INTERNATIONAL PACIFIC

HALIBUT COMMISSION

An update of the IPHC MSE process for SRB018

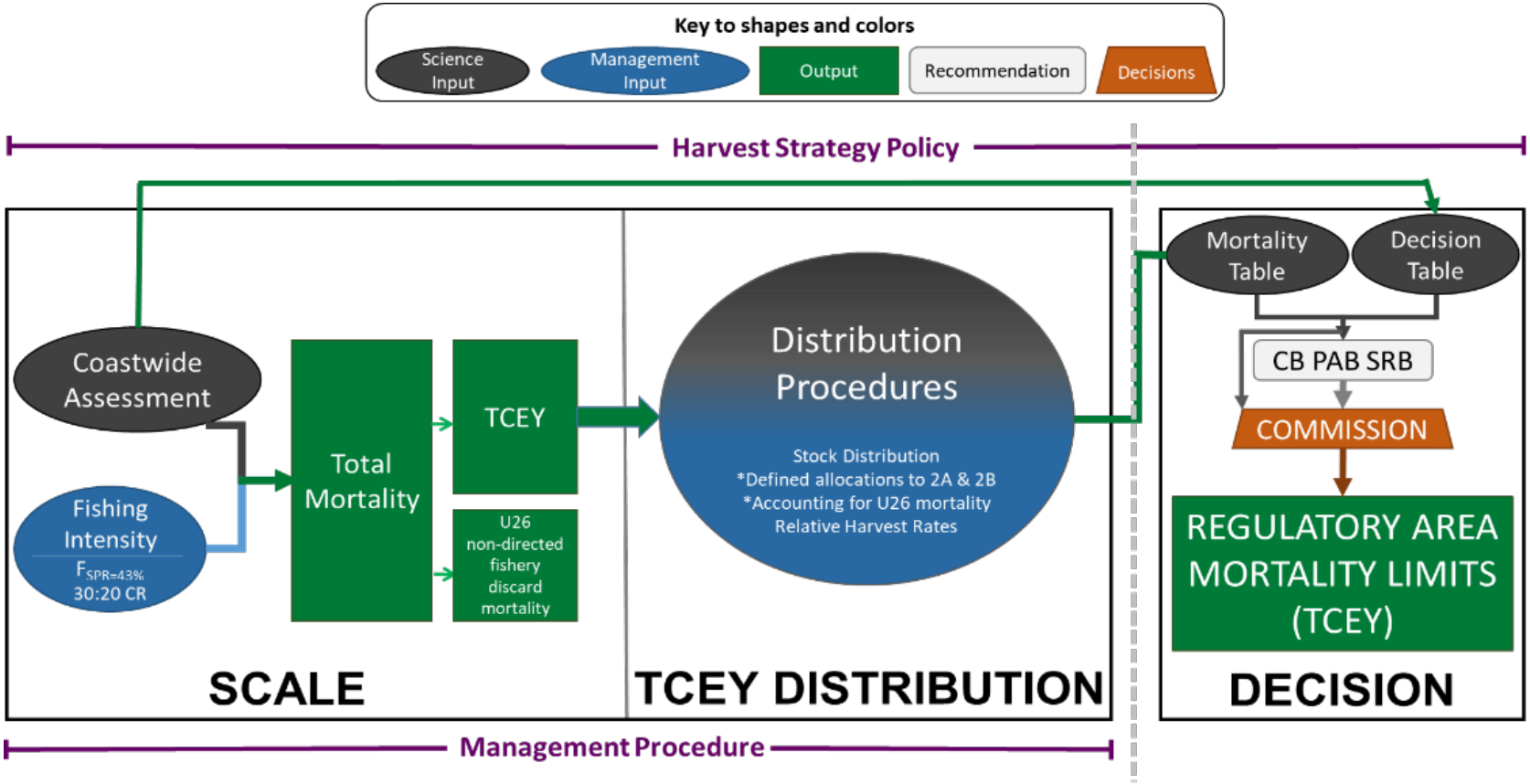
Agenda Item 6

IPHC-2021-SRB018-07

Outline

- Brief review of results
- Recent SRB requests and recommendations
- MSE priorities and integration with research
- MSE Program of Work for 2021-2022

IPHC Harvest Strategy Process



Management Procedures for evaluation

Element	MP-A	MP-B	MP-C	MP-D	MP-E	MP-F	MP-G	MP-H	MP-I	MP-J	MP-K
TCEY constraint of 15%											
Max Fishing Intensity buffer 36%											
O32 stock distribution											
O32 stock distribution (5-year moving average)											
All sizes stock distribution											
Fixed shares updated in 5th year from O32 stock distribution											
Relative harvest rates of 1.0 for 2-3A, and 0.75 for 3B-4											
Relative harvest rates of 1.0 for 2-3, 4A, 4CDE, and 0.75 for 4B											
Relative harvest rates by Region: R2=1, R3=1, R4=0.75, R4B=0.75											
1.65 Mlbs fixed TCEY in 2A											
Formula percentage for 2B											
National Shares (2B=20%)											

Are sustainability objectives met?

Objectives	PMs	Sim 30:20 43 MPA	Sim 30:20 43 MPB	Sim 30:20 43 MPC	Sim 30:20 43 MPD	Sim 30:20 43 MPE	Sim 30:20 43 MPF	Sim 30:20 43 MPG	Sim 30:20 43 MPH	Sim 30:20 43 MPI	Sim 30:20 43 MPJ	Sim 30:20 43 MPK
Maintain a min prop of female SB	$P(p_{sb,r=2} > 5\%)$	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maintain a min prop of female SB	$P(p_{sb,r=3} > 33\%)$	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maintain a min prop of female SB	$P(p_{sb,r=4} > 10\%)$	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maintain a min prop of female SB	$P(p_{sb,r=4B} > 2\%)$	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.15	0.16	0.16	0.18
Maintain a female SB above a biomass limit reference point 95% of the time	$P(SB < SB_{Lim})$	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Ranking Management Procedures

- Fishery objectives can be ranked using metrics
- Provides a quick evaluation of many MPs

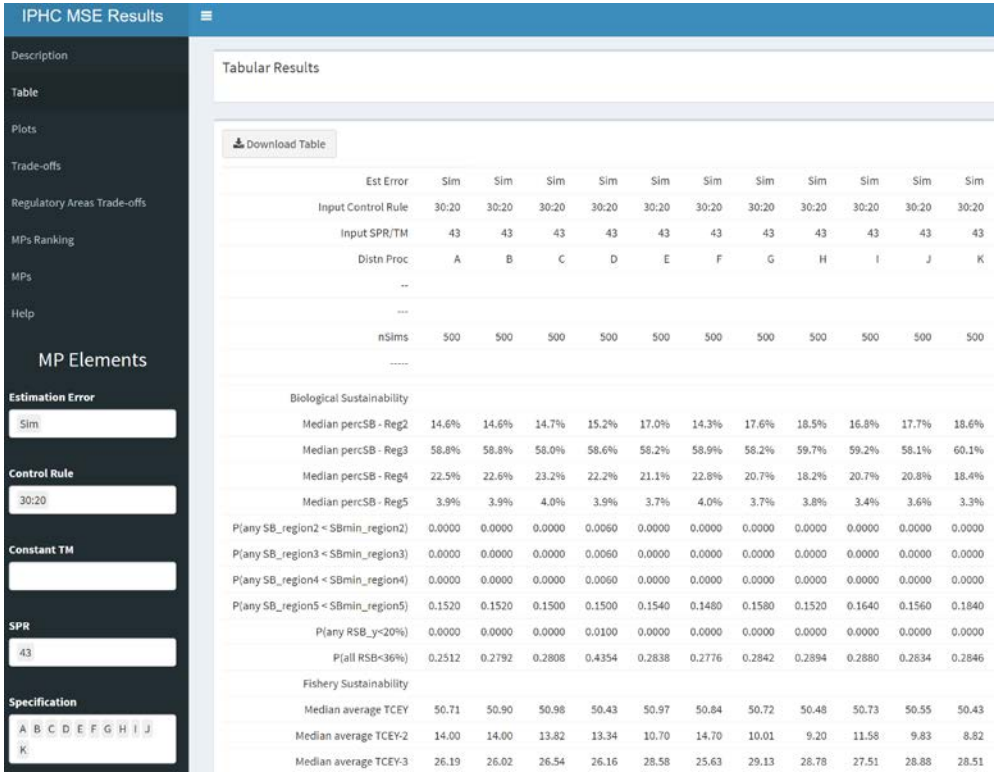
	A	B	C	D	E	F	G	H	I	J	K
Median TCEY	39.9	38.2	38.3	40.2	38.0	38.2	37.9	37.9	37.9	37.9	38.0
Rank	2	4	3	1	6	4	8	8	8	8	6

Summary ranks by general objective

Objective	Performance Metric	A	B	C	D	E	F	G	H	I	J	K
2.1 Maintain the coastwide female SB above a target	$P(SB < SB_{Targ})$	11	4	4	1	4	4	4	2	2	4	4
2.2 Limit catch variability	Limit annual change	10.1	4.56	4.22	3.62	4.59	5.25	5.25	3.75	4	3.75	2.88
2.3 Provide directed fishing yield	Optimize TCEY and maintain minimum TCEY in Reg Areas	5.55	5.02	5.22	3.7	3.92	5.62	3.8	4.15	3.45	3.37	3.72

MSE Explorer

- Interactive tool
- All results
- Additional MPs
- Additional Metrics
- Table, plots, ranks



Est Error	Sim	Sim	Sim	Sim	Sim	Sim	Sim	Sim	Sim	Sim	Sim
Input Control Rule	30:20	30:20	30:20	30:20	30:20	30:20	30:20	30:20	30:20	30:20	30:20
Input SPR/TM	43	43	43	43	43	43	43	43	43	43	43
Distn Proc	A	B	C	D	E	F	G	H	I	J	K
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---											
nSims	500	500	500	500	500	500	500	500	500	500	500

Biological Sustainability											
Median percSB - Reg2	14.6%	14.6%	14.7%	15.2%	17.0%	14.3%	17.6%	18.5%	16.8%	17.7%	18.6%
Median percSB - Reg3	58.8%	58.8%	58.0%	58.6%	58.2%	58.9%	58.2%	59.7%	59.2%	58.1%	60.1%
Median percSB - Reg4	22.5%	22.6%	23.2%	22.2%	21.1%	22.8%	20.7%	18.2%	20.7%	20.8%	18.4%
Median percSB - Reg5	3.9%	3.9%	4.0%	3.9%	3.7%	4.0%	3.7%	3.8%	3.4%	3.6%	3.3%
P(any SB_region2 < SBmin_region2)	0.0000	0.0000	0.0000	0.0060	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
P(any SB_region3 < SBmin_region3)	0.0000	0.0000	0.0000	0.0060	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
P(any SB_region4 < SBmin_region4)	0.0000	0.0000	0.0000	0.0060	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
P(any SB_region5 < SBmin_region5)	0.1520	0.1520	0.1500	0.1500	0.1540	0.1480	0.1580	0.1520	0.1640	0.1560	0.1840
P(any RSB_y<20%)	0.0000	0.0000	0.0000	0.0100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
P(all RSB<36%)	0.2512	0.2792	0.2808	0.4354	0.2838	0.2776	0.2842	0.2894	0.2880	0.2834	0.2846
Fishery Sustainability											
Median average TCEY	50.71	50.90	50.98	50.43	50.97	50.84	50.72	50.48	50.73	50.55	50.43
Median average TCEY-2	14.00	14.00	13.82	13.34	10.70	14.70	10.01	9.20	11.58	9.83	8.82
Median average TCEY-3	26.19	26.02	26.54	26.16	28.58	25.63	29.13	28.78	27.51	28.88	28.51

http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/MSE-Explorer/

Best performing MPs

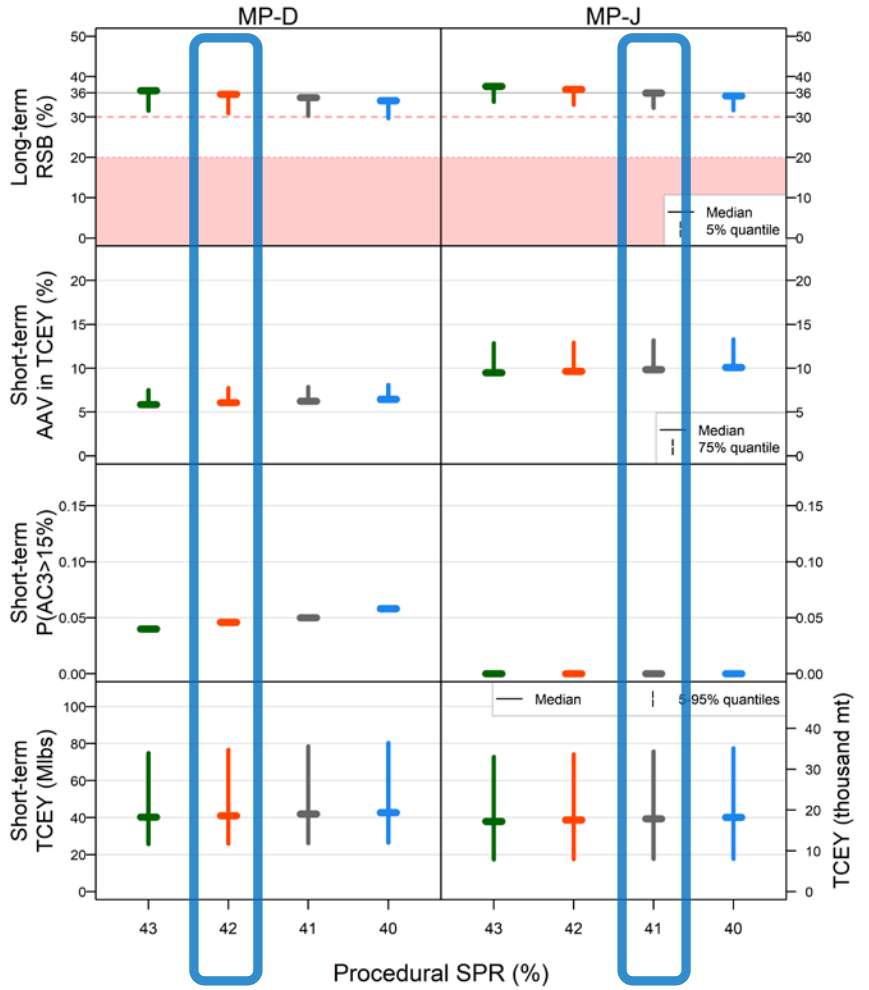
- **MP-D** and **MP-J** were overall ranked best

MP-D	MP-J
• *SPR-buffer* allows the TCEY to increase by increasing the fishing intensity • Agreements for 2A and 2B	• 5-year average for stock distribution

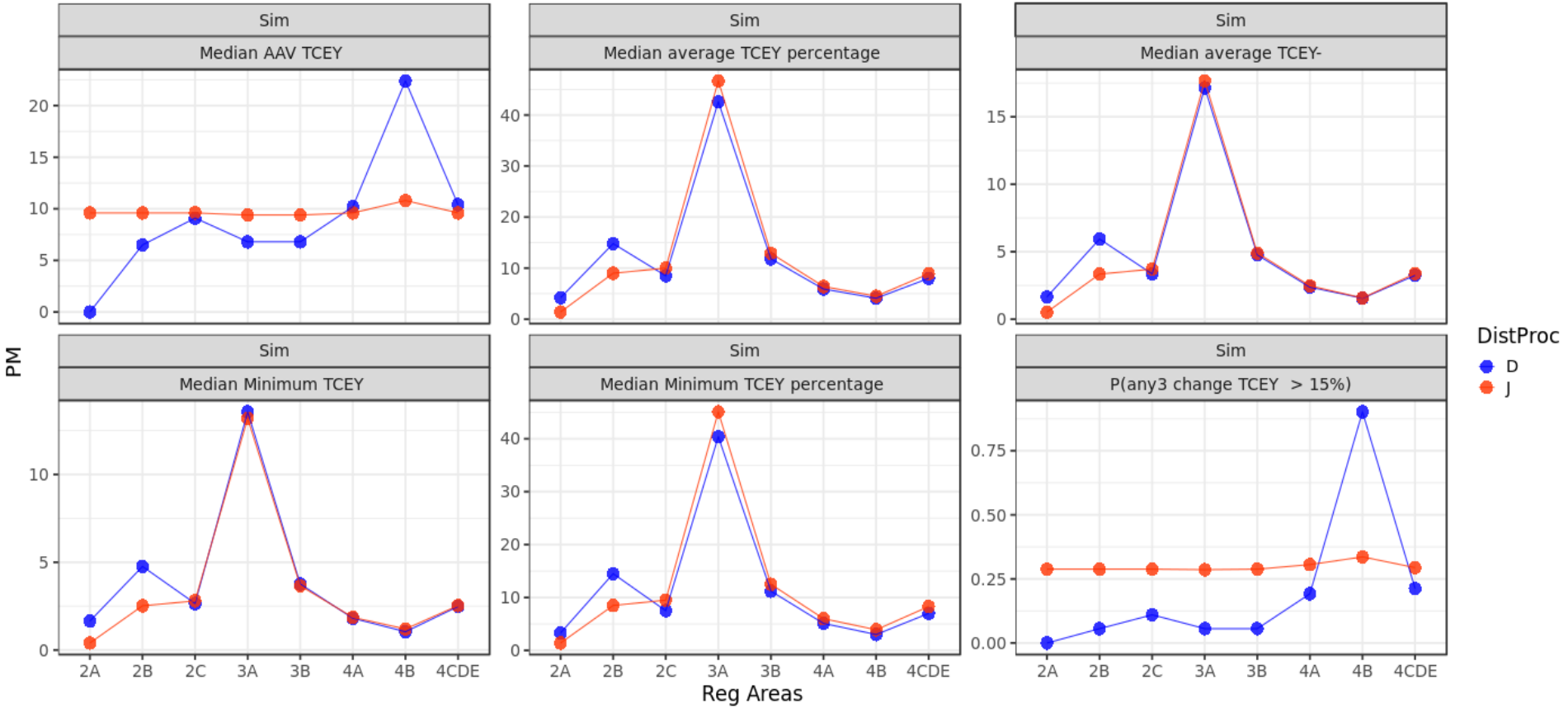
- Additional SPR values of 41% and 42% were done for MP-D and MP-J

Coastwide Performance Metrics

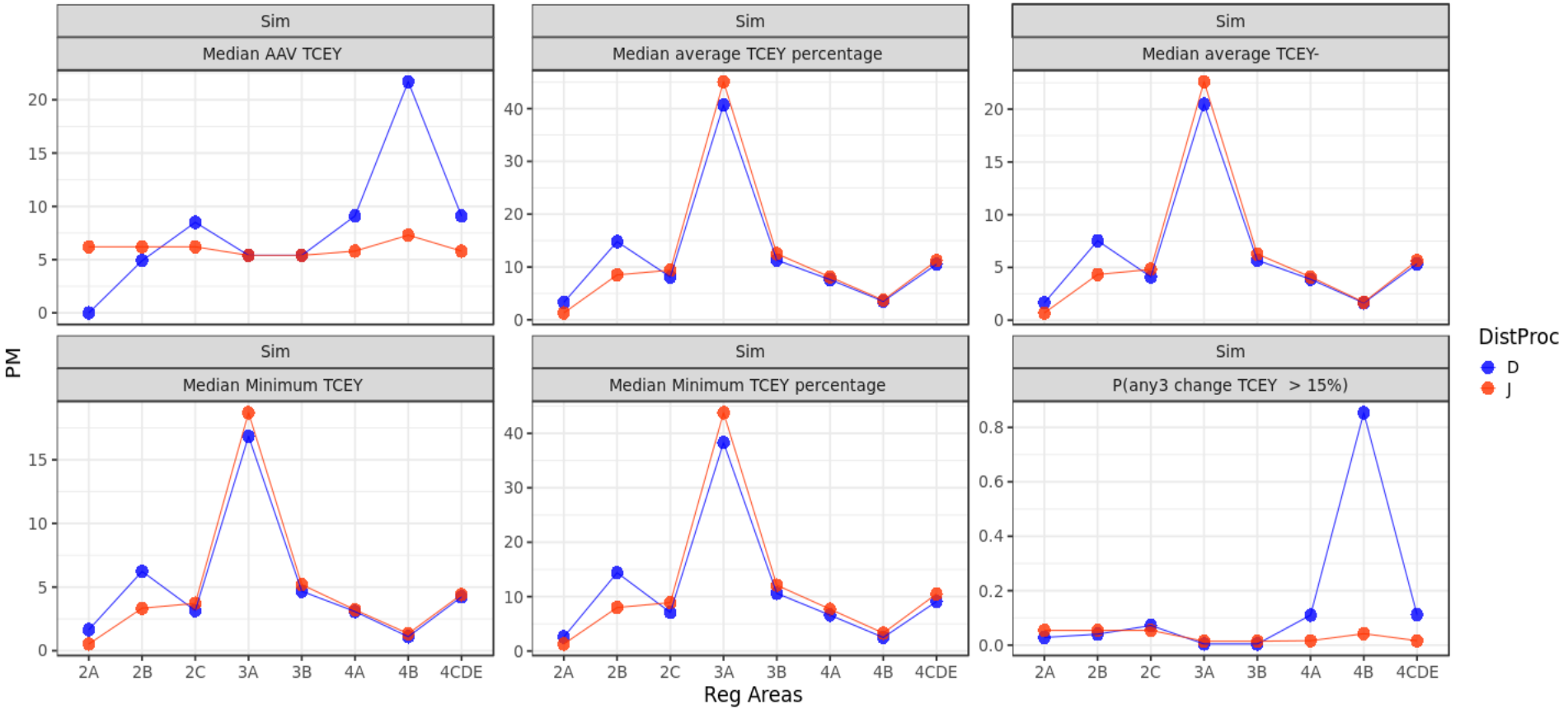
- One objective is a target RSB of 36%
  - MP-D: SPR=42%
  - MP-J: SPR=41%



Area Performance Metrics (short-term)



Area Performance Metrics (long-term)



Summary of MP-D and MP-J

MP-D (SPR=42%)

- More stable coastwide TCEY on average
  - Flexibility for agreements
- Short-term coastwide yield greater
- Higher and stable TCEY in 2A and 2B
- SPR is variable
  - Higher risk to stock
  - No control rule on buffer

MP-J (SPR=41%)

- More stable TCEYs in western Reg Areas
- Long-term coastwide yield greater
- Higher TCEY in areas other than 2A and 2B

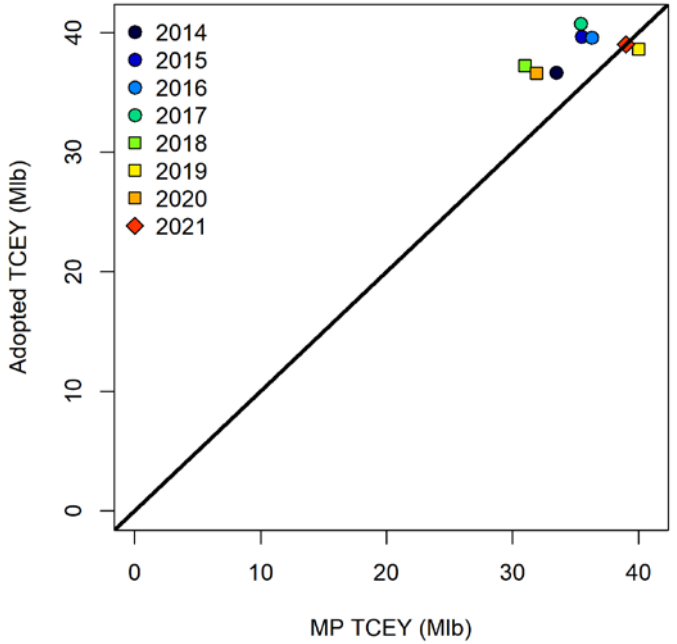
Recent SRB requests & recommendations

Abbreviated

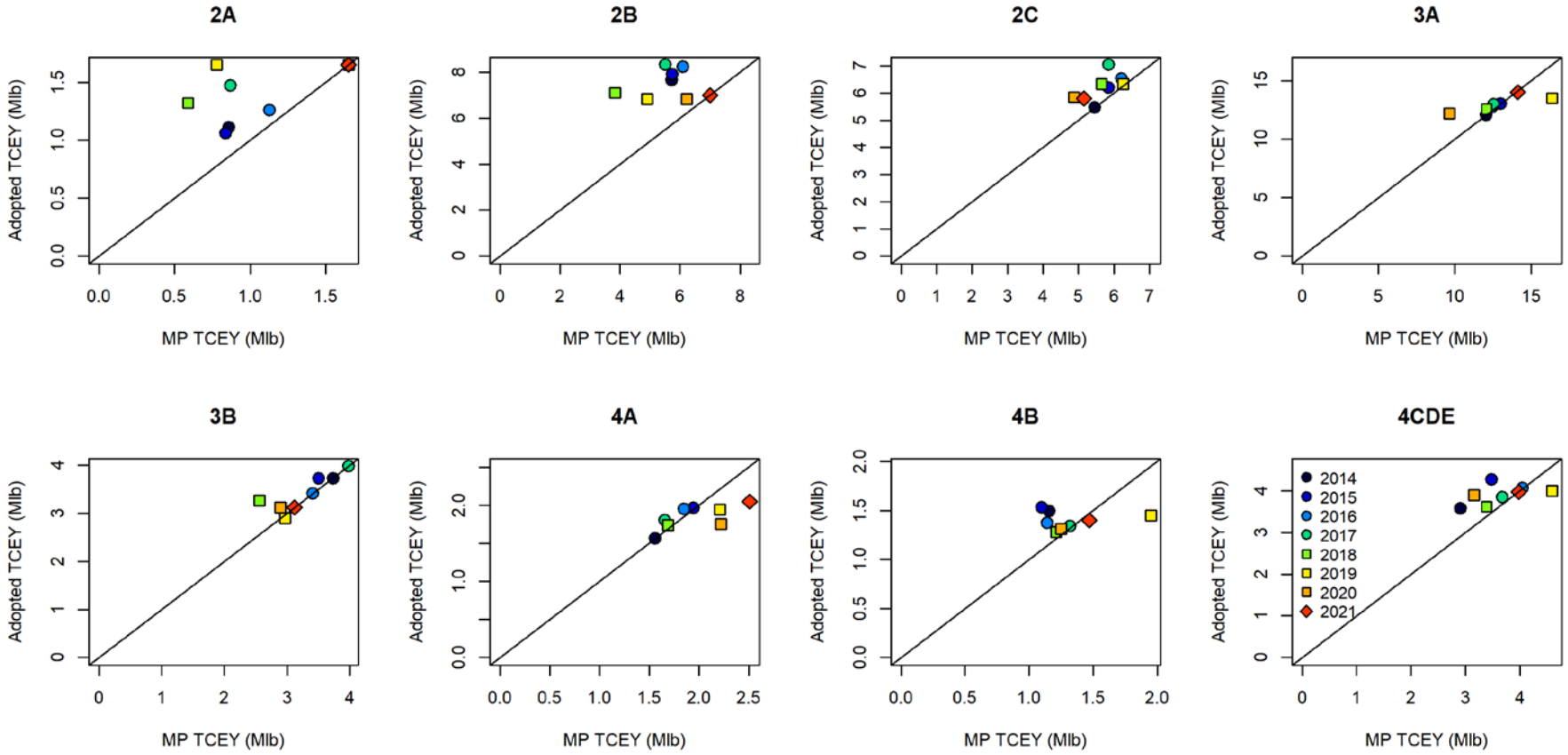
Decision-making variability

SRB016, para. 29. *… the SRB REQUESTED further investigation of decision-making variability, including empirical analysis of the relationship between recommended and implemented harvest levels*

- Adopted coastwide TCEY (2014-2021)
  - Circles are “blue-line” harvest policy
  - Squares are $F_{SPR=46\%}$ harvest policy
  - Diamond is $F_{SPR=43\%}$ harvest policy

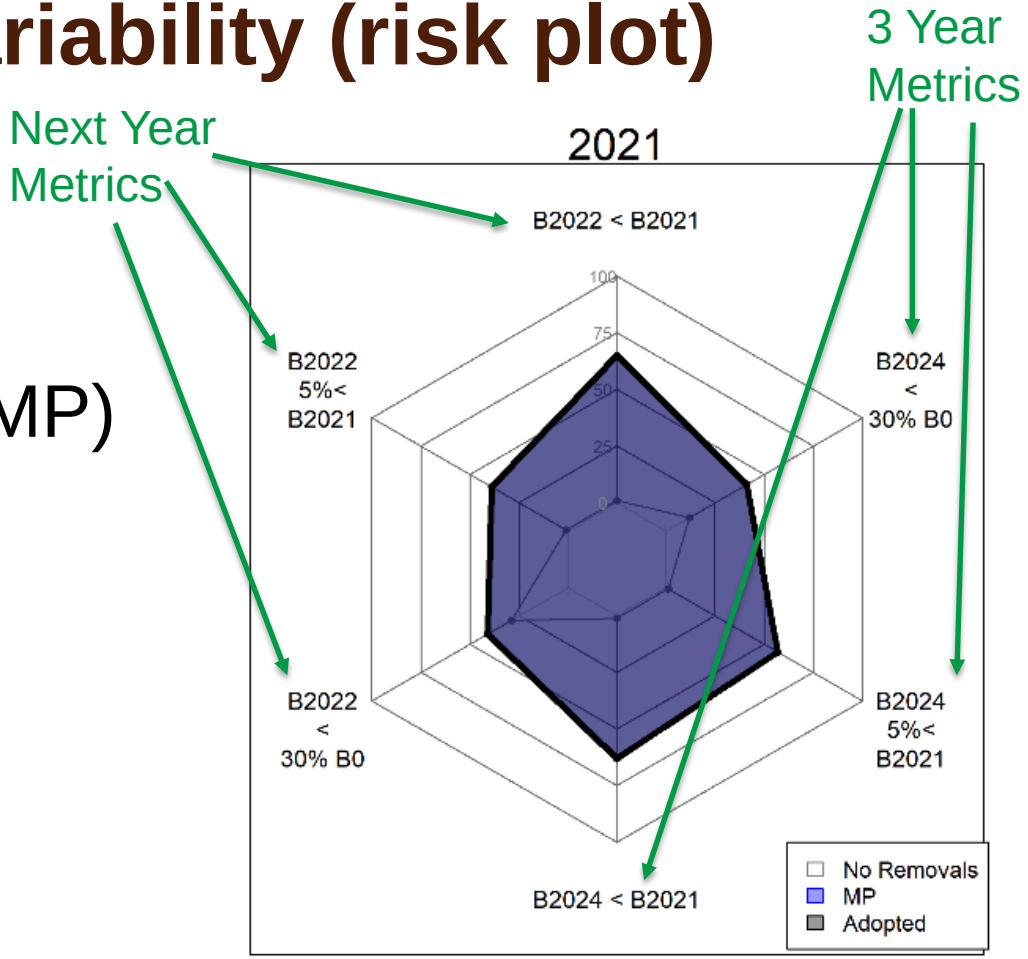


Decision-making variability by Area

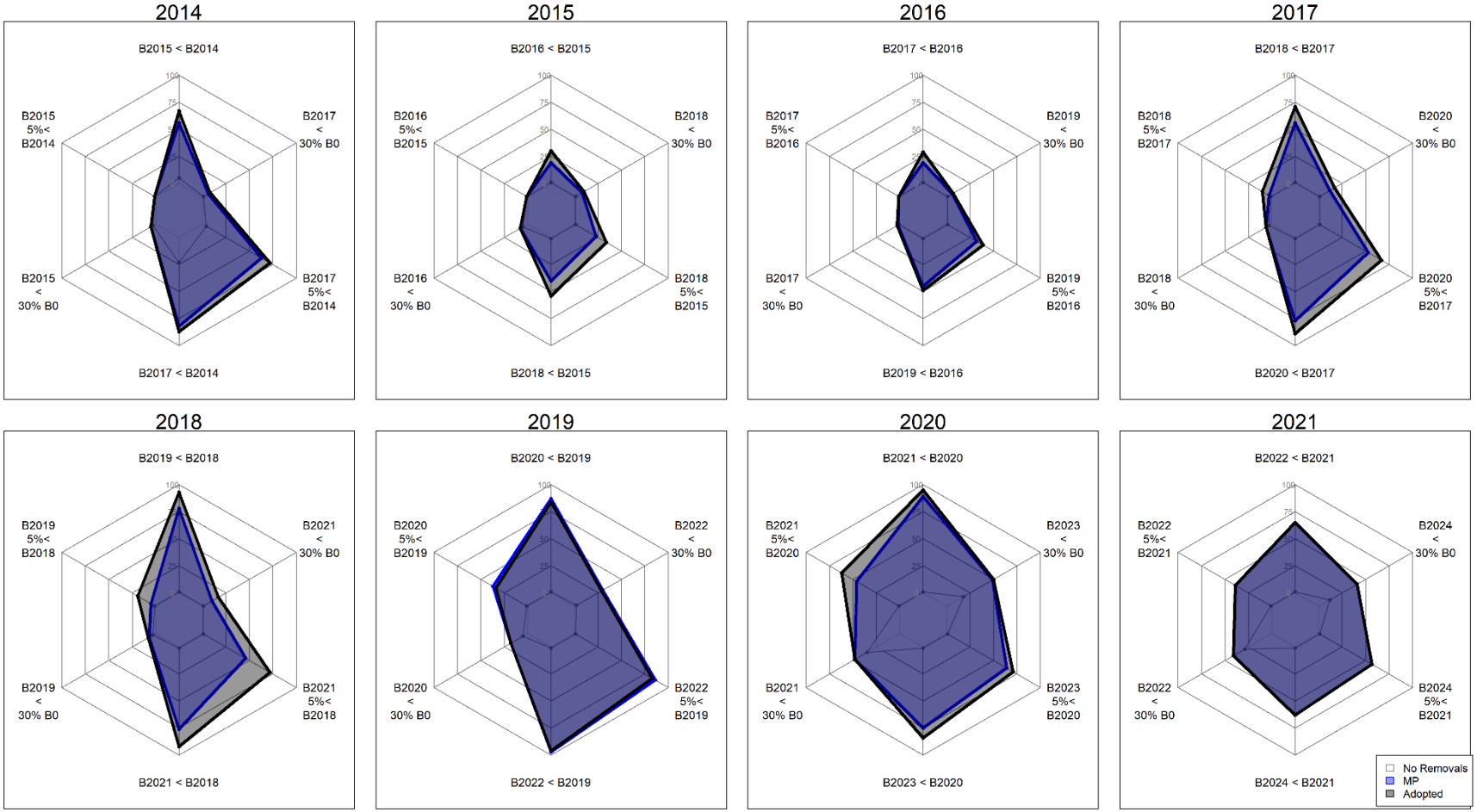


Decision-making variability (risk plot)

- Six metrics from the decision table
- Harvest policy limits (MP) in blue
- Adopted limits in grey
- No removals in center with circles



Decision-making variability (risk)



Implementation variability

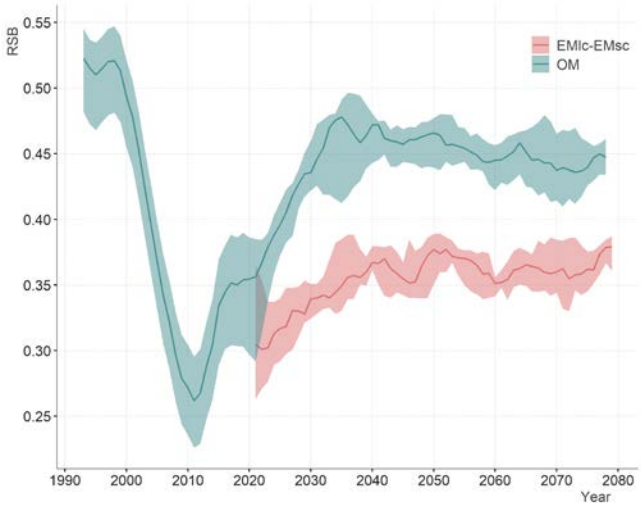
Three types of implementation variability

1. **Decision-making variability** is the difference between the mortality limits determined from the MP and the mortality limits set by the Commission
2. **Realized variability** is the difference between the mortality limits set by the Commission and the actual mortality caused by fishing
3. **Perceived variability** is the difference from the realized mortality that is a result of estimating the mortality rather than knowing the actual fishing mortality (e.g. for fisheries with uncertain discard mortality rates, and/or low levels of observer coverage)

Estimation Model

SRB017, para. 57. *The SRB … RECOMMENDED continuing work to incorporate actual estimation models, as in the third option, because that method would best mimic the current assessment process.*

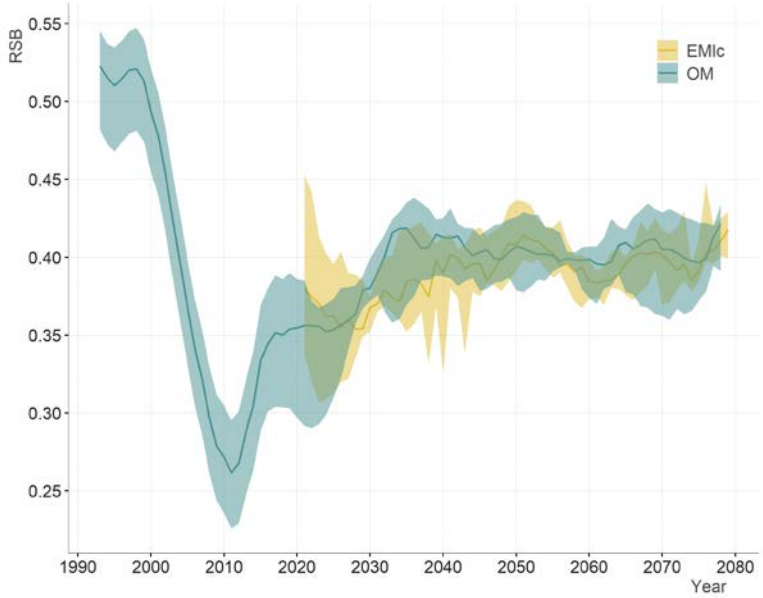
- A balance between fast for simulations, accurate with past assessments, and representative of the future
- Would like to include more than one SS model
  - Short coastwide estimation model shows some differences from short CW assessment model



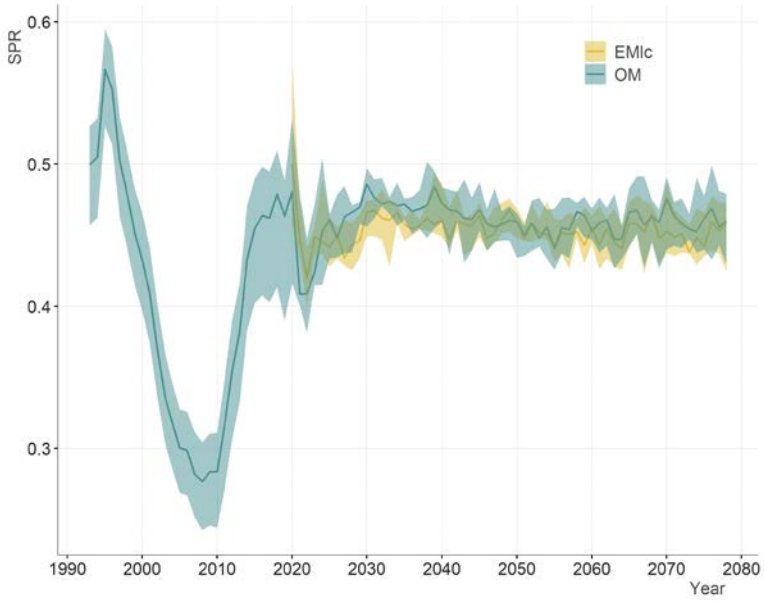
Estimation model

- Using only the simplified long coastwide

Relative Spawning Biomass



SPR



- Performance metrics using this EM are available in MSE Explorer

http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/MSE-Explorer/

Exceptional Circumstances

SRB017, para. 60. *The SRB RECOMMENDED that Exceptional Circumstances be defined to determine whether monitoring information has potentially departed from their expected distributions generated by the MSE…*

Potential topic areas

- Stock predictions (compared to assessment and data)
  - MSE population trajectories, distribution, etc.
- TCEY (compared to assessment and decisions)
  - MSE evaluated and produced similar range and trends
- Decision table probabilities (compared to assessment)
  - MSE doesn't deviate drastically from near-term probabilities
- Changes in data collection
- Changes in fisheries

MSE Priorities and Integration with Research

Biological parameterization and validation of movement estimates

1. Distribution of life stages and stock connectivity
2. Spatial spawning patterns and connectivity
3. Understanding growth variation

- Benefits to MSE
  - Spatial and temporal patterns in recruitment
  - Movement of juvenile and adult stages
  - Stock structure
  - Modelling weight-at-age

Fishery Parameterization

- Discard mortality rates
- Benefits to MSE
  - Improved characterization of fisheries
  - Better spatial accounting of fishery mortality

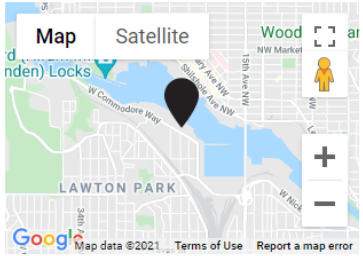
MSE Program of Work for 2021-2022

AM097 requests

- **AM097, para. 70.** *The Commission REQUESTED that the IPHC Secretariat consider and develop a draft MSE Program of Work for review by the Commission. The MSE Program of Work should describe technical versus policy oriented issues, linkages between/among specific work products, and sequencing considerations between/among items. The MSE Program of Work should describe the resources required to complete items.*

- **AM097, para. *71.*** *The Commission AGREED to meet intersessionally to review the draft MSE program of work for the IPHC Secretariat and provide direction on the prioritisation of tasks over the next 1-2 years, as well as the role of the MSAB in contributing to those tasks.*

11th Special Session of the IPHC (22 June 2021)



SEATTLE, WA

IPHC Office, Salmon Bay
2320 West Commodore Way
Seattle, WA 98199

Adobe Connect Registration ›

11th Special Session of the IPHC (SS011)

Date:	22 June 2021
Location:	Electronic
Venue:	Adobe Connect
Time:	11:00 - 14:00 (or as needed) PDT
Chairperson:	Mr Glenn Merrill (U.S.A.)
Vice-Chairperson:	Mr Paul Ryall (Canada)

Meeting Documents

Document	Title	PDF	PPT	Availability
IPHC-2021-SS011-01	Agenda for the 11th Special Session of the IPHC (SS011)			1 June 2021
IPHC-2021-SS011-02	List of Documents for the 11th Special Session of the IPHC (SS011)			1 June 2021
IPHC-2021-SS011-03	Management Strategy Evaluation Program of Work (Hicks A, Stewart I, Hutniczak B)			1 June 2021
IPHC-2021-SS011-04	Budget estimates: FY2022 (for approval) (Wilson D, Jernigan K)			

Categories in the MSE PoW

1. **Objectives**
2. **Management Procedures (MPs)**
3. **Framework**
4. **Evaluation**
5. **Application**

- **Time:** the amount of time for that task (10 is a full schedule up to IM097)
- **Total time:** the amount of time for that task plus any prerequisite tasks

MSE tasks (High priority)

ID	Category	Task	Deliverable	Time	Total Time	Priority
F.1	Framework	Develop migration scenarios	Develop OMs with alternative migration scenarios	3–7	3–7	High
F.2	Framework	Implementation variability	Incorporate additional sources of implementation variability in the framework	2–4	2–4	High
F.3	Framework	Develop more realistic simulations of estimation error	Improve the estimation model to more adequately mimic the ensemble stock assessment	3–8	3–8	High
F.5	Framework	Develop alternative OMs	Code alternative OMs in addition to the one already under evaluation.	3–4	5–8	High

MSE tasks (Medium priority)

ID	Category	Task	Deliverable	Time	Total Time	Priority
M.1	MPs	Size limits	Identification, evaluation of size limits	2–3	10–20	Mid
M.2	MPs	Survey-based MPs	Identification, evaluation of empirical MPs using FISS data directly	2–4	4–6	Mid
M.3	MPs	Multi-year assessments	Evaluation of multi-year assessments	1–2	2–4	Mid
M.4	MPs	Non-directed discard mortality	Evaluation of management procedures related to non-directed discard mortality.	2–4	3–6	Mid
M.5	MPs	Additional MPs with scale and distribution	Evaluation of additional MPs with scale and distribution elements	1–5	3–8	Mid
F.4	Framework	Time-varying parameters	Code into the OM the option for more time-varying parameters.	2–4	2–4	Mid
F.6	Framework	Improve framework code	A more usable framework	1–10	1–10	Mid
F.7	Framework	Model length-at-age	OM that can model length specifically	6–10	6–10	Mid

MSE tasks (Low priority)

ID	Category	Task	Deliverable	Time	Total Time	Priority
O.1	Objectives	Revisit sustainability objectives	Updated coastwide & regional objectives	1–2	1–2	Low
O.2	Objectives	Revisit fishery objectives	Updated coastwide & regional objectives	2–4	2–4	Low
E.1	Evaluation	Develop conservation & fishery performance metrics (PMs)	PMs linked to primary objectives. Additional performance metrics for evaluation beyond primary objectives	1	1–2	Low
E.2	Evaluation	Add economic performance metrics	Develop economic PMs to link with economic study and bring in the human dimension	2-3	2-4	Low
E.3	Evaluation	Presentation of results	Develop methods and outputs that are useful for presenting outcomes to stakeholders and Commissioners	1–2	1–3	Low
A.1	Application	Develop exceptional circumstances	A list of exceptional circumstances that would result in additional MSE evaluations	1–3	1–3	Low

Recommendations

a) **NOTE** paper IPHC-2021-SRB018-07 which provides a response to requests from SRB016 and SRB017, and an update on model development for 2021.

- **REQUEST** any further analyses to be provided at SRB019, September 2021.

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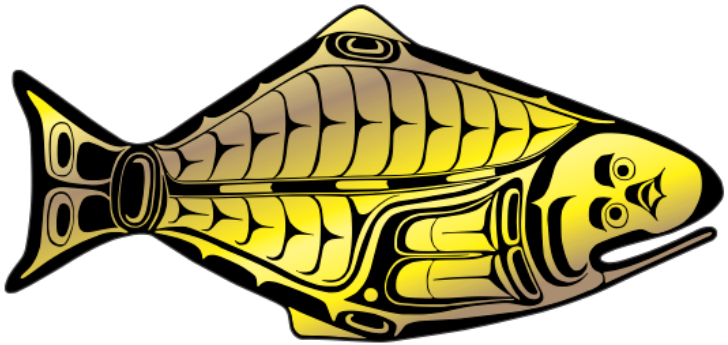

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