Unassessed Stocks Fishing Level Recommendations

Amendment 29

Long Slow Journey

- First ABC-OFL Discussions June 2007, MSRA
- Considering unassessed stocks June 2008
  - leaning toward OFL based on average catch
- Dedicated effort to address unassessed stocks December 2008, SSC workshop
- Workshop to develop ABC control rule March 2009
- ORCS working group formed Nov. 2009, Nat. SSC
- DCAC applied to unassessed stocks (SAFMC staff) reviewed April 2010

Timeline Continued

- Tiers added to ABC control rule August 2010
- Decision tree added to ABC CR April 2011
  - Led to ABC-OFL recommendations, unassessed
- ORCS report final, May 2011
- Recommend considering ORCS, Nov. 2011
  - Reviewed Wreckfish DCAC: *deceptively complex*
- SSC review preliminary ORCS application (prepared by SAFMC Staff) April 2012
- ORCS application workshops held August 2012 and April 2013
- Revised ABC values based on ORCS, April 2013

What is the ORCS Approach?

1. Stock assigned to *Risk of Overexploitation levels*
   - ORCS stocks ranged from low to moderate
   - SSC added resolution to moderate (hi, med, lo)
   - 25 stocks did not make the ORCS cut
2. Reference Statistic chosen – one for all
   - max catch, 1999-2007
3. Risk of Overexploitation scalar chosen

   - varies with risk of overexploitation
4. Risk Tolerance scalar chosen

   - SSC recommendation, based on Council risk tolerance

What is the ORCS Approach?

Reference Statistic (max catch)

X Risk of Overexploitation scalar (1.25-2 for ORCS stocks)

X Risk Tolerance scalar (Council options)

= ABC.

as summarized in Workshop:

Ref Stat = 1, OE scalar = 1.5, risk scalar = 0.75,

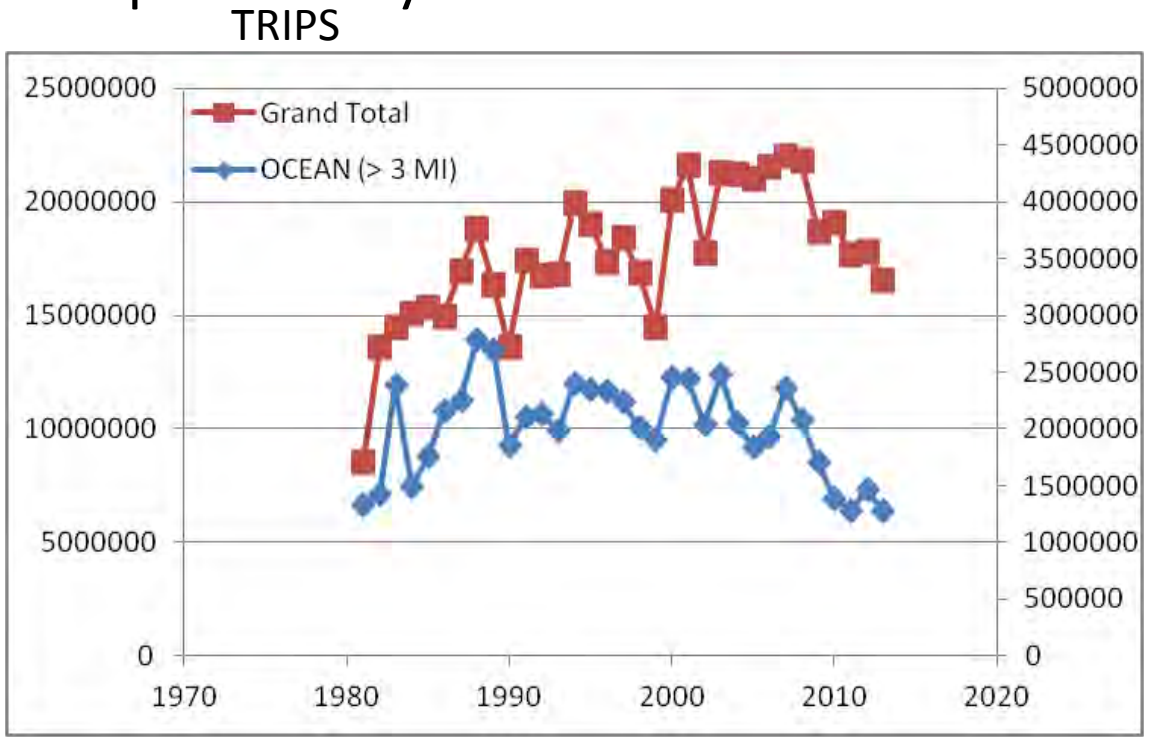
gives an ABC of 1.125 X ref stat.

Did the SSC consider CPUE ?

- Nominal FD CPUE provided December 2008. *Rejected by SSC. Requested more robust approaches be applied by SEFSC. No resources.*
- MARMAP CPUE reviewed regularly
  - *Prominent for unassessed stocks when decision tree applied and in ORCS workshop*
  - *Does not adequately sample all stocks. (see FI workshop report for full details of the index problem)*

Did the SSC Consider Effort ?

- SSC considered effort trends during the ORCS workshops.
- Effort is down.
- Recreational example: total is down. Offshore portion is particularly down.



From 2000 to 2013 :

Total trips down 18%

Offshore trips down 48%

Critical to SSC expert judgment opinion of the possible exploitation status of these stocks now.

Different scales! Offshore trips are only 7% of total trips. Peaked in 80's near 17%

Did the SSC overlook various other data sources?

- Not intentionally
- ORCS = **O**nly **R**eliable **C**atch **S**tocks
- Considerable debate on Reliability of catch
- Large library of over 100 references created through numerous workshops
- Age composition and surveys are key data sources that inform many data poor methods
  - Survey issues well documented, and making progress through SEFIS
  - Bio (age, length) sampling issues well documented, even for assessed stocks.
  - Extremely COSTLY and difficult to sample rare events

Do SSC recommendations on scalars contradict exploitation assignments?

- FACTS from ORCS workshops
  - Exploitation level is unknown for all unassessed stocks.
  - Stock Biomass level is unknown for all unassessed stocks
  - Harvest levels are highly uncertain for all unassessed stocks
  - Therefore: Stock status (EXPLOITATION) is unknown for all unassessed stocks.
- Therefore, SSC acknowledges status is unknown
- **Risk of overexploitation DOES NOT EQUAL exploitation status**
  - In other words, assigning a stock to moderate risk of overexploitation says NOTHING of its current exploitation level
  - Moderate ***RISK*** of over exploitation does not equal moderate exploitation

Semantics problem with TORs

- "Develop a scoring method for assigning stocks to exploitation categories ….."
- "Determine the appropriate catch statistic …. Identify the proper OFL scalar range to be applied to different exploitation categories."

- Workshop discussion and debate clarified that:
  - exploitation levels are unknowns
  - assignments address RISK of overexploitation
- 20/20 hindsight – wording in the TORs is misleading.

Are ORCS stocks likely overexploited, since many assessed stock are?

Not a valid assumption

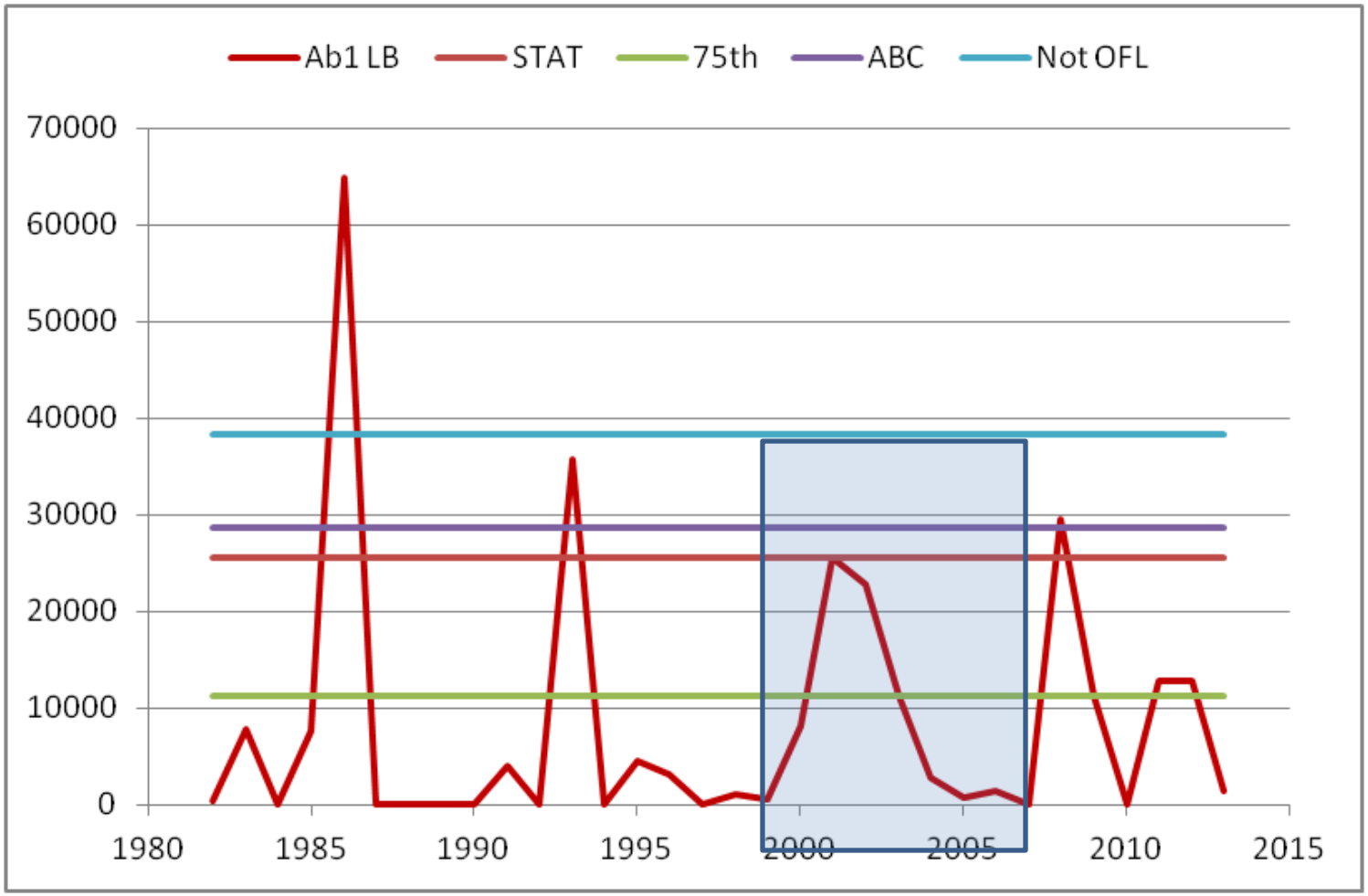
Stocks were not chosen for assessment at random, so status of assessed stocks is not a representative sample.

Analogous to assuming most people are sick, based on a sample taken from a Doctor's office that shows many sick people.

Is the range of “OFL” scalars too high?

- Derived after much debate, while report focuses primarily on the outcome
- Reflects the expert judgment of the Committee, as such is prone to alternative ideas by other groups of experts
- What is extreme tends to be bounded by the uncertainty in the observations

Cubera Snapper, MRIP Data



Moderate Risk, with an “OFL” scalar of 1.5, ABC with 75% scalar.

Did SSC consider an analysis suggesting high levels of risk associated with catch-derived ABC levels?

- SSC provided presentation on suite of data poor methods in October 2013.
- SSC was not presented a full analysis, nor asked to review the methods or outcomes
  - Presentation focused on methods for developing ABC values, described as an FYI on recent advancements
- Inclusion of ORCS application was a last minute addition to the end of a long presentation, but not included in the documentation

Did SSC consider an analysis suggesting high levels of risk associated with catch-derived ABC levels?

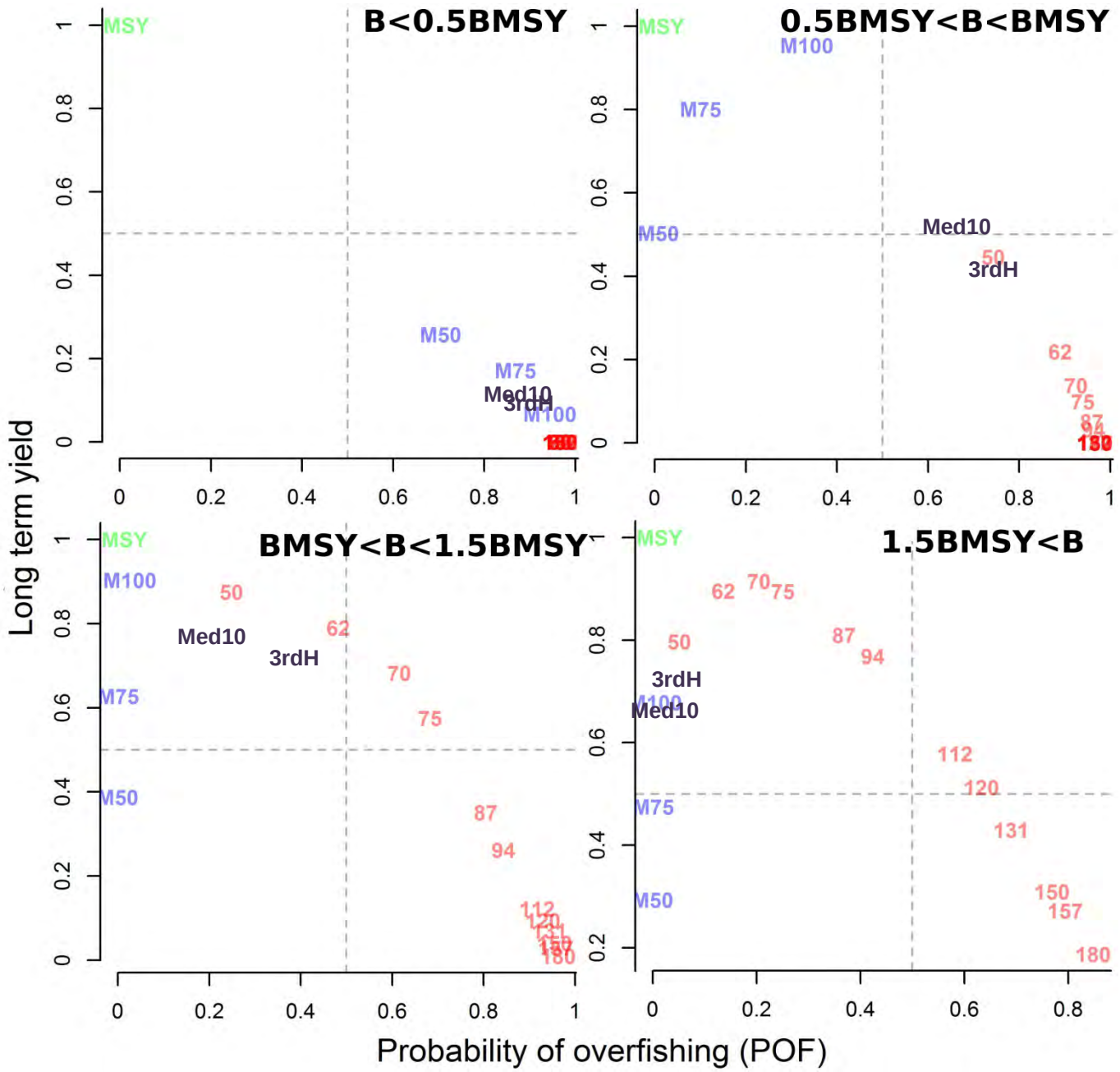
- SSC intrigued by recent developments, interested in continuing to improve the scientific basis of fishing level recommendations for unassessed stocks
- Issue remains that exploitation (overfishing) status is UNKNOWN for these stocks). Many assumptions required to evaluate any landings level for an unassessed stock against a biological reference.
  - SSC has grappled with, debated, and argued this difficult point each time ABCs considered since 2007.
  - A root cause of much of the delay in even obtaining ABC recommendations for many stocks.

Simulation Evaluation of ORCS

(and many other catch based ABC methods)

- Simulations based on assuming some biomass level. *Since true biomass level and Bmsy are unknowns, various levels considered.*
- Catch based methods performed poorly across the board
- The higher the catch, and lower the assumed B/Bmsy, the worse they performed
- Methods that account for current abundance perform best

Performance of maximum catch rules (Mackerel)



Rules

Maximum Catch

50 = 50% Max Catch

62 = 62% Max Catch

70 = 70% Max Catch

…

Mean Catch

M50 = 50% Mean Catch

M75 = 75% Mean Catch

M100 = Mean Catch

Reference approaches

FMSY = OFL

Other approaches

Med10 = Median catch of last 10 years

3rdH = 3rd highest catch

Similar pattern across all species except butterfish

Results are largely as expected

- Assume the observed catch history resulted in stock biomass below Bmsy
- Simulate catch at the observed level, or fraction thereof
- The stock will experience overfishing and reduced yield and will not rebuild.

In other words, if you TELL a model that the stock is overfished and it had a given landings history, then the model WILL TELL you that those observed landings will result in overfishing, even possibly collapse.

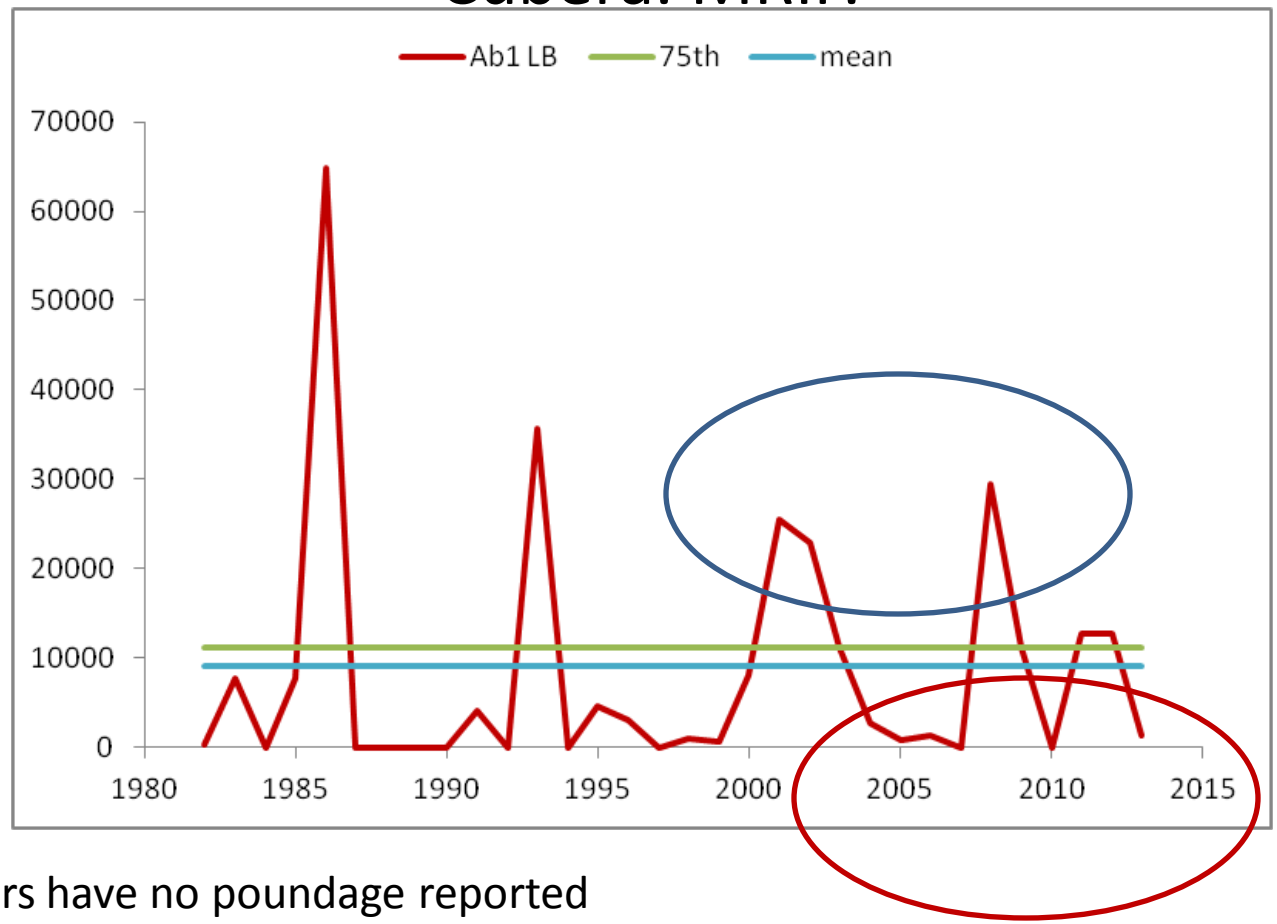
- Performance improved by being adaptive and obtaining abundance information.

Simulation Evaluation of ORCS & Dealing with the uncertainty in Catch

- Simulating catch at various ABC limits could remove the observed uncertainty in catch from the scenario
- CVs applied to simulated catch, not clear if treated as a one sided or two sided bound
  - appropriate for central tendency (mean, median)
  - If using a limit that is scaled, this shifts the average catch over the simulation to the scaled level (e.g., max)
  - For values on the edges, this is analogous to a shifting baseline situation
- SSC discussion has focused on maintaining 'current levels' despite uncertain measures (catch)

How uncertain?

Cubera. MRIP.



31% of Years have no poundage reported

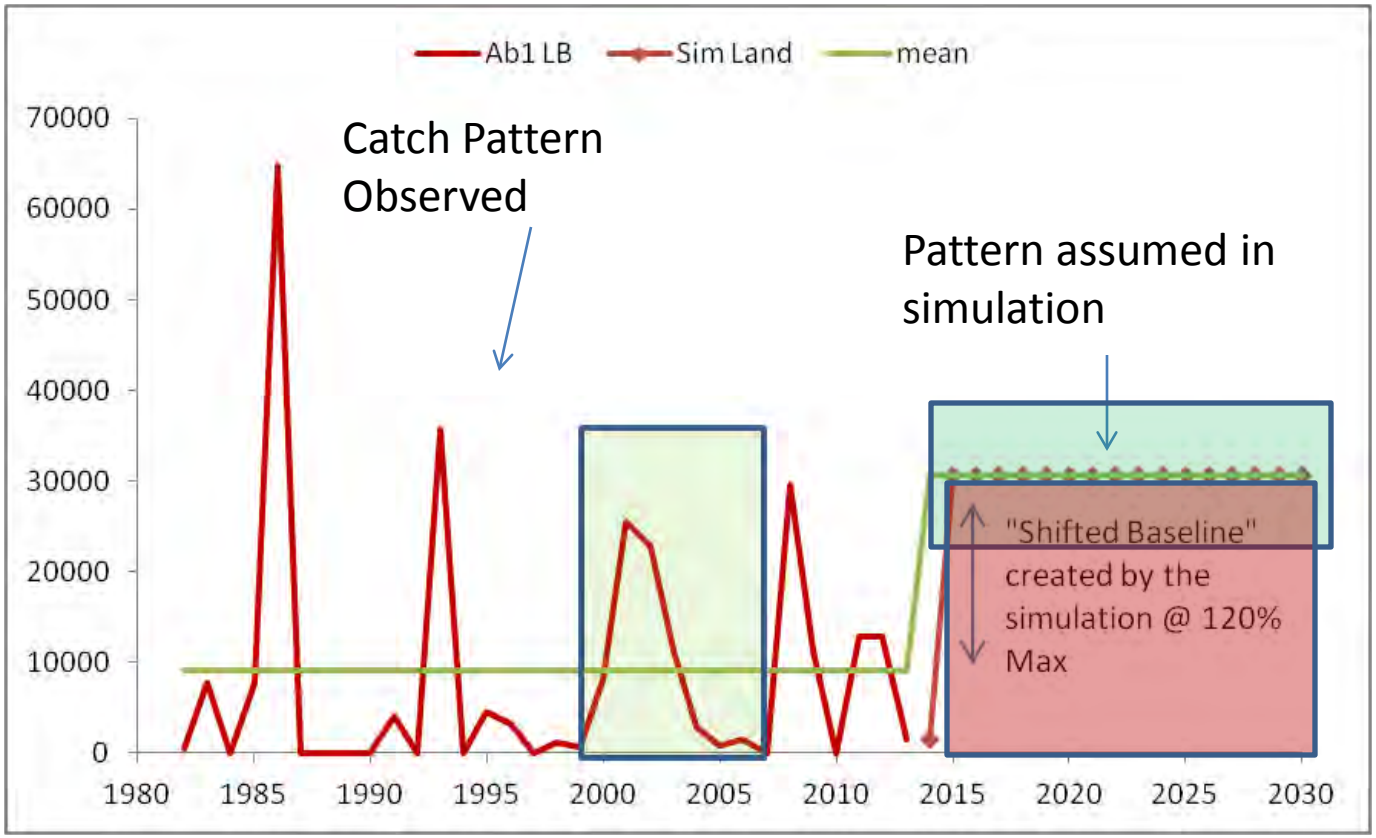
(0 fish observed by samplers, all waves, modes, areas)

5 years have no fish observed at all: estimated 0 catch.

Mean PSE on annual weight landed = 61%, max is 102% (ref period)

PSE of lbs landed across reference years is 115% (ref period)

Simulation Evaluation of ORCS application implies a shifting baseline



Assumed catch overestimates yield in an upper bound limit scenario

Sum harvest over 9 reference years: 73,181 lbs

Sum harvest over 9 year sim: 275,670
376% increase!

Is it a realistic assumption for species that are minor components of the fishery, seldom specifically targeted and routinely absent from catch sampling over an entire year, to suddenly experience a sustained increase in catch?

Simulation outcome, Low yields from higher ABCs?

- Another outcome of the simulations is low long term yield for many of the approaches that result in higher ABC levels
- Seems counter-intuitive, that higher ABC gives less yield, at least to such a degree
- The non-obvious reason is that the higher ABCs lead to stock decline (which means less yield available) and in some cases total collapse, while the yield metric in the simulations is based on the last 5 years of 30 simulated

Will setting a higher ABC on red hind, e.g., lead fishermen to pursue this species to collapse?

Is the SSC being true to ORCS principles?

- First 3 Authors of the ORCS report are on the SAFMC SSC
  - Discussed their intent as well as the experience of actually applying the method to real data limited situations
  - Recognized that some changes in the approach were anticipated as different areas applied the method to their own circumstances

Is the SSC being true to ORCS principles?

- Stated ORCS intent is to maintain current catch levels for moderately exploited stocks, reduce catches for heavily exploited stocks, and allow limited increases in lightly exploited stocks
  - Exploitation is unknown
  - No stocks evaluated by the SSC were considered to be at high RISK of overexploitation
  - Continuing debate by SSC, attempting to develop ABCs that are true to “maintaining current catch levels”
  - 25 stocks not included in ORCS, some expected to have experienced overexploitation

How to *Maintain Current Catch Levels*?

This is the underlying challenge!

- What statistic best represents current catch levels?
  - median, average, maximum, Xth percentile?
  - likely depends on your purpose
    - Setting a limit is different than reporting central tendency
  - SSC expectation is that setting a limit near the upper bound of the uncertain observed catch will allow the fishery to yield its average in the future
    - Therefore, median simulation is a more realistic approach

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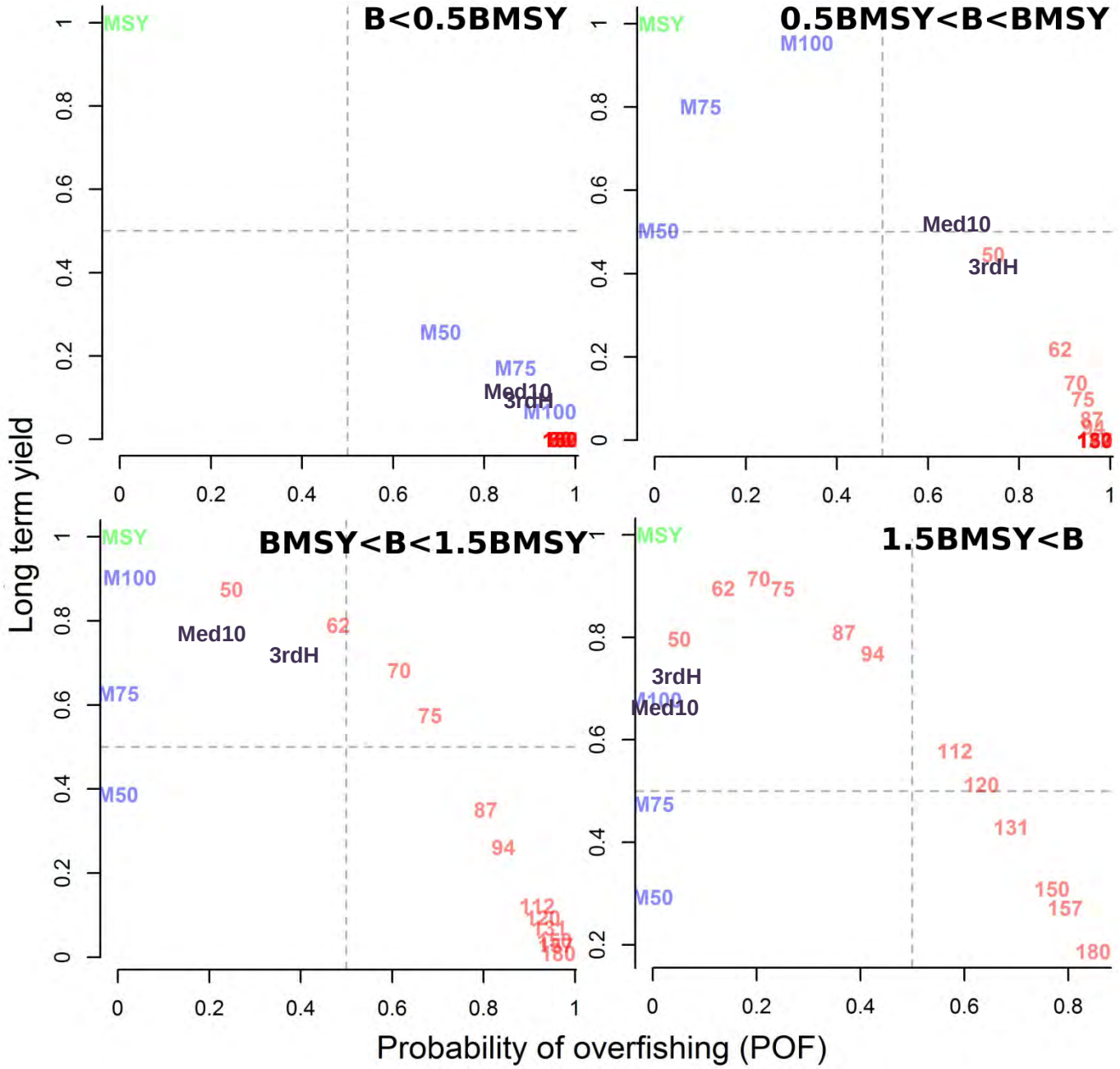

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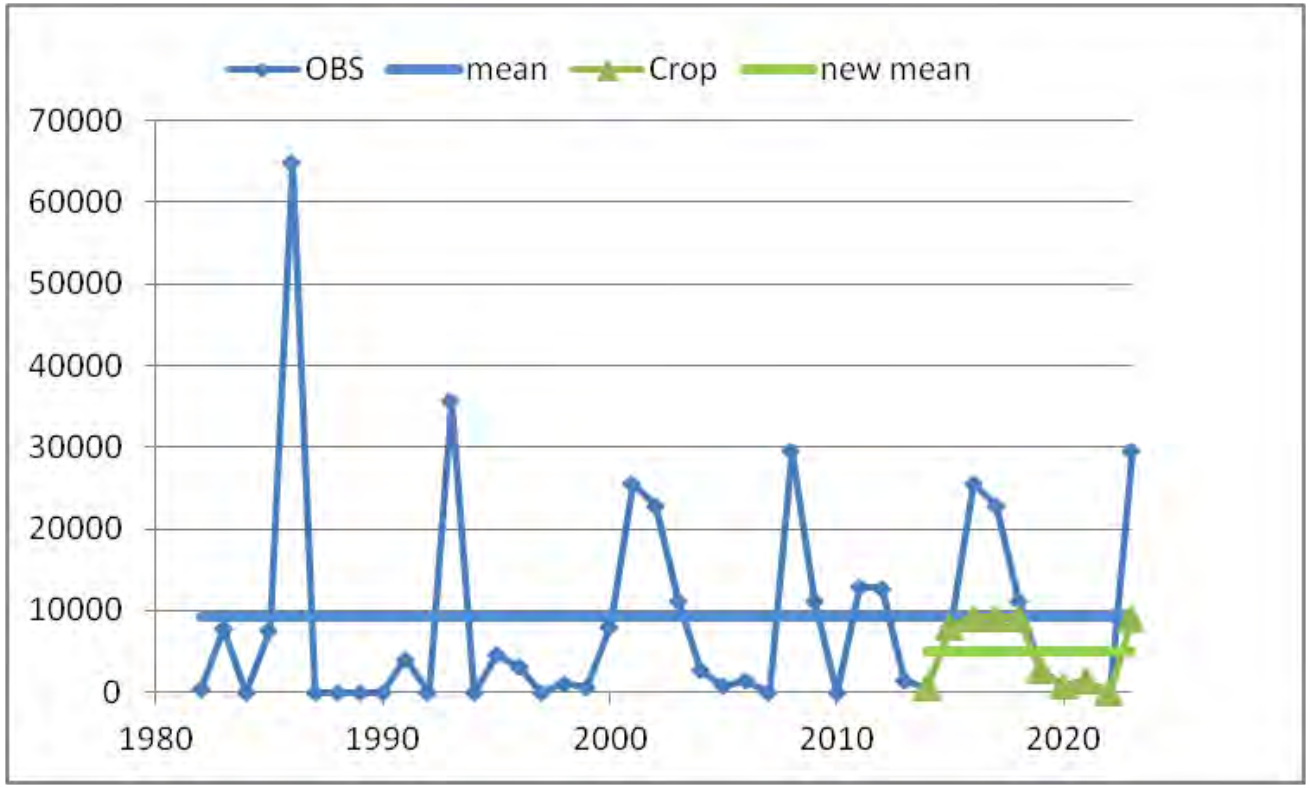
What happens if ABC (limit) is set at the Average Catch?

- All prior observed catches over that average considered “bad”
  - They cannot occur in the future, since ABC is a LIMIT
- Future catches capped at the Limit
- In reality some years naturally lower, so future average will be lower than past average.
  - shifted baseline
  - Fails to “maintain current catch levels”

IT IS ALL ABOUT THE VARIABILITY!!!!

What happens if ABC (limit) is set at the Average Catch?

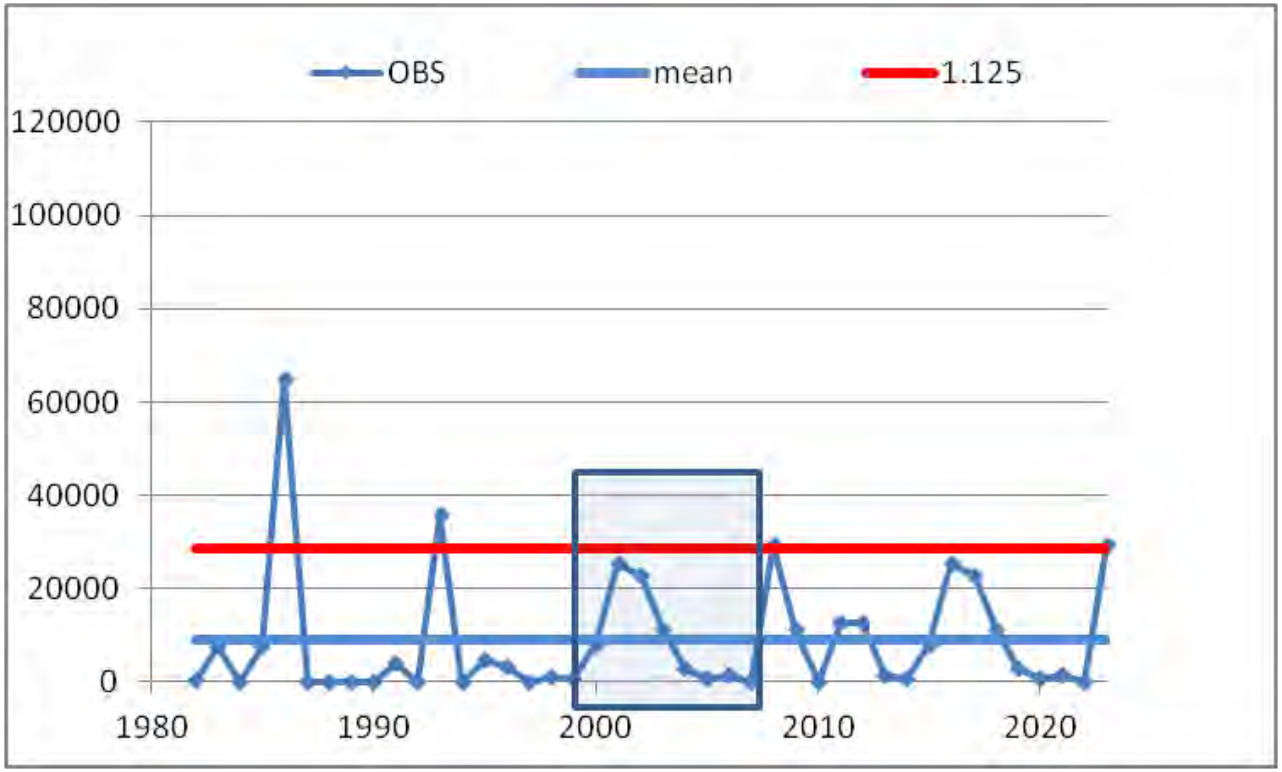


Repeat reference period landings 10 years into the future, but crop off any that exceed the reference average (because the average became the ABC limit for the future)

Loss of all landings > average results in a new average that is nearly 50% less than before, does not *maintain current catch*.

Foregone yield of over 50% hardly achieves OY – the other side of the management objective….*prevent overfishing while achieving OY*.

What happens if ABC (limit) is set at 1.125X the maximum catch?

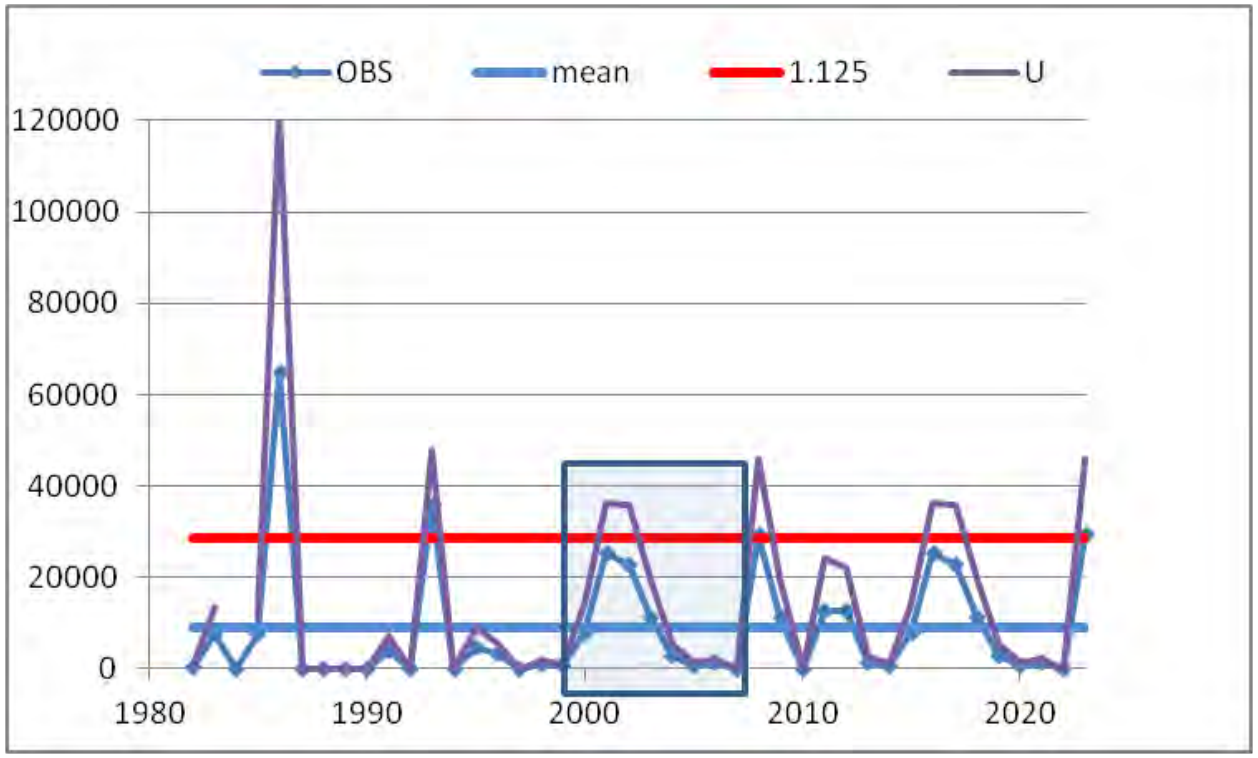


Repeat reference period landings 10 years into the future. One year exceeds the ABC limit by about 1,000 pounds. The Future will not be this easy to predict.

ORCS and SSC intention of maintaining status quo, despite the large variability in annual catch estimates, is accomplished.

Average yield equal to the baseline is largely achieved. Very high yields observed in the past would be prevented.

What about the Catch Variability?



Mentioned the high annual PSEs for this stock earlier. Does that help give some more perspective to the ABC?

Including the upper bound shows that true catches could easily often be higher than the ABC (at 1.125X max observed).
Shows that we should expect some years in the future to experience estimated landings in excess of the ABC, even at this level of ABC.
Not surprising, comparing the variability of 50-100% and the ABC bump of 12%.

Things to Consider

- Risk to a stock will more realistically come from a gradual increase in the average than sustained harvest of the maximum
  - Landings > ACL will trigger AMs
  - Nothing now addresses an increasing average
  - Consider evaluation (AM?) if the average starts to rise (old fashioned triggers):
    - 3 yr average > reference average
    - 3 sequential observations > reference average

Things to Consider

- Adjust ACL based on uncertainty
  - OFL to ABC is a defined scientific determination
    - scalar based on uncertainty and risk tolerance
  - ABC to ACL is a defined management determination
    - should also account for uncertainty

Council consider scalar to reduce ACL from ABC

- catch data (ORCS) is uncertain
  - Cubera MRIP catch variability is 61% of the average Catch
- management based on catch is therefore uncertain

Things to Consider

- Simulation shows current abundance, historic effort, and stock depletion are critical info
  - Focus future research on these topics for ORCS stocks (and the 25 that failed to even make ORCS).