

# 4.1 Assessment of Northern and Southern rock sole (*Lepidopsetta polyxstra* and *bilineata*) stocks in the Gulf of Alaska

by  
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## Executive Summary

The Gulf of Alaska (GOA) northern and southern rock sole assessment has been moved to a 4-year assessment cycle per the stock assessment prioritization schedule. During years when a full assessment is not completed a partial assessment will be done. This year marks a partial assessment year. The last full assessment was completed in 2017 and marked the first year of the new assessment schedule (Bryan 2017, available online at <https://www.afsc.noaa.gov/REFM/Docs/2017/GOAnsrocksole.pdf>).

### Summary of Changes in Assessment Inputs

*Changes in the data inputs:* There were no changes made to the assessment model inputs since this was an off-cycle year. New data added to the projection model included updated 2017 catch and catch estimates for 2018 and 2019.

*Changes to the assessment model:* There were no changes made to the assessment model since this was an off-cycle year.

### Summary of Results

New inputs for this year's projection model were an updated 2017 catch estimate of 1,059 t. Northern and southern rock sole are not reported separately in the commercial catch data. The 2017 catch estimate for northern and southern rock sole separately represents 50% of the total rock sole catch, which was 2,118 t. The 2018 total rock sole catch estimate was found by summing catch extracted from the AKFIN database on October 31, 2018 (1721 t) and the average of the catch caught between October 31<sup>st</sup> and the end of year (205 t). Therefore, the total catch estimate for 2018 was 1,923 t and the value used in the projection model was 963 t. The 2019 total rock sole catch estimate was 3,199 t and represented the average of the catch from 2013-2017. The catch value used in the projection model was 1600 t.

The recommended maximum allowable ABC for northern rock sole is 17,331 t and for southern rock sole is 21,794 t from the updated projection model. This represents a 3% increase for northern rock sole and a 1% increase for southern rock sole from the 2018 ABCs. The 2019 ABCs are less than 1% larger than the projected 2019 ABC from last year's projection model. The following table summarizes the reference values and the recommended ABC and OFL values in bold. Overfishing is not occurring, the stock is not overfished, and it is not approaching an overfished condition.

## Northern Rock Sole

<b>Quantity</b>	As estimated or <i>specified last year for:</i>		As estimated or <i>recommended this year for:</i>	
	2018	2019	2019	2020
<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)	90,794	93,374	93,791	94,110
Projected Female spawning biomass (t)	44,536	45,519	47,104	45,967
$B_{100\%}$	51,553	51,553	51,387	51,387
$B_{40\%}$	20,621	20,621	20,555	20,555
$B_{35\%}$	18,044	18,044	17,985	17,985
$F_{OFL}$	0.462	0.462	0.462	0.462
$maxF_{ABC}$	0.382	0.382	0.382	0.382
$F_{ABC}$	0.382	0.382	0.382	0.382
OFL (t)	19,960	20,477	20,582	20,836
maxABC (t)	16,802	17,243	17,331	17,548
ABC (t)	16,802	17,243	17,331	17,548
<b>Status</b>	As determined <i>last</i> year for:		As determined <i>this</i> year for:	
	2016	2017	2017	2018
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

\*Male natural mortality was estimate

The northern rock sole exploitation rate has ranged from less than 0.01 to 0.04 between 1993 and 2017 2008 (Figure 4.2). The southern rock sole exploitation rate has ranged between 0.005 and 0.02 (Figure 4-1). Both have a generally declining trend since 2008.

## Southern Rock Sole

Quantity	As estimated or specified last year for:		As estimated or recommended this year for:	
	2018	2019	2019	2020
<i>M</i> (natural mortality rate; female, male)	0.2, 0.262*	0.2, 0.262*	0.2, 0.262*	0.2, 0.262*
Tier				
Projected total (age 0+) biomass (t)	138,620	139,907	140,338	141,681
Projected Female spawning biomass (t)	71,913	69,178	71,433	69,295
$B_{100\%}$	93,583	93,583	93,518	93,518
$B_{40\%}$	37,433	37,433	37,407	37,407
$B_{35\%}$	32,754	32,754	32,731	32,731
$F_{OFL}$	0.326	0.326	0.326	0.326
$maxF_{ABC}$	0.271	0.271	0.271	0.271
$F_{ABC}$	0.271	0.271	0.271	0.271
OFL (t)	25,333	25,689	25,779	26,383
maxABC (t)	21,424	21,717	21,794	22,298
ABC (t)	21,424	21,717	21,794	22,298
Status	As determined last year for:		As determined this year for:	
	2016	2017	2017	2018
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

\*Male natural mortality was estimated

### Responses to SSC and Plan Team Comments on Assessments in General

NA

### Responses to SSC and Plan Team Comments Specific to this Assessment

*Spawning biomass reference levels were based on average age-0 recruitment for the period 1977-2017. Reference points should not include terminal years since there are no data for age-0 recruits in 2017, and the Plan Teams have developed a method for determining how many terminal years to remove from the reference point calculations, which should be applied in the future.*

This was addressed in this year's projections. The terminal year for age-0 recruits in the projections was 2015.

*In the next full assessment in four years, the author is requested to provide an equation and rationale for the input sample size calculation applied to the conditional age-at-length data; it was not clear how this calculation was performed or why this would be a function of the length samples and not purely the age samples.*

This will be addressed in the next full assessment.

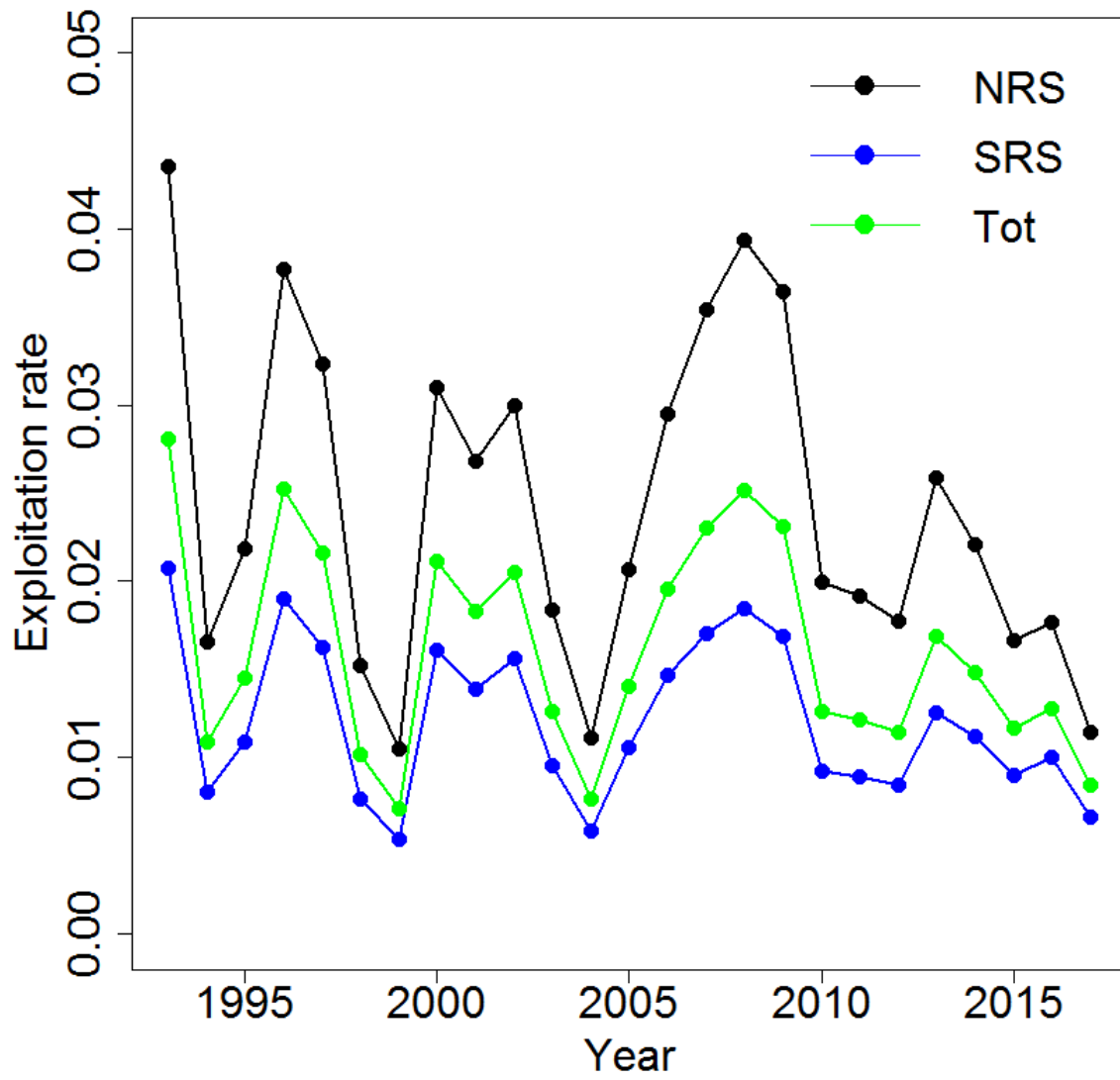


Figure 4.2. Catch divided by age 0+ total biomass from the age-structured model for Gulf of Alaska northern and southern rockfish from 1991-2017.