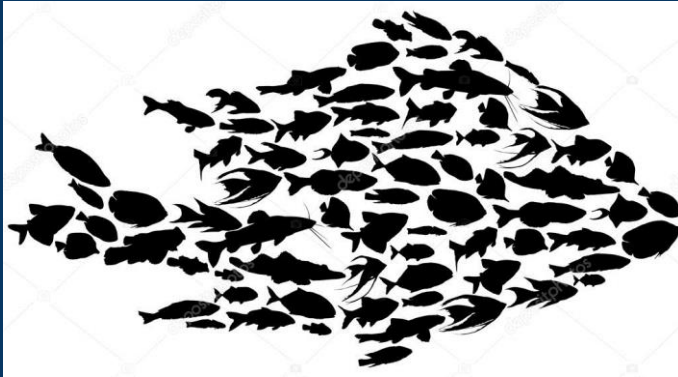


# Stock Complex Evaluation

[GMT Report 2](#) & Supplemental GMT Report 3



In September 2021, the Council requested the Groundfish Management Team (GMT):

*“prepare a comprehensive evaluation of mortality estimates compared to harvest specification contributions of the species managed in stock complexes”*

# What is a “stock complex”?

- [50 CFR 600.310\(d\)\(2\)](#)
- Stocks that require conservation and management can be grouped into stock complexes.
- A “stock complex” is a tool to manage a group of stocks within an FMP:
  - At the time a stock complex is established, the FMP should provide, to the extent practicable, a full and explicit description of the proportional composition of each stock in the stock complex.
  - Stocks may be grouped into complexes for various reasons, including
    - where stocks in a multispecies fishery cannot be targeted independent of one another;
    - where there is insufficient data to measure a stock's status relative to SDC; or
    - when it is not feasible for fishermen to distinguish individual stocks among their catch.

# What is a “stock complex”?

- A “stock complex” is a tool to manage a group of stocks within an FMP:
  - Where practicable, the group of stocks should have:
    - a similar geographic distribution,
    - life history characteristics, and
    - vulnerabilities to fishing pressure
    - such that the impact of management actions on the stocks is similar.
  - The vulnerability of individual stocks should be considered when determining if a particular stock complex should be established or reorganized, or if a particular stock should be included in a complex.

# Current Stock Complexes

- Created prior to the National Standard 1 revisions
- Are an evolution of what used to be a “Sebastes” complex in the 1990s
- Many of the guidelines outlined on the previous 2 slides were not considered during their creation
- Do not have practicable indicator stocks
  - stocks with measurable status determination criteria that can be used to help manage and evaluate more poorly known stocks that are in a stock complex
- Many of the complexes have a mixture of vulnerability scores and OFL contribution proportions

# Vulnerability ([2020 SAFE Document](#); Sec. 2.1.1)

- The Productivity-Susceptibility Assessment (PSA) approach of [Patrick et al. \(2009\)](#) was used to characterize vulnerability and has two components:
  - 1) productivity as defined by life history traits, and
  - 2) susceptibility to current fishing practices ([Cope, et al. 2011](#)).
- Each vulnerability component is comprised of several attributes (10 productivity & 12 susceptibility attributes) and the weighted mean score of all attributes defines the overall productivity and susceptibility score.

# Vulnerability

- [Cope et al. \(2011\)](#) established vulnerability reference points of assessed and unassessed West Coast groundfish stocks to determine vulnerability groups as follows:
  - $V > 2.2$  indicate species of major concern
  - $2.0 \leq V < 2.2$  indicate species of high concern
  - $1.8 \leq V < 2.0$  indicate species of medium concern
  - $V \leq 1.8$  indicate species of low concern
- Rockfishes & elasmobranchs showed the highest vulnerabilities ( $>2.0$ ), with the deepest residing members of those groups often the most vulnerable,
  - though there were several species of nearshore rockfish (China, quillback, & copper rockfish) with some of the highest scored vulnerabilities.
- Flatfishes in general showed the lowest vulnerabilities.

# Summary Data on the Current Complexes



## Data Sources:

GEMM Tables

Harvest Specifications Database

SAFE Report

Stock Assessment Documents

Briefing Book Documents

Federal Regulations



# Nearshore Rockfish north of 40° 10' N lat. (Table 1)

Species	Category	Vulnerability Score	Avg. OFL contribution (2017-2020, mt)	Avg. OFL contribution (2017-2020, percent)	Avg. over/under OFL contribution (2017-2020, mt)	# of years over OFL (2017-2020)
<b>Copper Rockfish</b>	<b>2</b>	<b>2.27</b>	<b>11.74</b>	<b>11.56%</b>	<b>8.69</b>	<b>4</b>
<b>Quillback Rockfish</b>	<b>3,2</b>	<b>2.22</b>	<b>7.37</b>	<b>7.27%</b>	<b>11.94</b>	<b>4</b>
<i>Black and Yellow Rockfish</i>	3	1.70	0.01	0.01%	0.04	4
<i>Olive Rockfish</i>	3	1.87	0.32	0.31%	0.59	4
<i>Kelp Rockfish</i>	3	1.62	0.01	0.01%	0.00	1
<i>Brown Rockfish</i>	2	1.99	2.06	2.03%	-1.19	0
<i>China Rockfish</i>	2	2.23	29.00	28.58%	-17.73	0
<i>Grass Rockfish</i>	3	1.89	0.66	0.65%	-0.22	0
<i>Treefish</i>	3	1.73	0.22	0.21%	-0.22	0
<i>Blue/Deacon Rockfish (WA)</i>	3	2.01	8.55	9.37%	N/A	N/A
<i>Blue/Deacon Rockfish (CA)</i>	3	2.01	31.70	34.73%	N/A	N/A

# Nearshore Rockfish south of 40° 10' N lat. (Table 2)

Species	Category	Vulnerability Score	Avg. OFL contribution (2017-2020, mt)	Avg. OFL contribution (2017-2020, percent)	Avg. over/under OFL contribution (2017-2020, mt)	# of years over OFL (2017-2020)
<b>Quillback Rockfish</b>	<b>2</b>	<b>2.22</b>	<b>5.39</b>	<b>0.41%</b>	<b>1.39</b>	<b>4</b>
China Rockfish	2	2.23	14.07	1.06%	-0.99	2
<i>Treefish Rockfish</i>	3	1.73	13.23	1.00%	-0.96	2
Black & Yellow Rockfish	--	1.70	27.54	2.08%	-6.52	1
<i>Blue Rockfish</i>	2,3	2.01	308.40	23.30%	-131.35	0
Brown Rockfish	2	1.99	175.95	13.29%	-82.64	0
Copper Rockfish	2	2.27	319.23	24.11%	-153.13	0
Gopher Rockfish	2	1.76	148.10	11.19%	-76.49	0
<i>Grass Rockfish</i>	3	1.89	59.63	4.50%	-46.04	0
<i>Kelp Rockfish</i>	3	1.62	27.66	2.09%	-20.13	0
<i>Olive Rockfish</i>	3	1.87	224.64	16.97%	-178.73	0

# Shelf Rockfish north of 40° 10' N lat. (Table 3)

Species	Category	Vulnerability Score	Avg. OFL contribution (2017-2020, mt)	Avg. OFL contribution (2017-2020, percent)	Avg. over/under OFL contribution (2017-2020, mt)	# of years over OFL (2017-2020)
<b>Vermilion Rockfish</b>	<b>1,2</b>	<b>2.05</b>	<b>9.71</b>	<b>0.42%</b>	<b>12.66</b>	<b>4</b>
<i>Starry Rockfish</i>	3	2.09	0.00	0.00%	0.03	4
<i>Tiger Rockfish</i>	3	1.73	0.98	0.04%	1.22	4
<i>Stripetail Rockfish</i>	3	1.80	40.40	1.75%	6.14	3
<i>Redstripe Rockfish</i>	3	2.16	269.91	11.72%	-229.51	2
<i>Chilipepper</i>	1	1.35	198.00	8.59%	-58.38	1
<i>Flag Rockfish</i>	3	1.97	0.08	0.00%	-0.04	1
<i>Swordspine Rockfish</i>	3	1.94	0.00	0.00%	0.01	1
<i>Bocaccio Rockfish</i>	3	1.93	284.01	12.33%	-181.92	0
<i>Cowcod Rockfish</i>	3	2.13	0.40	0.02%	-0.28	0
<i>Greenstriped Rockfish</i>	2	1.88	1,308.05	56.77%	-1,263.59	0

# Shelf Rockfish south of 40° 10' N lat. (Table 4)

Species	Category	Vulnerability Score	Avg. OFL contribution (2017-2020, mt)	Avg. OFL contribution (2017-2020, percent)	Avg. over/under OFL contribution (2017-2020, mt)	# of years over OFL (2017-2020)
<b>Squarespot Rockfish</b>	<b>2</b>	<b>1.86</b>	<b>11.09</b>	<b>0.58%</b>	<b>5.57</b>	<b>3</b>
<b>Vermilion Rockfish</b>	<b>1,2</b>	<b>2.05</b>	<b>269.28</b>	<b>14.04%</b>	<b>88.36</b>	<b>3</b>
<i>Tiger Rockfish</i>	3	2.06	0.04	0.00%	0.25	4
<i>Stripetail Rockfish</i>	3	1.80	23.62	1.23%	-0.36	2
<i>Silvergray Rockfish</i>	3	2.02	0.53	0.03%	-0.06	1
<i>Bronzespotted Rockfish</i>	3	2.12	3.63	0.19%	-3.56	0
<i>Flag Rockfish</i>	3	1.97	23.42	1.22%	-14.41	0
<i>Greenblotched Rockfish</i>	3	2.12	23.12	1.21%	-21.61	0
Greenspotted Rockfish	2	1.98	78.46	4.09%	-60.92	0
Greenstriped Rockfish	2	1.88	239.95	12.51%	-236.68	0

# Slope Rockfish north of 40° 10' N lat. (Table 5)

Species	Category	Vulnerability Score	Avg. OFL contribution (2017-2020, mt)	Avg. OFL contribution (2017-2020, percent)	Avg. over/under OFL contribution (2017-2020, mt)	# of years over OFL (2017-2020)
<b>Aurora Rockfish</b>	<b>1</b>	<b>2.10</b>	<b>17.49</b>	<b>0.90%</b>	<b>13.73</b>	<b>4</b>
<i>Redbanded Rockfish</i>	3	2.02	45.27	2.34%	0.73	3
<i>Blackgill Rockfish</i>	3	2.08	4.70	0.24%	2.57	2
Rougheye/ Blackspotted Rockfish	2	2.27	215.53	11.15%	-31.71	2
<i>Bank Rockfish</i>	3	2.02	17.23	0.89%	-14.72	0
Sharpchin Rockfish	2	2.05	355.80	18.40%	-334.83	0
<i>Shortraker Rockfish</i>	3	2.25	18.70	0.97%	-7.06	0
Splitnose Rockfish	1	1.82	1066.10	55.15%	-896.29	0
<i>Yellowmouth Rockfish</i>	3	1.96	192.44	9.95%	-172.72	0

# Slope Rockfish south of 40° 10' N lat. (Table 6)

Species	Category	Vulnerability Score	Avg. OFL contribution (2017-2020, mt)	Avg. OFL contribution (2017-2020, percent)	Avg. over/under OFL contribution (2017-2020, mt)	# of years over OFL (2017-2020)
Aurora Rockfish	1	2.10	74.54	8.86%	-67.5	0
<i>Bank Rockfish</i>	3	2.02	503.21	59.79%	-470.9	0
Blackgill Rockfish	2	2.08	159.25	18.92%	-112.2	0
<i>Redbanded Rockfish</i>	3	2.02	10.40	1.24%	-7.8	0
Rougheye/ Blackspotted Rockfish	2	2.27	4.39	0.52%	-4.1	0
Sharpchin Rockfish	2	2.05	88.95	10.57%	-84.5	0
<i>Shortraker Rockfish</i>	3	2.25	0.10	0.01%	-0.06	0
<i>Yellowmouth Rockfish</i>	3	1.96	0.84	0.10%	-0.7	0

## Other Flatfish (Table 7)

Species	Category	Vulnerability Score	Avg. OFL contribution (2017-2020, mt)	Avg. OFL contribution (2017-2020, percent)	Avg. over/under OFL contribution (2017-2020, mt)	# of years over OFL (2017-2020)
<i>Flathead Sole</i>	3	1.26	4.6	0.05%	-4.59	1
<i>Butter Sole</i>	3	1.18	8.2	0.09%	-5.26	0
<i>Curlfin Sole</i>	3	1.23	35.0	0.37%	-8.71	0
<i>Pacific Sanddab</i>	3	1.25	4,801.0	50.80%	-4,638.70	0
<i>Rex Sole</i>	2	1.28	3,762.7	39.81%	-3,226.95	0
<i>Rock Sole</i>	3	1.42	66.7	0.71%	-61.28	0
<i>Sand Sole</i>	3	1.23	773.2	8.18%	-745.47	0

# Species With New Overfished Declaration

- Previously, when a species is declared overfished, it has been removed from a complex (e.g. canary rockfish)
  - And managed with individual harvest specifications (ACL)
- **The GMT recommends the council continue to give additional consideration for any species newly designated as overfished**



# Considerations if Species Removed from Stock Complex

- Off-the-top deductions and fishery harvest guidelines would need to be developed for species that were no longer part of a complex
  - Some of the information to inform the off the top deductions may be difficult to compile at the species level, given that impacts have been tracked to the complex level
- Similarly, for the IFQ fishery, mechanisms for distributing species to IFQ owners would need to be developed for the species removed from the complex, as well as the remainder of the complex

# Summary of Species GMT Identified for Further Consideration

- Nearshore Rockfish north of 40° 10' N lat.: **copper and quillback rockfish**
- Nearshore Rockfish south of 40° 10' N lat.: **quillback rockfish**
- Shelf Rockfish north of 40° 10' N lat.: **vermilion rockfish**
- Shelf Rockfish south of 40° 10' N lat.: **squarespot & vermilion/sunset rockfish**
- Slope Rockfish north of 40° 10' N lat.: **aurora rockfish**
- Slope Rockfish south of 40° 10' N lat.: no species of immediate concern
- Other flatfish: no species of immediate concern

# If Council Identifies Species that Needs to be Addressed

GMT sees two potential pathways for inclusion in 2023-2024 process:

- Remove species from complex
  - Set new species-specific OFL, ABC, & ACL
  - Set OFL, ABC, & ACL for remainder of complex
  - Determine off-the-top deductions, between & within sector allocations, state sharing, etc.
  - Develop management measures
    - Commercial trip limits
    - Recreational bag/sub-bag limits
  - GMT sees as more complicated pathway

# If Council Identifies Species that Needs to be Addressed

GMT sees two potential pathways, for inclusion in 2023-2024 process:

- Leave in complex, but set species-specific management measures
  - Species specific harvest guideline
  - Commercial trip limits
  - Recreational bag/sub-bag limits
  - Depth restrictions
  - GMT sees as less complicated pathway

# Further Examination of Stock Complexes

Council may want to do a comprehensive examination of stock complexes (*outside of the 2023-2024 spex process*)

- Update susceptibility part of the productivity-susceptibility analysis
  - Reflect changes in fishery management since 2011
  - Once non-trawl RCA item is completed
- Indicator stocks
- Inflater stocks
- OFL apportionment among management areas
- Stocks without species-specific OFL contributions
  - And more than negligible annual mortality
- Potential other considerations

# Questions