FACT SHEET: OVERFISHING AND REBUILDING

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Federal law requires that every Council end overfishing and rebuild overfished stocks. Therefore, if a Council-managed species is overfished or is being overfished, the Council must reduce catches to a level that allows the population to rebuild to a healthy size.

The terms "overfishing" and "overfished" are defined in the Magnuson-Stevens Fishery Conservation and Management Act, which governs fisheries in Federal waters. While stocks may decline for reasons other than fishing (for example, habitat loss or environmental factors), at this point these terms are still used to indicate the status of the stock. This terminology may change with a future reauthorization of the Magnuson-Stevens Act.

STOCK STATUS DETERMINATIONS, OR CATEGORIES

The amount of fishing a stock can sustain depends on its productivity. When no fishing occurs on a fish stock, productivity is actually lower because growth and mortality of the stock are roughly balanced.

As biomass (stock size) approaches **MAXIMUM SUSTAINABLE YIELD [DESIGNATED B_{MSY}],** the population becomes more productive because there is less competition for resources, and the population generates more fish than needed to replace fish that die of natural causes. In fact, most fish populations can be fished well below their unfished biomass level (the stock size if fishing never occurred) and still be sustained and capable of returning to their unfished status. For a very productive stock, B_{MSY} can be a small fraction of the unfished biomass.

One of the main goals of fishery management is to keep stocks around B_{MSY}. If the population falls below that level, productivity can decrease because there aren't as many fish reproducing. Abundance indicators are in place to help managers understand the stock's status, or the health of the spawning population. If a population starts to fall below a certain level, these indicators can trigger a precautionary reduction of allowable harvest levels (for example, annual catch limits).

If a reduction in the population size indicates the stock is undergoing overfishing or is overfished, National Marine Fisheries Service declares a stock status change and the Council must develop measures to help ensure the stock can return to a healthy state. If a stock is declared overfished, then a rebuilding plan is required. Rebuilding plans outline measures to be taken until the stock is rebuilt to a healthy status.

Overfishing

Overfishing occurs when the level of harvest or fishing-related mortality is too high compared to the estimated population size (B_{MSY}). The gauge to determine if a stock is subject to overfishing is the called the **MAXIMUM FISHING MORTALITY THRESHOLD [MFMT],** and is typically described as a harvest or exploitation rate. If stock mortality has exceeded MFMT in a given year, then the stock has been subject to overfishing. If overfishing continues and the population is driven too low, the stock may become overfished.

Overfished

A fish stock is "overfished" when its population size (in terms of spawning biomass) falls below a certain level or threshold. The **MINIMUM STOCK SIZE THRESHOLD [MSST]** is the common gauge used to determine if a stock is overfished and is typically set at half of $B_{MSY,}$ or, in the case of salmon, **THE NUMBER OF ADULT SPAWNERS ASSOCIATED WITH MSY [S_{MSY}].** Stocks can become *overfished* due to *overfishing,* but that is not always the case. In salmon management, a stock is considered overfished if the three-year geometric mean of spawning escapement is less than MSST.

Rebuilding

After a stock has been declared overfished and the population begins to improve, the status changes from an "overfished" state to a "rebuilding" state once the stock reaches MSST, but has not yet regained B_{MSY} or S_{MSY}. This indicates the population is showing progress towards meeting the rebuilding goals.

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FACT SHEET: REBUILDING

Rebuilt

A stock is considered "rebuilt" when the population meets or exceeds B_{MSY}, or, in the case of salmon, when spawning escapement exceeds the three-year geometric mean of S_{MSY}.

REBUILDING PLANS

Rebuilding plans direct the process of rebuilding overfished species. There are three important aspects to rebuilding: the abundance of the spawning stock, the time needed to rebuild the stock, and the rate of fishing that allows the stock to increase to the target level (B_{MSY} or S_{MSY}). A rebuilding plan prescribes the management measures and strategy that will be used to rebuild the fish stock. Often, the conditions triggering the stock's low abundance are environmental, yet the Council must do what it can to help the stock rebuild.

Certain elements of rebuilding plans are pre-determined at the national level. For example, time limits for rebuilding are set out in the Magnuson-Stevens Act. The Council *is* able to choose a fishing mortality rate, the corresponding annual level of fishing, and the duration of the rebuilding plan within the statutory limits. When developing a rebuilding plan, the Council must also take into consideration the needs of the tribal, commercial, and recreational fishing interests and the economic importance of the fisheries to coastal communities.

Rebuilding Time Frame

Two boundaries, called T_{MIN} and T_{MAX}, are used to determine the amount of time required to rebuild a stock (the T stands for time). The minimum boundary **[T_{MIN}] IS SET BY CALCULATING HOW LONG THE STOCK WOULD TAKE TO REBUILD IF NO FISH WERE CAUGHT.** This depends on life history traits affecting the productivity of the stock. **T_{MAX} IS THE MAXIMUM ALLOWABLE TIME FOR STOCK REBUILDING.** It is set by Federal law, and must be no more than 10 years if the stock is capable of rebuilding that quickly. Otherwise, the statutory maximum time to rebuild (T_{MAX}) is determined based on calculating the minimum time to rebuild (T_{MIN}) plus one mean generation time. Mean generation time is the estimated time it takes a spawning female to be replaced by a spawning female in the next generation.

Rebuilding analyses

The Council relies on rebuilding analyses, which provide estimates of the time to rebuild under different harvest strategies.

Rebuilding analyses typically describe rebuilding in terms of probability, or the likelihood the stock will rebuild under varying time intervals. Probability is also a measure of risk. If a particular course of action is less likely to produce the desired outcome, it may be considered riskier.

The rebuilding analyses that the Council uses to determine rebuilding harvest policies estimate the probability that the overfished stock will rebuild by T_{MAX} or any other interval under a given harvest strategy. Rebuilding probabilities inform a crucial policy choice: lower harvest levels result in a higher probability that the stock will rebuild in time, and vice versa.

The median time to rebuild in a rebuilding analysis under any given harvest rate or strategy is the year predicted to have a 50% probability that the stock will reach B_{MSY} by this year. The Council usually uses the median time to rebuild as the **TARGET YEAR [T_{TARGET}]** in formulating its policy recommendation, as long as it's no greater than T_{MAX}. By court precedent and national policy, rebuilding probabilities cannot be less than 50%.

Balancing tradeoffs

Rebuilding a stock is a tradeoff between sharply reducing catches in the short term to rebuild a stock quickly, or allowing more catch and waiting longer for a stock to rebuild.

In finding a balance between meeting the conservation objective of rebuilding stocks quickly and allowing some fishing opportunities in a rebuilding regime, the Council is limited by the biology of the stock and by national policy. All other things being equal, a stock will rebuild fastest if there is no fishing at all, but this would be hard on fishing communities, and the Council is required to take community impacts into account.

Choosing a timeframe can be difficult and controversial. If managers choose a very early target date (only a few years after the lower time limit, T_{MIN}), then almost all fishing may have to be halted in order for the stock to recover. Catch limits may be too low to allow access to co-mingled, healthy target stocks. On the other hand, if managers opt for a target year far in the future (very close to the upper time limit, T_{MAX}), it will take longer to realize the economic and ecological benefits of a rebuilt stock.

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