

## 4. Assessment of the Northern and Southern Rock Sole Stock in the Gulf of Alaska

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### Executive Summary

Gulf of Alaska northern and southern rock sole (*Lepidopsetta ployxystra* and *Lepidopsetta bilineatta*) are assessed every 4-years following the stock prioritization schedule. GOA northern rock and southern rock sole are classified as Tier 3 stocks and are assessed using statistical catch-at-age models that account for regional differences in growth configured in Stock Synthesis 3 (Methot and Wetzel 2013). The western GOA and central-eastern GOA are modeled separately with estimated area-specific growth patterns. The assessment models are not run during an off-cycle year. During off-cycle years, harvest projections are presented with recommendations of harvest levels for the next two years, using updated catch information in the projection model. The last full assessment in 2021 is available online <https://apps-afsc.fisheries.noaa.gov/refm/docs/2021/GOAnsrocksole.pdf>. A full stock assessment document with updated assessment and projection model results will be presented in November, 2025.

### Description of Updated Catch

An assumption of the northern and southern rock sole assessment models is that total rock sole catch is split evenly between the species. New catch data were added to the projection model and the values reported here are representative of the 50% split between species.

New data added to the projection model included an updated 2023 catch of 343 t and 11 t for the central-eastern and western GOA, respectively. We estimated the 2024 catch by increasing the official catch as of August 31, 2024 by an expansion factor. The expansion factors used were 1.384 for the central-eastern GOA and 1.005 for the western GOA. The expansion factor represents the average fraction of catch taken after August 31st in the last five complete years (2019-2023). This resulted in an estimated catch for 2024 of 372 t and 15 t for the central-eastern GOA and western GOA, respectively and represents a small increase in the 2024 catch estimates used in the 2023 harvest projection. The 2024 preliminary catch estimates were also used for the 2025 and 2026 catch values in the projection model.

There was a slight increase in the exploitation rates for both northern rock sole and southern rock sole in the Central-eastern GOA in 2024 (Figure 1).

### Summary of Results

The recommended ABCs for northern rock sole in the central-eastern GOA for 2025 and 2026 are 4,600 t and 4,703 t. The recommended OFLs are 5,383 t and 5,504 t for 2025 and 2026 in the central-eastern GOA. The recommended ABCs for northern rock sole in the western GOA for 2025 and 2026 are 9,168 t

and 9,290 t. The recommended OFLs are 11,046 t and 11,119 t. The 2025 advice from the updated projection models is similar to what was recommended in the 2023 assessment for 2025.

The recommended ABCs for southern rock sole in the central-eastern GOA for 2025 and 2026 are 15,450 t and 15,657 t. The recommended OFLs are 18,283 t and 18,522 t. The recommended ABCs for southern rock sole in the western GOA for 2025 and 2026 are 12,612 t and 12,531 t. The recommended OFLs are 14,925 t and 14,825 t. The 2025 advice from the updated projection models is similar to what was recommended in the 2023 assessment for 2025.

## **References**

Methot, R. D., Wetzell, C. R. 2013. Stock synthesis: A biological and statistical framework for fish stock assessment and fishery management. *Fisheries Research* 142: 86-99.

Northern rock sole, Central-Eastern GOA 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; female, male)	0.2, 0.232*	0.2, 0.232*	0.2, 0.232*	0.2, 0.232*
Tier	3a	3a	3a	3a
Projected total (age 0+) biomass (t)	38,855	40,172	39,925	40,808
Projected Female spawning biomass (t)	16,054	17,427	17,277	17,890
<i>B</i> <sub>100%</sub>	20,913	20,913	20,913	20,913
<i>B</i> <sub>40%</sub>	8,365	8,365	8,365	8,365
<i>B</i> <sub>35%</sub>	7, 320	7, 320	7, 320	7, 320
<i>F</i> <sub>OFL</sub>	0.181	0.181	0.181	0.181
<i>maxF</i> <sub>ABC</sub>	0.153	0.153	0.153	0.153
<i>F</i> <sub>ABC</sub>	0.153	0.153	0.153	0.153
OFL (t)	5,227	5,419	5,383	5,504
maxABC (t)	4,466	4,631	4,600	4,703
ABC (t)	4,466	4,631	4,600	4,703
	As determined <i>last year</i> for:		As determined <i>this year</i> for:	
Status	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

\* Female natural mortality is fixed and male natural mortality is estimated in the assessment model.  
Northern rock sole, central-eastern GOA: Projections are based on the final catch of 509 t for 2022 and 343 t for 2023 and preliminary catch of 372 t used in place of maximum permissible ABC for 2024, 2025, and 2026.

Northern rock sole, Western GOA 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; female, male)	0.2, 0.254*	0.2, 0.254*	0.2, 0.254*	0.2, 0.254*
Tier	3a	3a	3a	3a
Projected total (age 0+) biomass (t)	67,086	67,327	67,322	67,374
Projected Female spawning biomass (t)	29,303	30,348	30,344	30,491
<i>B</i> <sub>100%</sub>	28,702	28,702	28,702	28,702
<i>B</i> <sub>40%</sub>	11,481	11,481	11,481	11,481
<i>B</i> <sub>35%</sub>	10,045	10,045	10,045	10,045
<i>F</i> <sub>OFL</sub>	0.385	0.385	0.385	0.385
<i>maxF</i> <sub>ABC</sub>	0.313	0.313	0.313	0.313
<i>F</i> <sub>ABC</sub>	0.313	0.313	0.313	0.313
OFL (t)	10,749	11,047	11,046	11,119
maxABC (t)	8,916	9,168	9,168	9,290
ABC (t)	8,916	9,168	9,168	9,290
	As determined <i>last year for:</i>		As determined <i>this year for:</i>	
Status	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

\* Female natural mortality is fixed and male natural mortality is estimated in the assessment model.  
Northern rock sole, western GOA: Projections are based on a final catch of 12 t for 2022 and 11 t for 2023 and preliminary catch of 15 t used in place of maximum permissible ABC for 2024, 2025, and 2026.

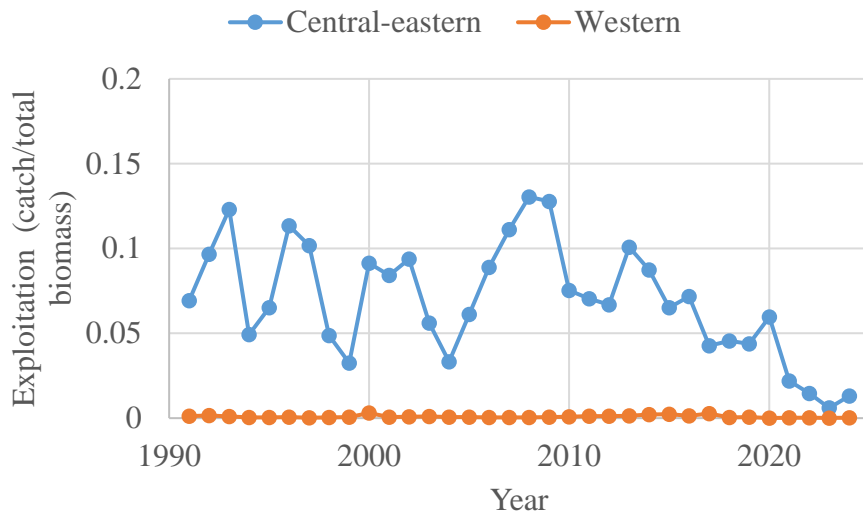
<b>Southern rock sole, Central-Eastern GOA</b>	As estimated or <i>specified last year for:</i>		As estimated or <i>recommended this year for:</i>	
	2024	2025	2025	2026
Quantity				
<i>M</i> (natural mortality rate; female, male)	0.2, 0.253*	0.2, 0.253*	0.2, 0.253*	0.2, 0.253*
Tier	3a	3a	3a	3a
Projected total (age 0+) biomass (t)	134,978	135,672	135,442	135,558
Projected Female spawning biomass (t)	49,889	54,623	54,486	56,993
<i>B</i> <sub>100%</sub>	53,439	53,439	53,439	53,439
<i>B</i> <sub>40%</sub>	21,376	21,376	21,376	21,376
<i>B</i> <sub>35%</sub>	18,703	18,703	18,703	18,703
<i>F</i> <sub>OFL</sub>	0.268	0.268	0.268	0.268
<i>maxF</i> <sub>ABC</sub>	0.224	0.224	0.224	0.224
<i>F</i> <sub>ABC</sub>	0.224	0.224	0.224	0.224
OFL (t)	17,787	18,322	18,283	18,522
maxABC (t)	15,024	15,483	15,450	15,657
ABC (t)	15,024	15,482	15,450	15,657
	As determined <i>last year for:</i>		As determined <i>this year for:</i>	
Status	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

\* Female natural mortality is fixed and male natural mortality is estimated in the assessment model. Southern rock sole, central-eastern GOA Projections are based on the final catch of 509 t for 2022 and 343 t for 2023 and preliminary catch of 372 t used in place of maximum permissible ABC for 2024, 2025, and 2026.

Southern rock sole, Western GOA Quantity	As estimated or <i>specified last year for:</i>		As estimated or <i>recommended this year for:</i>	
	2024	2025	2025	2026
$M$ (natural mortality rate; female, male)	0.2, 0.271*	0.2, 0.271*	0.2, 0.271*	0.2, 0.271*
Tier	3a	3a	3a	3a
Projected total (age 0+) biomass (t)	114,483	113,960	113,955	113,202
Projected Female spawning biomass (t)	45,481	49,057	49,053	50,699
$B_{100\%}$	43,788	43,788	43,788	43,788
$B_{40\%}$	17,515	17,515	17,515	17,515
$B_{35\%}$	15,326	15,326	15,326	15,326
$F_{OFL}$	0.222	0.222	0.222	0.222
$maxF_{ABC}$	0.185	0.185	0.185	0.185
$F_{ABC}$	0.185	0.185	0.185	0.185
OFL (t)	14,718	14,926	14,925	14,825
maxABC (t)	12,430	12,612	12,612	12,531
ABC (t)	12,430	12,612	12,612	12,531
	As determined <i>last year for:</i>		As determined <i>this year for:</i>	
Status	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

Female natural mortality is fixed and male natural mortality is estimated in the assessment model.  
Southern rock sole, western GOA: Projections are based on a final catch of 12 t for 2022 and 11 t for 2023 and preliminary catch of 15 t used in place of maximum permissible ABC for 2024, 2025, and 2026.

a)



b)

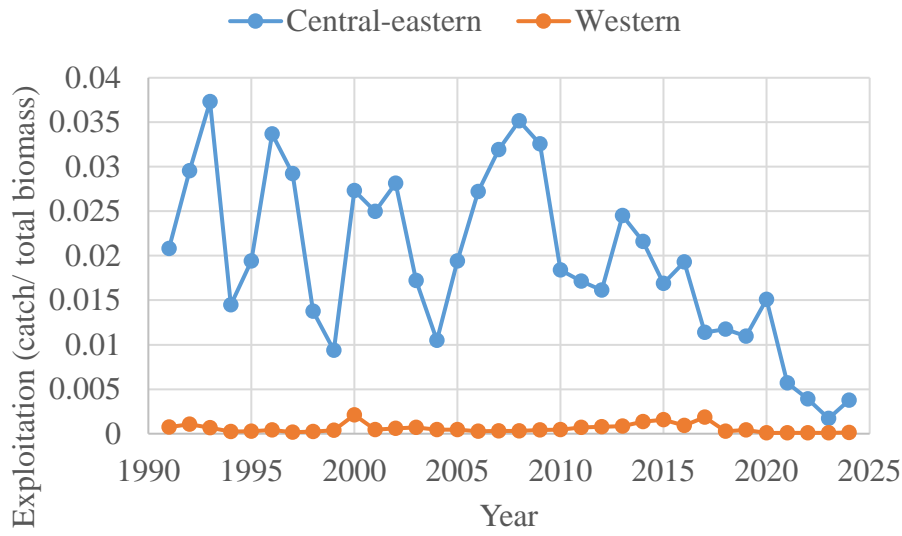


Figure 1. Exploitation rates by area for a) northern rock sole and b) southern rock sole.