INTERNATIONAL PACIFIC HALIBUT COMMISSION

Updates to the IPHC MSE

Agenda item: 4.1
IPHC-2025-SRB026-08 Rev_1
(A. Hicks & I. Stewart)

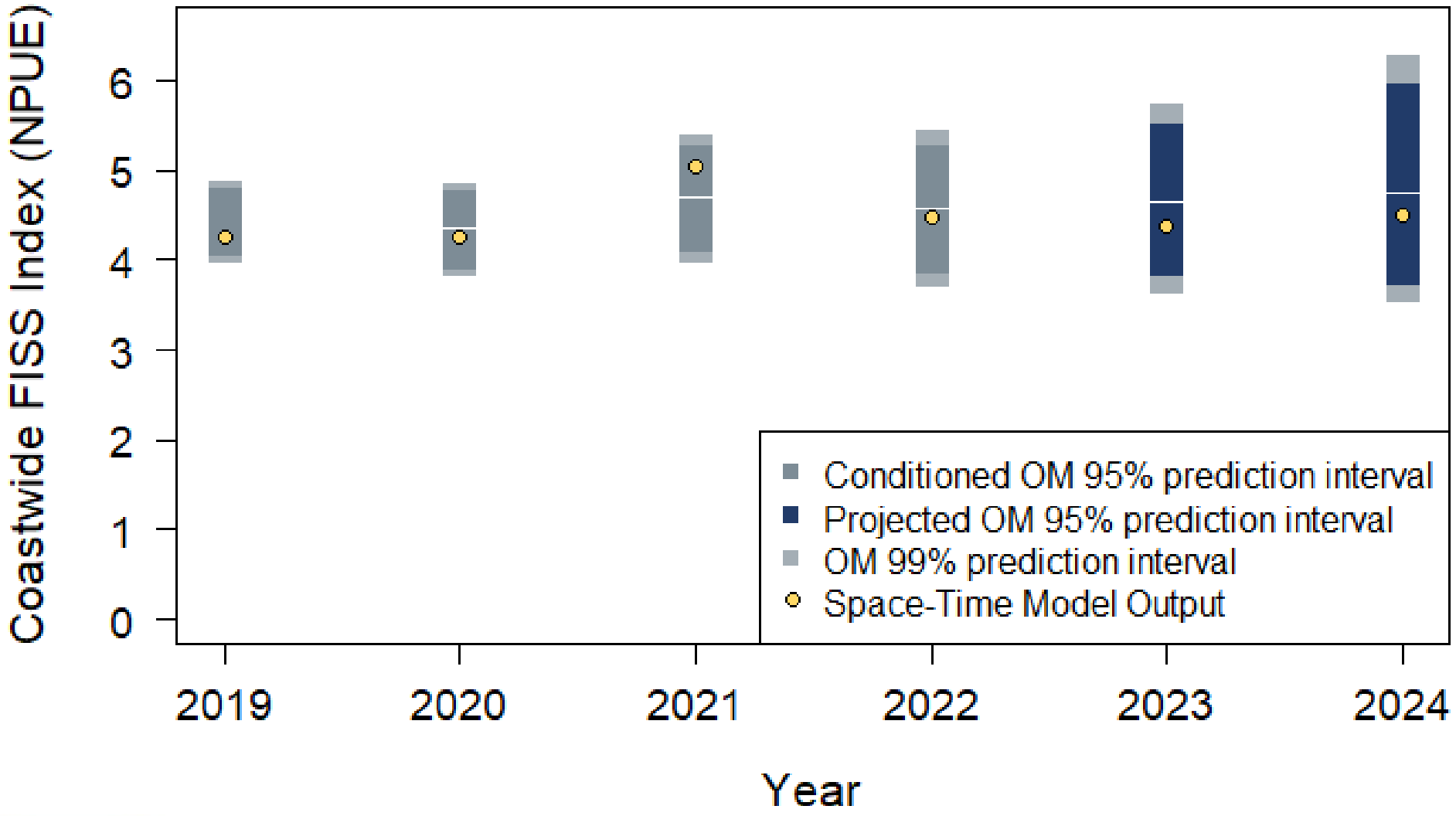
Outline

- Exceptional Circumstances
- Effects of weight-at-age and PDO regimes
- Harvest Strategy Policy updates

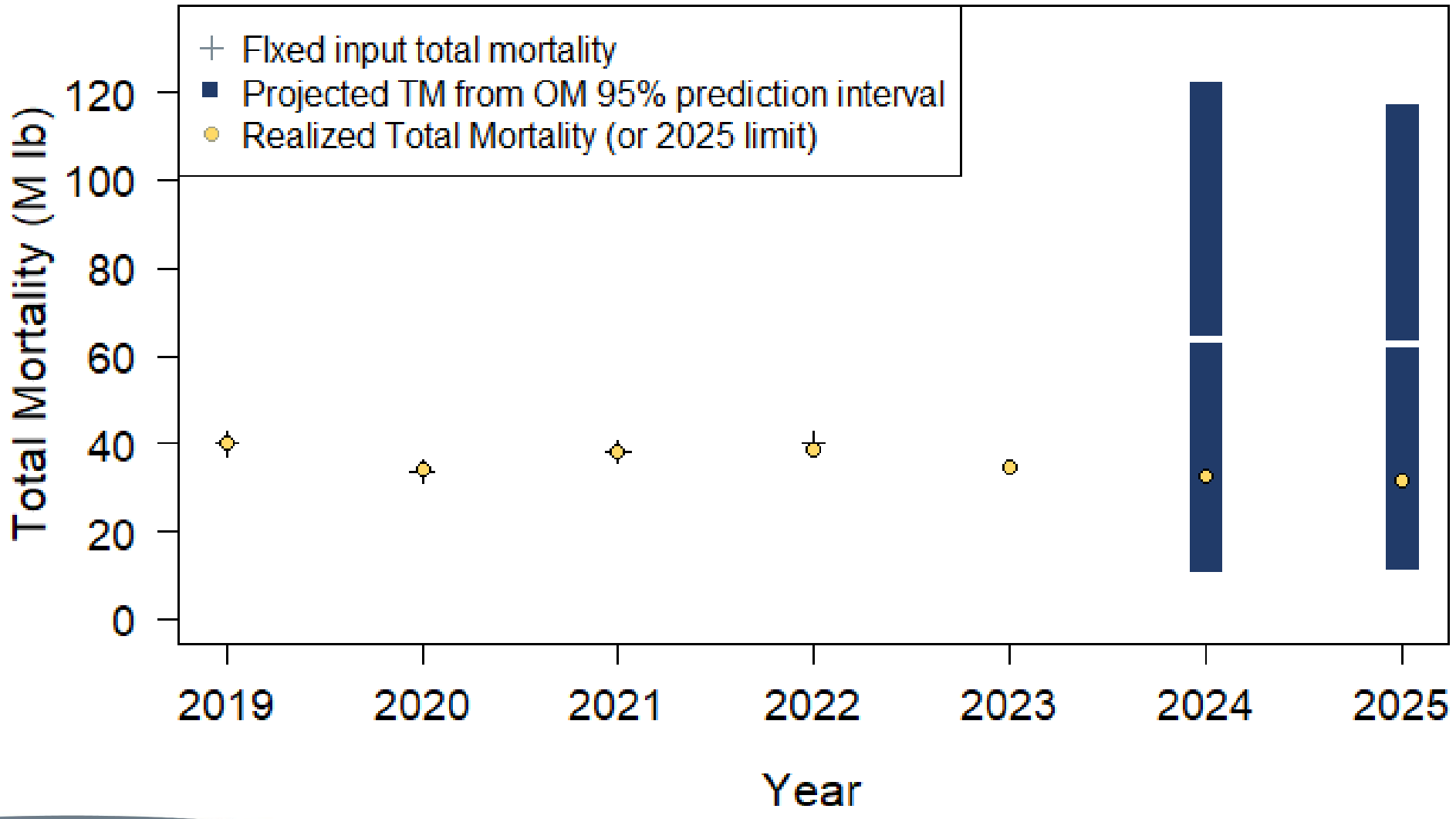
Exceptional Circumstances

- Two exceptional circumstances are considered in the draft HSP
  - The coastwide all-sizes FISS WPUE or NPUE from the space-time model is above the 97.5th percentile or below the 2.5th percentile of the simulated FISS index for two or more consecutive years.
  - The realised coastwide mortality is above the 97.5th percentile or below the 2.5th percentile of the simulated realised coastwide mortality for two or more consecutive years.
- If SRB declares an exceptional circumstance
  - Review the MSE simulations to determine if the OM can be improved and MPs should be re-evaluated.
  - Consult with the SRB and MSAB to identify why the exceptional circumstance occurred, what can be done to resolve it, and determine a set of MPs to evaluate with an updated OM.
  - Present these recommendations to the Commission for a Commission recommendation whether to update the OM and re-evaluate the reference MP and alternative MPs.
  - Further consult with the SRB and MSAB after simulations are complete to recommend a new MP to the Commission.
  - Present these results to the Commission to identify whether a new MP is appropriate and the HSP should be updated.

Coastwide FISS NPUE (SPR=43%)

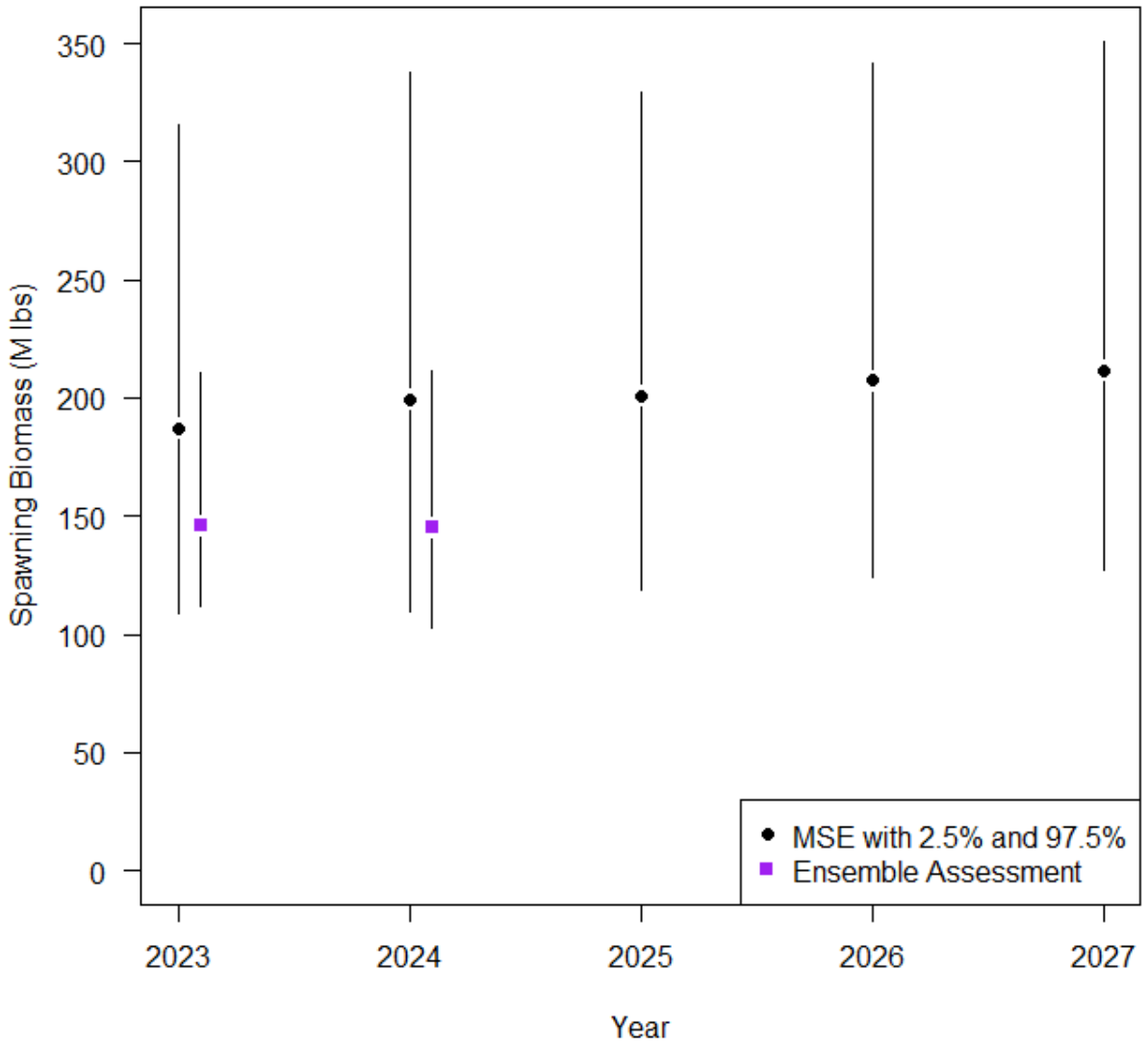


Total Mortality (SPR=43%)



Estimated Spawning Biomass (SPR=43%)

Bonus:
not a tested
exceptional
circumstance

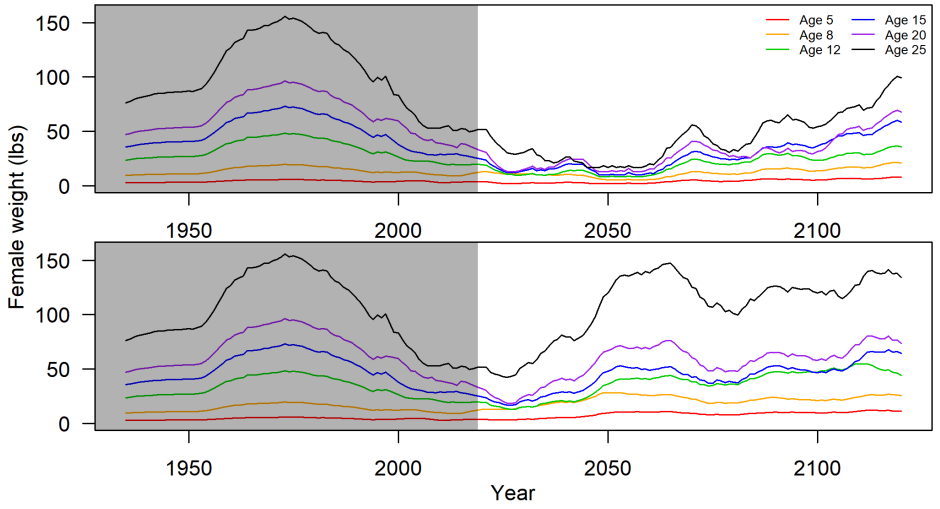


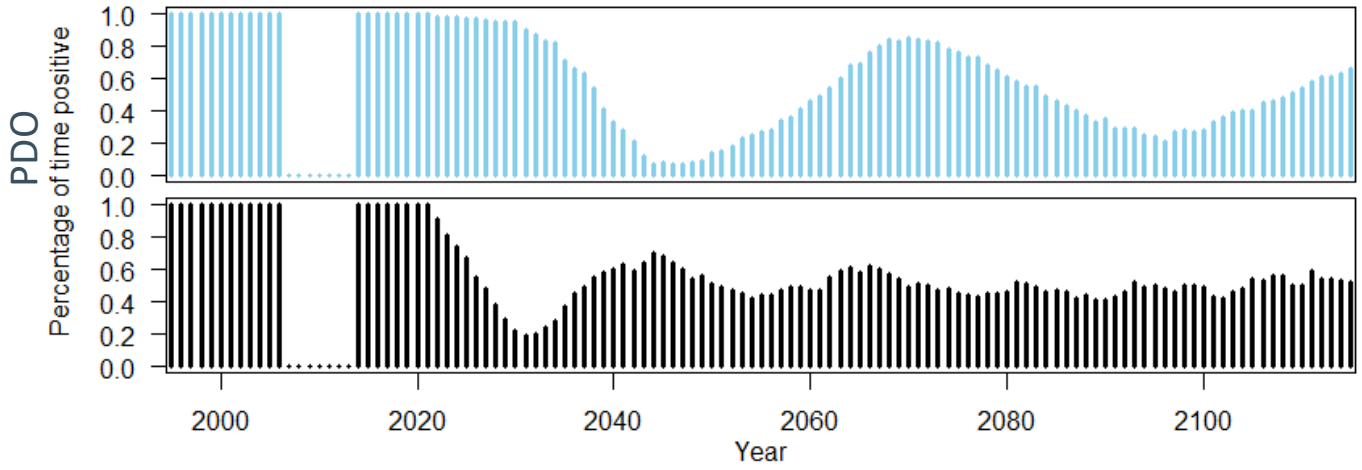
Exceptional Circumstances Summary

- Observations from both tests were within the simulated intervals
- Simulated spawning biomass above estimated spawning biomass
  - Range of simulations contained the estimated spawning biomass
  - OM was conditioned in 2023 to 2022 stock assessment inputs
  - Stock assessment has subsequently decreased estimated Spawning Biomass
- Simulations remain relevant
  - A number of recent improvements and the full stock assessment make it useful to recondition the OM in early 2026

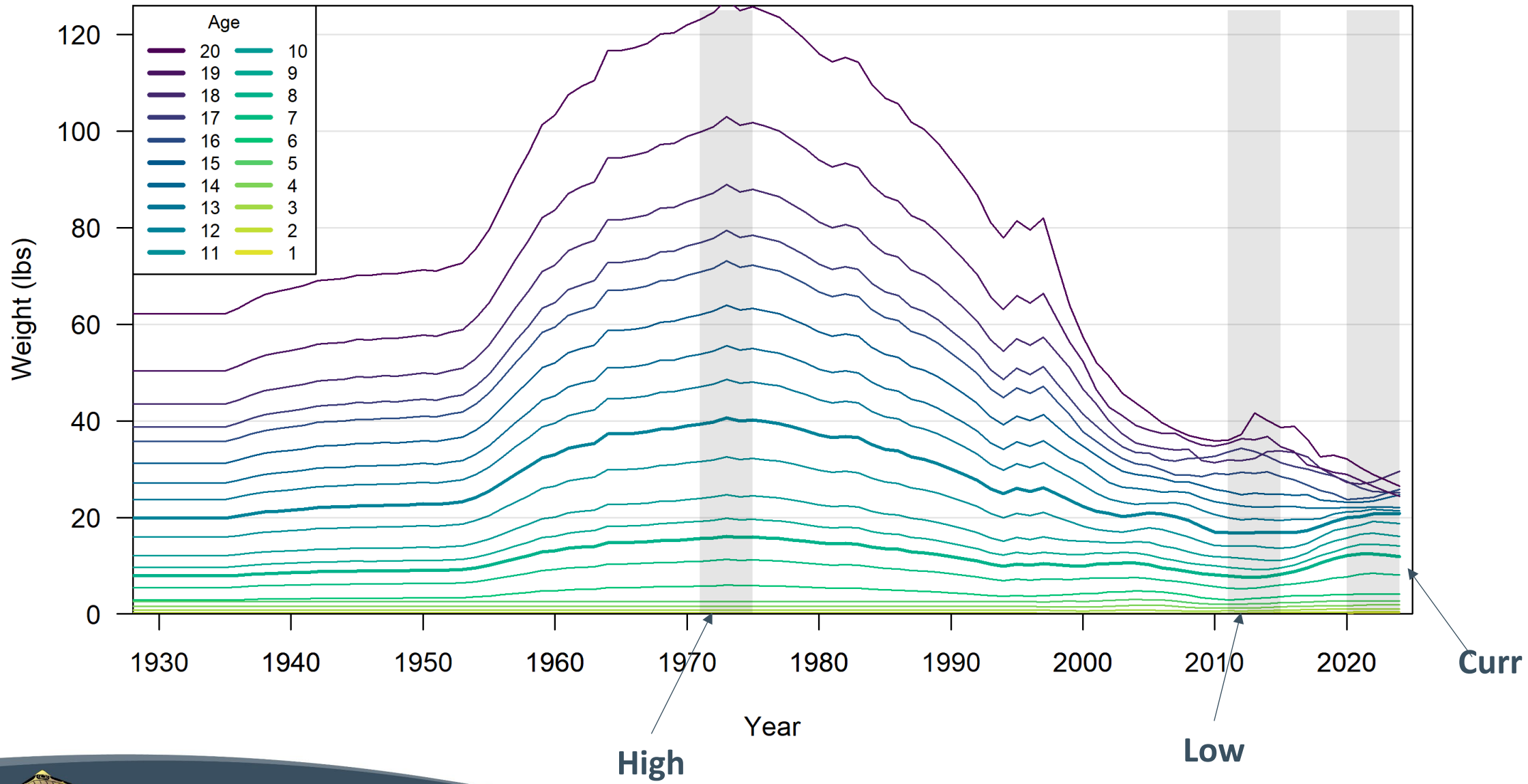
Weight-at-age and Recruitment regimes

- We cannot control the size-at-age or environmental effects
  - Modelled as variability in the OM
- However, we can investigate the effects of different **SCENARIOS**
  - Helpful to understand effects and patterns
  - Useful to understand the importance of the modelling assumptions
  - Not useful to determine the performance of an MP
    - Can be insightful to the behavior of an MP given that Scenario



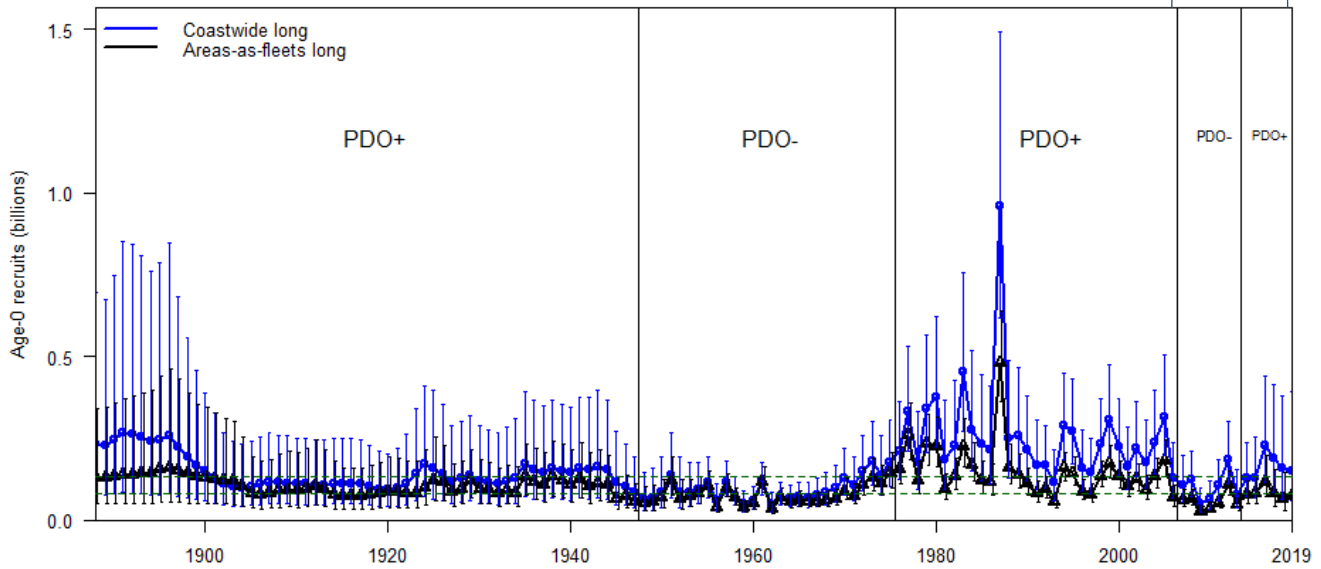


Historical weight-at-age



Pacific Decadal Oscillation

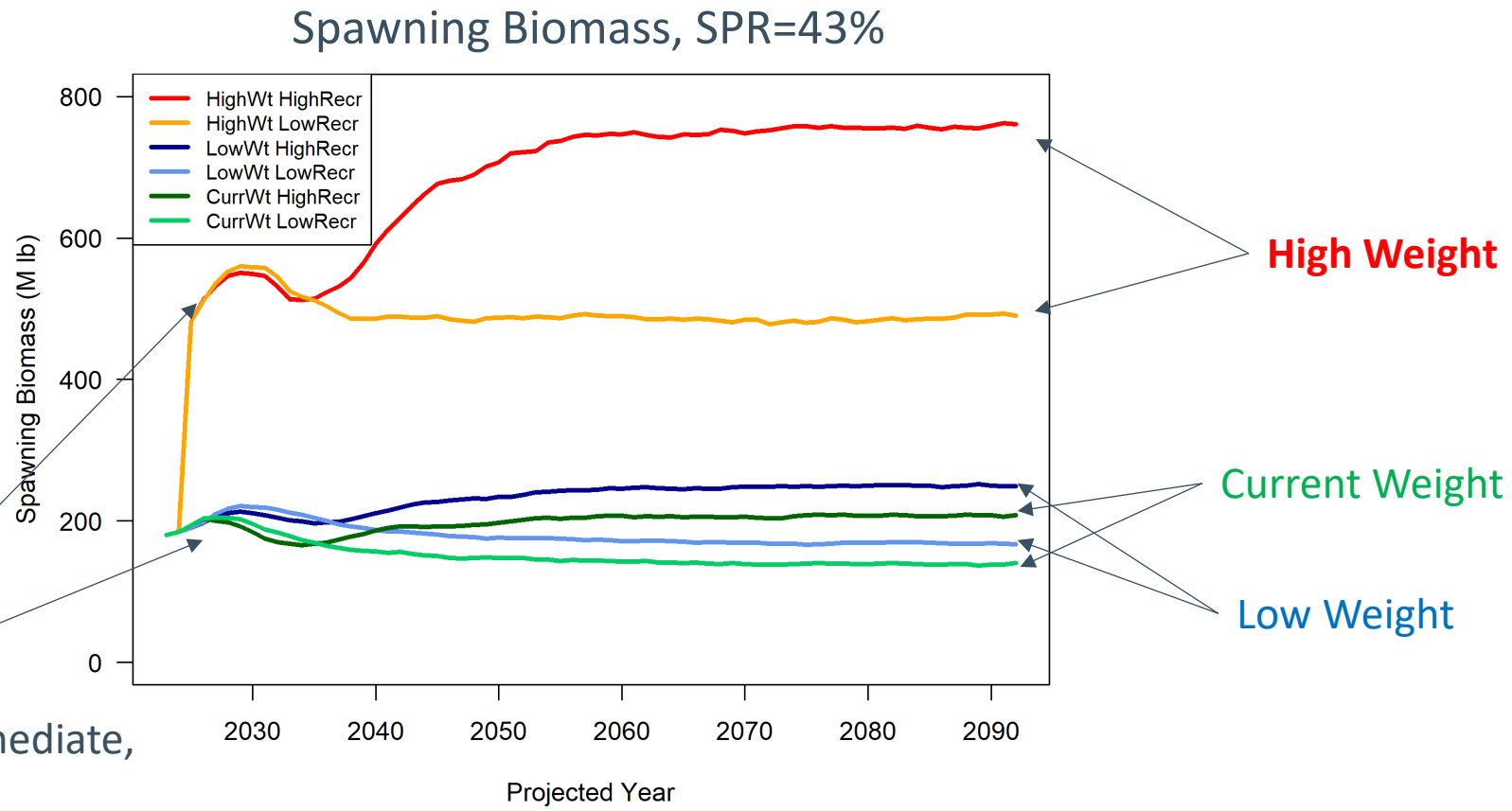
- Can fix the PDO to low or high throughout the projections
- Average recruitment is about 1.4 times greater during high PDO
- More age-0 Pacific halibut typically recruit to Region 4 during high PDO
- Fewer Pacific halibut move to Region 2 during high PDO



Updated analysis has classified recent period as negative PDO

Spawning Biomass from Simulated Regimes

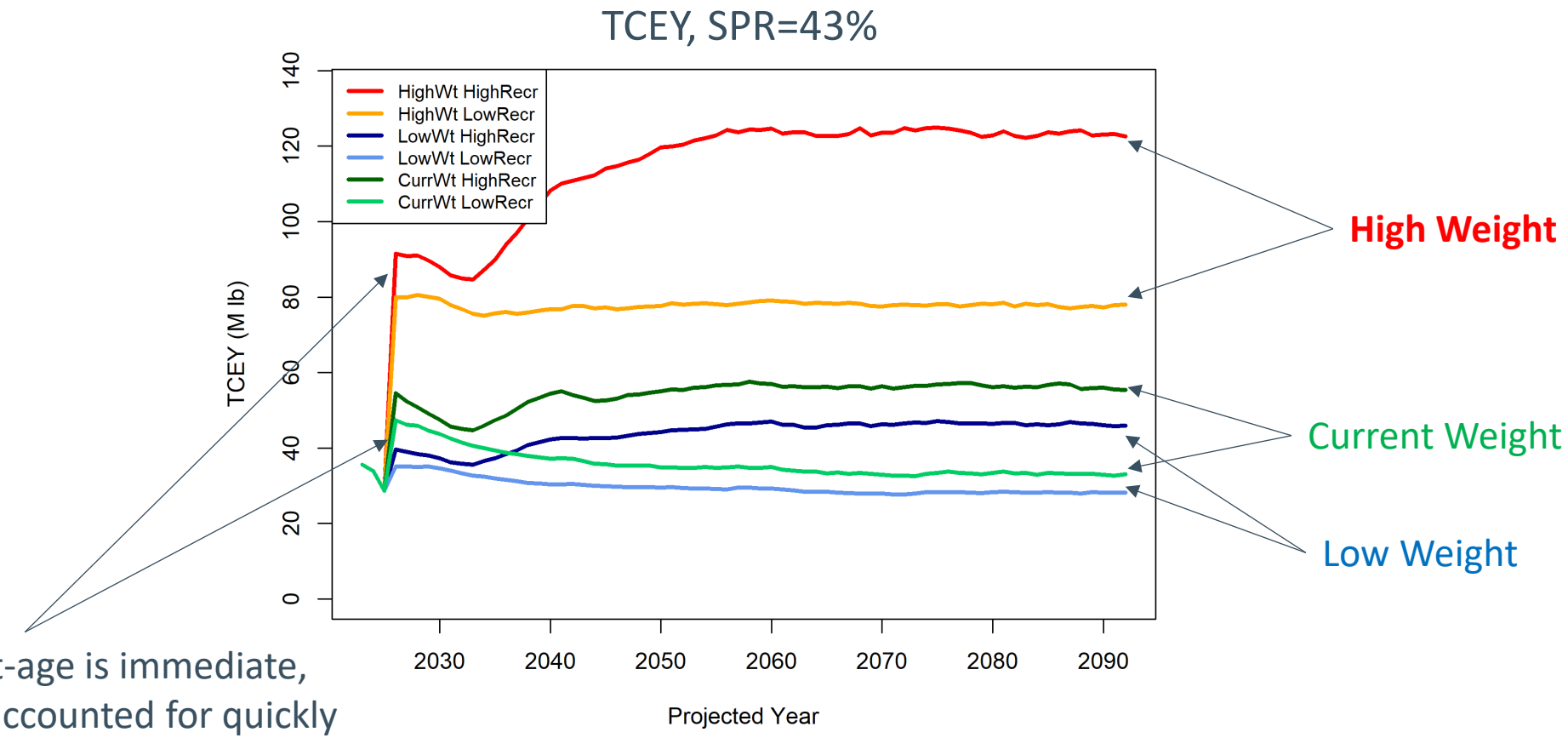
- Spawning Biomass is greatly affected by weight-at-age and recruitment
- Would not likely see these effects immediately



Effect of weight-at-age is immediate, but recruitment has a lag

TCEY from Simulated Regimes

- TCEY is greatly affected by weight-at-age and recruitment
- Slightly different order than Spawning Biomass (low and current)



Effect of weight-at-age is immediate,
And recruitment accounted for quickly

Simulated Regimes Summary

- Average recruitment and weight-at-age have a large effect on spawning biomass and TCEY
- The demographics of the weight-at-age can result in different effects on spawning biomass and TCEY
- Helpful for stakeholders to understand what cannot be controlled by management
  - Currently working with MSAB on ways to present this (e.g. partition variability)
  - MSAB is interested to see performance of MPs under certain scenarios

MSAB021–Req.04 (para. 39) The MSAB **REQUESTED** conducting simulations assuming the following productivity regimes with a subset of the MPs from paras. 36 and 37 and all other sources of variability:

a) low recruitment and low weight-at-age;
b) low recruitment and current weight-at-age;
c) high recruitment and low weight-at-age.

Harvest Strategy Policy

- Workshop with Commissioners in April 2025 to discuss draft HSP
  - Many edits were suggested
  - Hierarchical objectives were discussed
  - Present a typical schedule of annual events
- Plan to consider edits this summer and consider for adoption this fall

Priority Objectives

Long-Term Overarching Objectives Defining Acceptable MPs

1. SUSTAINABILITY

General Objective	Measurable Objective
Keep female spawning biomass above a limit to avoid critical stock sizes	Maintain the long-term coastwide female relative spawning biomass above a biomass limit reference point ($RSB_{20\%}$) at least 95% of the time

2. OPTIMISE FISHING ACTIVITIES AND OPPORTUNITIES

General Objective	Measurable Objective
Maintain spawning biomass at or above a level that supports optimal fishing activities and opportunities	Maintain the long-term coastwide female relative spawning biomass at or above a biomass threshold reference point ($RSB_{36\%}$) 50% or more of the time.

Short-Term Management Objectives Informing A Reference MP

3. OPTIMISE YIELD

General Objective	Measurable Objective
Provide directed fishing yield while limiting variability in mortality limits	Balance the trade-off between maximising the sustainable average coastwide mortality limit and minimising annual changes in the coastwide mortality limit.

Priority Objectives: MSAB recommendation

MSAB021–Rec.01 (para. 44) The MSAB **RECOMMENDED** the following wording for the objectives in the Harvest Strategy Policy:

a) maintain the long-term coastwide Pacific halibut female relative spawning biomass above a biomass limit reference point ($RSB_{20\%}$) at least 95% of the time;
b) maintain the long-term coastwide Pacific halibut female relative spawning biomass at or above a threshold reference point ($RSB_{36\%}$) at least 50% of the time;
c) subject to meeting the previous two objectives, maximise the sustainable coastwide yield while minimising annual changes in the coastwide mortality limit.

Schedule of events

Y: Task is done
x: Task may be done

Year	1	2	3	4	5	6	7	8
Example Year	2025	2026	2027	2028	2029	2030	2031	2032
FISS coastwide index	Y	Y	Y	Y	Y	Y	Y	Y
Full stock assessment	Y			Y			Y	
Update stock assessment		Y	Y		Y	Y		Y
Commission TCEY decision	Y	Y	Y	Y	Y	Y	Y	Y
MSE OM updated		Y			x			Y
MP re-evaluated		Y			x			Y
Exceptional circumstances checked	Y		Y	Y	x[1]	Y	Y	
- Consult with SRB and MSAB			x	x	x	x	x	
- Present to Commission			x	x	x	x	x	
- Re-evaluate MP due to EC			*	*	Y[2]	x*	x*	
Update HSP			x			x		

[1] The exceptional circumstance would be checked only if a new MSE OM was not updated.

[2] The MP would be re-evaluated as part of the normal three-year cycle due to an exceptional circumstance occurring in two sequential years.

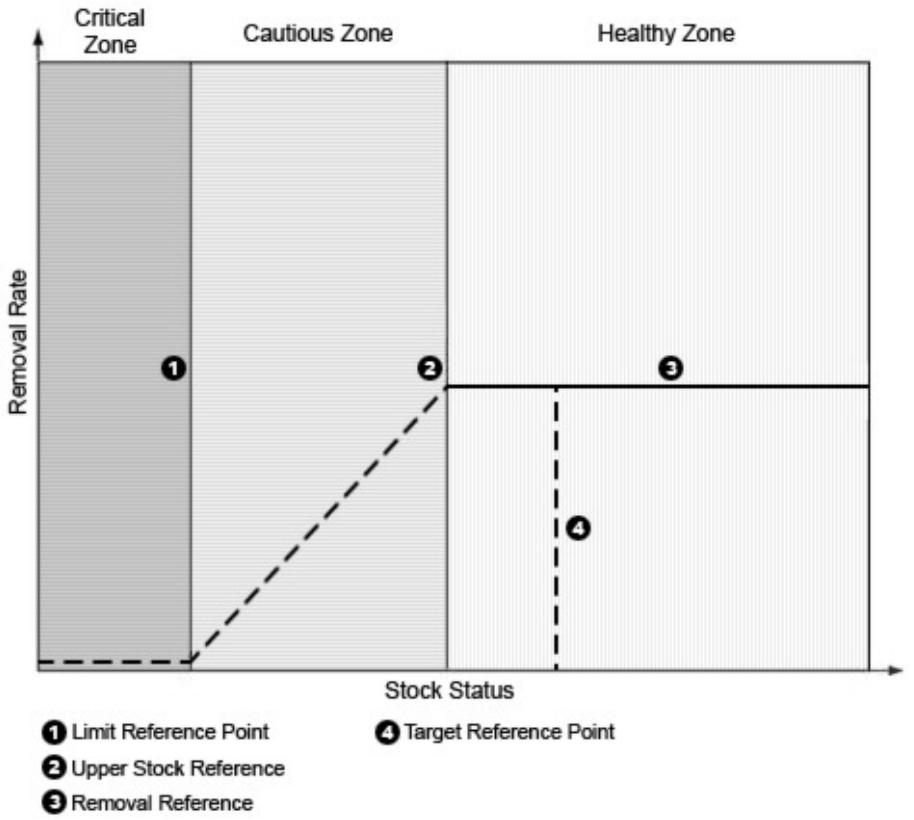
* An exceptional circumstance can be declared after two sequential instances, thus re-evaluation of an MP would have a delay, unless recommended by the Commission outside of the normal process.

Overfished & Overfishing

IPHC-2024-SRB025-R, para 32. **NOTING** that the definitions of "overfished" and "overfishing" are consistent with the use of these terms in the USA federal fishery management systems under the Magnuson-Stevens Act, but differ from the terms and IPHC–2024–SRB025–R Page 11 of 19 definitions elsewhere, the SRB **REQUESTED** a broader investigating of terms and definitions related to B and F reference points used by fishery managements organisations throughout the world.

Canada

- Fisheries Act
  - the Minister shall implement measures to maintain major fish stocks at or above the level necessary to promote the sustainability of the stock, taking into account the biology of the fish and the environmental conditions affecting the stock.
- Fishery decision-making framework
  - Stock Status
    - Critical Zone: Biomass < 40%Bmsy (LRP)
    - Cautious Zone: 40%Bmsy < Biomass < 80%Bmsy
    - Healthy: Biomass >= 80%Bmsy
  - Fishery Status
    - Removal Reference: F <= Fmsy
  - Proxies
    - Corresponding to F0.1
    - Average over productive period
    - 50% max biomass or equal to M
  - Overfished and Overfishing are not mentioned



USA

- MSFCMA
  - Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery
    - For those fisheries managed under a fishery management plan or international agreement, the status shall be determined using the criteria for overfishing specified in such plan or agreement
    - A fishery shall be classified as approaching a condition of being overfished if, [...] the Secretary estimates that the fishery will become overfished within two years

USA (NPFMC)

- Bering Sea/Aleutian Islands FMP
  - Maximum fishing mortality threshold (MFMT, also called the “OFL control rule”) is the level of fishing mortality (F), on an annual basis, used to compute the smallest annual level of catch that would constitute overfishing. Overfishing occurs whenever a stock or stock complex is subjected to a level of fishing mortality or annual total catch that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis.
  - Overfishing limit (OFL) is the annual amount of catch that results from applying the MFMT to a stock or stock complex’s abundance. The OFL is the catch level above which overfishing is occurring
  - Tier system based on uncertainty and availability of estimates
  - **Overfishing**: Catch exceeds OFL for that year
  - **Overfished**: Below MSST. MSST is 1/2MSY
    - If no estimate of Bmsy, a proxy is used (e.g. B35%)
  - **Approaching overfished**: become overfished in two years (using projections)

USA (PFMC)

- Groundfish FMP
  - Overfished describes any stock or stock complex whose size is sufficiently diminished that a change in management practices is required to achieve an appropriate level and rate of rebuilding. The default proxy is generally 25 percent of its estimated unfished biomass; however, other scientifically valid values are also authorized.
  - Overfishing means exceeding an OFL specified in regulations.
  - Overfishing limit (OFL) is the MSY harvest level or the annual abundance of exploitable biomass of a stock or stock complex multiplied by the maximum fishing mortality threshold or proxy thereof and is an estimate of the catch level above which overfishing is occurring.

New Zealand

- Harvest Strategy Standard for New Zealand Fisheries
  - **Overfished**: Stocks that are below a biomass limit, such as the soft limit, are frequently referred to as “overfished” (e.g. in the United States). However, the term “depleted” should generally be used in preference to “overfished” because stocks can become depleted through a combination of overfishing and environmental factors, and it is usually impossible to separate the two.
  - **Overfishing**: Overfishing is deemed to be occurring if FMSY (or relevant proxies) is exceeded on average.

Proposal for IPHC HSP

- Overfished (as currently specified)
  - when the estimated probability that coastwide female relative spawning stock biomass is below the limit reference point ($RSB_{20\%}$) is greater than 50%.
    - Calculated using current stock and environmental conditions
- Overfishing (added probabilities and time-frame)
  - where the stock is subject to a level of fishing that would move it to an overfished state with a greater than 50% probability, or prevent it from rebuilding to a '*not overfished*' state with a less than 70% probability, within three (3) years. The level of fishing is defined as a fixed mortality in biomass applied to all three (3) years.
    - Consistent with the decision table, and would define the overfishing level
    - If stock is large, management may want to fish down and exceed Fmsy to achieve optimal yield (flexibility for Commission)
    - A three year period with a consistent mortality ensures that one year is not excessive

Example of overfishing (2024 assessment)

Table 1. Harvest decision table for 2025-2027 mortality limits. Columns correspond to yield alternatives and rows to risk metrics. Values in the table represent the probability, in "times out of 100" (or percent chance) of a particular risk.

2025 Alternative					*Status quo -25%*	*Status quo -15%*	*Status quo -10%*	*Status quo -5%*	*Status quo*	$F_{46\%}$	3-Year Surplus	*Status quo +10%*	*Reference* $F_{43\%}$	*MEY proxy*	*MSY proxy*	
Total mortality (M lb)			0.0	21.8	28.3	31.8	33.6	35.4	37.1	37.8	39.0	40.7	41.7	46.1	55.1	
TCEY (M lb)			0.0	20.0	26.5	30.0	31.8	33.5	35.3	35.9	37.2	38.8	39.8	44.3	53.2	
2025 fishing intensity			$F_{100\%}$	$F_{63\%}$	$F_{55\%}$	$F_{51\%}$	$F_{50\%}$	$F_{48\%}$	$F_{47\%}$	$F_{46\%}$	$F_{45\%}$	$F_{44\%}$	$F_{43\%}$	$F_{40\%}$	$F_{35\%}$	
Fishing intensity interval			--	41-75%	33-69%	30-66%	28-65%	27-63%	26-62%	25-62%	25-61%	24-60%	23-59%	21-56%	17-51%	
Stock Trend (spawning biomass)	in 2026	is less than 2025	<1	5	16	26	31	37	43	45	49	54	57	70	88	a
		is 5% less than 2025	<1	<1	2	4	6	8	11	12	14	17	19	29	50	b
	in 2027	is less than 2025	<1	7	21	30	35	40	45	47	50	55	58	69	86	c
		is 5% less than 2025	<1	2	8	14	18	22	26	27	30	34	37	48	70	d
	in 2028	is less than 2025	<1	8	20	30	35	40	45	47	50	55	58	70	87	e
		is 5% less than 2025	<1	3	11	18	22	26	30	32	36	40	43	55	77	f
Stock Status (Spawning biomass)	in 2026	is less than 30%	26	26	27	27	27	27	27	27	28	28	28	28	29	g
		is less than 20%	1	5	7	8	9	10	10	11	11	12	12	14	18	h
	in 2027	is less than 30%	25	25	26	26	26	26	26	26	26	26	26	27	28	i
		is less than 20%	<1	2	4	6	7	8	9	9	10	11	12	15	20	j
	in 2028	is less than 30%	17	25	25	25	25	26	26	26	26	26	26	27	28	k
		is less than 20%	<1	1	3	5	6	7	8	9	10	11	12	16	21	l
Fishery Trend (TCEY)	in 2026	is less than 2025	0	7	24	28	31	34	38	39	42	46	49	60	80	m
		is 10% less than 2025	0	4	22	26	27	29	32	33	35	38	39	48	67	n
	in 2027	is less than 2025	0	6	23	27	30	33	37	38	41	46	48	60	81	o
		is 10% less than 2025	0	4	20	25	27	29	31	32	34	37	39	49	69	p
	in 2028	is less than 2025	0	5	21	26	29	33	37	38	41	46	49	61	82	q
		is 10% less than 2025	0	3	18	23	26	28	31	32	34	37	40	50	71	r
Fishery Status (Fishing intensity)	in 2025	is above $F_{43\%}$	0	7	25	29	32	35	39	41	44	47	50	59	78	s

3 year projection

Recommendations

That the SRB:

1) **NOTE** paper IPHC-2025-SRB026-08 which details testing for exceptional circumstances, recent work done using the management strategy evaluation framework, and progress on the Harvest Strategy Policy.

2) **REQUEST** any topics to add to the 2025-2026 MSE Program of Work.

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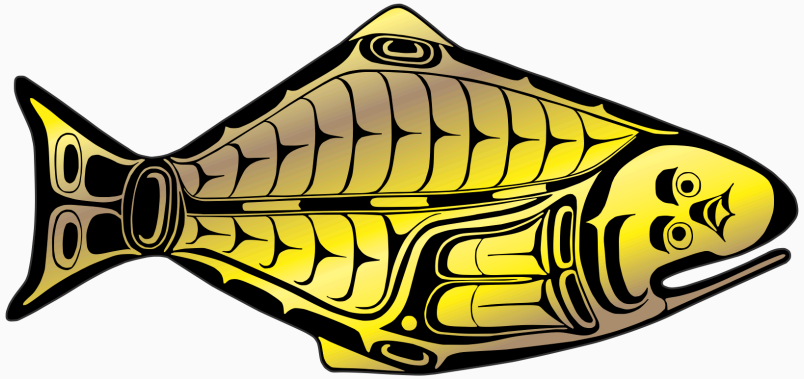

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