Some Initial Results in the Development of OMP-18rev

SWG-PEL Meeting

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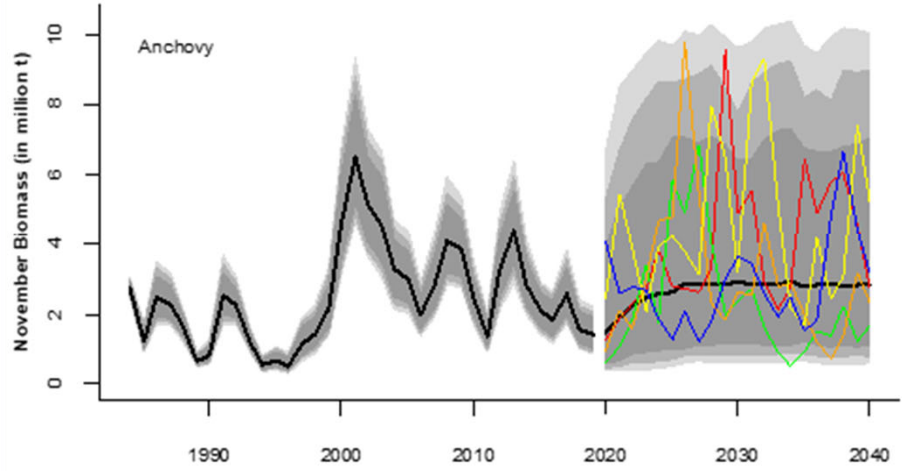
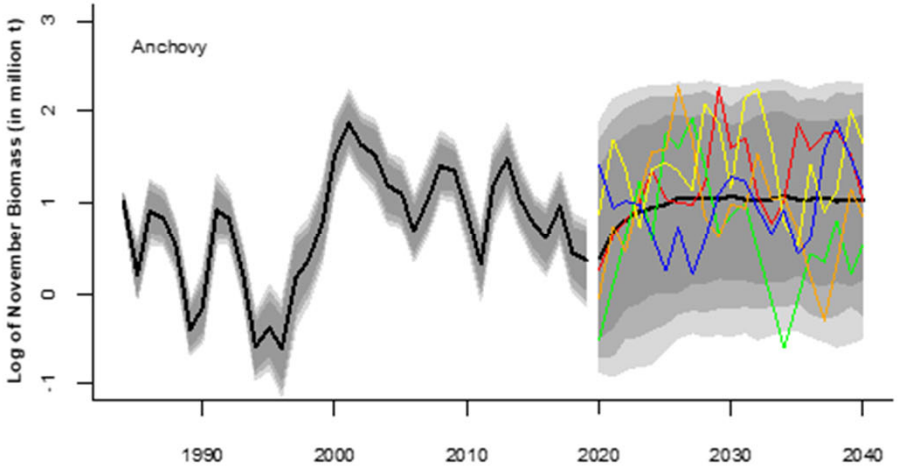
Simulation Testing Framework

- See FISHERIES/2020/DEC/SWG-PEL/122
- OM consists of population dynamics (biological) model + observation model + implementation model

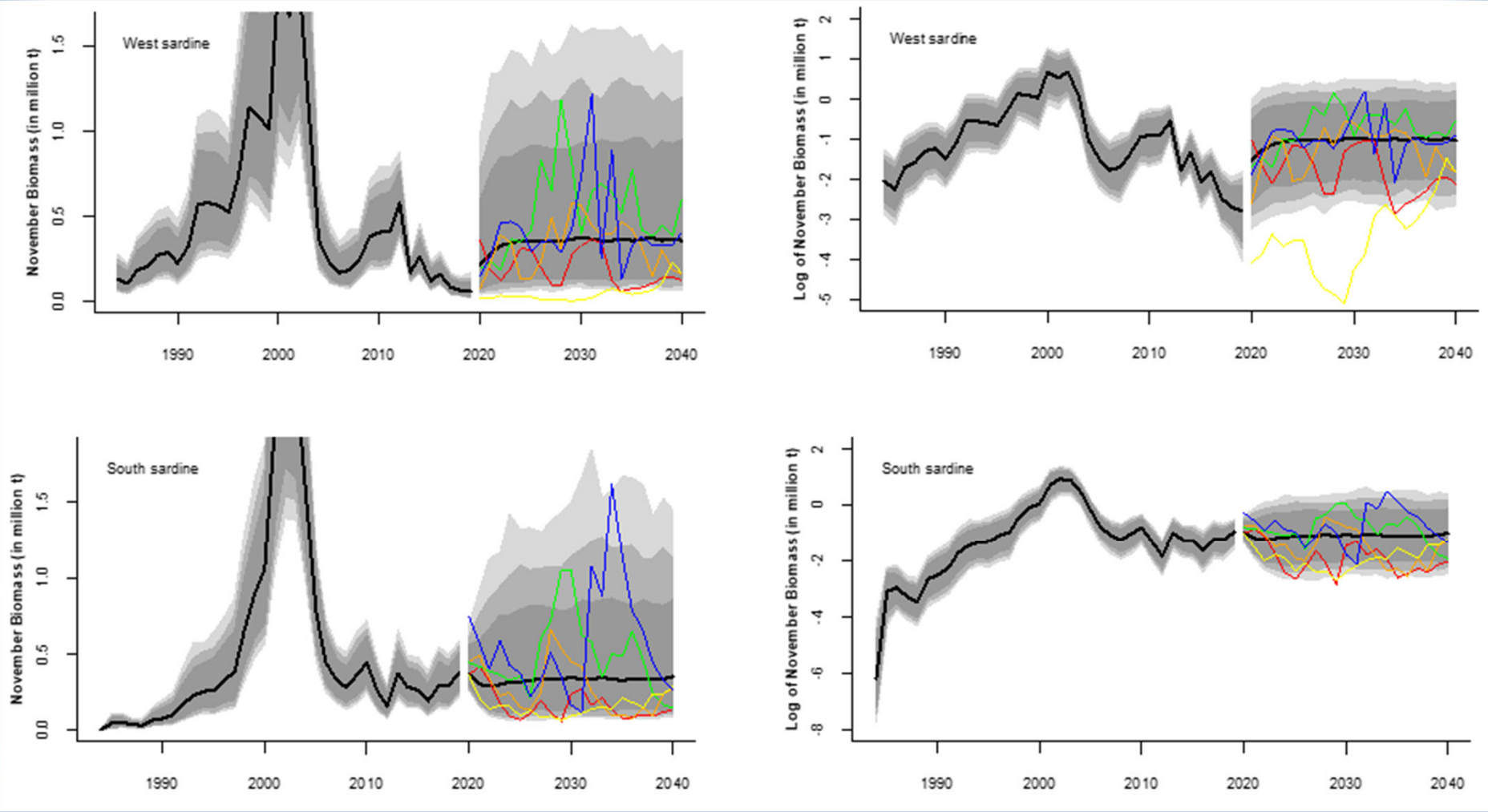
Checking Projections





- Projected within the same range as that estimated historically

Checking Projections

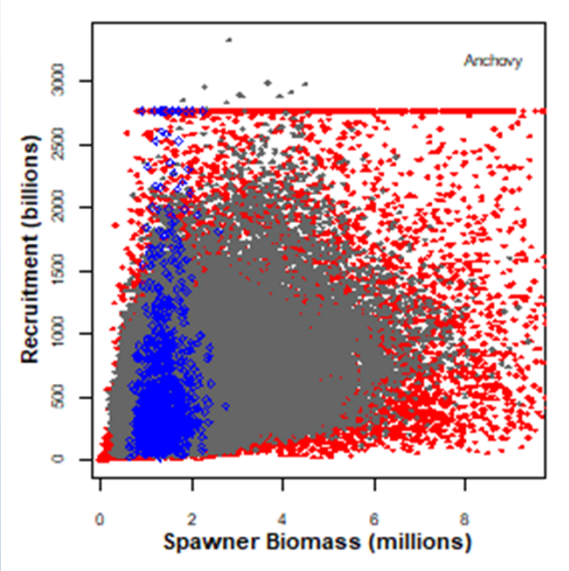


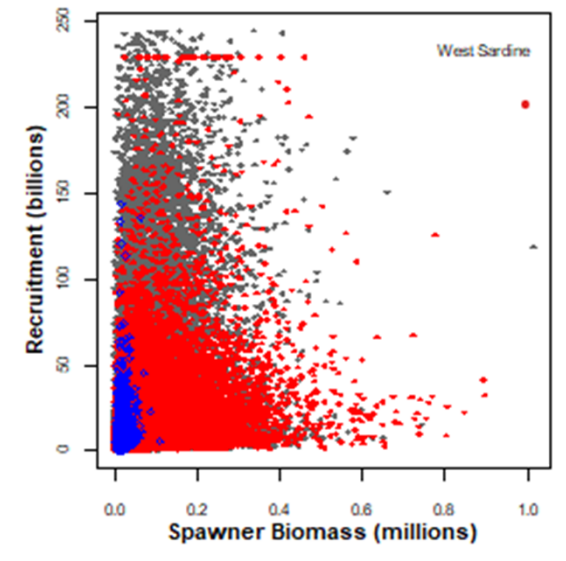
Generating Future Recruitment

Historical

Future

November 2019

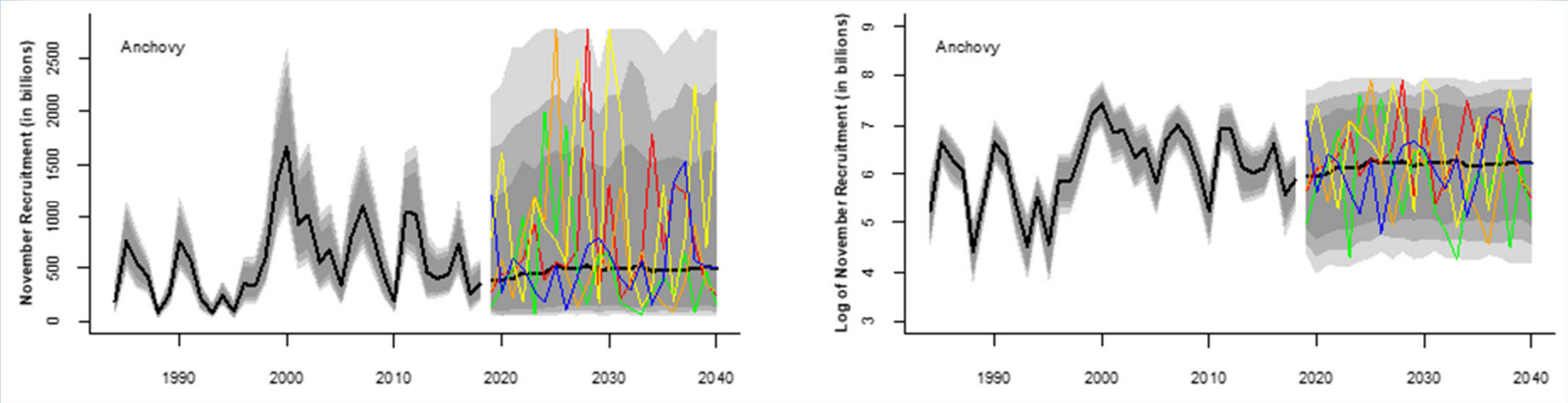




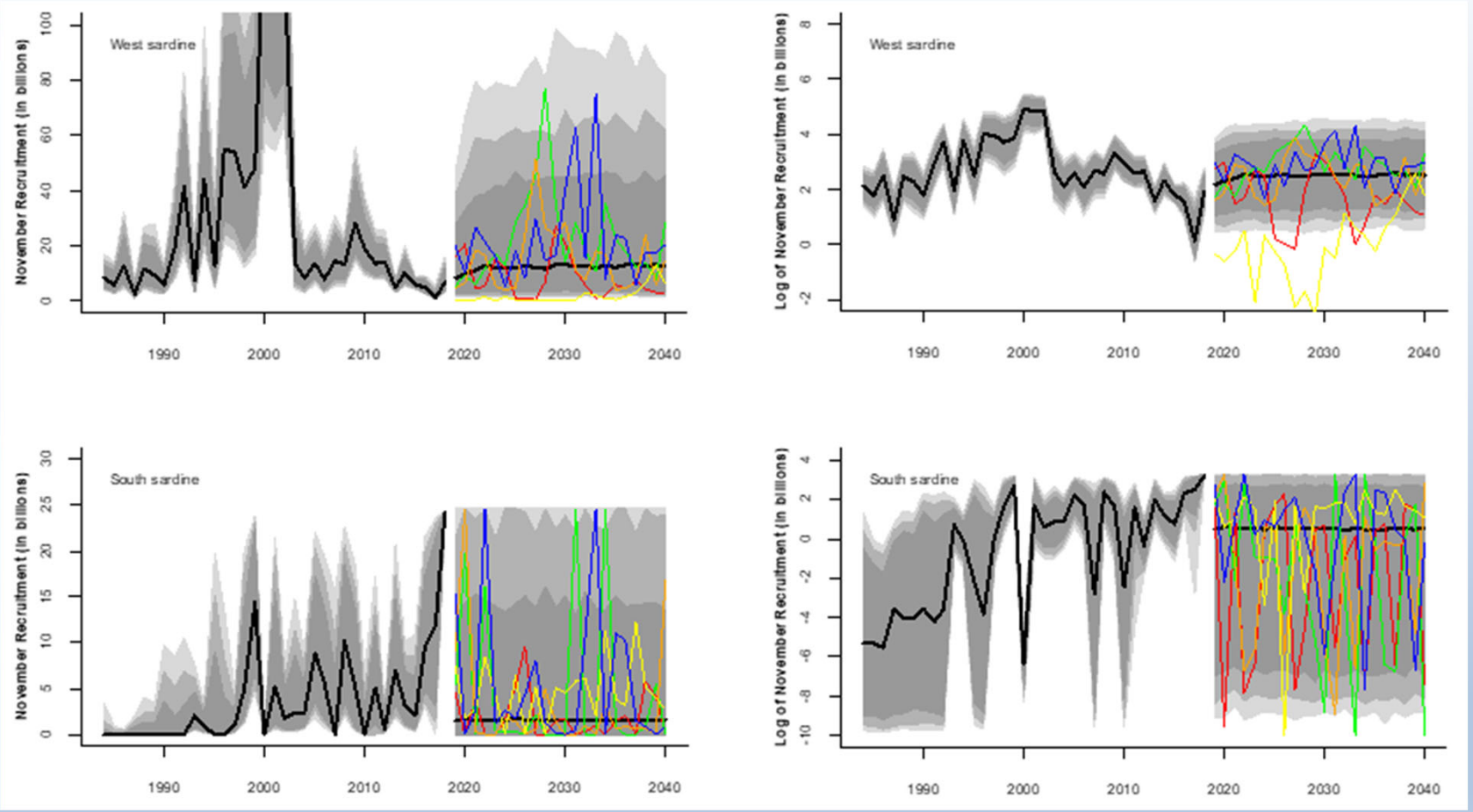
Anchovy – Beverton Holt

West sardine – Hockey Stick

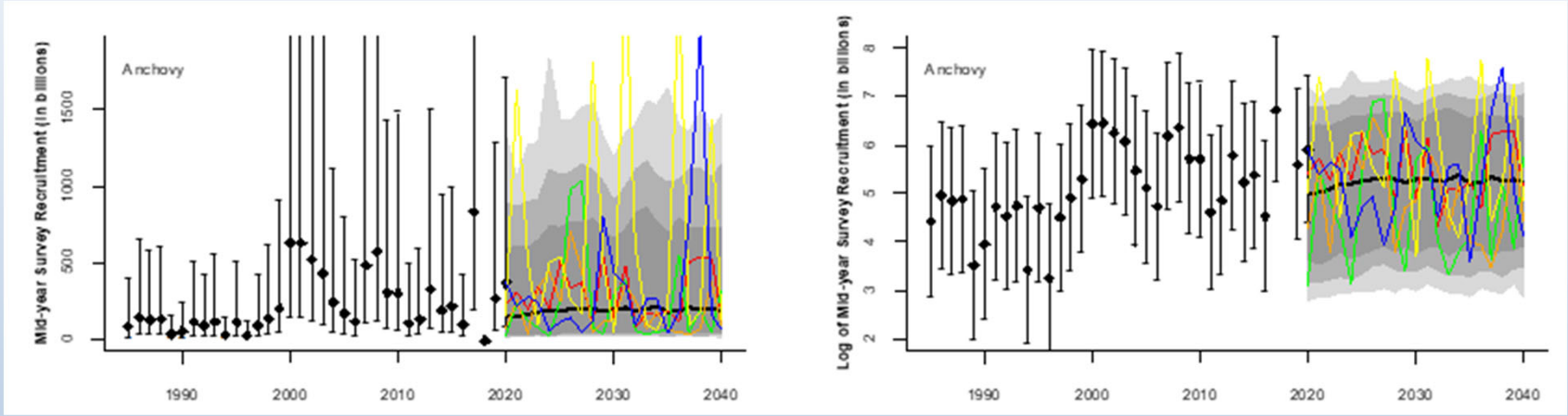
Generating Future Recruitment



Generating Future Recruitment



Generating Survey Observations



- June 2020 observation within the range simulated for May 2020

Risk

- $Risk_A$: the probability of the anchovy B^{sp} being below the 1996 level [historical minimum] over the projection period
- Acceptable level of risk differs from one OMP to another given changes in the perceived level of productivity of a resource resulting from the inclusion of revised and new data when conditioning OMs
- Can't use 'leftward shift' for anchovy

Tuning Anchovy HCR

	Old OM		A_{BH}			
	No Catch	OMP-18	No Catch			
α	-	1.16	-			
$Risk_A$	0.018	0.089	0.030			
$p(B_{21}^{sp}<B_{96}^{sp})$			0.08			
$p(B_{22}^{sp}<B_{96}^{sp})$			0.05			
$p(B_{23}^{sp}<B_{96}^{sp})$			0.04			
C^A	-	311 350	-			
MAV^A	-	0.00	-			
p(Bsar+Banc)< hist min	0.01	0.07	0.09			

$Risk_A$ under a no catch scenario increases by 1.2%

Tuning Anchovy HCR

	Old OM		A_{BH}			
	No Catch	OMP-18	No Catch	OMP-18		
α	-	1.16	-	1.16		
$Risk_A$	0.018	0.089	0.030	0.218		
$p(B_{21}^{sp}<B_{96}^{sp})$			0.08	0.15 (+7)		
$p(B_{22}^{sp}<B_{96}^{sp})$			0.05	0.17 (+12)		
$p(B_{23}^{sp}<B_{96}^{sp})$			0.04	0.19 (+15)		
C^A	-	311 350	-	281 350		
MAV^A	-	0.00	-	0.04		
p(Bsar+Banc)< hist min	0.01	0.07	0.09	0.36		

$Risk_A$ under OMP-18 increases by 12.9%

Tuning Anchovy HCR

	Old OM		A_{BH}			
	No Catch	OMP-18	No Catch	OMP-18	OMP-14	CMP3
α	-	1.16	-	1.16	0.889	?
$Risk_A$	0.018	0.089	0.030	0.218	0.181	0.181
$p(B_{21}^{sp}<B_{96}^{sp})$			0.08	0.15 (+7)	0.14 (+6)	
$p(B_{22}^{sp}<B_{96}^{sp})$			0.05	0.17 (+12)	0.15 (+10)	
$p(B_{23}^{sp}<B_{96}^{sp})$			0.04	0.19 (+15)	0.15 (+11)	
C^A	-	311 350	-	281 350	310 341	
MAV^A	-	0.00	-	0.04	0.25	
p(Bsar+Banc)< hist min	0.01	0.07	0.09	0.36	0.34	

‘Blinkers on’….

Tuning Anchovy HCR

	Old OM		A_{BH}			
	No Catch	OMP-18	No Catch	OMP-18	OMP-14	CMP3
α	-	1.16	-	1.16	0.889	0.936
$Risk_A$	0.018	0.089	0.030	0.218	0.181	0.181
$p(B_{21}^{sp}<B_{96}^{sp})$			0.08	0.15 (+7)	0.14 (+6)	0.14 (6)
$p(B_{22}^{sp}<B_{96}^{sp})$			0.05	0.17 (+12)	0.15 (+10)	0.15 (+10)
$p(B_{23}^{sp}<B_{96}^{sp})$			0.04	0.19 (+15)	0.15 (+11)	0.16 (12)
C^A	-	311 350	-	281 350	310 341	274 350
MAV^A	-	0.00	-	0.04	0.25	0.12
p(Bsar+Banc)< hist min	0.01	0.07	0.09	0.36	0.34	0.33

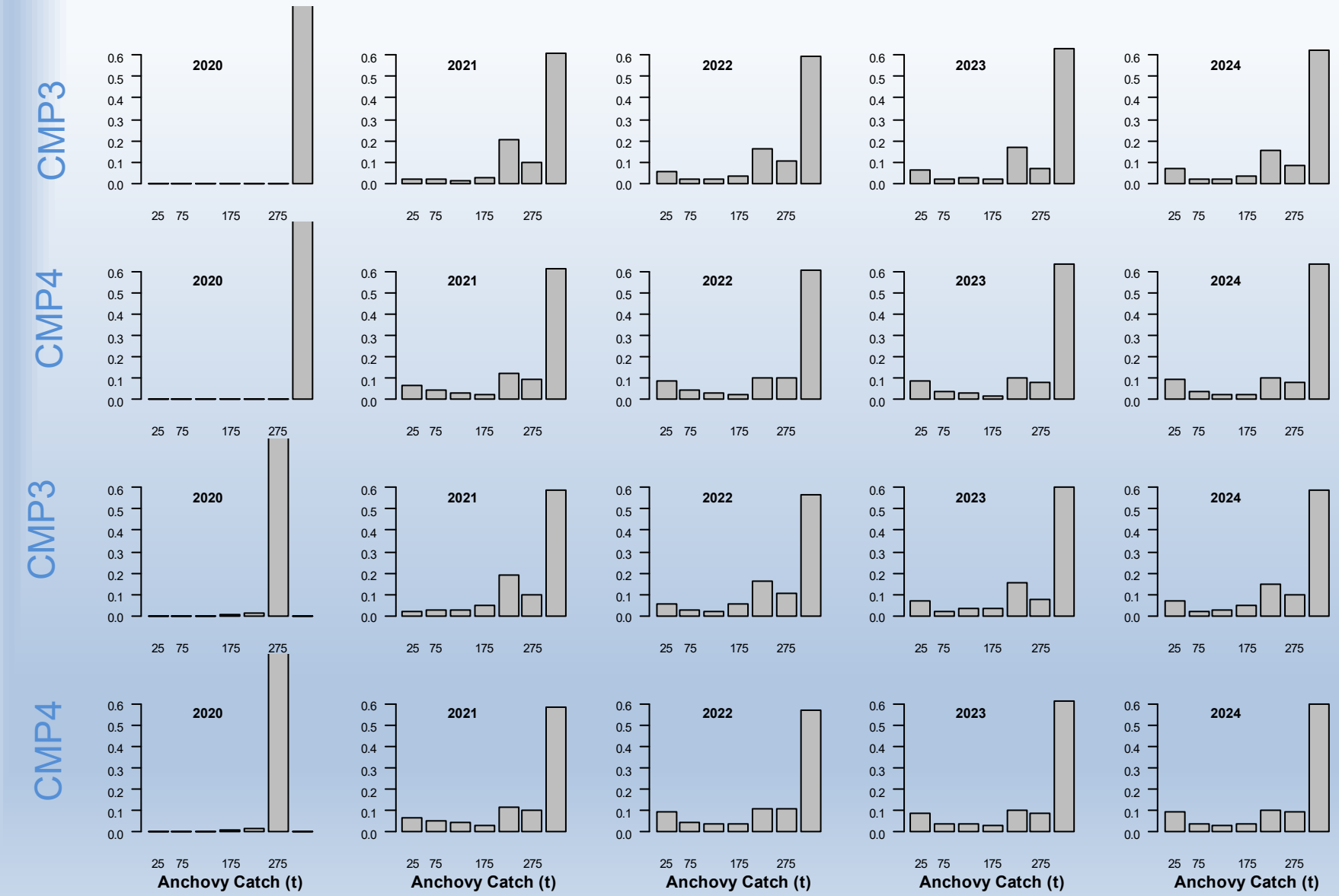
‘Blinkers on’….’Blinkers off’

Alternative CMPs with A_{BH}

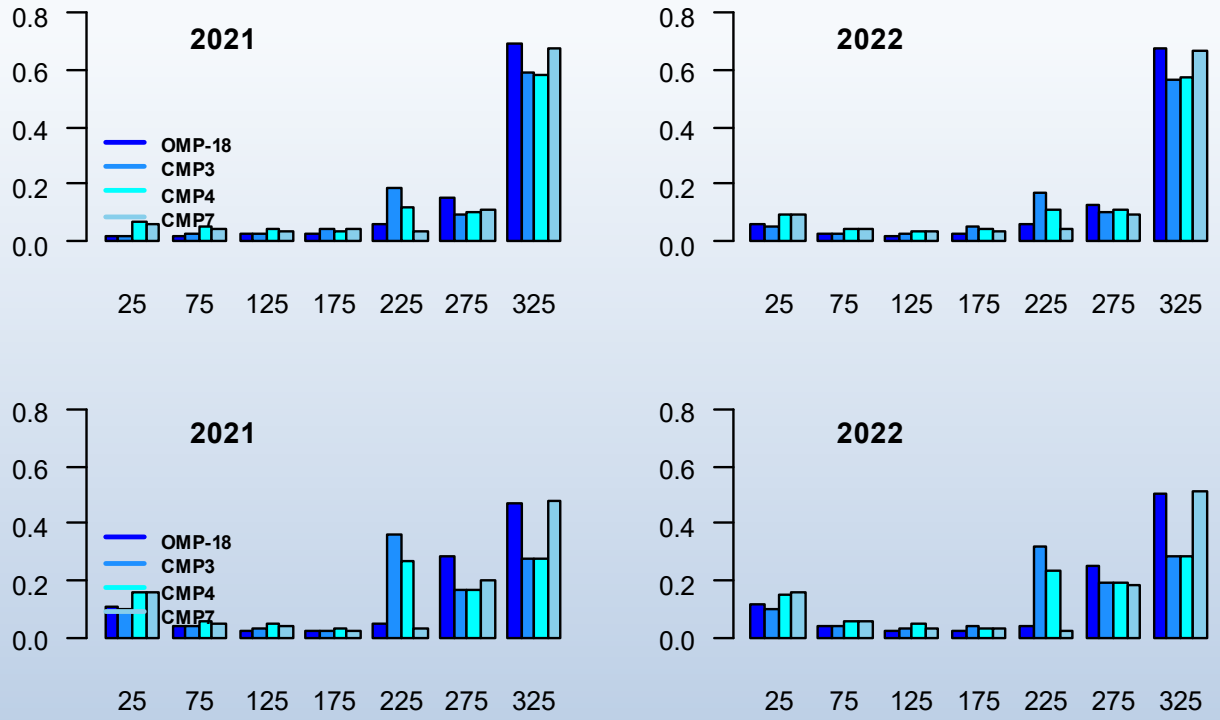
	No Catch	OMP-18	CMP3	CMP4	CMP5	CMP6	CMP7
B^A_{crit}		600	600	900	800	700	900
α	-	1.16	0.936	0.936	0.936	0.936	1.16
$Risk_A$	0.030	0.218	0.181	0.140	0.153	0.167	0.160
$p(B_{21}^{sp}<B_{96}^{sp})$	0.08	0.15 (+7)	0.14 (+6)	0.12 (+4)	0.13 (+5)	0.14 (+6)	0.13 (+5)
$p(B_{22}^{sp}<B_{96}^{sp})$	0.05	0.17 (+12)	0.15 (+10)	0.13 (+8)	0.14 (+9)	0.15 (+10)	0.15 (+10)
$p(B_{23}^{sp}<B_{96}^{sp})$	0.04	0.19 (+15)	0.16 (+12)	0.12 (+8)	0.13 (+9)	0.14 (+10)	0.15 (+11)
C^A	-	281 350	274 350	270 350	272 350	273 350	277 350
MAV^A	-	0.04	0.12	0.13	0.13	0.12	0.13
p(Bsar+Banc)< hist min	0.09	0.36	0.33	0.30	0.31	0.32	0.32

No concern at high biomass/recruitment; concern at low biomass/recruitment

Final TAC v Catch



Catch v Initial TAC



- Initial TAC more spread out
- greater dependence on biomass
- catch restricted by 350 000t

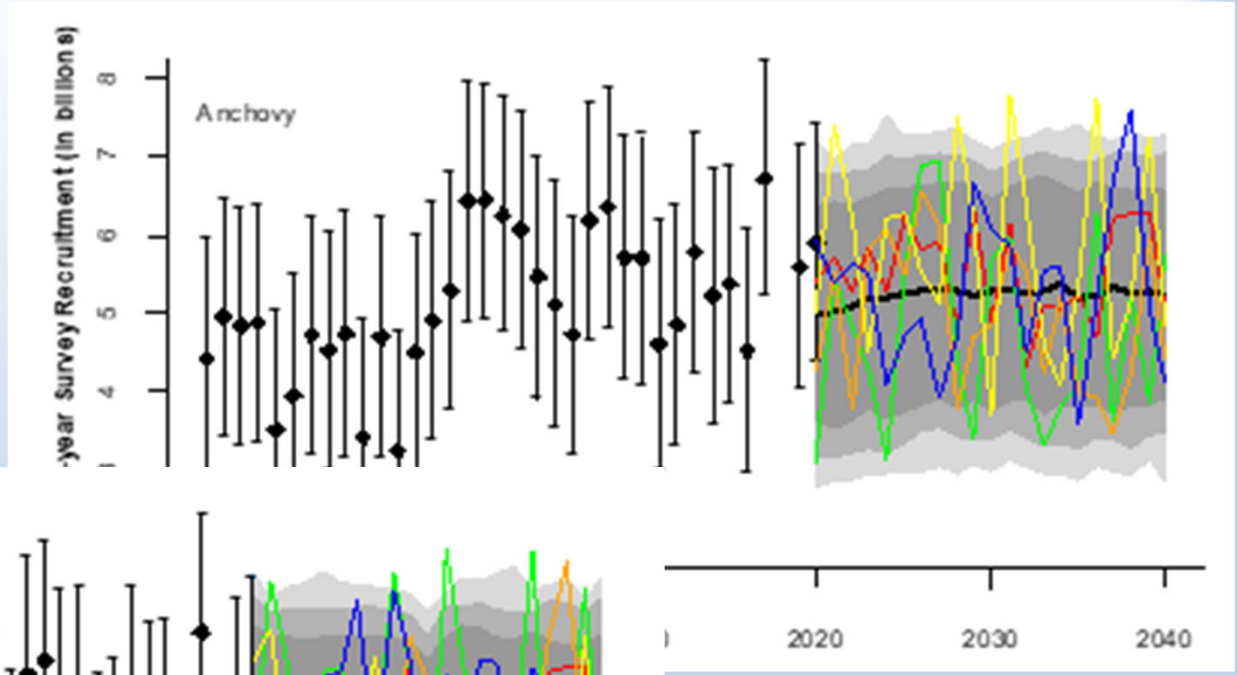
Lower Max Anchovy TAC

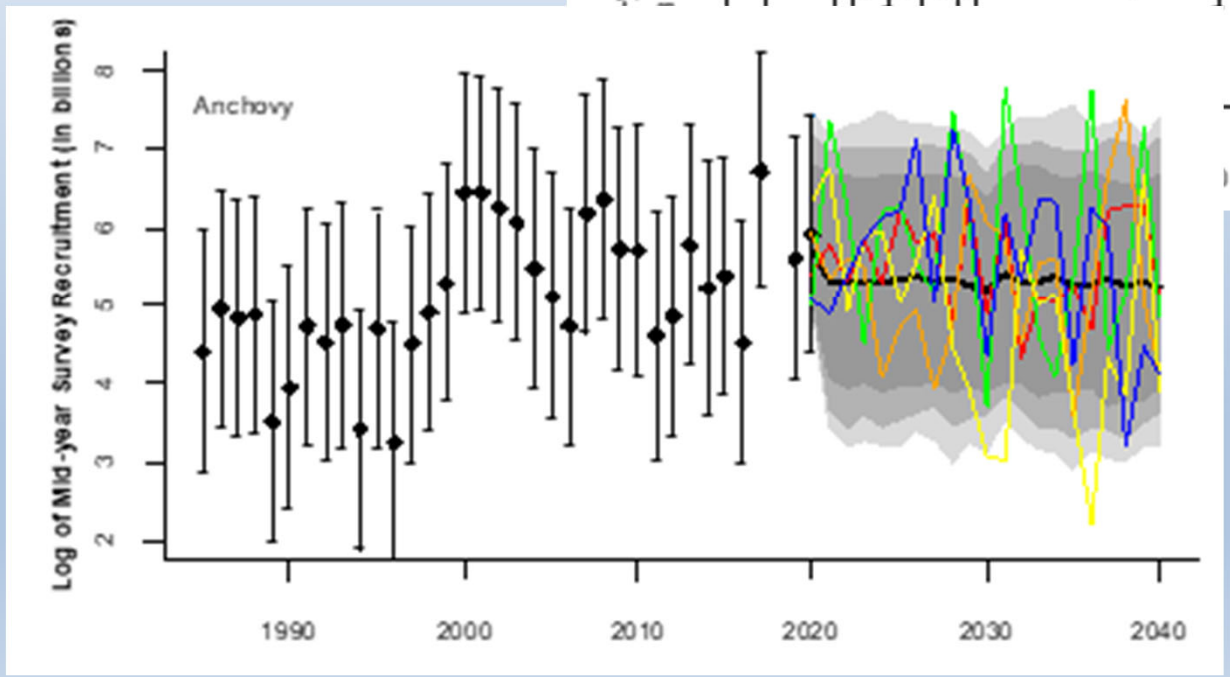
- Lower average and median (350->275) catches
- Lower risk
- See Table 3

June 2020 Survey Observation

- Simply deleting lowest 50% of simulations

June 2020 Survey Observation

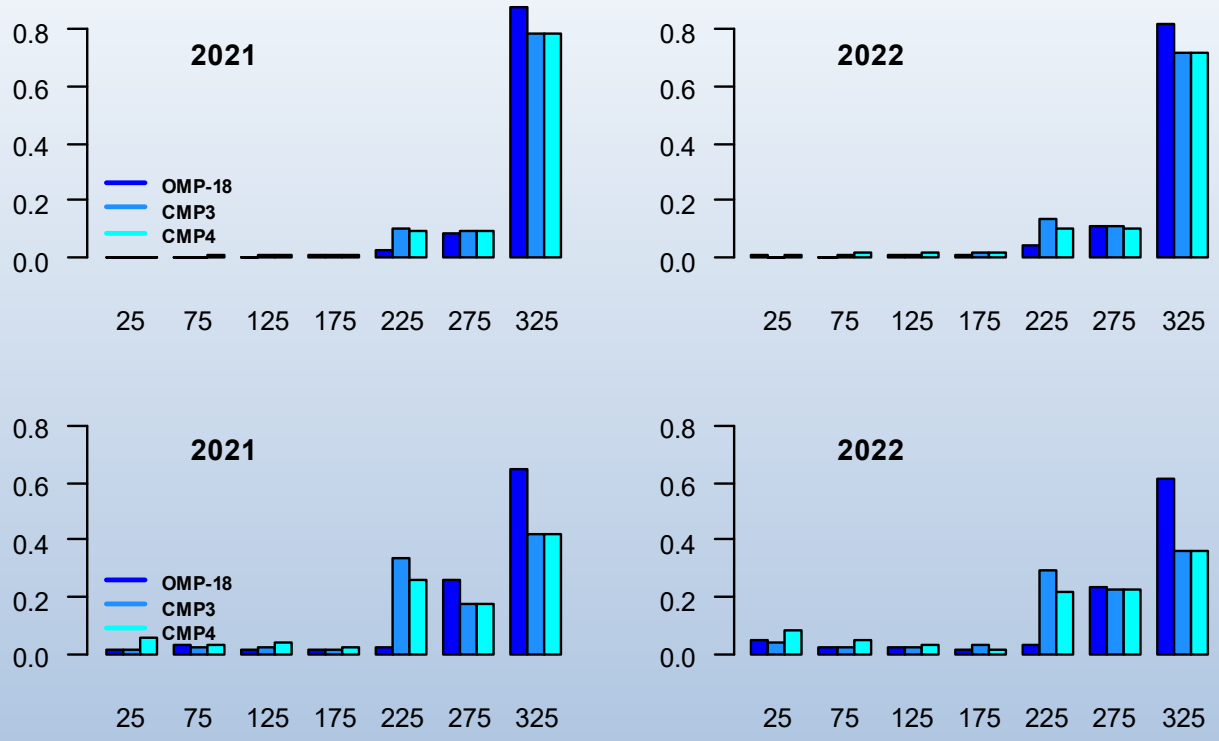




June 2020 Survey Observation

- Simply deleting lowest 50% of simulations
- ‘Upper recruitment extreme’
- ‘Rough’ run, but useful to ‘ballpark’ if the assumption would make a difference in tuning α
- See Table 2 - α relatively robust
- If June 2020 survey observation is ‘correct’ then subsequent biomass and catches will be relatively good

June 2020 Survey Observation



- Catch v Initial TAC

‘Short-list’ CMPs with A_{BH}

	No Catch	CMP3	CMP6	CMP5
B^{A}_{crit}		600	700	800
α	-	0.936	0.936	0.936
$Risk_{A}$	0.030	0.181	0.167	0.153
$p(B_{21}^{sp}<B_{96}^{sp})$	0.08	0.14 (+6)	0.14 (+6)	0.13 (+5)
$p(B_{22}^{sp}<B_{96}^{sp})$	0.05	0.15 (+10)	0.15 (+10)	0.14 (+9)
$p(B_{23}^{sp}<B_{96}^{sp})$	0.04	0.16 (+12)	0.14 (+10)	0.13 (+9)
C^{A}	-	274 350	273 350	272 350
MAV^{A}	-	0.12	0.12	0.13
P(Bsar+Banc)<hist min	0.09	0.33	0.32	0.31

Alternative OMs

- MSE – simulation test CMPs taking account of plausible uncertainties
- A subset of all anchovy sensitivity tests were selected as 'important' for testing CMPs against (doc #90)
- Tested CMP5 and CMP6 against these OMs
- Robust to some uncertainties (A_{Mj}, A_4, A_{kegg}, A_{lamN2})
- More optimistic OMs (A_{2BH}, A_{HS}, A_{lamR}) –avg catch increases, risk decreases
- A_{com2} – catches robust but risk increases

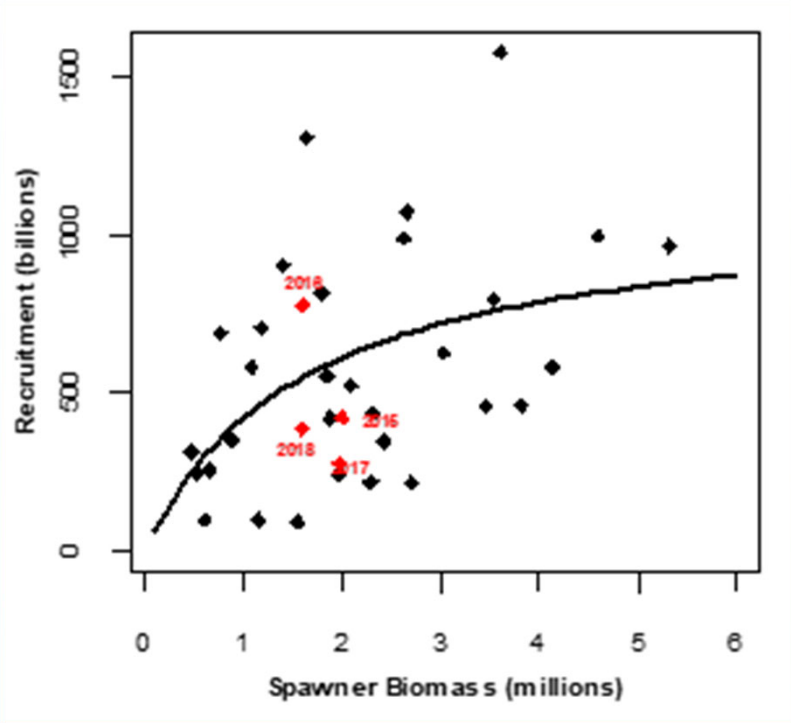
Alternative OMs

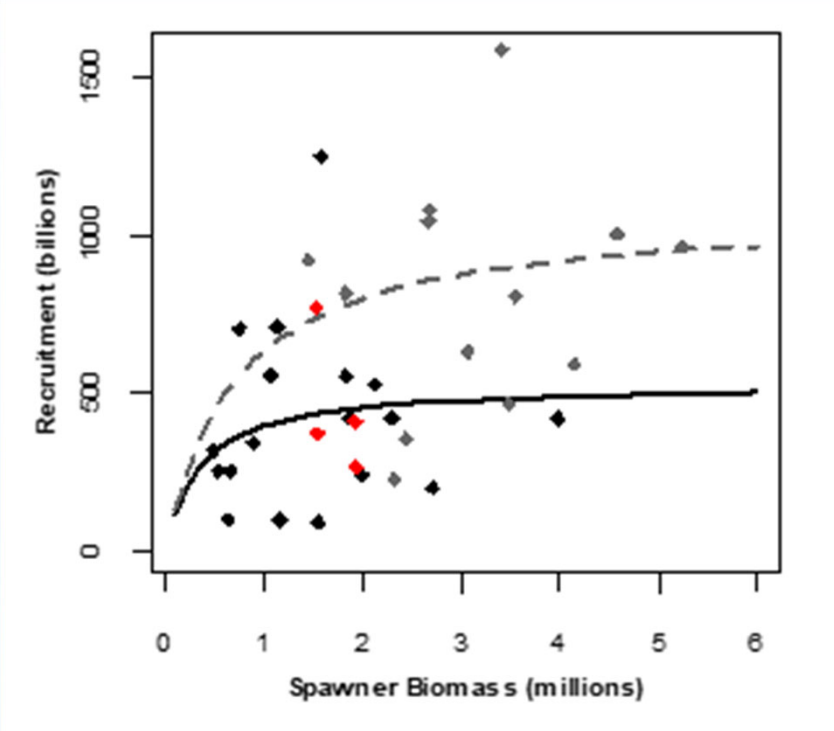
- Less optimistic OMs (A_{2BHrtn}, A_R, A_{DD}) –avg catch increases, risk decreases
- A_{com2} – catches robust but risk increases

CMPs 5 and 6 with alternative OMs

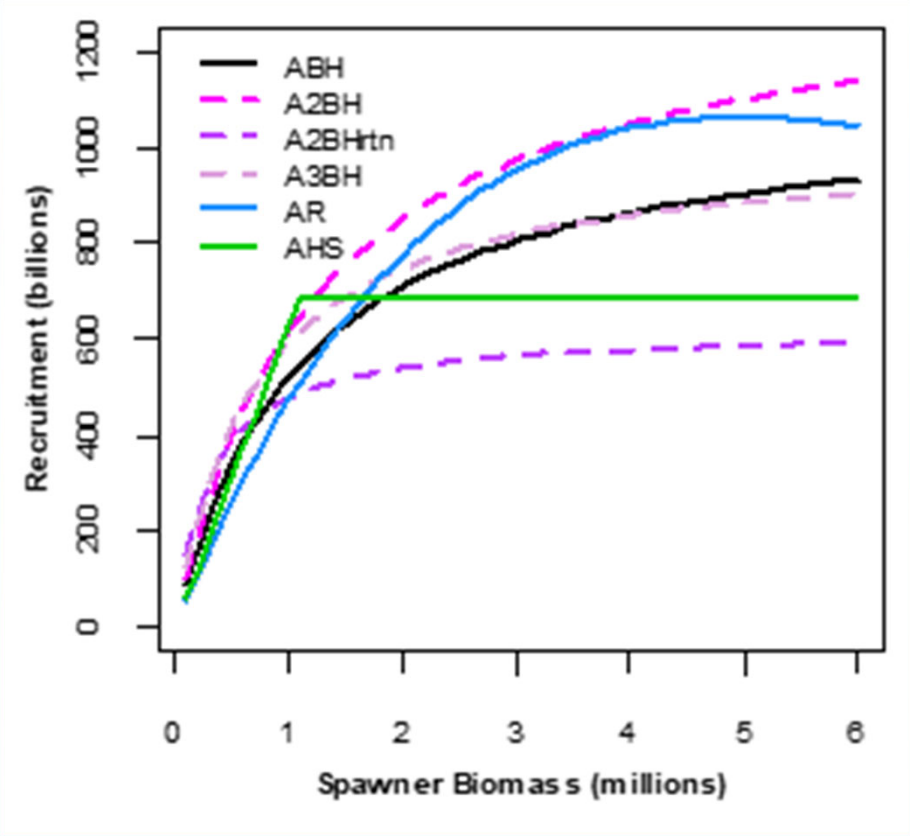
	A_{BH}	A_{2BHrtn}	A_{R}	A_{M1}	A_{M2}	A_{Mad}	A_{DD}
$Risk_A$	0.153	0.169	0.239	0.189	0.192	0.181	0.178
$p(B_{21}^{sp}<B_{96}^{sp})$	0.13	0.15	0.16	0.16	0.14	0.15	0.12
$p(B_{22}^{sp}<B_{96}^{sp})$	0.14	0.14	0.16	0.16	0.14	0.16	0.12
$p(B_{23}^{sp}<B_{96}^{sp})$	0.13	0.13	0.19	0.17	0.15	0.16	0.13
C^A	272 350	260 305	245 324	269 343	260 349	268 350	262 341
MAV^A	0.13	0.21	0.15	0.14	0.12	0.12	0.14
p(Bsar+Banc) <hist min	0.31	0.37	0.37	0.29	0.34	0.32	0.33
$Risk_A$	0.167	0.184	0.261	0.205	0.209	0.197	0.194
$p(B_{21}^{sp}<B_{96}^{sp})$	0.14	0.15	0.16	0.17	0.14	0.15	0.12
$p(B_{22}^{sp}<B_{96}^{sp})$	0.15	0.15	0.17	0.18	0.15	0.17	0.12
$p(B_{23}^{sp}<B_{96}^{sp})$	0.14	0.15	0.20	0.18	0.16	0.17	0.14
C^A	273 350	263 303	245 318	271 340	261 345	269 350	263 336
MAV^A	0.12	0.20	0.15	0.13	0.12	0.11	0.13
p(Bsar+Banc) <hist min	0.32	0.38	0.38	0.30	0.35	0.33	0.34

Alternative OMs





Alternative OMs



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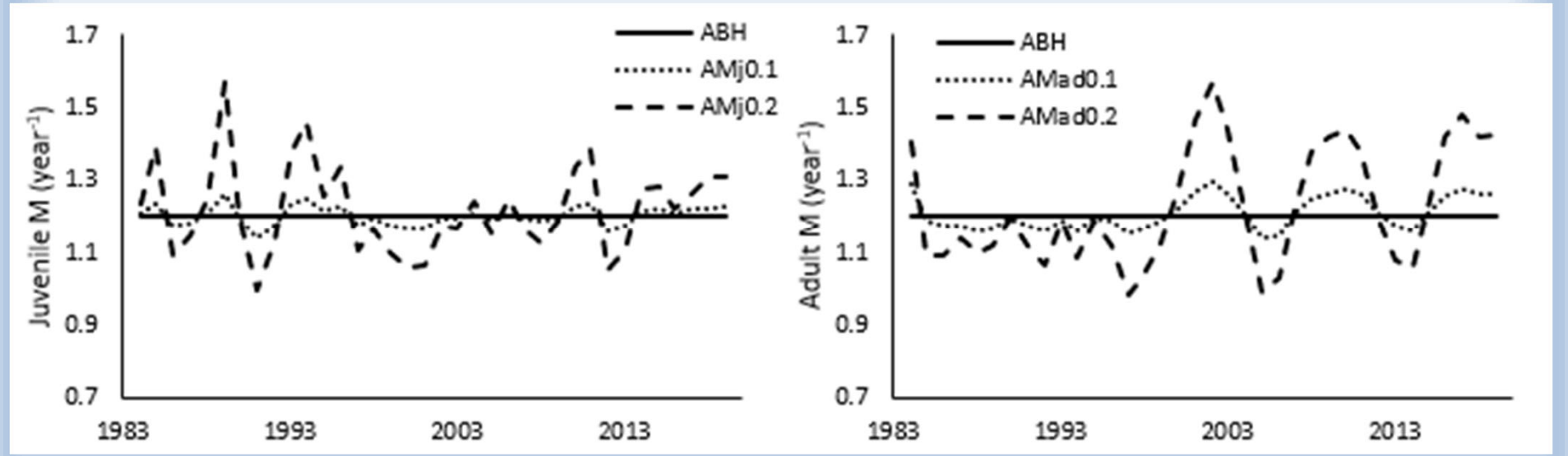

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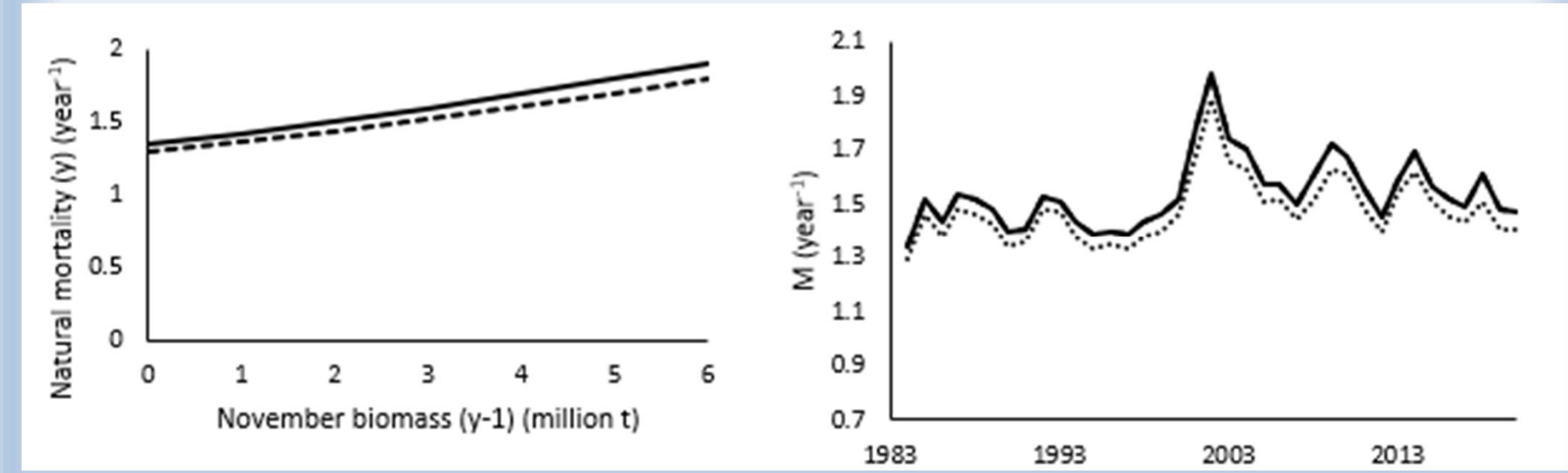

CMPs 5 and 6 with alternative OMs

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$p(B_{23}^{sp}<B_{96}^{sp})$	0.13	0.13	0.19	0.17	0.15	0.16	0.13
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$p(B_{21}^{sp}<B_{96}^{sp})$	0.14	0.15	0.16	0.17	0.14	0.15	0.12
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Alternative OMs

- Are CMP5 and CMP6 sufficiently able to ‘handle’ alternative states of nature
- Catches lower (median lower, average higher for CMP6)
- MAV (mostly) higher
- Risk higher. Greater in the long term than in the short term. (How high is too high)

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Thank you!