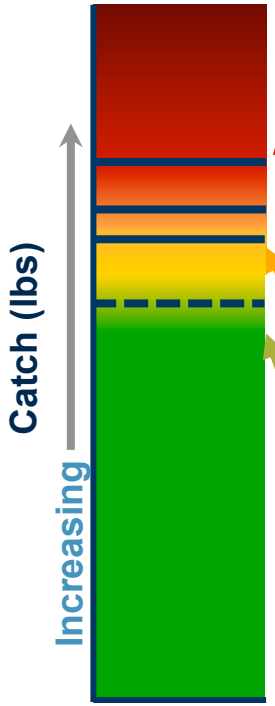
NOAA FISHERIES

Review of U.S. Fisheries Management Framework and Data Limited Approaches

ABC in context: Sorting through the acronyms



Overfishing Limit (OFL): Catch expected when fishing at MFMT (catch with a 50% probability of exceeding the true OFL as determined by the stock assessment)

Acceptable Biological Catch (ABC): Catch reduced below OFL to account for scientific uncertainty (catch with less than a 50% probability of exceeding the true OFL)

SSC

Annual Catch Limit (ACL): Catch that invokes accountability measures

Annual Catch Target (ACT): Catch reduced below ACL to account for management uncertainty or achieve optimum yield

Council

National Standard 1 Guidelines

For all stocks and stock complexes that are "in the fishery"… the Councils must evaluate and describe the following items in their FMPs and amend the FMPs, if necessary, to align their management objectives to end or prevent overfishing:

(1) Maximum sustainable yield (MSY) and status determination criteria (SDC)

(2) Optimum Yield (OY)

(3) ABC control rule

(4) Mechanisms for specifying ACLs and ACTs

Maximum Sustainable Yield

MSY is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological, environmental conditions and fishery technological characteristics (e.g., gear selectivity), and the distribution of catch among fleets.

F_{MSY} = fishing mortality rate that, if applied over the long term, would result in *MSY*.

B_{MSY} = long-term average size of the stock, measured in terms of the stock's reproductive potential that would be achieved by fishing at F_{MSY}

Status determination criteria (SDC)

MFMT (Maximum fishing mortality threshold) = level of fishing mortality F above which overfishing is occurring (typically = F_{MSY} or proxy)

OFL (Overfishing limit OFL) = annual amount of catch that corresponds to fishing at MFMT. The OFL is an estimate of the catch level above which overfishing is occurring.

MSST (Minimum stock size threshold) = the stock size below which the stock or stock complex is considered to be overfished (typically = cB_{MSY}, where $c \geq 0.5$).

Optimum Yield (OY) in the MSRA

(28) The term "optimum", with respect to the yield from a fishery, means the amount of fish which--

(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;

(B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, ***as reduced*** by any relevant economic, social, or ecological factor; and

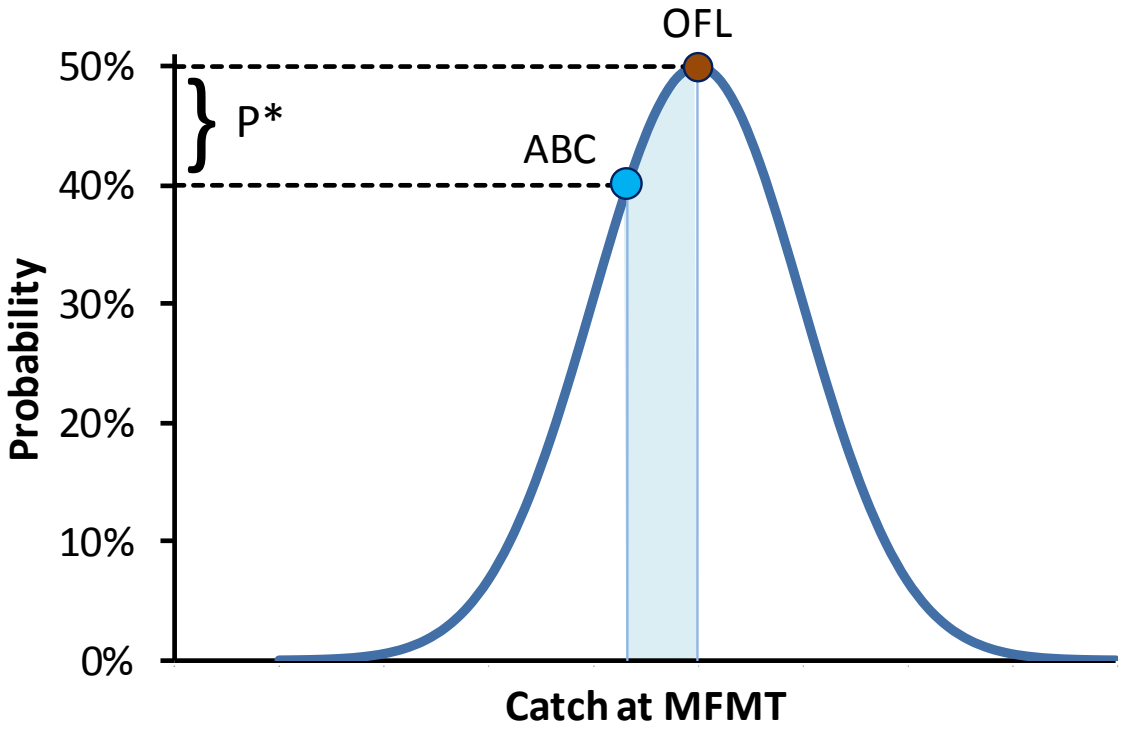
(C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

ABC Control Rule

- ABC control rule is an agreed procedure, codified in the FMP, for setting the ABC for a stock or stock complex as a function of the scientific uncertainty in the estimate of OFL and any other scientific uncertainty
- Each Council must establish an ABC control rule based on scientific advice from its SSC.
- The SSC must recommend the ABC to the Council. An SSC may recommend an ABC that differs from the result of the ABC control rule, but must explain why.
- It can be data-limited in some circumstances and can involve complex drivers based on measured stock biomass, measured uncertainty, forecasts of environmental effects, etc.

ABC Control Rule

- ABC should be based, when possible, on the probability that a catch equal to the stock's ABC would result in overfishing (P*). The probability of overfishing cannot exceed 50% and should be a lower value.
- The control rule may be used in a tiered approach to address different levels of scientific uncertainty



Actual ABC Control Rules Vary by Council

Some Councils have adopted a single framework for all Fishery Management Plans and others have different frameworks for each FMP

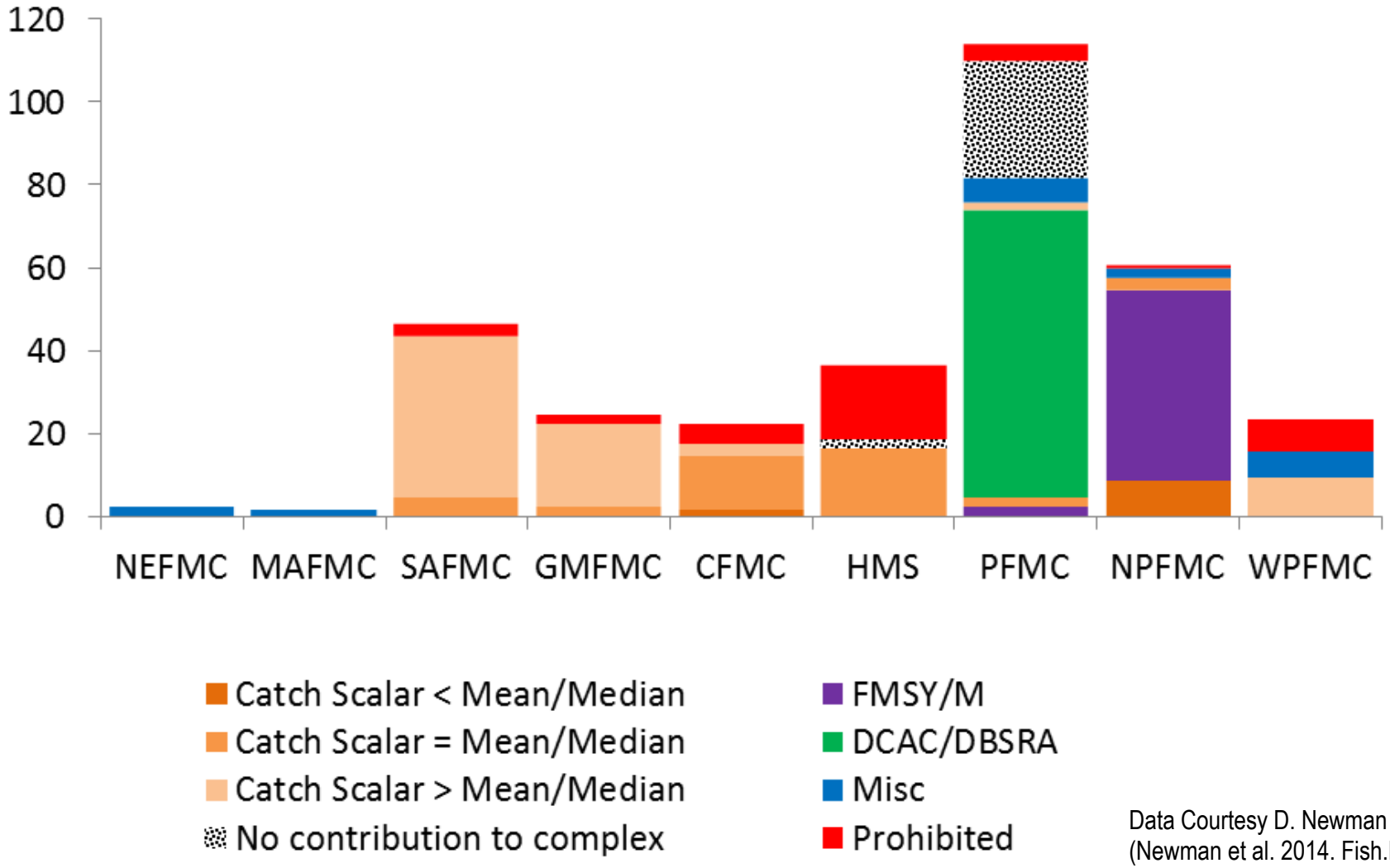
Most attempt to various degrees to set ABCs below the OFL in a way that reflects uncertainty…

…but how they do it varies a great deal

Actual ABC Control Rules

Council	Tiers	OFL (catch at MFMT)	ABC method
NPFMC	2 of 6	MFMT = M mean catch	catch at F = 0.75M 0.75 OFL
PFMC	2 of 3	DB-SRA, DCAC, mean catch	P* = 0.4, σ = 0.72 - 1.44
WPFMC	2 of 5	considered unknown	0.91 MSY [0.33 - 1]median catch
GMFMC	1 of 3	overfished: mean catch not overfished: mean catch + 2σ	overfished: [0-0.65]mean catch not overfished: mean catch+ [0-1.5]σ
CFMC	1 of 1?	Ad hoc (mean/median catch)	Usually ABC = OFL, ACL = [0.75-1]ABC
SAFMC	3 of 4	DB-SRA, DCAC, ORCS, Ad hoc	Ad hoc
MAFMC	1 of 4	Ad hoc	Ad hoc
NEFMC	varies	Ad hoc	Ad hoc
HMS sharks	1 of 2	Average catch, prohibited species	Ad hoc

Differences among councils in choice of DLMs



Data Courtesy D. Newman
(Newman et al. 2014. Fish.Res 164)

Example: GMFMC ABC Control Rule for Reef Fish

- Tier 3a – No assessment, but stock unlikely to suffer overfishing if future landings remain similar to recent landings
  - OFL = mean recent landings + 2σ (σ = std dev recent landings)
  - ABC = mean recent landings + [1.5, **1.0**, 0.5, 0] σ
- Tier 3b – No assessment, but stock likely to suffer overfishing
  - OFL = mean recent landings
  - ABC = mean recent landings [1.0,0.85,**0.75**,0.65] OFL

Results of “Best Available Methods”