How NOAA Fisheries Calculates Discards

The New England and Mid-Atlantic Fishery Management Councils and NOAA Fisheries set annual catch limits for each fishery based on the best information available, and NOAA Fisheries monitors catches to determine if they are within these levels. If an annual catch limit is exceeded for a fishery, the catch level may be adjusted downward in a following fishing year to account for the overage.

During most fishing operations, some fish are discarded at sea for a variety of reasons, for instance, discards include fish that are undersized or of poor quality. The total catch for a fishery consists of all fish that have been landed or discarded at sea. It is the total catch that is compared against the annual catch limit for a fishery to determine if any overages occurred. NOAA Fisheries estimates the total amount of fish discarded at sea using available information provided by fisheries observers deployed on some, but not all, fishing trips. In 2010, scientists developed a peer-reviewed method for determining discards in the Northeast multispecies fishery—since then, the method has adopted for monitoring yellowtail flounder discards in the scallop fishery, haddock discards in the herring fishery, and butterfish discards in the longfin squid fishery.

The Cumulative Method

The peer-review method is a cumulative method that continually recalculates the discards back to the beginning of the fishing year as more information is received. Under the cumulative discard methodology, how discards are calculated depends on whether there is an at-sea fisheries observer on a fishing trip or not.

On observed trips, if 100% of the hauls are observed, the actual observed discards are applied to the trip. So, landings + discards = total catch for the trip. If fewer than 100% of the hauls are observed, the discards from the observed hauls are used to estimate the amount of discards on the unobserved hauls.

On unobserved trips, discards are estimated. The discard estimation process is performed at what is referred to as "the stratum level." A **stratum** is a way of grouping similar trips. For example, one Northeast multispecies stratum is made up of trips made by members of the common pool using the same gear type and fishing in the same stock area.

What is a **discard ratio**? A ratio compares the size of two quantities. The basis for calculating discards on unobserved trips is the ratio of discards-to-total landings from observed trips within a stratum. This is called the discard ratio. For example, suppose that on observed trips within the stratum, there were 100 pounds of discards with a landings total of 10,000 pounds. The discard ratio would be: 100/10000 = 1/100 = 0.01. The discard ratio is multiplied against the unobserved trips' landings to estimate their discards.

The method of estimating discards is cumulative. This means that, as more data are reported during the fishing year, discards are re-estimated with updated discard ratios using the most current year-to-date totals. For example, suppose that additional observed trips within the previous stratum had 200 pounds of discards with a landings total of 10,000 pounds. The discard ratio would be updated to: (100 + 200) / (10,000 + 10,000) = 3 / 100 = 0.015.

Depending on how many observed trips have occurred in the stratum, the method for determining the discard ratio for unobserved trips will fall within one of the following stages:

- *Assumed Discard Ratio* -- At the beginning of the fishing year, no observed trips have occurred. Therefore, NOAA Fisheries provides an assumed discard ratio. This is based on observer data from the previous year for the same gear and stock.
- *In-Transition Discard Ratio* -- For the first four observed trips within a stratum in the fishing year, NOAA Fisheries calculates a transition discard ratio. After each observed trip, the transition ratio reduces the influence of the assumed discard ratio in the calculation of discards for that stratum. After four trips have been completed in the stratum, the in-season ratio replaces the assumed and transition ratios.
- *In-Season Discard Ratio* -- Starting with the fifth observed trip in a stratum, NOAA Fisheries changes the method to the in-season ratio. This ratio uses discard data from observed trips to estimate discards from unobserved trips. As more observer data become available, NOAA Fisheries updates the in-season discard ratio and applies it to all unobserved trips within that stratum during the fishing year.

Key Points

- Discard ratios are shared across a stratum. The observed discard patterns of all the vessels in a stratum determine the discard ratios for that stratum. All vessels in the stratum then share those discard ratios when their discards are computed. This means that permit holders can be charged for discards on unobserved trips, whether a particular stock was caught on a trip or not.
- Discard ratios are computed at the stratum level and applied at the individual trip level.
- The sum of discards from a stratum's observed and unobserved trips equals total stratum discards. .

More detailed documents explaining discard calculations are available for the Northeast multispecies groundfish fishery at <www.greateratlanticfisheries.noaa.gov/regs/infodocs/discardcalculations.pdf> and for butterfish at <www.greateratlanticfisheries.noaa.gov/regs/2013/January/smb2013specsbmcmethodology.pdf .

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