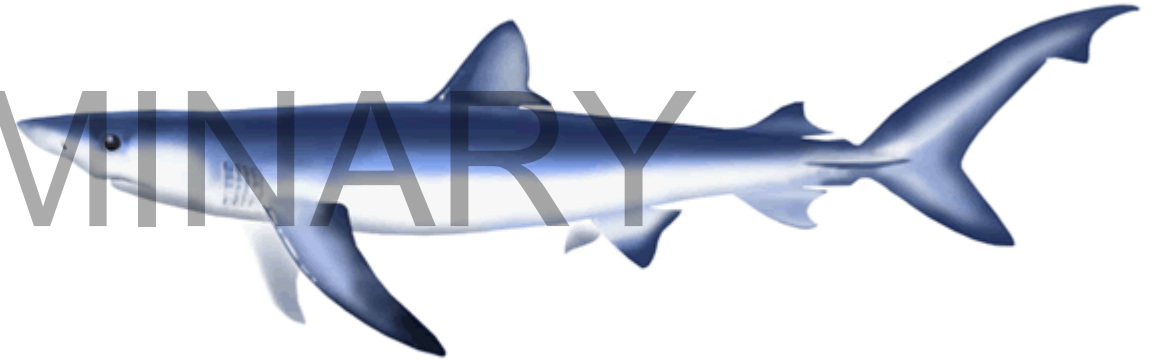




A theoretical Blue Shark Management Strategy Evaluation for the IOTC

Global BSH MSE Workshop
Rome, Italy – October 2025

PRELIMINARY



By: The IOTC Dream Team



Breakout Session Part 2

Blue Shark Case Study: Base Case

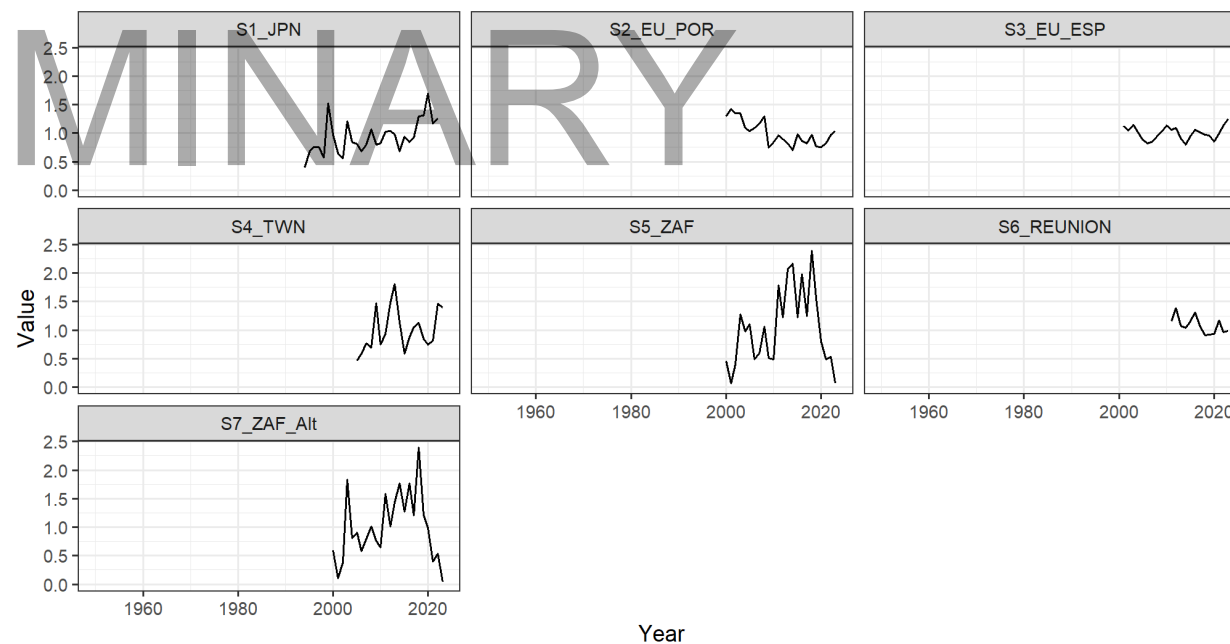
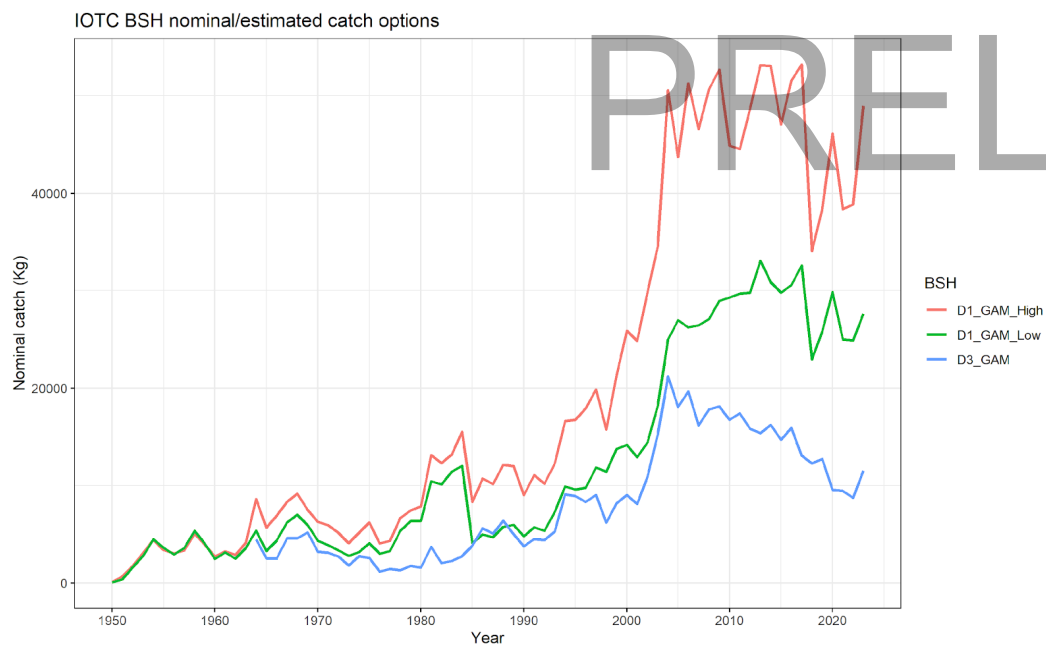


Stock Overview: IOTC Blue Shark

► Assessment inputs

One of main issues is the catches; Discards?

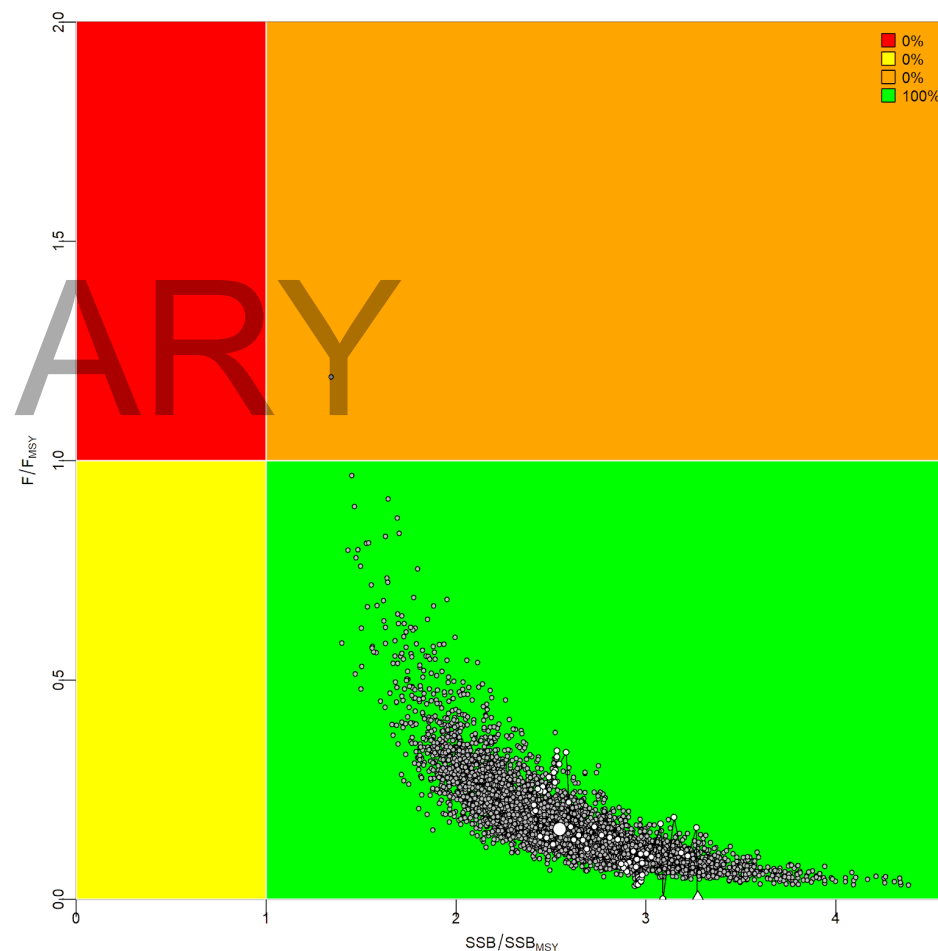
Various CPUEs, conflicts, unreasonable variation in some





Stock Overview: IOTC BSH Blue Shark

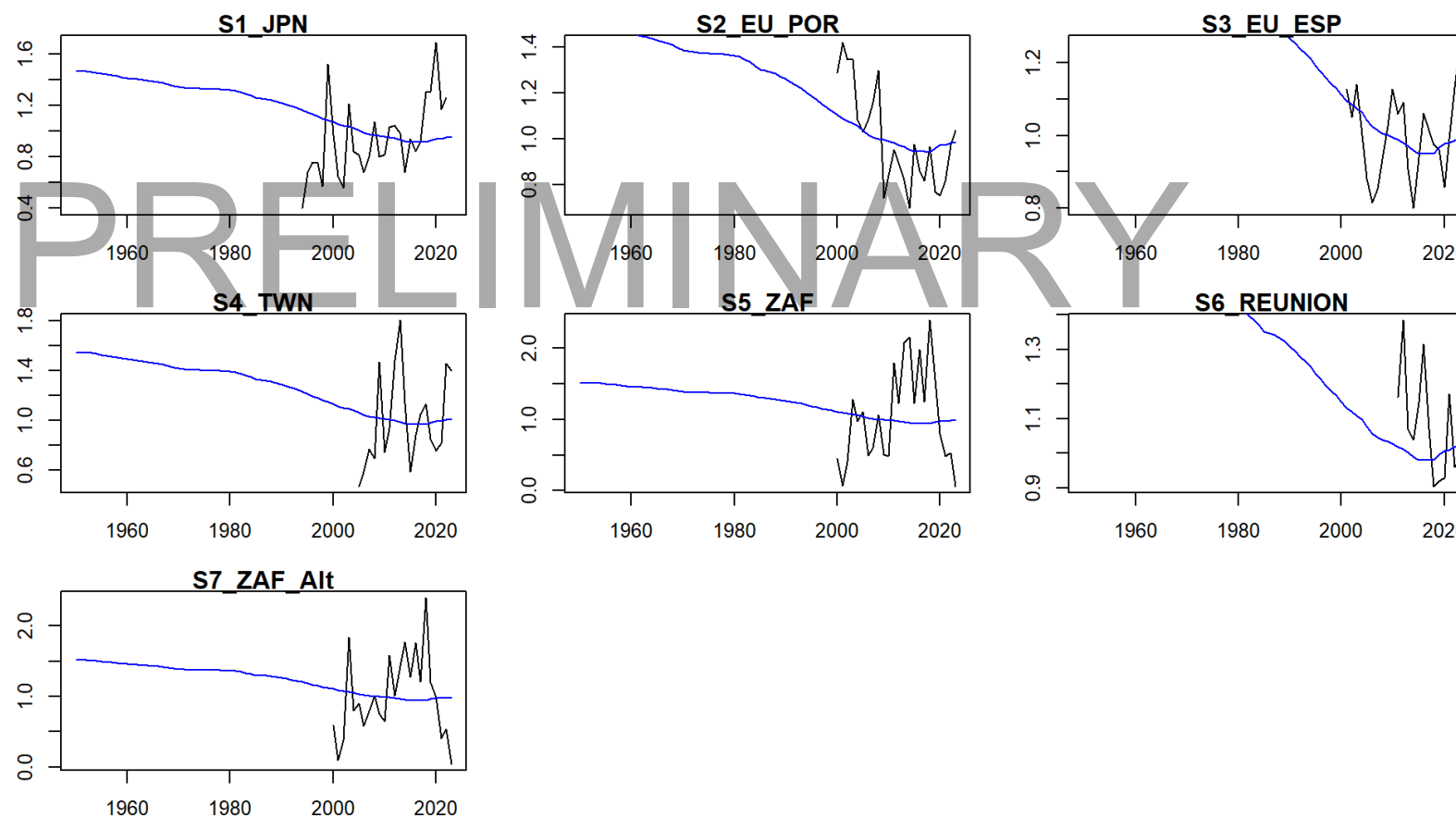
- ▶ *Stock status*
- ▶ *CMPs with 3 year management interval*
- ▶ *Project ~20years seems to make sense for BSH*
- ▶ *BUT - projected for 40-years to see contrasts*





Candidate BSH IOTC Management Procedures

Explored how the various indices are tracking Biomass





Candidate BSH IOTC Management Procedures

- *Most time spent exploring EMP CPMs initial specifications/options*

```

AH1 <- Emp
formals(AH1)$Inds <- 1:nIndices # use all indices
formals(AH1)$I_wt <- Index_weight
formals(AH1)$curI_2_target <- 0.5
formals(AH1)$Ind_fac <- 1.5
formals(AH1)$delta_down <- c(0.01, 0.2)
formals(AH1)$delta_up <- c(0.01, 0.2)
formals(AH1)$calib_yrs <- 5
class(AH1) <- 'MP'

```

```

Index_weight <- c(0,1,1,0,0,1,0) # use PRT, ESP, REU
RC3 <- Emp
formals(RC3)$Inds <- 1:nIndices
formals(RC3)$I_wt <- Index_weight # use PRT, ESP, REU
formals(RC3)$curI_2_target <- 0.5
formals(RC3)$Ind_fac <- 1.5
formals(RC3)$delta_down <- c(0.01, 0.3) # Go down max 30%
formals(RC3)$delta_up <- c(0.01, 0.2) # Go up max 20%
formals(RC3)$calib_yrs <- 10 # last 10 years to define "current" catch
formals(RC3)$HCR_CP_B <- c(0.3, 1) # Biomass control points for HCR - x-axis of hockey-stick
formals(RC3)$HCR_CP_TAC <- c(0.1, 1) # TAC control points for HCR - y-axis of hockey-stick
class(RC3) <- 'MP'

```

```

DF1 <- AH1
formals(DF1)$Inds <- 1:nIndices # use all indices
formals(DF1)$I_wt <- c(0,0,1,0,0,0,0)
formals(DF1)$Ind_fac <- 1.8
class(DF1) <- 'MP'

```

```

HM2 <- Emp
formals(HM2)$Inds <- 1:nIndices # use all indices
formals(HM2)$I_wt <- Index_weight
formals(HM2)$curI_2_target <- 0.5
formals(HM2)$Ind_fac <- 1.5
formals(HM2)$delta_down <- c(0.01, 0.2)
formals(HM2)$delta_up <- c(0.01, 0.2)
formals(HM2)$calib_yrs <- 5
formals(HM2)$curI_2_target <- 0.8
formals(HM2)$Ind_fac <- 1.3
class(HM2) <- 'MP'

toby1 <- Emp
formals(toby1)$Inds <- 1:nIndices # use all indices
formals(toby1)$I_wt <- Index_weight
formals(toby1)$curI_2_target <- 0.5
formals(toby1)$Ind_fac <- 1.2
formals(toby1)$delta_down <- c(0.1, 0.5)
formals(toby1)$delta_up <- c(0.1, 0.2)
formals(toby1)$calib_yrs <- 5
class(toby1) <- 'MP'

toby2 <- toby1
formals(toby2)$Ind_fac <- 1.5
formals(toby2)$delta_down <- c(0.1, 0.3)
formals(toby2)$delta_up <- c(0.05, 0.1)
class(toby2) <- 'MP'

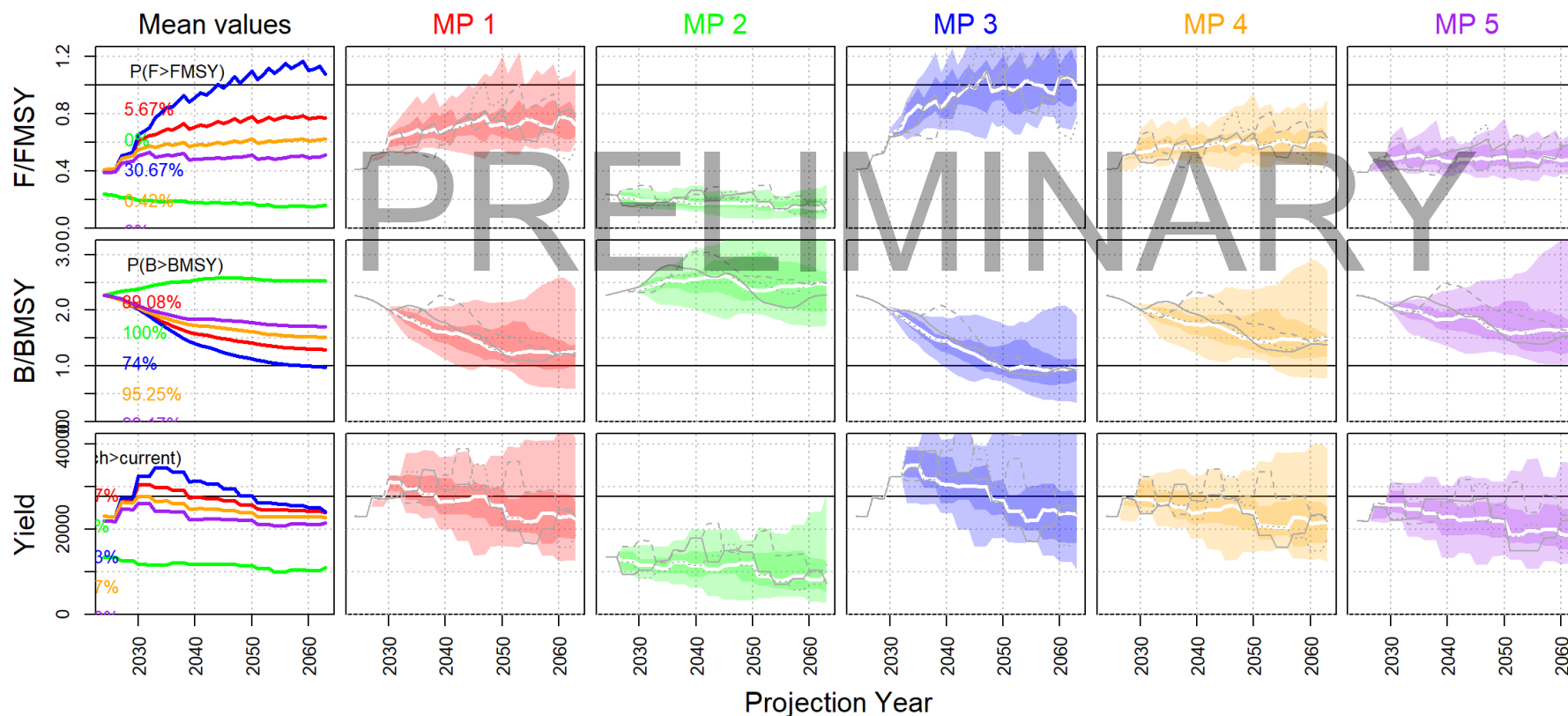
toby3 <- toby2
formals(toby3)$delta_down <- c(0.01, 0.2)
formals(toby3)$delta_up <- c(0.01, 0.2)
formals(toby3)$calib_yrs <- 1.9
formals(toby3)$calib_yrs <- 2
class(toby3) <- 'MP'

```



Candidate BSH IOTC Management Procedures

► Summary results of the initial CMPs





Breakout Session Part 3

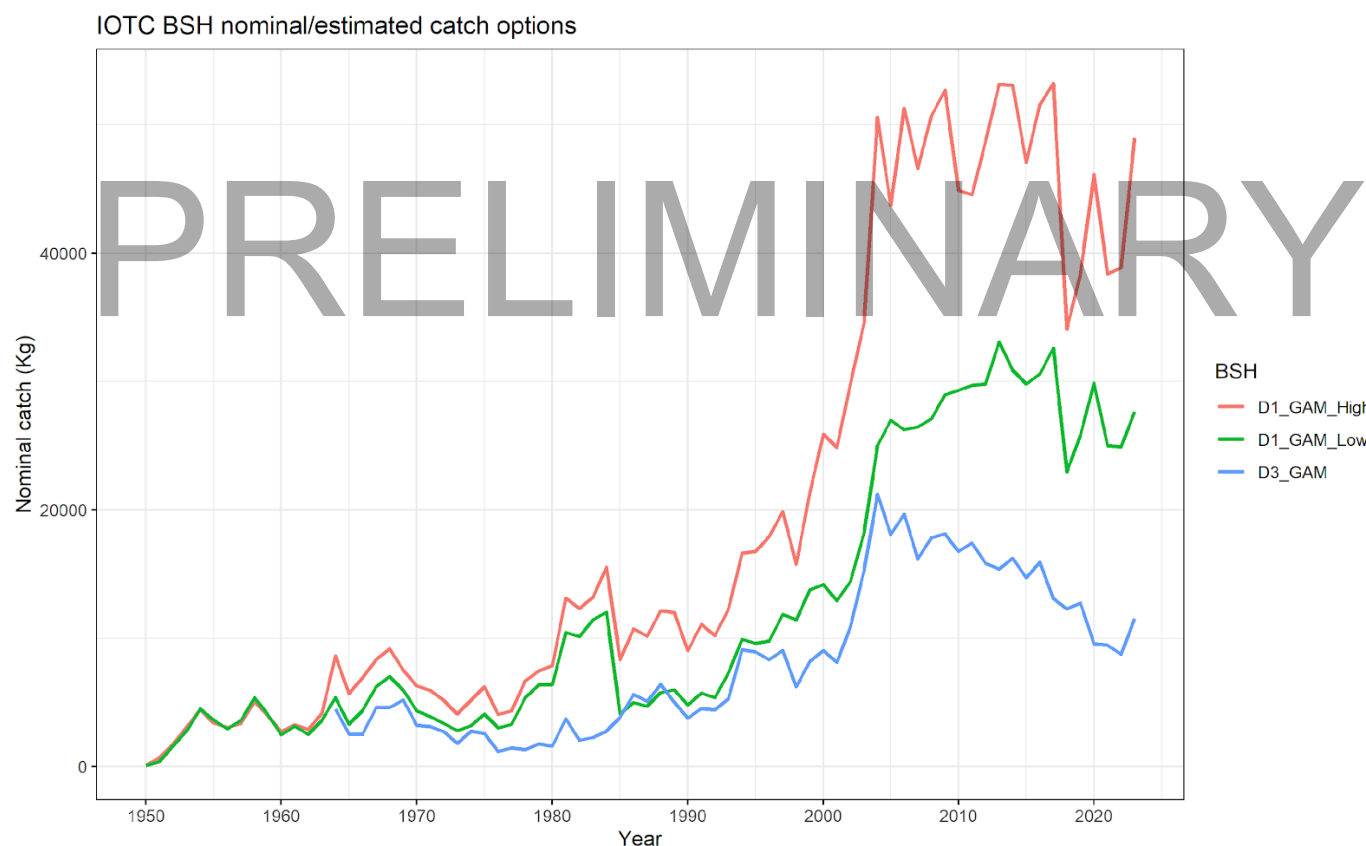
Alternative OMs: Reference and Robustness

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IOTC BSH Alternative OMs

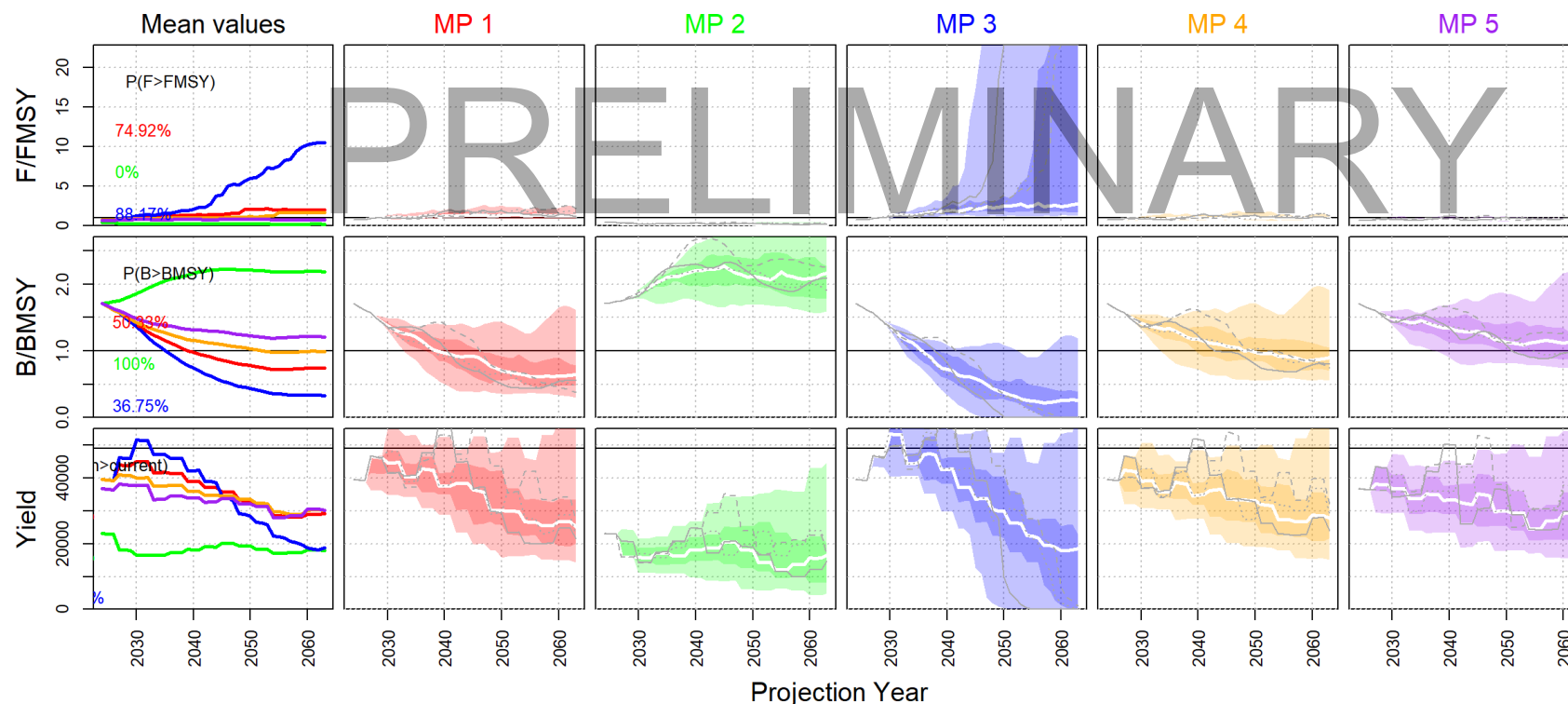
Key uncertainties: **Main uncertainty considered - possible higher catches**





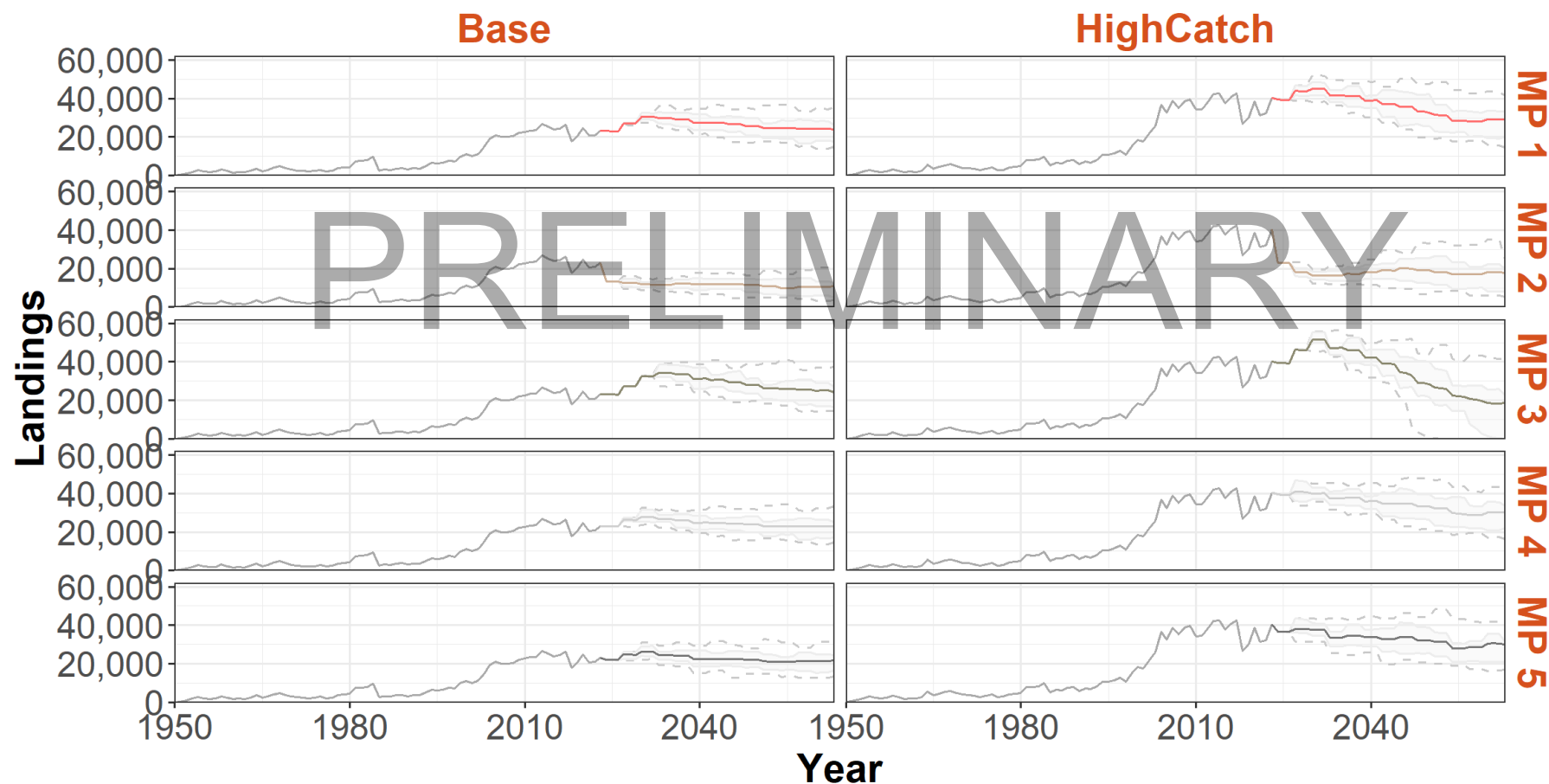
IOTC BSH Alternative OMs

Key uncertainties: **E.g. – CMP 3 was performing OK with base catches, but it is worse with alternative (higher catches)**



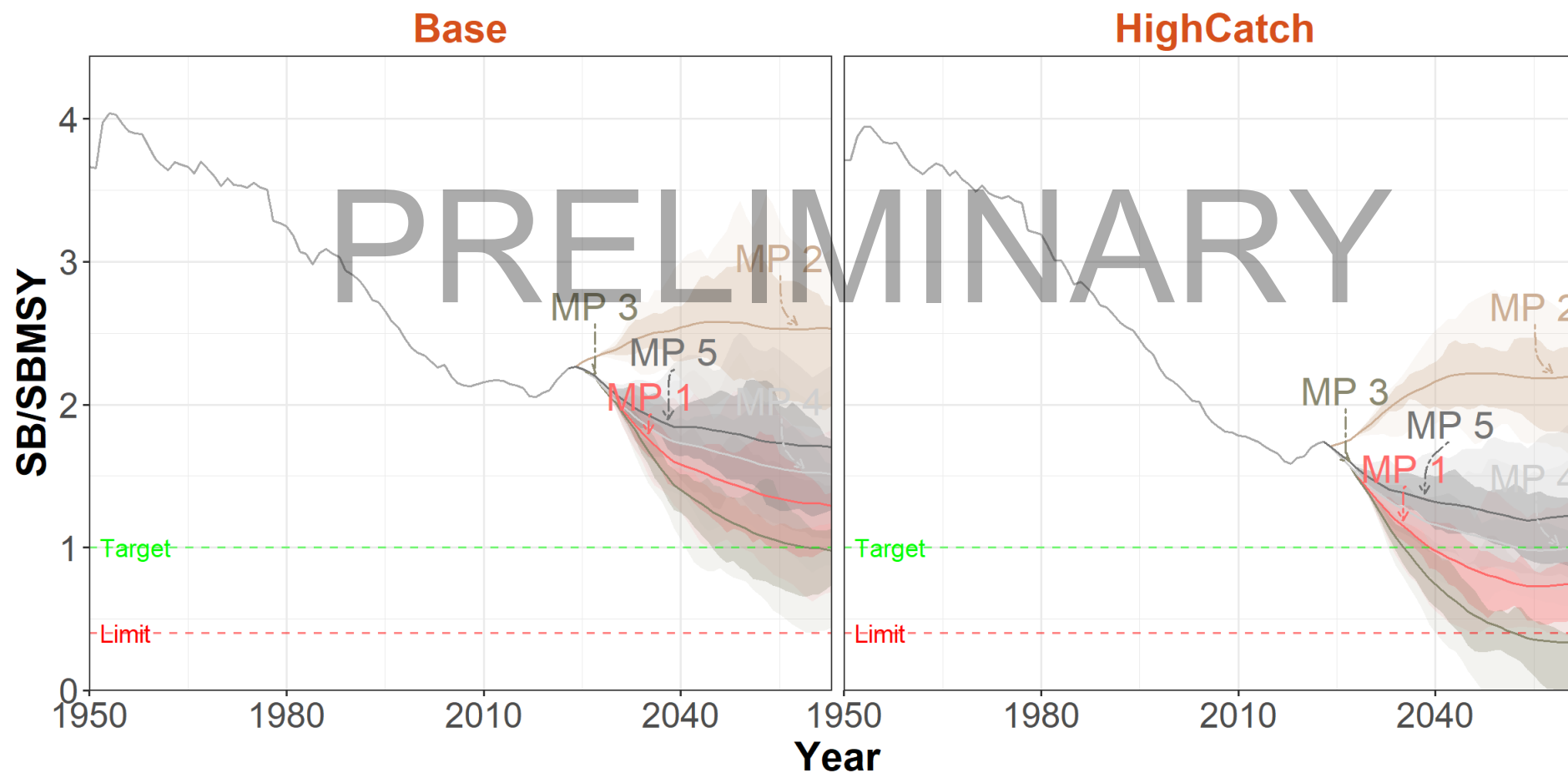


[stock] Operating Models – Comparison with alternative OM



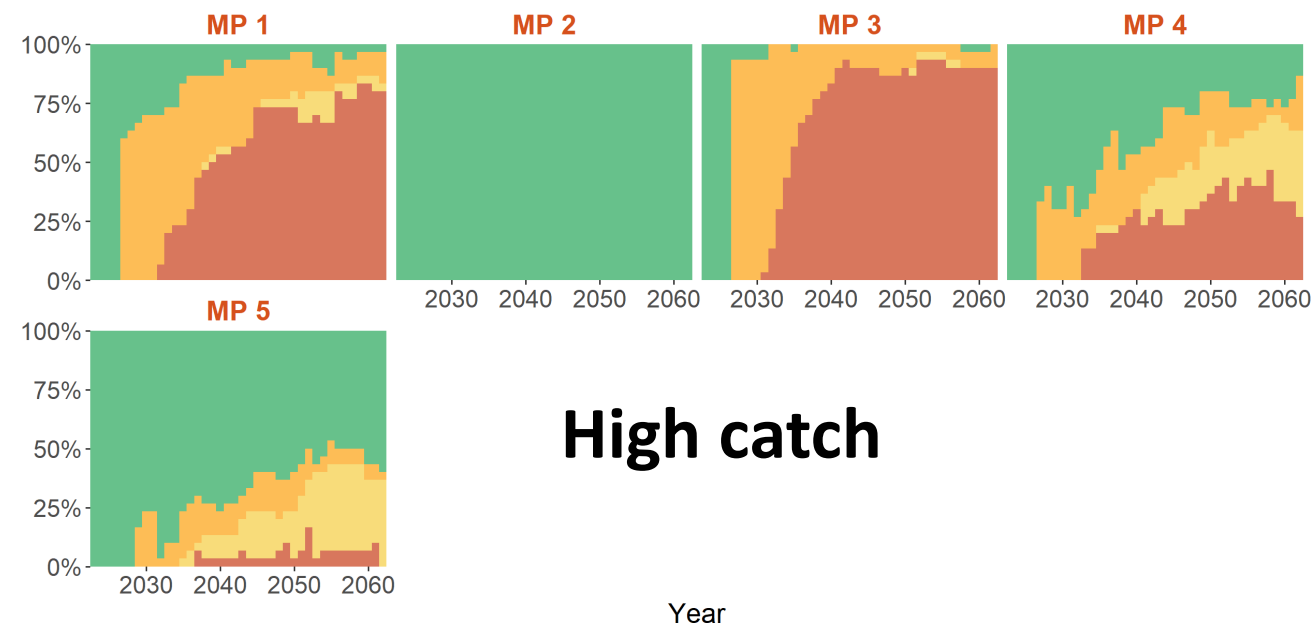
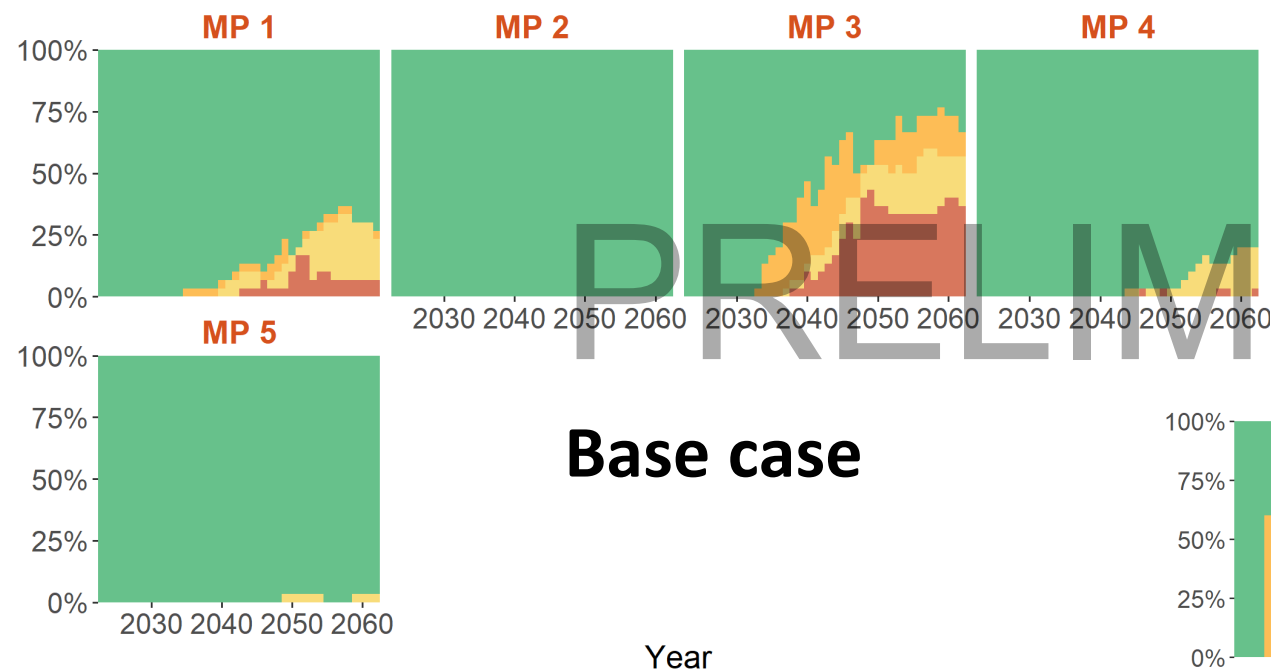


IOTC BHS Operating Models – Comparison with alternative OM





IOTC BSH Operating Models – Comparison with alternative OM





IOTC BSH Operating Models – Comparison with alternative OM

MP	Status	Safety	P100	PNOF	Catch_ST	Catch_LT
MP 1	0.872	0.998	0.891	0.943	27,200	24,400
MP 2	1.000	1.000	1.000	1.000	12,500	10,400
MP 3	0.607	0.978	0.740	0.693	28,300	25,400
MP 4	0.956	1.000	0.952	0.996	25,800	23,000
MP 5	0.992	1.000	0.992	1.000	24,300	21,200

Base case

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MP	Status	Safety	P100	PNOF	Catch_ST	Catch_LT
MP 1	0.222	0.948	0.503	0.251	42,600	28,600
MP 2	1.000	1.000	1.000	1.000	18,900	17,500
MP 3	0.114	0.680	0.368	0.118	45,800	20,100
MP 4	0.463	0.987	0.648	0.577	39,800	29,700
MP 5	0.715	1.000	0.815	0.859	37,100	29,200

High catch



Visualizing Results

Slick Breakout Session
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(Working on browser)



IOTC BSH Operating Models

- ▶ *Additional uncertainties would you consider in the:*
 - a) E.g.: M , h , growth, ...*
 - b) Catch levels (implications for absolute MSY estimations)*
- ▶ *Next on CMPs:*
 - ▶ *Consider what CMPs might be available and perform better given the issues in data*
 - ▶ *Uncertainty on catch levels: CMPs based on size limits?*

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Draft Workplan

- ▶ **2025/26:**
 - ▶ *WP-Methods: meeting late 2025: Preliminary OM discussion including main axis of uncertainty and potential CMPs*
 - ▶ *TCMP (May 2026): Receive prelim results and give feedback. Define management objectives,...*
- ▶ **2027:**
 - ▶ *Work developed by MSE taskforce and present to WP-Methods*
 - ▶ *TCMP: Present results (TCMP can accept or ask for another round)*
- ▶ **2028+:...**



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Questions from the group?