Food and Agriculture Organization of the United Nations

iotc ctoi

ITEM 5. INTRODUCTION TO MSE

5.1 BRIEF INTRODUCTION OF MANAGEMENT PROCEDURES AND MSE

- 5.1.1 BASIC PRINCIPLES
- 5.1.2 ROLES OF RESPONSIBILITIES, DIALOGUE TOOLS AND FEEDBACK MECHANISM

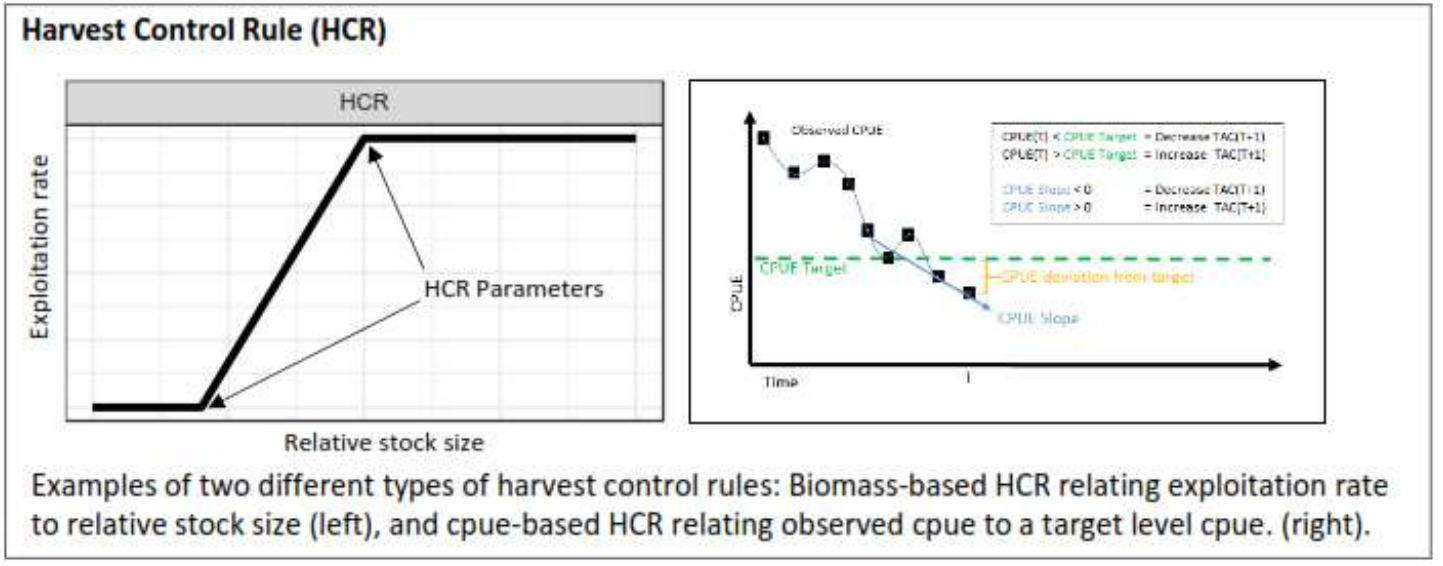
5.2 DEMONSTRATION OF MSE CAPACITY BUILDING TOOLS
(POLINA LEVONTINE AND JANA KLEINEBERG)

5.3 SC PROPOSAL FOR THE STANDARD PRESENTATION OF MSE RESULTS

PROPOSAL FOR PRESENTING MSE RESULTS

1. **Illustrate the MPs** that have been evaluated in a figure and/or briefly define them in text.
2. Present the results for the performance of each MP in:
   a. **Boxplots** for a representative subset of performance measures
   b. **Trade-off plots** for a representative subset of performance measures
   c. **A summary table** that ranks the performance of each MP against a subset of performance measures
   d. **A Kobe plot** for the B/B_{MSY} and F/F_{MSY} performance measures
   e. **Time series plots** for stock size and fishing intensity performance measures.
3. Provide a clear and **succinct summary** of the performance of each MP.
4. Provide the **numerical results for each MP** across all 16 performance measures

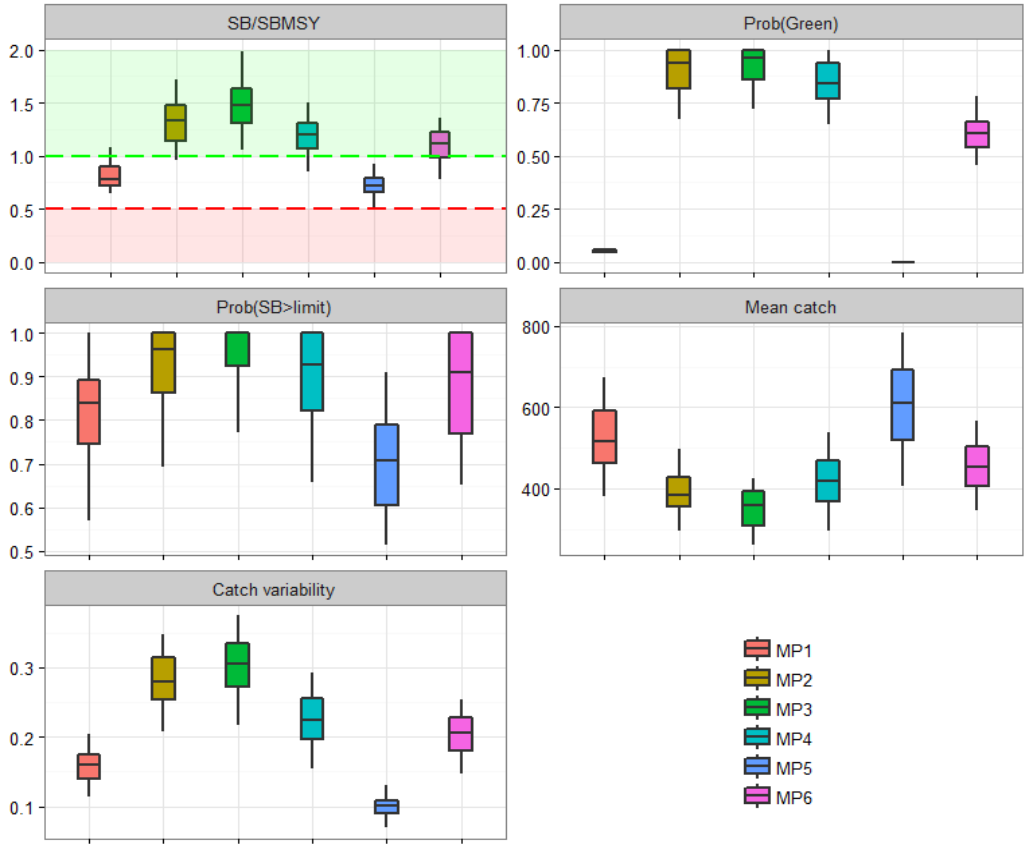
1. ILLUSTRATE CANDIDATE MPS OR HCRS



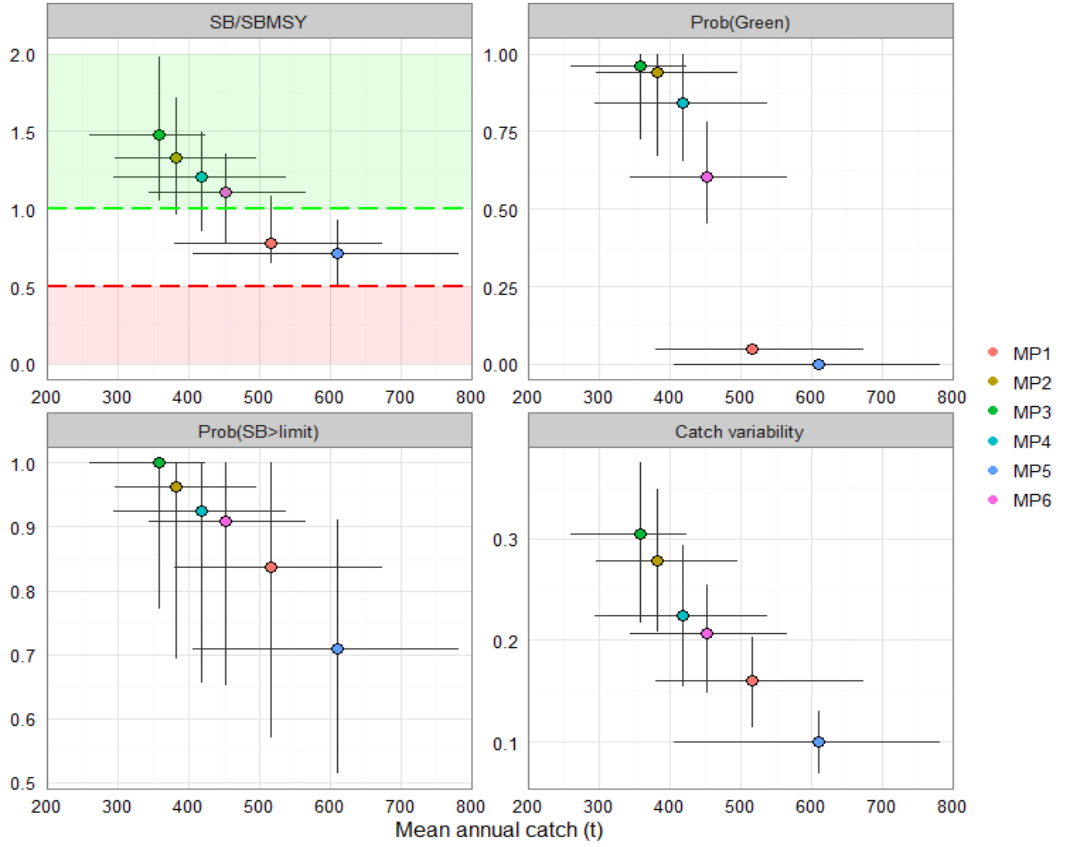
Examples of two different types of harvest control rules: Biomass-based HCR relating exploitation rate to relative stock size (left), and cpue-based HCR relating observed cpue to a target level cpue. (right).

It will be important that decision makers have a clear understanding of the MPs (or HCRs) that have been evaluated. **To achieve this, a clear description of each MP (or HCR) should be presented prior to the MSE results**, along with an explanation of the relevant decision steps involved.

2. PERFORMANCE OF MPS – (A) BOX PLOTS



2. PERFORMANCE OF MPS – (B) TRADE-OFF PLOTS

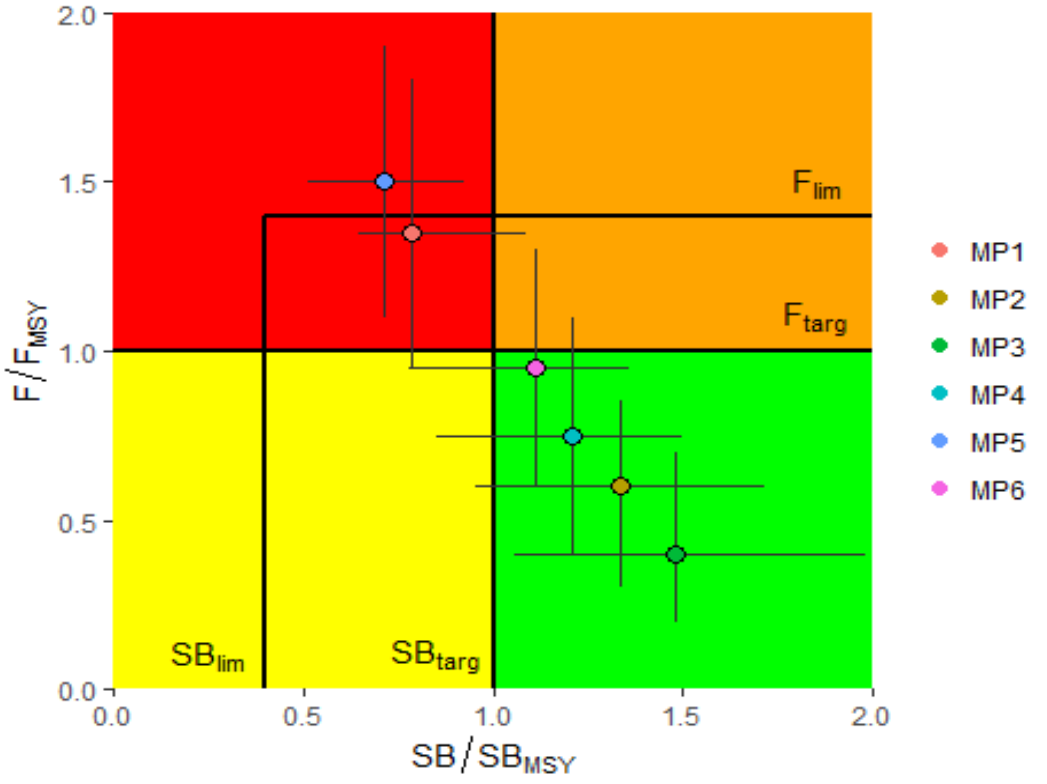


2. PERFORMANCE OF MPS – (C) SUMMARY TABLE

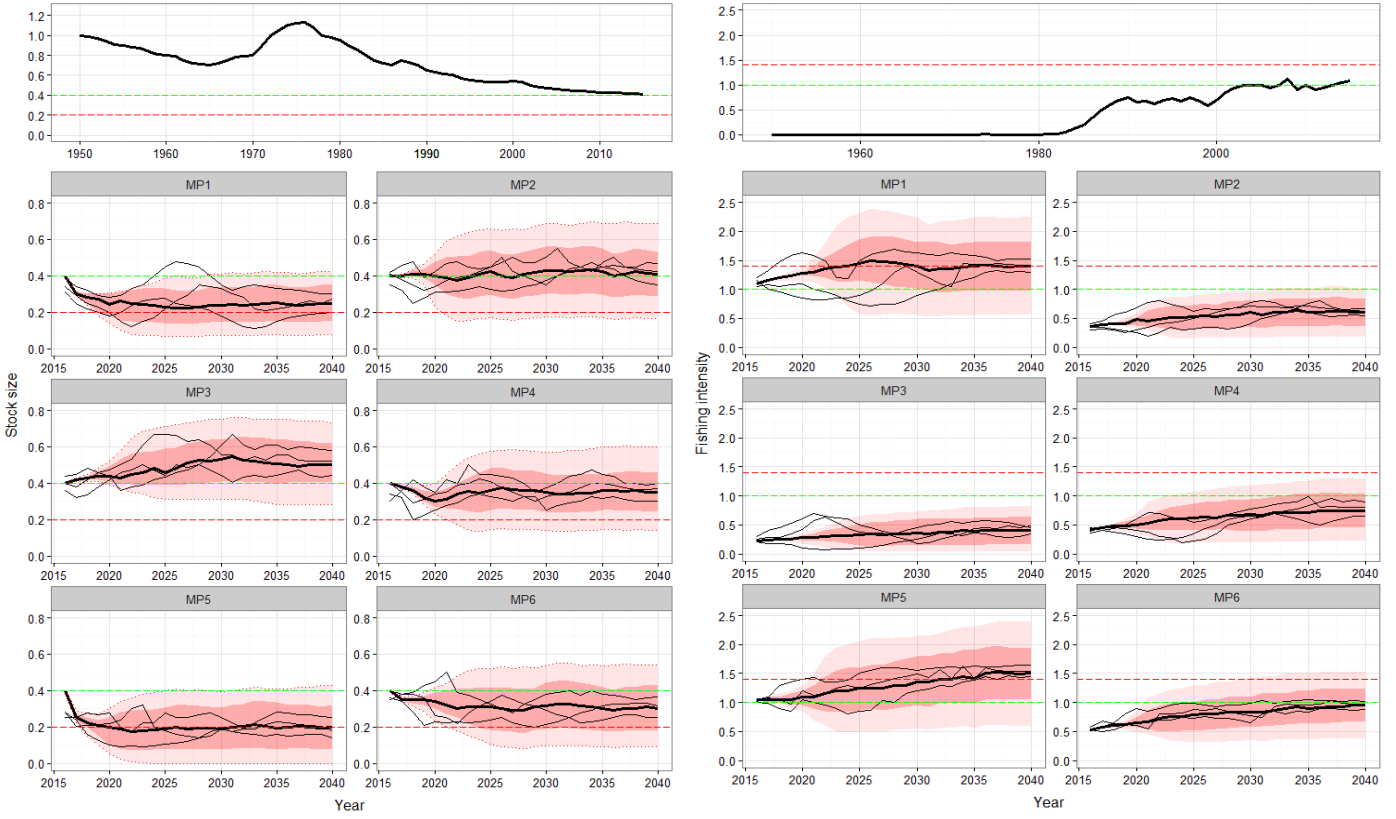
Management Procedure	Performance Measure				
	SB/SB_{MSY}	Prob(Green)	Prob(SB>limit)	Mean Catch	Catch variability
MP1	0.78	0.05	0.84	516	0.16
MP2	1.33	0.94	0.96	383	0.28
MP3	1.48	0.96	1	358	0.3
MP4	1.21	0.84	0.93	419	0.22
MP5	0.72	0	0.71	611	0.1
MP6	1.11	0.61	0.91	452	0.21

Summary table of performance of Management Procedures (MPs). Performance of 6 MPs against 5 performance measures averaged over 20 years of simulation in the projection period. Shading indicates the relative performance for each MP (dark = better, light = worse).

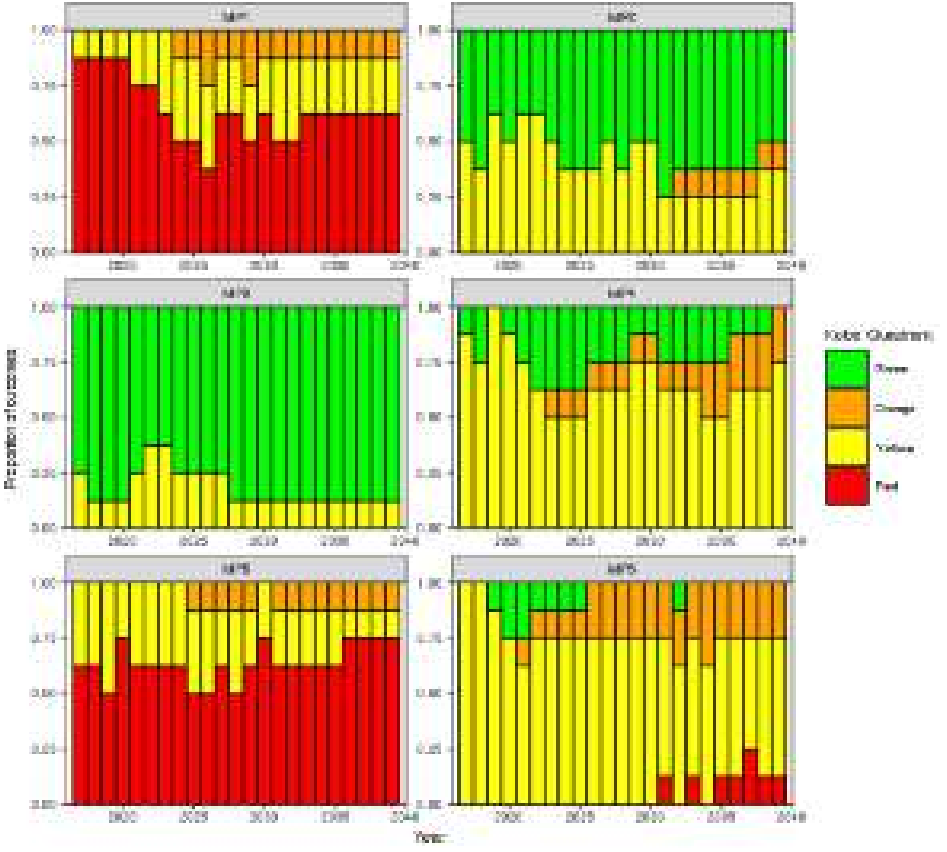
2. PERFORMANCE OF MPS – (D) KOBE PLOT



2. PERFORMANCE OF MPS – (E) TIME SERIES PLOTS



2. PERFORMANCE OF MPS – (E) TIME SERIES PLOTS FOR KOBE QUADRANT



3. DETAILS OF PERFORMANCE OF MPS ACROSS ALL INDICATORS

Status : maximize stock status		1 year						5 years					
		MP1	MP2	MP3	MP4	MP5	MP6	MP1	MP2	MP3	MP4	MP5	MP6
1. Mean spawner biomass relative to pristine	*SB/SB0*	0.5	0.8	0.9	0.7	0.4	0.6	0.5	0.8	1.0	0.7	0.4	0.6
2. Minimum spawner biomass relative to pristine	*SB/SB0*	0.3	0.6	0.6	0.5	0.2	0.4	0.3	0.5	0.6	0.5	0.2	0.4
3. Mean spawner biomass relative to SB_{MSY}	*SB/SBMSY*	0.8	1.3	1.4	1.2	0.7	1.1	0.9	1.2	1.3	1.1	0.7	1.2
4. Mean fishing mortality relative to target	*F/Ftar*	1.4	0.6	0.4	0.8	1.5	0.9	1.4	0.6	0.4	0.8	1.5	0.9
5. Mean fishing mortality relative to *Fmsy*	*F/FMSY*	1.4	0.6	0.4	0.8	1.5	0.9	1.5	0.5	0.4	0.8	1.6	0.9
6. Probability of being in Kobe green quadrant	*SB,F*	0.5	0.9	1	0.8	0.3	0.7	0.5	0.9	0.9	0.8	0.3	0.7
7. Probability of being in Kobe red quadrant	*SB,F*	0.3	0.1	0	0.1	0.5	0.2	0.3	0.1	0.0	0.1	0.5	0.2
Safety : m*aximize the probability of remaining above low stock status (i.e. minimize risk)*													
8. Probability of spawner biomass being above 20% of *SB0*	*SB*	0.8	0.9	0.9	0.8	0.7	0.8	0.8	0.8	0.9	0.8	0.7	0.8
9. Probability of spawner biomass being above *B*Lim	*SB*	0.8	1.0	1.0	0.9	0.7	0.9	0.8	1.0	1.0	0.9	0.7	0.8
Yield : maximize catches across regions and gears													
10. Mean catch (1'000 t)	*C*	520	390	350	430	600	460	551	417	378	434	600	460
11. Mean catch by region and/or gear (1'000 t)	*C*	250	200	180	210	310	220	248	194	176	229	335	218
12. Mean catch relative to MSY	*C/MSY*	1.1	0.7	0.6	0.8	1.2	0.9	1.2	0.6	0.6	0.8	1.3	1.0
Abundance: maximize catch rates to enhance fishery profitability													
13. Mean catch rates (by region and gear) (for fisheries with meaningful catch-effort relationship)	*I*	3.2	3.8	3.9	2.7	2.5	2.6	3.0	3.8	4.0	2.6	2.3	2.8
Stability: maximize stability in catches to reduce commercial uncertainty													
14. Mean absolute proportional change in catch	*C*	0.2	0.3	0.3	0.2	0.1	0.2	0.2	0.3	0.3	0.2	0.1	0.2
15. % Catch co-efficient of variation	*C*	20	25	24	18	12	21	19.4	27.3	26.2	17.6	11.5	21.0
16. Probability of shutdown	*C*	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

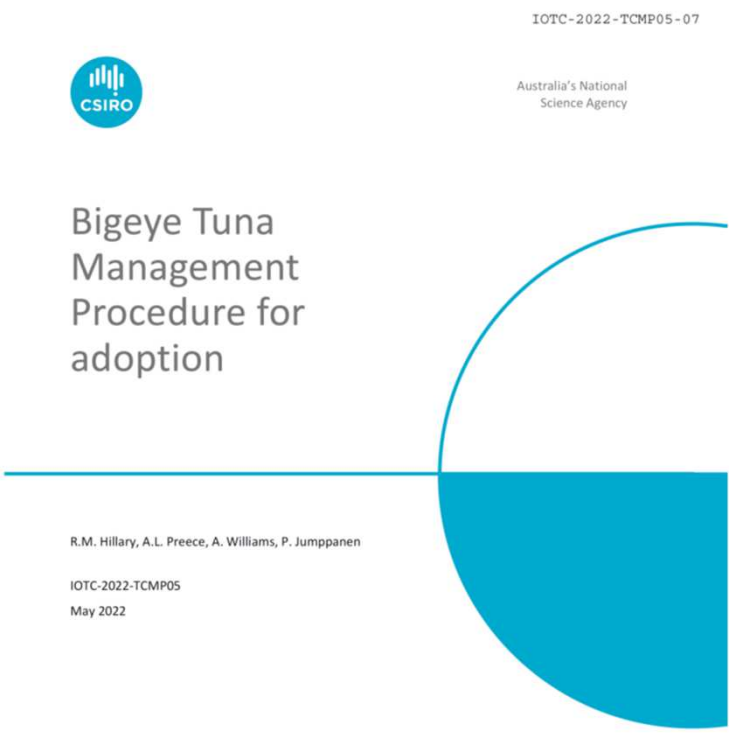
3. DETAILS OF PERFORMANCE OF MPS ACROSS ALL INDICATORS

Status : maximize stock status		10 years						20 years					
		MP1	MP2	MP3	MP4	MP5	MP6	MP1	MP2	MP3	MP4	MP5	MP6
1. Mean spawner biomass relative to pristine	*SB/SB0*	0.5	0.8	0.9	0.7	0.4	0.6	0.5	0.8	1.0	0.7	0.4	0.6
2. Minimum spawner biomass relative to pristine	*SB/SB0*	0.3	0.6	0.6	0.5	0.2	0.4	0.3	0.5	0.6	0.5	0.2	0.4
3. Mean spawner biomass relative to SB_{MSY}	*SB/SBMSY*	0.8	1.3	1.4	1.2	0.7	1.1	0.9	1.2	1.3	1.1	0.7	1.2
4. Mean fishing mortality relative to target	*F/Ftar*	1.4	0.6	0.4	0.8	1.5	0.9	1.4	0.6	0.4	0.8	1.5	0.9
5. Mean fishing mortality relative to *Fmsy*	*F/FMSY*	1.4	0.6	0.4	0.8	1.5	0.9	1.5	0.5	0.4	0.8	1.6	0.9
6. Probability of being in Kobe green quadrant	*SB,F*	0.5	0.9	1	0.8	0.3	0.7	0.5	0.9	0.9	0.8	0.3	0.7
7. Probability of being in Kobe red quadrant	*SB,F*	0.3	0.1	0	0.1	0.5	0.2	0.3	0.1	0.0	0.1	0.5	0.2
Safety : m*aximize the probability of remaining above low stock status (i.e. minimize risk)*													
8. Probability of spawner biomass being above 20% of *SB0*	*SB*	0.8	0.9	0.9	0.8	0.7	0.8	0.8	0.8	0.9	0.8	0.7	0.8
9. Probability of spawner biomass being above *B*Lim	*SB*	0.8	1.0	1.0	0.9	0.7	0.9	0.8	1.0	1.0	0.9	0.7	0.8
Yield : maximize catches across regions and gears													
10. Mean catch (1'000 t)	*C*	520	390	350	430	600	460	551	417	378	434	600	460
11. Mean catch by region and/or gear (1'000 t)	*C*	250	200	180	210	310	220	248	194	176	229	335	218
12. Mean catch relative to MSY	*C/MSY*	1.1	0.7	0.6	0.8	1.2	0.9	1.2	0.6	0.6	0.8	1.3	1.0
Abundance: maximize catch rates to enhance fishery profitability													
13. Mean catch rates (by region and gear) (for fisheries with meaningful catch-effort relationship)	*I*	3.2	3.8	3.9	2.7	2.5	2.6	3.0	3.8	4.0	2.6	2.3	2.8
Stability: maximize stability in catches to reduce commercial uncertainty													
14. Mean absolute proportional change in catch	*C*	0.2	0.3	0.3	0.2	0.1	0.2	0.2	0.3	0.3	0.2	0.1	0.2
15. % Catch co-efficient of variation	*C*	20	25	24	18	12	21	19.4	27.3	26.2	17.6	11.5	21.0
16. Probability of shutdown	*C*	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

4. SUMMARY PERFORMANCE OF MPS

- **MP1** MP1 achieved the second highest catches, and second lowest level of catch variability. There was a 5% chance that MP1 would be at or above the biomass target reference point and 2% chance it would be at or below the fishing mortality target reference point. There is a 25% risk that MP1 will cause the spawning biomass to fall below the limit reference point and a 50% risk that MP1 will cause the fishing mortality to exceed the limit reference point over the next 20 years.
- **MP2** performed …
- **MP3** performed …
- **MP4** performed …
- **MP5** performed …
- **MP6** performed …

NEW TEMPLATE



Contents

- Not yet SC-endorsement.
- Feedback from TCMP is appreciated.