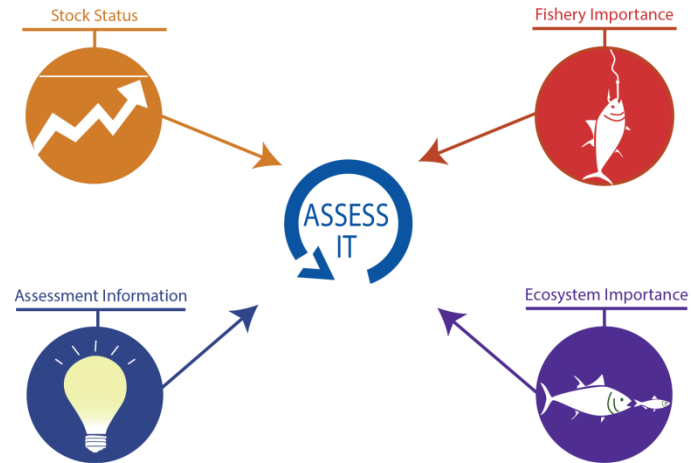


Stock Assessment Prioritization

Fish stock assessments provide the quantitative scientific information required by resource managers to determine stock status and set annual catch limits to prevent overfishing. Well-established procedures for assessments have been developed to utilize data from fishery catch monitoring, fishery-independent surveys of abundance, biological studies, and other sources to produce the highly focused deliverables required by the Magnuson-Stevens Act (MSA). These data collection and analysis activities constitute a significant portion of the budget for the National Marine Fisheries Service (NMFS), but resources are

insufficient to assess all managed stocks at a data-rich level each year (nor is this a realistic target). It is therefore important to provide a transparent, quantitative, and objective process for determining appropriate assessment targets, and how to prioritize our efforts to best meet those targets.



A document recently published by NMFS (<http://goo.gl/IVsvw7>) describes a national framework for prioritization of stock assessments. Although fish stock assessment prioritization will take place under the guidance of this national framework, the process will be implemented on a regional level, coordinating with existing regional processes and planning bodies. For each regions fish stocks, the prioritization process described under the national framework considers many of the same criteria as the existing process used to determine annual assessment priorities.

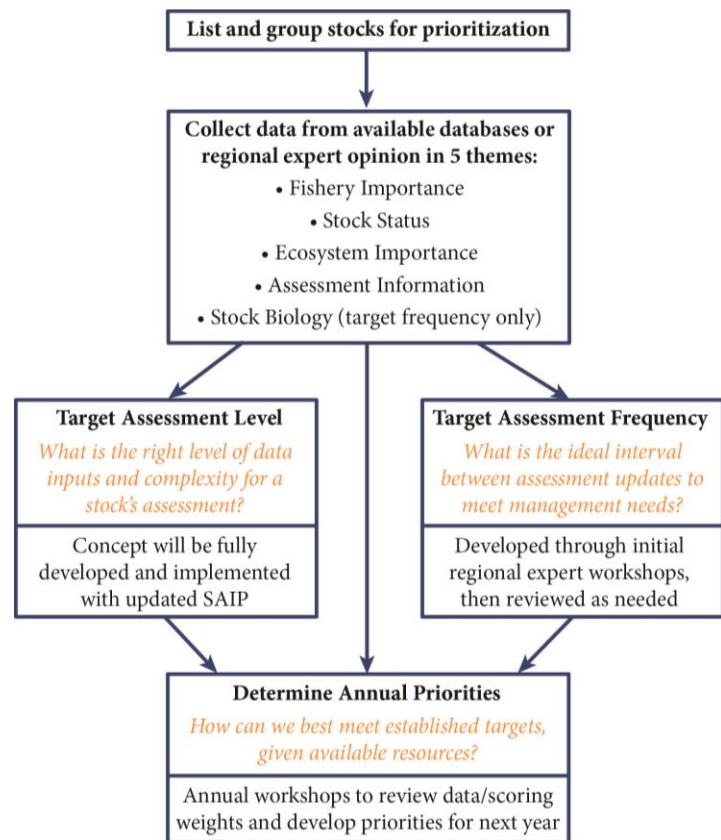
What Is Meant By Assessment Prioritization?

Prioritization IS:	Prioritization IS NOT:
<ul style="list-style-type: none"> • A way to ensure comprehensive, efficient and transparent decision-making for stock assessment planning 	<ul style="list-style-type: none"> • Intended to reallocate resources between regions
<ul style="list-style-type: none"> • Advisory and non-binding; regions maintain flexibility to make departures from recommendations when necessary 	<ul style="list-style-type: none"> • A prescriptive or final decision for all stock assessments
<ul style="list-style-type: none"> • Expected to evolve over time as implementation reveals improvements 	<ul style="list-style-type: none"> • A dramatically different way of doing business relative to current processes
<ul style="list-style-type: none"> • A way to identify data gaps and un-met needs 	<ul style="list-style-type: none"> • Going to automatically result in more assessments getting done each year

Stock assessment prioritization includes first-time assessments for previously unassessed stocks, updating existing assessments using established methods/data, and upgrading assessments to use new types of data/methods. All stocks managed under Federal Fishery Management Plans, as well as additional stocks that may be assessed using NMFS Science Center resources, are included in assessment prioritization. For stocks that have been previously assessed, the prioritization approach sets targets for assessment completeness (level) and frequency and then determines priorities relative to meeting those targets. For stocks that have only been previously assessed with data-poor methods, the system provides an opportunity to periodically examine: (1) fishery importance, (2) ecosystem importance, (3) biological vulnerability to overfishing, (4) preliminary information on fishery impact level (stock status) and (5) data availability to determine which of the stocks, if any, are both sufficiently at risk to warrant an assessment and have sufficient data to conduct a fuller assessment.

The prioritization process includes five steps conducted at the regional level and updated as needed:

1. Determine which stocks should be included, and how to best organize stocks into groups for prioritization (e.g. by FMP).
2. Collect information for stocks to develop scores for 14 prioritization factors (Table 1) in five themes: Fishery Importance, Stock Status, Ecosystem Importance, Assessment Information, and Stock Biology. Information may be extracted from available databases or through workshops with regional experts, and scores should be updated periodically to support development of the priority ranks described in Step 5.
3. Identify the current and **Target Assessment Level** describing the data completeness and model complexity required for each stock; initially this could be as simple as determining which previously unassessed stocks are in need of a first-time assessment.
4. Develop **Target Assessment Frequencies** based on a subset of the information collected in Step 2 to establish how often each stock needs to receive an updated assessment to maintain sufficient timeliness for status determinations and annual catch limit advice; re-examine as situations change. Stocks that are expected to change in abundance more rapidly need more frequent assessments.
5. Use factor scores developed in Step 2 and a region-specific factor weighting scheme to calculate prioritization ranks for each stock.



Factor scores for each stock for each of the 12 prioritization factors

	Stock 1	Stock 2	...	Stock X
Factor 1				
Factor 2				
...				
Factor 12				

Factor weights (importance to region)

	Weight
Factor 1	
Factor 2	
...	
Factor 12	

- Each stock's rank is the sum of its factor scores each multiplied by its region's factor weights.
- These ranks serve as the starting position from which regional managers subsequently determine the final set of stocks to be assessed, after accounting for additional considerations. Ranks will be updated each year or as needed to prioritize stocks for near-term assessment.

Table 1. Summary of the 12 factors included in stock assessment prioritization and 2 stock biology factors used in setting target assessment frequency.

Category	Factor	Source	Scores
Fishery Importance	Commercial Fishery Importance – rescaled log(ex-vessel value)	NMFS (data) and other Experts*	0-5
	Recreational Fishery Importance – from regional input	NMFS (data) and other Experts	0-5
	Importance to Subsistence	Experts	0-5
	Non-Catch Value	Experts	0-5
	Constituent Demand/Choke Stock	Experts	0-5
	Rebuilding Status	SIS** -NMFS	0-1
Stock Status	Relative Stock Abundance	SIS-NMFS	1-5
	Relative Fishing Mortality	SIS-NMFS	1-5
Ecosystem Importance	Key Role in Ecosystem	Experts	1-5
Assessment Information	Unexpected Changes in Stock Indicators	Experts	0-5
	Relevant New Type of Information Available	Experts	0-5
	Years Assessment Overdue – relative to Target Frequency	SIS-NMFS	0-10
Stock Biology	Mean Age in Catch	Assessment and Experts	Value
	Stock Variability	Assessment	-1 to +1

* Experts refer to a group of NMFS, SSC and other Council Advisors.

** SIS is the NMFS Species Information System, which is a national repository for important assessment information and results.

A stock's annual assessment-priority score represents a combination of the 14 factors listed in Table 1. Stocks that are more overdue, more important and closer to reference points will have higher priority for assessment action. In addition, the recent assessment history and availability of new data affect whether the next assessment should be conducted as an update (using the same approach as previous assessments

and simply incorporating new data points) or as a benchmark (introducing new methods or data types and requiring a more thorough investigation).

The ***Fishery Importance*** theme contains several factors that are likely to contribute considerably to the final assessment-priority score. The first step in evaluating some of these will be to compile relevant catch and value information (NMFS). The National framework document, referenced above, identifies a method for converting commercial revenue into Fishery Importance ranks. The ***Constituent Demand/Choke Stock*** factor is envisioned as the place where the importance of less measurable considerations can be emphasized within the prioritization process. For example, some species which are very important for one fleet or in one area may have lower overall catch value that does not represent the degree to which some fishery sectors (and/or communities) are reliant upon them. Other stocks may have heightened importance for assessments because their bycatch limits opportunities to catch other more productive stocks. Of course, not all stocks can receive a top score for this or any other subjective factor.

NMFS will take the lead in assembling available data relevant to consideration of all factors and will work with experts (generally from within the Council family) as indicated in Table 1.

Target Assessment Level describes the appropriate level of modeling complexity and data inputs for a stock's assessment. High-level assessments include more factors and provide better forecasts for annual catch limits, but also typically need precise and accurate fishery-independent surveys and fish ages from the fishery and the surveys. These increased data requirements and costs should be reserved for specific situations, such as stocks with high fishery importance, high ecosystem importance, and biological factors that lead to high natural fluctuations. Stocks at moderate levels of importance or expected fluctuations can suffice with less data-rich assessments. Some stocks will be identified as sufficiently minor components of the fishery such that their assessments need not extend beyond baseline monitoring of catch and simple indicators. At all assessment levels, there should be consideration of environmental and ecosystem factors to help distinguish natural from fishery effects on the stocks. The process for setting target assessment levels will be more fully developed after completion of the update to the Stock Assessment Improvement Plan, currently underway.

Target Assessment Frequency defines the ideal interval between updates for a stock's assessments. It is driven by a stock's biology (intrinsic variability over time), as well as its importance to the fishery and ecosystem. The greatest fluctuations are expected for stocks with short life spans and high variability in productivity. Stocks with longer life spans tend to fluctuate less because of the many age classes in the population. High fluctuations create a greater need for frequent updates in annual catch limits. Fisheries for stocks with high importance benefit from frequent assessment updates to quickly provide access to increases in abundance while keeping the chance of overfishing at an acceptable level. Target update periods are expected to typically be 1-3 years, but some may range up to a maximum of 10 years. In addition to these prioritized assessments, simpler partial updates may be conducted for previously assessed stocks to account for actual recent catches to fine-tune upcoming catch limits. These partial updates are generally encouraged whenever assessments are not updated annually.

Factor Weighting. Each factor included in this assessment-prioritization process is assigned a region-specific relative weight, intended to reflect each factor's relative importance within the region and maintain consistency across species. Factor weights will be the same for all stocks within an FMP and will be developed by regional NMFS and Fishery Management Council leaders (prototype weights will be provided, initially). This flexibility will allow tailoring the contribution of each factor to the overall score, so as to reflect regional importance of each factor. The weighted sum of the relative factors scores are then ranked and used to guide decisions on assessment planning for the upcoming assessment cycle.

Conclusion. As implementation of prioritization moves forward, a portfolio of assessments is expected to evolve, with some activity directed towards first-time assessments (above the data-poor level), some towards baseline monitoring of low priority stocks, some towards high-quality assessments of high-priority stocks, and some towards more intensive investigation of ecosystem linkages, where needed. To maintain the pace of assessments currently required to meet management demands, it is expected that, over time, most of a region's assessments will be completed as updates/operational assessments using standardized methods and data sources that have been fully reviewed and endorsed for use in updates.

Management strategy evaluations (MSEs) will be an important tool to refine the prioritization process. MSEs on a few representative stocks in each region can be used to simulate the whole data-assessment-management process. MSEs also provide a logical way to more completely include economic considerations into the prioritization process. Ideally, an economically-based prioritization system would evolve towards a portfolio analysis that accounts for the costs of various types of assessments as well as the marginal benefits from those assessments. This would help scientists and managers better understand the implications of stock variability, assessment imprecision, assessment frequency, and time lags between assessment and management implementation.