

Towards a Horse mackerel management plan

Pelagic RAC focus group

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Why have a management plan

- Current approach relies on setting an annual TAC based on a deterministic forecast of the stock.
- Because of the uncertainty in the assessment a deterministic forecast is not made so advice on TAC can be qualitative.
- Without a management plan there may be no consistent and clear objective by which the TAC is agreed and it is subject to annual negotiations; the result of which may be out of line with the maintaining long term productivity in the stock.
- A management plan based on clear objectives forms a consistent basis for harvesting the stock which is in line with maintaining long term stock productivity.



What elements does a management plan need

- Objectives for the stock and the fishery
- A knowledge base of stock and fishery dynamics
- Exploitation controls
- Rules to set the exploitation
- Measurable performance criteria
- A schedule for re-evaluation



Some objectives which are considered here

- Exploitation controls based on TAC only; TAC set for 3 years
- Protection of stock productivity; HCR to adjust catch in line with stock abundance
- Stability in yield; fixed catch component and a 15% max change limit in TAC subject to stock abundance
- Stock dynamics not including large recruitment as seen in 1982.



Some things which still need to be considered

- Mismatch between stock and management areas
- Regulation of all fisheries on the stock
- Accurate discard estimates
- TAC carry-over between years




Some outstanding issues

- Robustness testing of Harvest Control Rule
- Rules for setting of TAC
- Conditions for the identification of exceptional events (i.e. large pulse of recruitment of the order of 1982)
- Specifics of re evaluation of plan



The next steps in the science process

- Further testing of HCR July-August
- Conclusion at ICES WGMHSA September
- Peer review by ICES October
- Evaluation of consistency with precautionary approach October




What the next slides show

Ref TAC	Size of Yield			Variability of Yield					SSB	
	β val	Median	Cum. Yield	%CV	TAC Events	0,+ve Events	-ve Events	Mean Adj.	SSB ₂₀₁₀	% Risk SSB ₁₉₈₂
100	108.3	4.30	2.17	13	11	2	8.58	1.86	0.29	
110	118.2	4.69	2.38	13	10	3	8.32	1.86	0.335	
120	127.9	5.07	2.60	13	10	3	7.66	1.86	0.58	
130	136.3	5.42	2.86	13	10	3	6.04	1.86	0.61	
140	146.2	5.8	2.89	13	9	4	5.35	1.86	0.963	
150	154.0	6.14	3.11	13	9	4	3.69	1.86	1.09	
160	162.6	6.47	3.32	13	9	4	1.69	1.86	1.66	
170	170.9	6.76	3.61	13	8	5	-1.17	1.86	2.86	
180	179.0	7.07	3.74	13	8	5	-3.54	1.86	3.49	
190	183.5	7.3	4.1	13	7	6	-8.07	1.86	5.45	
200	194.4	7.58	4.2	13	7	6	-11.1	1.86	6.47	
210	195.9	7.78	4.53	13	6	7	-15.8	1.86	8.89	
220	201.2	8.0	4.61	13	6	7	-20.2	1.86	11.8	
230	203.6	8.12	4.55	13	6	7	-26.2	1.86	13.3	
240	206.6	8.21	4.46	13	5	8	-32.5	1.86	15.4	
250	209.7	8.32	4.38	13	5	8	-38.2	1.86	17.4	

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Increasing Reference TAC Variability of yield Risk to stock
 Trigger point

Options with greater than 5% risk




The simulation results

- For the target yield HCR, target TAC is not achieved in simulations when it is set above 180kt.
- To maintain the risk to SSB below 5% and have a higher TAC_{ref} you need to raise the trigger point, however the trade off is that the higher the trigger point greater the chance of having to negatively adjust the TAC.



The simulation results

- In the case of the slope strategy which is implemented with a 50% weighting to a constant catch of 150kt, the risk profile associated with median yields is very similar to the target yield HCR.
- Under the slope strategy median catches of up to about 170kt are possible while keeping the risk to SSB < SSB₁₉₈₂ below 5%.



Ref TAC	Size of Yield			Variability of Yield					SSB	
	β val	Median	Cum. Yield	%CV	TAC Events	0,+ve Events	-ve Events	Mean Adj.	SSB ₂₀₁₀	% Risk SSB ₁₉₈₂
100	108.3	4.30	2.17	13	11	2	8.58	1.86	0.29	
110	118.2	4.69	2.38	13	10	3	8.32	1.86	0.335	
120	127.9	5.07	2.60	13	10	3	7.66	1.86	0.58	
130	136.3	5.42	2.86	13	10	3	6.04	1.86	0.61	
140	146.2	5.8	2.89	13	9	4	5.35	1.86	0.963	
150	154.0	6.14	3.11	13	9	4	3.69	1.86	1.09	
160	162.6	6.47	3.32	13	9	4	1.69	1.86	1.66	
170	170.9	6.76	3.61	13	8	5	-1.17	1.86	2.86	
180	179.0	7.07	3.74	13	8	5	-3.54	1.86	3.49	
190	183.5	7.3	4.1	13	7	6	-8.07	1.86	5.45	
200	194.4	7.58	4.2	13	7	6	-11.1	1.86	6.47	
210	195.9	7.78	4.53	13	6	7	-15.8	1.86	8.89	
220	201.2	8.0	4.61	13	6	7	-20.2	1.86	11.8	
230	203.6	8.12	4.55	13	6	7	-26.2	1.86	13.3	
240	206.6	8.21	4.46	13	5	8	-32.5	1.86	15.4	
250	209.7	8.32	4.38	13	5	8	-38.2	1.86	17.4	

Ref TAC	Size of Yield			Variability of Yield					SSB	
	β val	Median	Cum. Yield	%CV	TAC Events	0,+ve Events	-ve Events	Mean Adj.	SSB ₂₀₁₀	% Risk SSB ₁₉₈₂
100	108.7	4.35	1.87	13	11	2	10.2	1.736	0.295	
110	119.8	4.75	2.06	13	11	2	10.3	1.736	0.36	
120	129.4	5.14	2.28	13	11	2	9.87	1.736	0.477	
130	139.3	5.53	2.46	13	10	3	9.27	1.736	0.785	
140	148.8	5.9	2.61	13	10	3	8.27	1.736	1.01	
150	157.2	6.24	2.90	13	9	4	6.58	1.736	1.72	
160	165.4	6.57	3.15	13	9	4	4.37	1.736	2.55	
170	173.8	6.9	3.33	13	9	4	2.34	1.736	3.78	
180	181.6	7.18	3.56	13	8	5	-0.638	1.736	5.13	
190	188.5	7.5	3.78	13	8	5	-2.76	1.736	5.95	
200	193.6	7.7	4.16	13	7	6	-8.23	1.736	9.43	
210	201.5	7.98	4.24	13	7	6	-11.3	1.736	11.5	
220	204.8	8.13	4.5	13	6	7	-17.1	1.736	14.2	
230	208.0	8.24	4.34	13	6	7	-23.8	1.736	16.8	
240	210.8	8.36	4.3	13	6	7	-29.8	1.736	18.3	
250	215.2	8.44	4.17	13	6	7	-36.1	1.736	21.0	

Ref TAC	Size of Yield			Variability of Yield					SSB	
	β val	Median	Cum. Yield	%CV	TAC Events	0,+ve Events	-ve Events	Mean Adj.	SSB _{191g}	% Risk SSB ₁₉₈₂
100	110.9	4.4	1.54	13	13	12	1	11.9	1.612	0.343
110	121.4	4.82	1.68	13	13	11	2	12.6	1.612	0.367
120	131.5	5.22	1.86	13	13	11	2	12.2	1.612	0.605
130	141.2	5.6	2.13	13	13	11	2	11.7	1.612	0.948
140	151.1	6.0	2.31	13	13	11	2	11.3	1.612	1.22
150	159.6	6.33	2.63	13	13	10	3	9.35	1.612	1.93
160	169.0	6.69	2.72	13	13	10	3	8.14	1.612	2.87
170	177.2	7.02	3.04	13	13	9	4	6.04	1.612	4.01
180	184.7	7.3	3.28	13	13	9	4	2.7	1.612	6.31
190	192.5	7.64	3.49	13	13	8	5	0.602	1.612	8.2
200	199.1	7.9	3.78	13	13	8	5	-3.36	1.612	10.2
210	204.6	8.09	4.09	13	13	7	6	-8.75	1.612	14.4
220	210.1	8.32	4.27	13	13	7	6	-12.8	1.612	17.4
230	213.3	8.42	4.08	13	13	7	6	-19.9	1.612	18.7
240	216.1	8.51	3.99	13	13	7	6	-26.7	1.612	21.3
250	215.5	8.47	4.24	13	13	6	7	-35.8	1.612	26.4

Ref TAC	Size of Yield			Variability of Yield					SSB	
	β val	Median	Cum. Yield	%CV	TAC Events	0,+ve Events	-ve Events	Mean Adj.	SSB _{191g}	% Risk SSB ₁₉₈₂
100	111.9	4.44	1.21	13	13	12	1	13.2	1.488	0.432
110	122.4	4.86	1.43	13	13	12	1	13.8	1.488	0.522
120	133.0	5.28	1.55	13	13	12	1	14.1	1.488	0.75
130	143.5	5.69	1.67	13	13	11	2	14.4	1.488	1.15
140	153.5	6.08	1.9	13	13	11	2	14.0	1.488	1.83
150	162.7	6.43	2.28	13	13	11	2	12.4	1.488	2.77
160	172.0	6.81	2.4	13	13	10	3	11.6	1.488	4.09
170	180.7	7.15	2.58	13	13	10	3	9.68	1.488	5.29
180	188.1	7.44	2.98	13	13	9	4	6.31	1.488	8.02
190	195.3	7.73	3.25	13	13	9	4	3.16	1.488	11.7
200	203.0	8.0	3.55	13	13	8	5	-0.306	1.488	14.4
210	209.9	8.27	3.81	13	13	8	5	-4.09	1.488	17.4
220	211.6	8.34	4.23	13	13	7	6	-12.6	1.488	23.3
230	216.9	8.51	3.97	13	13	7	6	-17.9	1.488	23.3
240	219.6	8.58	3.83	13	13	7	6	-25.6	1.488	26.0
250	220.6	8.56	3.95	13	13	7	6	-34.4	1.488	28.8

Ref TAC	Size of Yield			Variability of Yield					SSB	
	β val	Median	Cum. Yield	%CV	TAC Events	0,+ve Events	-ve Events	Mean Adj.	SSB _{191g}	% Risk SSB ₁₉₈₂
$\beta = 1$	149.4	5.98	2.60	13	13	7	6	0.846	NA	2.41
$\beta = 1.01$	152.0	6.08	2.64	13	13	7	6	1.15	NA	2.81
$\beta = 1.02$	154.2	6.18	2.67	13	13	7	6	1.51	NA	3.13
$\beta = 1.03$	157.3	6.3	2.69	13	13	7	6	1.92	NA	3.2
$\beta = 1.04$	159.8	6.4	2.71	13	13	7	6	2.45	NA	3.59
$\beta = 1.05$	162.6	6.5	2.77	13	13	7	6	2.31	NA	3.7
$\beta = 1.06$	165.5	6.61	2.8	13	13	7	6	2.88	NA	4.14
$\beta = 1.07$	168.1	6.72	2.89	13	13	7	6	3.39	NA	4.93
$\beta = 1.08$	171.2	6.84	2.96	13	13	7	6	3.11	NA	5.83
$\beta = 1.09$	173.7	6.95	3.00	13	13	7	6	4.51	NA	6.03
$\beta = 1.1$	176.6	7.06	3.11	13	13	7	6	4.24	NA	7.24
$\beta = 1.11$	179.4	7.19	3.14	13	13	7	6	4.64	NA	7.48
$\beta = 1.12$	182.5	7.27	3.21	13	13	7	6	4.54	NA	10.0
$\beta = 1.13$	185.6	7.39	3.27	13	13	7	6	5.65	NA	10.5
$\beta = 1.14$	188.3	7.49	3.31	13	13	7	6	5.56	NA	12.3
$\beta = 1.15$	191.8	7.64	3.38	13	13	7	6	5.94	NA	12.0

Key Comparisons

Reference	Size of yield			Variability of yield					SSB	
	Median	Cumulative yield	%CV	TAC events	0,+veTAC adjust	0,-veTAC adjust	mean of TAC adjust	191g	%Risk SSB-SSB1982	
160	179	7.07	3.74	13	8	5	-3.54	1.86	3.49	
170	174	6.9	3.33	13	9	4	2.34	1.74	3.78	
170	177	7.02	3.04	13	9	4	6.04	1.61	4.01	
160	172	6.81	2.4	13	10	3	11.6	1.49	4.09	
$\beta = 1.07$	168	6.72	2.89	13	7	6	3.39	NA	4.93	
$\beta = 1.06$	166	6.61	2.8	13	7	6	2.88	NA	4.44	

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Key Comparisons Target yield

$B_{191g} = 1.86\text{Mt}$
Median Yield = 179kt

$B_{191g} = 1.74\text{Mt}$
Median Yield = 174kt

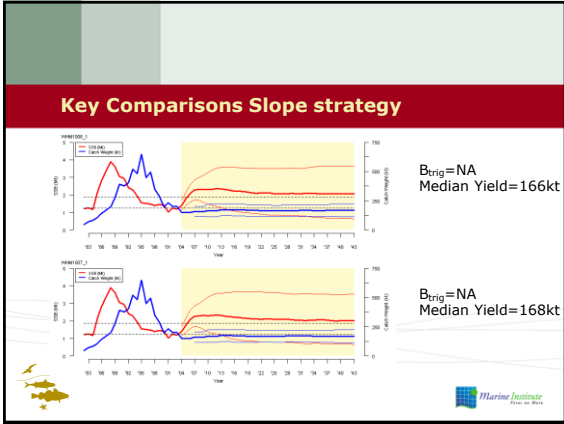
 Marine Institute
From the Sea

Key Comparisons Target yield

$B_{191g} = 1.61\text{Mt}$
Median Yield = 177kt

$B_{191g} = 1.49\text{Mt}$
Median Yield = 172kt

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