Stock projections and the harvest decision table for 2025-2027

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PURPOSE

To provide the Commission with short-term (3 year) stock projections and the harvest decision table for 2025-2027.

METHODS

Short-term tactical stock projections under varying levels of mortality are conducted using the results from the 2024 stock assessment (IPHC-2024-IM100-11 Rev_1). Standard projections are based on existing Catch Sharing Agreements/Plans (CSPs) for directed commercial and recreational fisheries where they exist, as well as summaries of the 2024 and earlier directed and non-directed fisheries.

Specifically, the projected mortality levels are based on the three-year running average non-directed discard mortality[1] through the most recent year (2024), per the decision made during AM096 para. 97). Subsistence harvest is assumed to be constant at the most recent year's estimates. The discard mortality for the directed commercial fisheries is assumed to occur at the same rate observed in the most recent year, and to scale up or down with the projected landings.

The harvest decision table provides a comparison of the relative risk (in times out of 100), using stock and fishery metrics (rows), against a range of coastwide alternative harvest levels for 2025 (columns). The block of rows entitled "Stock Trend" provides for evaluation of the risks to short-term trend in spawning biomass, independent of all harvest policy calculations. The remaining rows portray risks relative to the spawning biomass reference points ("Stock Status") and fishery performance relative to the approach identified in the interim management procedure. The alternatives (columns) include several levels of mortality intended for evaluation of stock and management procedure dynamics including:

- No fishing mortality (useful to evaluate the stock trend due solely to population processes)

- The mortality consistent with repeating the coastwide TCEY set for 2024 (the *status quo*)

- Bracketing alternatives 5 and 10% above and below the *status quo*

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[1] The North Pacific Fishery Management Council adopted a new method for setting the Prohibited Species Catch (PSC) limit for Pacific halibut mortality in the Amendment 80 (A80) trawl sector in 2024. This approach adjusts PSC limits based on the NOAA Fisheries Eastern Bering Sea trawl survey and the modelled FISS index of abundance for IPHC Regulatory Areas 4A, 4B, and 4CDE. This new approach resulted in a 20% reduction to the A80 sector's PSC limit in 2024 and an additional 5% reduction for 2025. However, the actual halibut mortality has been far below the aggregate PSC limit for all sectors in the Bering Sea and Aleutian Islands (52% in 2024). Therefore, it is unclear whether any future adjustments to the 3-year running average approach might be warranted, as actual mortality could still go up or down from the three year-average under current conditions. Recent actual non-directed discard mortality estimates in both IPHC Regulatory Areas 2A and 2B and in the Gulf of Alaska are similarly far below full regulatory limits (29% in 2024).

- The mortality at which there is less than or equal to a 50% chance that the spawning biomass will be smaller in 2028 than in 2025 ("*3-year surplus*")

- The mortality consistent with the current "Reference" SPR ($F_{43\%}$) level of fishing intensity

- The mortality consistent with the Maximum Economic Yield (*MEY*) proxy SPR ($F_{40\%}$) level of fishing intensity

- The mortality consistent with the Maximum Sustainable Yield (*MSY*) proxy SPR ($F_{35\%}$) level of fishing intensity

- Other levels of mortality spaced between the above alternatives to provide for continuous evaluation of the change in risk across alternative yields

For each column of the decision table, the projected total fishing mortality (including all sizes and sources), the coastwide TCEY and the associated level of estimated fishing intensity projected for 2025 (median value with the 95% credible interval below) are reported.

RESULTS

Spawning biomass estimates in 2024 from the 2024 stock assessment are lower (17%) than those in last year's stock assessment, but the recent estimated trend is nearly flat. Updated estimates of the 2012 and 2016 year-classes (both larger than all those occurring from 2006-2011) show that these two year-classes will be highly important in the short-term stock projections as both will be maturing over the next several years. However, these two year-classes are insufficient to support short-term fishing mortality appreciably higher than the *status quo* without a decrease in spawning biomass. Risks are similar over the three-year projection period as both year-classes continue to mature.

Projections indicate that the spawning biomass would increase in the absence of any fishing mortality, with risks of stock decline over one and three years both less than 1/100 (Table 1, Figure 1). At the *status quo* coastwide TCEY (35.28 million pounds; Table 2), risks of stock decrease over one and three years are 41/100 and 44/100. For all harvest levels that exceed the three-year surplus (37.4 million pounds) risks of stock decline are larger than 50/100, and reaching 87/100 for the coastwide TCEY that is projected to correspond to the $F_{35\%}$ *MSY* proxy harvest level in 2025. Alternative harvest levels around the *status quo* (+/- 5 and 10%) are projected to result in levels of fishing intensity ranging from $F_{50\%}$ to $F_{44\%}$, similar to those estimated in recent years. At the reference level of fishing mortality ($F_{43\%}$) the 2025 coastwide TCEY is projected to be 39.8 million pounds (41.7 million pounds of mortality including U26 non-directed discard mortality). Stock decline over the next three years is projected to be likely (56/100 to 57/100) at this level of fishing intensity. The probability of a reduction in the coastwide TCEY in order to maintain a fishing intensity no greater than $F_{43\%}$ over the next three years is projected to be 49/100.

All projections result in a probability of the relative spawning biomass dropping below the $SB_{30\%}$ threshold over the next three years of 18-28/100. The probability of dropping below the $SB_{20\%}$ limit is estimated to be <1-22%.

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 -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	33.6	35.4	37.1	37.8	39.2	40.7	41.7	46.1	55.1	
TCEY (M lb)			0.0	20.0	31.8	33.5	35.3	35.9	37.4	38.8	39.8	44.3	53.2	
2025 fishing intensity			$F_{100\%}$	$F_{63\%}$	$F_{50\%}$	$F_{48\%}$	$F_{46\%}$	$F_{46\%}$	$F_{45\%}$	$F_{44\%}$	$F_{43\%}$	$F_{40\%}$	$F_{35\%}$	
Fishing intensity interval			--	41-75%	28-65%	27-63%	26-62%	25-61%	24-60%	23-59%	23-59%	21-56%	17-51%	
Stock Trend (spawning biomass)	in 2026	is less than 2025	<1	4	30	36	41	43	48	53	56	69	87	a
		is 5% less than 2025	<1	<1	5	7	10	11	14	16	18	28	49	b
	in 2027	is less than 2025	<1	7	34	39	44	46	50	54	57	68	86	c
		is 5% less than 2025	<1	2	17	21	25	26	30	33	36	47	69	d
	in 2028	is less than 2025	<1	7	33	38	44	45	50	54	57	69	86	e
		is 5% less than 2025	<1	3	21	25	29	31	35	39	42	54	76	f
Stock Status (Spawning biomass)	in 2026	is less than 30%	26	27	27	28	28	28	28	28	28	28	29	g
		is less than 20%	2	6	10	11	12	12	13	14	14	16	19	h
	in 2027	is less than 30%	25	25	26	26	26	26	26	27	27	27	28	i
		is less than 20%	<1	2	8	9	10	10	11	12	13	16	21	j
	in 2028	is less than 30%	18	25	26	26	26	26	26	26	26	27	28	k
		is less than 20%	<1	1	7	8	9	10	11	12	13	16	22	l
Fishery Trend (TCEY)	in 2026	is less than 2025	0	7	31	34	38	40	43	47	49	60	81	m
		is 10% less than 2025	0	7	31	34	38	39	43	47	49	60	80	n
	in 2027	is less than 2025	0	6	30	33	37	39	42	46	49	61	82	o
		is 10% less than 2025	0	6	30	33	37	38	42	46	48	60	81	p
	in 2028	is less than 2025	0	6	29	33	37	38	42	46	49	61	82	q
		is 10% less than 2025	0	5	29	33	37	38	42	46	49	61	82	r
Fishery Status (Fishing intensity)	in 2025	is above $F_{43\%}$	0	8	32	36	40	41	44	48	50	60	79	s
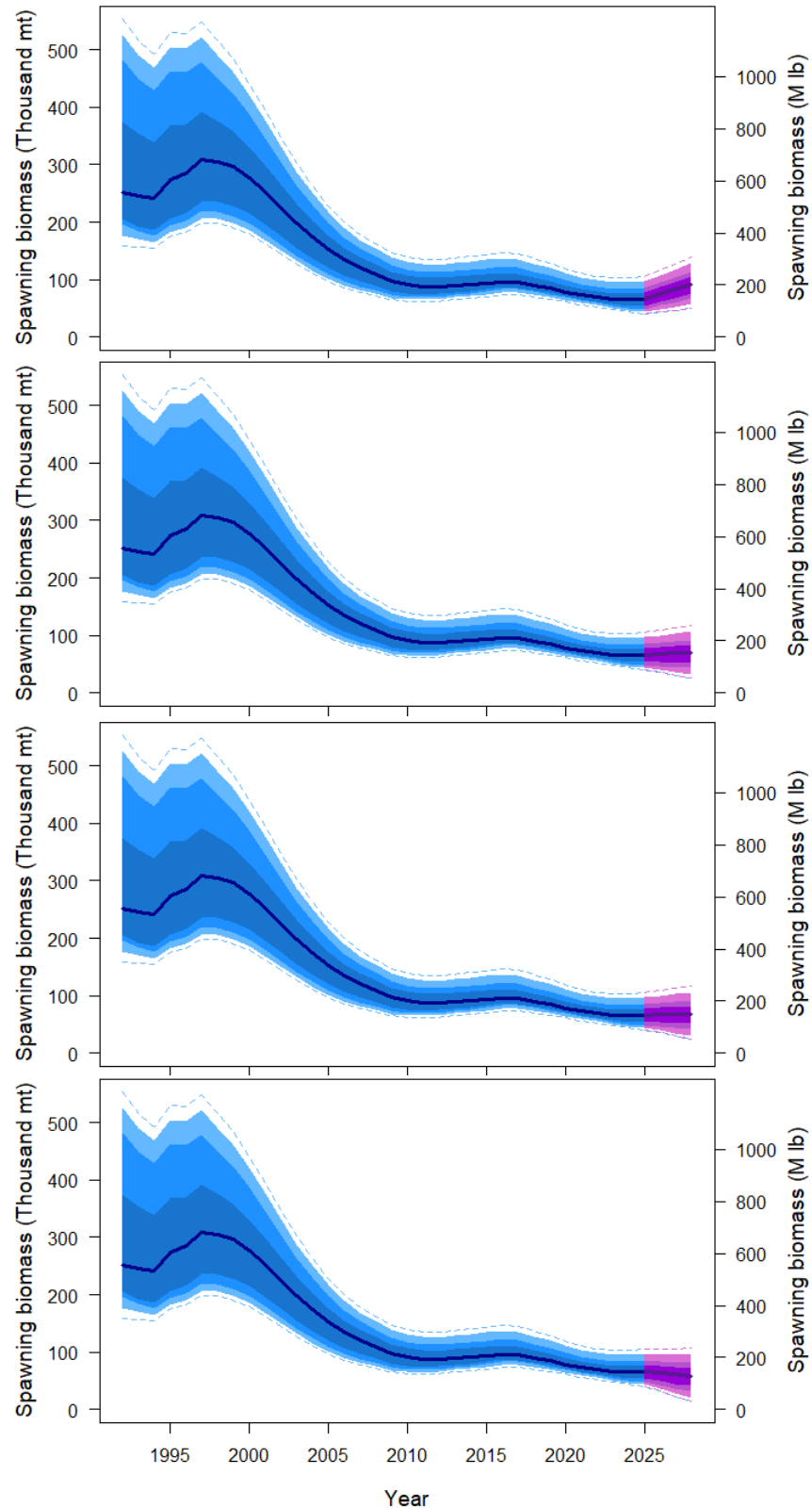
Figure 1. Three-year projections of stock trend under alternative levels of mortality: no fishing mortality (upper panel), the *status quo* coastwide TCEY set in 2024 (35.28 million pounds; second panel), the 3-year surplus (37.4 million pounds; third panel), and the TCEY projected for the $F_{43\%}$ reference level of fishing intensity (39.8 million pounds, fourth panel) and the TCEY projected for the $F_{35\%}$ MSY proxy level of fishing intensity (53.2 million pounds, bottom panel).

Table 2. Recent adopted TCEYs by IPHC Regulatory Area and coastwide (M lbs net).

Year	2A	2B	2C	3A	3B	4A	4B	4CDE	Total
2013	1.11	7.78	5.02	17.07	5.87	2.43	1.93	4.28	45.48
2014	1.11	7.64	5.47	12.05	3.73	1.56	1.49	3.58	36.65
2015	1.06	7.91	6.20	13.00	3.72	1.96	1.53	4.27	39.63
2016	1.26	8.24	6.54	12.75	3.41	1.95	1.37	4.07	39.59
2017	1.47	8.32	7.04	12.96	3.98	1.80	1.34	3.84	40.74
2018	1.32	7.10	6.34	12.54	3.27	1.74	1.28	3.62	37.21
2019	1.65	6.83	6.34	13.50	2.90	1.94	1.45	4.00	38.61
2020	1.65	6.83	5.85	12.20	3.12	1.75	1.31	3.90	36.60
2021	1.65	7.00	5.80	14.00	3.12	2.05	1.40	3.98	39.00
2022	1.65	7.56	5.91	14.55	3.90	2.10	1.45	4.10	41.22
2023	1.65	6.78	5.85	12.08	3.67	1.73	1.36	3.85	36.97
2024	1.65	6.47	5.79	11.36	3.45	1.61	1.25	3.70	35.28

RISKS NOT INCLUDED IN THE HARVEST DECISION TABLE

The IPHC's current management procedure uses threshold and limit reference points in relative spawning biomass (current estimate compared to the spawning biomass estimated to have occurred in that year in the absence of any fishing mortality). This calculation measures the effects of fishing on the stock. Other factors affecting the spawning biomass (i.e., trends in recruitment and weight-at-age) have resulted in the absolute spawning biomass in 2022-2024 estimated to be lower than at any time in the last 34 years. Although this does not represent a conservation concern at this time, low stock size results in additional risks to the IPHC's Fishery Independent Setline Survey (FISS) design objective of revenue neutrality and to fishery efficiency and economic viability. Further, the modelled FISS index in 2024 extends the 20-year trend in the stock distribution shifting from Biological Region 3 toward Biological Region 2. Finally, increased environmental/climate-related variability in the marine ecosystems comprising the Pacific halibut species range in Convention waters lead to little expectation that historical productivity patterns may be relevant for future planning. Specifically, it is unclear whether long-term productivity levels are likely to occur under continued climate change, or whether increases or decreases may be likely for critical life-history stages of Pacific halibut. Recent poor recruitment (2006+) seems to suggest that the stock is in a state of low productivity with no indication of when this prevailing condition may change. Finally, the extremely important role of the directed commercial fishery data in informing reductions in the estimated scale of recent biomass in the stock assessment is a new phenomenon observed only in the last two stock assessments. To the degree that the FISS designs have been limited in those years there is an ongoing uncertainty about why these two time-series are providing different or lagged signals.

An alternative projection was conducted, using 2024 commercial fishery catch rates corrected for the magnitude of changes observed in the 2023 data after additional logs had been collected through 2024. This projection used the status quo mortality for 2025 and resulted in an estimated SPR of 45%, compared to the value of 46% using preliminary commercial fishery data available through October 2024. Based on this result, if commercial data updates in 2025 are similar to those in recent years, it seems likely that the 2025 stock assessment may estimate a higher fishing intensity for a given management alternative than is reflected in the current decision table.

ADDITIONAL INFORMATION

Estimate of non-directed discard mortality based on end-of-year information for 2024 will be available in early Janaury 2025. At that time, detailed mortality projection tables (reporting allocations to specific fishing sectors within individual IPHC Regulatory Areas) will be available on request and the mortality proejction tool will be updated for 2025.

Detailed stock assessment (IPHC-2025-SA-01) and data overview (IPHC-2025-SA-02) documents will be published directly to the stock assessment page on the IPHC's website.

RECOMMENDATION/S

That the Commission:

a) **NOTE** paper IPHC-2024-IM100-13 Rev_1, which provides a summary of projections and the harvest decision table for 2025-2027.
b) **REQUEST** any additional harvest decision table alternatives for evaluation at AM101.
c) **REQUEST** any detailed mortality projections[2] for 2025 (by IPHC Regulatory Area and fishery sector) for evaluation at AM101.

REFERENCES

IPHC. 2020. Report of the 96th Session of the IPHC Annual Meeting (AM096). Anchorage, Alaska, USA, 3-7 February 2020. IPHC-2020-AM096-R. 51 p.

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[2] Detailed projections will include revised non-directed discard estimates through the end of 2024, available in early January 2025.