Setting Targets and Analyzing Data Gaps for U.S. Fish Assessments

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U.S. Department of Commerce
National Oceanic and Atmospheric Administration
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This analysis would not have been possible without the significant contributions of regional stock assessment experts.

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Executive Summary

NOAA Fisheries maintains regional data collection programs and conducts population assessments to provide scientific advice for the sustainable management of U.S. fisheries. The data inputs used to support fish assessments vary based on a number of factors, including species characteristics, fishery and management characteristics, and ecosystem characteristics. In order to better understand data used by the national stock assessment enterprise, NOAA Fisheries undertook a systematic investigation of currently available data inputs to support fish assessments and the remaining needs to develop science products in support of sustainable fisheries management.

This analysis was carried out for all federally managed stocks or stock complexes (n = 554) based on five primary types of data inputs that are used to calibrate assessment models: catch, size/age composition, abundance, life history, and ecosystem linkage. Stocks were first classified based on their current assessment data input levels. Classifying assessments in this way provides a common language at the national level to discuss assessments.

Next, assessment targets were developed for each individual stock. Establishing realistic assessment targets is essential to ensure efficient use of assessment and management resources and aid in prioritization and planning. Targets should be both ambitious and achievable to guide investments and encourage incremental improvements in the assessment enterprise. Two types of targets are set on a stock-by-stock basis for assessments: Target Assessment Frequency and Target Assessment Input Data Levels. Target Assessment Frequency determines how often the stock needs to be assessed, while Target Assessment Input Data Levels are based on the same five data attributes outlined above that were used to classify assessments. Target assessment levels were set by regional assessment experts using national protocols established in the Next Generation Stock Assessment framework (NGSA) (Lynch et al., 2018). In general, target levels tended to be set higher for stocks that have higher current levels of data inputs.

Gaps were identified on a stock-by-stock and data category by data category basis by comparing current and target data input levels. At the national level, about 14% of stocks are currently meeting target data input levels across all five attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). In contrast, 28% of stocks have targets above current for all data input attributes. Looking at individual data input attributes, the percentage of stocks meeting targets is highest for catch data (46%) and lowest for ecosystem linkage (33%). Indeed, over 60% of stocks currently have Level 0 data inputs (i.e., no data) for ecosystem linkage. Although data gaps exist for many stocks across multiple data input attributes, most of these gaps are modest (i.e., one or two levels); only a small number of gaps exist across three or more levels. The average gap size across all stocks analyzed is ~1, indicating a broad need for feasible, incremental improvements in our data collection programs to benefit the stock assessment enterprise and the science products it provides to our management partners. Both current and target data input levels are generally highest for catch data and lowest for ecosystem linkage, across all regions.

Regional differences in current data levels and targets are present and to be expected as each region is unique in its number of managed stocks, stakeholder expectations for science and management, fisheries characteristics, historical data collection programs, and ecology. This results in some regional differences in average gaps; however regional differences in gaps are not analyzed or highlighted in this report. Each

region developed targets based on regional assessment needs individually, using a similar approach to the guidance for assessment prioritization (Methot, 2015), so such regional comparisons are inappropriate.

The results of this comprehensive analysis can support multiple uses, including informing assessment planning and investments at regional and national levels. Quantitative information on data requirements for the national stock assessment enterprise provides NOAA Fisheries with a strong evidence-based justification for continued support and increased investments. Additionally, these results can be applied to other planning processes within the agency – especially within the data collection and survey enterprise – to aid in prioritization and planning efforts. These results may also be useful for identifying partnerships and opportunities for collaborative research to help meet NOAA Fisheries' stock assessment enterprise's data needs.

Introduction

NOAA Fisheries, together with the eight regional Fishery Management Councils (FMCs) and other partners, manages hundreds of fish and shellfish stocks and stock complexes. Under the Magnuson-Stevens Act (MSA) and other applicable regulations, the agency is directed to sustain fish populations, preserve marine habitats, increase the domestic seafood supply, and protect economic and social interests related to fishing. In order to provide scientific advice for sustainable management of U.S. fisheries, NOAA Fisheries maintains regional data collection programs and conducts population assessments. Fishery stock assessments are used to identify stock status (i.e., *Is the stock overfished? Is the stock experiencing overfishing?*) and establish catch limits to optimize yield. While stock assessments are a crucial piece of sustainable fisheries management, the large number of recreational and commercial fish stocks managed in the U.S. prevents annual assessment of all stocks. For example, in fiscal year 2021 (October 2020–September 2021) NOAA Fisheries assessed 170 out of the 554 "assessment" stocks[1] nationwide. While many stocks maintain sufficient assessment information without annual assessments, a substantial number of stocks have never been assessed or have very outdated assessment advice.

NOAA Fisheries strives for a portfolio approach towards stock assessment, where assessment frequency and complexity are matched to characteristics of the fishery and stock life history. Under this portfolio approach, annual assessment of every stock is not an appropriate goal. Similarly, not all managed stocks require highly complex assessment analyses to provide adequate management advice. U.S. fishery stocks vary widely in terms of life history attributes including size, growth, reproduction, and life span, as well as population size and spatial extent, and level of effort, type, and size of the fishery. These differences flow through into different management requirements in terms of the science products (e.g., stock assessments) managers require and the complexity of data and modeling required to support development of those products.

The variety in U.S. fisheries leads to differences in the data required to support stock assessments and the data collection programs that have evolved over time. Although limitations on assessment capacity (e.g., staffing) represent an important barrier to increasing assessment throughput and thoroughness, data considerations are a substantial challenge, especially as ecosystems undergo increasing change. The stock assessment classification and gap analysis described in this document represent an effort to systematically investigate currently available levels of data to support stock assessments for U.S. managed fisheries stocks and the levels of data that would improve science for those stocks. Results of this analysis provide vital information to help NOAA Fisheries identify key data needs to support the national stock assessment enterprise and develop systematic approaches for meeting those needs.

National Guidance, Regional Implementation

The portfolio approach supports a timely, efficient, and effective stock assessment enterprise by helping provide regions with the tools they need to "right-size" assessments to management needs. Unifying

[1] This is the number of stocks analyzed for this classification exercise, and considers some stock complex members individually. This number is therefore higher than the 460 stocks and stock complexes managed by NOAA Fisheries.

guidance at the national level helps ensure process consistency, while regional implementation allows for the flexibility necessary to accommodate differences in fisheries and management complexity. The portfolio approach consists of multiple components:

1. Annually analyzing assessment priorities using objective criteria
2. Classifying stock assessments
3. Establishing stock-specific targets for assessment
4. Conducting a gap analysis for assessment
5. Using results of the assessment gap analysis to guide strategic planning

In 2015, in response to sustained interest from the U.S. Office of Management and Budget, the General Accountability Office, and Congress, NOAA Fisheries developed a national framework for prioritization of stock assessments (Methot, 2015). Implemented on a regional basis, this framework provides a transparent and objective process for regional assessment programs and their management partners to quantitatively determine assessment priorities. A key component of the assessment prioritization process is an approach to determine target assessment frequencies for managed stocks based on each individual stock's life history and fishery characteristics. This information allows regions to establish targets for each stock based on how often assessment analyses need to be updated to provide timely management information (e.g., status determinations and annual catch limit advice).

Additional guidance to classify stock assessments and set assessment targets was provided in the Next Generation Stock Assessment framework (NGSA; Lynch et al., 2018). The NGSA responds to growing demands for both increased quantity and quality of fish assessments to support sustainable fisheries management in the U.S. and provides recommendations across three areas: holistic and ecosystem-linked assessments; innovative science for improving stock assessments; and developing a stock assessment enterprise that is timely, efficient, and effective. A recurrent theme throughout the NGSA is the need for standardization within the stock assessment enterprise, where possible (acknowledging regional differences), to streamline processes and increase efficiency to meet the aforementioned growing demands.

The NGSA (Lynch et al., 2018) specifically outlines a process for classifying stock assessments based on seven attributes:

- <u>Assessment Application</u>
  - Model Category - *What type of model was used to conduct the assessment?*
  - Assessment Age - *What is the age of the most recent assessment of the stock?*

- <u>Assessment Input Data</u>
  - Catch - *How complete is the catch data supporting the assessment?*
  - Size/Age Composition - *How complete is composition data supporting the assessment?*
  - Abundance - *How complete is abundance data supporting the assessment?*
  - Life History - *How complete is biological input data for the stock?*
  - Ecosystem Linkage - *What level of ecosystem linkages are included within the assessment?*

The classification system outlined in the NGSA updated a classification system identified in the original Marine Fisheries Stock Assessment Improvement Plan (SAIP; NMFS, 2001) that NOAA Fisheries previously used to track fish assessments across five attributes. The NGSA (Lynch et al., 2018) further outlines a process for regions to identify quantitative targets within each of the Assessment Input Data attributes in support of analyzing assessment data gaps at the regional and national levels. The focus in this process is on data inputs to stock assessments, which form the basis for how comprehensively an assessment can be conducted and help establish definable priorities for data collection as well as analytical approaches.

Methods

Classifying Fish Assessments

Classifying stock assessments provides a common language for referencing the level of effort required, the type of product produced, and the kinds of data supporting stock assessments. The list of stocks for classification and target setting included all federally managed stocks; in other words, all stocks contained within the Fishery Management Units (FMUs) of Federal Fishery Management Plans (FMPs). Non-FMU stocks such as those designated "Ecosystem Components" or "Data Collection" stocks were omitted from consideration for this process. A notable exception was stocks managed by the Caribbean Fishery Management Council (CFMC), which was still in the process of revising its FMPs when this exercise was conducted; stocks within the Caribbean region were listed according to the proposed FMUs under the new CFMC island-based FMPs, rather than the existing FMUs under the current CFMC FMPs.

Stock groupings (e.g., by management complex or individual species) for classifying assessments and setting targets were based on how stocks have been broken out by individual regions for stock assessment prioritization (Methot, 2015). The approach for this varied by region, with some regions matching their stock list to the list of management stocks that receive status determinations (a mix of single-species stocks and multispecies management complexes). Other regions opted to split out some or all of the species contained within management complexes, based on likely assessment structure in the near- to medium-term.

Beginning in October 2018, NOAA Fisheries transitioned from using a classification system defined in the original SAIP (NMFS, 2001) to tracking agency fish assessments using the classification system outlined in the NGSA (Lynch et al., 2018; see Appendix 1: NOAA Fisheries' Stock Assessment Classification System for details). This system classifies inputs across the five data attributes between Levels 0 to 5. The details of these levels differ for each attribute, but generally range from no data available for Level 0 to complete data available to support stock assessments at Level 5. Substantial uncertainties in available data may be present at lower data levels, which can impact stock assessment results. Higher level data inputs generally support more complex stock assessment models and more complete management advice.

Tracking is achieved electronically via the Species Information System (SIS; https://apps-st.fisheries.noaa.gov/sis)[2]. Summary records of assessment results, including classification of assessments based on the seven attributes outlined above (i.e., Model Category, Assessment Age, Catch, Size/Age Composition, Abundance, Life History, and Ecosystem Linkage) are entered by regional assessment users shortly after completion of all assessments of federally managed stocks. This enables comprehensive tracking of current fish assessment classifications, as well as trend analysis.

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[2] SIS is a national repository database with web user interface developed and maintained by the NOAA Fisheries Office of Science and Technology. Records are entered by regional NOAA Fisheries users, with data quality control and quality assurance processes occurring at the national level.

SIS users are directed to record the level of data inputs for each classification category that was actually utilized in the final, accepted assessment model configuration. Although additional data may theoretically be available to support assessments, its lack of use in a tactical assessment is an important consideration for this process and likely indicates some sort of gap that must be addressed to make the data fully usable (e.g., ageing structures have been collected, but not read).

Stocks that had not been assessed in the years 2019-2021 lacked the necessary classification information in SIS under the NGSA system. There is no direct translation available between the previous and current classification systems because of significant differences between the two systems. To properly classify older completed assessments under the new classification system, regional assessment experts were asked to review the assessment details and assign levels under the new classification system based on data inputs utilized in the final, accepted model configuration for the assessment.

Unassessed stocks also did not have this information readily available, so a similar approach was used. Regional assessment experts were asked to consider the amount of data available for each unassessed stock, in each data input category, and assign levels based on the data that would realistically be likely used in a tactical assessment that could pass peer review, *were one conducted today*.

Setting Assessment Targets

Assessment Frequency

The process for identifying target assessment frequencies is outlined in the stock assessment prioritization framework (Methot, 2015). Target assessment frequency is specific to each individual stock, based on life history and fishery characteristics. Briefly, the process for calculating target assessment frequency is:

1. Begin with Mean Age in Catch (or proxy)
2. Multiply by a regional scaling factor to adjust for region-specific assessment capacity
3. Adjust for stock variability by adding one year for stocks with low (<0.3) recruitment CV, or decreasing by one year for stocks with high (>0.9) recruitment CV
4. Adjust for Fishery Importance by adding one year for stocks within the bottom third of regional Fishery Importance, or decreasing by one year for stocks in the top third of regional Fishery Importance.[3]
5. Adjust for Ecosystem Importance by adding one year for stocks within the bottom third of regional Ecosystem Importance, or decreasing by one year for stocks in the top third of regional Ecosystem Importance.[4]

Minimum Target Assessment Frequencies are one year (or annual assessments), while the maximum is capped at 10 years. Although the calculations described above produce target frequencies >10 years from some stocks, the cap of 10 years is in place because assessments older than 10 years cannot realistically

[3] Regional Fishery Importance is calculated during Stock Assessment Prioritization and is based on a summation of the following prioritization factors: Commercial Fishery Importance, Recreational Fishery Importance, Importance to Subsistence, Rebuilding Status, Constituent Demand, and Non-Catch Value.

[4] Regional Ecosystem Importance is another factor scored during Stock Assessment Prioritization. It is based on a stock's *Key Role in Ecosystem*, determined by its maximum contribution to either Bottom-Up or Top-Down Components.

provide useful practical advice to resource managers. In some regions, additional minor modifications may be made to accommodate assessment processes (e.g., biennial assessment scheduling).

For a majority of stocks, target assessment frequencies had already been developed via the stock assessment prioritization process and were retrieved from existing resources. For stocks that have not undergone stock assessment prioritization[5], target assessment frequencies were developed using the same approach outlined above. Many of these species had data limitations requiring the use of proxies to estimate a target assessment frequency. Where life history estimates could not be obtained from literature, the FishLife R package (https://github.com/James-Thorson-NOAA/FishLife; Thorson et al., 2017; Thorson, 2020) was used to calculate an estimate for use in the target assessment frequency calculation. Fishery Importance and Ecosystem Importance factor scores were not available for these stocks and could not be reliably developed, so they were omitted from the calculation of target assessment frequency for unprioritized stocks only. The resulting target assessment frequencies for these stocks should be considered provisional – able to provide a rough estimate, but in need of update once better information is available.

Assessment Input Data

Establishing reasonable targets is essential to ensure efficient use of assessment and management resources. For example, management advice for stable stocks benefits little from frequent reassessment. Similarly, conducting data-intensive assessments of minor stocks may not be worth the investment when such stocks can be adequately managed using more moderate approaches. Targets should be both ambitious and achievable to guide investments and encourage incremental improvements in the assessment enterprise. Regional assessment experts were asked, when considering assessment targets, to think critically about the management needs for each individual stock and the science information products required to meet those needs.

Assessment Input Data targets are based on the five data attributes that capture the main types of information used to calibrate assessment models. This approach provides more informative details than simply investigating the type or complexity of model needed. For instance, NOAA Fisheries can utilize target data inputs to establish priorities for data collection as well as analytical techniques on a stock-by-stock basis.

The NGSA (Lynch et al., 2018; see Section 10.3.2) outlines a series of simple calculations to develop stock-specific baseline target levels for each of the five data input attributes (summarized in Appendix 2: Calculations for Baseline Target Assessment Levels). Similar to Target Assessment Frequency, these

[5] Includes 225/554 total stocks, managed under the following FMPs: Atlantic Salmon; Coastal Pelagic Species; Consolidated Atlantic Highly Migratory Species; Coral and Coral Reefs of the Gulf of Mexico; Coral, Coral Reefs and Live / Hard Bottom Habitats of the South Atlantic Region; Dolphin and Wahoo Fishery of the Atlantic; Fish Resources of the Arctic Management Area; Golden Crab Fishery of the South Atlantic Region; Hawaii Archipelago Ecosystem; Pacific Coast Groundfish (minor species only); Pacific Coast Salmon; Pacific Pelagic Fisheries of the Western Pacific Region Ecosystem; Pacific Remote Island Areas Ecosystem; Pelagic Sargassum Habitat of the South Atlantic Region; Salmon Fisheries in the EEZ off the Coast of Alaska; Scallop Fishery of the South Atlantic Region; Shrimp Fishery of the South Atlantic Region; Snapper-Grouper Fishery of the South Atlantic Region (minor species only); U.S. West Coast Fisheries for Highly Migratory Species. Individual stocks are flagged in Appendix 3: Stock-Specific Assessment Classification and Targets.

calculations require information inputs from regional stock assessment prioritization. Where stocks had not been previously prioritized, baseline targets could not be developed.

A pilot study of the stock assessment classification system and target setting process was conducted for stocks in the Alaska Ecosystem Complex with assessment experts at the Alaska Fisheries Science Center in 2019[6] (Shotwell and Blackhart, 2023). The results of that pilot study emphasized the importance of expert review of the baseline targets developed using the NGSA calculations. Although the Alaska pilot study noted generally good agreement between the calculated baseline targets and the final target assessment input data levels and only small differences (i.e., +/-1) where they existed, some notable patterns did emerge. In particular, performance of the NGSA calculations was poor for the ecosystem linkage data input attribute. Targets for data-limited stocks were also problematic, with calculated targets often being higher than what experts thought was reasonable or necessary for specific stocks.

The baseline targets for each of the five Assessment Data Inputs developed from the NGSA calculations were provided to regional assessment experts and served as a starting point for further evaluation and review. These regional experts were asked to evaluate baseline targets, adjusting (up or down) as appropriate, based on other available information including stock assessment reports, Council research recommendations, results from other NOAA Fisheries initiatives (e.g., climate vulnerability assessments), primary literature, management strategy evaluations, etc. In many cases, expert opinion was a vital resource to review and finalize target assessment levels.

Regional review was collected virtually; mandatory telework due to COVID-19 restrictions precluded any sort of regional workshops to discuss and review targets. Online spreadsheets including all available information (i.e., target assessment frequency, current stock assessment classifications, calculated baseline target assessment levels) were sent to regional assessment program leads, along with detailed and consistent instructions for reviewing the information. Regional assessment program leads, working with their assessment staff, worked to review the calculated baseline assessment levels and provide final target assessment levels (adjusted from the baselines where appropriate). Upon initial receipt of target assessment levels from regional contributors, targets were reviewed for consistent application of the national guidance; regional contributors were provided an opportunity to review and revise any apparent deviations from the guidance after additional clarification.

Target data input levels, once established, should be reviewed periodically (i.e., on a ~five-year cycle). Although stock assessment targets are expected to remain relatively stable over time, this periodic review ensures that targets remain reasonable and current. A range of events could lead to shifts in assessment targets, including notable changes in fishery or population conditions, major ecosystem shifts, market changes, development of new fisheries, or emerging research. Targets are incremental improvements, so as stocks achieve one target level this may create the opportunity to identify a new opportunity for improvement.

[6] The pilot study included groundfish in the Bering Sea/Aleutian Islands and Gulf of Alaska as well as crab stocks; stocks managed under other FMPs in Alaska were analyzed later during the national exercise. For completeness, all Alaska stocks are included in the results here.

Identifying Assessment Gaps

As described in the NGSA (Lynch et al., 2018), stock assessment gaps can be identified and analyzed by comparing existing assessment levels to target levels. Gaps were identified for each data input attribute by subtracting the current assessment data input level from target assessment data input level. In other words, a gap exists when the target level is higher than the current level. The greater the difference between the current level and target level, the larger the gap. It should be noted that stocks with gaps do not necessarily indicate “data-limited” stocks; only that these stocks lack the data experts deem necessary to make achievable improvements in the stock’s assessment.

Assessment Classifications, Targets, and Gaps

The process outlined in previous sections results in detailed information on assessment classifications, targets, and gaps on a stock-by-stock and data category by data category basis. Information can also be summarized at a number of higher levels to inform planning. Thus, results of this exercise can be utilized to inform at levels from planning individual stock assessments all the way up to strategic planning (e.g., informing investments and priorities) at the national science enterprise level. A summary of key results follows, and a table of full results can be found in Appendix 3: Stock-Specific Assessment Classification and Targets.

National Summary

Target assessment data input levels were analyzed for a total of 554 stocks or stock complexes by regional experts. At the national level, about 14% of stocks are currently meeting target data input levels across all five attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). In some cases, stocks meeting targets are lower priority stocks with relatively low levels for both current and target data inputs. In contrast, 28% of stocks have a data gap for all data input attributes. The remaining stocks are meeting targets for one or more data input attributes (Figure 1).

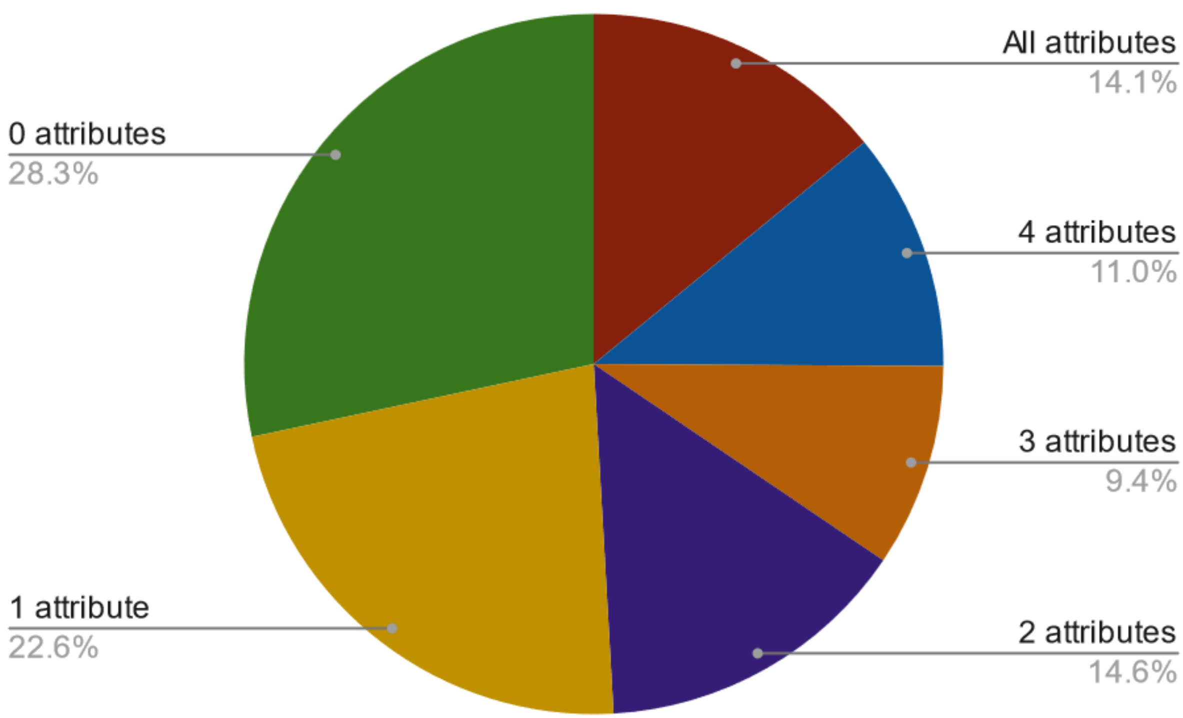

Figure 1. Percentage of stocks nationally (out of a total of 554 managed stocks analyzed) that currently meet target input levels across the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).

Looking at data input attributes individually, the percentage of stocks meeting targets is highest for catch and lowest for ecosystem linkage (Figure 2). About 33% of stocks nationwide are meeting their target level for ecosystem linkage data. Although substantially more stocks are meeting their target level for catch input data, this number is still less than 50% of stocks nationally.

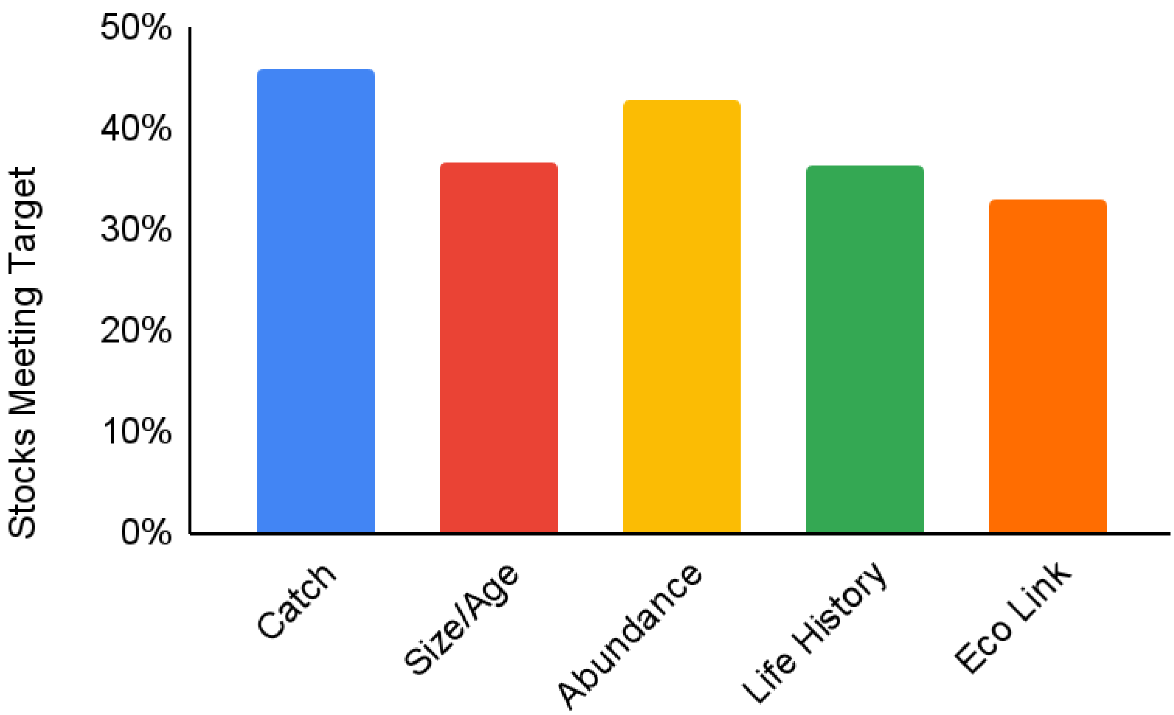

Figure 2. Percentage of stocks nationally (out of a total of 554 managed stocks analyzed) currently meeting target input levels in each of the five individual data attributes: catch, size/age composition, abundance, life history, and ecosystem linkage.

The number of stocks identified at the current input data levels varies across the five data attributes (Figure 3). For instance, over 70% of stocks nationally have Level 2 or greater current data inputs for both Catch and Life History. In contrast, over 60% of stocks currently have Level 0 data inputs for Ecosystem Linkage. Similarly, the number of stocks assigned to the different target data input levels showed a non-uniform distribution between the five data attributes.

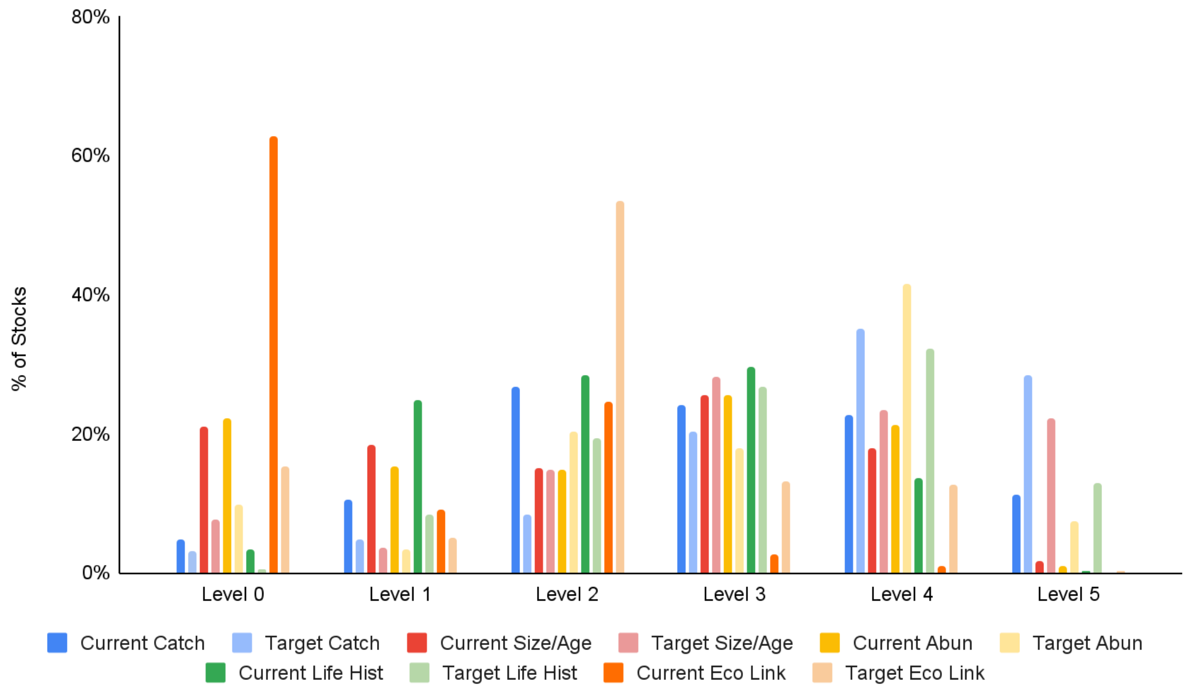

Figure 3. Percentage of stocks nationally (out of a total of 554 managed stocks analyzed) with current and target input levels identified within each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).

The size of gaps also varied between the individual data input attributes (Figure 4). In general, a majority of stocks face a gap of two or fewer levels across all data input attributes. For catch, size/age composition, and abundance, a simple majority of stocks have sufficient data inputs (i.e., no gap). For the life history data input attribute, a majority of stocks face a data gap of one level, while for ecosystem linkage, a majority of stocks have a data gap of two levels.

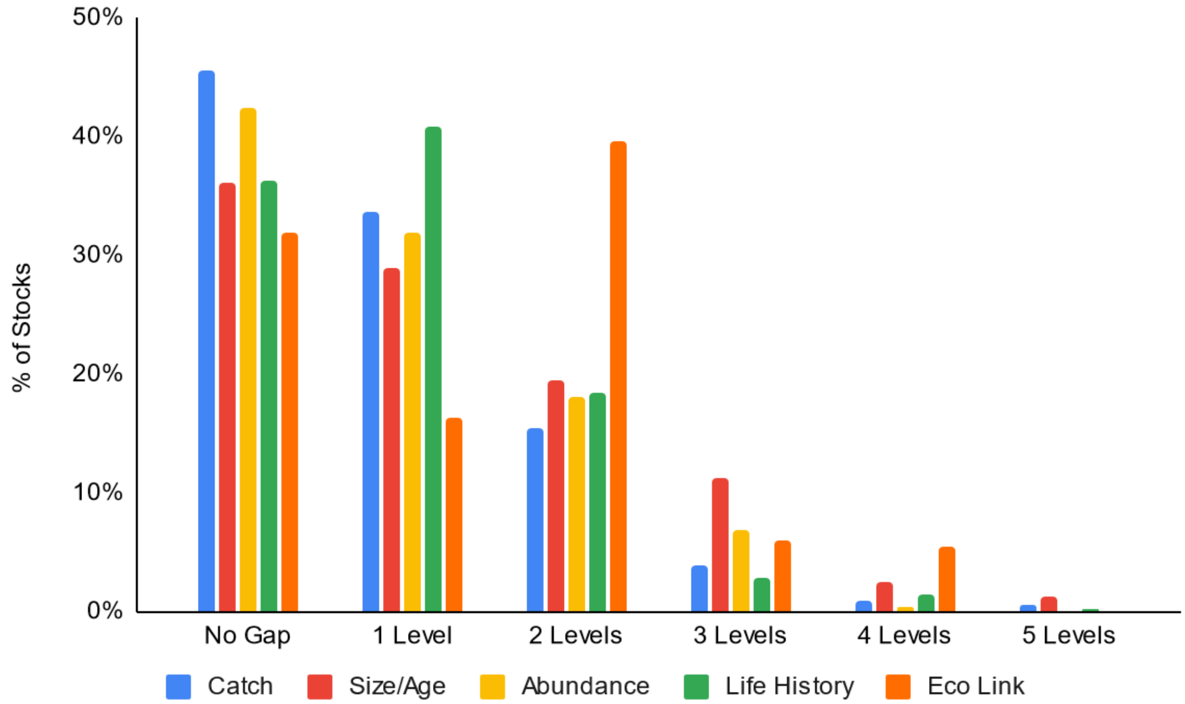

Figure 4. Percentage of stocks nationally (out of a total of 554 managed stocks analyzed) with gaps at each possible gap size, from no gap to complete gap (i.e., five levels), for each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).

Regional Summaries

Below regional results are summarized individually. Results are presented by region for convenience, but summaries at this level may disguise some key differences present in species grouping; for additional details, please see Appendix 3: Stock-Specific Assessment Classification and Targets. Differences in the average current data levels are present and to be expected as each region is unique in its number of managed stocks, fisheries characteristics, historical data collection programs, and ecology. Regional differences also exist in data targets, which were set independently by each region's assessment experts based on the national protocol but exact targets within each region are responsive to numerous factors that vary by region, such as stakeholder expectations, science and management partners (e.g. international treaties), and practical constraints on data collection.

Northeast

A total of 52 stocks were analyzed for the Northeast Region. All stocks were considered individually (i.e., no management complexes were considered). A majority of stocks in the Northeast have current data levels of at least Level 2 across all data input attributes, with the exception of Ecosystem Linkages (Figure 5). Just over 65% of Northeast stocks currently have Level 0 Ecosystem Linkages (i.e., no linkage to ecosystem dynamics or consideration of ecosystem properties in configuring the assessment), representing the data input attribute with the lowest current levels and the largest gap (Figure 5, Figure 6).

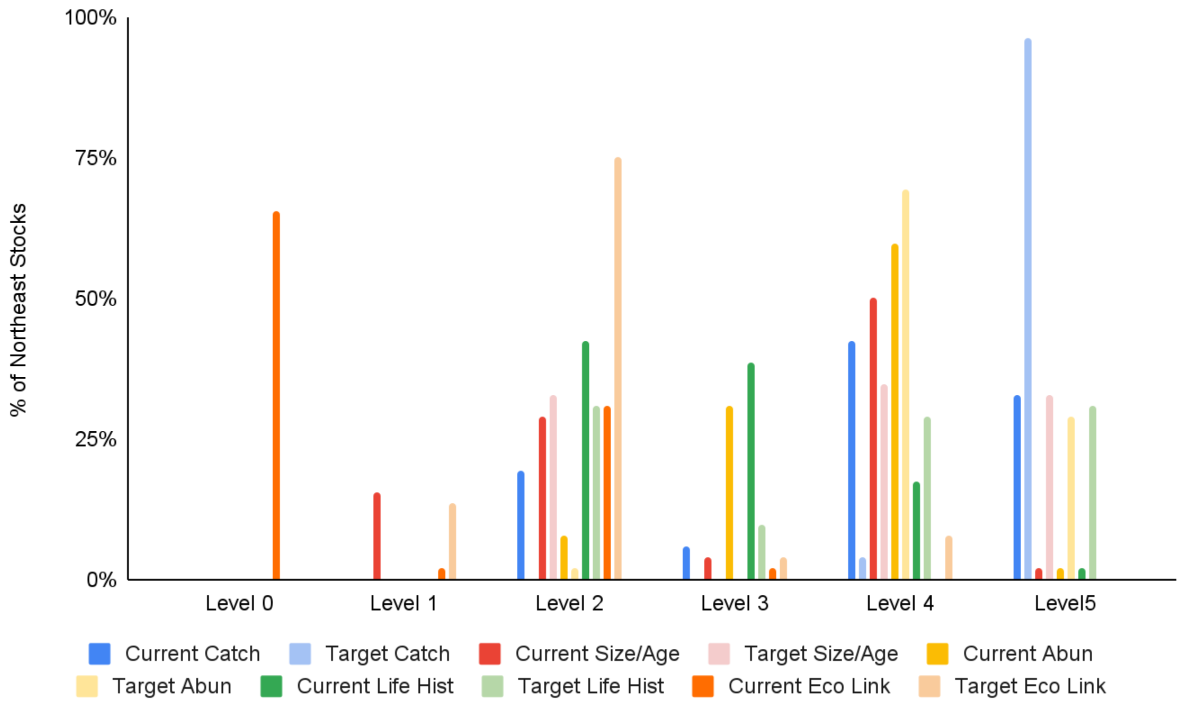

Figure 5. Percentage of Northeast stocks (out of a regional total of 52 managed stocks analyzed) with current and target input levels identified within each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).

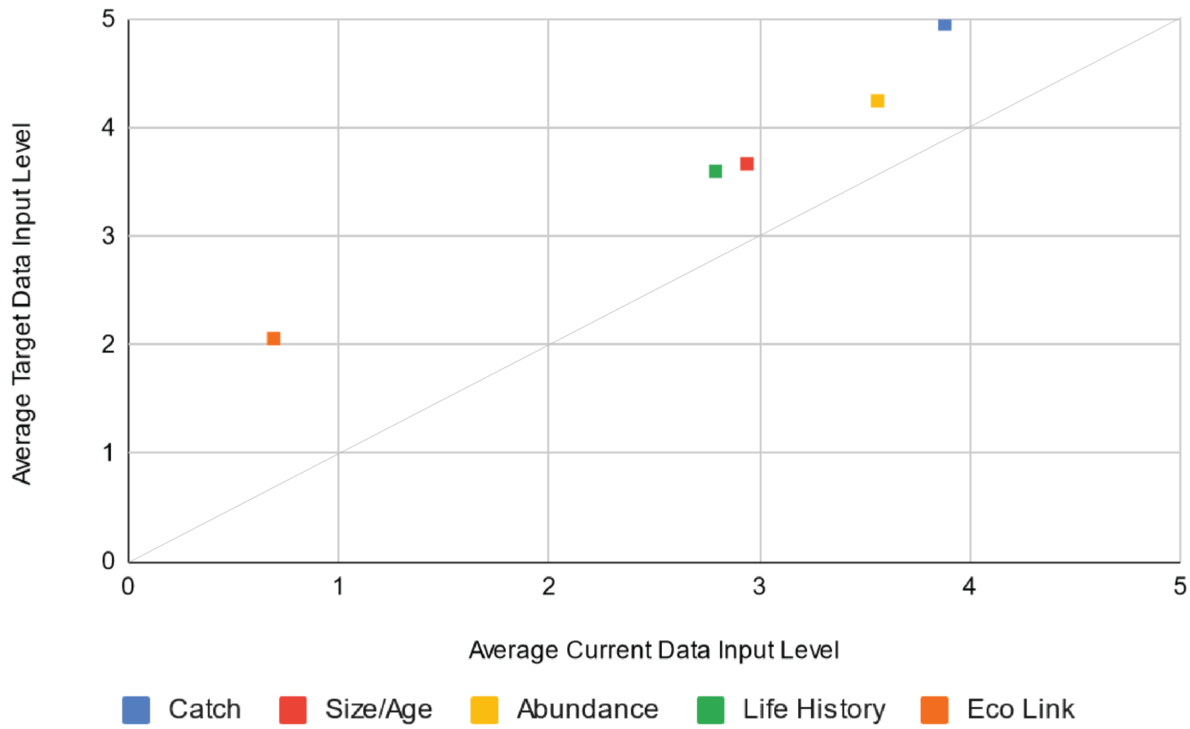

Figure 6. Average Northeast target data input level vs. current data input level, for each of the five data input attributes, averaged across the 52 managed regional stocks analyzed. The distance between the diagonal line and the points represents the average size of the gap between current and target data inputs.

Almost all stocks in the Northeast have some level of data gap for assessments (Figure 7, left panel); only two stocks (Atlantic Surfclam and Southern New England/Mid-Atlantic Yellowtail Flounder) are considered by regional assessment experts to be fully meeting targets for assessment data inputs. Significant data gaps exist for fish assessments in the Northeast region across all data input attributes (Figure 6; Figure 7, right panel). Most notable are gaps in Ecosystem Linkage data, which are present for 77% of Northeast stocks and also tend to be larger gaps; 50% of stocks have a gap of 2 levels (Figure 6; Figure 7, right panel). However, basic data (e.g., catch, abundance) necessary to support assessments also appears to be missing for many Northeast stocks (Figure 7, right panel).

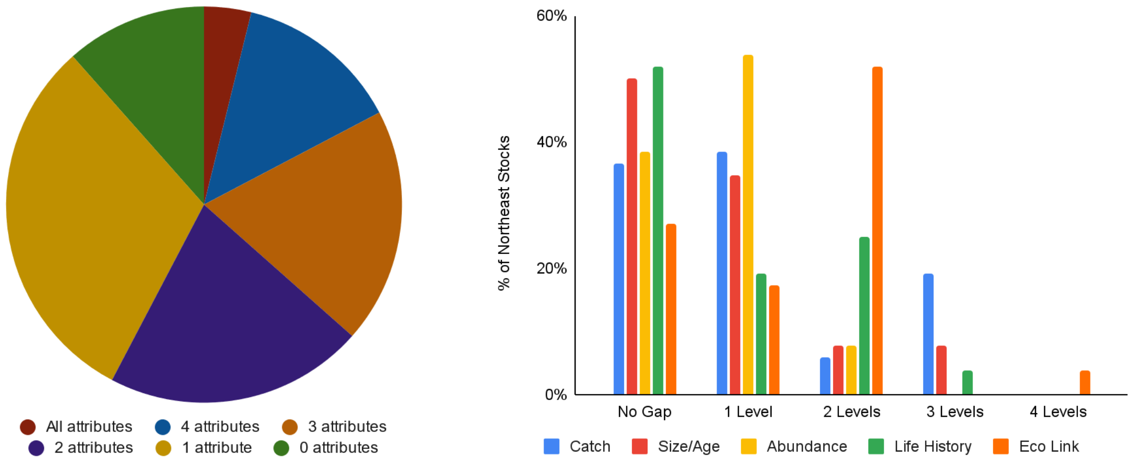

Figure 7. (a) Left panel: Percentage of stocks (out of a Northeast regional total of 52 managed stocks analyzed) currently meeting target input levels across the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). (b) Right panel: Percentage of stocks with gaps at each possible gap size, from no gap to a gap of four levels, for each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). Note that in the Northeast region, no stocks had a complete gap (i.e., five levels) for any of the data input attributes.

Southeast

Stock assessment scientists at the Southeast Fisheries Science Center are tasked with producing science information to support three different Fishery Management Councils (South Atlantic, Gulf of Mexico, and Caribbean) as well as the NOAA Fisheries Highly Migratory Species Division. A total of 220 stocks and stock complexes were analyzed for this exercise, a number significantly higher than any other region. To provide more detailed information on patterns within the Southeast Region, results are discussed for stocks within the South Atlantic, Gulf of Mexico, Caribbean, and Highly Migratory Species (HMS) separately.

In general, HMS stocks are closer to assessment data targets than other managed stocks in the Southeast region. Forty percent of HMS stocks are fully meeting data input targets, while no stocks in the South Atlantic, Gulf of Mexico, or Caribbean are meeting targets across all five data input attributes (Figure 8). Stocks in the Caribbean are the most data-poor in the Southeast region, with over 96% of Caribbean stocks failing to meet data targets across all five input attributes.

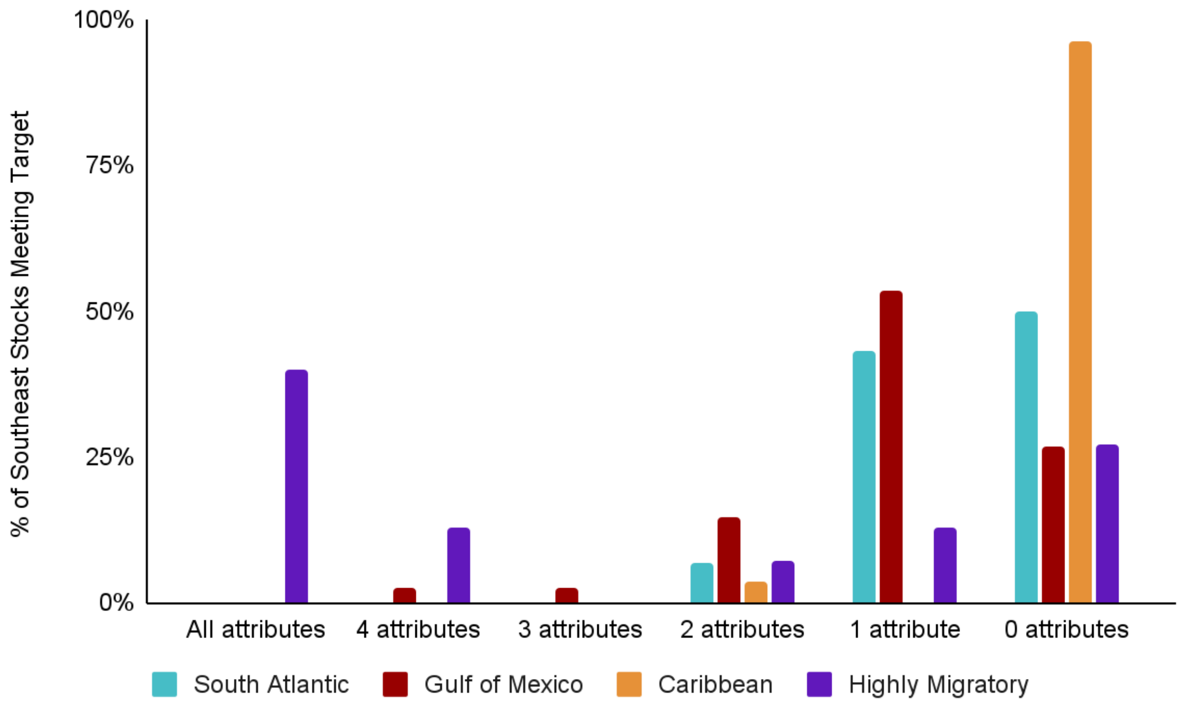

Figure 8. Percentage of Southeast stocks currently meeting target input levels across the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). South Atlantic (n = 44 stocks); Gulf of Mexico (n = 41 stocks); Caribbean (n=80 stocks); Highly Migratory Species (n = 55 stocks).

South Atlantic

Forty-four stocks managed in the South Atlantic region were analyzed, including a combination of individual stocks and management complexes. The current availability of data for South Atlantic stocks varies by data input attribute and also by stock. In general, catch data is more available, with over 60% of stocks having Level 3 data available (although no stocks have catch data at higher levels currently available; Figure 9). Data for life history, size/age composition, and abundance attributes is less available currently (Figure 10). The data attribute most unavailable is ecosystem linkage, with over 60% of South Atlantic stocks currently at Level 0 or “no linkage to ecosystem dynamics” in the assessment.

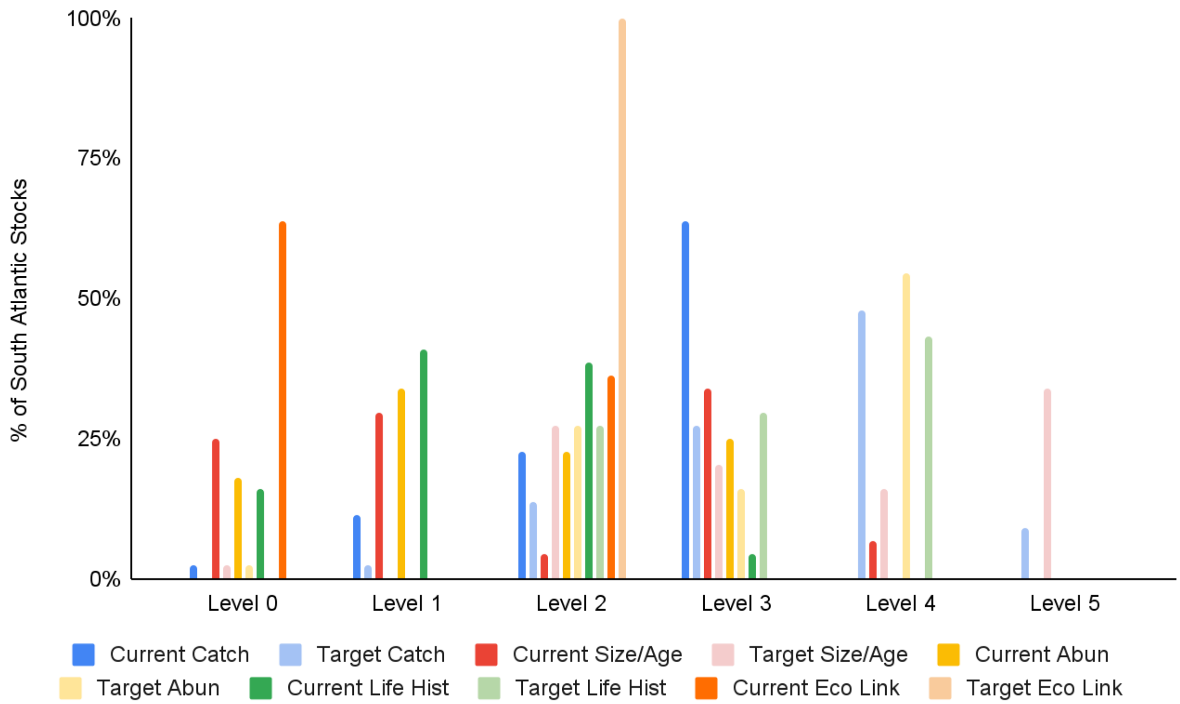

Figure 9. *Percentage of South Atlantic stocks (out of a total of 44 stocks analyzed) with current and target input levels identified within each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).*

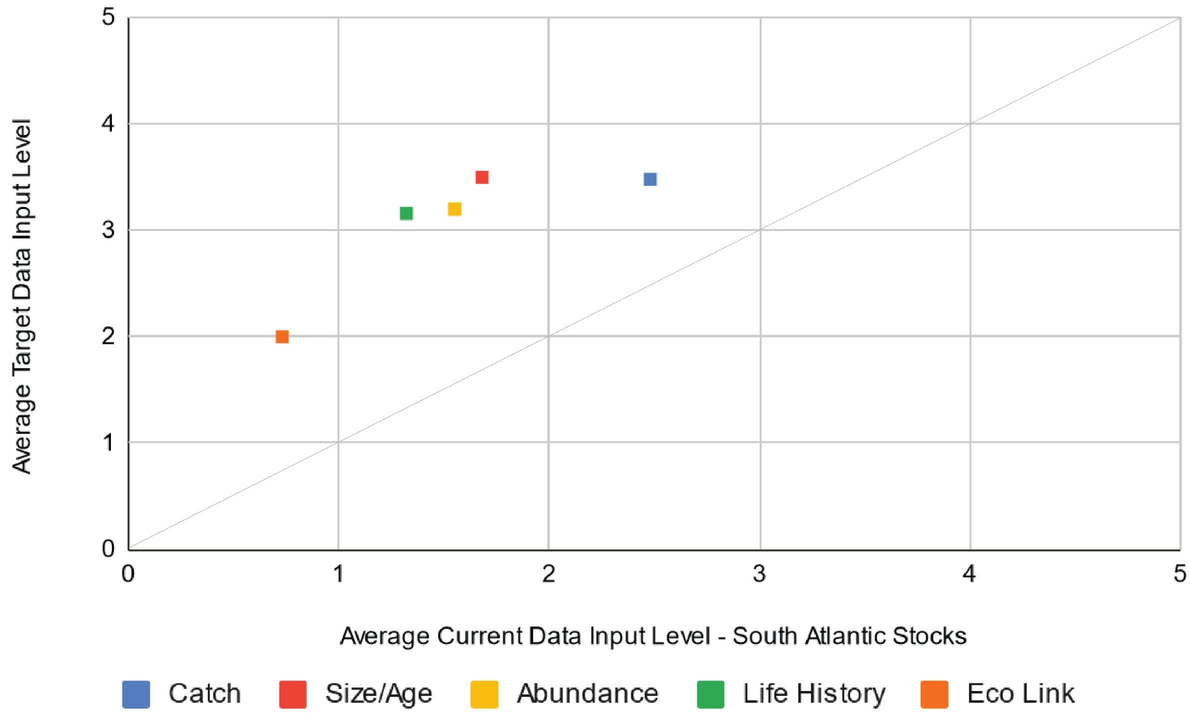

Figure 10. Target data input level vs. current data input level, for each of the five data input attributes, averaged across the 44 total managed stocks analyzed for the South Atlantic region. The distance between the diagonal line and the points represents the average size of the gap between current and target data inputs.

South Atlantic stocks have significant data input gaps for stock assessment. Across all five of the data input attributes, a majority of stocks have a gap or one or two levels (Figure 11). Notably, 77% of South Atlantic stocks have a gap for catch data, which is a fundamental input for even basic stock assessments and management analyses. Abundance input data is another attribute which needs priority attention (Figure 10); currently, only 2% of South Atlantic stocks are meeting targets for abundance input data and more than 50% have a gap of two or more levels (Figure 11).

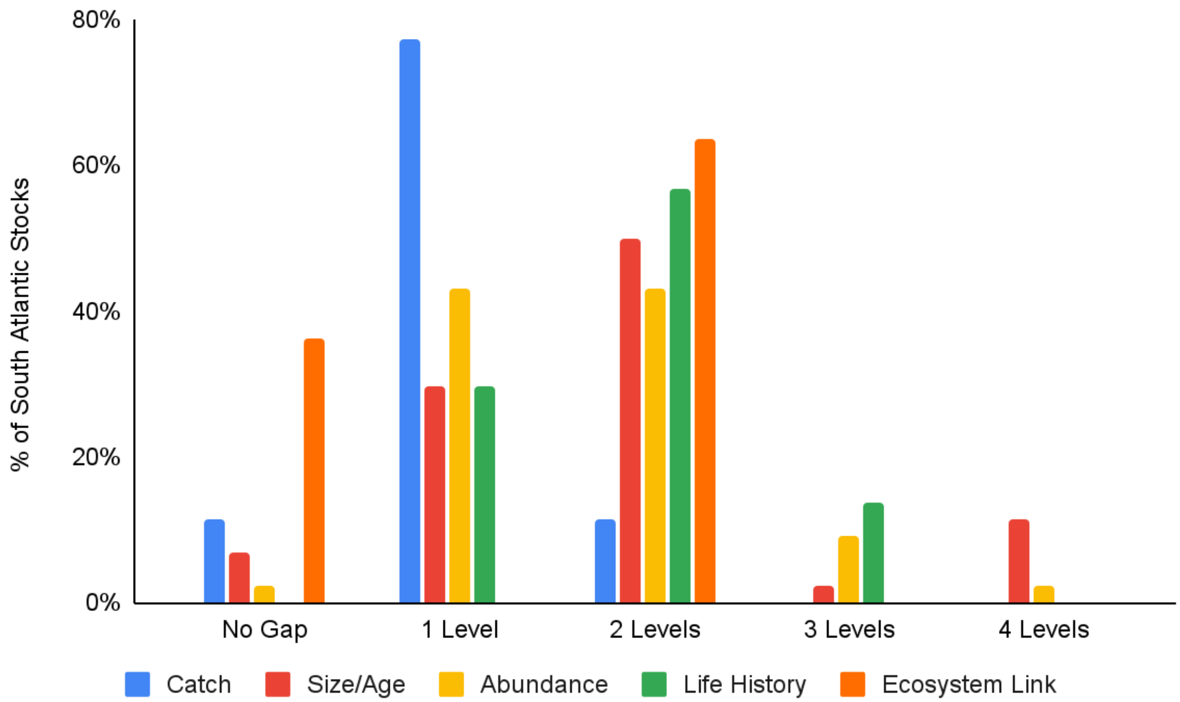

Figure 11. Percentage of South Atlantic stocks (out of a total of 44 stocks analyzed) with gaps at each possible gap size, from no gap to a gap of four levels, for each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). No South Atlantic stocks had a complete gap (i.e., five levels) for any of the data input attributes.

Gulf of Mexico

In the Gulf of Mexico (GoM) region, 41 stocks were analyzed. All GoM stocks managed as complexes were broken out into component species and considered individually for the purposes of this exercise. Similar to stocks in the South Atlantic region, the current availability of data inputs for GoM stocks varies by data attribute and stock. Sixty-one percent of GoM stocks do not have any ecosystem link data currently available, and 29% of stocks do not have any abundance data available (Figure 12). Catch, life history, and size/age composition data is more available (Figure 13), generally spread across levels 1-4.

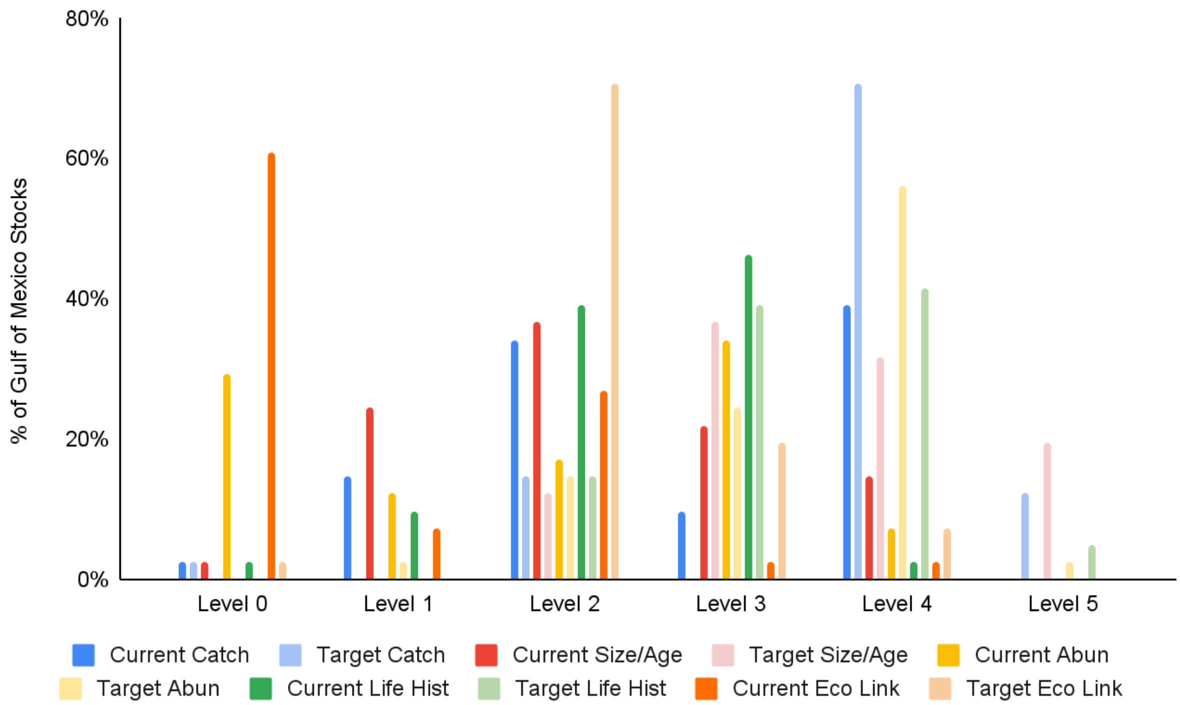

Figure 12. Percentage of Gulf of Mexico stocks (out of a total of 41 stocks analyzed) with current and target input levels identified within each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).

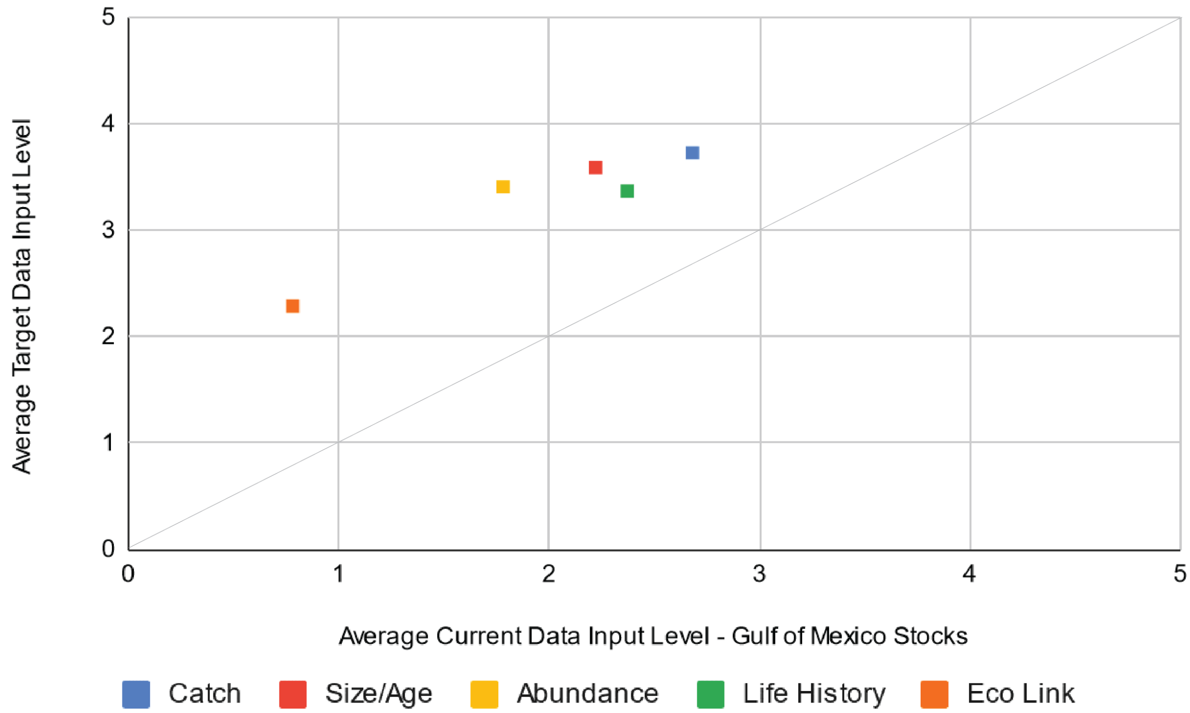

Figure 13. Target data input level vs. current data input level, for each of the five data input attributes, averaged across the 41 total managed stocks analyzed for the Gulf of Mexico region. The distance between the diagonal line and the points represents the average size of the gap between current and target data inputs.

As seen in the South Atlantic region, GoM stocks have significant data input gaps for stock assessment. However, more stocks in the GoM are currently meeting data input targets for all attributes except ecosystem linkage (Figure 14). In spite of this fact, a majority of stocks have gaps of at least one level for all data input attributes. The most significant gap in the GoM region is for ecosystem linkages, with over 60% of stocks having a gap of two levels.

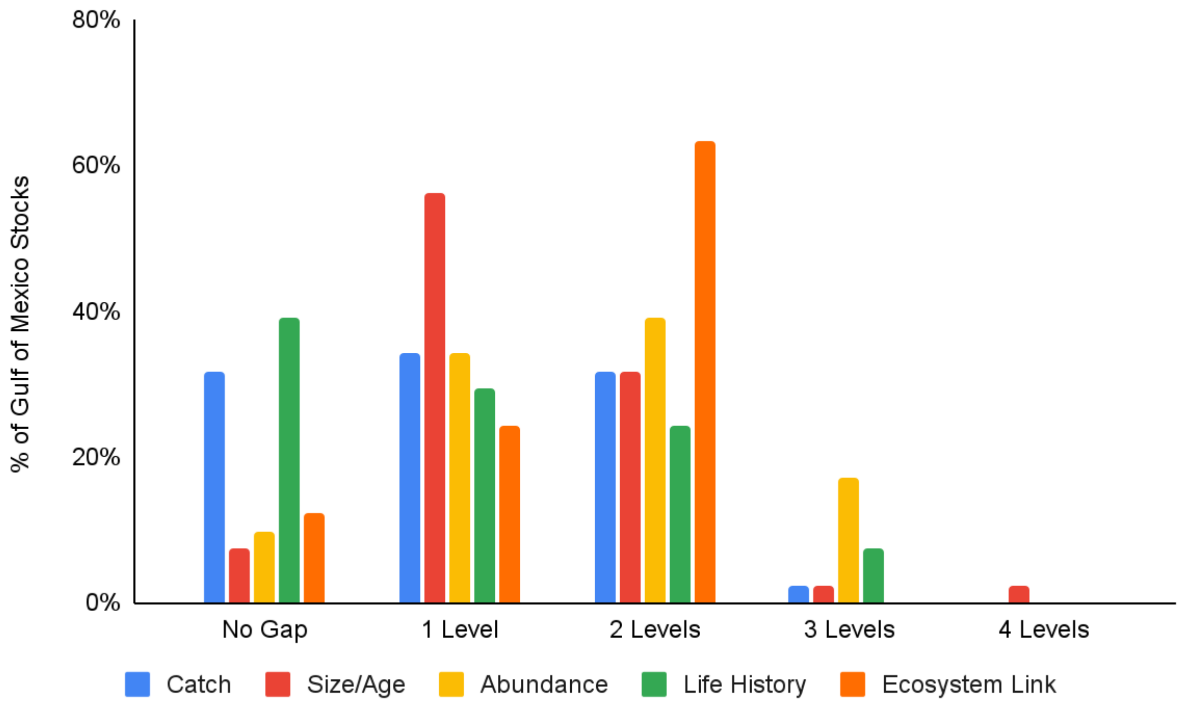

Figure 14. Percentage of Gulf of Mexico stocks (out of a total of 41 stocks analyzed) with gaps at each possible gap size, from no gap to a gap of four levels, for each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). No Gulf of Mexico stocks had a complete gap (i.e., five levels) for any of the data input attributes.

Caribbean

Eighty stocks were analyzed in the Caribbean region. At the time of analysis, the Southeast Fisheries Science Center, Southeast Regional Office, and Caribbean Fisheries Management Council were working to implement island-based revisions to Caribbean Fishery Management Plans. The Caribbean stock list utilized for this exercise was based on the anticipated Fishery Management Units under the new island-based FMPs, and included both management complexes and individual stocks.

Of the four management groupings in the Southeast, Caribbean stocks are generally recognized as the most data-poor. This analysis supported such anecdotal recognition, with many stocks currently having very low levels of assessment data across input attributes. Catch and life history data are most currently available, although catch is not available above Level 2 and life history is mainly available at Levels 1 or 2. Ecosystem linkage data is especially lacking and unavailable for 96% of Caribbean stocks (Figure 14).

The distribution of targets for Caribbean stocks is more conservative relative to those for other regions (Figure 15, Figure 16). This is likely due to the current data-poor state of nearly all Caribbean stocks.[7] A majority of data input targets for Caribbean stocks were at Levels 2-3, with the exception of some at Level 4 for catch. No targets were set at Level 5 for any Caribbean stocks across any data input attributes.

[7] Recall that regional assessment experts were directed to set targets that were "both ambitious and achievable."

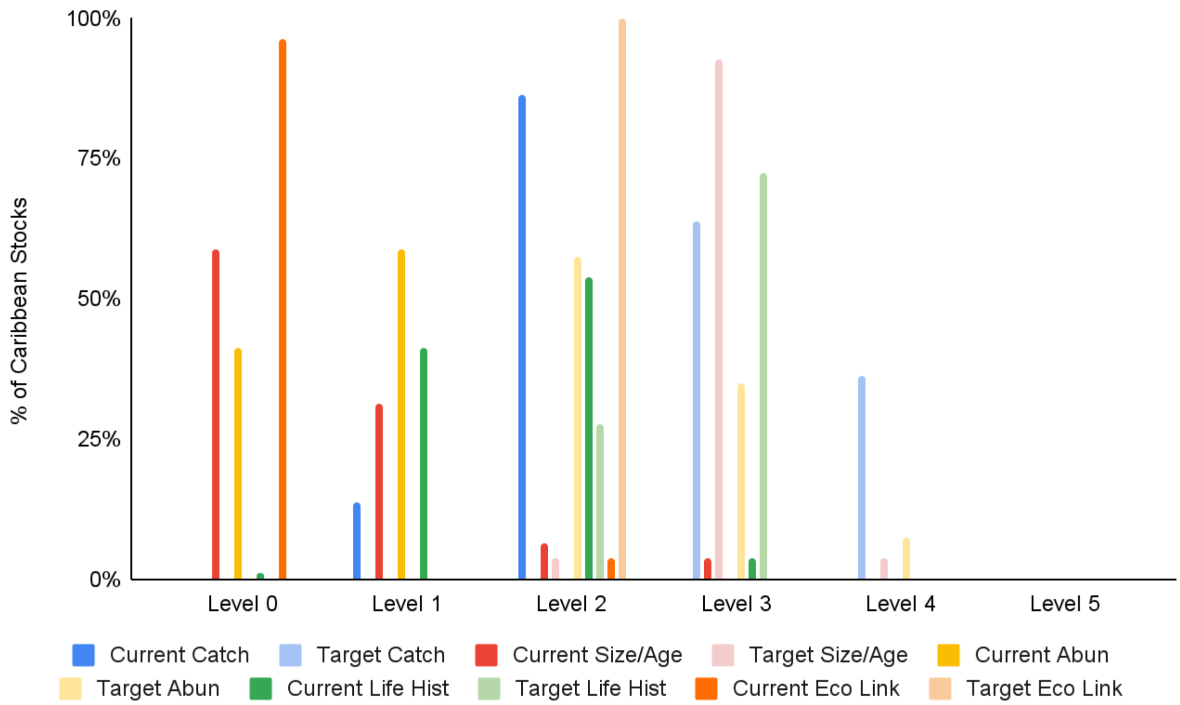

Figure 15. Percentage of Caribbean stocks (out of a total of 80 stocks analyzed) with current and target input levels identified within each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).

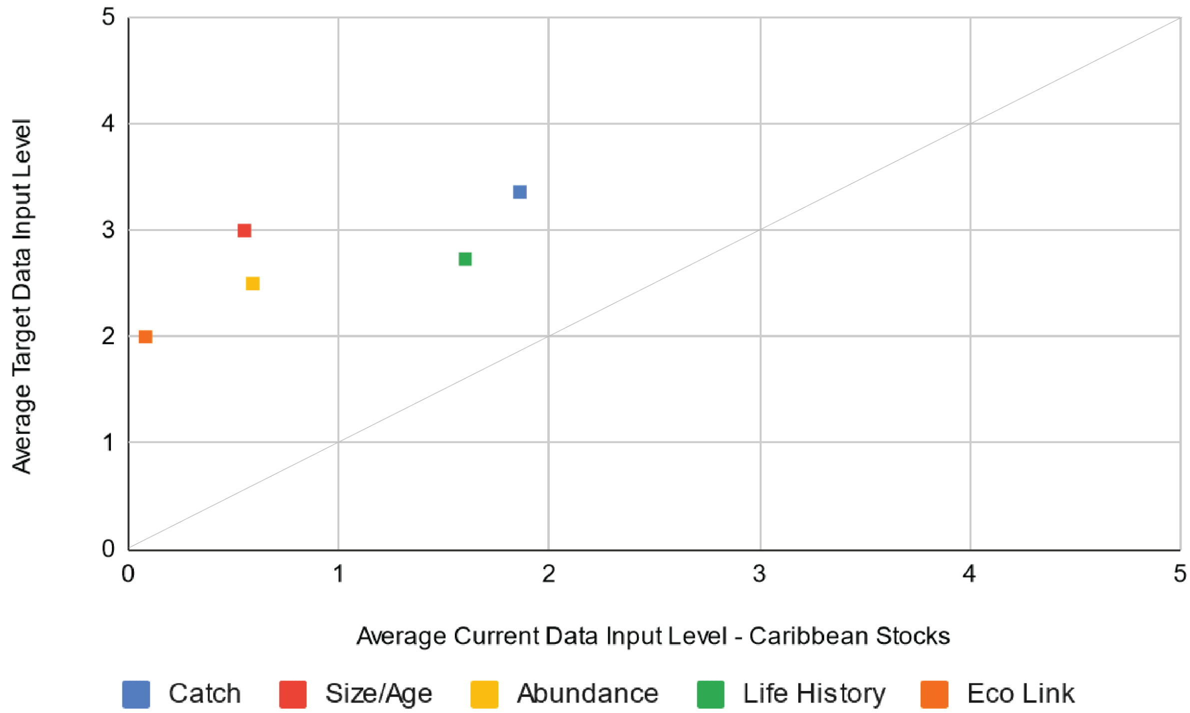

Figure 16. Target data input level vs. current data input level, for each of the five data input attributes, averaged across the 80 total managed stocks analyzed for the Caribbean region. The distance between the diagonal line and the points represents the average size of the gap between current and target data inputs.

Given the more conservative targets set for Caribbean stocks, no extreme gaps (i.e., 4 or 5 levels) were seen for stocks in the Caribbean region. However, even with the more conservative targets set for stocks in this region, nearly all stocks have data gaps of one, two or even three levels across all data attributes (Figure 17). Basic stock assessment inputs (e.g., abundance, biology, and catch) are inadequate for every stock in the Caribbean region. Given that this region includes Puerto Rico and the U.S. Virgin Islands, this issue touches multiple disciplines - data collection, fisheries management, and social justice.

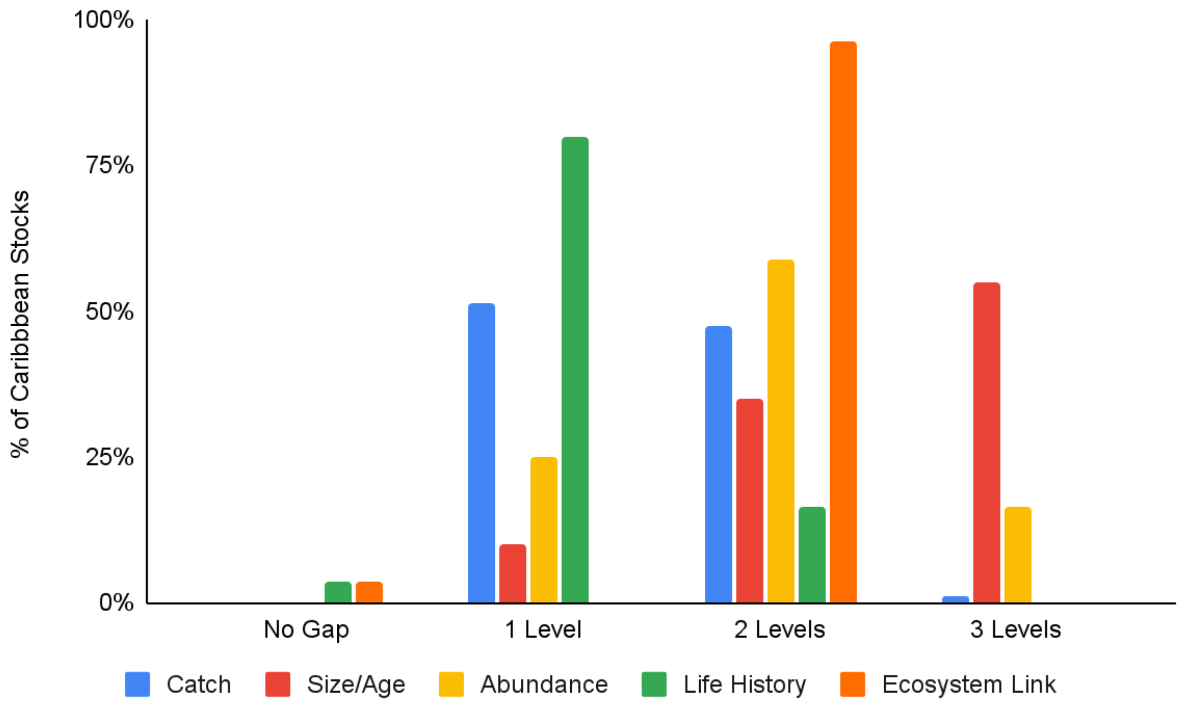

Figure 17. Percentage of Caribbean stocks (out of a total of 80 stocks analyzed) with gaps at each possible gap size, from no gap to a gap of three levels, for each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). No Caribbean stocks had a gap of four or five levels for any of the data input attributes.

Highly Migratory Species

Fifty-five Highly Migratory Species were analyzed; all HMS stocks are categorized as Southeast region stocks, although many have distributions that extend north along the Atlantic Coast into the Mid-Atlantic and New England regions. HMS stocks include both domestic shark species as well as tunas and billfishes, and many are managed domestically under the Consolidated Atlantic Highly Migratory Species FMP as well as internationally by the International Commission for the Conservation of Atlantic Tunas (ICCAT). All HMS stocks were considered individually for this exercise, with the exception of the Gulf Smoothhound Complex.

In general, HMS stocks currently have higher levels of available data inputs to support stock assessments (Figure 18). A substantial portion of stocks have data available at Level 3 for catch (51%), size/age composition (45%), abundance (44%), and life history (54%) attributes. Ecosystem linkage stands out as the exception, with 60% of stocks having no data available for this attribute. However, this is not deemed to be a priority for assessment and management of these stocks - nearly half of HMS stocks had a target ecosystem linkage level of zero.

Targets for HMS stocks tended to be set more conservatively relative to other regions within the Southeast or other management regions, resulting in smaller average gaps (Figure 19). Stock assessment experts for HMS stocks may have judged that current data inputs are sufficient for management needs, or may have been less able to identify opportunities for achievable improvements to the current data inputs.

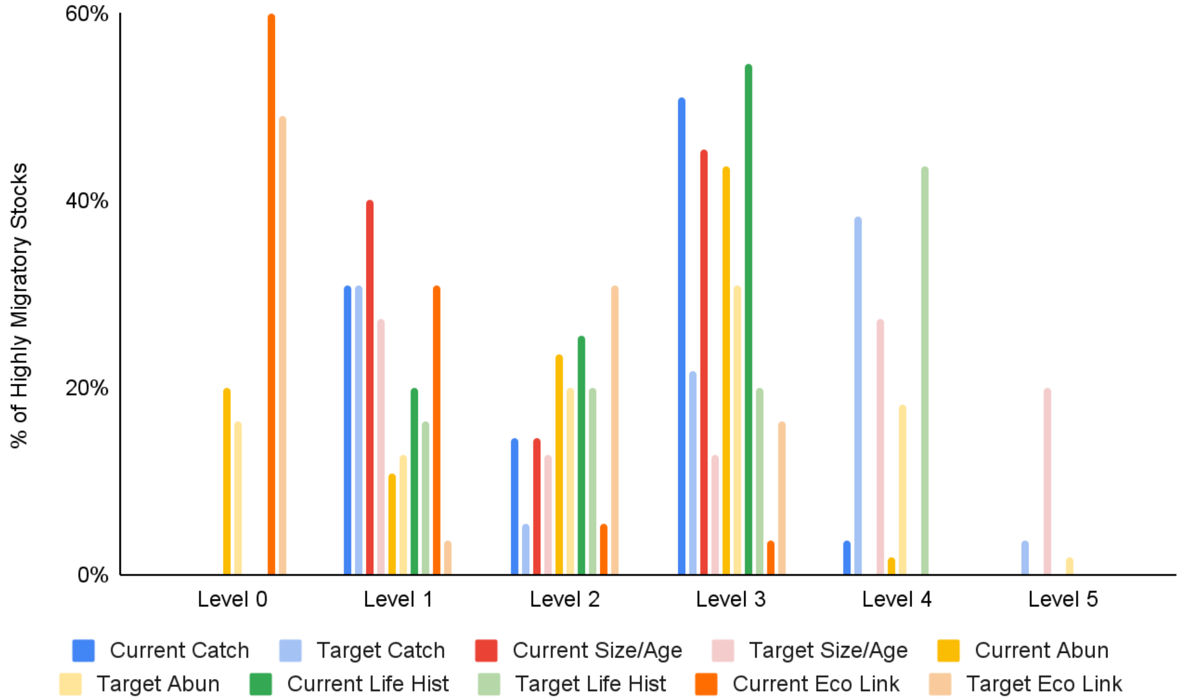

Figure 18. Percentage of Highly Migratory Species stocks (out of a total of 55 stocks analyzed) with current and target input levels identified within each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).

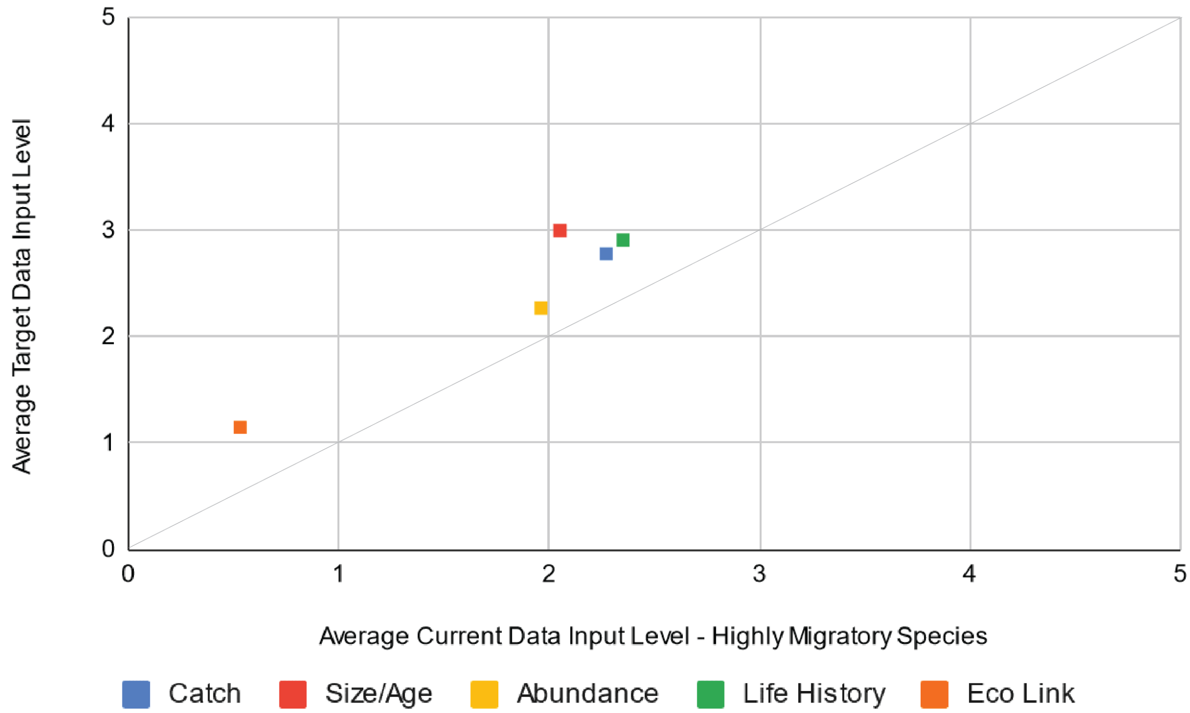

Figure 19. Target data input level vs. current data input level, for each of the five data input attributes, averaged across the 55 total managed Highly Migratory Species stocks analyzed for the Southeast region. The distance between the diagonal line and the points represents the average size of the gap between current and target data inputs.

As noted above, HMS stocks have a generally better data situation relative to other Southeast region stocks. At least 45% of HMS stocks have no gap in inputs for each data attribute (Figure 20); these levels are higher than those seen for the South Atlantic, Gulf of Mexico, or Caribbean. However, gaps persist for HMS stocks. Most of these gaps are one level only, but exist across all data input attributes.

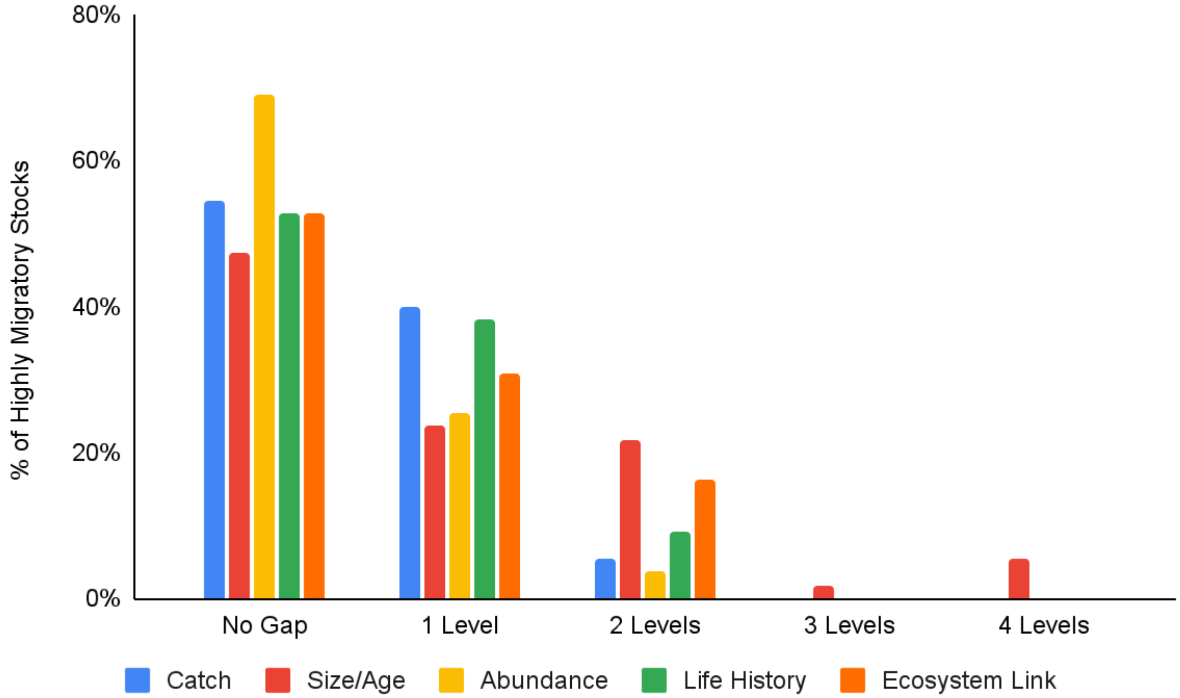

Figure 20. Percentage of Highly Migratory Species stocks (out of a total of 55 stocks analyzed) with gaps at each possible gap size, from no gap to a gap of four levels, for each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). No HMS stocks had a complete gap (i.e., five levels) for any of the data input attributes.

Alaska

As noted in the “Setting Assessment Targets” section, classifications and targets were set for Alaska region stocks during an initial pilot study (Shotwell and Blackhart, 2023). This pilot study included groundfish and crab stocks; additional Alaska regional stocks were analyzed later during the national exercise. The 69 Alaska regional stocks were analyzed both as individual stocks and management complexes.

Currently available data and target data input levels are distributed across levels and skewed towards higher levels (Figure 21). With the exception of ecosystem linkage data, no more than 6% of Alaska stocks are completely missing data (i.e., Level 0) in the other input attributes. Catch data is most available (Figure 22), with 46% of stocks currently at Level 5. Although 30% of Alaska stocks have no ecosystem linkage data, 50% have Level 2 inputs.

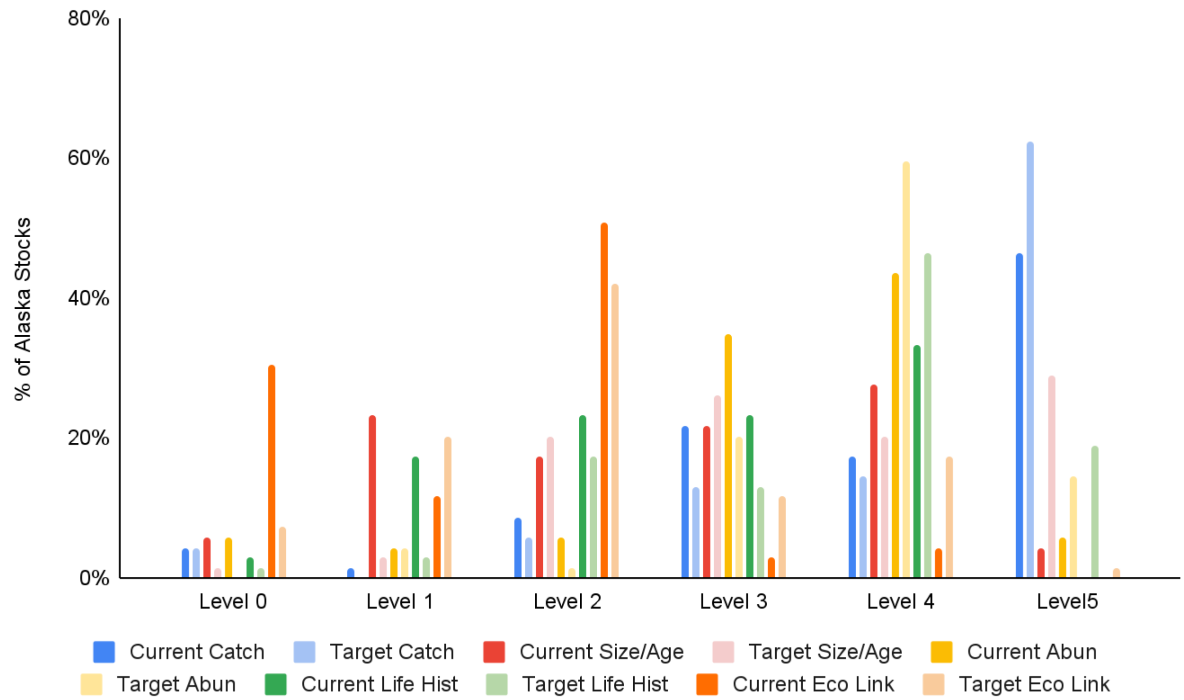

Figure 21. Percentage of stocks (out of an Alaska regional total of 69 managed stocks analyzed) with current and target input levels identified within each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).

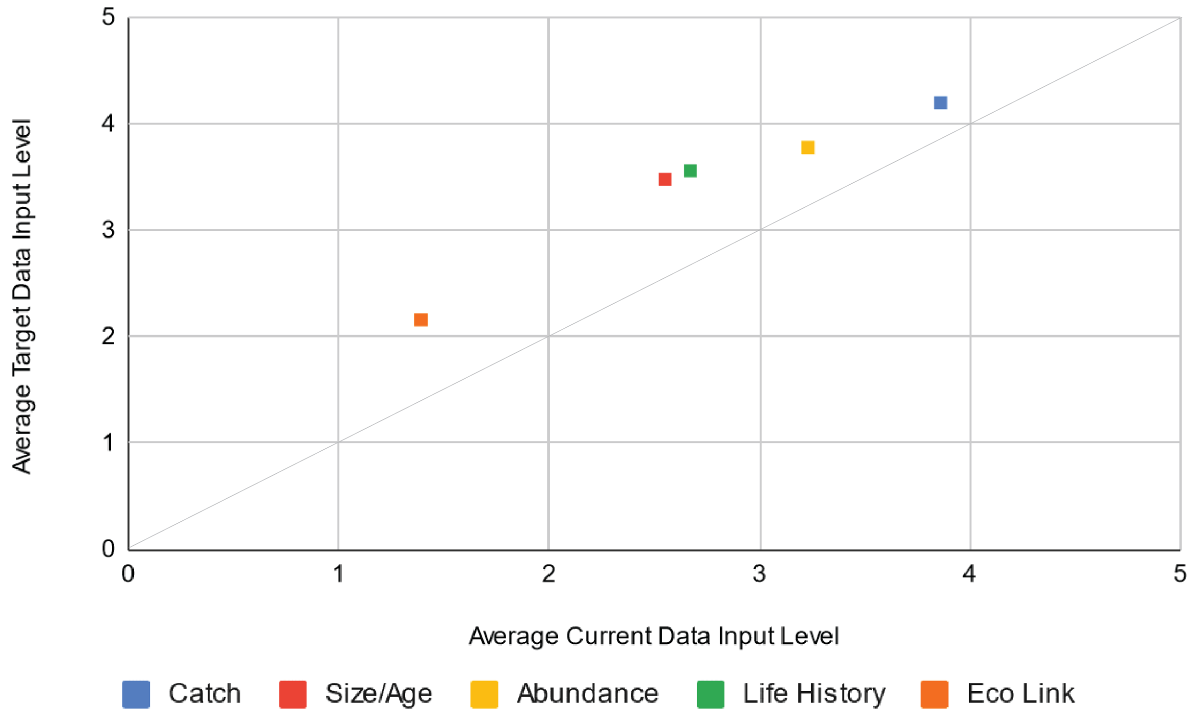

Figure 22. Target data input level vs. current data input level, for each of the five data input attributes, averaged across the 69 total managed stocks analyzed for the Alaska region. The distance between the diagonal line and the points represents the average size of the gap between current and target data inputs.

Ten percent of Alaska stocks are currently meeting targets for all five data input attributes. The remaining 90% of stocks have a gap in at least one data attribute (Figure 23, left panel). Catch data has the fewest gaps with 74% of stocks meeting catch data input targets (Figure 23, right panel). However, a large number of stocks are meeting targets for the other attributes as well: abundance (56%), ecosystem linkage (48%), size/age composition (41%), and life history (36%). For the remaining stocks, many of the gaps that do exist are one level. Only a small percentage of stocks have gaps of two or more levels (Figure 23, right panel).

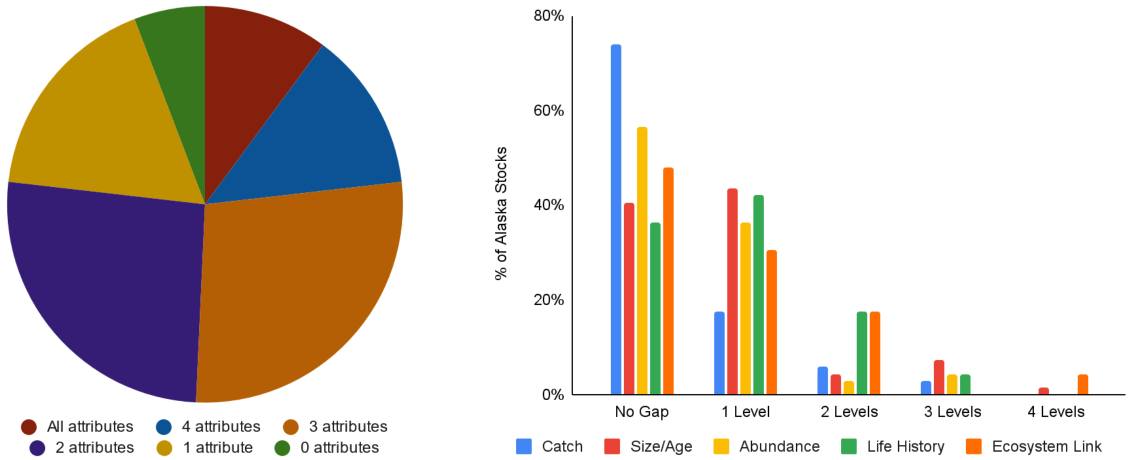

Figure 23. (a) Left panel: Percentage of stocks (out of an Alaska regional total of 69 managed stocks analyzed) currently meeting target input levels across the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). (b) Right panel: Percentage of stocks with gaps at each possible gap size, from no gap to a gap of four levels, for each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). Note that in the Alaska region, no stocks had a complete gap (i.e., five levels) for any of the data input attributes.

West Coast

Both the Northwest and Southwest Fisheries Science Centers on the West Coast conduct stock assessments and other science in support of the Pacific Fishery Management Council. For both groundfish and salmon stocks, scientists at both the Northwest and Southwest Centers lead and contribute to assessments. For this analysis, results for the 164 stocks analyzed by both these Centers were combined.[8] However, summaries were sorted by management groups (i.e., groundfish, salmon, and other stocks) because of the significant differences in assessment process, assessment and data resources, and management of these stocks. "Other stocks" includes Coastal Pelagic Species and Highly Migratory Species; although these species groupings are quite different from each other, their numbers were too small to present individually so they have been grouped together for summarization purposes. Please see "Appendix 3: Stock-Specific Assessment Classification and Targets" for species-specific details.

Looking across all West Coast stocks, a higher percentage of groundfish stocks (56%) are meeting assessment data targets relative to salmon (1%) or other stocks (none; Figure 24). Gaps exist across all three groupings and will be explored in further detail in the following sections.

[8] See Appendix 3: Stock-Specific Assessment Classification and Targets for stock-specific information, which can be used to sort by individual Fisheries Science Center.

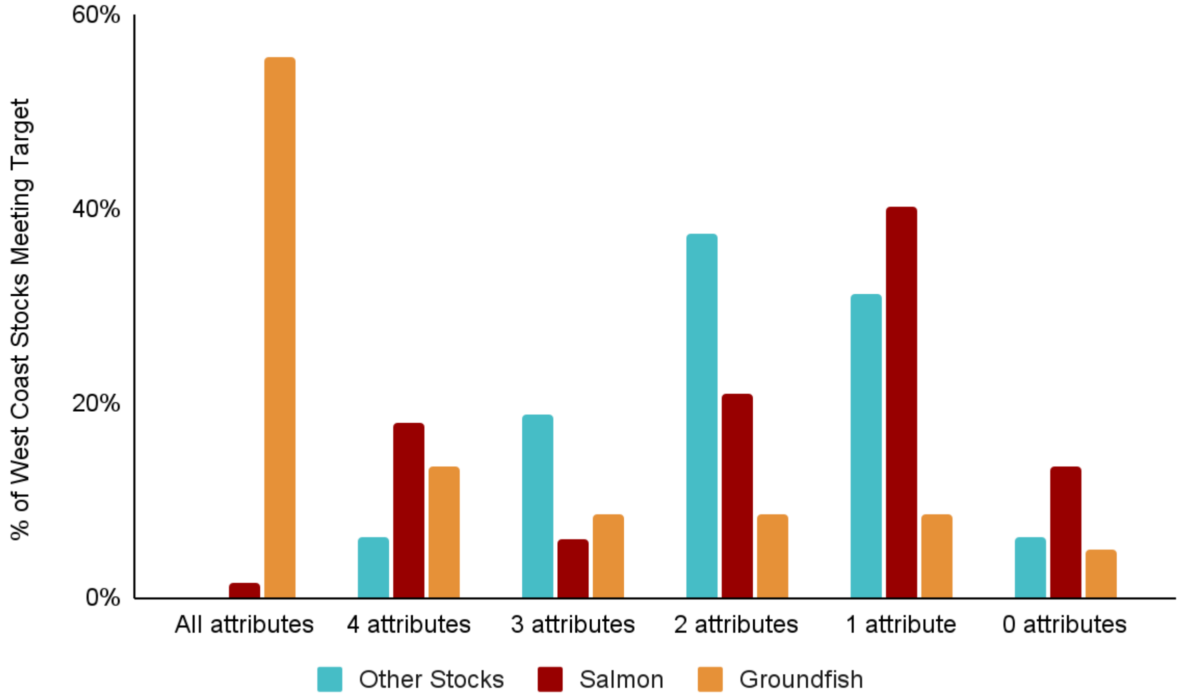

Figure 24. Percentage of West Coast stocks currently meeting target input levels across the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage), by Fishery Management Plan under the Pacific Fishery Management Council on the U.S. West Coast. Other Stocks = Coastal Pelagic Species and U.S. West Coast Fisheries for Highly Migratory Species FMPs (n=16 stocks); Salmon = Pacific Coast Salmon FMP (n=67 stocks); Groundfish = Pacific Coast Groundfish FMP (n=81 stocks).

Groundfish

Groundfish stocks include 81 stocks managed under the Pacific Coast Groundfish Fishery Management Plan. All management complexes under the groundfish FMP were broken out into individual species components for the purposes of the exercise. Many groundfish stocks have moderate (i.e., Level 2 or 3) levels of data available across the data input attributes to support stock assessments. However, a moderate percentage of stocks have Level 0 data (i.e., no data) available currently across multiple input attributes (ecosystem linkage, abundance, and size/age composition; Figure 25). The pattern of target levels mirrors current data availability closely at lower levels, but deviates at higher levels.

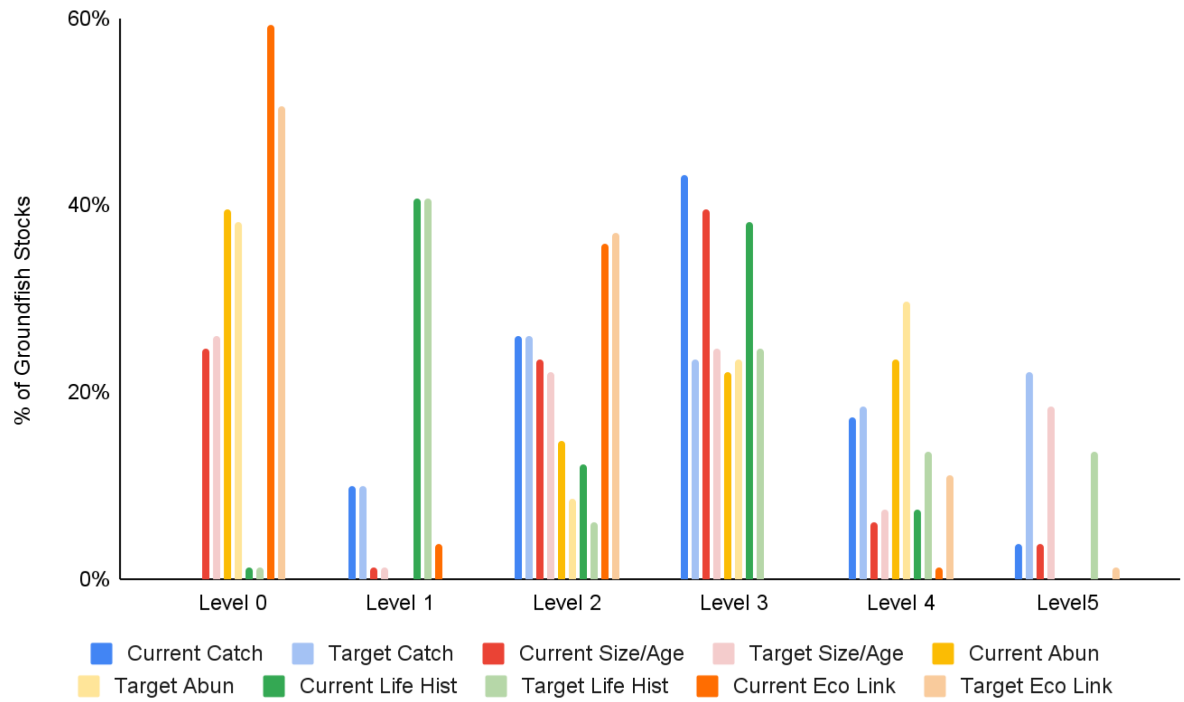

Figure 25. *Percentage of stocks (out of a total of 81 stocks analyzed under management of the Pacific Coast Groundfish Fisheries Management Plan) with current and target input levels identified within each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).*

As mentioned above, groundfish stocks broadly stand out for meeting assessment targets, both amongst other West Coast stocks and nationally (Figure 26). Fifty-six percent of groundfish stocks are currently meeting assessment data input targets across all five attributes (Figure 24). Looking at assessment input attributes individually, 70% of stocks are meeting targets for catch and even greater percentages of stocks are meeting targets for the other four attributes (Figure 27). The remaining gaps are moderate (one or two levels) and present across all five data input attributes. Similar to Highly Migratory Stocks in the Southeast, this may be a situation where stock assessment experts did not see the opportunity for achievable improvements to current data input levels.

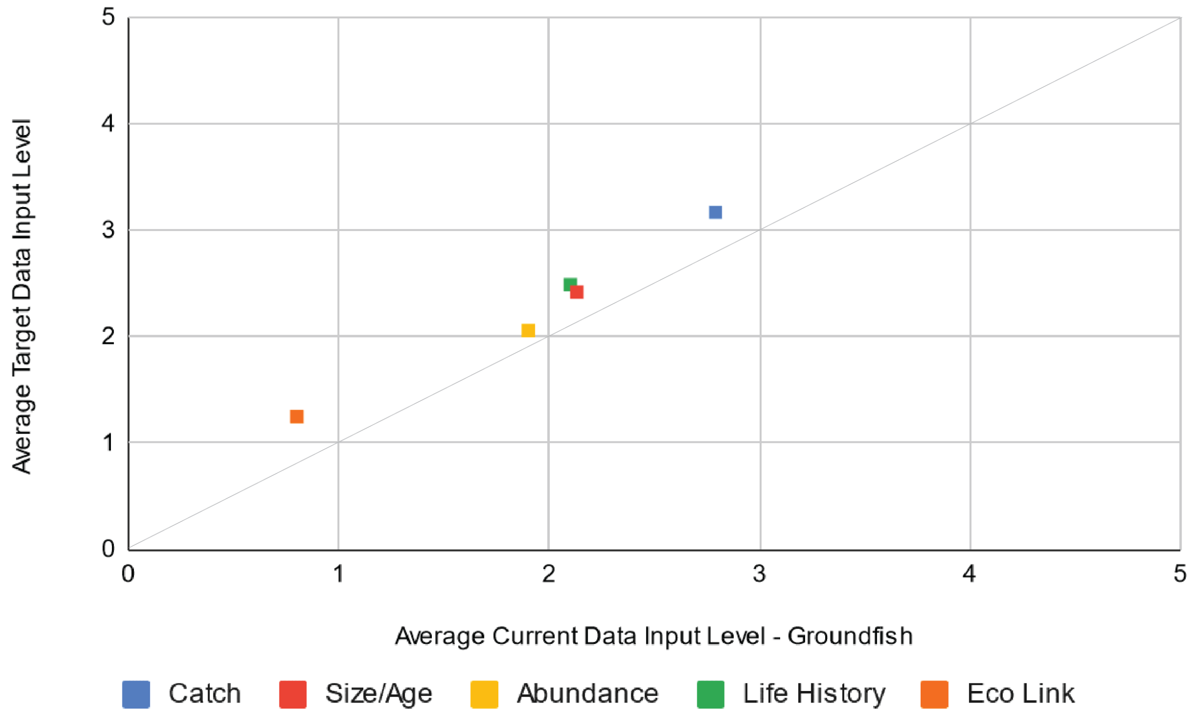

Figure 26. Target data input level vs. current data input level, for each of the five data input attributes, averaged across the 81 stocks analyzed under management of the Pacific Coast Groundfish Fisheries Management Plan. The distance between the diagonal line and the points represents the average size of the gap between current and target data inputs.

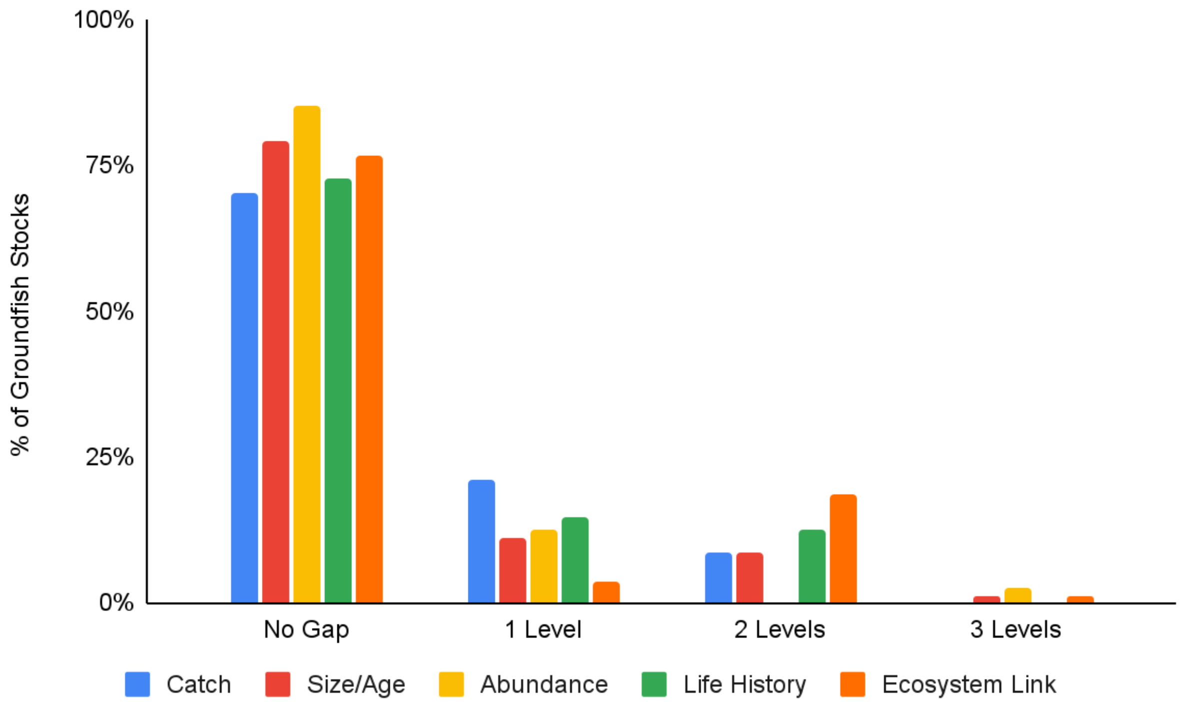

Figure 27. Percentage of stocks (out of a total of 81 stocks analyzed under management of the Pacific Coast Groundfish Fisheries Management Plan) with gaps at each possible gap size, from no gap to a gap of three levels, for each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). No groundfish stocks had a gap of four or five levels for any of the data input attributes.

Salmon

Salmon stocks include all 67 individual stocks managed under the Pacific Coast Salmon Fishery Management Plan. It should be noted that science, assessment, and management processes for anadromous salmon stocks have some unique characteristics relative to those generally used for many marine stocks, and including these stocks in a general framework can sometimes present challenges. However, inclusion of these stocks in these types of national analyses is important to review data availability and needs across all stocks managed by NOAA Fisheries.

Salmon stocks generally have good data availability, with many stocks currently having data inputs at Level 3 or 4 across input attributes (Figure 28). Ecosystem linkage data stands out as an exception to this pattern; 75% of stocks have no data currently available to support ecosystem linkages within their assessments. Although data is not available to support ecosystem linkages for a majority of salmon assessments, many salmon forecasts do use a form of environmental indicator to predict returns (either sibling regression or recent average marine survival). Assessment data targets for salmon stocks follow a similar pattern, although skewed even further to the right (Figure 29). Many targets for salmon stocks are in the Level 4 to 5 range, across input attributes.

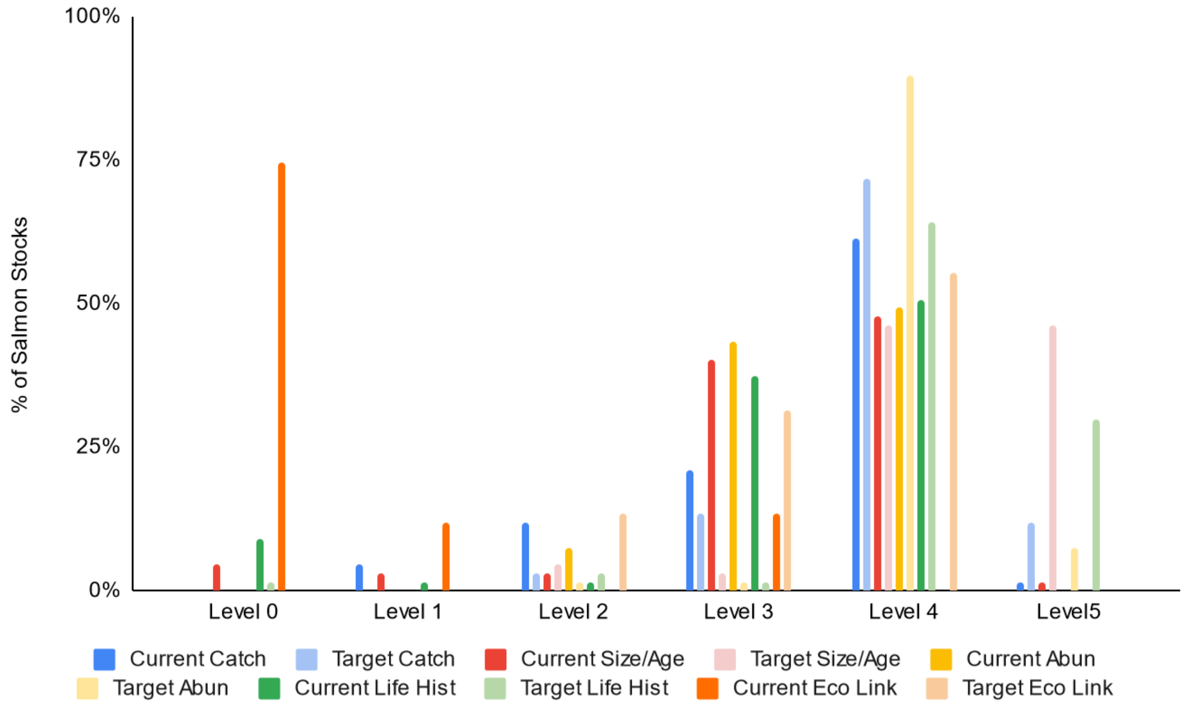

Figure 28. *Percentage of stocks (out of a total of 67 stocks analyzed under management of the Pacific Coast Salmon Fisheries Management Plan) with current and target input levels identified within each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).*

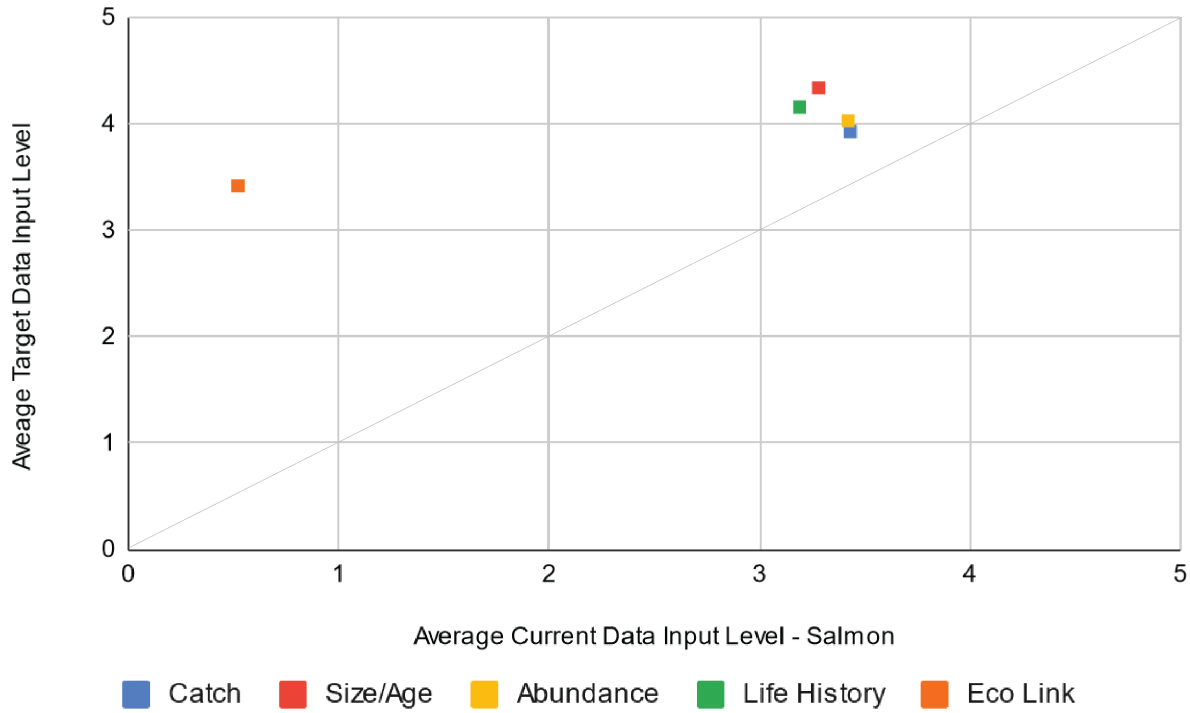

Figure 29. Target data input level vs. current data input level, for each of the five data input attributes, averaged across the 67 stocks analyzed under management of the Pacific Coast Salmon Fisheries Management Plan. The distance between the diagonal line and the points represents the average size of the gap between current and target data inputs.

Nearly 69% of salmon stocks are meeting targets for catch input data (Figure 30). Fewer stocks are meeting targets for the other data input attributes. Nearly half of salmon stocks have a gap of one level for size/age composition, life history, and abundance. However, ecosystem linkage data stands out for salmon stocks as a significant gap (Figure 29). Seventy-two percent of stocks have a gap of three or four levels in this data input attribute (Figure 30).

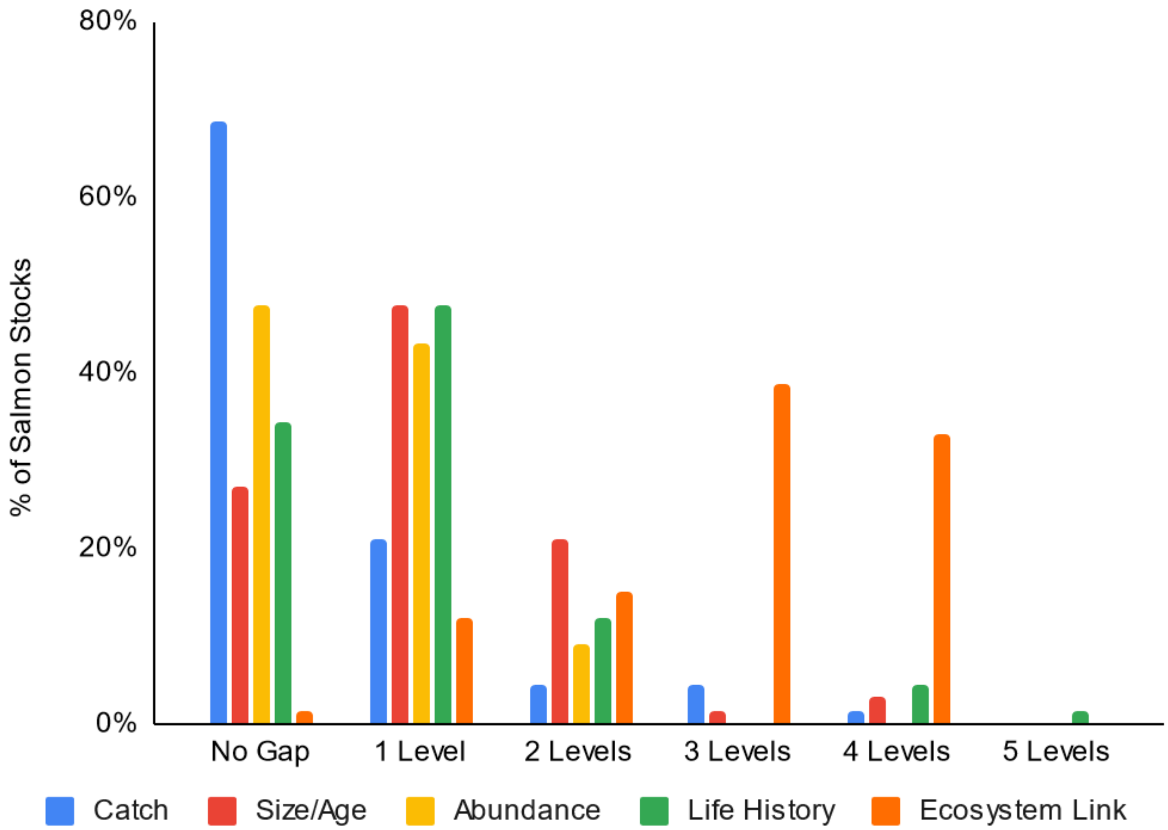

Figure 30. Percentage of stocks (out of a total of 67 stocks analyzed under management of the Pacific Coast Salmon Fisheries Management Plan) with gaps at each possible gap size, from no gap to a gap of five levels, for each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).

Other Stocks (Coastal Pelagic and Highly Migratory Species)

Other stocks include seven stocks managed under the Coastal Pelagic Species Fishery Management Plan and nine stocks jointly managed under the U.S. West Coast Fisheries for Highly Migratory Species / Pacific Pelagic Fisheries of the Western Pacific Region Ecosystem FMPs. Although this number of stocks (n=16) is relatively small for making summary statements based on averages, these stocks were deemed different enough from the groundfish and salmon stocks – based on assessment process, resources, and management – to consider separately.

This grouping of stocks shows variable patterns of current data availability (Figure 31, Figure 32). A majority of stocks (62%) have Level 4 catch data available, Level 3 life history data (56%) and size/age composition (44%), and Level 2 abundance data (50%). Ecosystem linkage data is nearly evenly split between Level 0 (no data available; 44%) and Level 2 (50%). Patterns of stock assessment targets are similarly variable (Figure 31, Figure 32). A majority of stocks require Level 4 inputs for both catch and size/age composition (81% for both), while targets for life history and abundance are split between Levels 2-5. Ecosystem linkage targets are split for these stocks between Levels 3 (69%) and 4 (31%; Figure 31).

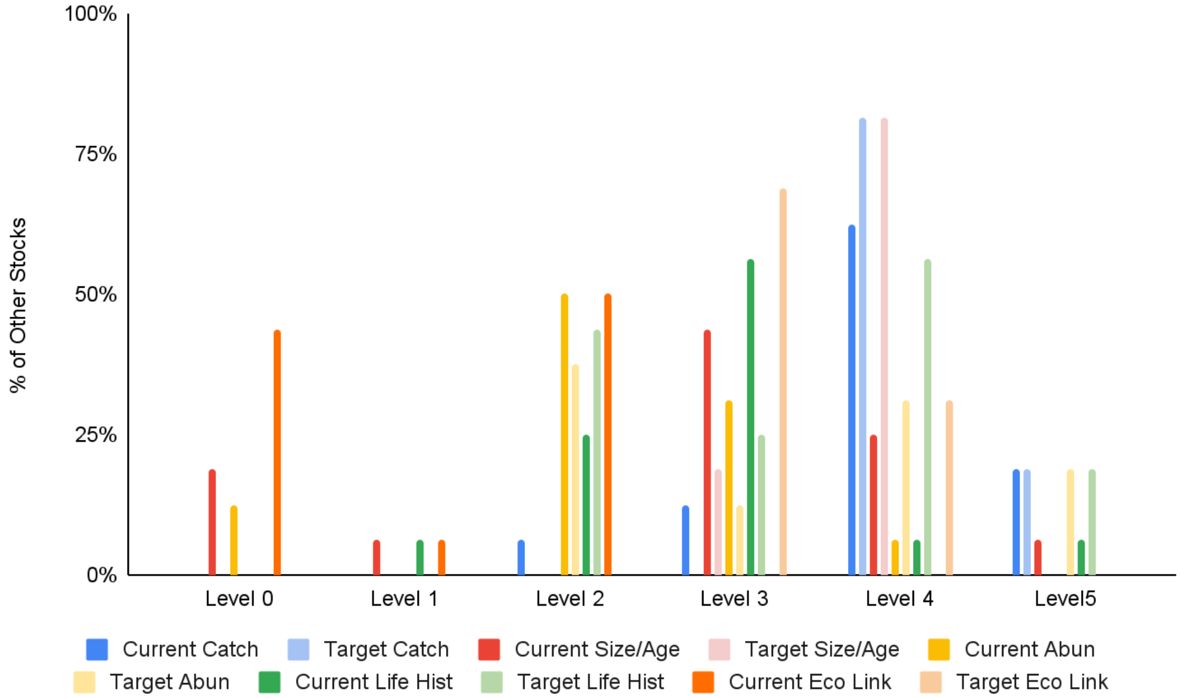

Figure 31. Percentage of stocks (out of a total of 16 stocks analyzed under management of the Coastal Pelagic Fisheries and U.S. West Coast Fisheries for Highly Migratory Species Fisheries Management Plans) with current and target input levels identified within each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).

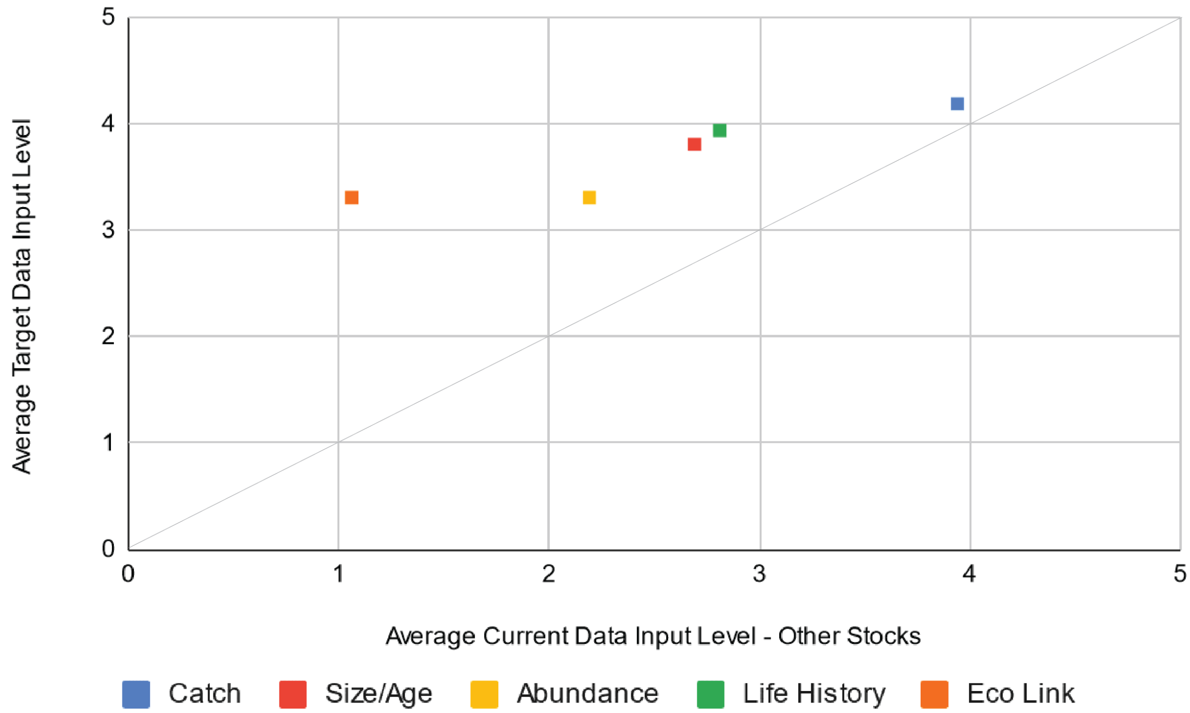

Figure 32. Target data input level vs. current data input level, for each of the five data input attributes, averaged across the 16 stocks analyzed under management of the Coastal Pelagic Fisheries and U.S. West Coast Fisheries for Highly Migratory Species Fisheries Management Plans. The distance between the diagonal line and the points represents the average size of the gap between current and target data inputs.

Eighty-one percent of the other stocks group have adequate catch data and half are meeting targets for abundance (Figure 33). A smaller percentage of other stocks are meeting targets for size/age composition and life history, and none are meeting targets for ecosystem linkage data. A majority of gaps that exist for other stocks are one level only across all input attributes, although gaps for abundance are more evenly distributed among sizes (up to four levels). Although no stocks are meeting targets for ecosystem linkage data, 44% of other stocks have a gap for this attribute of only one level (Figure 33).

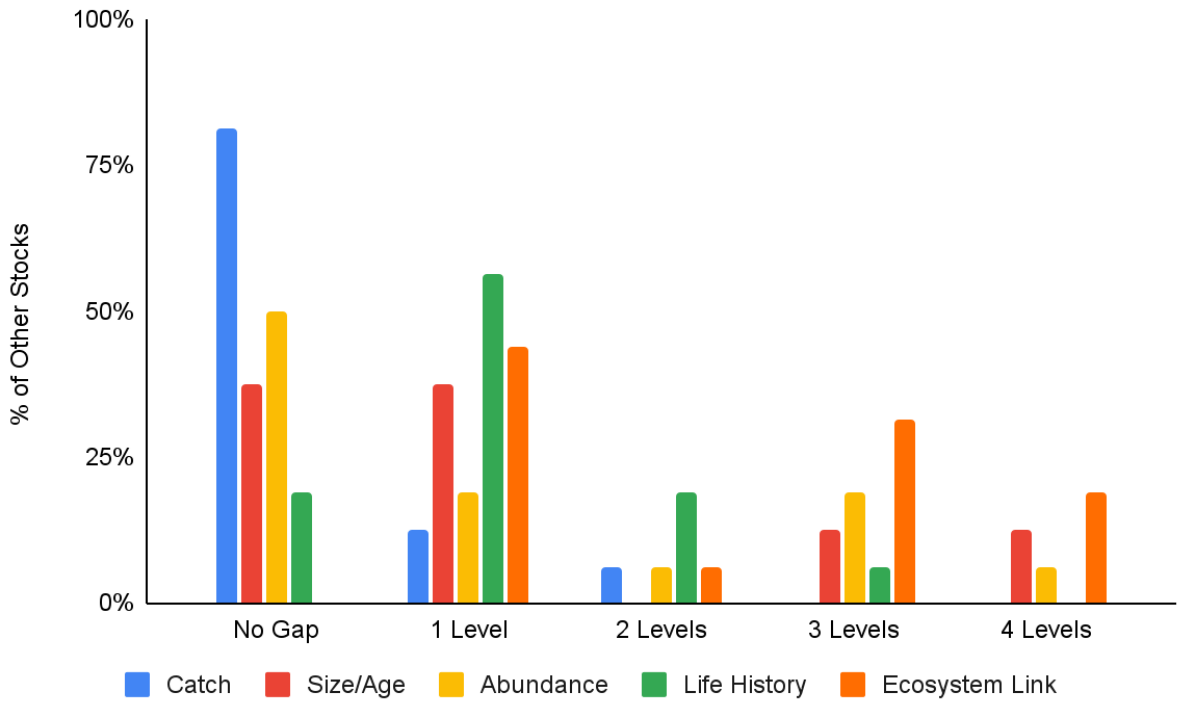

Figure 33. Percentage of stocks (out of a total of 16 stocks analyzed under management of the Coastal Pelagic Fisheries and U.S. West Coast Fisheries for Highly Migratory Species Fisheries Management Plans) with gaps at each possible gap size, from no gap to a gap of four levels, for each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). No Coastal Pelagic or Highly Migratory stocks had a complete gap (i.e., five levels) for any of the data input attributes.

Pacific Islands

The Pacific Islands region includes managed areas of American Samoa, the Hawaiian Archipelago (Main Hawaiian Islands and Northwestern Hawaiian Islands), the Mariana Archipelago (Guam and Northern Mariana Islands), and Pacific Remote Island Areas, as well as Pacific Highly Migratory Species. Forty-nine stocks were analyzed, including a mix of individual stocks and management complexes.

Similar to the Caribbean, stocks in the Pacific Islands region stand out for being more data-poor. The distribution of current data classifications for the Pacific Islands region stocks is left-skewed, with many stocks classified at lower levels of data (Figure 34, Figure 35). In fact, a majority of stocks have no data available for four of the five data input attributes: size/age composition (57%), ecosystem linkage (51%), catch (43%), and abundance (43%). Life history is the most available type of data for Pacific Island stocks, but only available at Level 1 for about half of stocks. Targets for stocks are more variable based on data input attribute (Figure 34). For instance, about half of stocks have a catch target of Level 5. Targets for abundance, life history, and ecosystem linkage are more distributed and centered on Level 2. Size/age composition targets are left-skewed, with 41% of Pacific Islands stocks requiring no composition data (Figure 35).

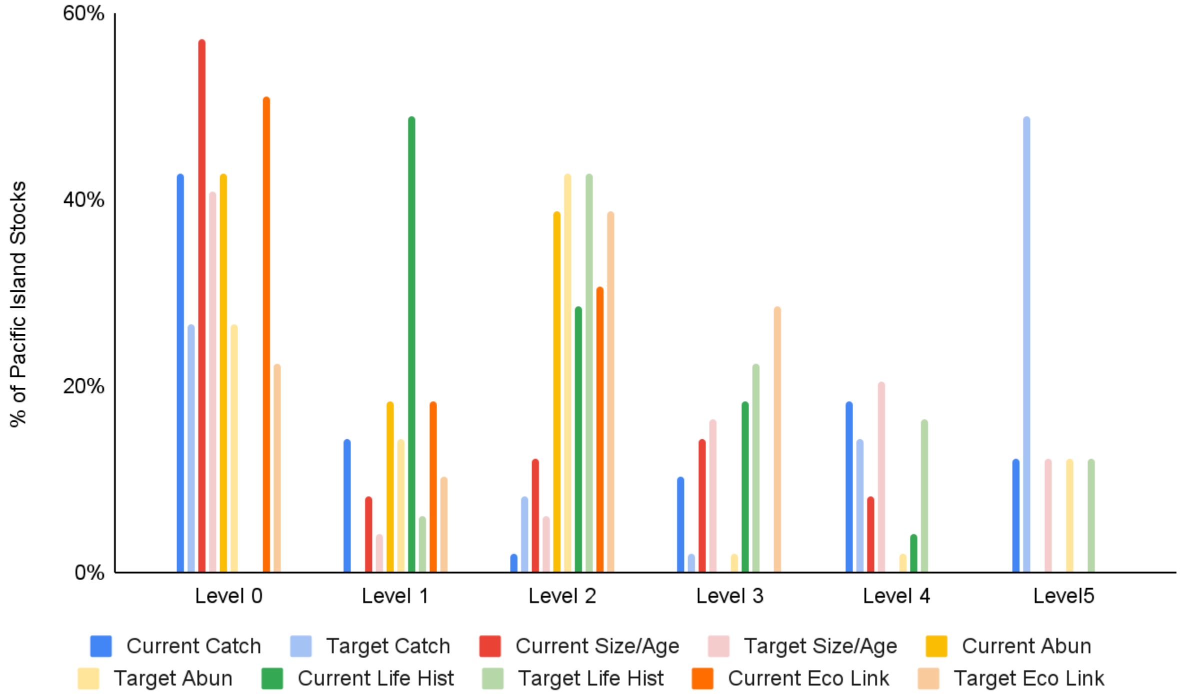

Figure 34. Percentage of stocks (out of a Pacific Islands regional total of 49 managed stocks analyzed) with current and target input levels identified within each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).

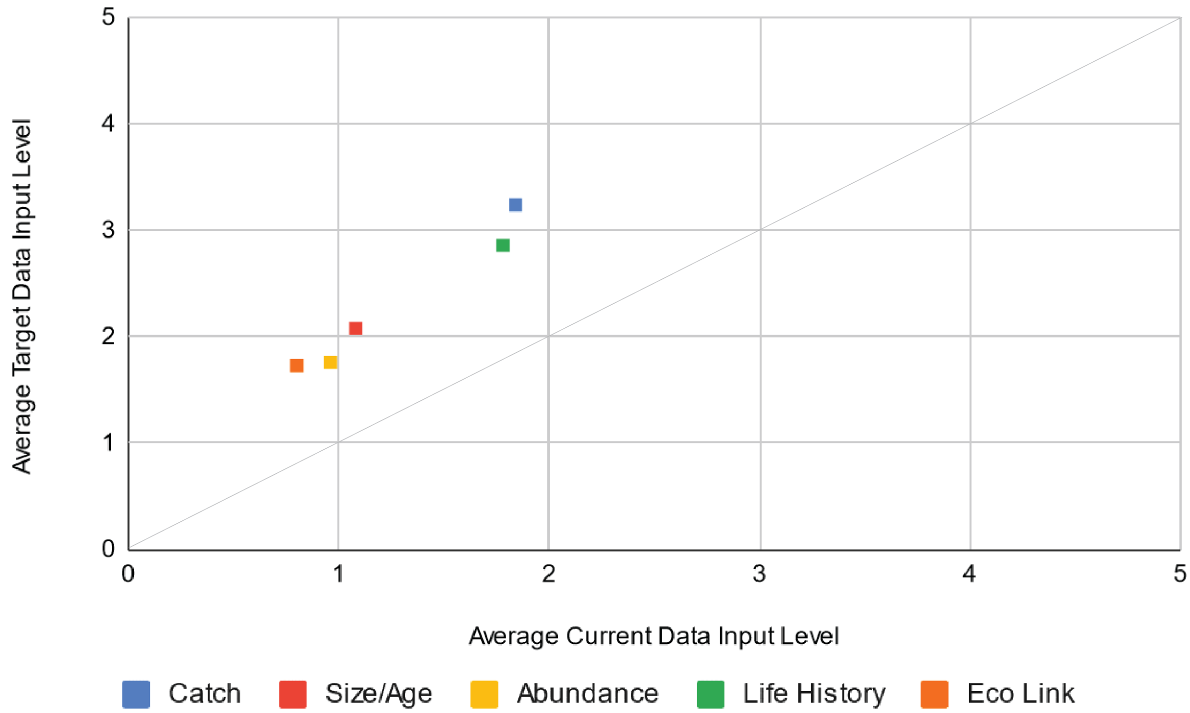

Figure 35. Target data input level vs. current data input level, for each of the five data input attributes, averaged across the 49 total managed stocks analyzed for the Pacific Islands region. The distance between the diagonal line and the points represents the average size of the gap between current and target data inputs.

A single stock (Kaena Point Bed Precious Coral Complex) is currently meeting all stock assessment targets (Figure 36, left panel). All of the remaining 48 Pacific Islands region stocks have some level of gap for stock assessment; stocks are fairly evenly distributed based on the number of attributes they have gaps in (one to all five). As noted above, many stocks do not require size/age composition data, contributing to nearly 60% of stocks meeting targets for this data attribute (Figure 36, right panel). For the remaining stocks, the size of the gap for this input attribute is distributed from one to five levels. Catch data follows a similar pattern, although only 41% of stocks are currently meeting targets; the remainder of stocks have gaps ranging from one to five levels. A majority of stocks have a gap of one level for life history data, and ecosystem link data is split between meeting targets and having gaps of one or two levels.

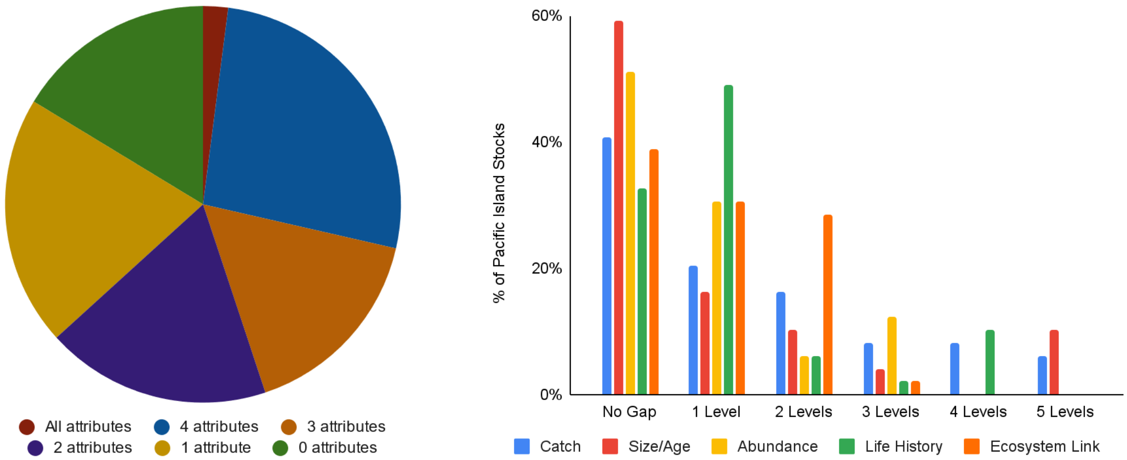

Figure 36. *(a) Left panel: Percentage of stocks (out of a Pacific Islands regional total of 49 managed stocks analyzed) currently meeting target input levels across the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage). (b) Right panel: Percentage of stocks with gaps at each possible gap size, from no gap to a gap of four levels, for each of the five data attributes (catch, size/age composition, abundance, life history, and ecosystem linkage).*

Interpretation and Application

A comprehensive analysis of data gaps across the national stock assessment enterprise supports multiple uses. Collectively, this information will help NOAA Fisheries identify approaches to maximize use of assessment resources by strategically prioritizing limited capacity and guiding future investments. Such a quantitative approach provides NOAA Fisheries with a strong evidence-based justification for continued support of the stock assessment enterprise.

Using the methods described, this classification and gap analysis provides a national framework and consistent planning tool for analyzing requirements to support the data and modeling capacity for stock assessments. Results are available on a stock-by-stock and data category by data category basis, but may also be summarized at a variety of other levels (e.g., region, Council, etc.) for broader evaluation and to facilitate planning. This information empowers NOAA Fisheries to better balance stock-specific needs and the use of assessment resources.

Although NOAA Fisheries produces around 180 world-class stock assessments each year, the results of this analysis provide quantitative evidence of the gap in data collection requirements for the assessment enterprise. This gap includes both needs for data-limited stocks to produce more complete assessments, as well as improving understanding and predictive capabilities under changing ecosystem conditions. Although the size of average data gaps varies between individual data input categories and regions, overall the average gap size is ~1, indicating an immediately available opportunity to make feasible, incremental improvements in our data collection programs to benefit the stock assessment enterprise and the science products it provides to our management partners. Particularly notable is the fact that the lowest currently available data inputs and the largest overall gaps across regions are associated with the ecosystem linkage attribute. As NOAA Fisheries continues to push towards ecosystem-based fisheries management, meeting demands of both stakeholders and resource management requirements under changing ecosystems, adequate data inputs must be available to support this progress.

Evaluation of tradeoffs will help NOAA Fisheries to prioritize specific gaps. Although ecosystem linkage input data has the largest gap overall, many gaps remain for data inputs fundamental to stock assessment (i.e., abundance, catch, life history). These gaps represent ongoing current challenges for NOAA Fisheries to provide our management partners with adequate catch advice.

An important consideration for managers and leadership to consider when reviewing these results is that they apply specifically to gaps in data inputs for fish assessments. Addressing these gaps is essential for the national stock assessment enterprise, but doing only that will not ensure that more assessments are completed. Indeed, assessment capacity issues (e.g., staffing, etc.) must be concurrently addressed to ensure thorough and timely assessments with increased throughput.

As noted above, the results of this analysis provide evidence to justify continued investments in the stock assessment enterprise. Results could be combined with information from other planning activities (i.e., regional stock assessment prioritization) to further prioritize gaps for strategic planning purposes. Additional analysis at the regional and national levels is needed to provide details on how to best address the gaps identified in this analysis, evaluate tradeoffs between identified data gaps, and strategize approaches for utilizing investments to address multiple gaps simultaneously. Thus, the results of this analysis can provide immediate contextual information for funding and prioritization decisions within the agency, and also provide a blueprint for more detailed analyses. These applications may be particularly useful to other planning processes within NOAA Fisheries, in particular related to the data collection and survey enterprise, as well as for prioritizing partnerships and collaborative research to better meet NOAA Fisheries' needs related to its stock assessment enterprise.

Moving forward, targets from this exercise will be used to develop a revised performance measure for NOAA Fisheries' national stock assessment enterprise. These results enable more granular tracking than has previously been possible, and will provide a better way to track incremental progress by the agency towards meeting its targets for fish stock assessments. This shift in monitoring performance provides an enhanced approach for evaluating capacity and communicating progress to constituents.

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Appendix 1: NOAA Fisheries' Stock Assessment Classification System

Attribute	Level	Description
Catch	0	No quantitative catch data.
	1	Some catch data, but major gaps for some fishery sectors or historical periods such that their use in assessments is not supported.
	2	Enough catch data establish magnitude of catch and trends in catch for a major fishery sector in order to apply a data-limited assessment method. This includes fisheries that are closed and it is known that negligible catch is occurring.
	3	Catch data is generally available for all fishery sectors to support quantitative stock assessment, but some gaps exist such as low observer coverage, high levels of self-reported catch, weak information on discard mortality.
	4	No data gaps substantially impede assessment, but catch is not without uncertainty (e.g., recreational catches estimated from surveys).
	5	Very complete knowledge of total catch.
Size/Age Composition	0	No composition data collected.
	1	Some size or age composition data has been collected, but major gaps in coverage, and not used in stock assessment.
	2	Enough size or age composition data has been collected to enable data-limited assessment approaches.
	3	Enough size or age composition data is collected over a sufficient time series to be informative in age/size structured assessment models.
	4	Enough age composition data has been collected over a sufficient time series to enable assessment methods that need age composition data from the fishery.
	5	Very complete age and size composition data, including, as needed on a stock-specific basis, knowledge of aging precision, spatial patterns or other issues.
Abundance	0	No indicator of stock abundance or trend in stock abundance over time.
	1	Fishery-dependent catch rates (CPUE) are available, but high uncertainty about their standardization over time; or expert opinion on degree of stock depletion over time.
	2	Fishery-dependent catch rates (CPUE) are sufficiently standardized to enable their use in full assessments; data from fishery-independent sources are not available or sufficient to estimate abundance trends.
	3	Limited fishery-independent survey(s) provide estimates of relative abundance; however, the temporal or spatial coverage of the stock is limited or the sampling variability is high.
	4	Complete fishery-independent survey(s) provide estimates of relative abundance, and the survey(s) cover a large proportion of the spatial extent of the stock with several years of tracking at a level of precision that supports assessments.
	5	Calibrated fishery-independent survey(s) or tag-recapture provide estimates of absolute abundance.

Attribute	**Level**	**Description**
Life History	0	No life history data.
	1	Estimates of most life history factors are not based on empirical data; instead derived using proxies, meta-analyses, borrowed from other species, or without scientific basis.
	2	Estimates of some life history factors are based on stock-specific empirical data, but at least one derived using life history proxies, meta-analyses, borrowed from other species, or without scientific basis. Generally supports data-poor assessments that use life history information.
	3	Estimates of most life history factors based on stock-specific empirical data.
	4	Data are sufficient to track changes over time in at least growth.
	5	No major gaps in life history knowledge, including detailed stock structure, spatial and temporal patterns in natural mortality, growth, and reproductive biology.
Ecosystem Linkage	0	No linkage to ecosystem dynamic or consideration of ecosystem properties (environment, climate, habitat, predator-prey, etc.) in configuring the assessment (i.e., equilibrium conditions assumed for ecosystem).
	1	Ecosystem-based hypotheses inform the assessment model structure (e.g., defining the stock boundaries and/or spatial or temporal features) and/or are used for processing assessment inputs (e.g., abundance index), but no explicit linkage to any ecosystem drivers (environment, climate, habitat, predator-prey, etc.).
	2	The assessment includes some form of variability or effect to explicitly account for unidentified ecosystem dynamic(s) (e.g., time/space "regimes", random variation, or other approaches to changing features without direct inclusion of ecosystem data).
	3	One or more assessment features is linked to a dynamic (i.e., data) from at least one of the following categories: environment, climate, habitat, predator-prey data (e.g., covariate).
	4	The assessment model is linked to at least one ecosystem dynamic; and one or more process studies directly support the manner in which environmental, climate, habitat, and/or predator-prey dynamics are incorporated (e.g., consumption rates measured and covariate informed by results).
	5	The assessment approach is configured to be coupled or linked with an ecosystem process (e.g., multispecies, coupled biophysical, climate-linked models).

Appendix 2: Calculations for Baseline Target Assessment Levels

This information is summarized from Lynch et al., 2018 and describes how baseline target levels are developed for each of the five data input attributes. Although the stock assessment classification system (Appendix 1: NOAA Fisheries' Stock Assessment Classification System) includes six levels for each data input attribute, not all levels are considered to be appropriate baseline targets and are omitted from the NGSA target definitions/calculations described below.

Target Catch Level

This attribute categorizes the need for data describing fishing removals on the stock and the completeness of information required to support appropriate modeling methods. For instance, assessments using traditional statistical methods often assume high or complete certainty in the understanding of fishery removals. However, more limited catch monitoring may be sufficient for stocks that are subject to little or no fishing. Baseline targets are based on catch levels and assigned as:

Target	**Assigned to:**
Level 0	Stocks not caught as target or bycatch in any fishery
Level 2	Stocks subject to very minimal catch so that fishing-induced mortality most likely does not have measurable effects on stock dynamics
Level 5	All other stocks

Target Size/Age Composition Level

This attribute categorizes the need for data describing the size and/or age structure of the stock. While assessments that include composition data produce more complete descriptions of the effects of fishing on stock populations, the collection and processing of size/age data requires significant resources and may not be worth the effort for lower value stocks. Regional experts may also want to consider age data that has been collected but not yet validated; although such data does not yet allow for an age-structured assessment for the stock, it may be an important consideration when assigning targets. Baseline targets for size/age composition utilize several factors from Stock Assessment Prioritization (i.e., Stock Variability, the six Fishery Importance Factor scores, and Ecosystem Importance) and are assigned by first calculating each stock's Size/Age Importance (values range between -3 and 3):

1. Initial Stock Size/Age Importance = 0
2. Adjust for Stock Variability (recruitment CV < 0.3, add 1; recruitment CV > 0.9, subtract 1)
3. Adjust for Fishery Importance (weighted sum of Commercial, Recreational, Subsistence, Rebuilding Status, Constituent Demand, and Non Catch Value; stock in bottom third of regional stocks for Fishery Importance, add 1; stock in top third of regional stocks, subtract 1)

4. Adjust for Ecosystem Importance (stock in bottom third of regional stocks for Ecosystem Importance, add 1; stock in top third of regional stocks, subtract 1)

Using the calculated size/age importance, baseline targets are assigned as:

Target	**Assigned to:**
Level 0	Stocks that are not a priority for assessment
Level 2	Stocks with Size/Age Importance > 1
Level 4	Stocks with Size/Age Importance from -1 to 1
Level 5	Stocks with Size/Age Importance < -1

Target Abundance Level

This attribute categorizes the need for indices describing estimates of stock abundance or biomass. Such abundance trends are useful indicators of stock dynamics for baseline monitoring for unassessed stocks, and provide measures of changes over time in assessments. However, the source and quality of abundance information is critical to the quality of management advice, as fishery catch rates alone or survey data with high uncertainty can lead to biased conclusions about abundance and stock dynamics. Baseline abundance target levels incorporate information of catch levels, from Stock Assessment Prioritization (i.e., Ecosystem Importance and the six Fishery Importance factors), and current Catch Level Classifications, and are assigned as:

Target	**Assigned to:**
Level 0	Stocks not caught as target or bycatch in any fishery and in the bottom third of regional stocks for Ecosystem Importance
Level 3	Stocks subject to very minimal catch so that fishing-induced mortality most likely does not have measurable effects on stock dynamics
Level 4	Stocks subject to fishing-induced mortality and not in the top third of regional stocks for Fishery or Ecosystem Importance
Level 5	If any of the following are met: a) stocks in the top third of regional fishery or ecosystem importance; b) stocks subject to measurable fishing-induced mortality, but with uncertain catch data (Current Catch Level < 3); or c) stocks for which absolute abundance estimates are feasible

Target Life History Level

This attribute categorizes the need for data describing a stock's biology and life history, such as natural mortality, growth, reproduction, and stock structure. While detailed biological information is useful as assessment inputs to isolate fishing impacts and improve precision/accuracy, less important stocks may be successfully managed based on assessments that rely on less complete life history data. Baseline target levels for life history are based on the Size/Age Importance calculation detailed under Target Size/Age Composition level; assignments are as follows:

Target	**Assigned to:**
Level 0	Stocks that are not a priority for assessments
Level 2	Stocks with Size/Age Importance > 1
Level 4	Stocks with Size/Age Importance from -1 to 1
Level 5	Stocks with Size/Age Importance < -1

Target Ecosystem Linkage Level

This attribute describes the extent to which an assessment should consider or incorporate ecosystem dynamics. This is not a straightforward determination, and regional experts may consider a number of factors such as:

- Is there sufficient return on investment for developing an ecosystem-linked assessment for the stock (e.g., based on fishery value, status, ecosystem importance)?
- Are there unexplained drifts in assessment results that may be resolved by investigating additional factors?
- Do existing process studies suggest coupling between stock productivity and specific ecosystem features?
- Is inclusion of ecosystem factors likely to improve management advice, or might empirically based approaches be a more appropriate way to consider ecosystem dynamics and guide management decisions?
- What is the feasibility of developing an ecosystem linked assessment model for the stock?

In general, stocks that may be readily considered for ecosystem-linked assessments include those that serve as key forage, those that exhibit strong habitat preferences during one or more life stages, or those that are particularly sensitive to environmental fluctuations. High value stocks should also be considered, both to improve management advice and to maximize fishing opportunities while minimizing the risk of ecosystem harm. When possible, results of decision analyses (e.g., MSEs) can evaluate when/how to expand assessment models to include ecosystem features; in the absence of such results, an Ecosystem Linkage Index is calculated for each stock and used to assign Target Ecosystem Linkage Levels. The Ecosystem Linkage Level (potential values range from -5 to 4) is calculated using several factors from Stock Assessment Prioritization (i.e., Stock Variability, the six Fishery Importance factor scores, and

Ecosystem Importance), as well as information on stock habitat associations[9] and model issues; it is calculated as:

1. Initial Ecosystem Linkage Index = 0
2. Adjust for stock variability (recruitment CV < 0.3, add 1; recruitment CV > 0.9, subtract 1)
3. Adjust for Fishery Importance (weighted sum of Commercial, Recreational, Subsistence, Rebuilding Status, Constituent Demand, and Non Catch Value; stock in bottom third of regional stocks for Fishery Importance, add 1; stock in top third of regional stocks, subtract 1)
4. Adjust for Ecosystem Importance (stock in bottom third of regional stocks for Ecosystem Importance, add 1; stock in top third of regional stocks, subtract 1)
5. Adjust for Physical Habitat Association (stock is thought to easily adapt to changes in physical properties of the ecosystem, add 1; it is clear that the stock relies on a particular habitat niche that is sensitive to ecosystem change during one or more life stages [e.g., anadromous species], subtract 1)
6. Adjust for Model Issues (current assessment model exhibits issues that may be appropriately addressed by including ecosystem dynamics [e.g., retrospective or residual patterns], subtract 1)

Using the calculated Ecosystem Linkage Index, baseline targets are assigned as:

Target	**Assigned to:**
Level 0	Stocks that are not a priority for assessments
Level 1	Stocks with Ecosystem Linkage Index > 2
Level 2	Stocks with Ecosystem Linkage Index from -3 to 1
Level 4	Stocks with Ecosystem Linkage Index of -4
Level 5	Stocks with Ecosystem Linkage Index of -5

[9] Information may be available from Habitat Assessment Prioritization, if available in the region.

Appendix 3: Stock-Specific Assessment Classification and Targets

The table below includes all current classifications (C) and targets (T) identified by regional assessment experts, as well as the gap present (G) in each of the five stock assessment data input attributes – catch, abundance (Abun), life history (LH), size/age composition (Comp), and ecosystem linkage (Eco), for the 554 stocks and stock complexes reviewed. Additional information provided in the table includes the year that each stock was last assessed (Last Asmt; information current as of August 2022), a categorical classification of the comprehensiveness or complexity of that last assessment (Model Cat), and the target assessment frequency (in years; Tar Freq). Stocks that have a target assessment frequency marked with a "^" are those stocks that did not have a target frequency available from stock assessment prioritization; as noted in the Methods section, these targets should be considered provisional. Stocks are sorted by Fisheries Science Center and Fisheries Management Plan.

Stock/Complex	**Last Asmt**	**Model Cat**	**Tar Freq**	**Catch**			**Abun**			**LH**			**Comp**			**Eco**		
				C	**T**	**G**	**C**	**T**	**G**	**C**	**T**	**G**	**C**	**T**	**G**	**C**	**T**	**G**
Northeast Fisheries Science Center																		
Atlantic Herring Fishery Management Plan																		
Atlantic herring - Northwestern Atlantic Coast	2020	6	1	5	5	0	4	4	0	3	5	2	4	5	1	2	2	0
Atlantic Salmon Fishery Management Plan																		
Atlantic salmon - Gulf of Maine	2020	2	1^	5	5	0	5	5	0	4	4	0	5	5	0	0	2	2
Atlantic Sea Scallop Fishery Management Plan																		
Sea scallop - Northwestern Atlantic Coast	2020	5	2	5	5	0	4	5	1	4	4	0	4	4	0	2	2	0
Atlantic Surfclam and Ocean Quahog Fishery Management Plan																		
Atlantic surfclam - Mid-Atlantic Coast	2020	6	4	5	5	0	4	4	0	5	5	0	4	4	0	2	2	0
Ocean quahog - Atlantic Coast	2020	6	10	5	5	0	4	4	0	4	5	1	4	5	1	2	2	0
Bluefish Fishery Management Plan																		
Bluefish - Atlantic Coast	2021	6	1	5	5	0	4	4	0	3	4	1	4	4	0	0	2	2
Deep-Sea Red Crab Fishery Management Plan																		
Red deepsea crab - Northwestern Atlantic	2006	2	5	4	5	1	2	4	2	2	2	0	4	4	0	0	2	2
Mackerel, Squid and Butterfish Fishery Management Plan																		
Atlantic chub mackerel - Mid-Atlantic Coast	NA	NA	5	2	5	3	2	2	0	2	4	2	1	4	3	1	2	1
Atlantic mackerel - Gulf of Maine / Cape Hatteras	2021	6	3	4	5	1	4	4	0	4	5	1	4	4	0	2	3	1
Butterfish - Gulf of Maine / Cape Hatteras	2020	6	2	4	5	1	4	4	0	4	4	0	4	4	0	3	3	0

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Longfin inshore squid - Georges Bank / Cape Hatteras	2020	2	1	5	5	0	4	4	0	2	5	3	2	5	3	0	2	2
Northern shortfin squid - Northwestern Atlantic Coast	2005	2	1	4	5	1	3	4	1	2	2	0	2	2	0	0	1	1
Monkfish Fishery Management Plan																		
Goosefish - Gulf of Maine / Northern Georges Bank	2019	2	3	5	5	0	3	4	1	2	2	0	2	2	0	0	2	2
Goosefish - Southern Georges Bank / Mid-Atlantic	2019	2	4	5	5	0	3	4	1	2	2	0	2	2	0	0	2	2
Northeast Multispecies Fishery Management Plan																		
Acadian redfish - Gulf of Maine / Georges Bank	2020	6	10	4	5	1	4	4	0	4	4	0	4	4	0	2	2	0
American plaice - Gulf of Maine / Georges Bank	2019	4	3	4	5	1	4	5	1	3	4	1	4	4	0	0	2	2
Atlantic cod - Georges Bank	2021	2	1	4	5	1	4	5	1	3	5	2	4	5	1	0	4	4
Atlantic cod - Gulf of Maine	2021	6	1	4	5	1	4	5	1	3	5	2	4	5	1	2	4	2
Atlantic halibut - Northwestern Atlantic Coast	2020	1	3	2	5	3	3	5	2	2	5	3	2	5	3	0	2	2
Atlantic wolffish - Gulf of Maine / Georges Bank	2020	5	2	5	5	0	3	4	1	3	4	1	4	4	0	2	2	0
Haddock - Georges Bank	2019	4	4	5	5	0	4	5	1	3	4	1	4	5	1	0	2	2
Haddock - Gulf of Maine	2019	6	4	4	5	1	4	5	1	3	4	1	4	5	1	2	2	0
Ocean pout - Northwestern Atlantic Coast	2020	2	3	5	5	0	3	4	1	2	4	2	2	4	2	0	2	2
Offshore hake - Northwestern Atlantic Coast	2011	2	4	5	5	0	3	4	1	2	4	2	2	4	2	0	2	2
Pollock - Gulf of Maine / Georges Bank	2019	6	5	4	5	1	4	4	0	3	3	0	4	4	0	2	2	0
Red hake - Gulf of Maine / Northern Georges Bank	2020	2	3	4	4	0	4	4	0	2	2	0	2	2	0	0	2	2
Red hake - Southern Georges Bank / Mid-Atlantic	2020	2	3	4	4	0	4	4	0	2	2	0	2	2	0	0	2	2
Silver hake - Gulf of Maine / Northern Georges Bank	2020	2	4	4	5	1	4	4	0	2	2	0	2	2	0	0	1	1
Silver hake - Southern Georges Bank / Mid-Atlantic	2020	2	4	4	5	1	4	4	0	2	2	0	2	2	0	0	1	1
White hake - Gulf of Maine / Georges Bank	2019	6	3	4	5	1	4	5	1	3	4	1	4	4	0	2	2	0
Windowpane - Gulf of Maine / Georges Bank	2020	2	3	3	5	2	3	4	1	3	3	0	2	2	0	0	2	2
Windowpane - Southern New England / Mid-Atlantic	2020	2	5	2	5	3	3	4	1	2	3	1	2	2	0	0	2	2
Winter flounder - Georges Bank	2020	4	1	4	5	1	4	5	1	3	5	2	4	5	1	0	4	4
Winter flounder - Gulf of Maine	2020	2	1	4	5	1	4	4	0	3	5	2	2	5	3	0	2	2
Winter flounder - Southern New England / Mid-Atlantic	2020	6	1	5	5	0	4	5	1	3	5	2	4	5	1	2	2	0

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Witch flounder - Northwestern Atlantic Coast	2019	2	3	5	5	0	4	5	1	3	5	2	3	5	2	0	2	2
Yellowtail flounder - Cape Cod / Gulf of Maine	2019	4	3	4	5	1	4	4	0	3	3	0	4	4	0	0	2	2
Yellowtail flounder - Georges Bank	2021	2	3	4	5	1	4	5	1	4	4	0	4	4	0	0	2	2
Yellowtail flounder - Southern New England / Mid-Atlantic	2019	6	5	5	5	0	4	4	0	3	3	0	4	4	0	2	2	0
Northeast Skate Complex Fishery Management Plan																		
Barndoor skate - Georges Bank / Southern New England	2020	2	1	2	5	3	3	4	1	2	2	0	1	2	1	0	2	2
Clearnose skate - Southern New England / Mid-Atlantic	2020	2	2	2	5	3	3	4	1	2	2	0	1	2	1	0	1	1
Little skate - Georges Bank / Southern New England	2019	2	2	2	5	3	3	4	1	2	2	0	1	2	1	0	1	1
Rosette skate - Southern New England / Mid-Atlantic	2020	2	2	2	5	3	3	4	1	2	2	0	1	2	1	0	1	1
Smooth skate - Gulf of Maine	2020	2	1	2	5	3	3	4	1	2	2	0	1	2	1	0	2	2
Thorny skate - Gulf of Maine	2020	2	1	2	5	3	3	4	1	2	2	0	1	2	1	0	2	2
Winter skate - Georges Bank / Southern New England	2020	2	2	2	5	3	3	4	1	2	2	0	1	2	1	0	2	2
Spiny Dogfish Fishery Management Plan																		
Spiny dogfish - Atlantic Coast	2018	5	5	4	5	1	4	4	0	4	4	0	4	4	0	0	2	2
Summer Flounder, Scup and Black Sea Bass Fishery Management Plan																		
Black sea bass - Mid-Atlantic Coast	2021	6	1	4	5	1	4	5	1	3	5	2	4	5	1	2	4	2
Scup - Atlantic Coast	2021	6	1	4	5	1	4	4	0	3	5	2	4	5	1	2	2	0
Summer flounder - Mid-Atlantic Coast	2021	6	1	5	5	0	4	5	1	4	5	1	4	5	1	2	2	0
Tilefish Fishery Management Plan																		
Blueline tilefish - Mid-Atlantic Coast	2018	1	2	3	5	2	2	4	2	2	2	0	2	2	0	0	1	1
Tilefish - Mid-Atlantic Coast	2021	6	1	3	5	2	2	4	2	3	5	2	3	5	2	0	2	2
Southeast Fisheries Science Center																		
South Atlantic																		
Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic Fishery Management Plan																		
King mackerel - Southern Atlantic Coast	2020	6	7	3	4	1	3	4	1	3	4	1	3	5	2	2	2	0
Spanish mackerel - Southern Atlantic Coast	2013	6	9	3	4	1	3	4	1	2	4	2	3	5	2	0	2	2
Coral, Coral Reefs and Live / Hard Bottom Habitats of the South Atlantic Region Fishery Management Plan																		
Black corals (Antipatharia) - Southern Atlantic Coast	NA	NA	10^	1	2	1	0	2	2	0	2	2	0	2	2	0	2	2

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Fire corals (Milleporidae) - Southern Atlantic Coast	NA	NA	10^	1	2	1	0	2	2	0	2	2	0	2	2	0	2	2
Hydrocorals (Stylasteridae) - Southern Atlantic Coast	NA	NA	10^	1	2	1	0	2	2	0	2	2	0	2	2	0	2	2
Soft corals (Octocorallia) - Southern Atlantic Coast	NA	NA	10^	1	2	1	0	2	2	0	2	2	0	2	2	0	2	2
Stony corals (Scleractinia) - Southern Atlantic Coast	NA	NA	10^	1	2	1	0	2	2	0	2	2	0	2	2	0	2	2
Dolphin and Wahoo Fishery of the Atlantic Fishery Management Plan																		
Dolphinfish - Southern Atlantic Coast	NA	NA	3	3	4	1	1	4	3	1	3	2	1	3	2	0	2	2
Wahoo - Southern Atlantic Coast	NA	NA	1^	3	4	1	1	4	3	1	3	2	1	3	2	0	2	2
Golden Crab Fishery of the South Atlantic Region Fishery Management Plan																		
Golden deepsea crab - Southern Atlantic Coast	NA	NA	10^	2	4	2	0	3	3	0	3	3	0	3	3	0	2	2
Pelagic Sargassum Habitat of the South Atlantic Region Fishery Management Plan																		
Sargassum - Southern Atlantic Coast	NA	NA	1^	0	1	1	0	0	0	0	2	2	0	0	0	0	2	2
Shrimp Fishery of the South Atlantic Region Fishery Management Plan																		
Brown rock shrimp - Southern Atlantic Coast	2018	2	1^	3	5	2	0	4	4	1	4	3	0	4	4	0	2	2
Brown shrimp - Southern Atlantic Coast	2018	2	1^	3	5	2	2	4	2	1	4	3	0	4	4	0	2	2
Pink shrimp - Southern Atlantic Coast	2018	2	1^	3	5	2	2	4	2	1	4	3	0	4	4	0	2	2
White shrimp - Southern Atlantic Coast	2018	2	1^	3	5	2	2	4	2	1	4	3	0	4	4	0	2	2
Snapper-Grouper Fishery of the South Atlantic Region Fishery Management Plan																		
Atlantic spadefish - Southern Atlantic Coast	NA	NA	1^	3	3	0	1	3	2	1	3	2	1	3	2	0	2	2
Bar jack - Southern Atlantic Coast	NA	NA	1^	3	3	0	1	3	2	1	3	2	1	3	2	0	2	2
Black sea bass - Southern Atlantic Coast	2018	6	5	3	4	1	3	4	1	2	4	2	4	5	1	0	2	2
Blueline tilefish - Southern Atlantic Coast	2017	3	5	3	3	0	1	3	2	2	3	1	2	3	1	0	2	2
Gag - Southern Atlantic Coast	2021	6	6	3	4	1	2	4	2	2	4	2	4	5	1	2	2	0
Gray triggerfish - Southern Atlantic Coast	NA	NA	5	3	4	1	3	4	1	1	4	3	1	5	4	0	2	2
Greater amberjack - Southern Atlantic Coast	2020	6	7	3	4	1	2	4	2	3	4	1	3	5	2	2	2	0
Hogfish - Carolinas	NA	NA	10	2	3	1	1	3	2	2	3	1	3	4	1	0	2	2
Hogfish - Southeast Florida	2014	6	7	3	4	1	2	4	2	2	3	1	3	4	1	0	2	2
Red grouper - Southern Atlantic Coast	2017	6	6	3	4	1	3	4	1	2	4	2	3	5	2	0	2	2
Red porgy - Southern Atlantic Coast	2020	6	7	3	4	1	3	4	1	2	4	2	3	5	2	2	2	0
Red snapper - Southern Atlantic Coast	2021	6	6	3	4	1	3	4	1	2	4	2	3	5	2	2	2	0

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Scamp - Southern Atlantic Coast	2021	NA	8	3	4	1	3	4	1	2	4	2	3	5	2	2	2	0
Snowy grouper - Southern Atlantic Coast	2021	6	10	3	4	1	2	4	2	2	4	2	3	5	2	2	2	0
South Atlantic Deepwater Snapper-Grouper Complex	2021	NA	10	2	3	1	1	2	1	1	2	1	1	2	1	2	2	0
South Atlantic Grunts Complex	2021	NA	8	2	3	1	1	2	1	1	2	1	1	2	1	2	2	0
South Atlantic Jacks Complex	2021	NA	7	2	3	1	1	2	1	1	2	1	1	2	1	2	2	0
South Atlantic Porgy Complex	2021	NA	8	2	3	1	1	2	1	1	2	1	2	2	0	2	2	0
South Atlantic Shallow Water Snapper-Grouper Complex	2021	NA	9	2	3	1	1	2	1	1	2	1	1	2	1	2	2	0
South Atlantic Snappers Complex	2021	NA	8	2	3	1	1	2	1	1	2	1	1	2	1	2	2	0
Speckled hind - Southern Atlantic Coast	2021	NA	10	2	3	1	1	2	1	1	3	2	1	2	1	2	2	0
Tilefish - Southern Atlantic Coast	2021	6	8	3	4	1	2	4	2	2	4	2	3	5	2	2	2	0
Vermilion snapper - Southern Atlantic Coast	2018	6	5	3	4	1	3	4	1	2	4	2	3	5	2	0	2	2
Warsaw grouper - Southern Atlantic Coast	NA	NA	10	2	2	0	1	3	2	2	3	1	3	3	0	0	2	2
Wreckfish - Southern Atlantic Coast	2014	6	8	3	4	1	2	3	1	1	3	2	1	3	2	0	2	2
Snapper-Grouper Fishery of the South Atlantic Region Fishery Management Plan / Reef Fish Resources of the Gulf of Mexico Fishery Management Plan																		
Black grouper - Southern Atlantic Coast / Gulf of Mexico	2010	6	9	3	4	1	2	4	2	2	4	2	4	5	1	0	2	2
Goliath grouper - Southern Atlantic Coast / Gulf of Mexico	22010	3	10	3	3	0	1	4	3	1	3	2	1	3	2	0	2	2
Mutton snapper - Southern Atlantic Coast / Gulf of Mexico	2015	6	8	3	4	1	3	4	1	2	4	2	3	5	2	0	2	2
Yellowtail snapper - Southern Atlantic Coast / Gulf of Mexico	2020	6	9	3	4	1	3	4	1	2	3	1	3	4	1	2	2	0
Gulf of Mexico																		
Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic Fishery Management Plan																		
King mackerel - Gulf of Mexico	2020	6	8	4	4	0	3	4	1	3	4	1	4	5	1	2	3	1
Spanish mackerel - Gulf of Mexico	2013	6	5	4	4	0	3	4	1	3	4	1	4	4	0	0	2	2
Cobia - Gulf of Mexico	2020	6	6	3	4	1	2	4	2	3	4	1	3	4	1	2	2	0
Coral and Coral Reefs of the Gulf of Mexico Fishery Management Plan																		
Black corals (Antipatharia) - Gulf of Mexico	NA	NA	10^	1	2	1	0	2	2	2	2	0	1	2	1	0	2	2
Fire corals (Milleporidae) - Gulf of Mexico	NA	NA	10^	1	2	1	0	2	2	2	2	0	1	2	1	0	2	2
Hydrocorals (Stylasteridae) - Gulf of Mexico	NA	NA	10^	1	2	1	0	2	2	2	2	0	1	2	1	0	2	2
Sea fans (*Gorgonia* spp.) - Gulf of Mexico	NA	NA	10^	1	2	1	0	2	2	2	2	0	1	2	1	0	2	2

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Stony corals (Scleractinia) - Gulf of Mexico	NA	NA	10^	1	2	1	0	2	2	2	2	0	1	2	1	0	2	2
Red Drum Fishery of the Gulf of Mexico																		
Red drum - Gulf of Mexico	NA	NA	8	2	5	3	1	4	3	3	3	0	1	4	3	0	2	2
Reef Fish Resources of the Gulf of Mexico Fishery Management Plan																		
Almaco jack - Gulf of Mexico [member of Gulf of Mexico Jacks Complex]	NA	NA	7	2	4	2	1	3	2	1	3	2	1	3	2	0	2	2
Banded rudderfish - Gulf of Mexico [member of Gulf of Mexico Jacks Complex]	NA	NA	7	2	4	2	0	3	3	1	3	2	1	3	2	0	2	2
Blackfin snapper - Gulf of Mexico [member of Gulf of Mexico Mid-Water Snapper Complex]	NA	NA	10	2	4	2	0	3	3	3	3	0	2	3	1	0	2	2
Blueline tilefish - Gulf of Mexico [member of Gulf of Mexico Tilefishes Complex]	NA	NA	10	2	4	2	2	4	2	3	3	0	2	4	2	0	2	2
Cubera snapper - Gulf of Mexico	NA	NA	10	1	2	1	0	3	3	2	3	1	2	3	1	0	2	2
Gag - Gulf of Mexico	2021	6	10	3	4	1	3	4	1	2	4	2	3	5	2	3	4	1
Gray snapper - Gulf of Mexico	2018	6	9	4	4	0	4	4	0	3	4	1	3	5	2	1	2	1
Gray triggerfish - Gulf of Mexico	2020	6	7	4	4	0	3	4	1	4	4	0	4	5	1	2	3	1
Greater amberjack - Gulf of Mexico	2021	6	6	4	4	0	1	4	3	1	4	3	4	5	1	2	3	1
Hogfish - Eastern Gulf of Mexico	2018	6	7	4	4	0	4	4	0	3	4	1	4	4	0	2	2	0
Lane snapper - Gulf of Mexico	2020	1	7	3	4	1	2	4	2	2	4	2	2	4	2	2	2	0
Lesser amberjack - Gulf of Mexico [member of Gulf of Mexico Jacks Complex]	NA	NA	8	2	4	2	1	3	2	1	3	2	1	3	2	0	2	2
Nassau grouper - Southern Atlantic Coast / Gulf of Mexico	NA	NA	10	0	0	0	0	2	2	2	4	2	1	3	2	0	2	2
Queen snapper - Gulf of Mexico [member of Gulf of Mexico Mid-Water Snapper Complex]	NA	NA	10	2	4	2	0	3	3	3	3	0	2	3	1	0	2	2
Red grouper - Gulf of Mexico	2021	6	8	4	4	0	3	4	1	2	5	3	3	5	2	4	4	0
Red snapper - Gulf of Mexico	2021	6	10	3	4	1	4	5	1	2	5	3	3	5	2	2	4	2
Scamp - Gulf of Mexico [member of Gulf of Mexico Shallow Water Grouper Complex]	NA	NA	9	4	4	0	3	4	1	3	4	1	3	4	1	1	2	1
Silk snapper - Gulf of Mexico [member of Gulf of Mexico Mid-Water Snapper Complex]	NA	NA	10	2	4	2	1	3	2	3	3	0	2	3	1	0	2	2
Snowy grouper - Gulf of Mexico [member of Gulf of Mexico Deep Water Grouper Complex]	NA	NA	9	2	4	2	2	4	2	3	4	1	2	3	1	0	2	2
Speckled hind - Gulf of Mexico [member of Gulf of Mexico Deep Water Grouper Complex]	NA	NA	10	2	4	2	2	4	2	3	3	0	2	3	1	0	2	2
Tilefish - Gulf of Mexico	2011	6	10	4	4	0	3	4	1	3	3	0	3	4	1	0	2	2
Vermilion snapper - Gulf of Mexico	2020	6	9	4	4	0	3	4	1	3	4	1	4	5	1	2	3	1

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Warsaw grouper - Gulf of Mexico [member of Gulf of Mexico Deep Water Grouper Complex]	NA	NA	10	2	4	2	2	4	2	3	3	0	2	3	1	0	2	2
Wenchman - Gulf of Mexico [member of Gulf of Mexico Mid-Water Snapper Complex]	NA	NA	7	2	4	2	3	3	0	2	3	1	2	3	1	0	2	2
Yellowedge grouper - Gulf of Mexico	2010	6	10	4	4	0	3	4	1	3	4	1	3	4	1	1	3	2
Yellowfin grouper - Gulf of Mexico [member of Gulf of Mexico Shallow Water Grouper Complex]	NA	NA	10	2	4	2	0	3	3	2	3	1	2	3	1	0	2	2
Yellowmouth grouper - Gulf of Mexico [member of Gulf of Mexico Shallow Water Grouper Complex]	NA	NA	9	2	4	2	3	3	0	3	3	0	2	3	1	0	2	2
Snapper-Grouper Fishery of the South Atlantic Region Fishery Management Plan / Reef Fish Resources of the Gulf of Mexico Fishery Management Plan																		
Caribbean spiny lobster - Southern Atlantic Coast / Gulf of Mexico	2005	6	6	4	4	0	2	4	2	3	3	0	3	3	0	0	2	2
Shrimp Fishery of the Gulf of Mexico Fishery Management Plan																		
Brown shrimp - Gulf of Mexico	2020	5	3	4	5	1	3	4	1	2	4	2	2	4	2	2	3	1
Pink shrimp - Gulf of Mexico	2020	5	4	4	5	1	3	4	1	2	4	2	2	4	2	2	3	1
Royal red shrimp - Gulf of Mexico	2021	2	4	4	5	1	0	1	1	0	2	2	0	4	4	0	0	0
White shrimp - Gulf of Mexico	2020	5	4	4	5	1	3	4	1	2	4	2	2	4	2	2	3	1
Caribbean																		
Puerto Rico EEZ Fishery Management Plan																		
Barracuda - Puerto Rico	NA	0	7	2	3	1	1	2	1	2	3	1	1	3	2	0	2	2
Caribbean spiny lobster - Puerto Rico	2020	6	7	2	4	2	1	4	3	3	3	0	3	4	1	2	2	0
Puerto Rico Angelfishes Complex	NA	0	7	1	3	2	0	2	2	0	2	2	0	3	3	0	2	2
Puerto Rico Dorado	NA	0	3	2	4	2	1	3	2	2	3	1	1	3	2	0	2	2
Puerto Rico Grouper Unit 1	NA	0	8	2	3	1	0	3	3	2	3	1	0	3	3	0	2	2
Puerto Rico Grouper Unit 2	NA	0	10	2	3	1	0	3	3	2	3	1	0	3	3	0	2	2
Puerto Rico Grouper Unit 3	NA	0	7	2	4	2	1	3	2	1	3	2	1	3	2	0	2	2
Puerto Rico Grouper Unit 4	NA	0	7	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
Puerto Rico Grouper Unit 5	NA	0	10	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
Puerto Rico Grouper Unit 6	NA	0	7	2	4	2	1	3	2	2	3	1	2	3	1	0	2	2
Puerto Rico Grunts Complex	NA	0	6	2	3	1	1	3	2	2	3	1	1	3	2	0	2	2
Puerto Rico Jacks 1	NA	0	6	1	3	2	0	2	2	1	3	2	1	3	2	0	2	2
Puerto Rico Jacks 2	NA	0	6	1	3	2	0	2	2	1	3	2	1	3	2	0	2	2

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Puerto Rico Jacks 3	NA	0	4	1	3	2	0	2	2	1	3	2	1	3	2	0	2	2
Puerto Rico Mackerels	NA	0	6	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
Puerto Rico Parrotfishes 1	NA	0	8	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
Puerto Rico Parrotfishes 2	NA	0	5	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
Puerto Rico Rays 1	NA	0	9	2	3	1	0	2	2	1	2	1	0	2	2	0	2	2
Puerto Rico Rays 2	NA	0	9	1	3	2	0	2	2	1	2	1	0	2	2	0	2	2
Puerto Rico Rays 3	NA	0	10	1	3	2	0	2	2	1	2	1	0	2	2	0	2	2
Puerto Rico Snapper Unit 1	NA	0	10	1	4	3	0	3	3	2	3	1	2	3	1	0	2	2
Puerto Rico Snapper Unit 2	NA	0	8	2	4	2	1	3	2	2	3	1	2	3	1	0	2	2
Puerto Rico Snapper Unit 3	NA	0	7	2	4	2	1	3	2	2	3	1	1	3	2	0	2	2
Puerto Rico Snapper Unit 4	NA	0	7	2	4	2	1	3	2	2	3	1	1	3	2	0	2	2
Puerto Rico Snapper Unit 5	NA	0	2	2	4	2	1	3	2	2	3	1	2	3	1	0	2	2
Puerto Rico Snapper Unit 6	NA	0	8	2	3	1	1	2	1	1	3	2	1	3	2	0	2	2
Puerto Rico Surgeonfishes Complex	NA	0	5	1	3	2	0	2	2	1	2	1	0	3	3	0	2	2
Puerto Rico Triggerfishes Complex	NA	0	4	2	3	1	1	2	1	2	3	1	1	3	2	0	2	2
Puerto Rico Tunas	NA	0	5	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
Puerto Rico Wrasses 1	NA	0	6	2	4	2	1	3	2	2	3	1	1	3	2	0	2	2
Puerto Rico Wrasses 2	NA	0	8	1	3	2	0	2	2	1	2	1	0	3	3	0	2	2
Queen conch - Puerto Rico	NA	0	9	2	4	2	1	4	3	2	3	1	1	3	2	0	2	2
Tripletail - Puerto Rico	NA	0	6	1	3	2	0	2	2	1	3	2	1	3	2	0	2	2
Wahoo - Puerto Rico	NA	0	5	2	3	1	1	2	1	2	3	1	1	3	2	0	2	2
St. Croix EEZ Fishery Management Plan																		
Caribbean spiny lobster - St. Croix	2020	6	6	2	4	2	1	4	3	3	3	0	3	4	1	2	2	0
Dolphin - St. Croix	NA	0	3	2	4	2	1	2	1	2	3	1	1	3	2	0	2	2
Queen conch - St. Croix	NA	0	8	2	4	2	1	4	3	2	3	1	1	3	2	0	2	2
St. Croix Angelfishes Complex	NA	0	7	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
St. Croix Grouper Unit 1	NA	0	9	2	3	1	0	3	3	2	3	1	0	3	3	0	2	2
St. Croix Grouper Unit 2	NA	0	10	2	3	1	0	3	3	2	3	1	0	3	3	0	2	2
St. Croix Grouper Unit 3	NA	0	7	2	4	2	1	3	2	2	3	1	1	3	2	0	2	2
St. Croix Grouper Unit 4	NA	0	8	2	4	2	1	3	2	2	3	1	2	3	1	0	2	2
St. Croix Grouper Unit 5	NA	0	8	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
St. Croix Grouper Unit 6	NA	0	10	2	3	1	1	2	1	1	3	2	0	3	3	0	2	2
St. Croix Grunts Complex	NA	0	6	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
St. Croix Parrotfishes 1	NA	0	8	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
St. Croix Parrofishes 2	NA	0	5	2	4	2	1	3	2	2	3	1	1	3	2	0	2	2
St. Croix Snapper Unit 1	NA	0	7	2	4	2	1	3	2	2	3	1	0	3	3	0	2	2
St. Croix Snapper Unit 2	NA	0	9	2	4	2	1	2	1	2	3	1	0	3	3	0	2	2
St. Croix Snapper Unit 3	NA	0	9	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
St. Croix Snapper Unit 4	NA	0	9	2	3	1	1	2	1	2	3	1	0	3	3	0	2	2
St. Croix Snapper Unit 5	NA	0	7	2	3	1	1	2	1	2	3	1	0	3	3	0	2	2
St. Croix Snapper Unit 6	NA	0	5	2	4	2	1	3	2	2	3	1	0	3	3	0	2	2
St. Croix Squirrelfishes Complex	NA	0	3	2	3	1	1	2	1	1	3	2	0	3	3	0	2	2
St. Croix Surgeonfishes Complex	NA	0	3	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
St. Croix Triggerfishes Complex	NA	0	5	2	3	1	1	2	1	2	3	1	1	3	2	0	2	2
Wahoo - St. Croix	NA	0	5	2	3	1	1	2	1	2	3	1	0	3	3	0	2	2
St. Thomas/St. John EEZ Fishery Management Plan																		
Caribbean spiny lobster - St. Thomas / St. John	2020	6	6	2	4	2	1	4	3	3	3	0	3	4	1	2	2	0
Dolphinfish - St. Thomas / St. John	NA	0	3	2	4	2	1	2	1	2	3	1	0	3	3	0	2	2
Hogfish - St. Thomas / St. John	NA	0	8	1	3	2	0	2	2	2	3	1	0	3	3	0	2	2
Queen conch - St. Thomas / St. John	NA	0	9	2	4	2	1	4	3	2	3	1	0	3	3	0	2	2
St. Thomas / St. John Angelfishes Complex	NA	0	6	2	3	1	1	3	2	1	3	2	0	3	3	0	2	2
St. Thomas / St. John Grouper Unit 1	NA	0	9	2	3	1	0	3	3	2	3	1	0	3	3	0	2	2
St. Thomas / St. John Grouper Unit 2	NA	0	10	2	3	1	0	3	3	2	3	1	0	3	3	0	2	2
St. Thomas / St. John Grouper Unit 3	NA	0	7	2	4	2	1	3	2	2	3	1	1	3	2	0	2	2
St. Thomas / St. John Grouper Unit 4	NA	0	7	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
St. Thomas / St. John Grouper Unit 5	NA	0	10	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
St. Thomas / St. John Grunts 1	NA	0	7	2	4	2	1	3	2	2	3	1	1	3	2	0	2	2
St. Thomas / St. John Grunts 2	NA	0	7	2	3	1	1	2	1	1	3	2	0	3	3	0	2	2
St. Thomas / St. John Jacks Complex	NA	0	4	2	3	1	1	2	1	1	3	2	0	3	3	0	2	2
St. Thomas / St. John Parrotfishes 1	NA	0	8	2	3	1	0	2	2	1	2	1	0	3	3	0	2	2
St. Thomas / St. John Parrotfishes 2	NA	0	6	2	4	2	1	3	2	2	3	1	0	3	3	0	2	2
St. Thomas / St. John Porgies Complex	NA	0	9	2	3	1	1	2	1	1	3	2	0	3	3	0	2	2

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
St. Thomas / St. John Snapper Unit 1	NA	0	6	2	4	2	1	3	2	2	3	1	0	3	3	0	2	2
St. Thomas / St. John Snapper Unit 2	NA	0	10	2	3	1	1	2	1	2	3	1	0	3	3	0	2	2
St. Thomas / St. John Snapper Unit 3	NA	0	9	2	4	2	1	3	2	2	3	1	0	3	3	0	2	2
St. Thomas / St. John Snapper Unit 4	NA	0	4	2	4	2	1	3	2	2	3	1	1	3	2	0	2	2
St. Thomas / St. John Surgeonfishes Complex	NA	0	4	2	3	1	1	2	1	1	2	1	1	3	2	0	2	2
St. Thomas / St. John Triggerfishes Complex	NA	0	5	2	3	1	1	2	1	2	3	1	1	3	2	0	2	2
Wahoo - St. Thomas / St. John	NA	0	5	2	3	1	1	2	1	2	3	1	0	3	3	0	2	2
Atlantic Highly Migratory Species																		
Consolidated Atlantic Highly Migratory Species																		
Albacore - North Atlantic	2020	3	3^	3	5	2	2	2	0	3	4	1	1	5	4	1	3	2
Atlantic angelshark - Atlantic [member of Prohibited Species complex]	NA	NA	3^	1	1	0	1	1	0	2	2	0	1	1	0	0	0	0
Atlantic sharpnose shark - Atlantic	2013	6	4	3	4	1	3	4	1	3	4	1	**3**	4	1	1	2	1
Atlantic sharpnose shark - Gulf of Mexico	2013	6	3	3	4	1	3	4	1	3	4	1	**3**	4	1	1	2	1
Basking shark - Atlantic [member of Prohibited Species complex]	NA	NA	3^	1	1	0	1	1	0	2	2	0	1	1	0	0	0	0
Bigeye sand tiger - Atlantic [member of Prohibited Species complex]	NA	NA	3^	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0
Bigeye sixgill shark - Atlantic [member of Prohibited Species complex]	NA	NA	2^	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0
Bigeye thresher - Atlantic [member of Prohibited Species complex]	NA	NA	4^	1	1	0	1	1	0	2	2	0	1	1	0	0	0	0
Bigeye tuna - Atlantic	2021	5	3^	3	4	1	2	3	1	2	4	2	3	5	2	2	3	1
Bignose shark - Atlantic [member of Prohibited Species complex]	NA	NA	3^	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0
Blacknose shark - Atlantic	2011	6	4	3	4	1	3	4	1	3	4	1	**3**	4	1	1	2	1
Blacknose shark - Gulf of Mexico	NA	NA	4	3	4	1	3	4	1	3	4	1	3	4	1	0	2	2
Blacktip shark - Atlantic	2021	6	5	2	4	2	3	4	1	2	4	2	3	4	1	1	2	1
Blacktip shark - Gulf of Mexico	2018	6	4	3	4	1	3	4	1	3	4	1	3	4	1	1	2	1
Blue marlin - Atlantic	2018	5	2^	2	4	2	2	2	0	2	4	2	3	5	2	1	3	2
Blue shark - North Atlantic	2015	6	3	3	4	1	2	3	1	3	4	1	3	4	1	1	2	1
Bluefin tuna - Western Atlantic	2021	6	3^	4	4	0	4	5	1	3	4	1	3	5	2	3	3	0
Bluntnose sixgill shark - Atlantic [member of Prohibited Species complex]	NA	NA	2^	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0
Bonnethead - Atlantic	NA	NA	5	3	4	1	3	4	1	3	4	1	3	4	1	0	2	2

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Bonnethead - Gulf of Mexico	NA	NA	5	3	4	1	3	4	1	3	4	1	3	4	1	0	2	2
Bull shark - Atlantic and Gulf of Mexico	NA	NA	3^	3	3	0	3	3	0	3	3	0	3	3	0	0	2	2
Caribbean sharpnose shark - Atlantic [member of Prohibited Species complex]	NA	NA	2^	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0
Dusky shark - Atlantic and Gulf of Mexico	2016	3	6	**1**	1	0	3	3	0	3	4	1	**3**	4	1	1	2	1
Finetooth shark - Atlantic and Gulf of Mexico	2007	3	6	**3**	4	1	3	3	0	3	4	1	1	4	3	1	2	1
Galapagos shark - Atlantic [member of Prohibited Species complex]	NA	NA	2^	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0
Great hammerhead - Atlantic and Gulf of Mexico	NA	NA	3^	3	3	0	3	3	0	3	3	0	2	2	0	0	0	0
Gulf Smoothhound Complex	2015	3	7	3	3	0	3	3	0	2	2	0	1	3	2	1	0	0
Lemon shark - Atlantic and Gulf of Mexico	NA	NA	2^	3	3	0	3	3	0	3	3	0	1	3	2	0	0	0
Longbill spearfish - Western Atlantic	NA	NA	1^	2	3	1	0	2	2	1	2	1	1	5	4	0	1	1
Longfin mako - Atlantic [member of Prohibited Species complex]	NA	NA	3^	1	1	0	1	1	0	1	1	0	1	1	0	0	0	0
Narrowtooth shark - Atlantic [member of Prohibited Species complex]	NA	NA	3^	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0
Night shark - Atlantic [member of Prohibited Species complex]	NA	NA	3^	1	1	0	3	3	0	2	2	0	2	2	0	0	0	0
Nurse shark - Atlantic and Gulf of Mexico	NA	NA	3^	3	3	0	3	3	0	3	3	0	2	2	0	0	0	0
Oceanic whitetip shark - Atlantic and Gulf of Mexico	NA	NA	3^	2	2	0	2	2	0	3	3	0	2	2	0	0	0	0
Porbeagle - Northwestern Atlantic	2021	1	7	2	2	0	2	1	0	3	4	1	2	4	2	1	2	1
Reef shark - Atlantic [member of Prohibited Species complex]	NA	NA	3^	1	1	0	0	0	0	2	2	0	1	1	0	0	0	0
Roundscale spearfish - Atlantic	NA	NA	1^	2	3	1	0	2	2	1	2	1	1	5	4	0	1	1
Sailfish - Western Atlantic	2016	6	1^	3	4	1	2	2	0	3	4	1	3	5	2	1	3	2
Sand tiger - Atlantic [member of Prohibited Species complex]	NA	NA	3^	3	3	0	3	3	0	3	3	0	2	2	0	0	0	0
Sandbar shark - Atlantic and Gulf of Mexico	2018	5	5	3	4	1	3	4	1	3	4	1	3	4	1	1	2	1
Scalloped hammerhead - Atlantic and Gulf of Mexico	2009	3	4	3	3	0	3	3	0	3	3	0	1	3	2	0	0	0
Shortfin mako - North Atlantic	2017	6	7	3	4	1	2	2	0	3	4	1	3	4	1	1	2	1
Silky shark - Atlantic and Gulf of Mexico	NA	NA	3^	3	3	0	3	3	0	3	3	0	3	3	0	0	2	2
Skipjack tuna - Western Atlantic	2014	3	1^	3	4	1	3	3	0	2	4	2	3	5	2	1	3	2
Smalltail shark - Atlantic [member of Prohibited Species complex]	NA	NA	2^	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0
Smooth dogfish - Atlantic	2015	6	4	3	4	1	3	4	1	3	4	1	3	4	1	1	2	1

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Smooth hammerhead - Atlantic and Gulf of Mexico	NA	NA	3^	2	2	0	2	2	0	2	2	0	2	2	0	0	0	0
Spinner shark - Atlantic and Gulf of Mexico	NA	NA	2^	3	4	1	3	3	0	3	3	0	3	3	0	0	0	0
Swordfish - North Atlantic	2017	6	3^	4	5	1	2	2	0	3	4	1	3	5	2	3	3	0
Thresher shark - Atlantic and Gulf of Mexico	NA	NA	3^	3	3	0	2	2	0	3	3	0	2	2	0	0	0	0
Tiger shark - Atlantic and Gulf of Mexico	NA	NA	3^	3	4	1	3	3	0	3	3	0	3	3	0	0	0	0
Whale shark - Atlantic [member of Prohibited Species complex]	NA	NA	8^	1	1	0	1	1	0	2	2	0	1	1	0	0	0	0
White marlin - Atlantic	2019	5	1^	2	3	1	2	2	0	2	4	2	3	5	2	2	3	1
White shark - Atlantic [member of Prohibited Species complex]	NA	NA	4^	1	1	0	1	1	0	2	2	0	1	1	0	0	0	0
Yellowfin tuna - Atlantic	2019	6	2^	3	4	1	2	3	1	3	4	1	3	5	2	2	3	1
Alaska Fisheries Science Center																		
Groundfish of the Bering Sea and Aleutian Islands Management Area Fishery Management Plan																		
Alaska plaice – Bering Sea / Aleutian Islands	2021	6	2	5	5	0	5	5	0	4	4	0	4	4	0	2	3	1
Alaska skate – Bering Sea / Aleutian Islands [member of Bering Sea / Aleutian Islands Skate Complex]	2021	6	2	3	5	2	3	4	1	4	4	0	3	3	0	2	2	0
Arrowtooth flounder – Bering Sea / Aleutian Islands	2021	6	2	4	4	0	4	4	0	3	4	1	3	3	0	4	4	0
Atka mackerel – Bering Sea / Aleutian Islands	2020	6	1	5	5	0	4	4	0	4	5	1	4	5	1	2	3	1
Bering Sea / Aleutian Islands Blackspotted and Rougheye Rockfish Complex	2020	6	2	4	5	1	4	4	0	4	4	0	4	5	1	2	3	1
Bering Sea / Aleutian Islands Flathead Sole Complex [indicator = flathead sole]	2021	6	2	5	5	0	4	4	0	4	4	0	4	5	1	2	1	0
Bering Sea / Aleutian Islands Octopus Complex [indicator = giant Pacific octopus]	2020	1	2	3	3	0	2	3	1	1	2	1	1	2	1	1	2	1
Bering Sea / Aleutian Islands Other Flatfish Complex [indicator = starry flounder]	2020	2	4	5	4	0	4	4	0	2	2	0	1	1	0	0	0	0
Bering Sea / Aleutian Islands Other Rockfish Complex	2020	2	4	2	5	3	3	4	1	3	4	1	1	4	3	0	4	4
Bering Sea / Aleutian Islands Other Skates Complex [remainder of Bering Sea / Aleutian Islands Skate Complex]	2021	2	2	3	5	2	2	4	2	2	3	1	2	2	0	0	2	2
Bering Sea / Aleutian Islands Rock Sole Complex [indicator = northern rock sole]	2021	6	2	5	5	0	4	5	1	4	4	0	4	5	1	2	4	2
Bering Sea / Aleutian Islands Shark Complex [indicator = Pacific sleeper shark]	2016	1	2	2	2	0	1	2	1	1	2	1	1	2	1	1	1	0
Greenland halibut – Bering Sea / Aleutian Islands	2021	6	2	5	5	0	3	4	1	3	4	1	3	4	1	2	3	1

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Kamchatka flounder – Bering Sea / Aleutian Islands	2021	6	2	4	5	1	3	4	1	3	4	1	3	4	1	2	2	0
Northern rockfish – Bering Sea / Aleutian Islands	2021	6	2	5	5	0	4	4	0	4	4	0	4	5	1	2	3	1
Pacific cod – Aleutian Islands	2021	2	2	5	5	0	3	4	1	1	4	3	1	4	3	2	2	0
Pacific cod – Bering Sea	2021	6	2	4	5	1	3	5	2	4	5	1	4	5	1	2	4	2
Pacific ocean perch – Bering Sea / Aleutian Islands	2021	6	2	5	5	0	4	4	0	4	4	0	4	5	1	2	3	1
Shortraker rockfish – Bering Sea / Aleutian Islands	2020	2	4	2	5	3	3	4	1	2	4	2	1	4	3	0	4	4
Walleye pollock – Aleutian Islands	2021	6	4	5	5	0	3	4	1	2	3	1	2	5	3	2	2	0
Walleye pollock – Bogoslof	2020	2	2	5	5	0	4	4	0	4	4	0	4	4	0	0	0	0
Walleye pollock – Eastern Bering Sea	2020	6	1	5	5	0	4	4	0	4	4	0	4	5	1	2	4	2
Yellowfin sole – Bering Sea / Aleutian Islands	2021	6	1	5	5	0	5	5	0	4	5	1	4	5	1	4	4	0
Groundfish of the Gulf of Alaska Fishery Management Plan																		
Arrowtooth flounder – Gulf of Alaska	2021	6	2	4	4	0	4	4	0	3	3	0	4	3	0	2	2	0
Atka mackerel – Gulf of Alaska	2016	1	1	1	2	1	0	1	1	3	4	1	1	2	1	0	1	1
Big skate – Gulf of Alaska [member of Gulf of Alaska Skates]	2021	2	2	5	5	0	4	4	0	2	5	3	2	3	1	0	2	2
Dover sole – Gulf of Alaska [indicator for Gulf of Alaska Deepwater Flatfish Complex]	2021	6	4	5	5	0	4	4	0	4	4	0	3	3	0	2	2	0
Dusky rockfish – Gulf of Alaska	2021	6	2	4	4	0	3	4	1	1	2	1	4	4	0	2	1	0
Flathead sole – Gulf of Alaska	2020	6	4	5	5	0	4	4	0	4	4	0	3	4	1	2	1	0
Gulf of Alaska Blackspotted and Rougheye Rockfish Complex	2020	6	4	4	5	1	4	4	0	4	4	0	4	4	0	2	2	0
Gulf of Alaska Demersal Shelf Rockfish Complex [indicator = yelloweye rockfish]	NA	NA	2	2	2	0	1	1	0	0	0	0	1	1	0	0	0	0
Gulf of Alaska Octopus Complex [indicator = giant Pacific octopus]	2017	2	2	3	3	0	3	3	0	1	2	1	2	2	0	1	2	1
Gulf of Alaska Other Deepwater Flatfish Complex [indicator = Dover sole]	2016	1	4	3	2	0	4	4	0	1	1	0	0	0	0	0	1	1
Gulf of Alaska Other Rockfish Complex [indicator = silvergray rockfish]	2021	2	2	3	3	0	3	3	0	2	2	0	1	2	1	0	1	1
Gulf of Alaska Other Shallow Water Flatfish Complex [remainder of Gulf of Alaska Shallow Water Flatfish Complex]	2019	2	4	4	4	0	3	4	1	0	2	2	1	2	1	0	1	1
Gulf of Alaska Other Skates Complex [remainder of Gulf of Alaska Skates]	2021	2	2	3	5	2	4	4	0	2	3	1	2	2	0	0	2	2
Gulf of Alaska Shark Complex [indicator = spiny dogfish]	2020	2	2	3	3	0	3	3	0	2	3	1	1	2	1	0	1	1

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Gulf of Alaska Thornyhead Rockfish Complex [indicator = shortspine thornyhead]	2020	2	2	2	3	1	3	3	0	2	4	2	2	3	1	0	1	1
Longnose skate – Gulf of Alaska [member of Gulf of Alaska Skates]	2021	2	2	5	5	0	4	4	0	2	5	3	2	3	1	0	2	2
Northern rock sole – Gulf of Alaska [indicator for Gulf of Alaska Shallow Water Flatfish Complex]	2020	6	4	3	4	1	3	4	1	3	4	1	3	4	1	2	2	0
Northern rockfish – Western / Central Gulf of Alaska	2021	6	2	5	5	0	3	4	1	3	4	1	4	4	0	2	2	0
Pacific cod – Gulf of Alaska	2020	6	1	5	5	0	4	4	0	4	5	1	4	5	1	4	5	1
Pacific ocean perch – Gulf of Alaska	2021	6	2	5	5	0	4	4	0	4	4	0	4	5	1	2	4	2
Rex sole – Gulf of Alaska	2019	6	2	5	5	0	4	4	0	4	5	1	5	5	0	2	2	0
Rock sole – Gulf of Alaska [indicator for Gulf of Alaska Shallow Water Flatfish Complex]	2020	6	4	3	4	1	4	4	0	3	4	1	3	4	1	2	2	0
Sharpchin rockfish – Gulf of Alaska [member of Gulf of Alaska Other Rockfish Complex]	NA	NA	2	3	3	0	3	3	0	2	2	0	2	2	0	1	1	0
Shortraker rockfish – Gulf of Alaska	2021	2	2	2	3	1	3	3	0	2	4	2	2	3	1	0	1	1
Walleye pollock – Southeast Gulf of Alaska	2021	2	2	5	5	0	3	4	1	2	4	2	2	2	0	0	0	0
Walleye pollock – Western / Central / West Yautat Gulf of Alaska	2021	6	1	5	5	0	4	5	1	4	5	1	5	5	0	2	4	2
Yelloweye rockfish – Gulf of Alaska [indicator for Gulf of Alaska Demersal Shelf Rockfish Complex]	2021	2	2	4	4	0	3	4	1	3	4	1	2	5	3	0	2	2
Groundfish of the Bering Sea and Aleutian Islands Management Area Fishery Management Plan/Groundfish of the Gulf of Alaska Fishery Management Plan																		
Sablefish - Eastern Bering Sea / Aleutian Islands / Gulf of Alaska	2021	6	1	5	5	0	4	4	0	4	4	0	4	5	1	2	4	2
Bering Sea/Aleutian Islands King and Tanner Crabs Fishery Management Plan																		
Blue king crab – Pribilof Islands	2021	2	3	4	5	1	3	3	0	2	3	1	2	2	0	0	4	4
Blue king crab – Saint Matthew Island	2020	5	1	3	4	1	3	4	1	2	3	1	3	3	0	2	2	0
Golden king crab – Aleutian Islands	2021	5	1	4	5	1	2	3	1	4	4	0	3	3	0	2	2	0
Golden king crab – Pribilof Islands	2017	1	3	3	3	0	2	3	1	1	1	0	1	2	1	1	1	0
Red king crab – Bristol Bay	2021	5	1	5	5	0	4	5	1	3	5	2	3	3	0	3	3	0
Red king crab – Norton Sound	2021	5	2	3	5	2	3	4	1	1	3	2	3	3	0	3	2	0
Red king crab – Pribilof Islands	2019	5	2	5	5	0	4	4	0	1	3	2	3	3	0	2	2	0
Red king crab – Western Aleutian Islands	2017	1	3	3	3	0	1	1	0	2	2	0	1	2	1	0	1	1
Snow crab – Bering Sea	2021	5	1	5	5	0	4	5	1	3	5	2	3	3	0	2	3	1
Southern Tanner crab – Bering Sea	2021	5	1	4	4	0	4	5	1	3	5	2	3	3	0	2	4	2

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Fish Resources of the Arctic Management Area Fishery Management Plan																		
Arctic cod - Arctic Management Area	NA	NA	1^	0	0	0	0	3	3	1	2	1	1	3	2	1	2	1
Saffron cod - Arctic Management Area	NA	NA	2^	0	0	0	0	3	3	1	2	1	1	3	2	1	2	1
Snow crab - Arctic Management Area	NA	NA	4^	0	0	0	0	3	3	1	2	1	1	3	2	1	2	1
Salmon Fisheries in the EEZ off the Coast of Alaska Fishery Management Plan																		
Coho salmon - Auke Creek [indicator for Alaska Coho Salmon Assemblage]	2021	2	1^	5	5	0	5	5	0	3	5	2	0	5	5	2	2	0
Coho salmon - Berners River [indicator for Alaska Coho Salmon Assemblage]	2021	2	1^	5	5	0	4	4	0	3	5	2	0	5	5	2	2	0
Coho salmon - Hugh Smith Lake [indicator for Alaska Coho Salmon Assemblage]	2021	2	1^	5	5	0	5	5	0	4	4	0	5	5	0	2	2	0
Chinook salmon - Eastern North Pacific Far North Migrating	2021	6	1^	5	5	0	4	4	0	4	4	0	0	4	4	2	2	0
Scallop Fishery off Alaska Fishery Management Plan																		
Weathervane scallop - Alaska	2021	2	1^	5	5	0	3	3	0	3	4	1	4	5	1	0	0	0
Northwest Fisheries Science Center																		
Pacific Coast Groundfish																		
Arrowtooth flounder - Pacific Coast	2021	6	6	4	4	0	4	4	0	3	3	0	3	4	1	2	2	0
Aurora rockfish - Pacific Coast [member of Minor Slope Rockfish]	2013	6	10	4	4	0	4	4	0	3	3	0	3	3	0	2	2	0
Bank rockfish - Pacific Coast [member of Minor Slope Rockfish]	2010	1	4^	3	3	0	3	3	0	2	2	0	3	3	0	0	0	0
Big skate - Pacific Coast	2019	6	4	3	3	0	4	4	0	3	3	0	3	3	0	0	2	2
Black rockfish - Pacific Coast	2019	6	4	3	4	1	2	3	1	3	5	2	3	5	2	2	4	2
Blackgill rockfish - Pacific Coast [member of Minor Slope Rockfish]	2019	6	10	3	3	0	2	2	0	3	3	0	3	3	0	0	2	2
Bocaccio - Pacific Coast	2017	6	4	4	5	1	4	4	0	3	5	2	3	4	1	2	4	2
Bronzespotted rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	2	2	0	2	2	0	1	1	0	0	0	0	0	0	0
Brown rockfish - Pacific Coast [member of Minor Nearshore Rockfish]	2013	3	4^	3	4	1	2	2	0	3	4	1	2	2	0	0	2	2
Butter sole - Pacific Coast [member of Other Flatfish]	NA	NA	2^	2	2	0	0	0	0	1	1	0	1	1	0	0	0	0
Cabezon - Pacific Coast	2019	6	4	3	4	1	2	2	0	2	3	1	3	3	0	2	2	0
Calico rockfish - Pacific Coast [member of Minor Nearshore Rockfish]	NA	NA	4^	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
California scorpionfish - Pacific Coast	2017	6	6	4	5	1	2	2	0	3	3	0	3	5	2	2	2	0

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Canary rockfish - Pacific Coast	2021	6	6	4	5	1	3	4	1	3	5	2	3	5	2	2	4	2
Chameleon rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
Chilipepper - Pacific Coast	2017	6	6	4	4	0	3	4	1	3	3	0	3	3	0	2	2	0
China rockfish - Pacific Coast	2019	6	10	3	4	1	2	3	1	3	3	0	3	3	0	1	2	1
Copper rockfish - Pacific Coast	2021	5	6^	4	5	1	0	3	3	3	4	1	2	5	3	0	2	2
Cowcod - Pacific Coast	2019	6	10	3	4	1	3	3	0	3	3	0	3	3	0	1	2	1
Curlfin sole - Pacific Coast [member of Other Flatfish]	NA	NA	2^	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0
Darkblotched rockfish - Pacific Coast	2021	6	8	4	4	0	4	4	0	3	3	0	3	3	0	2	2	0
Dover sole - Pacific Coast	2021	6	6	5	5	0	4	4	0	3	5	2	4	5	1	2	4	2
English sole - Pacific Coast	2013	3	6	3	4	1	4	4	0	3	3	0	3	3	0	0	0	0
Flag rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	2	2	0	0	0	0
Flathead sole - Pacific Coast [member of Other Flatfish]	NA	NA	4^	2	2	0	3	3	0	1	1	0	2	2	0	0	0	0
Freckled rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
Grass rockfish - Pacific Coast [member of Minor Nearshore Rockfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0
Greenblotched rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	6^	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0
Greenspotted rockfish - Pacific Coast [member of Minor Shelf Rockfish]	2011	6	10	3	3	0	3	3	0	3	3	0	3	4	1	2	2	0
Greenstriped rockfish - Pacific Coast [member of Minor Shelf Rockfish]	2009	6	10	4	4	0	3	3	0	3	3	0	3	3	0	2	2	0
Halfbanded rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
Harlequin rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
Honeycomb rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	2	2	0	0	0	0
Kelp greenling - Pacific Coast [member of Other Fish]	2015	6	6	3	3	0	2	3	1	3	3	0	3	3	0	2	2	0
Kelp rockfish - Pacific Coast [member of Minor Nearshore Rockfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	2	2	0	0	0	0
Leopard shark - Pacific Coast [member of Other Fish]	NA	NA	4^	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Lingcod - Pacific Coast	2021	6	4	3	5	2	4	4	0	3	5	2	3	5	2	2	4	2
Longnose skate - Pacific Coast	2019	6	6	3	5	2	4	4	0	3	4	1	3	3	0	1	2	1

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Longspine thornyhead - Pacific Coast	2019	6	8	3	5	2	4	4	0	3	3	0	3	3	0	2	2	0
Mexican rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0
Olive rockfish - Pacific Coast [member of Minor Nearshore Rockfish]	NA	NA	4^	3	3	0	0	0	0	1	1	0	2	2	0	0	0	0
Pacific Coast Blue and Deacon Rockfish Complex [member of Minor Nearshore Rockfish]	2019	6	8	3	4	1	2	3	1	3	4	1	3	4	1	2	2	0
Pacific Coast Gopher and Black-and-Yellow Rockfish Complex [member of Minor Nearshore Rockfish]	2019	6	6	3	4	1	2	3	1	2	4	2	3	5	2	2	2	0
Pacific Coast Blackspotted and Rougheye Rockfish Complex [member of Minor Slope Rockfish]	2019	6	10	3	4	1	3	3	0	3	3	0	3	3	0	2	2	0
Pacific Coast Vermilion and Sunset Rockfish Complex [member of Minor Shelf Rockfish]	2021	6	4^	3	5	2	2	2	0	3	5	2	3	5	2	2	2	0
Pacific cod - Pacific Coast	NA	NA	2^	3	3	0	3	3	0	2	3	1	3	3	0	0	2	2
Pacific hake - Pacfic Coast	2021	6	2^	5	5	0	4	4	0	4	5	1	5	5	0	2	5	3
Pacific ocean perch - Pacific Coast	2017	6	10	4	5	1	4	4	0	4	4	0	5	5	0	2	2	0
Pacific sanddab - Pacific Coast [member of Other Flatfish]	2013	6	2^	4	4	0	4	4	0	4	4	0	4	4	0	2	2	0
Pacific spiny dogfish - Pacific Coast	2021	6	10	3	5	2	4	4	0	3	4	1	3	3	0	0	2	2
Petrale sole - Pacific Coast	2021	6	4	5	5	0	4	4	0	3	5	2	5	5	0	2	4	2
Pink rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0
Pinkrose rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
Pygmy rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
Quillback rockfish - Pacific Coast [member of Minor Nearshore Rockfish]	NA	NA	4^	3	5	2	0	3	3	2	3	1	3	3	0	0	2	2
Redbanded rockfish - Pacific Coast [member of Minor Slope Rockfish]	NA	NA	4^	3	3	0	3	3	0	1	1	0	2	2	0	0	0	0
Redstripe rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	6^	3	3	0	0	0	0	1	1	0	0	0	0	0	0	0
Rex sole - Pacific Coast [member of Other Flatfish]	2013	3	6	3	3	0	4	4	0	3	3	0	2	2	0	0	0	0
Rock sole - Pacific Coast [member of Other Flatfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	2	2	0	0	0	0
Rosethorn rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0
Rosy rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Sablefish - Pacific Coast	2021	6	4	4	5	1	4	4	0	4	5	1	4	5	1	4	4	0
Sand sole - Pacific Coast [member of Other Flatfish]	NA	NA	2^	2	2	0	0	0	0	1	1	0	2	2	0	0	0	0
Sharpchin rockfish - Pacific Coast [member of Minor Slope Rockfish]	2013	3	10	3	3	0	3	3	0	2	2	0	2	2	0	0	0	0
Shortbelly rockfish - Pacific Coast	2007	6	4^	3	3	0	3	4	1	4	4	0	3	3	0	2	2	0
Shortraker rockfish - Pacific Coast [member of Minor Slope Rockfish]	NA	NA	6^	2	2	0	0	0	0	1	1	0	2	2	0	0	0	0
Shortspine thornyhead - Pacific Coast	2019	6	8	3	3	0	4	4	0	2	4	2	3	4	1	2	2	0
Silvergray rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	8^	3	3	0	3	3	0	1	1	0	2	2	0	0	0	0
Speckled rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	6^	2	2	0	0	0	0	1	1	0	2	2	0	0	0	0
Splitnose rockfish - Pacific Coast	2009	6	8	3	3	0	3	3	0	3	3	0	3	3	0	2	2	0
Squarespot rockfish - Pacific Coast [member of Minor Shelf Rockfish]	2021	5	4^	3	3	0	3	0	0	2	2	0	2	2	0	0	0	0
Starry flounder - Pacific Coast	2017	1	4^	3	3	0	2	2	0	2	2	0	2	2	0	0	0	0
Starry rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	6^	3	3	0	0	0	0	1	1	0	2	2	0	0	0	0
Stripetail rockfish - Pacific Coast	2013	3	4^	3	3	0	4	4	0	2	2	0	2	2	0	0	0	0
Swordspine rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0
Tiger rockfish - Pacific Coast [member of Minor Shelf Rockfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0
Treefish - Pacific Coast [member of Minor Nearshore Rockfish]	NA	NA	4^	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0
Widow rockfish - Pacific Coast	2019	6	6	4	5	1	3	3	0	3	5	2	4	5	1	2	4	2
Yelloweye rockfish - Pacific Coast	2017	6	10	4	5	1	3	4	1	3	4	1	3	5	2	2	2	0
Yellowmouth rockfish - Pacific Coast [member of Minor Slope Rockfish]	NA	NA	6^	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
Yellowtail rockfish - Pacific Coast	2017	6	6	3	5	2	3	4	1	4	5	1	4	5	1	2	4	2
Pacific Coast Salmon Fishery Management Plan																		
Chinook salmon - Columbia River Basin: Lower River Hatchery Fall	2021	4	1^	3	3	0	4	4	0	4	4	0	4	4	0	1	3	2
Chinook salmon - Columbia River Basin: Lower River Hatchery Spring	2021	2	1^	3	3	0	2	4	2	4	4	0	4	4	0	0	3	3
Chinook salmon - Columbia River Basin: Mid-River Bright Hatchery Fall	2021	4	1^	3	3	0	4	4	0	4	4	0	4	4	0	0	3	3
Chinook salmon - Columbia River Basin: North Lewis River Fall	2021	4	1^	3	4	1	3	4	1	4	4	0	4	5	1	0	4	4

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Chinook salmon - Columbia River Basin: Snake River Fall	2021	4	1^	2	3	1	4	4	0	4	4	0	4	5	1	0	4	4
Chinook salmon - Columbia River Basin: Snake River Spring/Summer	2021	4	1^	3	4	1	4	4	0	4	4	0	4	5	1	0	4	4
Chinook salmon - Columbia River Basin: Spring Creek Hatchery Fall	2021	4	1^	3	3	0	4	4	0	4	4	0	4	4	0	0	3	3
Chinook salmon - Columbia River Basin: Upper River Bright Fall	2021	4	1^	3	3	0	4	4	0	4	4	0	4	4	0	0	3	3
Chinook salmon - Columbia River Basin: Upper River Spring	2021	4	1^	3	4	1	4	4	0	4	5	1	4	5	1	0	4	4
Chinook salmon - Columbia River Basin: Upper River Summer	2021	4	1^	4	4	0	2	4	2	4	4	0	4	4	0	0	3	3
Chinook salmon - Columbia River Basin: Upper Willamette Spring	2021	4	1^	3	4	1	4	4	0	4	5	1	4	5	1	0	4	4
Chinook salmon - Oregon Coast: Central and Northern Oregon	2021	4	1^	2	3	1	2	4	2	2	4	2	3	3	0	0	3	3
Chinook salmon - Oregon Coast: Southern Oregon	2021	4	1^	3	3	0	2	4	2	4	4	0	4	4	0	0	3	3
Chinook salmon - Puget Sound: Cedar River Summer/Fall	2021	4	1^	4	4	0	4	4	0	4	5	1	4	5	1	0	4	4
Chinook salmon - Puget Sound: Eastern Strait of Juan de Fuca Summer/Fall	2021	4	1^	2	4	2	3	4	1	3	5	2	4	5	1	0	4	4
Chinook salmon - Puget Sound: Green River Summer/Fall	2021	4	1^	4	4	0	4	4	0	4	5	1	4	5	1	0	4	4
Chinook salmon - Puget Sound: Mid Hood Canal Summer/Fall	2021	4	1^	2	4	2	3	4	1	4	5	1	3	5	2	0	4	4
Chinook salmon - Puget Sound: Nisqually River Summer/Fall	2021	4	1^	4	4	0	4	4	0	4	5	1	4	5	1	0	4	4
Chinook salmon - Puget Sound: Nooksack Spring Early	2021	4	1^	4	4	0	4	4	0	4	5	1	4	5	1	0	4	4
Chinook salmon - Puget Sound: Puyallup Summer/Fall	2021	4	1^	4	4	0	4	4	0	4	5	1	4	5	1	0	4	4
Chinook salmon - Puget Sound: Skagit Spring	2021	4	1^	4	4	0	4	4	0	4	5	1	4	5	1	0	4	4
Chinook salmon - Puget Sound: Skagit Summer/Fall	2021	4	1^	4	4	0	4	4	0	4	5	1	4	5	1	0	4	4
Chinook salmon - Puget Sound: Skokomish Summer/Fall	2021	2	1^	5	5	0	3	4	1	4	5	1	4	5	1	0	4	4
Chinook salmon - Puget Sound: Snohomish Summer/Fall	2021	4	1^	4	4	0	4	4	0	4	5	1	4	5	1	3	4	1
Chinook salmon - Puget Sound: Stillaguamish Summer/Fall	2021	4	1^	4	4	0	4	4	0	4	5	1	4	5	1	3	4	1
Chinook salmon - Puget Sound: White River Spring	2021	4	1^	4	4	0	3	4	1	3	5	2	4	5	1	0	4	4

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch C	Catch T	Catch G	Abun C	Abun T	Abun G	LH C	LH T	LH G	Comp C	Comp T	Comp G	Eco C	Eco T	Eco G
Chinook salmon - Washington Coast: Grays Harbor Fall	2021	4	1^	4	4	0	4	4	0	4	4	0	3	4	1	0	3	3
Chinook salmon - Washington Coast: Grays Harbor Spring	2021	4	1^	3	4	1	4	4	0	4	4	0	3	4	1	0	3	3
Chinook salmon - Washington Coast: Hoh Fall	2021	4	1^	3	4	1	4	4	0	4	4	0	3	4	1	0	3	3
Chinook salmon - Washington Coast: Hoh Spring/Summer	2021	4	1^	3	4	1	4	4	0	3	4	1	3	4	1	0	3	3
Chinook salmon - Washington Coast: Hoko Summer/Fall	2021	4	1^	4	4	0	4	4	0	4	4	0	4	4	0	0	3	3
Chinook salmon - Washington Coast: Queets Fall	2021	4	1^	4	4	0	4	4	0	4	4	0	4	4	0	0	3	3
Chinook salmon - Washington Coast: Queets Spring/Summer	2021	4	1^	4	4	0	4	4	0	4	4	0	4	4	0	0	3	3
Chinook salmon - Washington Coast: Quillayute Fall	2021	4	1^	4	4	0	4	4	0	4	4	0	4	4	0	0	3	3
Chinook salmon - Washington Coast: Quillayute Spring/Summer	2021	4	1^	4	4	0	4	4	0	4	4	0	4	4	0	0	3	3
Chinook salmon - Washington Coast: Quinault Fall Hatchery	2021	4	1^	4	4	0	4	4	0	4	4	0	4	4	0	0	3	3
Chinook salmon - Washington Coast: Willapa Bay Fall Hatchery	2021	4	1^	4	4	0	4	4	0	4	4	0	4	4	0	0	3	3
Chinook salmon - Washington Coast: Willapa Bay Fall Natural	2021	4	1^	4	4	0	4	4	0	4	4	0	4	4	0	0	3	3
Coho salmon - Oregon Production Index Area: Columbia River Early Hatchery	2021	4	1^	4	4	0	3	4	1	3	4	1	3	5	2	0	4	4
Coho salmon - Oregon Production Index Area: Columbia River Late Hatchery	2021	4	1^	4	4	0	3	4	1	3	4	1	3	5	2	0	4	4
Coho salmon - Oregon Production Index Area: Lower Columbia Natural	2021	2	1^	2	4	2	3	4	1	3	5	2	3	5	2	0	4	4
Coho salmon - Oregon Production Index Area: Oregon Coast Hatchery	2021	4	1^	4	4	0	3	4	1	3	4	1	3	5	2	0	4	4
Coho salmon - Oregon Production Index Area: Oregon Coast Natural	2021	4	1^	4	4	0	3	4	1	3	5	2	3	5	2	3	4	1
Coho salmon - Puget Sound: Hood Canal	2021	4	1^	4	4	0	4	4	0	3	4	1	3	5	2	0	4	4
Coho salmon - Puget Sound: Skagit	2021	4	1^	4	4	0	3	4	1	3	4	1	3	5	2	3	4	1
Coho salmon - Puget Sound: Snohomish	2021	4	1^	4	4	0	3	4	1	3	4	1	3	5	2	1	4	3
Coho salmon - Puget Sound: South Puget Sound Hatchery	2021	4	1^	4	4	0	3	4	1	3	4	1	3	5	2	1	4	3
Coho salmon - Puget Sound: Stillaguamish	2021	4	1^	4	4	0	3	4	1	3	4	1	3	5	2	0	4	4
Coho salmon - Washington Coast: Grays Harbor	2021	4	1^	4	4	0	3	4	1	3	4	1	3	4	1	3	4	1
Coho salmon - Washington Coast: Hoh	2021	3	1^	4	4	0	3	4	1	3	4	1	3	4	1	3	4	1
Coho salmon - Washington Coast: Queets	2021	4	1^	4	4	0	3	4	1	3	4	1	3	4	1	3	4	1

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Coho salmon - Washington Coast: Quillayute Fall	2021	4	1^	4	4	0	3	4	1	3	4	1	3	4	1	1	4	3
Coho salmon - Washington Coast: Quillayute Summer Hatchery	2021	4	1^	4	4	0	3	4	1	3	4	1	3	4	1	1	4	3
Coho salmon - Washington Coast: Quinault Hatchery	2021	2	1^	4	4	0	3	4	1	3	4	1	3	4	1	1	4	3
Coho salmon - Washington Coast: Strait of Juan de Fuca	2021	4	1^	4	4	0	3	4	1	3	4	1	3	4	1	3	4	1
Coho salmon - Washington Coast: Willapa Bay Hatchery	2021	4	1^	4	4	0	3	4	1	3	4	1	3	4	1	1	4	3
Coho salmon - Washington Coast: Willapa Bay Natural	2021	4	1^	4	4	0	3	4	1	3	4	1	3	4	1	1	4	3
Pink salmon - Puget Sound	2021	3	1^	3	3	0	2	2	0	3	3	0	3	3	0	3	3	0
Southwest Fisheries Science Center																		
Pacific Coast Salmon Fishery Management Plan																		
Chinook salmon - California Central Valley: Sacramento River Fall	2021	3	1^	4	5	1	4	5	1	1	5	4	2	5	3	0	2	2
Chinook salmon - California Central Valley: Sacramento River Spring	2021	2	1^	2	5	3	3	5	2	0	4	4	2	4	2	0	2	2
Chinook salmon - California Central Valley: Sacramento River Winter	2021	4	1^	4	5	1	4	5	1	3	4	1	3	4	1	0	2	2
Chinook salmon - Northern California Coast: California Coastal	2021	2	1^	1	5	4	3	4	1	0	4	4	0	4	4	0	2	2
Chinook salmon - Northern California Coast: Klamath River Fall	2021	4	1^	4	5	1	4	5	1	3	5	2	5	5	0	0	2	2
Chinook salmon - Northern California Coast: Klamath River Spring	2013	2	1^	2	5	3	3	5	2	0	5	5	1	5	4	0	2	2
Chinook salmon - Northern California Coast: Smith River	NA	NA	1^	2	5	3	3	4	1	0	0	0	1	2	1	0	2	2
Coho salmon - Oregon Production Index Area: Central California Coast	2021	2	1^	1	2	1	3	3	0	0	2	2	0	2	2	0	2	2
Coho salmon - Oregon Production Index Area: Southern Oregon/Northern California Coast	2021	2	1^	1	2	1	3	4	1	0	2	2	0	2	2	0	2	2
Coastal Pelagic Species Fishery Management Plan																		
Jack mackerel - Pacific Coast	NA	NA	3^	4	4	0	0	3	3	2	3	1	1	4	3	0	3	3
Krill (Euphausiacea) - Pacific Coast	NA	NA	1^	2	4	2	3	3	0	1	3	2	0	3	3	0	3	3
Northern anchovy - Northern Pacific Coast	NA	NA	1^	4	4	0	3	4	1	2	3	1	0	4	4	0	4	4
Northern anchovy - Southern Pacific Coast	NA	NA	1^	4	4	0	3	4	1	3	3	0	3	4	1	0	4	4
Opalescent inshore squid - Pacific Coast	2006	1	1^	3	4	1	0	4	4	2	5	3	0	4	4	0	4	4
Pacific chub mackerel - Pacific Coast	2019	6	2^	4	4	0	3	4	1	3	5	2	3	4	1	1	4	3

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Pacific sardine - Northern Subpopulation	2020	6	2^	5	5	0	4	4	0	5	5	0	5	4	0	2	4	2
U.S. West Coast Fisheries for Highly Migratory Species Fishery Management Plan / Pacific Pelagic Fisheries of the Western Pacific Region Ecosystem Fishery Management Plan																		
Albacore - North Pacific	2020	6	3^	4	4	0	2	2	0	3	4	1	4	4	0	2	3	1
Bigeye tuna - Eastern Pacific	2020	6	3^	5	5	0	2	5	3	2	4	2	4	3	0	2	3	1
Blue shark - North Pacific	2017	6	3^	3	4	1	2	2	0	3	4	1	3	3	0	2	3	1
Pacific bluefin tuna - Pacific	2020	6	2^	4	4	0	3	5	2	4	4	0	4	4	0	2	3	1
Shortfin mako - North Pacific	2018	6	3^	4	4	0	2	2	0	3	4	1	3	4	1	2	3	1
Skipjack tuna - Eastern Pacific	2018	2	1^	5	5	0	2	2	0	3	4	1	4	4	0	0	3	3
Striped marlin - Eastern Pacific	2010	6	1^	4	4	0	2	2	0	3	4	1	3	4	1	2	3	1
Swordfish - Eastern Pacific	2014	3	3^	4	4	0	2	2	0	3	4	1	3	4	1	0	3	3
Yellowfin tuna - Eastern Pacific	2020	6	2^	4	4	0	2	5	3	3	4	1	3	4	1	2	3	1
Pacific Islands Fisheries Science Center																		
American Samoa Archipelago Ecosystem Fishery Management Plan																		
American Samoa Bottomfish Multi-species Complex	2019	3	1	5	5	0	2	5	3	1	5	4	0	5	5	2	3	1
Hawaii Archipelago Ecosystem Fishery Management Plan																		
Crimson jobfish - Main Hawaiian Islands	2018	3	2^	5	5	0	2	5	3	1	5	4	0	5	5	1	3	2
Green jobfish - Main Hawaiian Islands	2020	5	3	3	5	2	2	5	3	2	5	3	3	5	2	2	3	1
180 Fathom Bank Precious Coral Complex	NA	NA	10	0	2	2	0	1	1	1	2	1	0	0	0	0	0	0
Au'Au Bed Black Coral Complex	NA	NA	10	0	5	5	0	1	1	1	2	1	0	0	0	0	0	0
Brooks Bank Precious Coral Complex	NA	NA	10	0	2	2	0	1	1	1	2	1	0	0	0	0	0	0
Deepwater shrimps (Heterocarpus spp.) - Main Hawaiian Islands	NA	NA	2	0	5	5	0	1	1	1	2	1	0	0	0	0	0	0
Hancock Seamount Groundfish Complex	NA	NA	10^	0	2	2	0	1	1	1	2	1	0	0	0	0	0	0
Hawaiian Archipelago Exploratory Area Precious Coral Complex	NA	NA	10	0	2	2	0	1	1	1	2	1	0	0	0	0	0	0
Kaena Point Bed Precious Coral Complex	NA	NA	10	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0
Keahole Bed Precious Coral Complex	NA	NA	10	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0
Main Hawaiian Islands Deep 7 Bottomfish Multi-species Complex	2021	3	2	3	5	2	2	5	3	1	5	4	0	5	5	2	3	1
Makapu'u Bed Precious Corals Multi-species Complex	NA	NA	10	0	0	0	0	0	0	2	2	0	0	0	0	0	2	2
Northwestern Hawaiian Islands Bottomfish Multi-species Complex	NA	NA	2^	0	0	0	0	0	0	2	2	0	0	0	0	0	2	2

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Northwestern Hawaiian Islands Crustacean Complex	NA	NA	3^	0	0	0	0	0	0	1	2	1	0	0	0	0	2	2
Spanner crab - Main Hawaiian Islands	2019	3	3	3	5	2	2	4	2	2	3	1	0	3	3	2	3	1
Westpac Bed Refugium - Precious Corals Complex	NA	NA	10^	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0
Mariana Archipelago Ecosystem Fishery Management Plan																		
Guam Bottomfish Multi-species Complex	2019	3	1	5	5	0	2	5	3	1	5	4	0	5	5	2	3	1
Northern Mariana Islands Bottomfish Multi-species Complex	2019	3	1	5	5	0	2	5	3	1	5	4	0	5	5	2	3	1
Pacific Remote Island Areas Ecosystem Fishery Management Plan																		
Pacific Remote Island Areas Black Precious Coral Complex	NA	NA	10^	0	0	0	0	0	0	2	2	0	0	0	0	0	2	2
Pacific Remote Island Areas Bottomfish Complex	NA	NA	2^	0	0	0	0	0	0	1	2	1	0	0	0	0	2	2
Pacific Remote Island Areas Coral Reef Ecosystem Multi-species Complex	NA	NA	10^	0	0	0	0	0	0	2	2	0	0	0	0	0	2	2
Pacific Remote Island Areas Crustacean Complex	NA	NA	3^	0	0	0	0	0	0	1	2	1	0	0	0	0	2	2
Pacific Remote Island Areas Exploratory Area Precious Coral Complex	NA	NA	10^	0	0	0	0	0	0	1	2	1	0	0	0	0	2	2
Pacific Pelagic Fisheries of the Western Pacific Region Ecosystem Fishery Management Plan																		
Albacore - South Pacific	2015	6	3^	5	5	0	2	2	0	4	4	0	4	4	0	0	3	3
Black marlin - Pacific	NA	NA	1^	1	3	2	1	2	1	2	2	0	1	1	0	2	2	0
Blue marlin - Pacific	2013	6	2^	4	5	1	2	2	0	3	4	1	3	4	1	2	2	0
Kawakawa - Pacific	NA	NA	1	1	4	3	1	2	1	1	1	0	0	0	0	1	1	0
Longfin mako - North Pacific	NA	NA	3^	1	4	3	1	2	1	1	1	0	1	1	0	1	1	0
Oceanic whitetip shark - Western and Central Pacific	2019	6	3^	2	5	3	1	2	1	3	4	1	3	4	1	2	2	0
Opah - Pacific	NA	NA	1	1	5	4	1	2	1	1	3	2	1	3	2	0	2	2
Pacific Other Tuna Relatives Complex	NA	NA	1^	1	4	3	1	1	0	2	2	0	2	2	0	1	1	0
Pomfrets (Bramidae) - Pacific	NA	NA	1	1	5	4	1	2	1	1	3	2	1	3	2	0	1	1
Sailfish - Pacific	NA	NA	1^	3	4	1	2	2	0	2	3	1	2	3	1	1	2	1
Salmon shark - North Pacific	NA	NA	3^	4	4	0	1	2	1	2	3	1	2	3	1	1	2	1
Shortbill spearfish - Pacific	NA	NA	1^	3	4	1	2	2	0	2	3	1	2	3	1	1	2	1
Silky shark - Western and Central Pacific	2018	6	3^	4	5	1	2	2	0	3	3	0	3	3	0	2	2	0
Snake mackerels (Gempylidae) - Pacific	NA	NA	2^	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0

Stock/Complex	Last Asmt	Model Cat	Tar Freq	Catch			Abun			LH			Comp			Eco		
				C	T	G	C	T	G	C	T	G	C	T	G	C	T	G
Wahoo - Pacific	NA	NA	1	0	5	5	0	2	2	1	3	2	0	3	3	0	2	2
Western Pacific Squid Complex	NA	NA	1^	0	0	0	0	0	0	2	2	0	0	0	0	0	2	2
U.S. West Coast Fisheries for Highly Migratory Species Fishery Management Plan / Pacific Pelagic Fisheries of the Western Pacific Region Ecosystem Fishery Management Plan																		
Bigeye thresher - Pacific	2017	1	4^	5	5	0	2	2	0	3	3	0	2	2	0	0	1	1
Bigeye tuna - Western and Central Pacific	2020	6	3^	4	5	1	2	3	1	3	4	1	3	4	1	2	3	1
Dolphinfish - Pacific	NA	NA	1	1	5	4	1	2	1	2	3	1	2	4	2	1	3	2
Pelagic thresher - North Pacific	NA	NA	3^	0	4	4	0	2	2	1	1	0	0	2	2	0	0	0
Skipjack tuna - Western and Central Pacific	2019	5	1^	4	5	1	2	2	0	3	4	1	3	4	1	1	3	2
Striped marlin - Western and Central North Pacific	2019	5	1^	4	5	1	2	2	0	3	4	1	3	4	1	2	3	1
Swordfish - Western and Central North Pacific	2018	6	3^	4	5	1	2	2	0	4	4	0	4	4	0	2	3	1
Thresher shark - North Pacific	2018	6	3^	4	5	1	2	2	0	3	3	0	4	4	0	2	2	0
Yellowfin tuna - Western and Central Pacific	2020	5	2^	4	5	1	2	2	0	3	4	1	4	4	0	2	3	1