



Science and Management 101: Fish Stock Assessments

How Many Fish Are There?

The Magnuson-Stevens Fishery and Conservation Act mandates that the Council prevent overfishing while achieving optimum yield, using the best scientific information available. The Council works closely with the National Marine Fisheries Service (NMFS) on fish stock assessments that support management decisions.

Stock assessments use mathematical models to answer two basic questions:

-  What is the status of the stock?
-  What level of catch is sustainable?

Data that go into the models are collected from various sources including boat-based surveys, biological information about the species and required reports or volunteer surveys from fishermen, among others. Licensed commercial fishermen are required to report all of their catch data, but for noncommercial fishermen, it is not possible to gather data on every angler who fishes. In this case, surveys designed with input from statisticians

are used to interview a sample of fishermen that represent the whole population.

Typically, NMFS completes benchmark or “new” stock assessments every six years, with an update done about midway through. For example, in the Western Pacific Region, a 2015 update bottomfish stock assessment was completed for American Samoa, Guam and the Commonwealth of the Northern Marianas (CNMI), with a benchmark assessment following in 2019. The 2015 assessments showed that none of the U.S. Pacific territories were overfished or experiencing overfishing. However, the 2019 assessments said that the American Samoa bottomfish stock was overfished and experiencing overfishing, and the Guam bottomfish stock was overfished.

Overfishing is when the rate of fish being removed from the ocean is higher than what is sustainable, and **overfished** is when there are too few fish left in the ocean and the species may not be able to recover.

What Happened?

The main change between the 2015 and 2019 assessments was the definition of a fishing trip (see table) that increased the total number of data points used in the models. The new trip definition now includes trips with zero up to 50% bottomfish management unit species catch. Although data quality was not included in the review, the application of the data to the model passed an independent review panel and the Council’s Science and Statistical Committee determined the assessment to be the best scientific information available.

An angler **creel survey** is a sampling program involving interviews and inspection of individual catches to estimate fishing effort and catch. The name comes from the woven wooden basket, or creel, that anglers sometimes use to hold captured fish while they continue fishing.

	2015 Update Bottomfish Stock Assessment	2019 Benchmark Bottomfish Stock Assessment
Model used	Bayesian state-space surplus production model	Bayesian state-space surplus production model
Fishermen data used	Creel survey	Creel survey
Data timespan	1982–2013	1982–2018
Bottomfish species	17 species complex	13 and 11 species complexes (American Samoa + Marianas)
Fishing trip definition	>50% bottomfish MUS* in catch	Bottomfish gear was reported to be used

*MUS = management unit species

Moving Forward

- 🐟 The Council is working on bottomfish stock rebuilding plans.
- 🐟 In collaboration with Council staff and advisors, NMFS will hold a series of workshops with the bottomfish fishery community to improve the quality of data used for the 2023–2025 stock assessments.

🐟 The Magnuson-Stevens Act says that “an individual stock...shall be managed as a unit throughout its range.” Due to the close proximity of Guam to the CNMI (39 miles between the closest islands), an option may be explored to do a combined new benchmark assessment for the entire Mariana Archipelago in 2024.

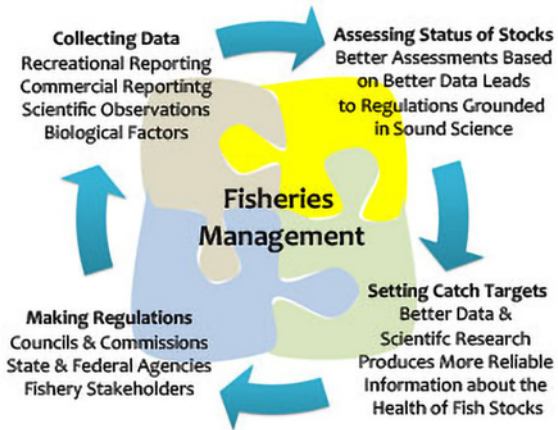


Image source: NMFS.

