2022 Fishing Effects Evaluation on Essential Fish Habitat

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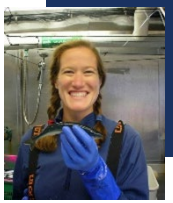
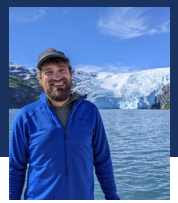
CRAB PLAN TEAM MEETING

SEPTEMBER 15, 2022





OUTLINE

- Brief Overview of EFH 5-Year Review
- Fishing Effects Results
- Stock Author and Expert Assessments
- Crab Highlights

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.

Chapter 1.1, page 13

2022 Fishing Effects Evaluation on EFH

2019 — Begin 2022 EFH 5-year Review

2020 — EFH team conduct C1 EFH analyses

May-Sept 2021 — SA Review of C1 EFH Descriptions and Maps

February 2022 — EFH team presents C1 and C2 updates to SSC

Spring 2022 — SA Review of C2 Fishing Effects

September/October 2022 — EFH team presents Fishing Effects to Plan Teams & SSC

2022 EFH FISHING EFFECTS (FE) EVALUATION

FE Evaluation Process:

Fishing effects model output

Fishing effects analysis for species-specific core EFH areas

Stock author assessment of species-specific fishing effects

Plan Team and SSC review; Council review

Orientation to EFH Component 2 Documents

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

Three folders with supporting files:

1. AI FE Species Results
2. EBS FE Species Results
3. GOA FE Species Results

These folders contain FE model maps, FE model output time series figures, EFH maps, and comparative maps of 50% core EFH area between 2017 and 2022.

Two EFH Component 1 documents are also linked and support the EFH Component 2 FE Evaluation review:

1. EFH SDM Updates September 2022 (Supplemental Analysis for the Species Distribution Model Ensemble EFH Maps for the 2022 5-year Review)
2. EFH SDM Update March 2022 (Discussion Paper on Advancing EFH Descriptions and Maps for the 2022 5-year Review; reviewed by SSC January 2022, and revised March 2022)

2022 Fishing Effects Evaluation on EFH

EFH Fishing Effects Evaluation Discussion Paper:

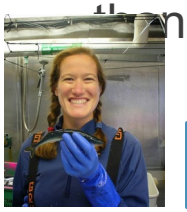
- **Chapter 1** Introduction to FE on EFH
- **Chapter 2** 2022 FE Model Description
  - FE model was presented to the SSC in February and discussed with the CPT in May
- **Chapter 3** Stock Author FE Assessment Process
  - The stock author process was presented to the CPT in May
- **Chapter 4** Results
  - 4.1 FE Analysis Results and Summary of Stock Author Concerns
  - 4.2 Species with Reported Data Limitations (***4.2.2 BSAI Crabs***)
  - 4.3 Species with ≥ 10% core EFH area (CEA) Disturbed
  - 4.4 FE assessments for species with ≥ 10% CEA Disturbed
- **Appendix 5**
  - Stock Author Fishing Effects Assessment and Responses

2022 Fishing Effects Evaluation on EFH

Big Picture Questions:

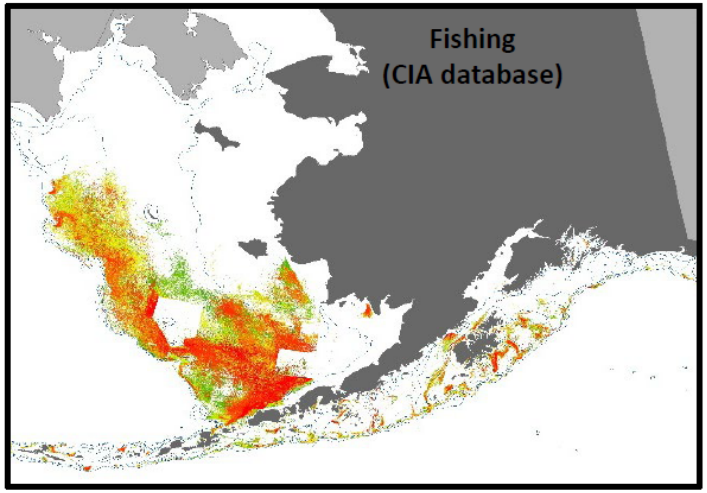
1. Does the 2022 FE evaluation incorporate newly available information to provide an appropriate evaluation of the potential adverse effects of fishing on EFH for the 2022 EFH 5 year review?
2. Does the 2022 FE evaluation support the continued conclusion that adverse effects of fishing activity on EFH 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?

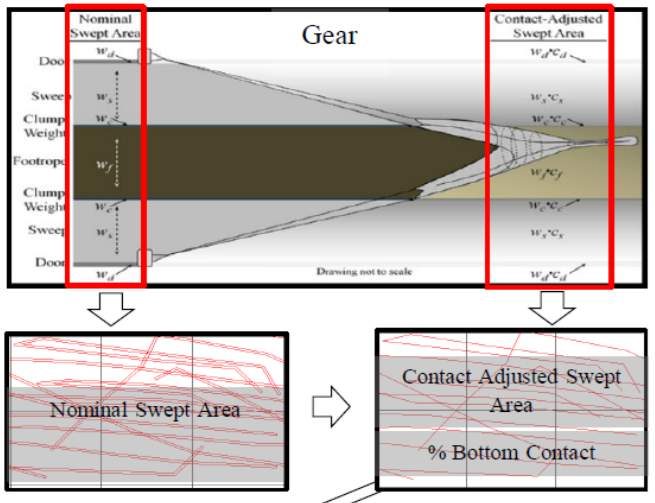
We are seeking feedback from the Crab Plan Team for stocks that were flagged with insufficient information to determine if fishing effects are more than minimal and not temporary.



Executive Summary, page 3 & Chapter 4 page 31

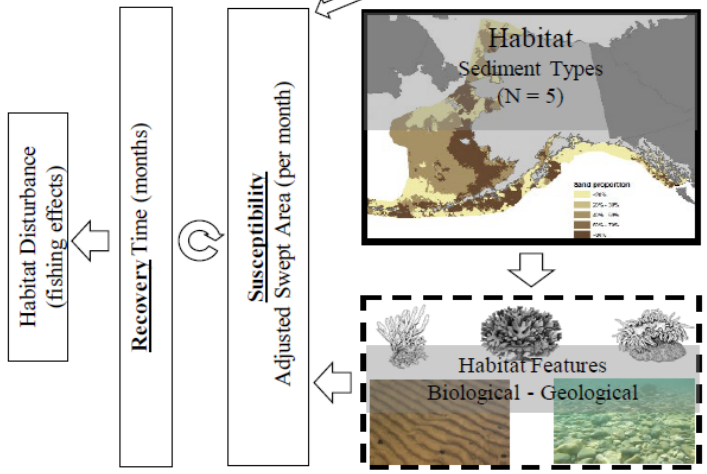
FISHING EFFECTS MODEL OVERVIEW





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

H: habitat undisturbed from fishing
h: habitat disturbed from fishing
I': monthly impact rate
ρ': monthly recovery rate



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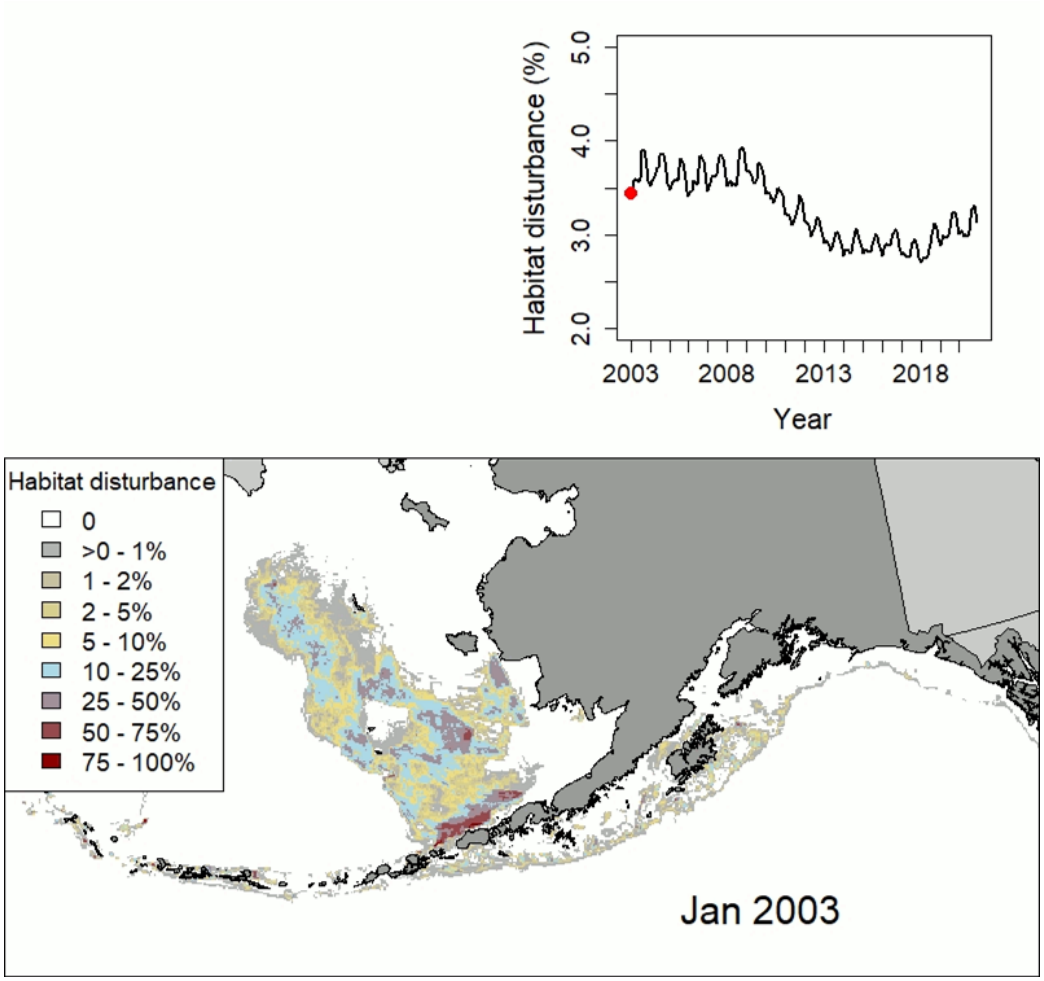
FISHING EFFECTS MODEL OUTPUT



Chapter 2, page 16

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

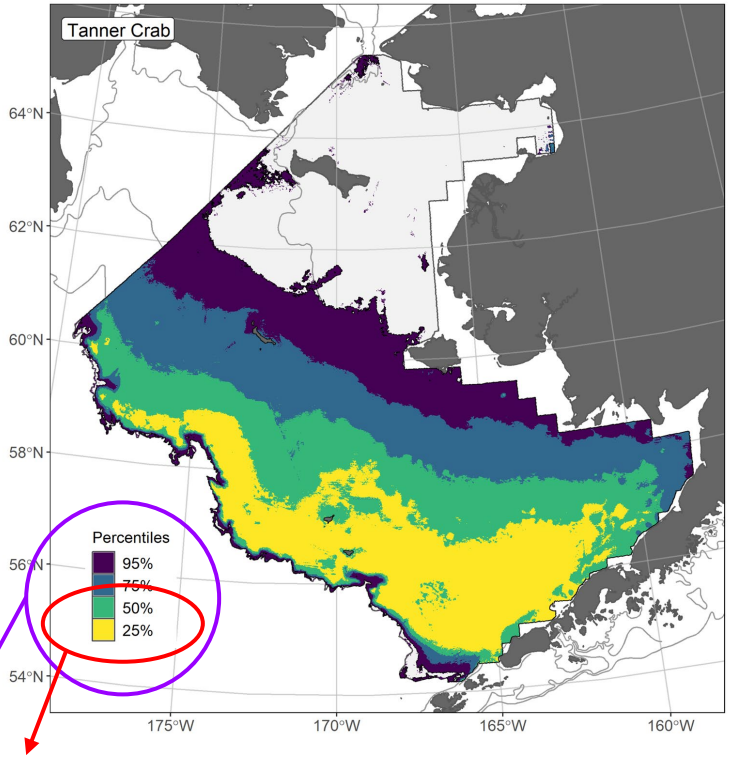
- New EFH maps

Chapter 2.3, page 26

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 of occupied habitat applied to the **EFH component 2 Fishing Effects Analysis.**

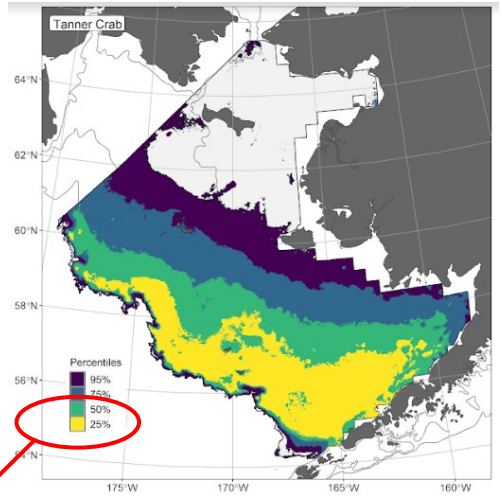
Figure 1. Tanner Crab SDM ensemble EFH component 1 Map



EFH Component 1 SDM EFH Discussion Paper

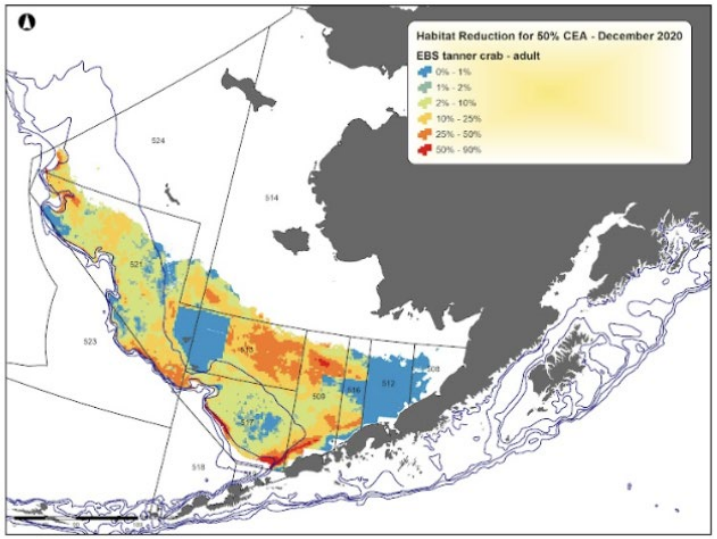
ASSESSING IMPACTS TO STOCKS

CEA from SDM ensemble EFH map



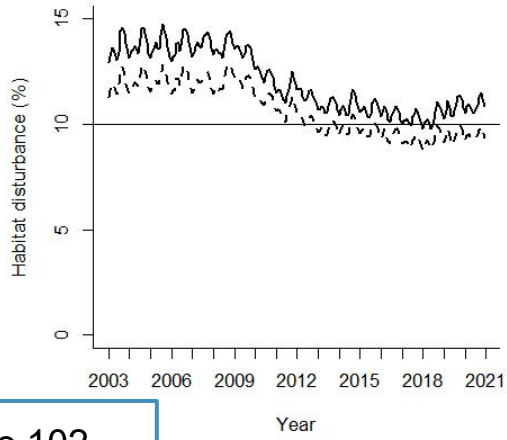
CEA

Overlay with Fishing Effects output:



ebs_all_tannercrab

Habitat disturbance to Tanner crab:
(top solid line = observed and unobserved fishing, bottom dashed line = observed fishing only)



Chapter 4.4.12, page 102

FISHING EFFECTS MODEL RESULTS

16 species with ≥ 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

FISHING EFFECTS MODEL RESULTS

Tanner crab habitat disturbance using corrected FE model with 2017 and 2022 SDMs

Nov 2016			Dec 2020	
2017 SDM	2022 SDM		2017 SDM	2022 SDM
11.1%	10.6%		11.4%	10.9%

← Current estimate

Tanner crabs would have been identified to have ≥ 10% habitat disturbance in the 2017 EFH Review using the corrected FE model

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
- We 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 ≥ 10% CEA disturbance
  - The SA preferred a qualitative assessment

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

Chapter 3, page 28

FISHING EFFECTS ANALYSIS OUTCOME

Crab results (Table 6 and 7 in report):

BSAI Crab species	% Habitat disturbed	SA FE Assessment (Found in Appendix 5)	Elevated for Mitigation?
EBS all Blue king crab	2.3%	Yes - stock below MSST	No
AI all Golden king crab	4.7%	No	Insufficient Information
EBS all Red king crab	4.9%	No	Insufficient Information
AI all Red king crab	2.3%	No	Insufficient Information
EBS all Snow crab	3.8%	Yes - stock below MSST	Insufficient Information
EBS all Tanner crab	10.9%	Yes - CEA ≥ 10% disturbed	Insufficient Information

Chapter 4, Table 6 and 7, page 38 and 39

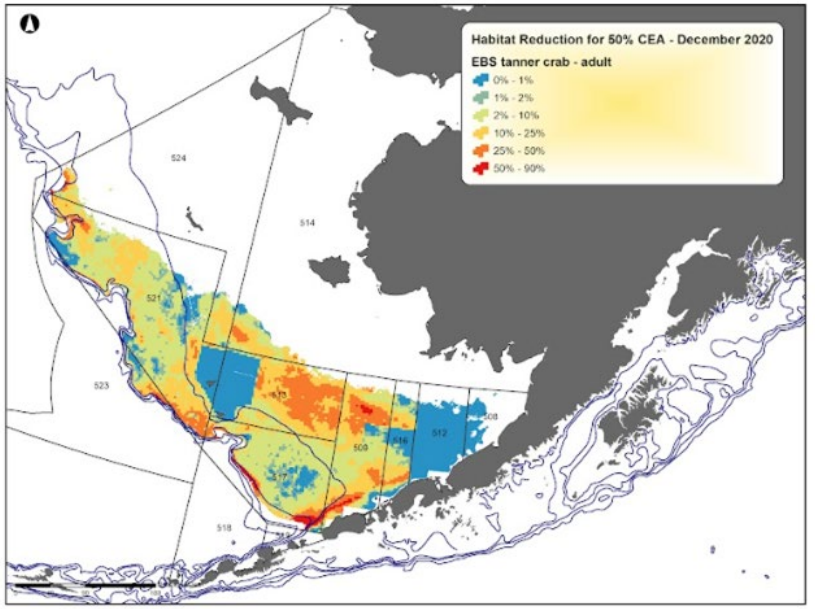
STOCK AUTHOR FE ASSESSMENT

Main Crab Fishing Effects Evaluation Concerns:

- Seasonal differences: the FE models disturbance using the summer distribution but crab stocks may have more effects from fishing gear during their winter distributions and/or during important stages like molting or mating
- Spatial scale of FE evaluation: EFH is based on FMP species and is developed regionally versus sub-regionally by crab stock
- Life history: juveniles may experience more of an impact from fishing than adults but the FE model only estimates disturbance to EFH of older life stages
- Insufficient information: all but BKC were marked as not being able to determine if the species should be elevated for mitigation measures

Tanner Crab FE Assessment

- 10.9% CEA disturbed
- No concerns with the SDM map or FE model
- Assessment: found correlations with disturbance and life history parameters
  - 2 were negative (immature male and female survey biomass, lagged 1 and 2 years)
  - 3 were positive (recruitment, clutch size, immature male survey biomass lagged 4 years)
- "Difficult to really draw any conclusions"



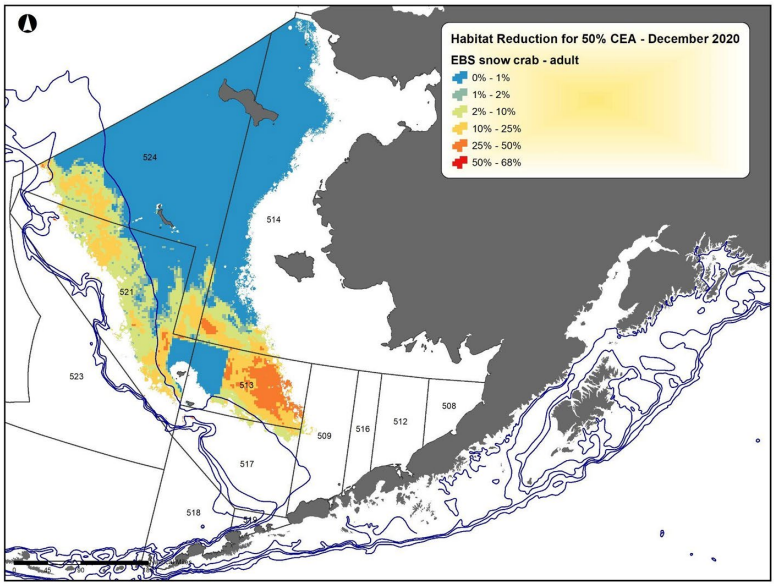
Habitat disturbance for 50% CEA of EBS Tanner crab, December 2020

- **Did not elevate for mitigation measures (insufficient information)**

Chapter 4.4.12, page 101 and Appendix 5, Chapter 5.3.5, page 198

Snow Crab FE Assessment

- **Below MSST**
- 3.8% disturbed
- Concern of including the NBS data may dilute meaningful fishing effects results in more important snow crab areas
- Assessment: no significant correlations were identified
  - The SA noted a longer time series would have been better (1990s data).
  - Key variables that weren't considered: "where" and "when" disturbance occurs



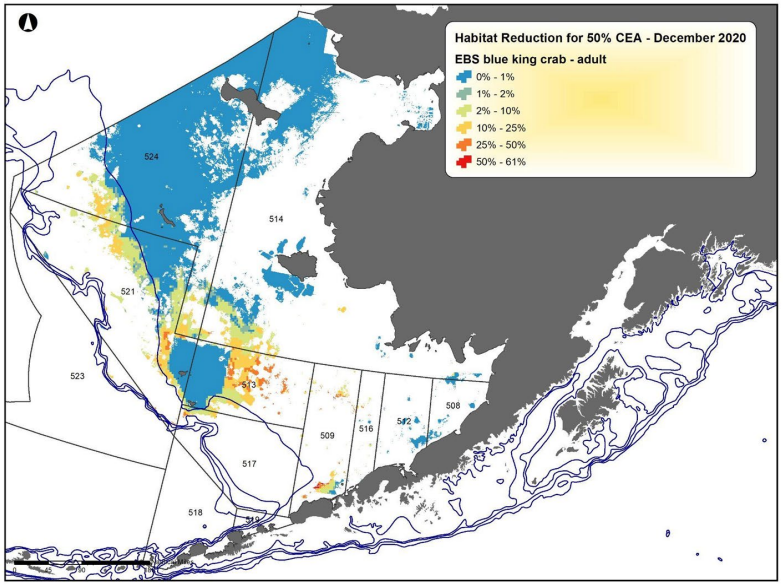
Habitat disturbance for 50% CEA of EBS snow crab, December 2020

- **Did not elevate for mitigation measures (insufficient information)**

Appendix 5, Chapter 5.3.4, page 195

Blue King Crab FE Assessment

- **Below MSST**
- 2.3% disturbed
- HAPC consideration (reported on the next slide)
- Assessment: found correlations with disturbance and life history parameters
  - 6 were negative
  - 2 were positive
- "Given the minimal amount of fishing-related habitat disturbance estimated in the core EFH area, I see no need for further mitigation measures for BKC beyond those currently-implemented."



Habitat disturbance for 50% CEA of EBS blue king crab, December 2020

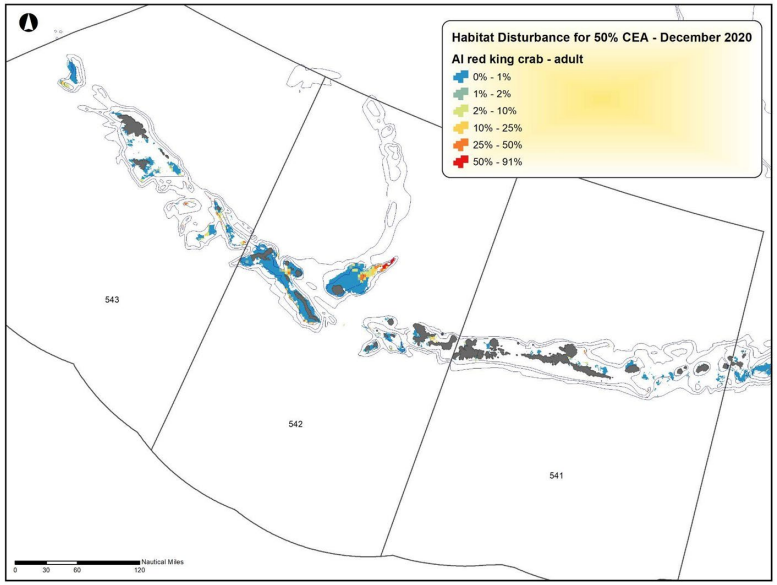
- **Did not elevate for mitigation measures - No further action**

Appendix 5, Chapter 5.3.1, page 187

HAPC CONSIDERATIONS

Red King Crab:

- EBS: 4.9%, AI: 2.3% disturbed
- Possible HAPC consideration for Petrel Bank



Blue King Crab:

- **Below MSST**
- EBS: 2.3% disturbed
- Possible HAPC consideration for important nursery habitats around the Pribilof Islands, St. Matthew Island, or St. Lawrence Island

Appendix 5, Chapter 5.3.3 and 5.3.1, pages 192 and 187

CPT 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 crab species were identified with insufficient information to make that decision.

Executive Summary, page 3

CPT 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. We want CPT feedback on how to meet the FE evaluation requirements for those crab species with insufficient information.
   ii. Does this FE evaluation provide enough information to determine fishing effects are minimal and temporary?
   iii. If there is not enough information, what available information is missing? How should the fishing effects evaluation be conducted?
      1. Addressing information gaps would require a new FE evaluation process for crabs with additional supporting research.
   iv. Are there crab stocks where fishing effects are potentially more than minimal and not temporary (and should be elevated to the Council for possible mitigation)?

Executive Summary, page 3

THANK YOU!

QUESTIONS?

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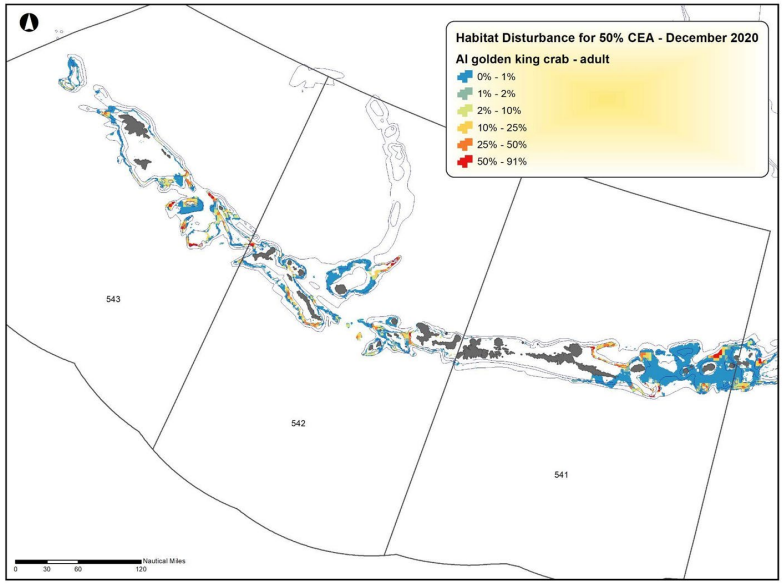
Golden King Crab FE Assessment

- 4.7% disturbed
- High concerns over the SDM maps:
  - The SA noted data sources that could be included to better inform the SDM maps.
  - This concern is discussed in the Component 1 Discussion paper prepared for the October 2022 SSC meeting.



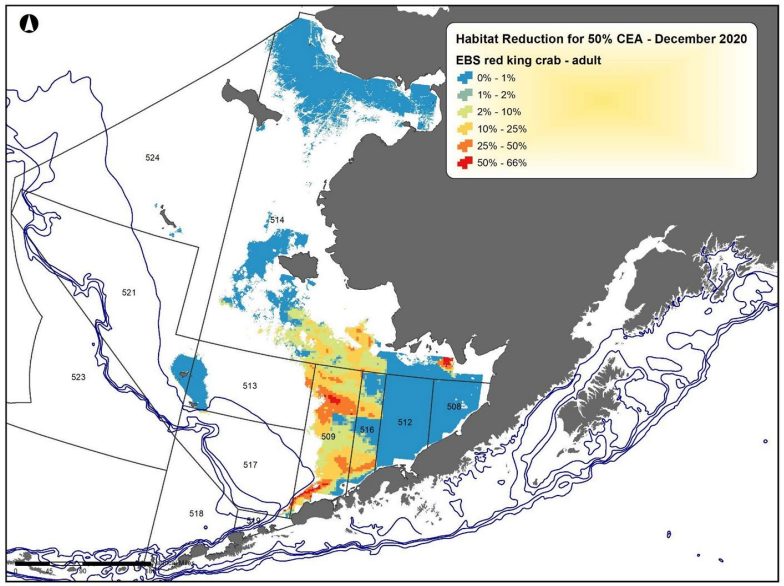
Habitat disturbance for 50% CEA of AI golden king crab, December 2020

Appendix 5, Chapter 5.3.2, page 191

- **Did not elevate for mitigation measures (insufficient information)**

Red King Crab FE Assessment

- EBS: 4.9%, AI: 2.3% disturbed
- Concerns over mapping of different life history stages/ times/ places that may be more vulnerable than others:
  - Molting
  - Female spawning habitat
  - Juvenile rearing habitat
- Data gaps:
  - Critical spawning habitat
  - Post-larval settlement habitat
- HAPC consideration: Petrel Bank (for AI red king crab)



Habitat disturbance for 50% CEA of EBS red king crab, December 2020

- **Did not elevate for mitigation measures (insufficient information)**

Appendix 5, Chapter 5.3.3, page 192