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Canadian Science Advisory Secretariat
Pacific Region | Science Response 2026/031

APPLICATION OF THE OUTSIDE YELLOWEYE ROCKFISH (*SEBASTES RUBERRIMUS*) MANAGEMENT PROCEDURE TO PROVIDE HARVEST ADVICE FOR 2027/28 AND 2028/29

CONTEXT

The Groundfish Management Unit of Fisheries and Oceans Canada (DFO) requested updated harvest advice for Outside Yelloweye Rockfish (*Sebastes ruberrimus;* OYE) in British Columbia as part of the Outside Yelloweye management strategy evaluation (MSE) process. Under the MSE framework, harvest advice is provided every two years to DFO Fisheries Management using a simulation-tested Management Procedure (MP). The MP is not used to evaluate stock status; it serves only as a means of calculating a recommended catch limit based on updated monitoring data.

The current OYE MP, labelled “HBLL 3 Year”, was selected by DFO Groundfish Fisheries Management in May 2023 based on advice provided in DFO (2023), and was applied for the first time for the 2023/24 fishing year. This Science Response Report updates the harvest advice from that MP; it does not re-evaluate the MP or the operating models.

This Science Response Report results from the regional peer review of July 27, 2026 on the Application of the Outside Yelloweye Rockfish Management Procedure to Provide Harvest Advice for 2027/28-2028/29 Seasons.

SCIENCE ADVICE

Status

- OYE was in the Healthy Zone of the Precautionary Approach (PA) Framework at the beginning of 2024. The probability that spawning biomass at the beginning of 2024 was greater than the Limit Reference Point (LRP: 0.4 B_{MSY}) and the Upper Stock Reference (USR: 0.8 B_{MSY}) was >99% and 96%, respectively.
- Stock status at the beginning of 2024 (B2024/BMSY) was estimated to be 1.48 (0.75 – 2.54, 95% Credible Interval), and outside coastwide spawning biomass (B) was estimated to be 9,900 tonnes (5,200 – 18,300, 95% Credible Interval).
- Status is characterized relative to fisheries reference points based on Maximum Sustainable Yield (MSY).
- The most recent status advice was provided in 2026, at which time stock status was estimated for the beginning of 2024 (DFO 2026; Doherty et al. in prep[1]), when the OYE

[1] Doherty, B.D., Wang, S., Johnson, S.D.N., Cox, S.P., Siegle, M., Tai, T., and English, P. In prep. Operating Model and Stock Status Update for Outside Yelloweye Rockfish (*Sebastes ruberrimus*) in British Columbia. DFO Can. Sci. Advis. Sec. Res. Doc.

operating models were updated as part of the planned MSE cycle. Stock status is not updated in this Science Response.

Trends

- **Spawning biomass, recruitment, and fishing mortality:** these trajectories are not updated in this Science Response and were last estimated in the 2026 operating model review (DFO 2026; Doherty et al. in prep[1]). In brief, coastwide spawning biomass was broadly stable and near unfished levels through the mid-1980s, then declined rapidly through the late 1980s and 1990s under fishing mortality well above the current Removal Reference (F_{MSY} of 0.041 yr-1). Following reductions in fishing mortality in the 2000s, coastwide spawning biomass stabilized near its current level, with only limited increases under moderate recruitment. Spawning biomass did not fall below the USR at any point.
- **HBLL survey index (an MP input, updated through 2025):** the Northern 5BCDE index rose to 5.93 Yelloweye per 100 hooks in 2025, the highest value in the 2006–2025 series and a continued increase from 5.22 in 2023. The Southern 5A3CD index has risen over the last three surveys, from 3.77 Yelloweye per 100 hooks in 2022 to 4.59 in 2024.
- **HBLL 3 Year moving-average biomass estimate (the harvest control rule input):** the updated survey indices give 6.6 kt in the Northern subunit and 4.32 kt in the Southern subunit. Both subunits are above the upper control point of the harvest control rule, so the MP applies the full removal reference rate in both.

Ecosystem and Climate Change Considerations

- Ecosystem and climate change considerations were evaluated in the most recent operating model review and status update in 2026 (DFO 2026; Doherty et al. in prep[1]) and are not updated during annual MP application.
- Mechanisms by which environmental conditions affect OYE productivity are not well understood. Results from the 2026 investigation of environmental variables showed that none were strongly correlated to recruitment. As a result, no variables are currently recommended for tracking as part of annual MP application.

Stock Advice

- Application of the OYE MP to HBLL survey data updated through 2025 sets a 2-year constant coastwide catch limit of 372 tonnes for the 2027/28 and 2028/29 fishing years: 221 tonnes for the Northern subunit and 152 tonnes for the Southern subunit. For both subunits the MP biomass estimate is above the upper control point of 80% of B^*_{MSY} (spawning biomass at MSY, averaged over the suite of OMs) of the harvest control rule, so the target removal rate is applied. These catch limits meet the management objective of a coastwide TAC above 200 tonnes (above 125 tonnes in the North and 75 tonnes in the South).

Other Management Questions

- The ensemble of OMs is used to update the probability of decline over three generations for coastwide OYE spawning biomass, and provide metrics relevant to the COSEWIC A Criterion (COSEWIC 2021, Table 2). Under the weighted average operating model, coastwide spawning biomass in 2024 (B_{2024}) had a 6%, 71%, and 99% probability of having declined by at least 70%, 50%, and 30% relative to the estimated unfished level (B_0), respectively. The decline is measured against the weighted average unfished equilibrium B_0

(which is assumed in either 1918 or 1960, depending on OM) rather than over a full three-generation window (Doherty et al. in prep[1], Appendix H), which would be 117 years and longer than the historical period in any of the operating models.

- No exceptional circumstances were triggered. Observed HBLL survey indices since MP adoption remain within the simulation envelopes projected by the operating model ensemble, and realized catch has been below the simulated catch, i.e., in the conservative direction.

BASIS FOR ASSESSMENT

Assessment Details

The assessment of stock status for OYE is based on an ensemble of four operating models (OMs) that represent a range of key uncertainties: model start date, commercial catch, and natural mortality. The OMs support an MSE process in which simulation modelling is used to inform selection of an MP based on relative performance against OYE stock and fishery objectives. The selected MP is applied to annual monitoring data to update harvest advice until the next OM update. This Science Response Report is restricted to the MP application component of the OYE MSE process. The ensemble of OMs and their estimates of stock status were reviewed at a separate CSAS Regional Peer-Review meeting, February 11-12, 2026.

Year Assessment Approach was Approved

Advice on the application of an MSE framework for OYE was first approved in 2020 (Cox et al. 2020), the current MP in use was reviewed in 2023 (DFO 2023), and the OMs were most recently reviewed and approved in 2026 (DFO 2026; Doherty et al. in prep[1]).

Current Assessment Type

Management Procedure Application

Most Recent Assessment Date

Last full assessment: February 2026 (DFO 2026; Doherty et al. in prep[1]).

Stock Assessment Approach

1. Broad category: Full MSE
2. Specific category: Multi-fleet statistical catch-at-age operating model

Ecosystem and Climate Change Assessment Approach

Detailed information on ecosystem and climate change considerations was provided by Doherty et al. (in prep[1]). Environmental variables that could potentially affect OYE population dynamics showed no, or only weak, correlations with recruitment deviations.

Operating Model Scenarios

In 2023, MP performance was assessed using a weighted average of four OM scenarios (base case OM is weighted 50%, and the other three OMs weighted 16.7% each) representing key uncertainties: model start date (1918 vs. 1960), high or low commercial catch, and alternative natural mortality parameter values (Cox et al. 2020). All OM scenarios used an age-structured statistical catch-at-age model fit to fishery-specific landed catch from two gear types (longline hook, and trawl), as well as at-sea releases from each gear type, three survey indices of abundance, and age and length composition data.

Stock Structure Assumption

OYE represents a single genetic population. It is assessed as a single coastwide stock (excluding Groundfish Management Area 4B, Figure 1), however, is treated as a separate northern and southern subunits for management purposes. Different exploitation histories as well as different abundances support this delineation. (Yelloweye Rockfish in GMA 4B are managed as a separate stock.)

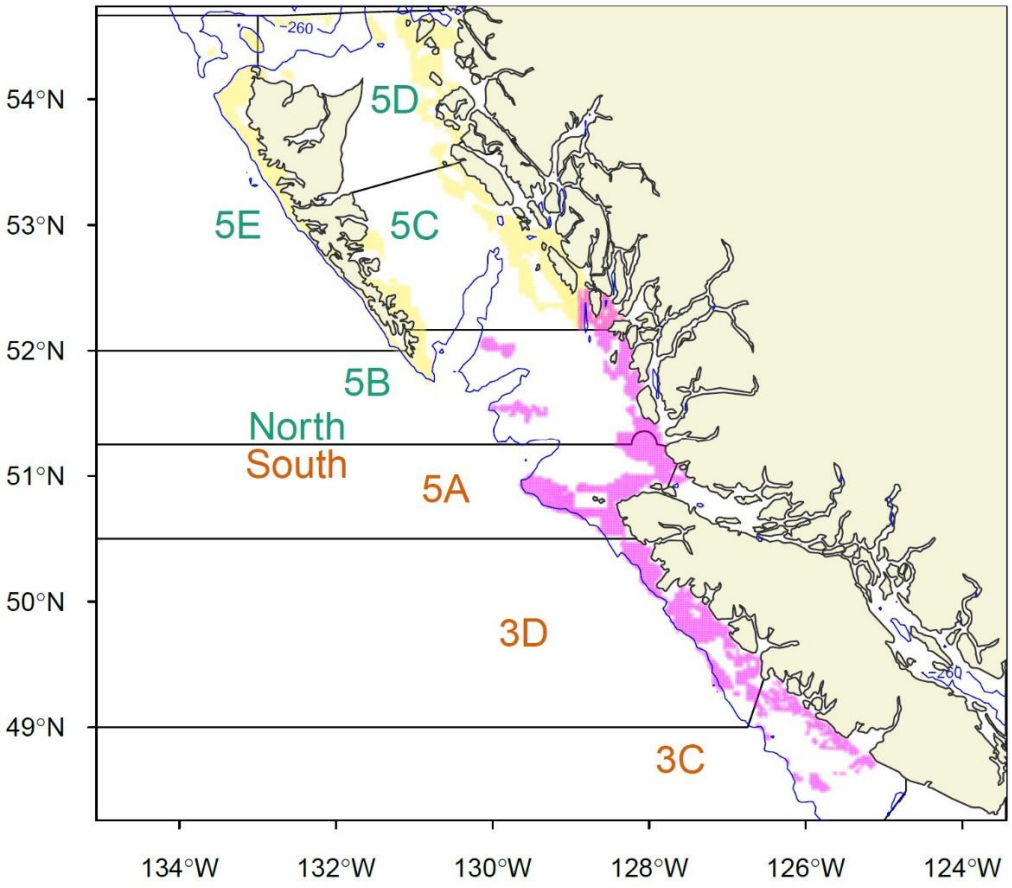


Figure 1. BC groundfish major management areas used to bound the North Outside Yelloweye Stock in areas 5BCDE (green) and the South Outside Yelloweye Stock in areas 3CD5A (orange). The HBLL northern survey grid (yellow) and southern survey grid (pink) are shown along with 260 m contour lines at the deep end of the depth range for Yelloweye habitats.

Reference Points

Reference points based on Maximum Sustainable Yield (MSY) were last estimated in 2026 via a weighted composite, or 'ensemble', of four operating model scenarios (Doherty et al. in prep[1]):

- Limit Reference Point (LRP): 0.4 B_{MSY}
- Upper Stock Reference (USR): 0.8 B_{MSY}
- Removal Reference (RR): F_{MSY}
- Target Reference Point (TRP): B_{MSY}
- Target Removal Rate: F that achieves TRP in equilibrium

Management Objectives

Five management objectives guide the choice of MP during the evaluation stage of the MSE. Objectives 1, 2, and 3 embed fishery reference points based on MSY, e.g., LRP, USR and TRP, consistent with the DFO PA Policy requirements (DFO 2009). Objectives 4 and 5 ensure TACs are consistent with commercial industry viability.

1. Short-term (10 years) When the spawning stock biomass is between the LRP (0.4 BMSY) and USR (0.8 BMSY), limit the probability of decline over the next 10 years from very low (5%) at the LRP to moderate (50%) at the USR. At intermediate stock status levels, define the tolerance for decline by linearly interpolating between these probabilities.
2. Maintain spawning stock biomass out of the critical zone with a very high (95%) probability, measured at the end of 1.5 generations (i.e., above the LRP of 0.4 BMSY, where BMSY is the operating model biomass at MSY).
3. Maintain spawning stock biomass above the TRP (BMSY), where BMSY is the operating model biomass at MSY, with a neutral (50%) probability of decline, measured at the end of 1.5 generations.
4. Maintain annual total allowable catch (TAC) above 200 tonnes coastwide (125 t in North, 75 t in South).
5. Limit annual change in TACs to less than 20% and less than 30 t for North and South subunits.

Management Procedure

The HBLL 3 Year MP uses an empirical estimate of the hook and line survey biomass as an input to a harvest control rule. The empirical estimate of vulnerable survey biomass, referred to as HBLL 3-Year Moving Average Biomass Estimate, is calculated via a moving average of survey indices over the last three calendar years with available data (2 data points for South, 3 data points for North), with numbers-per-hook transformed to biomass via a model averaged catchability estimate and recent observations of average weight.

Data

The HBLL 3 Year MP has the following data inputs:

- MP inputs updated each cycle: the design-based, stratified-mean HBLL survey indices for the 5BCDE, 5B QCS, and 5A3CD survey areas, updated through 2025.
- MP inputs fixed at MP adoption (DFO 2023): the per-series catchability $\bar{q}_g$, mean individual fish weight $\bar{W}_g$, and survey CV τ_g (Table 1), together with the control-point reference biomass B^*_{MSY} and the removal reference rate F_{ref} for each subunit. These are operating-model-derived constants and are not re-estimated from the updated survey data.

ASSESSMENT

Unlike a single ‘best’ stock assessment approach, estimated trajectories of spawning stock biomass, recruitment, and mortality are only updated at intervals when the OMs are revised. The most recent estimates are from the 2026 operating-model review (Doherty et al. in prep[1]; DFO 2026).

Stock Status and Trends

This section describes the current stock status — determined coastwide from the operating-model ensemble, not from the MP — and the HBLL survey index and biomass estimate that the MP uses to set the catch limit.

HBLL Survey Index

The MP uses the design-based, stratified-mean Hard Bottom Longline (HBLL) survey index of Yelloweye Rockfish abundance, computed separately for the Northern and Southern Subunits. The Northern subunit uses two survey indices: one developed from the 5BCDE survey sets in odd years, and another developed from the Southern survey run in even years, which covers the Queen Charlotte Sound and extends into the southern part of area 5B (5B QCS) . The Southern subunit uses the HBLL survey from the 3CD5A areas. In 2025 the Northern 5BCDE index was 5.93 YE per 100 hooks — the highest value in the Northern series (2006–2025) and a continued increase from 5.22 in 2023. The Southern series has risen over the last three surveys, from 3.77 YE per 100 hooks in 2022 to 4.59 in 2024. Figure 2 shows both subunit index series with 95% confidence intervals; filled points are the survey years entering the moving average for the 2027/28 TAC.

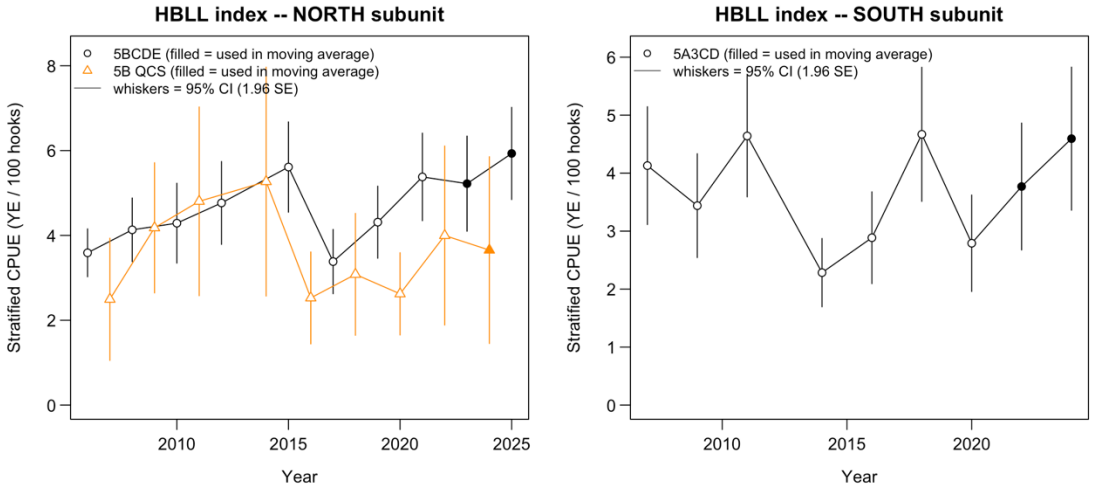


Figure 2. Design-based stratified HBLL survey index (MP input) for the Northern (5BCDE + 5B QCS) and Southern (5A3CD) subunits, with 95% confidence intervals; filled points are the survey years entering the 3-year moving average for the 2027/28 TAC.

HBLL 3 Year Moving-Average Biomass Estimate

The empirical HBLL survey biomass estimate $\hat{B}_{HL}$ is a 3-year moving average of the HBLL survey index. For survey index g, vulnerable numbers are $N_{g,t} = I_{g,t}/\bar{q}_g$, where $I_{g,t}$ is the survey index (YE per 100 hooks) and $\bar{q}_g$ is the model-averaged catchability. Because each survey series is itself biennial, not every year in the 3-year window contains an observation; the per-series estimate therefore averages vulnerable numbers over the survey years falling within the window and scales them to exploitable biomass by the model-averaged average individual weight $\bar{W}_g$:

$$\hat{B}_{HL,g} = \frac{1}{n_g} \sum_{t' \in \mathcal{T}_g} N_{g,t'}\ \bar{W}_g$$

where $\mathcal{T}_g = \{t-1, \ldots, t-3\} \cap \{\text{survey years for series } g\}$ is the set of survey years for series g falling within the 3-year window and $n_g = |\mathcal{T}_g|$ is the number of such years (e.g., $n_g = 2$ for a biennial series with two occurrences in the window, $n_g = 1$ if only one occurrence falls in the window).

The Northern subunit combines its two series (5BCDE, 5B QCS) by inverse-variance weights from their survey CVs τ_g,

$$\rho_g = \frac{1/\log(\tau_g^2 + 1)}{\sum_{j \in \mathcal{G}} 1/\log(\tau_j^2 + 1)},$$

where $\mathcal{G}$ is the set of survey series contributing to that subunit, so the weights ρ_g sum to one within each subunit. The Southern subunit uses the single 5A3CD series and therefore takes $\rho_g = 1$.The catchabilities $\bar{q}_g$ and average weights $\bar{W}_g$ are fixed operating-model-weighted constants from the 2023 SR (Table 1); only the survey index updates each cycle. For the 2027/28 TAC this gives $\hat{B}_{HL}$ = 6.60 kt in the North and 4.32 kt in the South (Table 2); this estimate is the input to the harvest control rule.

Table 1: Adopted per-series survey constants for the HBLL 3YR MP, fixed at the 2023 Science Response (operating-model-weighted averages): catchability $\bar{q}_g$, average individual weight $\bar{W}_g$ (kg), and survey CV τ_g. These are not updated from the index data.

Subunit	Survey index	$\bar{q}_g$	$\bar{W}_g$ (kg)	τ_g
North	5BCDE	3.276	4.024	0.10
North	5B QCS	3.468	5.063	0.23
South	5A3CD	4.901	5.066	0.13

Table 2: HBLL survey index points entering the 3-year moving average for the 2027/28 TAC and the resulting per-series vulnerable biomass $\hat{B}_{HL,g}$ (scaled by the Table 1 constants), with inverse-variance weight ρ_g.

Subunit	Survey index	Years	Index (YE/100 hooks)	Mean	$\hat{B}_{HL,g}$ (kt)	ρ_g
North	5BCDE	2023, 2025	5.22, 5.93	5.58	6.85	0.838
North	5B QCS	2024	3.65	3.65	5.33	0.162
South	5A3CD	2022, 2024	3.77, 4.59	4.18	4.32	1.000

Current Status

Stock status was last estimated in the 2026 operating model review and is not updated here (DFO 2026; Doherty et al. in prep[1]). Coastwide OYE spawning stock biomass (SSB) is estimated to be 9,900 tonnes (95% CI: 5,200 – 18,300), or 1.48 B_{MSY} in 2024 (95%CI: 0.75 – 2.54) (Doherty et al. in prep[1]). The probability of 2024 spawning stock biomass being greater than the Limit Reference Point (LRP: 0.4 B_{MSY}) and Upper Stock Reference (USR: 0.8 B_{MSY}) is >99% and 96%, respectively, placing the stock in the Healthy Zone of the Precautionary Approach (PA) Framework.

History of OYE Stock Assessment and Management Strategy Evaluation

OYE populations in British Columbia were designated as Special Concern by COSEWIC in 2008 and listed on Schedule 1 of the *Species at Risk Act* since 2011 due to significant population declines attributed to overfishing in the latter half of the 20th century (Yamanaka and Logan 2010). The 2014 stock assessment (Yamanaka et al. 2018), using a Bayesian Schaefer surplus production model, indicated that OYE stocks were in the Critical Zone under DFO's Sustainable Fisheries Framework, triggering the development of a rebuilding plan as required under the Fisheries Act. Fisheries and Oceans Canada (DFO), in collaboration with the Pacific Halibut Management Association of BC (PHMA), began the OYE MSE process in 2019–2020 (Cox et al. 2020), which focused heavily on the development of new age-structured operating models (OMs) to represent alternative hypotheses about OYE population dynamics and fisheries. The OMs incorporated data up to 2018 (Cox et al. 2020), with four scenarios to account for major structural uncertainties: (1) model start date (1918 vs. 1960); (2) alternative historical catch data series (reconstructions vs. raw data inputs); and (3) natural mortality assumptions. Results from the 2018 OM indicated that OYE stocks were above the LRP of 0.4 B_{MSY} with high probability and that a rebuilding plan was no longer needed.

Harvest Control Rule

The Outside Yelloweye Rockfish harvest control rule is a hockey-stick function of the MP survey biomass estimate $\hat{B}_{HL}$ relative to the reference biomass B^*_{MSY}. Here, B^*_{MSY} is the operating-model-weighted spawning biomass at MSY for each subunit, equal to 4.0 kt in the North and 3.0 kt in the South. These values were taken from the operating models available when the MP was adopted (DFO 2023) and are held fixed as MP tuning constants; they are not the same numbers as the coastwide B_{MSY} underlying the current status estimate, which comes from the revised 2026 ensemble. The asterisk denotes this fixed, subunit-level MP reference.

Note that the MP compares an estimate of survey-vulnerable biomass, $\hat{B}_{HL}$, against a spawning-biomass reference, B^*_{MSY}. The resulting ratio is an operational quantity that positions the stock on the harvest control rule; it is tuned and simulation-tested as a rule, and is not interpretable as a measure of stock status. The removal rate is zero below the lower control point (LCP, $0.4\,B^*_{MSY}$), increases linearly to the removal reference rate F_{ref} at the upper control point (UCP, $0.8\,B^*_{MSY}$), and is constant above the upper control point (Figure 3). The catch limit follows from the harvest control rule:

$$F(\hat{B}_{HL}) = \begin{cases} 0 & \hat{B}_{HL} < 0.4\,B^*_{MSY} \\ F_{ref}\,\dfrac{\hat{B}_{HL} - 0.4\,B^*_{MSY}}{0.4\,B^*_{MSY}} & 0.4\,B^*_{MSY} \le \hat{B}_{HL} < 0.8\,B^*_{MSY} \\ F_{ref} & \hat{B}_{HL} \ge 0.8\,B^*_{MSY} \end{cases} \qquad Q = \hat{B}_{HL}\,(1 - e^{-F})$$

where Q is the resulting catch limit.

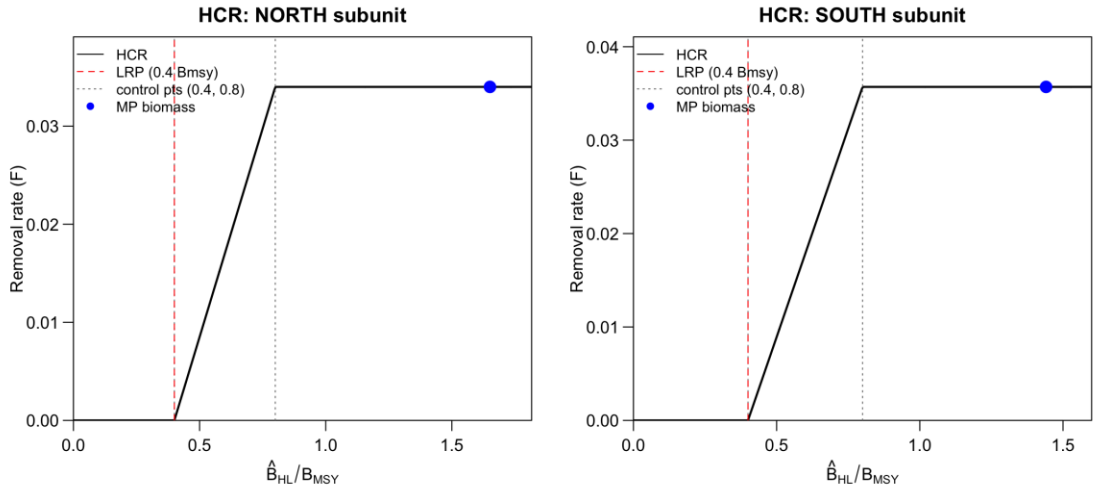


Figure 3. Adopted hockey-stick harvest control rule for the Northern and Southern subunits, with the MP biomass estimate (point, an HCR input) and control points at 0.4 and 0.8 B^*_{MSY}.

Exceptional Circumstances

No exceptional circumstances were triggered: the index remained within the simulation envelope with one marginal point, and the catch shortfall was in the conservative direction and may explain the increase in Northern subunit indices. Additionally, the OM has already been re-evaluated with indices including data up to 2024 (Doherty et al. in prep[1]), which would generate a shift in catchability and may reduce the residuals between the model biomass and observed index data.

Exceptional circumstances were evaluated by comparing the monitoring data collected since the MP was adopted against the simulation envelopes from the 2023 Science Response operating-model (OM) ensemble (Punt et al. 2016; Sainsbury et al. 2000; de Moor et al. 2022). Survey indices and catch series are shown for both subunits in Figure 3. Visual comparisons of real and simulated data are assessed here by judgement across key data sources rather than as a single pass/fail test on any one data point, as the operating models have since been reconditioned on data through 2024 (Doherty et al. in prep[1]).

For each historical year, predictive distributions of the survey indices were generated (100 simulated observations per OM replicate, incorporating the estimated index observation error). The resulting distribution was compared to the observed index. In the projection period, simulated survey indices are used to show an envelope of possible data, overlaid on the projected operating model biomass. Realized catch was compared against the OM catch envelope (Figure 4).

Pre-2022, the observed HBLL index fell within its 95% posterior-predictive interval in all index series. Because the OM is conditioned on the catch history, the observed catch matched the simulated catch over this period, so no deviation was expected or seen.

After the start of the simulated MP in 2022, HBLL index observations fell within the projected simulation envelope in all three series. The 2025 Northern 5BCDE index (5.93 Yelloweye per 100 hooks) sat at the upper edge of its 95% predictive interval — the highest value in the 2006–2025 series and a continued increase from 2023 — but remained within the envelope. Realized catch data were available only through 2023, and new catch data in 2022 and 2023 fell below the catch simulated under the MP indicating that removals were lower than the OM assumed.

Note that early simulated catches have no uncertainty as MPs set TACs based on fixed data in the historical period.

Note that the realized catches reported here are removals, and are distinct from the adopted TACs in Table 3, which extend through the 2026/27 fishing year. Removals below the assumed level are in the conservative direction and are consistent with the higher-than-expected index in 2023 and 2025. Realized catches for 2024 and 2025 were not available in this data set (nor in the 2024-vintage data underlying the 2026 OM update).

*Table 3. Summary of results from application of OYE MPs by fishing year (Feb 21 – Feb 20) since 2023. Quantities shown include the MP TAC advice for the North and South subunits, the total TAC adopted for North and South, and catch. Values are presented in tonnes. The * corresponds to the updated HBLL 3 YR MP presented in this document.*

Year	MP	MP TAC advice N	MP TAC North	Catch North	MP TAC advice S	MP TAC South	Catch South	Catch trawl
2022/23	idxSmuv	147	147	58.84	77	77	29.54	12.56
2023/24	idxSmuv	158	158	64.57	71	71	30.41	12.79
2024/25	HBLL 3 YR	187.5	190	70.88	135.2	134	37.01	16.84
2025/26	HBLL 3 YR	214	190	86.76	118.9	134	56.45	17.99
2026/27	HBLL 3 YR	214	190	50.47	118.9	134	22.18	8.68
2027/28	HBLL 3 YR*	220.8	TBD	NA	151.6	TBD	NA	NA
2028/29	HBLL 3 YR*	220.8	TBD	NA	151.6	TBD	NA	NA

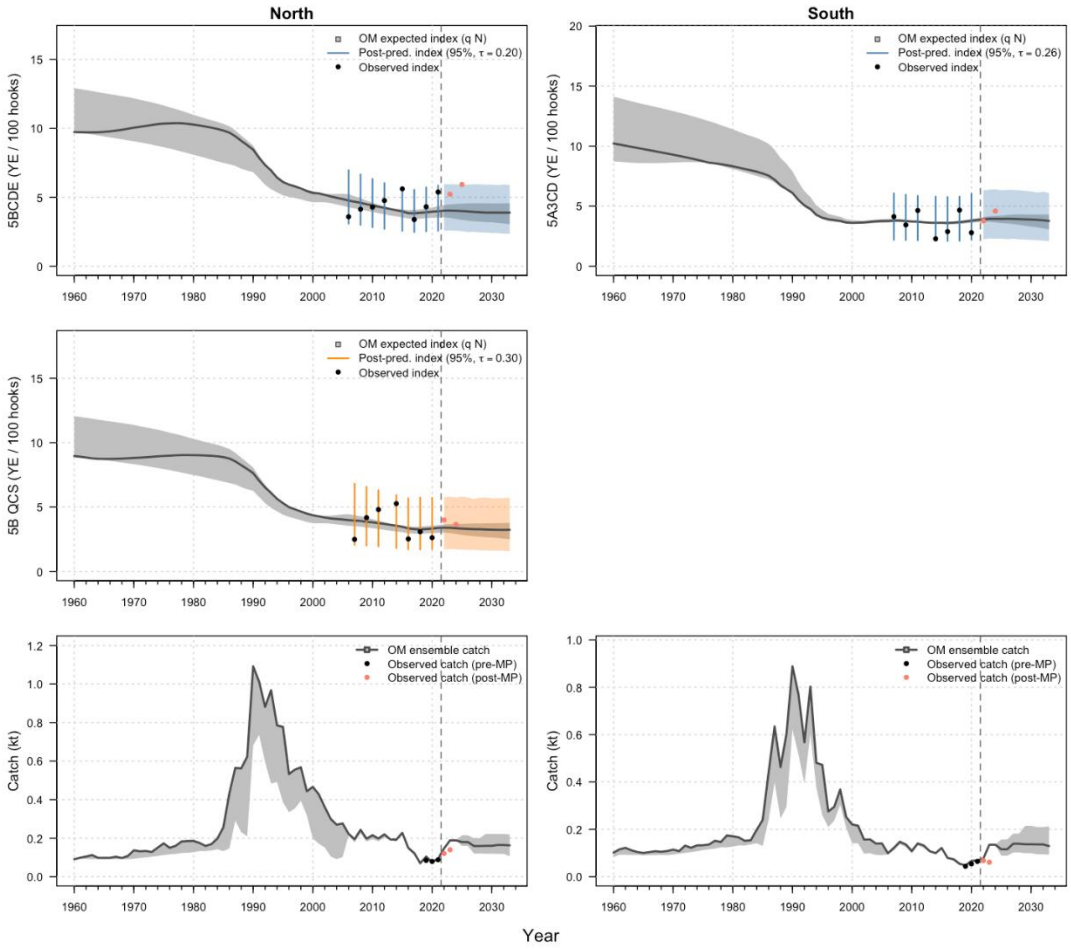


Figure 4. Exceptional-circumstances check for the Northern and Southern subunits against the 2023 Science Response operating-model ensemble. All index panels are on the same scale as Figure 2 (Yelloweye per 100 hooks). Index panels (top, middle): grey band = operating-model expected index ($\boldsymbol{q}\,\boldsymbol{N}$, central 95%); coloured whiskers = central-95% predictive index distribution at each historical survey year; coloured band = projected predictive index distribution; points = observed indices. Note that the historical numbers are skewed because the historical distribution is based on point estimates across four operating models. Catch panels (bottom): grey band = operating-model catch envelope (central 95%); points = realized catch not used in conditioning. In all panels, black points are before MP adoption and salmon-coloured points are after; the dashed vertical line marks the start of the simulated MP. Early catch projection years are determined by the data before the end of the historical period.

Ecosystem and Climate Change Considerations

Detailed information on ecosystem and climate change considerations was provided by Doherty et al. (in prep[1]). Environmental variables that could potentially affect OYE population dynamics showed no, or only weak, correlations with recruitment deviations.

Stock Advice

Application of the OYE MP sets a coastwide catch limit of 372 tonnes for the 2027/28 and 2028/29 fishing years (221 tonnes in the North, 152 tonnes in the South). For the 2027/28 and 2028/29 fishing years $\hat{B}_{HL}$ is above the UCP in both subunits ($\hat{B}_{HL}/B^*_{MSY}$ = 1.65 in the North,

1.44 in the South), so the target removal rate applies (Table 5). This ratio positions the biomass estimate on the HCR (an operational input); it is not a determination of stock status.

The South catch limit rises by 32.7 t (27.5%) relative to the 2025/26 & 2026/27 block (Table 4), reflecting the recent increase in the 5A3CD survey index (Figure 1). This change exceeds Management Objective 5's interannual TAC-stability target (less than 20% or 30 t change). The harvest control rule as applied has no explicit damping term on year-to-year TAC change, and Objective 5 is evaluated as a long-term. That is, the objective is looking for an average TAC change as a simulation-tested MP performance measure across the full MSE projection horizon, rather than enforced as a hard constraint on any single MP application.

Table 5. MP application: the MP biomass estimate ($\hat{B}_{HL}$), the harvest control rule control points (LCP and UCP), the removal reference rate (F_{ref}), and the resulting TAC by subunit for the 2027/28 TAC. B^*_{MSY} is the operating-model-weighted spawning biomass at MSY for each subunit, fixed at MP adoption (DFO 2023) and used as the MP control-point reference; LCP and UCP are 0.4 and 0.8 B^*_{MSY}.

Subunit	$\hat{B}_{HL}$ (kt)	B^*_{MSY} (kt)	LCP (kt)	UCP (kt)	$\hat{B}_{HL}/B_{MSY}$	F_{ref}	TAC (t)
North	6.60	4.0	1.6	3.2	1.65	0.034	220.8
South	4.32	3.0	1.2	2.4	1.44	0.0357	151.6

SOURCES OF UNCERTAINTY

The uncertainties below were characterized during the 2020 and 2026 operating model reviews and are not re-evaluated in this Science Response. They matter for the present advice because the HBLL 3 Year MP was simulation-tested against the reference set of 2020 operating models only. Uncertainties that fall outside the range spanned by that reference set are, by construction, untested: if the assumptions they represent are violated, realized MP performance may deviate from the performance demonstrated in simulation, and the catch limits reported here would carry correspondingly less assurance.

The OYE operating model ensemble (and 2026 OM Bayes posteriors) capture:

- Parameter uncertainty for mortality and steepness
- Historical catch uncertainty

While the 2020 OMs incorporated the best available data when selecting the HBLL 3-YR MP, there are several notable limitations:

- Major spatial and temporal gaps in commercial longline age composition data, biasing selectivity estimates which may lead to differences in MP performance over time
- Lack of recreational age composition data, which forces the use of fixed selectivity assumptions and biases estimates of expected fishing mortality-at-age from recreational fishing.
- The HBLL survey observes few OYE before age 15, which limits the ability to estimate recent recruitment. As a result, the operating models estimate recruitment only for 1952–2009 and assume average recruitment from the stock-recruit curve for 2010–2024. Extended periods of below-average recruitment in both subunits suggest autocorrelation in the recruitment series that the models do not account for, so the average-recruitment assumption may bias biomass estimates from 2010–2024 (Doherty et al. in prep[1]). This

doesn't affect the MP, however, as the MP is tested under random recruitment deviations from 2009 onwards.

- The two-area OM and MP may simplify a population that is structured at a finer spatial resolution, given the sedentary nature of Yelloweye Rockfish. The MP allocates catch between two subunits only, so finer-scale depletion within a subunit would not be detected by the survey indices the MP uses.

The HBLL 3YR MP's control-point parameters (B^*_{MSY} and F_{ref}) and the survey catchabilities and average weights used to compute $\hat{B}_{HL}$ (Table 1) were estimated from the operating models available at MP adoption (DFO 2023) and have not yet been re-tuned or re-tested for performance against the revised 2026 operating-model ensemble (Doherty et al., in prep[1]). Reconfirming MP performance against the updated OMs is recommended as part of the next full MSE review cycle.

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SOURCES OF INFORMATION

Committee on the Status of Endangered Wildlife in Canada. 2021. Quantitative criteria.

Cox, S.P., Doherty, B., Benson, A.J., Johnson, S.D.N., and Haggarty, D.R. 2020. Evaluation of potential rebuilding strategies for Outside Yelloweye Rockfish in British Columbia. DFO Can. Sci. Advis. Sec. Res. Doc. 2020/069. viii + 135 p.

de Moor, C. L., Butterworth, D. S., & Johnston, S. 2022. Learning from three decades of Management Strategy Evaluation in South Africa. ICES Journal of Marine Science, 79(6), 1843–1852.

DFO. 2009. A Fishery Decision-Making Framework Incorporating the Precautionary Approach

DFO. 2023. Management Procedures Update and Catch Advice for 2023/24–2026/27 Fishing Seasons for Outside Yelloweye Rockfish (*Sebastes ruberrimus*) in the Pacific Region. DFO Can. Sci. Advis. Sec. Sci. Resp. 2023/037.

DFO. 2026. Operating Model Code Transition and Stock Status Update (2024) for Outside Yelloweye Rockfish (*Sebastes ruberrimus*) in British Columbia. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2026/039.

Punt, A. E., Butterworth, D. S., de Moor, C. L., De Oliveira, J. A. A., & Haddon, M. 2016. Management strategy evaluation: best practices. Fish and Fisheries. 17(2). 303–334.

Sainsbury, K. J., Punt, A. E., & Smith, A. D. M. 2000. Design of operational management strategies for achieving fishery ecosystem objectives. ICES Journal of Marine Science. 57(3). 731–741.

Yamanaka, K.L., and Logan, G. 2010. Developing British Columbia's inshore rockfish conservation strategy. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 2: 28–46.

Yamanaka, K.L., McAllister, M.M., Etienne, M.-P., Edwards, A.M., and Haigh, R. 2018. Stock Assessment for the Outside Population of Yelloweye Rockfish (*Sebastes ruberrimus*) for British Columbia, Canada in 2014. DFO Can. Sci. Advis. Sec. Res. Doc. 2018/001. ix + 150 p.

APPENDIX: FSP COMPLIANCE TABLE

Table A.1: Fish Stock Provisions Report Card for the Outside Yelloweye Rockfish management system, showing key components and stock status indicators relevant to policy compliance. See DFO (2023) for details on the current harvest control rule. Acronyms: B = spawning biomass, B_{2024} = spawning biomass in 2024, MSY = maximum sustainable yield, B_{MSY} = spawning biomass at MSY, P() = probability, LRP = Limit Reference Point, USR = Upper Stock Reference, TRP = Target Reference Point, LCP = Lower Control Point, UCP = Upper Control Point, F_{ref} = removal reference rate, TAC = total allowable catch, MP = Management Procedure.

Policy requirement	Description
2024 spawning biomass	9,900 t (95% CI: 5,200–18,300)
2024 stock status	Healthy Zone
	B_{2024}/B_{MSY} = 1.48 (95% CI: 0.75–2.54)
	$P(B_{2024} > LRP) > 99\%$
	$P(B_{2024} > USR) = 96\%$
Rebuilding plan currently required	No
Reference points and stock status zones	LRP: 0.4 B_{MSY}
	USR: 0.8 B_{MSY}
	TRP: B_{MSY}
Harvest control rule	Hockey-stick HCR
	LCP: 1,600 t (North), 1,200 t (South)
	UCP: 3,200 t (North), 2,400 t (South)
	F_{ref}: 0.034 (North), 0.0357 (South)
Conservation objectives	Short-term (10 years): when spawning biomass is between the LRP (0.4 B_{MSY}) and the USR (0.8 B_{MSY}), limit the probability of decline over the next 10 years from very low (5%) at the LRP to moderate (50%) at the USR, interpolating linearly at intermediate status levels.
	Long-term (59 years): maintain spawning biomass out of the critical zone (above the LRP of 0.4 B_{MSY}) with a very high (95%) probability, measured at the end of 1.5 generations.
Target objectives	Long-term (59 years): maintain spawning biomass above the TRP (B_{MSY}) with a neutral (50%) probability of decline, measured at the end of 1.5 generations.
Rebuilding plans	Entry point: final-year stock status at or below the LRP with greater than 50% probability, $P(B \leq LRP) > 50\%$.
	End point: final-year stock status above the LRP with less than 25% probability of being below it, $P(B < LRP) < 25\%$.

Policy requirement	Description
	Rebuilding target: median stock status when P(B < LRP) = 25%.
Management procedure performance (2023–2081)	MP: HBLL 3 Year B_{2081}/B_{MSY} = 1.0 $P(B_{2081} > LRP) > 99\%$ $P(B_{2081} > TRP) = 50\%$ $P(F < F_{ref}) = 83\%$
Catch advice from this application	2027/28 and 2028/29: 372 t coastwide (221 t North, 152 t South). The MP biomass estimate is above the UCP in both subunits, so the target removal rate applies.
Exceptional circumstances	None triggered. Observed HBLL indices since MP adoption remain within the operating model simulation envelopes, and realized catch has been below the simulated catch.
Timeline for future OYE management research	The 2023 Science Response anticipated a new MP evaluation against the updated operating models to provide advice for the 2027/28 fishing year. That evaluation has not been completed, and this Science Response instead re-applies the adopted HBLL 3 Year MP as an interim extension. Reconfirming MP performance against the revised 2026 operating models is recommended as part of the next full MSE review cycle.

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