the dealer recorded weights to incentivize accurate reporting of landings. For smaller dealers that are subject to occasional dockside monitoring, their DSM coverage rate could increase if their dealer reports are not similar to the vessel end trip hails. The logistics of getting dockside monitors to remote ports at the correct time to meet an offload remain a concern. The system would involve coordination between private dockside monitoring vendors and dealers based on hails from groundfish vessels. A possibility would be to periodically have unannounced DSM events, similar to a traffic checkpoint, where dockside monitors are temporarily stationed in the vicinity of one or more remote ports and monitor every offload of groundfish in nearby remote ports for a period of time.

Past experience showed that private monitoring companies were unable, or unwilling, to base operations in areas that served remote ports. The ability and willingness for private companies to provide dockside monitoring services required by any new DSM program is an important issue that should be considered throughout designing and evaluating any new DSM program.

Dockside monitor access, liability, and fish hold inspections [PDT Dockside Monitoring Discussion Paper Discussion Point #4]:

Dockside monitors will need access to the docks where vessels unload, workspace at fish dealers or offload sites, and safe access and egress to vessels. Regardless of who is responsible for a DSM program (vessel, sector, or dealer), monitors will need access to perform their duties safely and efficiently. Docks where vessels offload and dealers operate may be owned and operated by the vessels, the dealer, or a third party. All entities will need clarity on their role and responsibilities, as well as any liability.

An issue with the previous DSM program created under Amendment 16 was that dockside monitors were not allowed to inspect fish holds, primarily because of safety and liability concerns. NOAA's Office of

Law Enforcement (OLE) has expressed concern that fish holds must be inspected at the conclusion of an offload to ensure that all landings have been accounted for and independently verified. Additionally, fish hold inspections are a mandatory component of dockside monitoring programs in other fisheries throughout the world (e.g. Canadian Regional DSM Program, West Coast IFQ Catch Monitor Program). Further, the Northeast Fisheries Science Center (NEFSC) is conducting a DSM pilot program, associated with an electronic monitoring (EM) project, that includes inspection of fish holds.

These measures may consider that monitors be allowed to access the fish hold of vessels (either directly or using cameras) to verify that all of the retained catch is offloaded and accounted for, which would address the concern with a previous DSM program. These measures should clearly articulate whether the insurance liability associated with having monitors inspect the fish hold of the vessel falls on the vessel owner, or the dockside monitoring service provider.

In response to a comment, the final rule for FW 45 provides information on concerns for a fish hold inspection for the previous DSM program. This section also acknowledges the overlapping role of dockside monitors and OLE in terms of compliance monitoring.

How will dockside monitoring fit in with existing efforts so it does not produce duplicative information [PDT Dockside Monitoring Discussion Paper Discussion Point #3 and #4]:

Should dealers continue to weigh catch and have monitors confirm that the weights reported match the scale? If so, should dealers be required to use certified scales?
or
Should the dockside monitor travel with certified scales and directly weigh the catch? If so, is the dealer-reported weight still used in the monitoring program, or is the monitor's weight measurement used?

A major criticism of the previous dockside monitoring program was that because dockside monitoring did not replace dealer reporting or VTRs, dockside monitoring did not produce a new data stream that assisted in the assessment and management of the fishery. It was for this reasoning that FW 45 removed the requirement that industry pay the costs of dockside monitoring (though this was disapproved by NMFS), and FW 48 ultimately removed the requirement for dockside monitoring. The Council's rationale was that as long as unreported landings do not occur, the dealer reports can be used to monitor sector landings and there is little advantage to having dockside monitors verify these reports. At that time, NMFS determined that dealer reporting combined with dockside intercepts by enforcement personnel were sufficient to monitor landings of sector catch at the time. However, after the removal of the DSM program there were incidents of unreported and misreported landings.

The dockside monitoring data may only be considered duplicative if landings are reported accurately by the vessel and dealer. Because dockside monitoring independently verifies landings, the primary goal of dockside monitoring is more of compliance, whereas dealer reporting and VTRs are used for monitoring. A major question remains as to whether dockside monitoring data can be used to replace dealer data as the official landings record, for trips that are monitored dockside.

In response to a comment, the final rule for FW 45 provides information on why DSM data could not replace dealer data, both as the official data record and also as a proxy for sectors to report for landings in lieu of official dealer data. The rule explains that during development of A16, it was anticipated that sectors would rely on DSM data to document sector landings immediately following a vessel offload until the official dealer data reports became available approximately one week later. NMFS determined that

DSM data was "not systematically collected in a format that can be easily transferred to a catch share monitoring database. Instead, they are often merely scanned images of a dockside monitor report," and so NMFS did not allow sectors to report DSM data for landings in place of dealer data. NMFS said it had the regulatory authority to accept DSM data in the future if the data became available in an acceptable electronic format.

Further, NMFS determined that DSM data could not replace dealer data as the official landings record, because "dealer landings, as documented through official dealer reports, have been the standard by which landings are monitored for many years, and were used as the basis for the calculation of potential sector contributions and, therefore, sector ACE." Thus, NMFS determined that even if DSM data "could be considered a proxy for dealer landings in weekly sector catch reports, dealer landings data would continue to be the official record of species landed by each federally permitted vessel."

However, the Council may choose to alter the data collected and the data sources used to monitor and manage the NE multispecies fishery through Amendment 23. For instance, DSM landings data could be used in ACE accounting for monitored trips while continuing to use dealer landing data for unmonitored trips, similar to the use of ASM discard data for observed trips and calculated discards for unobserved trips. On the west coast, both the dealer and the dockside monitor report landings weights electronically and the higher value is used in cases where there is an irreconcilable difference. Additionally, the Council could recommend that reporting in a format usable by existing data systems be a contract requirement for DSM providers to meet, so that DSM data could be considered in place of dealer data.

Funding for dockside monitoring [PDT Dockside Monitoring Discussion Paper Discussion Point #2]:

Would dockside monitoring be industry-funded, and would it follow cost sharing responsibilities for industry-funded monitoring programs, as described in the Draft Environmental Impact Statement to the Industry-Funded Monitoring Amendment:

> "Department of Commerce General Counsel has advised NMFS that monitoring cost responsibilities can be allocated between industry and the government by delineating the sampling and administrative portions of the costs of monitoring. Industry would be responsible for costs directly attributable to the sampling portion of a monitoring program, and NMFS would be responsible for costs directly attributable to the administrative portion of the monitoring program…"[1]

For a mandatory DSM program structured as a dealer responsibility, the dealers would be responsible for contracting and paying for DSM services, but that cost would likely affect the prices vessels received for catch. For a voluntary program structured as a sector responsibility, the sector would be responsible for contracting and paying for DSM services. Sector costs are born by sector members. In either case, the fishing industry would be responsible for DSM sampling costs to the extent Federal funding in not available for reimbursement. On the west coast, the dealers are responsible for DSM costs, while vessel operators are responsible for at-sea observer costs.

[1] NEFMC and MAFMC. Draft Environmental Impact Statement for the Industry-Funded Monitoring Omnibus Amendment. September 2018.

Analyses Completed

No new analyses of dockside monitoring have been conducted. Past analyses available include the Amendment 16 EIS, the Archipelago/ Pacific Fisheries Management Incorporated reports created during the development of Amendment 16, the GMRI pilot study of dockside monitoring, and the PDT's 2016 (updated in 2018) Dockside Monitoring Discussion Paper.

Analyses Planned

After further refining the mandatory and voluntary DSM options we will need to analyze costs for operating the DSM alternatives. Additionally, if the voluntary DSM program is a trade-off for other monitoring requirements, the PDT will need to analyze the effect of removing a portion of the fleet from the existing monitoring requirements (e.g., exempting some vessels/trips from ASM).

An EFP was issued to the Gulf of Maine Research Institute in 2018 to test a maximized retention-based electronic monitoring (MREM) program. This EFP requires the landing of allocated groundfish that would normally be discarded at sea (e.g., below minimum size). Therefore, the data typically collected by an observer/at-sea monitor or an EM system will need to be captured on land. A DSM program to collect the data is being undertaken by the Fishery Monitoring and Research Division of the NEFSC, as part of the EFP. This opportunity will allow for the further refinement of DSM approaches and protocols, building upon efforts by the NEFSC in recent years, including inspection of fish holds and DSM logistics.

Groundfish catch west of –72.5 degrees

Daniel W. Linden, NOAA/NMFS/GARFO

10 September 2018

The Groundfish Plan Development Team was asked to examine groundfish catch west of –72.5 degrees longitude, an area at or beyond the western limits of most groundfish species (see map below). This analysis presents data on landings and discards for groundfish trips taken during 2010-2017.

The catch summaries presented here represent the best available data from a combination of vessel trip reports (VTRs), dealer reports, and both NEFOP and ASM observer records. We only used trips with a VTR-reported longitude that matched the VTR-reported statistical area, given that longitude records are prone to reporting errors.

Groundfish catch west of –72.5 degrees

Tables 1 and 2 present the total landings and observed discards, respectively, for each groundfish stock from 2010-2017 on trips where the reported longitude was west of –72.5 degrees. Landings came from all eligible groundfish trips while discards were restricted to observed trips (NEFOP or ASM). Table 3 presents the proportion of total groundfish catch (landings + discards) in the Greater Atlantic that was caught west of –72.5 degrees during the same period.

Total groundfish catch across longitudes

Figures 1 and 2 present the trip-level landings and observed discards, respectively, for each groundfish stock from 2010-2017 for trips across all longitudes. A dashed line indicates –72.5 degrees and individual trips are colored by year (with later years plotting on top of earlier years). As with the data presented in the tables, low amounts of groundfish landings and discards are apparent west of –72.5 degrees, particularly in more recent years.

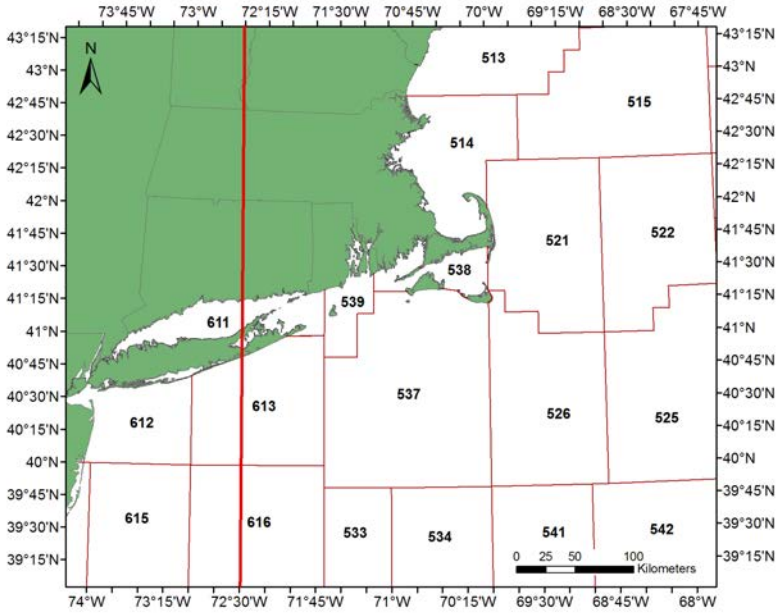


Table 1: Groundfish landings (tons) west of –72.5 degrees

stock	2010	2011	2012	2013	2014	2015	2016	2017
Cod (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cod (GB west)	0.71	3.34	0.63	0.52	0.16	0.21	0.11	0.02
Cod (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Windowpane (S)	0.94	1.63	0.00	0.00	0.00	0.03	0.00	0.00
Windowpane (N)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (SNE/MA)	1.82	3.28	0.02	21.16	4.41	2.82	2.66	3.91
Haddock (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GB west)	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00
Haddock (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atlantic halibut	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00
White hake	0.35	0.23	0.03	0.20	0.00	0.00	0.04	0.08
Ocean pout	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American plaice	0.00	0.94	0.00	0.00	0.00	0.03	0.00	0.00
Pollock	0.11	0.86	0.26	0.09	0.00	0.00	0.45	0.03
Redfish	0.00	0.00	0.00	0.00	0.00	0.00	4.40	0.00
Witch fl	0.00	0.04	0.08	1.18	0.10	0.11	0.01	0.00
Wolffish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (SNE/MA)	4.87	6.94	9.83	5.94	7.39	0.95	0.02	0.03

Table 2: Groundfish discards (tons) west of –72.5 degrees

stock	2010	2011	2012	2013	2014	2015	2016	2017
Cod (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cod (GB west)	2.33	1.63	0.37	0.41	0.12	0.07	0.03	0.01
Cod (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Windowpane (S)	3.27	23.14	3.75	7.24	7.58	2.22	1.51	0.24
Windowpane (N)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (SNE/MA)	0.47	5.93	0.61	0.86	0.23	0.07	0.08	0.02
Haddock (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GB west)	0.07	0.08	0.08	0.29	1.72	1.06	0.76	0.01
Haddock (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atlantic halibut	0.48	0.16	0.33	0.20	0.07	0.31	0.01	0.00
White hake	0.25	0.19	0.19	0.11	0.10	0.04	0.02	0.00
Ocean pout	1.82	2.67	1.33	1.21	1.10	0.21	0.14	0.01
American plaice	1.03	0.18	0.16	0.12	0.26	0.12	0.04	0.01
Pollock	1.38	0.97	0.59	0.22	0.11	0.15	0.01	0.00
Redfish	0.09	0.07	0.10	0.53	0.75	0.05	0.00	0.02
Witch fl	0.39	0.11	0.08	0.24	0.27	0.10	0.04	0.02
Wolffish	0.40	0.30	0.04	0.02	0.03	0.02	0.00	0.00
Yellowtail fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (SNE/MA)	1.58	0.27	0.85	0.32	0.23	0.10	0.04	0.00

Table 3: Proportion of groundfish catch west of –72.5 degrees

stock	2010	2011	2012	2013	2014	2015	2016	2017
Cod (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cod (GB west)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cod (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Windowpane (S)	0.06	0.22	0.03	0.06	0.08	0.02	0.01	0.00
Windowpane (N)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter fl (SNE/MA)	0.05	0.09	0.01	0.03	0.01	0.00	0.01	0.01
Haddock (GB east)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GB west)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Haddock (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atlantic halibut	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.00
White hake	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ocean pout	0.03	0.04	0.03	0.04	0.03	0.00	0.01	0.00
American plaice	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pollock	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Redfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Witch fl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wolffish	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GOM)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (GB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yellowtail fl (SNE/MA)	0.04	0.02	0.02	0.02	0.02	0.00	0.00	0.00

Figure 1. Landings on all GF trips 2010−2017

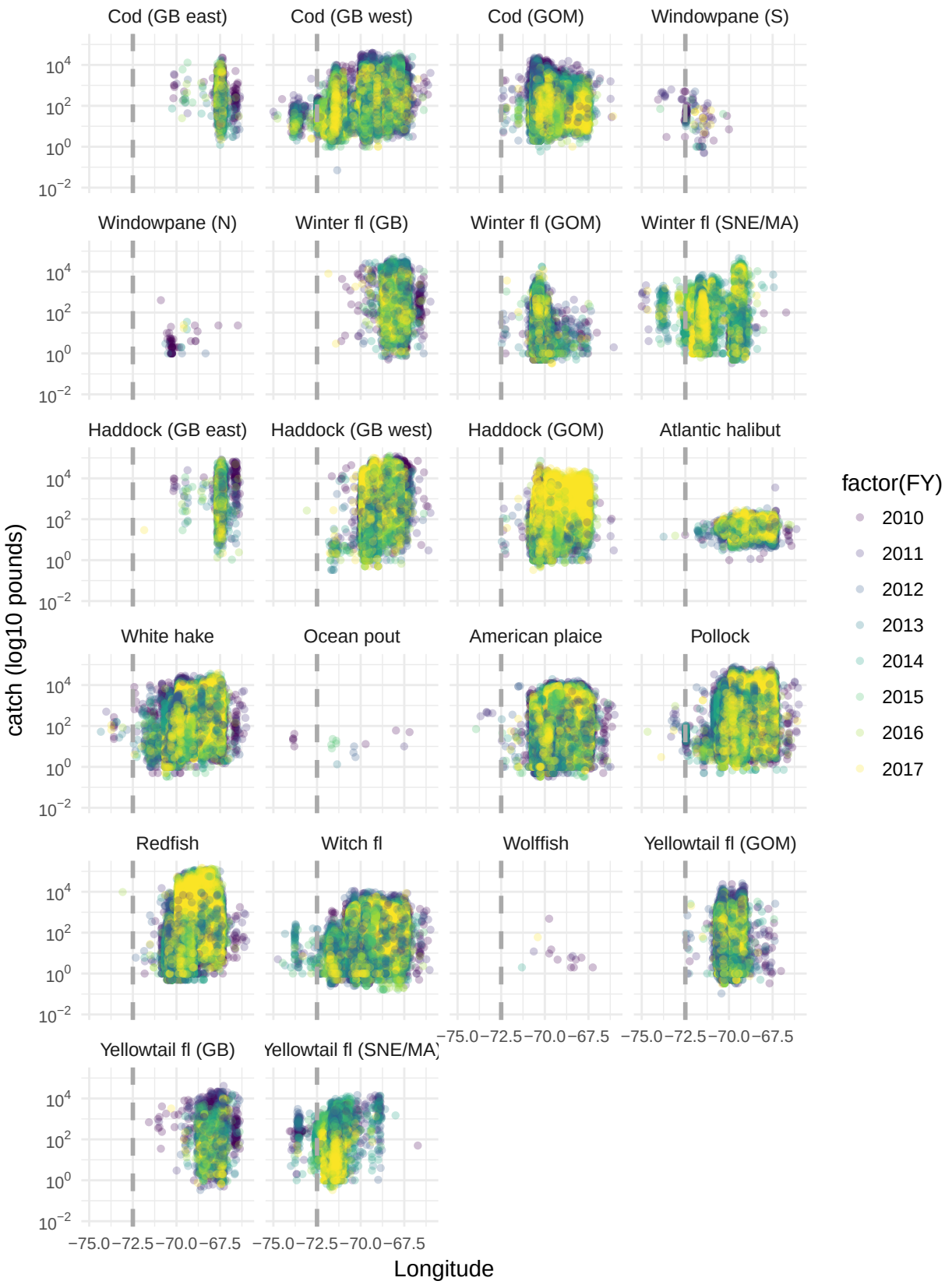
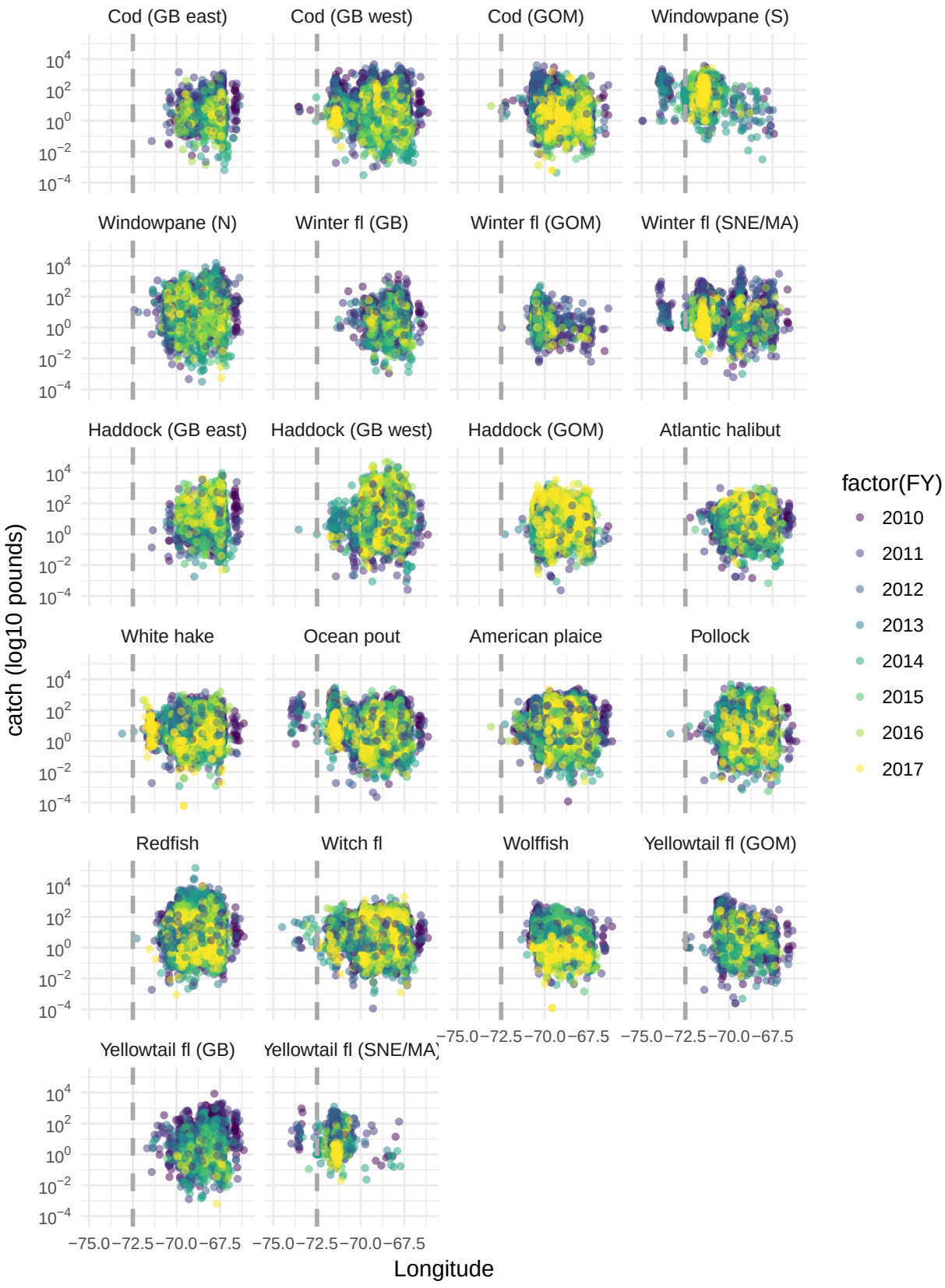


Figure 2. Discards on observed GF trips 2010−2017



Draft A23 Definitions for Key Terms

Accuracy – The closeness of the estimated value of some quantity to the true value.

Bias - Systematic difference between the estimated value of some quantity and the true value being estimated.

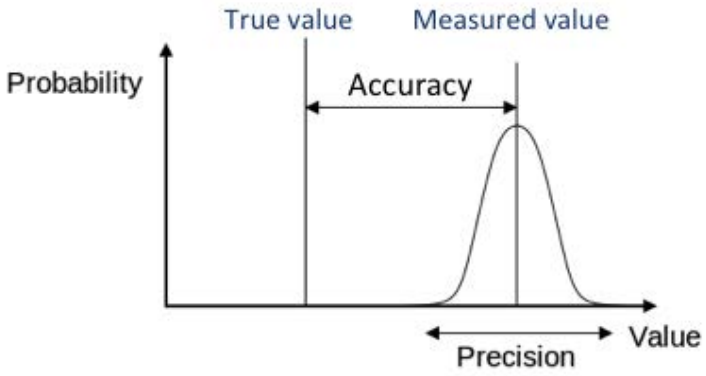
As described in the Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment: the accuracy of the data from a sampling program rarely can be measured because the true value of the population feature being estimated is not known (which is why it is being estimated). While accuracy cannot be determined directly, an estimator can be tested for potential biases and precision with a simulated population where the truth is known. Sources of bias can be identified and reduced in the data collection program. Absent bias, precision supports accuracy; thus, bias and accuracy are used interchangeably, but bias is generally associated with the design of sampling program. Eliminating potential sources of bias improves the accuracy of the results.

Bias can be due to:

1) a statistical estimator that is not properly tuned, such that the expected value does not align with the true value
2) a sample that is not representative of the true population

In regard to SBRM, the ratio estimator used to estimate discards is an unbiased estimator of the true discard rate. Therefore, any bias in discard estimation is solely due to bias in the sampling program, such that observed trips are not representative of all trips due to various known and unknown factors.

If the degree of bias can be determined then the estimate can be adjusted for the bias to produce an estimate closer to the truth.



(Adapted from Wikipedia)

Bias in the Fishery Monitoring System:

> *Observer Bias:* Also referred to as the 'observer effect'. Fishing activities on observed trips systematically vary from fishing activities on unobserved trips. This may be intentional or unintentional. Differences in fishing activities on observed trips versus on unobserved trips may arise due to the following: the act of knowing one is being watched results in changes in behavior

(Hawthorne effect[1]); fishermen strategically altering behavior to avoid affecting the rest of the sector; costs associated with slower fish processing and handling; or increased catch accountability (quota limits more constraining).

Selection Bias: Also referred to as a 'deployment effect'. Occurs when the assignment of observers to vessels is non-random within sampling strata, resulting in a biased selection of trips across sampling strata. A *random* sampling design is one in which each sample has an equal probability of being chosen, so that a sample chosen randomly is meant to be an unbiased representation of the total population.

Discard estimation bias: When discards on observed trips are not representative of unobserved trips. Function of both observer and selection bias.

Self-reported data biases: Information from these sources may also contain errors or otherwise misrepresent information which contributes to bias. These errors may be intentional or unintentional. Examples include:

- VTRs: statistical areas fished
- Dealer reports: landings information
- VTRs: Kept catch for home consumption (not weighed out by a dealer)
- Learning curve bias: It takes time for captains to become familiar with electronic monitoring and electronic reporting, and for observers to become familiar with collecting and recording data.

Precision – (see above figure) How much estimates of the same quantity differ from each other across multiple samples, due both to sample variation and sample size.

Variability - Refers to the degree to which individual observations diverge from the mean and also how spread they are from one another (dispersion). The main measures used to assess the variability of data points in a sample are the range, mean, standard deviation, and variance.

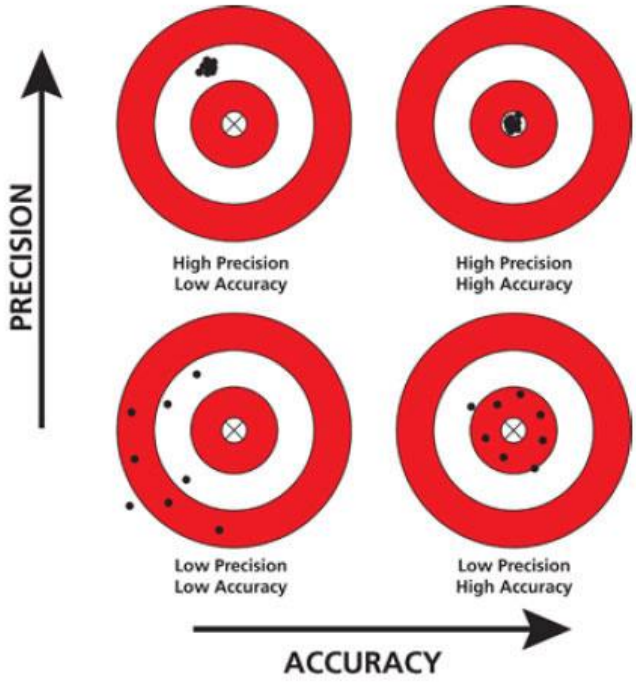
As defined in the SBRM Omnibus Amendment: Precision is a measure of how closely repeated samples will agree to one another (i.e., the variability of the samples). The precision of a sampling program can be measured because the data collected can be compared with one another using several basic statistical methods (to calculate the variance, standard error, standard deviation, etc.). Because we can compare the samples to one another, we can calculate the variability and, hence, get a measure of the precision of the observations. In a sampling program such as the at-sea observer program, the precision of the observations can be measured and controlled by calculating measures of variability and, if necessary, increasing the number of observations. Precision can also be increased through stratification (or changes to stratification), however, such changes may not be allowed through the mechanics of SBRM.

Coefficient of Variation – The ratio of the standard deviation to the mean. In other words, it is a measure of the extent of sample variation in relation to the mean of the population. It is useful for comparing the degree of variation from one data series to another, even if the means are drastically different from one another. In terms of an observer program, it is a standard measure of precision, calculated as the ratio of the square root of the variance of the bycatch estimate (i.e., the standard error) to the bycatch estimate

[1] Hawthorne effect describes a phenomenon in psychology when subjects behave differently when observed, which may be a result of conscious and subconscious behavior changes.

itself. The higher the CV, the larger the standard error is relative to the estimate. A lower CV reflects a smaller standard error relative to the estimate.[2]

30 percent Coefficient of Variation precision standard (CV30) - Specified in the SBRM Omnibus Amendment, this performance standard for SBRM was also adopted as the current requirement for determining at-sea monitoring coverage levels. Total monitoring coverage levels for the groundfish fishery must be set so that they result in achieving the CV30 or better precision of the total discards at the overall stock level for each groundfish stock. Additionally, the current method for determining total monitoring coverage levels for the groundfish fishery applies a step to filter out healthy stocks, so that coverage levels are not driven by these stocks. Healthy stocks are defined as those in a given fishing year that are not overfished, with overfishing not occurring, according to the most recent available stock assessment, and; that in the previous fishing year less than 75 percent of the sector sub-ACL was harvested with less than 10 percent of catch comprised of discards.



(from Wikipedia)

Reliability – The ability of the overall groundfish monitoring program to consistently provide an accurate estimate of total annual catch for each stock with a known level of precision. If estimates with similar accuracy and precision are achieved each year, year after year, they can be said to be reliable. In the context of a monitoring program, this refers to the consistency in quality of catch data, so that there is confidence that the monitoring program estimates each year can be used for catch accounting and stock assessment purposes. Reducing bias and improving accuracy in catch data increases reliability of the data.

[2] MAFMC/NEFMC. 2007. Northeast Region Standardized Bycatch Reporting Methodology: An omnibus amendment to the fishery management plans of the Mid-Atlantic and New England Regional Fishery Management Councils.

Validity - The extent to which you are adequately measuring what you claim you are measuring. In the case of monitoring, validity could be in reference to the stock assessments and reliability could be in reference to the methods used to collect the data that goes into them. In other words, the sampling program could be said to produce reliable estimates, and if they are accurately representing the population they are providing for valid stock assessments.

Accountability – An obligation to be held responsible for one's actions.

In the case of a sector monitoring program, it is the concept of holding all sectors and their members to the same standards, such as matching catches with equivalent units of quota. An effective monitoring program is one designed so that each sector is confident that participants both within sectors and across all sectors are treated in a fair and equitable manner in terms of catch reporting requirements and ensuring catches do not exceed allocations. In the context of the groundfish fishery as a whole, it is being held accountable to the catch levels set by the measures of the management plan.

This includes responsibilities for vessels, sectors, and the agency. Vessels are responsible for complying with trip notification, assigned monitoring, and vessel reporting requirements. Sectors are responsible for contracting monitoring services as required and ensuring sector members comply with the vessel requirements, as well as sector-level monitoring and reporting requirements to manage allocations. NMFS is responsibility for equally and effectively administering a reporting and monitoring program that considers the impacts of the costs of the groundfish monitoring program with the tradeoffs of benefits of this program.

Amendment 16 provides the following rationale that is related to accountability:

The only fishing mortality control for sectors is the hard TAC that, if caught, results in the sector vessels not being allowed to fish. Effective management of sectors requires that catch be accurately known. This is important not only for managers but also so that each sector is confident that all sectors are being held to the same standards. The provisions in this section are designed to ensure that landings are accurately monitored.

Monitoring System Tools/Components:

Dockside Monitoring (DSM): Dockside monitoring is the independent verification or collection of fishery landings data. This may take several forms including:

> *Dockside monitor:* An independent party ensures that all landings are offloaded, sorted, and weighed correctly to ensure accurate catch accounting. An example of a DSM program that employs this form of DSM is the Canadian Department of Fisheries and Oceans (DFO) Maritimes Region DSM program.
>
> *Independent verification:* Catch is sorted and weighed by an independent party to ensure accurate catch accounting. An example of a DSM program that employs this form of DSM is the Canadian DFO Pacific Region DSM program.

Monitoring at sea: Independent third-party records fishery data while at sea.

> *Northeast Fisheries Observer Program (NEFOP):* The Northeast Fisheries Observer Program is administered over a range of commercial fisheries, including the groundfish, herring, squid, surf clam and ocean quahog, and lobster fisheries. NEFOP observers meet requirements of the

Magnuson-Stevens Act and the SBRM Omnibus Amendment, the Marine Mammal Protection Act and the Endangered Species Act. The primary duty of observers is to record all kept and discarded catch, with discard information as the priority. Actual weights of catch should be collected whenever possible, with estimates or extrapolates of weights by sub-sampling as necessary. Other duties include collection of lengths of discards and kept catch of managed species, information on fishing gear, tow-by-tow information (location and time when fishing begins and ends), and detailed information on protected species interactions. Additionally, NEFOP observers collect biological samples from managed species and protected species.

At-Sea Monitoring (ASM): The At-Sea Monitoring program is a vessel monitoring program that is specific to groundfish sector monitoring. The primary duty of at-sea monitors is to record all kept and discarded catch, with discard information as the priority. Actual weights of catch should be collected whenever possible, with estimates or extrapolates of weights by sub-sampling as necessary. At-sea monitor duties are similar to those of NEFOP observers, with the exception that at-sea monitors do not collect biological samples and do not record the same level of detail on protected species interactions. Amendment 23 will consider changes to the ASM program.

Vessel Trip Report (VTR): Fishermen are required to fill out and submit self-reported trip reports for every trip, which provide information on when and where catch occurred. Information reported includes fishing location, time of fishing activity, gear characteristics, and estimates of catch and discards by species.

Vessel Monitoring System (VMS): Systems used to track and monitor the activities of fishing vessels.

Hailing notifications: Notifications sent prior to starting a trip (trip start hail) or at the end of a trip (trip end hail) which may include specific fishing information such as areas fished, gear type used, when and where the vessel will be landing, if the product is being trucked or where the fish is going.

Pre-Trip Notification System (PTNS): The system used to ensure groundfish vessels selected to carry observers are representative of fishing activities sufficient to meet precision requirements across sampling strata (CV30). PTNS requires fishing vessels to notify all trips at least 48 hours in advance, but no more than 10 days in advance.

Electronic Monitoring (EM): EM uses camera, sensors, and GPS on vessels to record a variety of information which may be very specific to the fishery and data needs including: vessel fishing location, fishing activity, catch, discards, and compliance with regulations.

Audit model: Where EM runs on 100% of trips and a subset of hauls or trips is reviewed to verify VTR-reported discards.

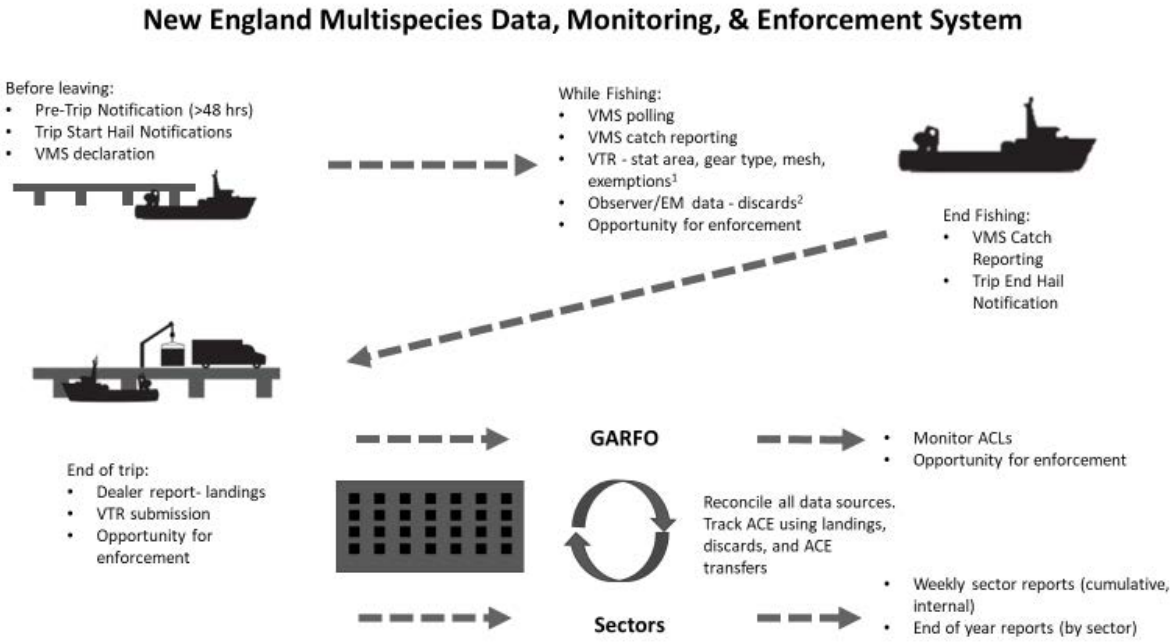
Census: Where EM runs on 100% of trips and 100% of hauls and trips are reviewed.

Max retention: Where EM runs on 100% of trips to verify retention of all groundfish species. For this approach, vessels would be required to land all groundfish, which would eliminate the need to monitor discards. Dockside monitoring would be used to sample all landed groundfish, which would now include fish that previously would have been sublegal.

Electronic Reporting (ER): Reporting electronically, with the goal of reducing paper and lag time.

For example, eVTR, or electronic reporting of vessel trip reports. Currently eVTR is an option for vessel operators in the commercial groundfish fishery to choose to report by eVTR but is not a requirement. Additionally, dealers report electronically, and sector managers submit sector catch data electronically.

Enforcement: Enforcement agents from a variety of agencies including state fish and wildlife departments, NOAA Office of Law Enforcement, and U.S. Coast Guard may board and inspect vessels at sea or inspect landings for compliance with federal and state regulations. The purpose of enforcement activities is to inspect fishing operations for compliance with regulations and administer penalties if found in violation. This is distinct from the goals of monitoring systems, in which the purpose is to collect catch data for use in management and scientific processes. For example, the goal of the ASM program is to collect catch data for quota management, and while it may provide information useful to enforcement or encourage compliance, it is not designed as an enforcement tool. However, the previous dockside monitoring program was more enforcement focused as it did not collect or generate any additional data, and only acted to notify as to whether or not the reported data was falsified.



1: VTRs are used primarily in the current data system for catch monitoring by apportioning dealer reported landings and either observed or estimated discards by identifying changes in sampling strata (statistical areas, gear type, mesh size).

2: In addition to discard information, observers also collect information on protected species interactions and kept catch

Discards:

Catch that is not landed.

Economic discards: discards of undesirable or unprofitable species. Reasons for economic discarding include quota limitations, highgrading, unmarketable (spoiled, dead, or low quality). Depending on the quota system, economic discards may be limited to certain situations, or must still be covered with sufficient quota. The current sector regulations prohibit discarding of legal-size allocated fish, except for legal-size unmarketable fish (e.g., fish damaged by slime eels, seals, or gear).

Regulatory discards: Also known as mandatory or required discards. Discards that are required under the fishery management regulations, for example for prohibited species catches or for species that do not meet size requirements.