

**A SYNOPSIS OF U.S. FEDERAL FISHERIES
REFERENCE POINTS, WITH SPECIFIC
REFERENCE TO THE WEST COAST**

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4 December 2009**

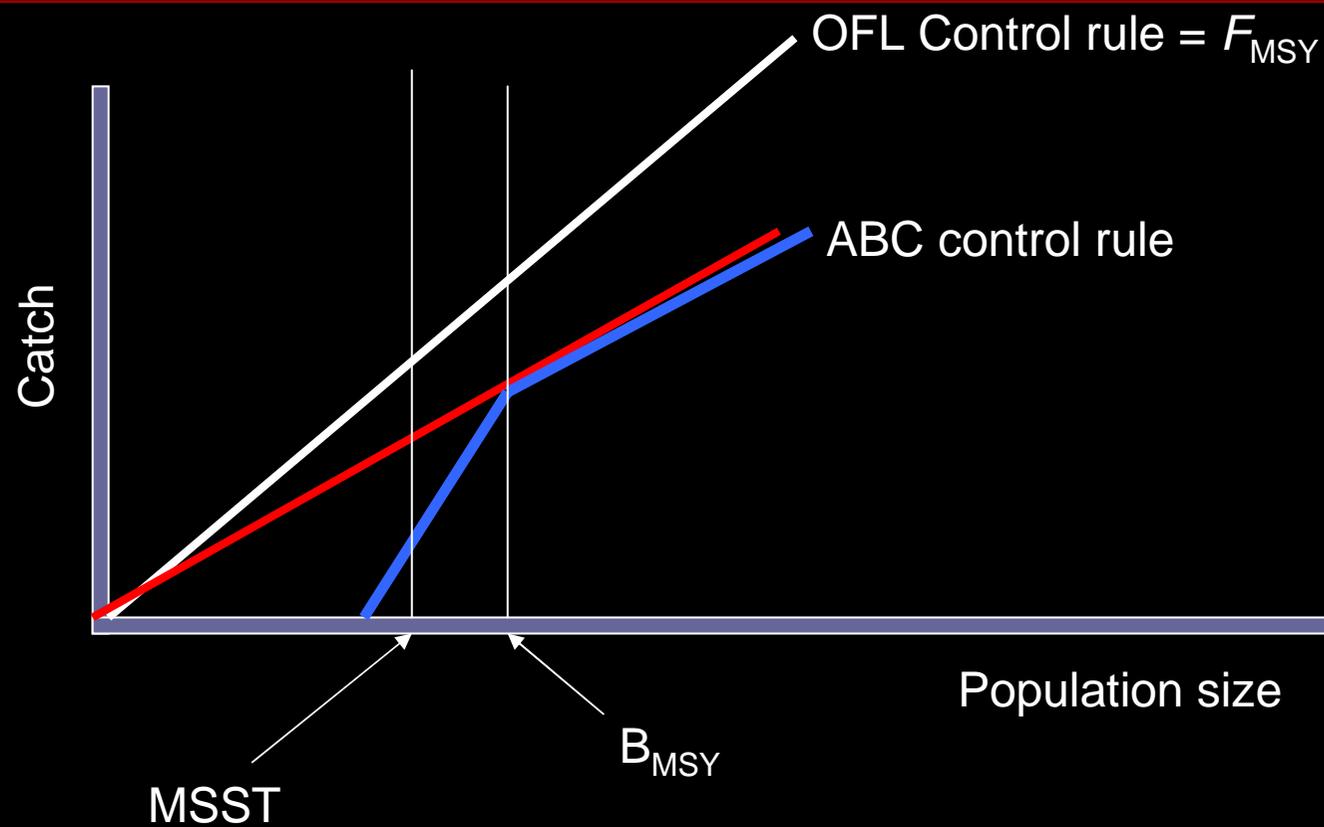
Key Concepts

- **Overfishing:**
 - Fishing mortality (or catch) exceeds the Overfishing Level (OFL)
- **Overfished:**
 - Stock size (usually spawning biomass) is below the Minimum Stock Size Threshold (MSST).

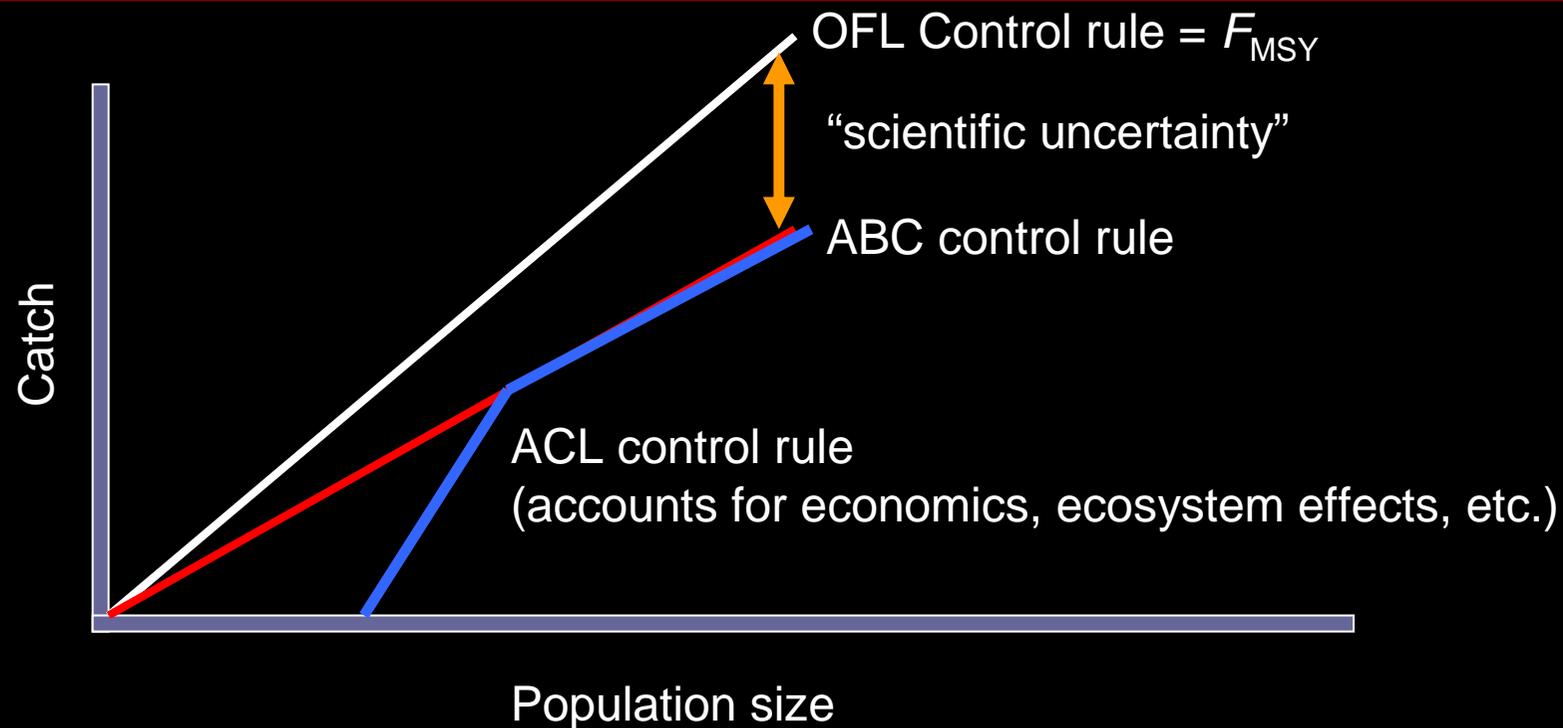
Harvest Control Rule Principles

- Catch may not exceed that corresponding to F_{MSY} (taking uncertainty into account in a precautionary manner).
- Catches are less than those under F_{MSY} if the stock is between B_{MSY} and MSST ($\geq 0.5B_{MSY}$)
- A rebuilding plan is needed if the stock drops below MSST:
 - the rebuilding target is B_{MSY} , and
 - rebuilding must occur “as soon as possible taking into account the stock’s status and biology, the socioeconomic needs of fishing communities; and the interaction of depleted stocks in the marine ecosystem”.

OFL, ABCs and ACLs-I



OFL, ABCs and ACLs-II



Note: $ACL \leq ABC < OFL$ [unless you want to get into trouble]

Overfished and Rebuilding-I

- A stock is overfished if it is depleted to below its MSST.
- MSST is related to B_{MSY} (or the proxy for B_{MSY} : e.g. $0.4K$ for rockfish; $0.25 K$ for flatfish)
- MSST is:
 - no smaller than $0.5 B_{MSY}$; and
 - the stock size so that recovery to B_{MSY} can occur in ten years;
OR
 - $(1-M) B_{MSY}$.
 - $0.25 K$ for west coast rockfish and $0.15 K$ for west coast flatfish
 - hard to determine for Pacific sardine and salmon.

Overfished and Rebuilding-II

Lots of definitions:

- T_{MIN} (minimum time to recovery if $F=0$)
- T_{MAX} :
 - 10 years if recovery can occur in ten years (crab, cod, etc.) OR
 - T_{MIN} + one generation time if recovery cannot occur in ten years (rockfish).
- T_{target} :
 - Year with 50% probability of recovery (between T_{MIN} and T_{MAX}).

Bonus Material

What is Law and What isn't-I

- The primary Federal law (the re-authorized Magnusson-Stevens Act) provides guidance on all of the above concepts:
 - Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
 - Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities
 - develop annual catch limits for each of its managed fisheries that may not exceed the fishing level recommendations of its scientific and statistical committee or the peer review process established under subsection

What is Law and What isn't-II

- The above needs to be interpreted and guidance is developed by the US Department of Commerce (though a public process).
 - The guidelines provide options which seem to be legal.
 - Each of the eight regional Fishery Management Councils have to implement Fishery Management Plans to implement the M-S Act.

What is Biomass (in control rules)?

- West coast definition:
 - The population component which “drives” recruitment:
- Examples:
 - Rockfish - female spawning biomass
 - Rockfish – female egg production [preferred]
 - Sardine – total 1+ biomass [written into the FMP!]
 - Snow crab – mature male biomass at the time of mating

Overfished and Rebuilding-Contd

- Under a 9th Circuit Court decision (The Darkblotched Rockfish case).
 - Recovery must occur “as soon as possible” (so good recruitment must be “invested” in the stock).
 - Arguments for catch limits must start with $F=0$ and should be only increase given “need” for higher limits.
- There are rules for: (a) evaluating progress to rebuilding and (b) what to do in case of failure to rebuild.

OFL, ABCs and ACLs-add

$$P(\text{ABC} > \text{OFL}) = P^*$$

