

Exploring options for spatially disaggregated directed sardine catch under OMP-14

SPSWG Meeting
29th April 2014

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University of Cape Town

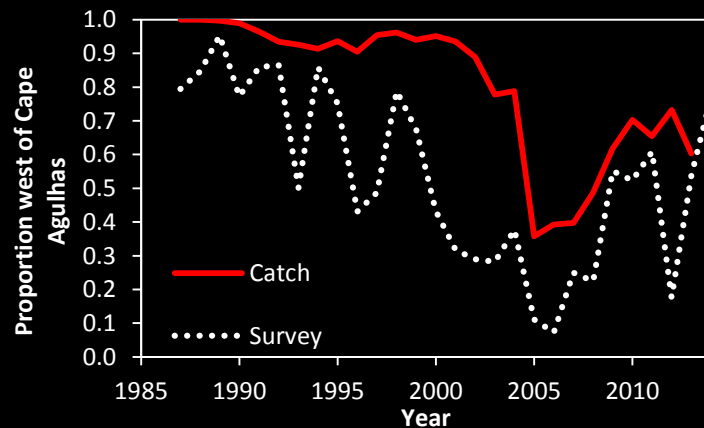
Spatially Disaggregated Catch

- Agreement to finalise an OMP-14 based on Interim OMP-13v3 with guidelines for some spatial disaggregation of directed sardine catch
- Part 1 : Alternative predictors of past splits in directed sardine catch
- Part 2 : A way-forward for how to develop a rule to advise on a catch split under OMP-14

Part 1 :

Predicting Past Catch/Survey Splits

- A) Model the proportion of catch west of Cape Agulhas
- B) Model the proportion of survey biomass west of Cape Agulhas



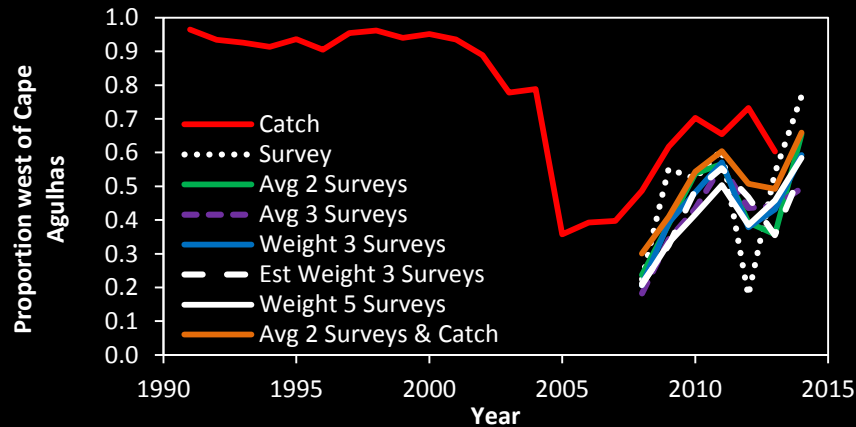
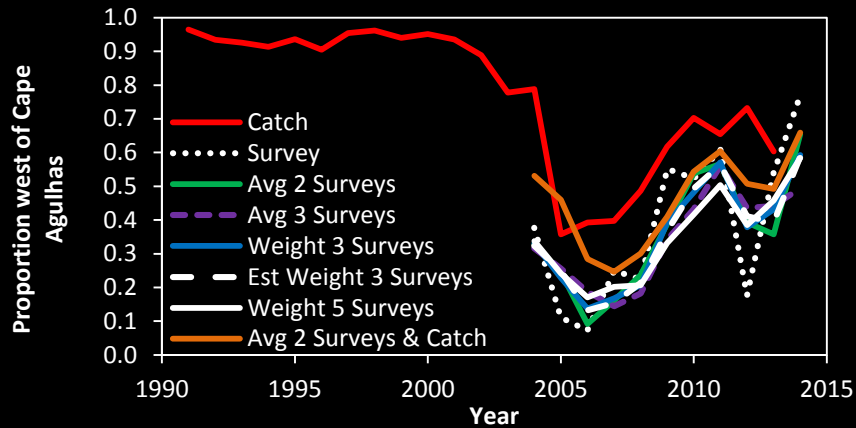
Only considered data
in past 10 years

Part 1 :

Predicting Past Catch/Survey Splits

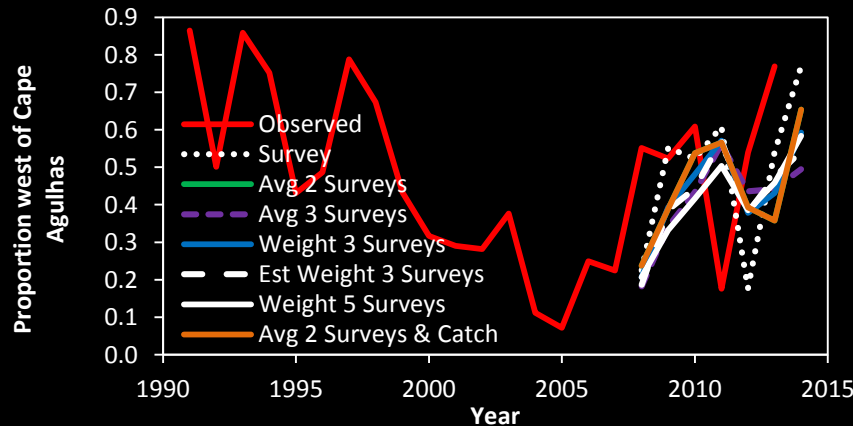
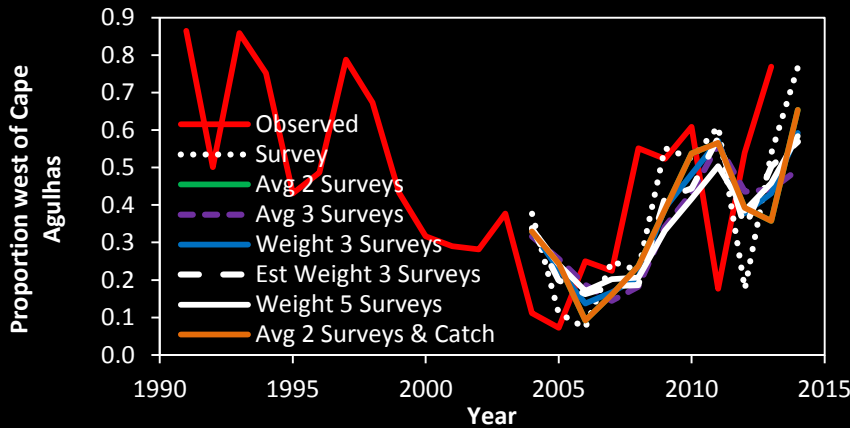
- **Models:**
 - **Survey:** the proportion of survey biomass west of CA in $y-1$
 - **Avg 2 Surveys:** the average of the proportion of survey biomass west of CA in $y-1$ and $y-2$
 - **Avg 3 Surveys:** the average of the proportion of survey biomass west of CA in $y-1$, $y-2$ and $y-3$
 - **Weight 3 Surveys:** the weighted average of the proportion of survey biomass west of CA in $y-1$, $y-2$, $y-3$, with greater weight given to more recent years
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 - **Avg 2 Surveys & Catch:** the average of the proportion of survey biomass and catch west of CA in $y-1$, $y-2$, with greater weight given to survey data

Predicting Past Catch Splits



Fitting to 2008-2013 Data only			
Alternative	q	Variance	SE
Survey	0.20	0.038	0.195
Avg 2 Surveys	0.22	0.007	0.085
Avg 3 Surveys	0.23	0.007	0.086
Weight 3 Surveys	0.22	0.008	0.092
Est Weight 3 Surveys	0.23	0.008	0.090
Weight 5 Surveys	0.25	0.007	0.082
Avg 2 Surveys & Catch	0.16	0.004	0.065

Predicting Past Survey Splits



Variance much higher. Bias lower.

Fitting to 2008-2013 Data only			
Alternative	q	Variance	SE
Survey	0.09	0.087	0.296
Avg 2 Surveys	0.11	0.077	0.278
Avg 3 Surveys	0.13	0.073	0.271
Weight 3 Surveys	0.12	0.073	0.270
Est Weight 3 Surveys	0.12	0.120	0.347
Weight 5 Surveys	0.14	0.059	0.243
Avg 2 Surveys & Catch	0.11	0.077	0.278

Part 1 :

Predicting Past Catch/Survey Splits

- Summary:
- Can predict past catch split more accurately than past survey split
- A non-negligible additive bias is required to fit the data
- Note additive bias implies model can only be used for a short period of time (e.g. if current upward trend in survey proportion continues, the models could soon produce unrealistic results)

Part 1 :

Predicting Past Catch/Survey Splits

- Summary:
- Catch predictions represent what would happen in the absence of any directive regarding spatial management
 - What flexibility about recommended OMP-14 proportions might be appropriate, given the level of precision with which the proportion can be estimated?

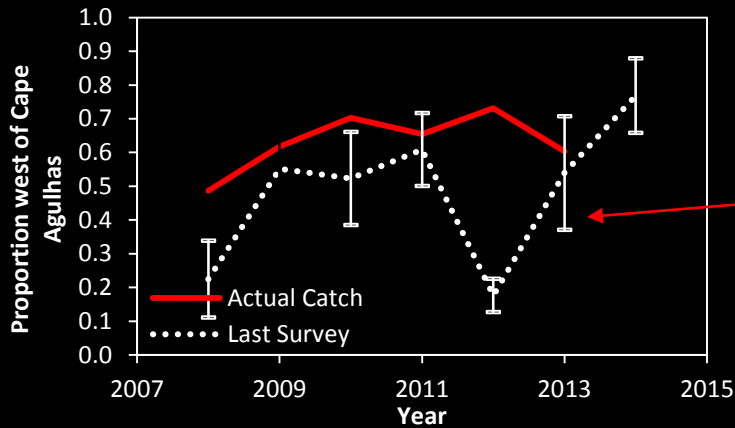
Part 2 :

Recommendation for OMP-14 Catch Splits

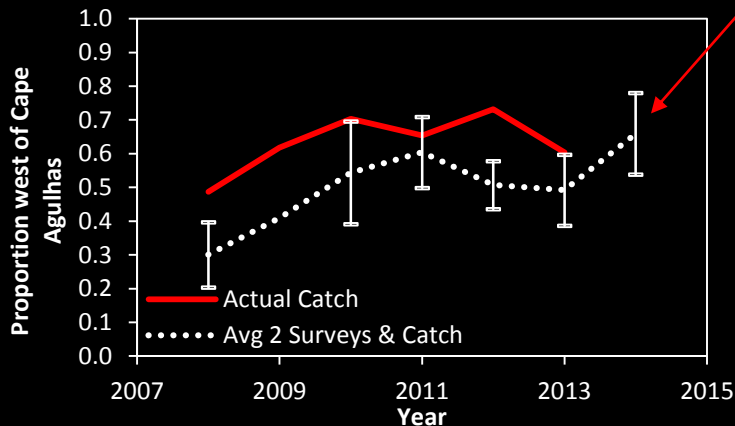
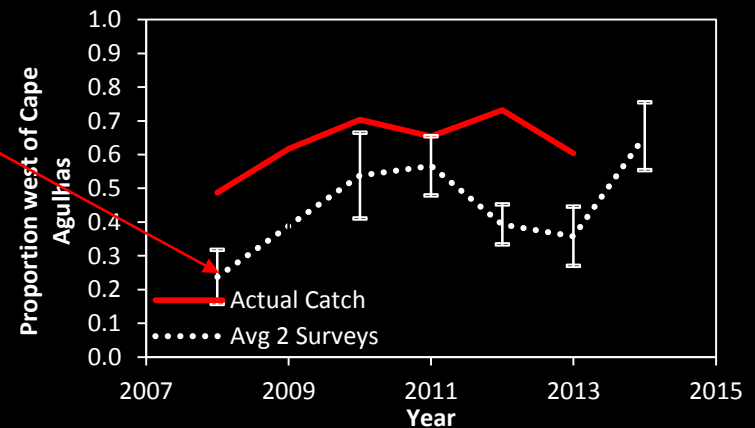
- Step 1: SPSWG needs to agree on an ideal median annual proportional split
- Four examples:
 - **Survey y-1**: Catch should reflect the distribution of sardine during Nov y-1 survey
 - **Avg last 2 Surveys**: Catch should reflect average distribution of sardine during recent 2 surveys. May smooth out any large, but temporary changes in proportions
 - **Avg last 2 Surveys & Catch**: Best predictor model. Inclusion of historic catch as a means to allow some socio-economic preference
 - **Avg last and next Survey**: Catch should reflect the distribution of sardine during the catch period (taken as an average of that at the beginning and end of period)

Part 2 :

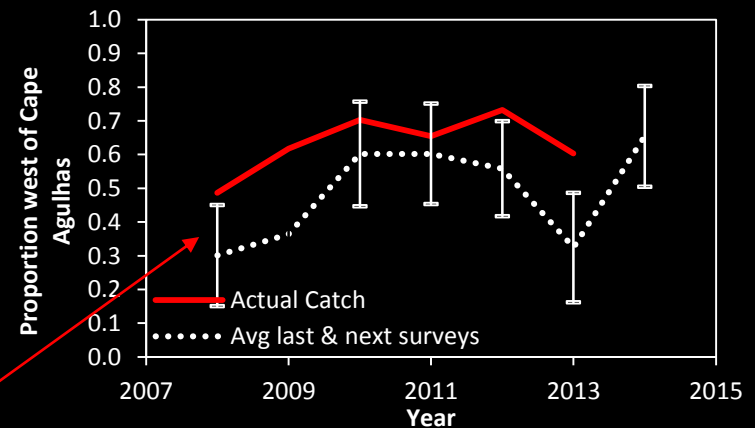
Recommendation for OMP-14 Catch Splits



Variability from observed data only

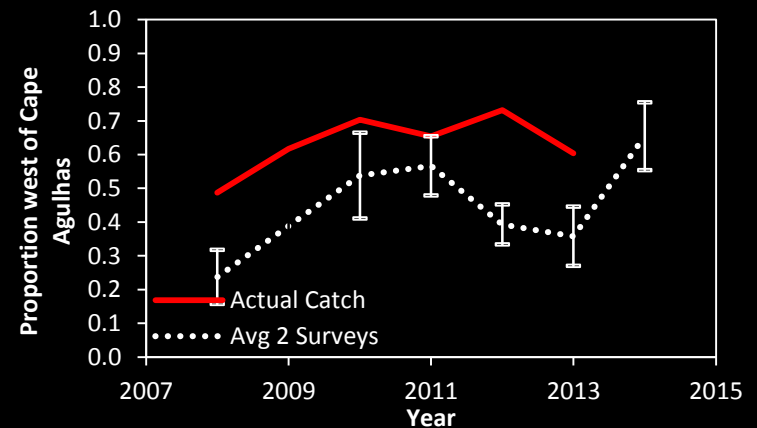
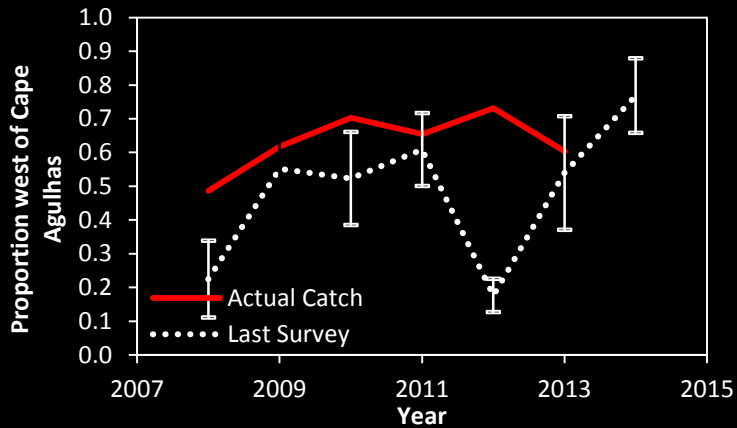


Variability from observed data AND predictive model

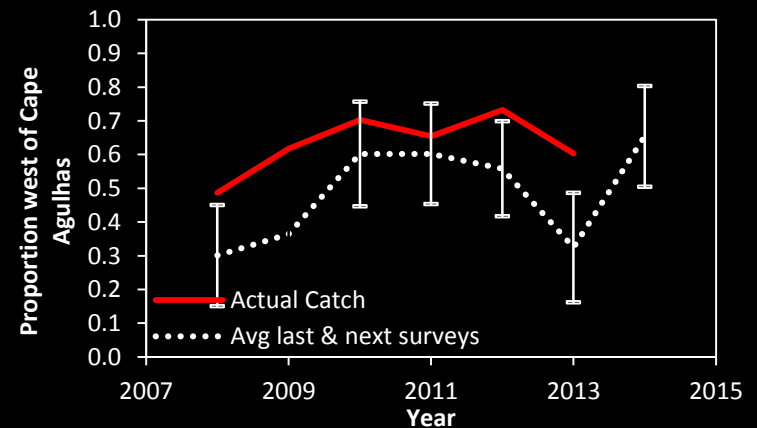
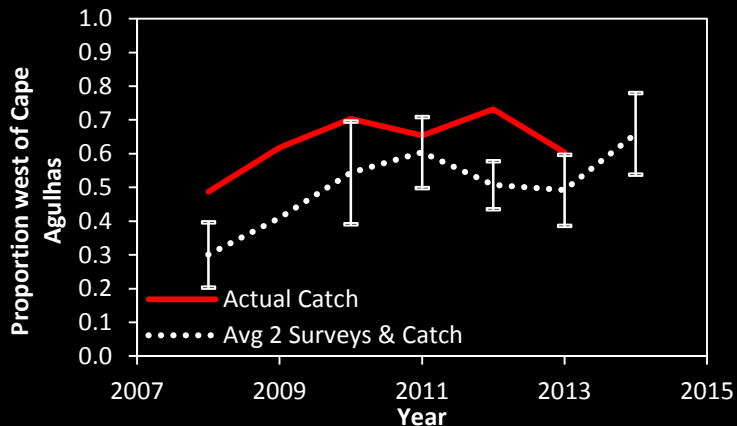


Part 2 :

Recommendation for OMP-14 Catch Splits



“Recommendations” consistently lower than observations -> a shift in fishing pressure would be required



Part 2 :

Recommendation for OMP-14 Catch Splits

- Step 1: SPSWG needs to agree on an ideal median annual proportional split
- Step 2: What is an acceptable error about such a recommendation?
- Step3: Can industry realistically achieve the ideal split + error or should some further tolerance (bias) be allowed during the short term (OMP-14)

Part 2 :

Recommendation for OMP-14 Catch Splits

- OMP-14 recommendation =
 $p(\text{ideal}) \pm \text{error} + \text{bias}$
- Should recommendation apply to TAC or catch?

**Exploring options for spatially
disaggregated directed sardine catch
under OMP-14**

Thank you for your attention

Exploring options for spatially disaggregated directed sardine catch under OMP-14

SPSWG Meeting

23rd July 2014

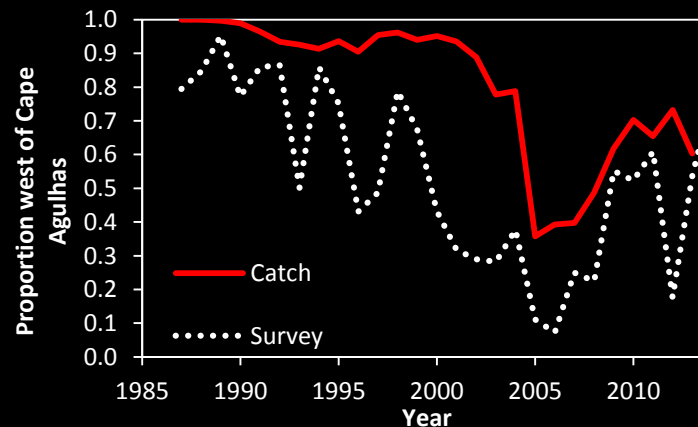
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Spatially Disaggregated Catch

- Agreement to finalise an OMP-14 based on Interim OMP-13v3 (single area directed sardine TAC) with guidelines for some spatial disaggregation of directed sardine catch



Recommendation for OMP-14 Catch Splits

- Step 1: SPSWG needs to agree on an ideal median annual proportional split
- Step 2: What is an acceptable error about such a recommendation?
- Step3: Can industry realistically achieve the ideal split + error or should some further tolerance (bias) be allowed during the short term (OMP-14)

OMP-14 recommendation = $p(\text{ideal}) \pm \text{error} + \text{bias}$

Recommendation for OMP-14 Catch Splits

- Step 1: SPSWG needs to agree on an ideal median annual proportional split

Generally management objectives would be to split the catch by area in the same proportion as the split of the resource abundance by area

Recommendation for OMP-14 Catch Splits

- **Four examples:**
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Recommendation for OMP-14 Catch Splits

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Predicting Past Survey Splits

Need a predictor of proportion of sardine west of Cape Agulhas during next survey

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Predicting Past Survey Splits

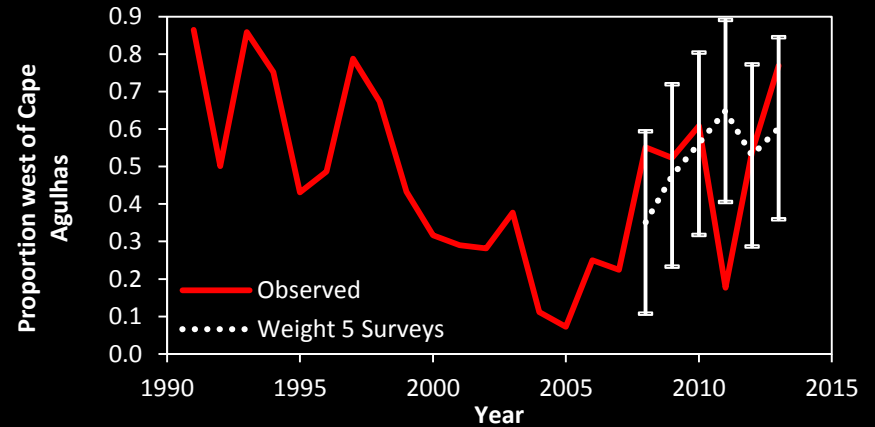
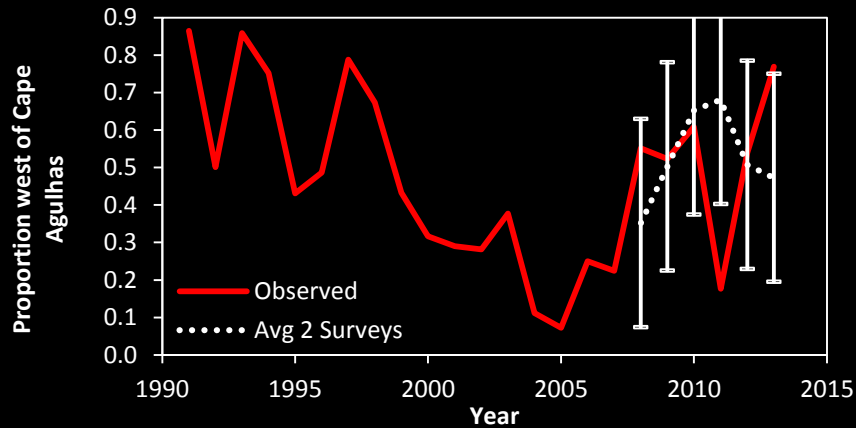
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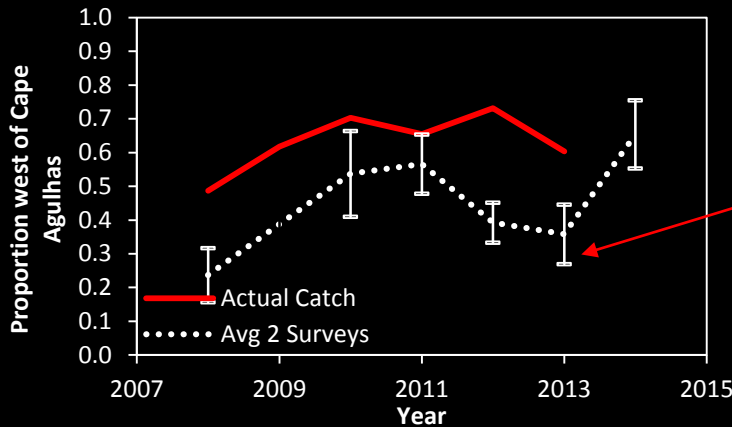
SIMPLEST
(variance not
much more than
next 2 options)

LOWEST VARIANCE

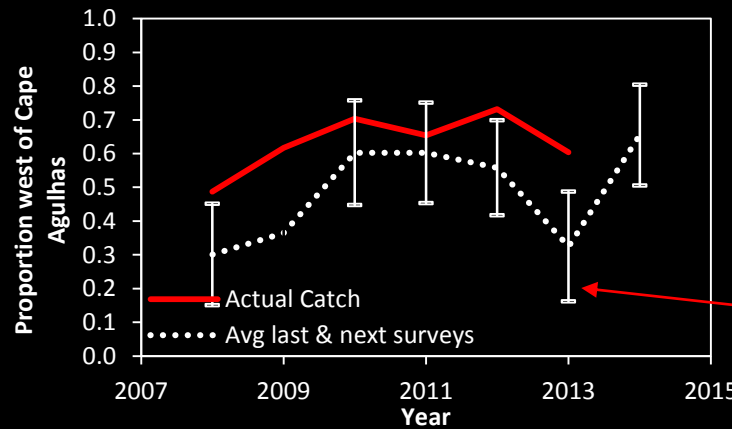
Predicting Past Survey Splits



Recommendation for OMP-14 Catch Splits



Variability from observed data only



Variability from observed data AND predictive model

“Recommendations” consistently lower than observations -> a shift in fishing pressure would be required

Predictive model used: Avg 2 Surveys, Variance would be a little smaller if weight 5 surveys used

Recommendation for OMP-14 Catch Splits

- Step 1: SPSWG needs to agree on an ideal median annual proportional split
- OMP-14 recommendation = $p(\text{ideal}) \pm \text{error} + \text{bias}$
- e.g. $p(\text{ideal}) = 0.5[p(\text{Nov}_{y-2}) + p(\text{Nov}_{y-1})]$
- e.g. $p(\text{ideal}) = 0.5[p(\text{Nov}_{y-1}) + p(\text{predicted Nov}_y)]$

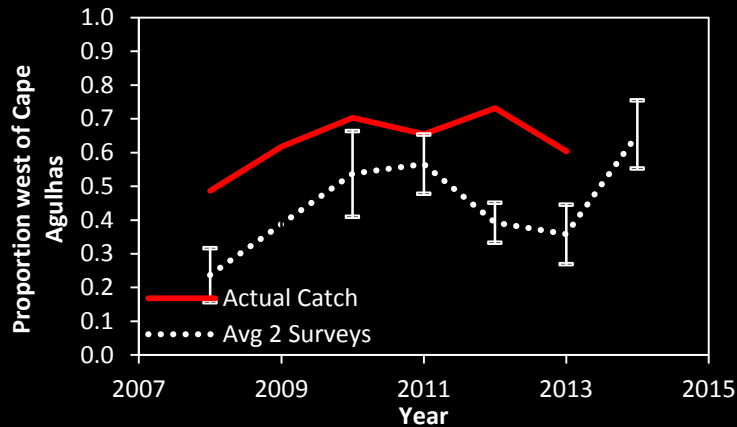
Recommendation for OMP-14 Catch Splits

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- Step 2: What is an acceptable error about such a recommendation?
- OMP-14 recommendation = $p(\text{ideal}) \pm \text{error} + \text{bias}$
- e.g. error = ± 1 SE
 - (± 0.09 average for Avg last 2 surveys)
 - (± 0.15 average for Avg last and next survey)

Recommendation for OMP-14 Catch Splits

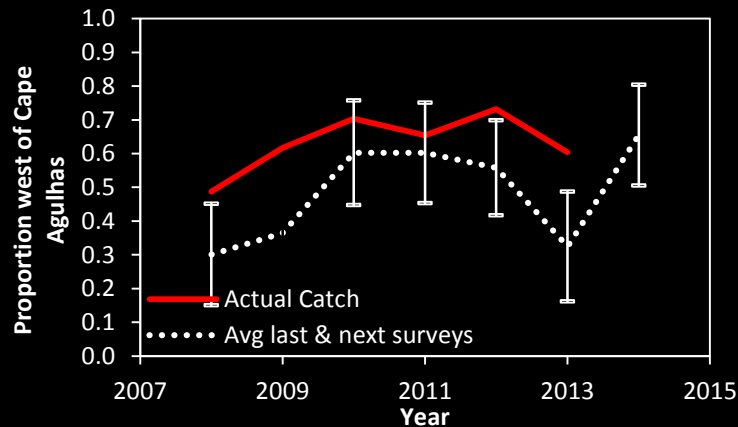
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Recommendation for OMP-14 Catch Splits



White bars show $p(\text{ideal}) \pm 1\text{SE}$

e.g. bias = 0?



Recommendation for OMP-14 Catch Splits

- Apply recommendation to TAC or catch?

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Thank you for your attention