

2022 Fishing Effects Evaluation on Essential Fish Habitat

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JOINT GROUND FISH
PLAN TEAM MEETING
SEPTEMBER 19, 2022



Atka mackerel from the 2013 GOA IERP cruise



OUTLINE

- Brief Overview of EFH 5-Year Review
- Fishing Effects Results
- Stock Author Assessments
- Groundfish Examples



Octopus from the 2009 EBS trawl survey



EFH 5-YEAR REVIEW

- 1. EFH descriptions and identification (maps)**
- 2. Fishing activities that may adversely affect EFH**
3. Non-MSA fishing activities that may adversely affect EFH
- 4. Non-fishing activities that may adversely affect EFH**
5. Cumulative impacts analysis
- 6. EFH conservation and enhancement recommendations**
- 7. Prey species list and locations**
- 8. Habitat areas of particular concern (HAPC) identification**
- 9. Research and Information needs**
- 10. Review EFH every 5 years**



FISHING EFFECTS

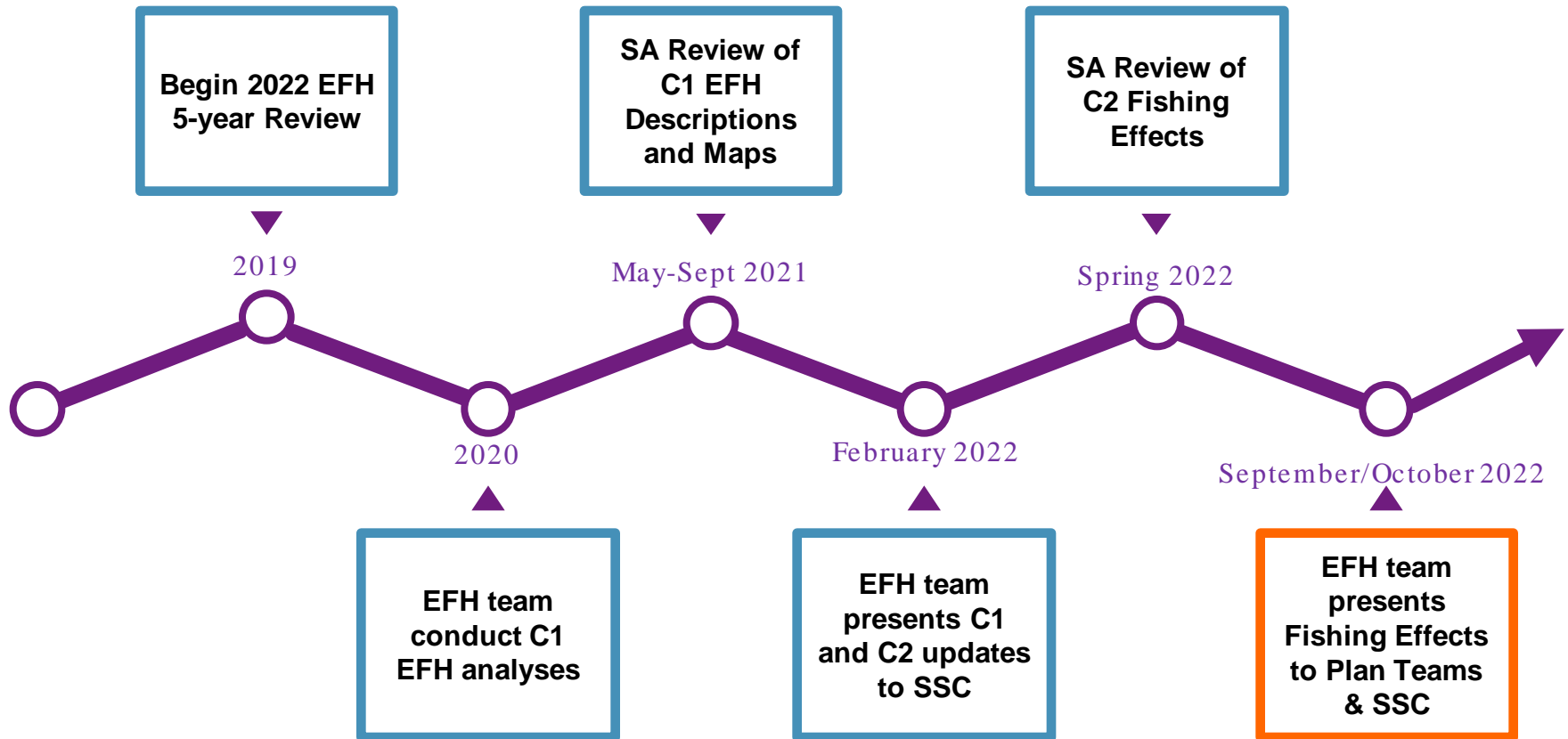
EFH component 2 - Fishing activities that may adversely affect EFH

EFH regulations (50 CFR 600.815(a)(2)):

- (i) *Evaluation*: Each FMP must contain an evaluation of the potential adverse effects of fishing on EFH designated under the FMP.
- (ii) *Minimizing adverse effects*: Each FMP must minimize to the extent practicable adverse effects from fishing on EFH. Councils must act to prevent, mitigate, or minimize any adverse effects from fishing, to the extent practicable, if there is evidence that a fishing activity adversely affects EFH in a manner that is **more than minimal and not temporary in nature**, based on the evaluation.



2022 Fishing Effects Evaluation on EFH



2022 EFH FISHING EFFECTS (FE) EVALUATION

FE Evaluation Process:

Fishing effects
model output

Fishing effects
analysis for
species-specific
core EFH areas

SSC Subcommittee Process
(December 2016)

Thresholds for providing FE assessments:

- Stock below MSST
- $\geq 10\%$ CEA disturbed
- Qualitative assessment preferred

Stock author
assessment of
species-specific
fishing effects

Plan Team and
SSC review;
Council review



Chapter 3, Page 29 & Appendix 4



Orientation to EFH Component 2 Documents

EFH Fishing Effects Evaluation Discussion Paper is the main linked document for review at this meeting.

Three regional folders with materials for the EFH component 2 FE evaluation:

1. Aleutian Islands FE Species
2. Eastern Bering Sea FE Species
3. Gulf of Alaska FE Species

Two EFH component 1 documents supporting the EFH component 2 FE evaluation:

1. Supplemental Analysis for the SDM Ensemble EFH Maps (September 2022)
2. Discussion Paper on Advancing EFH Descriptions and Maps (January 2022, and revised March 2022) with methods overview and results summary

Three regional collections of EFH component 1 methods and results:

1. Aleutian Islands EFH Descriptions and Maps
2. Bering Sea EFH Descriptions and Maps
3. Gulf of Alaska EFH Descriptions and Maps



2022 Fishing Effects Evaluation on EFH

EFH Fishing Effects Evaluation Discussion Paper:

- **Chapter 1** Introduction to FE on EFH
- **Chapter 2** 2022 FE Model Description
 - FE model was presented to the SSC in February and discussed with the JGPT in October 2021
- **Chapter 3** Stock Author FE Assessment Process
 - The stock author process was presented to SAs in April
- **Chapter 4** Results
 - 4.1 FE Analysis Results and Summary of Stock Author Concerns
 - 4.2 Species with Reported Data Limitations
 - 4.3 Species with $\geq 10\%$ core EFH area (CEA) Disturbed
 - 4.4 FE assessments for species with $\geq 10\%$ CEA Disturbed
- **Appendix 5**
 - Stock Author Fishing Effects Assessment and Responses



2022 Fishing Effects Evaluation on EFH

Big Picture Questions:

1. Does the 2022 FE evaluation incorporate newly available information to provide an appropriate evaluation of the potential adverse effects of fishing on EFH for the 2022 EFH 5 year review?
2. Does the 2022 FE evaluation support the continued conclusion that adverse effects of fishing activity on EFH are minimal and temporary in nature?
3. Does the Plan Team or SSC have guidance on evaluating FE beyond what is provided in this document for the species identified with data limitations?

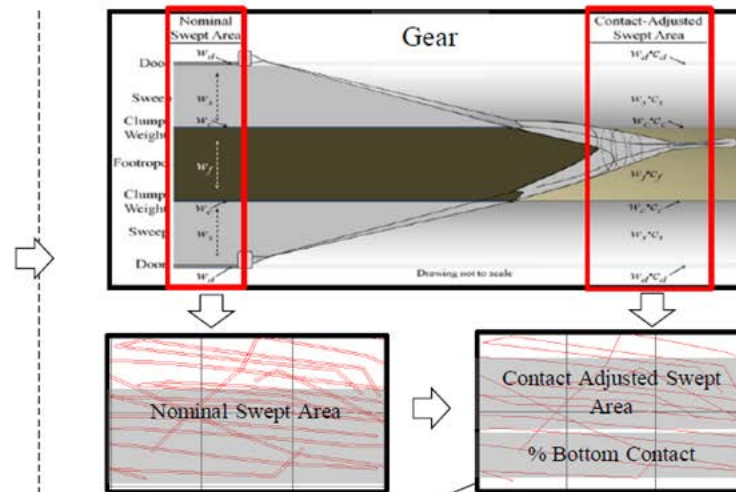
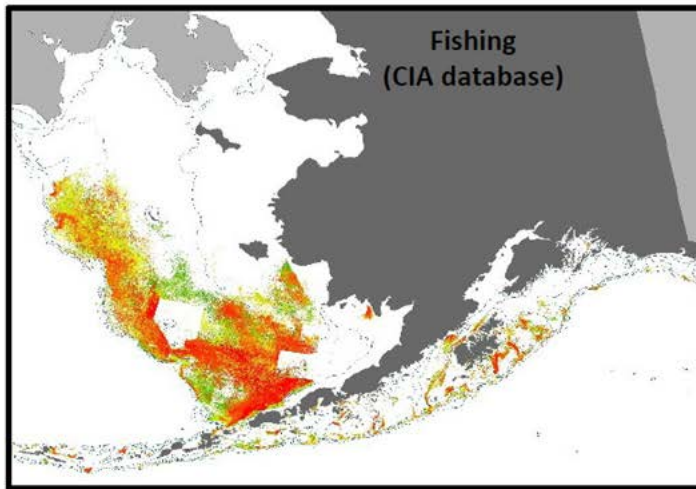
We are seeking feedback from the Joint Groundfish Plan Team for stocks that were flagged with insufficient information to determine if fishing effects are more than minimal and not temporary.



Executive Summary, page 3 & Chapter 4 page 31



FISHING EFFECTS MODEL OVERVIEW



$$H_{t+1} = H_t(1 - I'_t) + h_t\rho'_t$$

H : habitat undisturbed from fishing

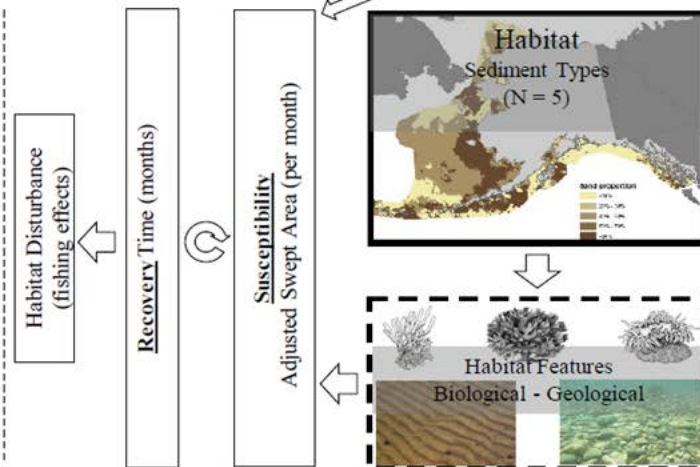
h : habitat disturbed from fishing

I' : monthly impact rate

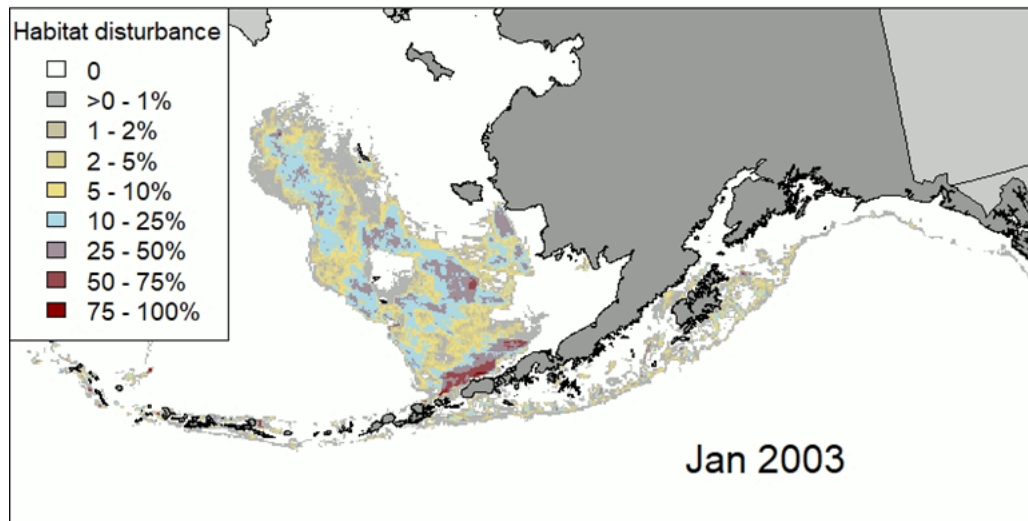
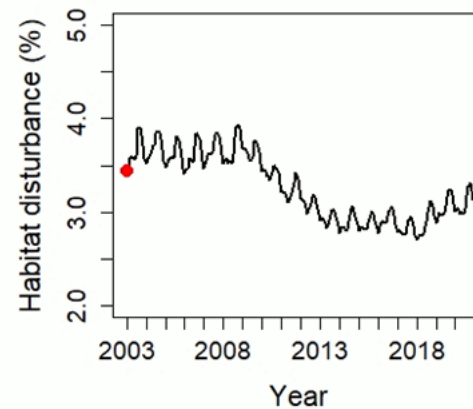
ρ' : monthly recovery rate



Chapter 2, page 15



FISHING EFFECTS MODEL OUTPUT



FISHING EFFECTS MODEL NOTES

Changes to the Fishing Effects model since the 2017 EFH Review:

- Corrected model code
- Included fishing data up to 2020
- Incorporated new information on gears and habitat recovery
 - Longline nominal width: 2 m -> 6 m (Welsford et al. 2014)
 - GOA rockfish trawls contact adjustment: 0 -> 0.2 (public testimony)

- New EFH maps



EFH MAPS

- **EFH component 1** requires species maps for the fishery management unit of the FMP (50 CFR 600.805(b)), where *some or all* portions of the species' geographic range is mapped (50 CFR 600.815(a)(1)(iii)(1)).
- Species distribution model (**SDM**) ensemble EFH maps for the 2022 5-year Review.
- EFH is the upper 95% of the spatial domain of occupied habitat.
- Core EFH area (**CEA**) is the upper 50% of the area occupied habitat applied to the **EFH component 2 Fishing Effects Analysis**.

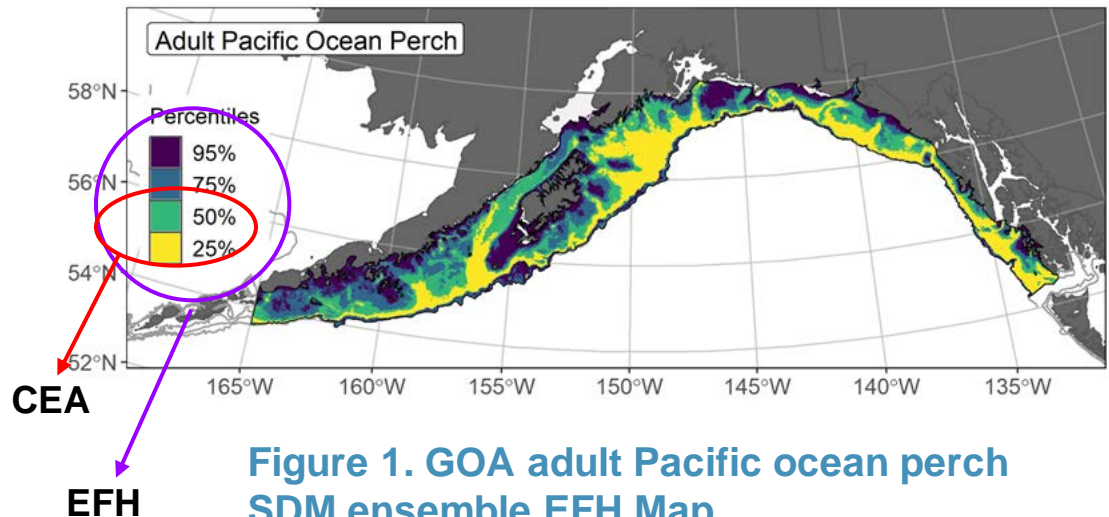
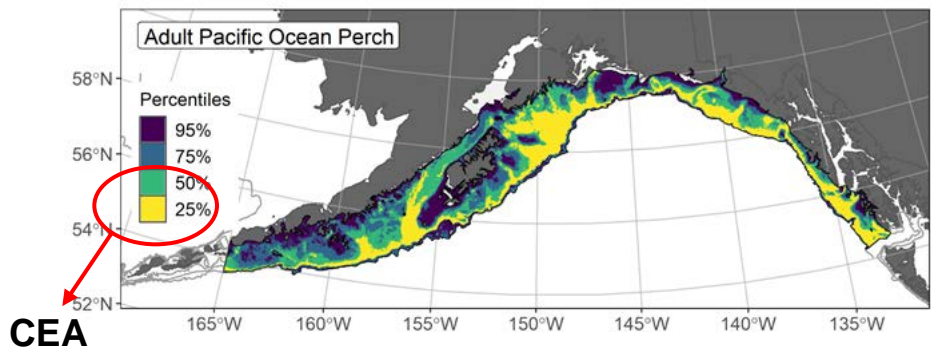


Figure 1. GOA adult Pacific ocean perch SDM ensemble EFH Map

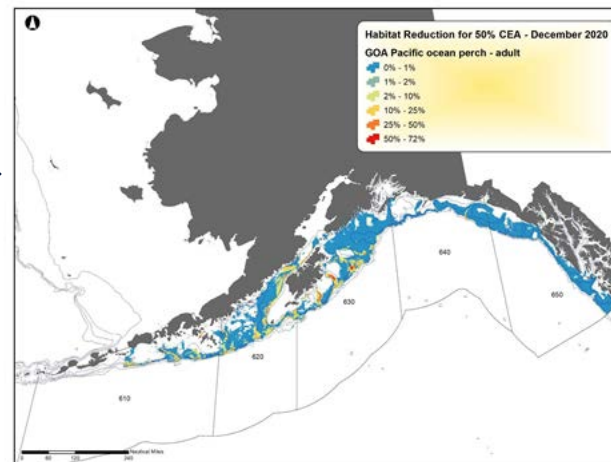


ASSESSING IMPACTS TO STOCKS

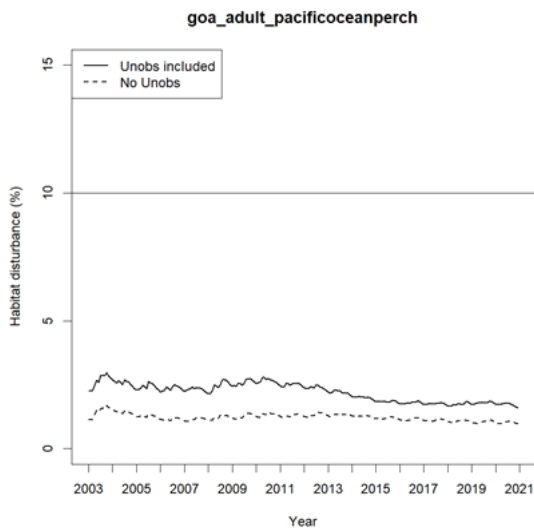
CEA from SDM ensemble EFH map



Overlay with Fishing Effects output:



Habitat disturbance to GOA Pacific ocean perch: (top solid line = observed and unobserved fishing, bottom dashed line = observed fishing only)



FISHING EFFECTS MODEL RESULTS

16 species with $\geq 10\%$ CEA disturbed (all EBS):

- Arrowtooth flounder
- Atka mackerel
- Blackspotted/Rougheye rockfish complex
- Giant octopus
- Other flatfish complex species: Dover sole, Rex sole
- Northern rockfish
- Pacific ocean perch
- Sablefish
- Shortraker rockfish
- Shortspine thornyhead rockfish
- Skate complex species: Aleutian skate, Bering skate, Mud skate, Whiteblotched skate
- Tanner crab



Chapter 4.3, page 42 and Chapter 4.4, page 43 for stock author FE assessments



FISHING EFFECTS MODEL RESULTS

	Habitat disturbance		Habitat disturbance		Cause of species exceeding 10% in 2022 but not 2017 EFH review
	Nov 2016		Dec 2020		
	2017 SDM	2022 SDM	2017 SDM	2022 SDM	
EBS Aleutian skate	13.3%	13.5%	19.8%	20.3%	FE model code correction
EBS Tanner crab	11.1%	10.6%	11.4%	10.9%	FE model code correction
EBS Dover sole	13.0%	13.3%	20.1%	18.8%	FE model code correction
EBS Rex sole	12.5%	10.4%	14.6%	10.2%	FE model code correction
EBS Atka mackerel	10.7%	23.3%	10.6%	24.8%	FE model code correction
EBS Bering skate	12.6%	11.0%	14.0%	11.1%	FE model code correction
EBS Mud skate	12.7%	12.0%	18.9%	19.0%	FFE model code correction
EBS Northern rockfish	12.4%	12.1%	13.9%	14.9%	FE model code correction
EBS Pacific ocean perch	12.7%	11.6%	17.6%	12.8%	FE model code correction



Chapter 4.3, Table 9, page 46



FISHING EFFECTS MODEL RESULTS

	Habitat disturbance Nov 2016		Habitat disturbance Dec 2020		
	2017 SDM	2022 SDM	2017 SDM	2022 SDM	
					Cause of species exceeding 10% in 2022 but not 2017 EFH review
EBS Arrowtooth flounder	9.1%	13.0%	9.6%	10.3%	Updated SDMs
EBS Giant octopus	8.8%	10.4%	10.1%	13.5%	Updated SDMs
EBS Shortspine thornyhead	4.4%	7.0%	7.3%	11.4%	Increased fishing
EBS Shortraker rockfish	9.4%	5.2%	16.1%	11.5%	Increased fishing
EBS Sablefish	8.9%	8.8%	11.5%	12.4%	Increased fishing



EBS Whiteblotched skate
EBS Rougheye/ black spotted rockfish complex



Not assessed in
2017 Review

Chapter 4.3, Table 9, page 46



STOCK AUTHOR FE ASSESSMENT

Launched April 5th:

- Provided FE model results
 - FE disturbance maps
 - Time series graphs and CSV
 - 2017 to 2022 CEA map comparisons
- Collected responses through the Google Form as well as via email and followed up with stock authors and experts to produce the most accurate responses
- Asked for an FE assessment if
 - Stock was below the Minimum Stock Size Threshold (MSST)
 - Species had $\geq 10\%$ CEA disturbance
 - The SA preferred a qualitative assessment

THANK YOU, Stock Authors for your review and assessment!!



Species with a Quantitative FE Assessment

Species with Quantitative Assessments (All EBS)	% Habitat Disturbed	SA FE Assessment (Found in Appendix 5)	Elevated for mitigation?
Arrowtooth flounder	10.3%	p. 137	No
Blackspotted/Rougheye rockfish complex	19.9%	p. 144	No
Kamchatka flounder	9.1%	p. 147	No
Northern rockfish	14.9%	p. 150	No
Dover sole	18.8%	p. 151	No
Rex sole	12.0%	p. 151	No
Pacific ocean perch	12.8%	p. 158	No
Shortraker rockfish	11.5%	p. 162	No
Shortspine thornyhead rockfish	11.4%	p. 155	No

Species with a FE Qualitative Assessment

Species with Qualitative Assessments (All EBS)	% Habitat Disturbed	SA FE Assessment (Found in Appendix 5)	Elevated for mitigation?
Atka mackerel	24.8%	p. 142	No
Giant octopus	13.5%	p. 145	No
Sablefish	12.4%	p. 159	No
Aleutian skate	20.3%	p. 167	No
Bering skate	11.1%	p. 167	No
Mud skate	19.0%	p. 167	No
Whiteblotched skate	20.8%	p. 167	No

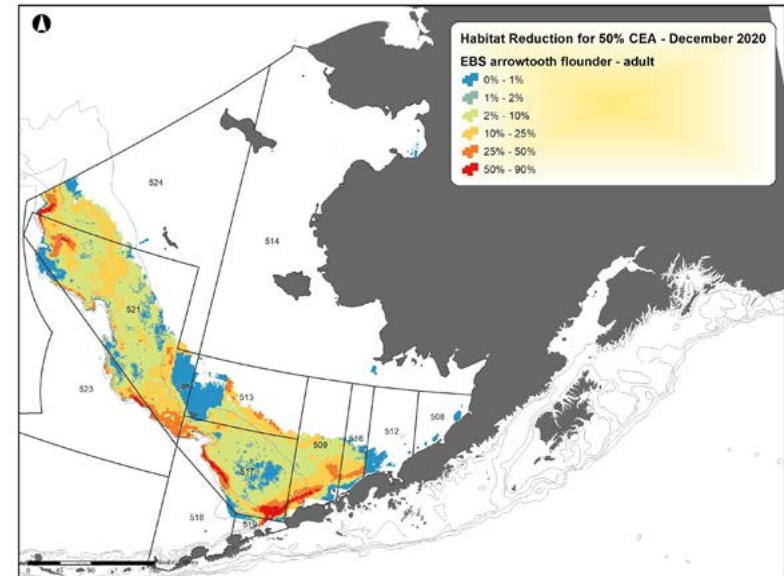


Species with Qualitative Assessments

Species with Qualitative Assessments	% Habitat Disturbed	SA FE Assessment (Found in Appendix 5)	Elevated for mitigation?
GOA Atka mackerel	2.1%	p. 169	No
<i>GOA Other rockfish complex demersal subgroup</i>	0.7%	p. 173	No
<i>GOA Other rockfish complex slope subgroup</i>	1.1%	N/A	No
Greenstriped rockfish	0.0%	p. 177	Insufficient information
Pygmy rockfish	0.3%	p. 180	Insufficient information
Redbanded rockfish	1.3%	p. 181	Insufficient information
Silvergray rockfish	0.7%	p. 183	Insufficient information
GOA Spiny dogfish	0.0%	p. 185	Insufficient information
EBS Walleye pollock	8.2%	p. 167	No

EBS Arrowtooth Flounder FE Assessment

- 10.3% CEA disturbed
- No concerns with the SDM map or FE model
- Assessment: no correlations tests were significant
 - A close to significant relationship was between disturbance and the spawning stock biomass, however, ATF spawning takes place in deep water greater than 400 m so the impact would be unlikely to affect spawning
- Mitigation measures are not needed at this time



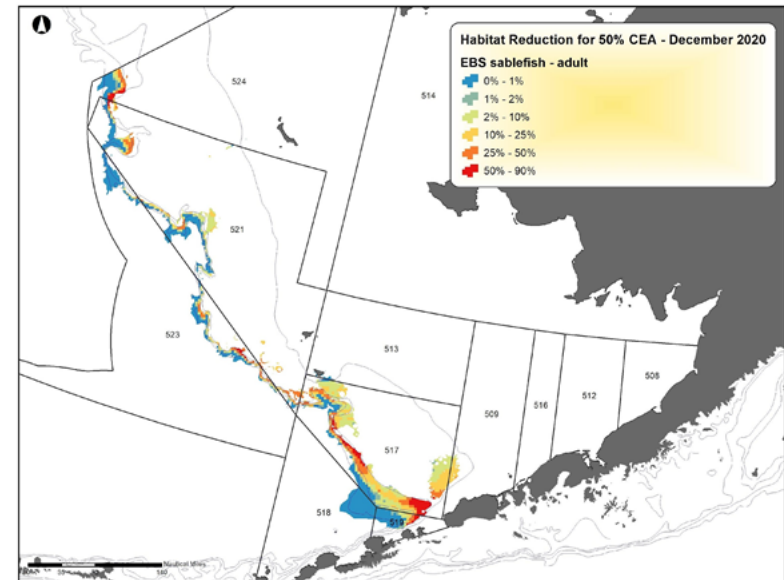
Habitat disturbance for 50% CEA of EBS arrowtooth flounder, December 2020

- **Did not elevate for mitigation measures – no further action**



EBS Sablefish FE Assessment

- 12.4% CEA disturbed
- Concerns with regional vs. population-wide determinations
- Suggested incorporating longline survey data in EFH mapping
- Assessment: “[T]he impact of BS fisheries on the sablefish population were generally limited to juvenile fish and unlikely to exceed the impact of natural mortality in the region.”
- Note: the impact of fishery disturbance on potential sablefish juvenile nursery areas should not be discredited



Habitat disturbance for 50% CEA of EBS sablefish, December 2020

- **Did not elevate for mitigation measures – no further action**



Species with Insufficient Information (from slide 22)

GOA Groundfish Species	% Habitat disturbed	2022 Adult records (N)	Summary of FE Assessment (Found in Appendix 5)
Greenstriped rockfish	0.0%	120	Insufficient data to compare life history parameters and fishing activities
Pygmy rockfish*	0.3%	63*	This species is exceedingly rare so FE are unlikely due to limited presence
Redbanded rockfish	1.3%	321	Without longline survey data [for the SDM map], the FE model may not adequately represent the impact on this species
Silvergray rockfish	0.7%	557	There is not enough information to determine if fishing effects are more than minimal and not temporary
Spiny dogfish*	0.0%	127	It is not possible to detect the fishing effects for this species



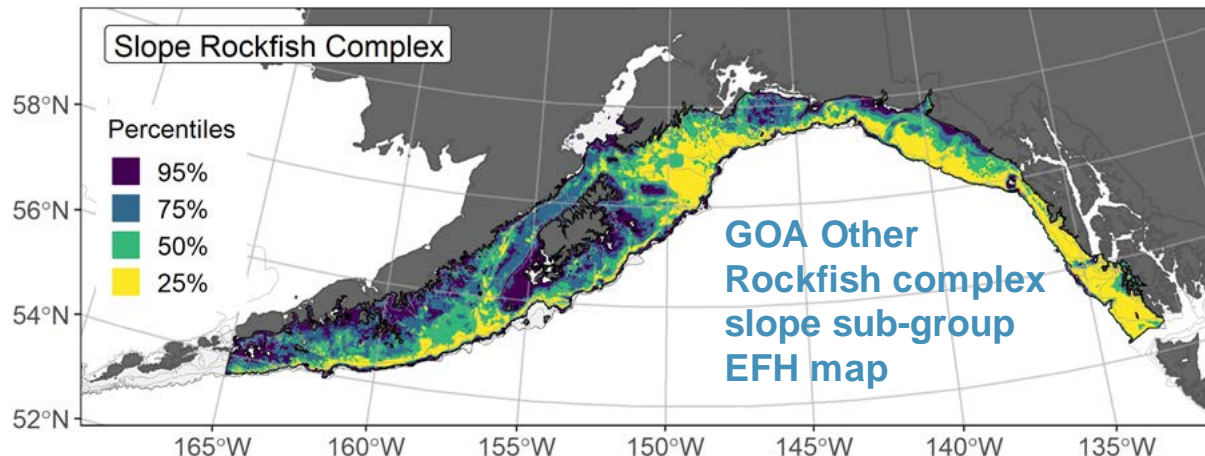
* Adults and subadults

Chapter 4.1, Table 5, page 36 and Appendix 5, Section 5.2.9, page 173



Mapping EFH for Species Complexes

- EFH component 1 requires individual species maps (50 CFR 600.805(b)). EFH may also be designated with justification for assemblages of species or life stages (50 CFR 600.815(a)(1)(iv)(E)).
- EFH maps for species complexes are an interim solution to represent the EFH of member species without an EFH map at this time.
- An additive composite map of individual species' SDM ensemble EFH maps.
- Advanced for EFH component 1 and provided as an option for the EFH component 2 FE evaluation.



NMFS Recommendations for GOA Other Rockfish Complex, Slope Sub-group

How to evaluate FE:

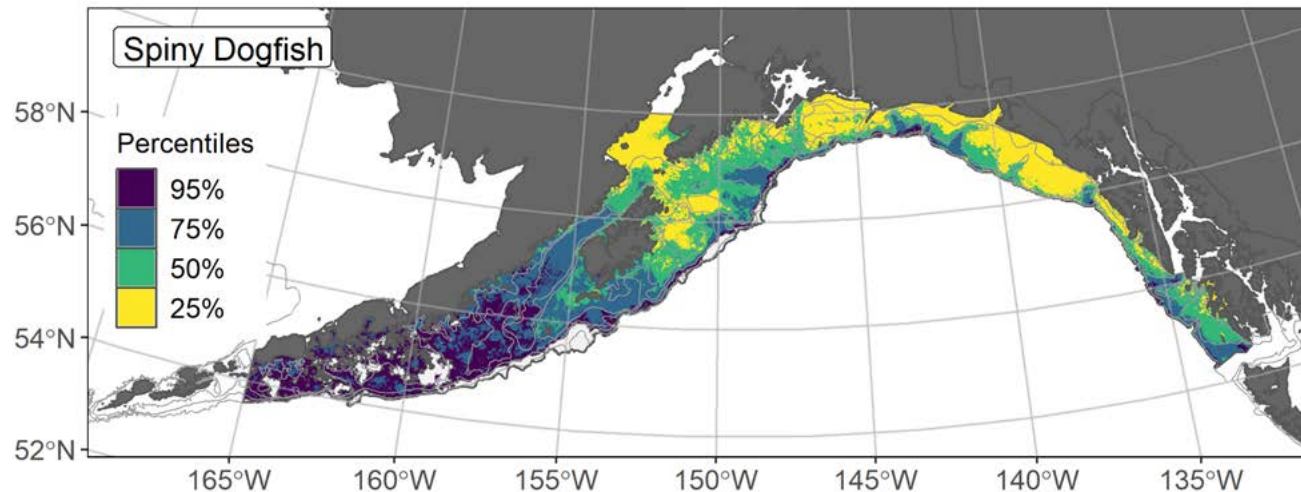
Chapter 4.2.1, page 40

- Use the CEA from the individual species EFH maps for Harlequin, Redstripe, and Sharpchin rockfishes
- Use the CEA from the sub-group complex map for Greenstriped, Pygmy, Redbanded, and Silvergray rockfishes
- Use the CEA from the sub-group complex map for slope sub-group species without an EFH map (e.g., darkblotched rockfish)

GOA Other rockfish complex, slope sub-group species	% Habitat disturbed	Recommendation
Harlequin rockfish	1.1%	Individual FE evaluation - No further action
Redstripe rockfish	1.2%	Individual FE evaluation - No further action
Sharpchin rockfish	1.2%	Individual FE evaluation - No further action
<i>All other rockfish species in the complex slope sub-group</i>	1.1%	Complex FE evaluation - No further action

NMFS Recommendations for GOA Spiny Dogfish

- Analysts revised the SDM ensemble EFH map by combining the subadult and adult spiny dogfish life stages in response to SA concerns.
- We recommend evaluating fishing effects to GOA spiny dogfish EFH using the FE model and the 50% CEA from the new EFH map.
- If the JGPT agrees, we can run this analysis for the SSC meeting.



STOCK AUTHOR FE ASSESSMENT

Main Groundfish Fishing Effects Evaluation Concerns:

- Additional data: Stock authors identified additional summer species distribution data sources that could be incorporated in the next iteration of SDM EFH maps.
 - EFH component 1 mapping requirements are “*some or all portions* of the geographic range of the species” 50 CFR 600.815(a)(1)(iii)(1)).
 - Research recommendation to develop methods to combine data sources in the SDM ensemble EFH maps for a subset of species (e.g., longline survey (LLS) data, fishery observer data, and optical image data from untrawlable habitats).
 - Interim step taken to understand this recommendation for LLS data (EFH map and LLS station historic haul location overlays *In* SDM EFH Supplemental Analysis Appendix 2 and Chapter 5).
- Spatial scale of FE evaluation: EFH maps were developed for the EBS and AI due to available data, however, some stocks are managed at the BSAI level (e.g., sablefish). Future work is required to combine areas for BSAI EFH maps.
- Temporal scale of FE evaluation: SSC process evaluates FE to EFH based on EFH maps for the summer season over a multiyear time series (e.g., GOA 1993-2019).
- Life history stages: Impacts on adults may differ from impacts on juvenile fish (e.g., extend FE evaluation to other life stages and improve life history information for EFH maps).
- Complexes vs individual species: There was concern that estimating impacts at the complex level may dilute impacts to individual species (e.g., GOA OR complex), although evaluating FE for the complex is a path ahead until more information is available.



Reported in Appendix 5 & SDM Concerns related to FE Evaluation discussed in SDM EFH Supplemental Analysis Chapter 5



JGPT Input on FE Evaluation

Big Picture Questions:

1. **Does the 2022 FE evaluation incorporate newly available information to provide an appropriate evaluation of the potential adverse effects of fishing on EFH for the 2022 EFH 5-year Review?**
 - i. The CEA maps, the FE model, and the SA assessments for each species used the best available science.

2. **Does the 2022 FE evaluation support the continued conclusion that adverse effects of fishing activity on EFH are minimal and temporary in nature?**
 - i. No species were identified as having fishing effects that are more than minimal and not temporary.
 - ii. Five GOA groundfish species were identified with insufficient information to make that decision (all below the $\geq 10\%$ threshold).



Executive Summary, page 3



JGPT Input on FE Evaluation

Big Picture Questions:

3. **Does the Plan Team have guidance on evaluating FE beyond what is provided for the species with data limitations?**
 - i. Does JGPT have input on the options for meeting the FE evaluation requirements for species with data limitations?
 1. See slide 27 & 28, sections 4.2.1 and 4.2.3 of the report
 - ii. Does the JGPT support the FE evaluations? Or, are there groundfish stocks where fishing effects are potentially more than minimal and not temporary (and should be elevated to the Council for possible mitigation)?



THANK YOU!

QUESTIONS?

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