

13. Assessment of the Rougheye and Blackspotted rockfish stock complex in the Gulf of Alaska

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Executive Summary

All Gulf of Alaska (GOA) rockfish stocks are assessed on a biennial stock assessment schedule to coincide with the availability of new survey data. We use a statistical age-structured model as the primary assessment tool for the GOA rougheye and blackspotted (RE/BS) rockfish complex, which qualifies as a Tier 3 stock (Sullivan et al. 2023). This assessment consists of a population model, which uses survey and fishery data to generate a historical time series of biomass trajectories, and a projection model, which uses results from the population model to predict future population estimates and recommended harvest levels. For 2024, which is a harvest projection year, we do not re-run the assessment model but do update the projection model with new catch information using the base model from 2023 (Model 23.1b). This allows us to incorporate the most current catch information without re-estimating model parameters and biological reference points.

Summary of Changes in Assessment Inputs

Changes in the input data: New data added to the projection model included an updated 2023 catch estimate and new catch estimates for 2024-2026. The updated 2023 catch was 434 t, which was slightly lower than the 2023 catch estimated in the 2023 assessment (487 t, Sullivan et al. 2023). The 2024 catch was estimated by increasing the official catch as of August 17, 2024 (216 t, accessed on August 23, 2024), by an expansion factor of 1.612, which is the average fraction of catch taken after August 17 in the last three complete years (2021-2023; Figure 13.1). This expansion factor resulted in an estimated catch for 2024 of 348 t. To estimate future catches, we updated the yield ratio 0.42 to 0.50, which was the average ratio of catch to ABC for the last three complete catch years (2021-2023). This yield ratio was multiplied by the projected ABCs from the updated projection model to generate catches of 656 t in 2025 and 667 t in 2026.

Changes in the assessment methodology: There are no changes in assessment methodology in harvest projection years.

Summary of Results

Due to major concerns in the assessment and population dynamics categories of the risk table detailed in the 2023 assessment, we recommend a reduction from maximum allowable ABC to 1,180 t for the 2025 fishery following the same methods that were accepted in 2023 (Sullivan et al. 2023). The recommended 2025 ABC was calculated as the mean of the 2025 ABC specified last year and the 2025 maximum ABC estimated this year. Similarly, the recommended 2026 ABC was calculated as the mean of the 2025 ABC specified last year and the 2026 maximum ABC estimated this year.

| Quantity | As estimated or <i>specified last year for:</i> | | As estimated or <i>recommended this year for:</i> | |
|---------------------------------------|--|--------|--|--------------|
| | 2024 | 2025 | 2025 | 2026 |
| <i>M</i> (natural mortality rate) | 0.042 | 0.042 | 0.042 | 0.042 |
| Tier | 3a | 3a | 3a | 3a |
| Projected total (ages 3+) biomass (t) | 46,029 | 46,109 | 46,360 | 46,319 |
| Projected female spawning biomass (t) | 12,986 | 13,005 | 13,078 | 13,059 |
| <i>B</i> _{100%} | 21,878 | 21,878 | 21,878 | 21,878 |
| <i>B</i> _{40%} | 8,751 | 8,751 | 8,751 | 8,751 |
| <i>B</i> _{35%} | 7,657 | 7,657 | 7,657 | 7,657 |
| <i>F</i> _{OFL} | 0.045 | 0.045 | 0.045 | 0.045 |
| <i>maxF</i> _{ABC} | 0.038 | 0.038 | 0.038 | 0.038 |
| <i>F</i> _{ABC} | 0.030 | 0.030 | 0.034 | 0.034 |
| OFL (t) | 1,555 | 1,566 | 1,576 | 1,631 |
| maxABC (t) | 1,302 | 1,310 | 1,319 | 1,365 |
| ABC (t) | 1,037 | 1,041 | 1,180 | 1,203 |
| Status | As determined <i>last year for:</i> | | As determined <i>this year for:</i> | |
| | 2022 | 2023 | 2023 | 2024 |
| Overfishing | No | n/a | No | n/a |
| Overfished | n/a | No | n/a | No |
| Approaching overfished | n/a | No | n/a | No |

The stock is not being subject to overfishing, is not currently overfished, nor is it approaching a condition of being overfished. The stock is not being subjected to overfishing because the official catch estimate for the most recent complete year (2023) is 434 t, which is less than the 2023 OFL of 930 t. The stock is not currently overfished nor approaching an overfished condition because the projected spawning biomass for 2025 and 2026 from the 2023 assessment model are 13,078 t and 13,059 t, respectively, well above the estimate of *B*_{35%} at 7,657 t.

Fishery Trends

Updated catch data (t) for RE/BS rockfish in the Gulf of Alaska as of August 17, 2024 (NMFS Alaska Regional Office Catch Accounting System via the Alaska Fisheries Information Network [AKFIN] database, <http://www.akfin.org>, accessed August 23, 2024) are summarized in the following table:

| Year | Western | Central | Eastern | Gulf-wide Total | Gulf-wide ABC | Gulf-wide TAC |
|------|---------|---------|---------|--------------------|------------------|------------------|
| 2023 | 102 | 156 | 176 | 434 | 781 | 775 |
| 2024 | 46 | 90 | 80 | 216 | 1,037 | 1,037 |

The observed and projected RE/BS catch for 2024 is low relative to the recent time series (Figure 13.1). Catches in the western and central GOA are primarily taken in rockfish trawl fisheries (Figure 13.2). Catches have remained low and relatively stable in the western GOA and have decreased markedly in the central GOA since the early 2010s. Catches in the eastern GOA have decreased in recent years, which may be attributed to low catches of sablefish in this region and increased use of slinky pot gear in sablefish target fisheries since 2017 (Figure 13.2).

Using the projected 2024 catch of 348 t and the 2024 age-3+ projected biomass of 46,082 t from this year’s updated projection model, the 2024 catch/biomass ratio is estimated to be 0.008, well below the

long-term mean of 0.015. The catch/biomass ratio is estimated to have ranged from 0.002-0.056 between 1977 and 2022, with a large spike in 1990 (Figure 13.3). While it is believed that the catch/biomass ratio is low, the scale of the population biomass is highly uncertain (Sullivan et al., 2023).

Survey Trends

There are no new survey data to inform GOA RE/BS abundance trends in 2024. The GOA bottom trawl surveys only occur on odd years, and the 2024 longline survey was cancelled.

Area Allocation of Harvests

The following table shows the recommended apportionment for 2025 and 2026 estimated by the two-survey random effects (REMA) model accepted in the 2023 assessment.

| Method | Area Allocation | Western GOA | Central GOA | Eastern GOA | Total |
|---------------------------|-------------------|--------------|--------------|--------------|--------|
| | | 19.0% | 30.4% | 50.6% | 100.0% |
| Two-Survey Random Effects | 2025 Area ABC (t) | 224 | 359 | 597 | 1,180 |
| | OFL (t) | | | | 1,576 |
| | 2026 Area ABC (t) | 229 | 366 | 608 | 1,203 |
| | OFL (t) | | | | 1,631 |

Summaries for Plan Team

| Species | Year | Biomass ¹ | OFL | ABC | TAC | Catch ² |
|---------------|------|----------------------|-------|-------|-------|--------------------|
| RE/BS complex | 2023 | 25,837 | 930 | 781 | 775 | 434 |
| | 2024 | 46,029 | 1,555 | 1,037 | 1,037 | 216 |
| | 2025 | 46,360 | 1,576 | 1,180 | | |
| | 2026 | 46,319 | 1,631 | 1,203 | | |

| Stock/ Assemblage | Area | 2024 | | | | 2025 | | 2026 | |
|----------------------|-------|-------|-------|-------|--------------------|-------|-------|-------|-------|
| | | OFL | ABC | TAC | Catch ² | OFL | ABC | OFL | ABC |
| RE/BS complex | W | | 197 | 197 | 46 | | 224 | | 229 |
| | C | | 315 | 315 | 90 | | 359 | | 366 |
| | E | | 525 | 525 | 80 | | 597 | | 608 |
| | Total | 1,555 | 1,037 | 1,037 | 216 | 1,576 | 1,180 | 1,631 | 1,203 |

¹Total biomass (ages 3+) from the age-structured model in the year the TAC was specified for current and past years, or the current model for projection years (e.g., the 2024 biomass is the value from the 2023 projection model).

²Current as of August 17, 2024. Source: NMFS Alaska Regional Office Catch Accounting System via the AKFIN database (<http://www.akfin.org>), accessed August 23, 2024.

Responses to SSC and Plan Team Comments on Assessments in General

There are no new or outstanding comments on assessments in general since the last full assessment that have not been addressed.

Responses to SSC and Plan Team Comments Specific to this Assessment

The Team recommended using the author's approach. Additionally, the Team recommended alternative methods be explored that take skip spawning into account. (GOA GPT, September 2023)

The SSC supports incorporating maturity data not previously used that comes from both rougheye and blackspotted rockfish determined through visual species identification and supports exploring alternative methods that account for skip spawning. (SSC, October 2023)

The dome-shaped trawl survey selectivity for this complex is expected given that adult habitat is typically in rocky areas along the shelf break where the trawl survey gear's sampling is limited. However, estimates in this assessment suggest that selectivity is changing considerably for older fish in the survey, which is unexpected given occupied habitat should not change above a certain age. For example, the GOA GPT noted it was unclear why 40-year-old fish would be so much less selected than a 30-year-old fish. Future research could consider alternative parameterizations that would allow for more constrained estimates of selectivity at older ages. (SSC 2021)

The Team recommended that the author investigate how selectivity is modeled. In particular, there were some abrupt changes between ages in the average fishery selectivity. ” (Plan Team, November 2019)

Literature cited

Sullivan, J.Y., J.A. Zahner, M.C. Siple, and B.E. Ferriss. 2023. Assessment of the Rougheye and Blackspotted Rockfish stock complex in the Gulf of Alaska. North Pacific Fishery Management Council, Anchorage, AK. Available from <https://www.npfmc.org/library/safe-reports/>

Figures

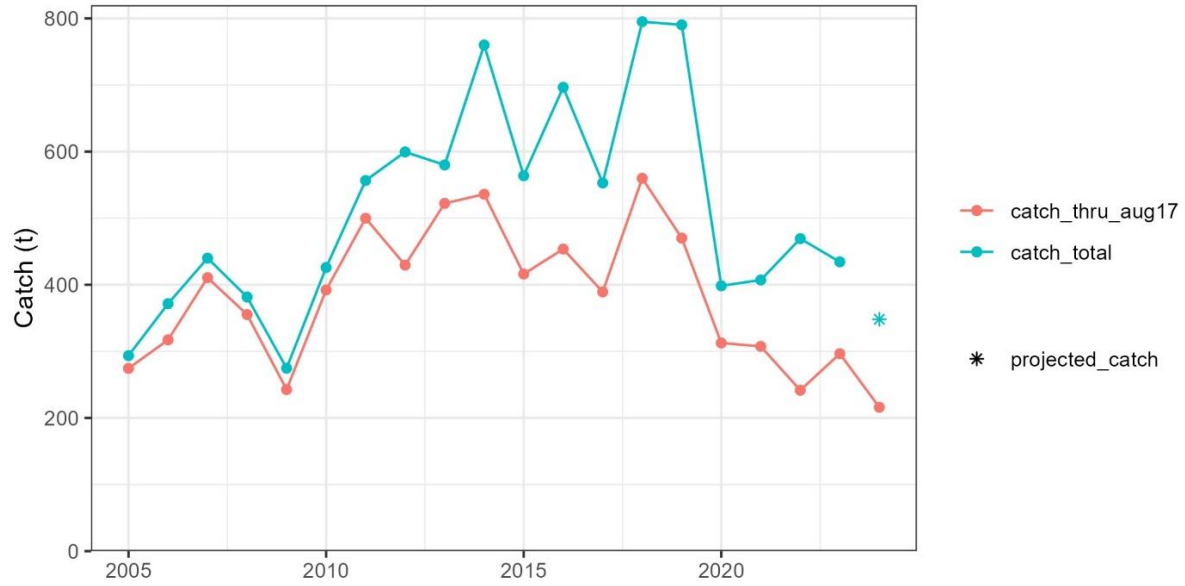


Figure 13.1. A comparison of GOA RE/BS total catch (blue) and partial year catch through August 17 from 2005-2024. The projected total catch for 2024 (348 t) used in the projection model is shown as an asterisk in blue. Source: NMFS Alaska Regional Office Catch Accounting System via the Alaska Fisheries Information Network [AKFIN] database, <http://www.akfin.org>, accessed August 23, 2024.

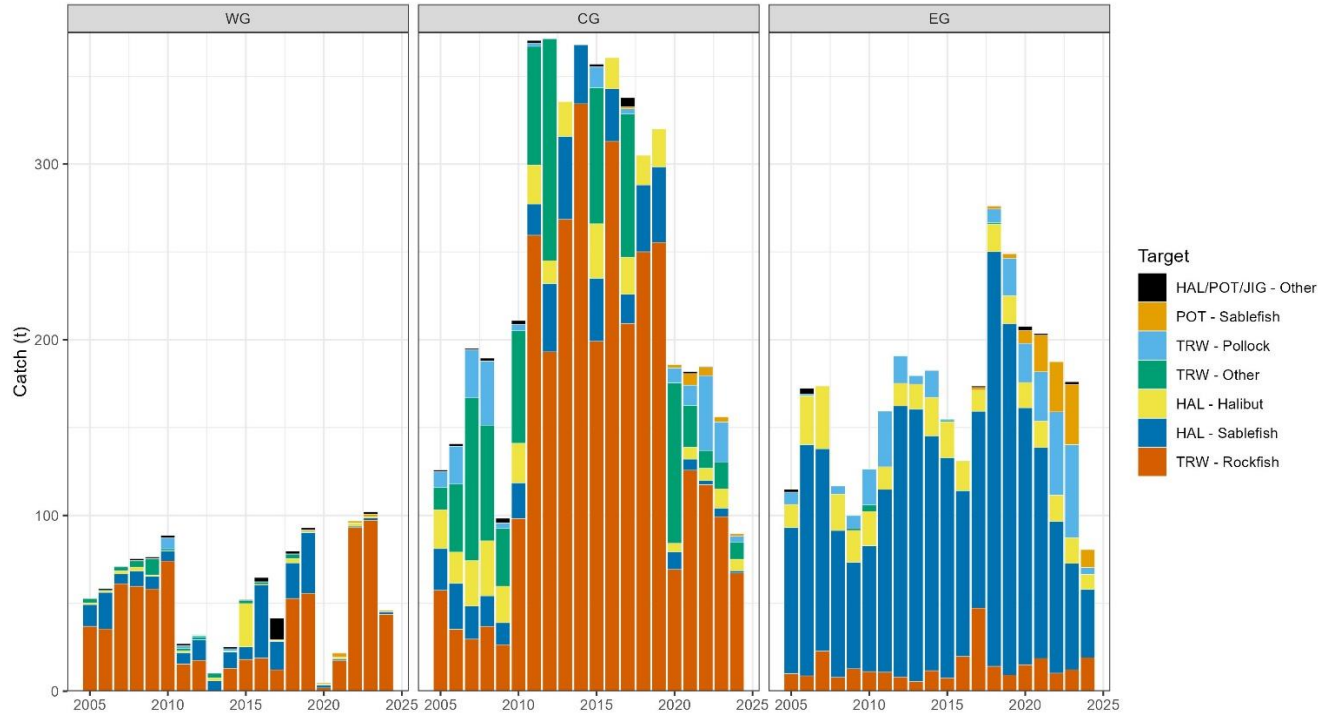


Figure 13.2. GOA RE/BS catch trends by management area (WG=Western GOA, CG=Central GOA, EG=Eastern GOA), target fishery and gear type (HAL=Hook-and-line, TRW=Trawl), 2005-2024. Each bar reflects a full year of catches, except 2024, which only includes catch through August 17. Source: NMFS Alaska Regional Office Catch Accounting System via the Alaska Fisheries Information Network [AKFIN] database, <http://www.akfin.org>, accessed August 23, 2024.

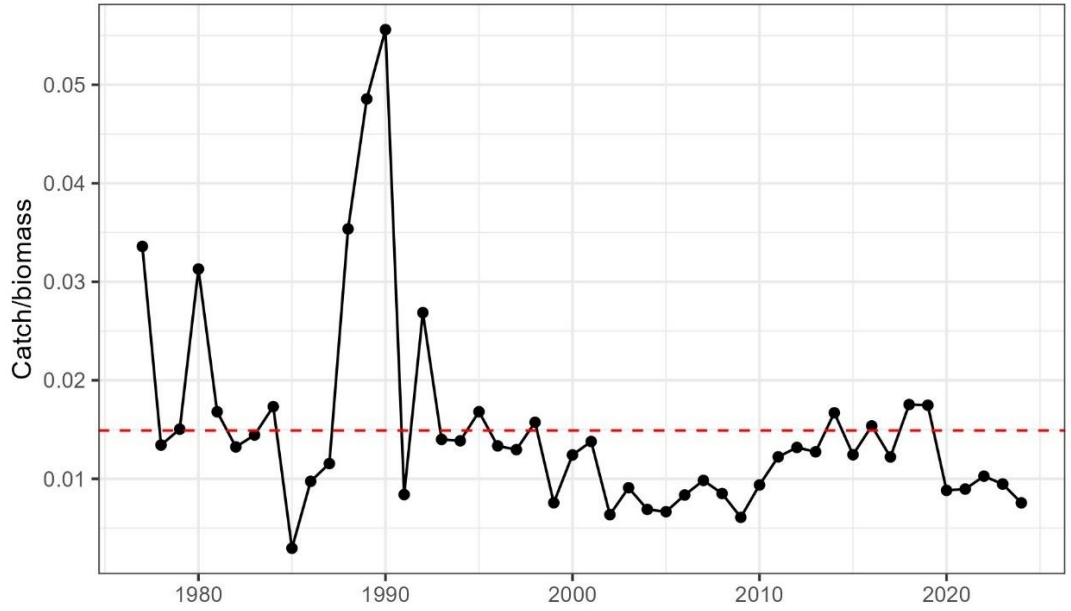


Figure 13.3. Catch divided by biomass (age 3+) for GOA RE/BS rockfish, 1977-2024. The red dashed line is the long-term average for the time series (0.015). Age-3+ biomass estimates for 1977-2022 and 2023-2024 were obtained from the 2023 assessment and 2024 projection models, respectively. The assumed projected total catch for 2024 is 348 t.