Implications of Timeliness and Precision of Recreational Catches on the Estimation of Acceptable Biological Catch for Mid-Atlantic Fisheries Management Council Stocks

Presentation to
NASEM Committee on Data and Management Strategies for Recreational Fisheries with Annual Catch Limits

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Objectives

- Review importance of recreational fishing for Mid Atlantic managed stocks
- Describe process of deriving Acceptable Biological Catches (ABC) from Overfishing Limits (OFL)
- Potential benefits of real-time recreational catch information

Spectrum of MRIP Importance in Mid-Atlantic

Surfclam

Ocean Quahog

Butterfish

Longfin Squid

Shortfin squid

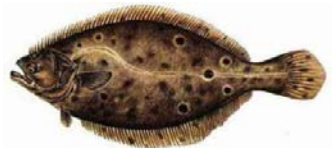
Chub Mackerel

Golden Tilefish

Spiny dogfish

Blueline Tilefish

Atlantic Mackerel



Summer Flounder

Scup

Black Sea Bass

Bluefish

Zero to Unmeasurable — IMPORTANCE OF RECREATIONAL HARVEST — Major

Fraction of Recreational Removals

Species	Total Catch (mt)	Approximate % Recreational	Comment
Bluefish	21,115	91%	Based on 2014-2018 New:Old MRIP = 2.8:1 for 2014-18 Uses APAIS for CPUE Uses alt weight/discard fish
Black Sea Bass	7,943	75%	Average 2014-2018
Summer Flounder	10,004	49%	2019 Data
Scup	15,994	44%	2019 Data
Atlantic Mackerel	18,010	20%	Average 2014-2018 New:Old MRIP ~ 2:1 2011-2016
Spiny Dogfish	9,550	1%	Average 2014-2018. Uses alt wt for landed and discarded fish
Golden Tilefish	641	0%	Not included in assessment. 2015-2019 ave
Blueline Tilefish	45	73%	No assessment model

Basic Assessment Considerations

- Scientific surveys provide measures of population trend.
- Removals, defined as sum of landings + discards in recreational and commercial fisheries provide measures of scale.
- Assessment models also require assumptions about natural mortality.
- When fishing mortality exceeds natural mortality, models perform better because reliance on assumed natural mortality is reduced.
- Recalibration of MRIP catch has changed perception of population scale for many species.
- …And changes relative importance of recreational fishing as a determinant of stock dynamics.

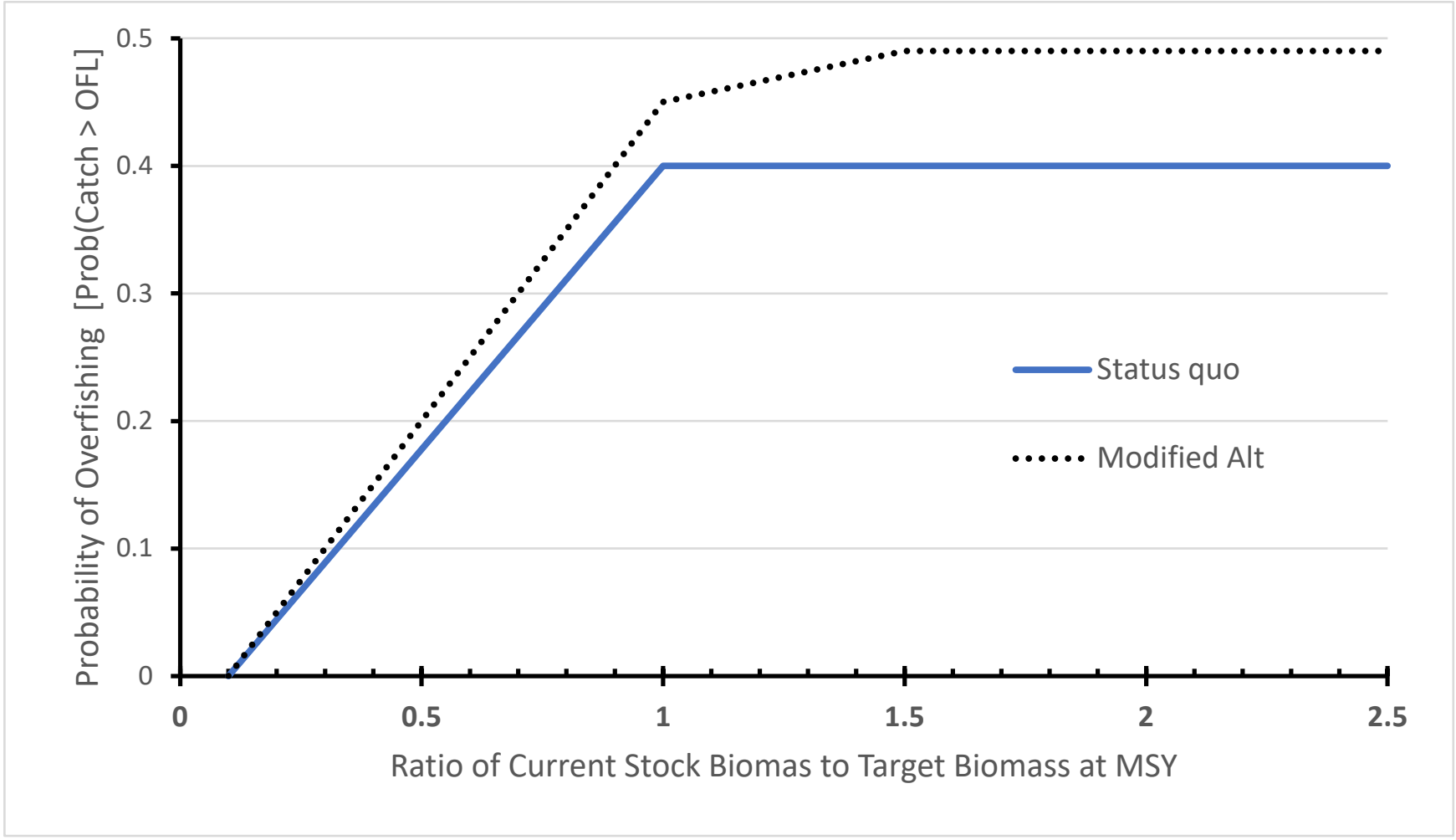
Timeline of Data Acquisition

- Scientific surveys seasonal “point” estimates
- Commercial Catch
  - Landings
    - Real-time with 1-2 week delay
    - Post season adjustments for stock units, reconciliation of VTR and Dealer data
  - Discards—end of season
    - Relies on estimate of total commercial landings
- Recreational Catch
  - Landing and discards by wave + lag
  - For some species, use alternative estimates of average weight (e.g., spiny dogfish, bluefish)
- As a consequence nearly all stock assessments use an ***ANNUAL TIME STEP***

How does the SSC use risk profiles and uncertainty to derive Acceptable Biological Catches (ABC) from Overfishing Limits (OFL)?

Council Risk Policy—Revised in 2020

Acceptable Probability of Overfishing is linked to relative abundance

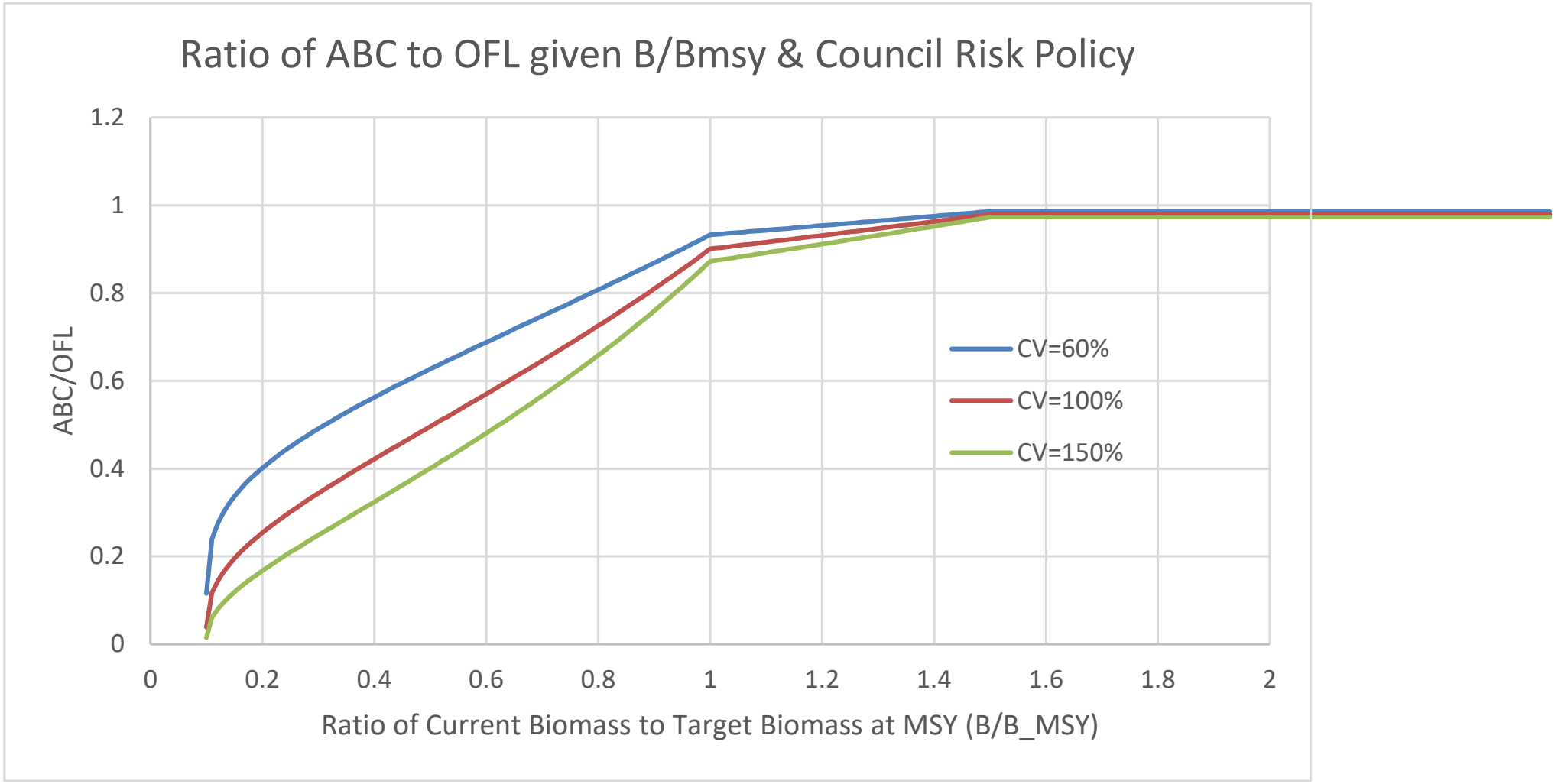


Translating the Risk Policy into ABCs

Assign level of precision to OFL

- Basic premise: Variability about the model underestimates true uncertainty. Why?
  - Model simulations
  - Retrospective patterns
  - Forecast error
  - Absence of alternative model formulations
- Simulations with model ensembles suggest CVs of at least 60% are appropriate given a log normal distribution of catch.
- SSC has extended this to consider range of 60 to 150%
- SSC assumes model's point estimate of OFL characterizes central tendency and assigns a measure of dispersion (CV) to OFL

Effects of OFL CV on ABC/OFL ratio for varying stock sizes



How do we select the an appropriate CV?

Factors considered in the OFL CV "matrix"

Decision Criteria	Considerations
Data Quality	**Accuracy & Precision of catch** Availability of age/length data External data for key parameters (e.g., M)
Model Appropriateness and Identification	Comparisons with alternative models, Match with life history
Retrospective Analysis	A measure of model misspecification, often due to undetected temporal trend
Comparison with Empirical Measures	External measure of population scale
Ecosystem Factors	Stationarity of model parameters
Trends in Recruitment	Evaluation of stanzas and trends
Prediction Error	Validation of predictions with subsequent estimates
Assessment Accuracy	Function of historical exploitation patterns
Simulation Analysis/Management Strategy Evaluation	Measures robustness of assessment approach

Uncertainty of Recreational Catch⇔ ABC?

- Translation from data uncertainty to model uncertainty to OFL uncertainty is neither linear nor direct. Instead, improvements to achieve timeliness are likely to improve overall quality of data collection.
- Improved data can lead to better model performance because unidentified processes are minimized.
  - Conversion of old to new MRIP eliminated retrospective patterns in some species.
- Setting up OFL computations for multi-year specifications
  - Assessment in year **t** uses data from year **t-1**
  - Need imputed values of catch in year **t** to get population size at start of year **t+1**
  - Projected OFL for years **t+1, t+2, …t+n** is based on F_{MSY}

Ideal World Scenarios

- Underestimation and overestimation of stock size can create pernicious feedback loops that undermine both science and management.
  - Overestimation➔Catches set too high; stock declines without detection; rebuilding required
  - Underestimation➔Catches set too low; Catches exceed OFL; Accountability measures invoked; Future catches reduced even as stock increases.
- Real-time data would be useful if the lags between acquisition, review, decision-making and execution can be shortened.
- Not solely a scientific issue but logistics, economics and public policy
- Controllability via inefficiency measures—seasons, bag limits, size limits often ineffective if fishing effort for similar species occurs.