

Ecosystem & Socioeconomic Profile

Bristol Bay Red King Crab Report Card

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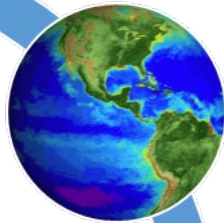
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Overview

- **2022 Bristol Bay Red King Crab Report Card**
 - Ecosystem Indicator Assessment and Analysis
 - Socioeconomic Indicator Assessment and Analysis
 - Recommendations and Considerations
 - Proposed Developments for 2023

BBRKC Ecosystem Indicators

Ecosystem Indicators



Physical



Lower Trophic



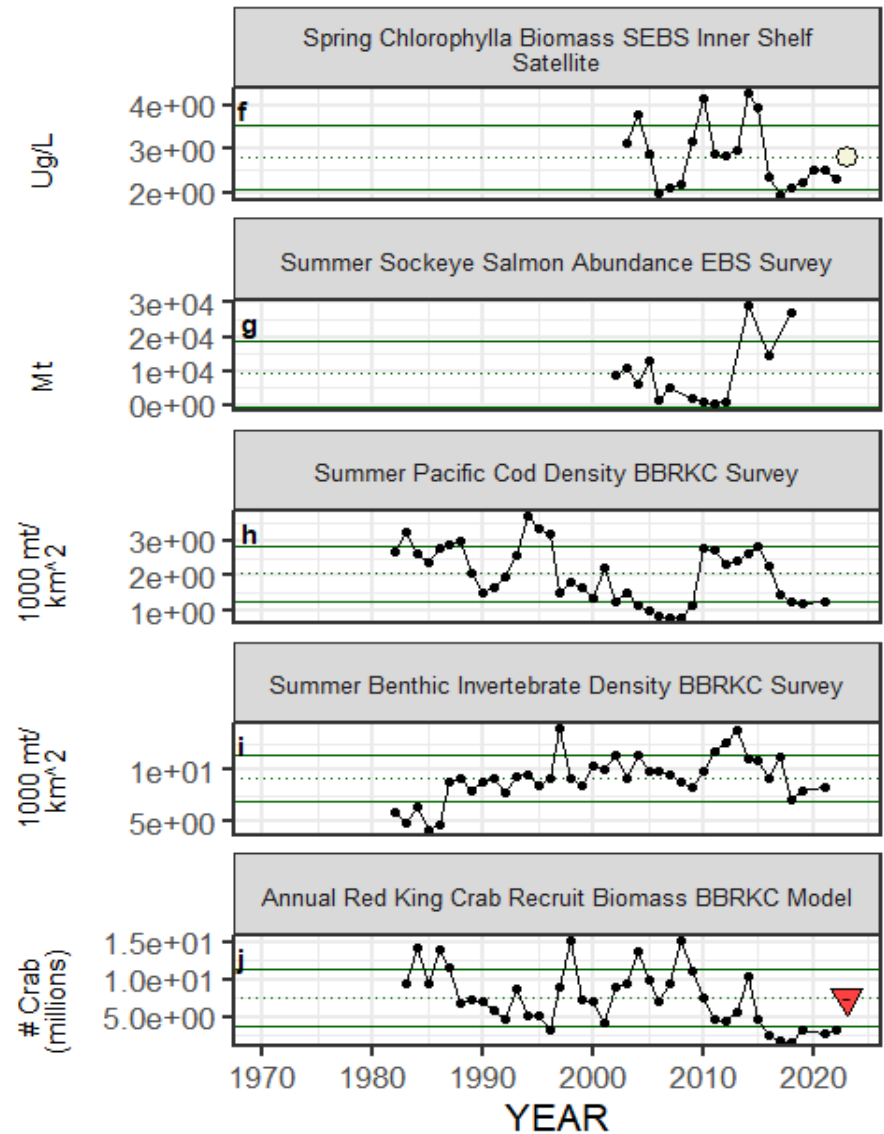
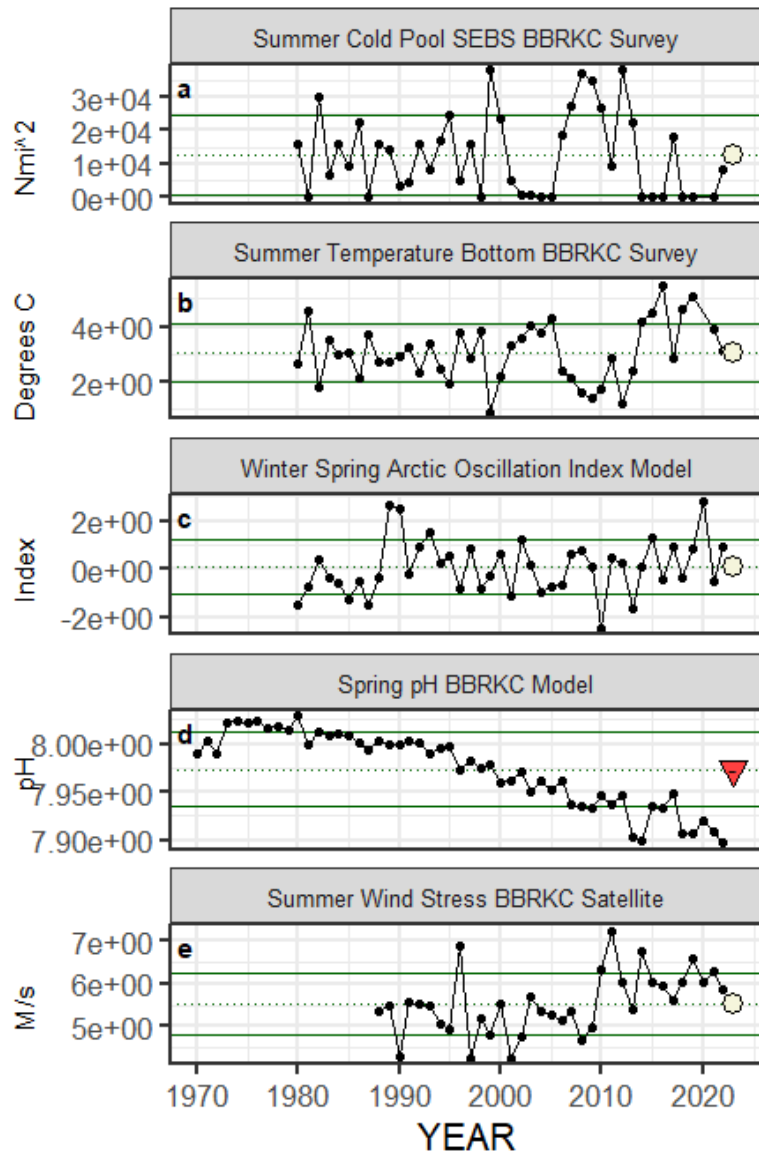
Upper Trophic

- + 1. Arctic Oscillation (climate model)
- + 2. Cold pool extent (BTS)
- + 3. Summer bottom temperature (BTS)
- + 4. pH index (ocean model)
- 5. Wind stress (satellite)

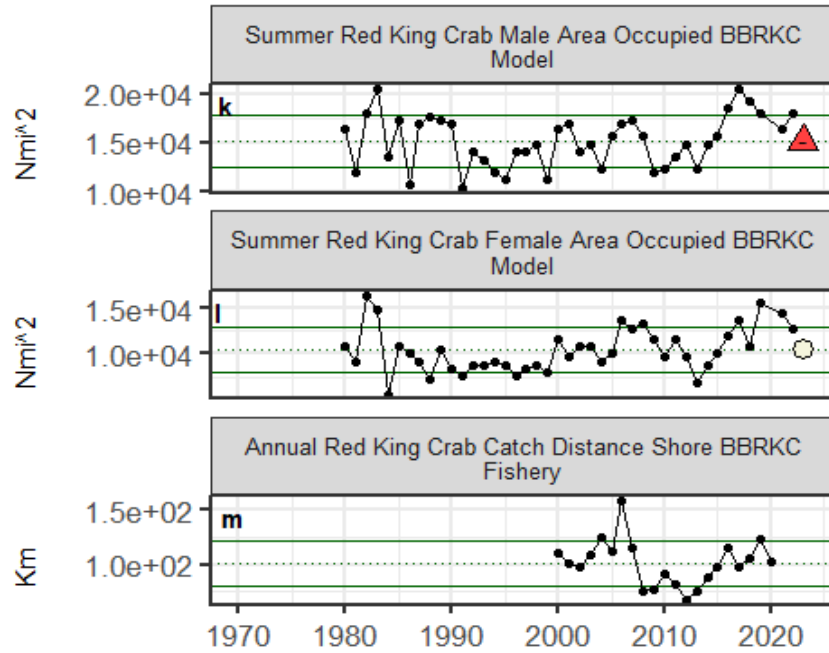
- + 6. Chl-*a* Biomass (satellite)

- + 7. Benthic invertebrate density (BTS)
- 8. Juvenile sockeye salmon abundance (BAS)
- 9. Pacific cod density (BTS)
- + 10. Male recruit abundance (BTS)
- 11. Area Occupied (BTS)
- + 12. Catch distance from shore (BBRKC fishery)

Ecosystem Indicator Time Series



Ecosystem Indicator Time Series



Indicator category	Indicator	2018 Status	2019 Status	2020 Status	2021 Status	2022 Status
Physical	Summer Cold Pool SEBS BBRKC Survey	low	low	NA	low	neutral
	Summer Temperature Bottom BBRKC Survey	high	high	NA	neutral	neutral
	Winter Spring Arctic Oscillation Index Model	neutral	neutral	high	neutral	neutral
	Spring pH BBRKC Model	low	low	low	low	low
	Summer Wind Stress BBRKC Satellite	neutral	high	neutral	high	neutral
Lower Trophic	Spring Chlorophylla Biomass SEBS Inner Shelf Satellite	neutral	neutral	neutral	neutral	neutral
Upper Trophic	Summer Sockeye Salmon Abundance EBS Survey	high	NA	NA	NA	NA
	Summer Pacific Cod Density BBRKC Survey	neutral	low	NA	neutral	NA
	Summer Benthic Invertebrate Density BBRKC Survey	neutral	neutral	NA	neutral	NA
	Annual Red King Crab Recruit Abundance BBRKC Survey	low	low	NA	low	low
	Summer Red King Crab Male Area Occupied BBRKC Model	high	high	NA	neutral	high
	Summer Red King Crab Female Area Occupied BBRKC Model	neutral	high	NA	high	neutral
	Annual Red King Crab Catch Distance Shore BBRKC Fishery	neutral	high	neutral	NA	NA

Ecosystem Traffic Light Table

Ecosystem Considerations

- In 2022, **bottom temperatures returned to near-average** and the cold pool extended into the Bristol Bay management area.
- Red king crab have experienced a **steady decline in bottom water pH** in the past two decades, reaching 7.89 in 2022. Continued declines to threshold pH levels of 7.8 could negatively affect juvenile red king crab growth, shell hardening and survival.
- **BBRKC recruitment remains well below the long-term average.** Concurrent declines in Pacific cod and benthic invertebrate densities in the past 7 years may suggest shared processes that drive productivity of Bristol Bay benthic communities.
- **Spatial extent** of mature male red king crab in Bristol Bay was **above average** in 2022, coinciding with increases in abundance.

Socioeconomic Indicators

Socio-economic Indicators



Fishery Performance

1. Catch-per-unit-effort (BBRKC fishery)
2. Total potlifts (BBRKC fishery)
3. Number active vessels (BBRKC fishery)
4. Incidental catch (Groundfish fisheries)



Economic

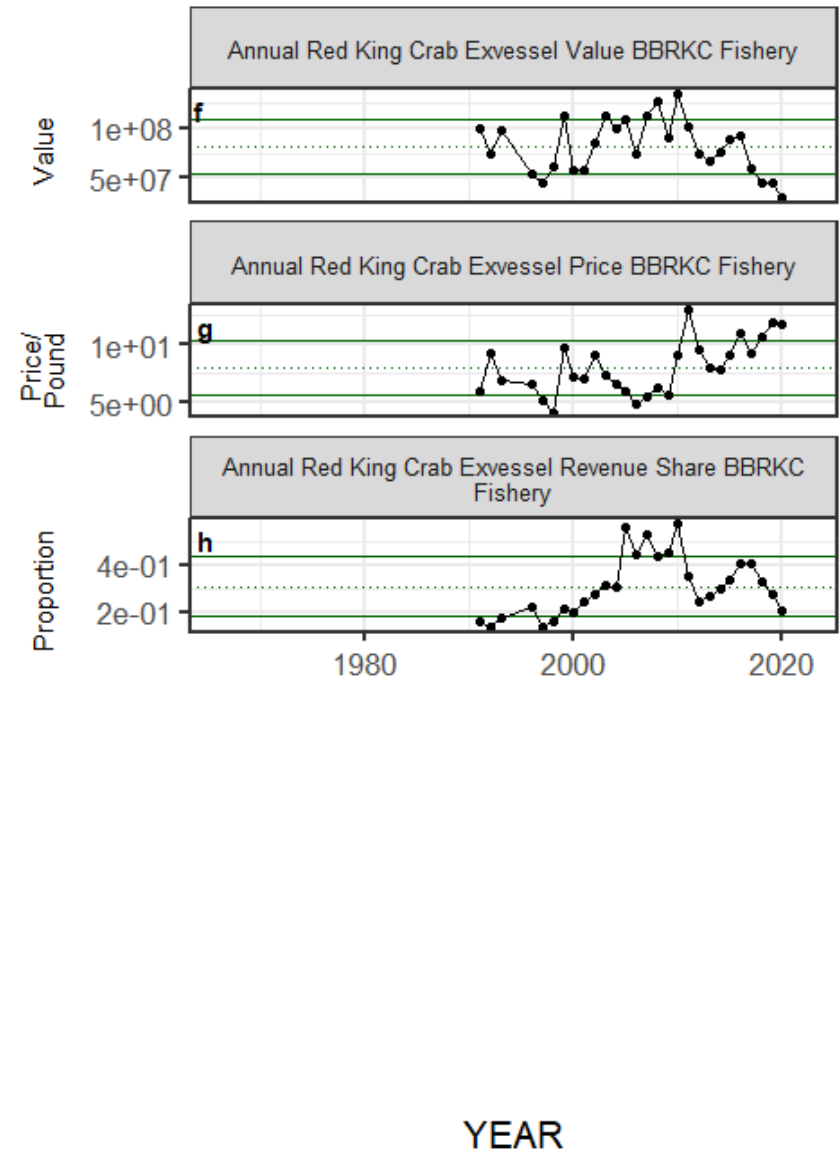
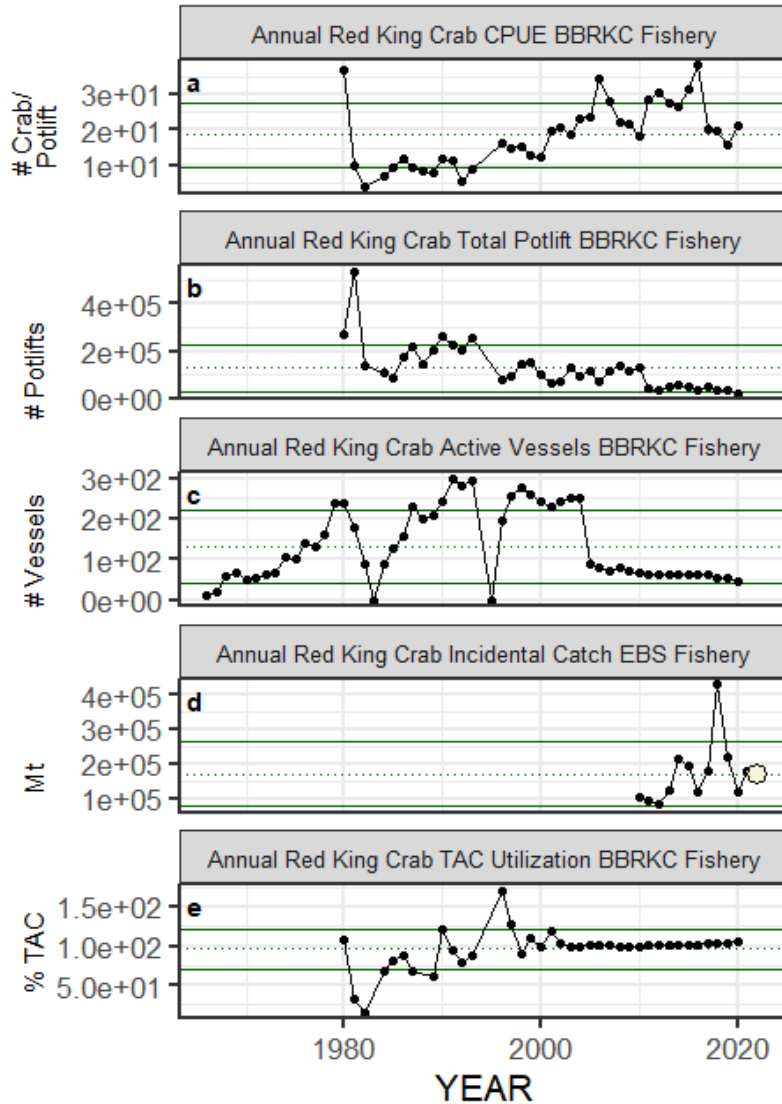
5. TAC Utilization (BBRKC fishery)
6. Ex-vessel value (BBRKC fishery)
7. Ex-vessel price/lb (BBRKC fishery)
8. Ex-vessel revenue share (BBRKC fishery)



Community

No community indicators proposed

Socioeconomic Indicator Time Series



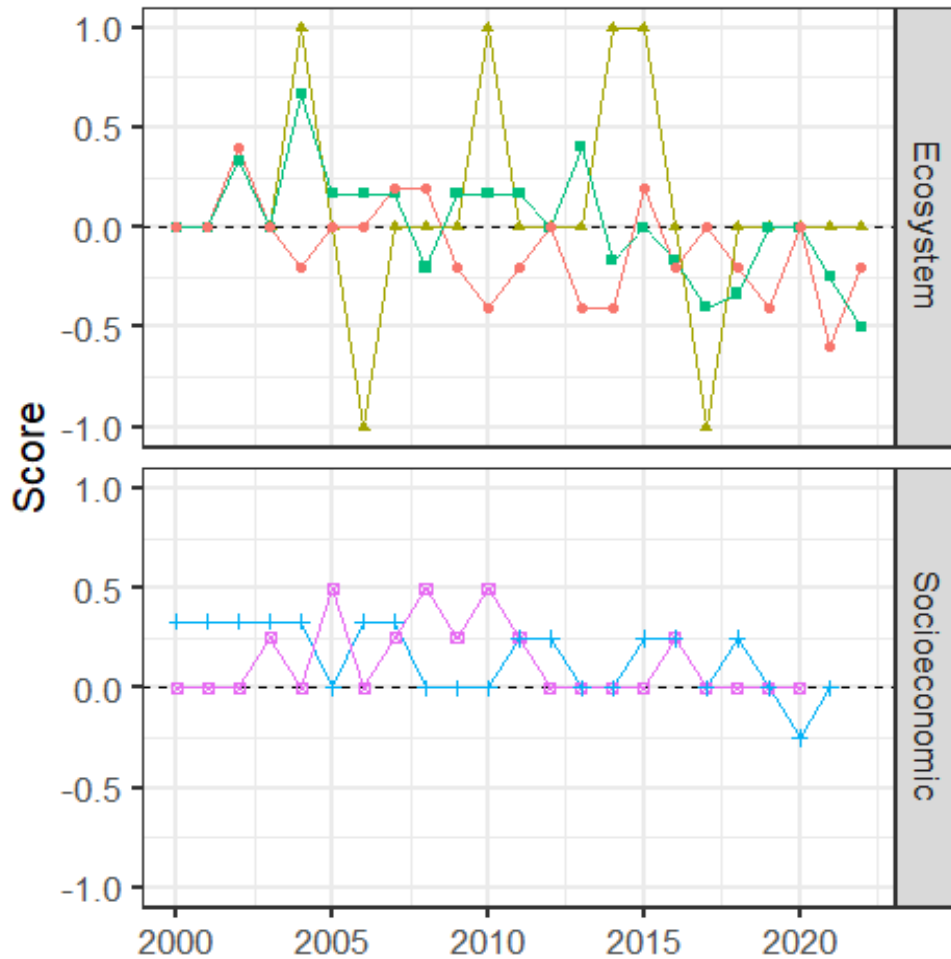
Socioeconomic Traffic Light Table

Indicator category	Indicator	2017 Status	2018 Status	2019 Status	2020 Status	2021 Status
Fishery Performance	Annual Red King Crab CPUE BBRKC Fishery	neutral	neutral	neutral	neutral	NA
	Annual Red King Crab Total Potlift BBRKC Fishery	neutral	neutral	neutral	low	NA
	Annual Red King Crab Active Vessels BBRKC Fishery	neutral	neutral	neutral	neutral	NA
	Annual Red King Crab Incidental Catch EBS Fishery	high	neutral	neutral	neutral	neutral
Economic	Annual Red King Crab TAC Utilization BBRKC Fishery	neutral	neutral	neutral	neutral	NA
	Annual Red King Crab Exvessel Value BBRKC Fishery	neutral	low	low	low	NA
	Annual Red King Crab Exvessel Price BBRKC Fishery	neutral	high	high	high	NA
	Annual Red King Crab Exvessel Revenue Share BBRKC Fishery	neutral	neutral	neutral	neutral	NA

Socioeconomic Considerations

- The BBRKC fishery was **closed to targeted fishing** for the 2021-2022 season.
- **Incidental catch** of BBRKC biomass in EBS groundfish fisheries during 2021 increased moderately from the previous year to **slightly above average** for the 2010-current period.

Overall Stage 1 Score

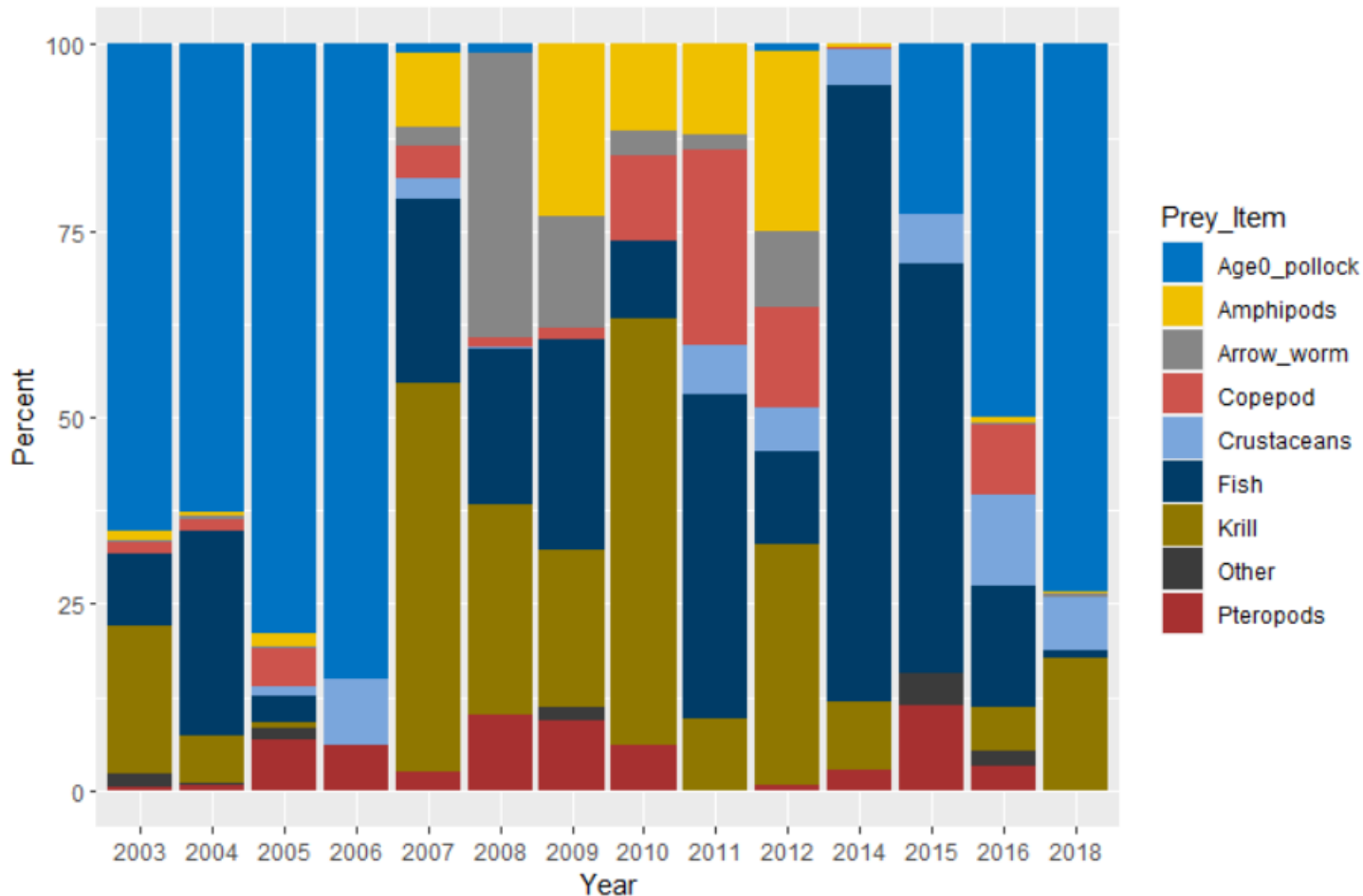


- Physical
- Lower Trophic
- Upper Trophic
- Fishery Performance
- Economic

Planned ESP Developments

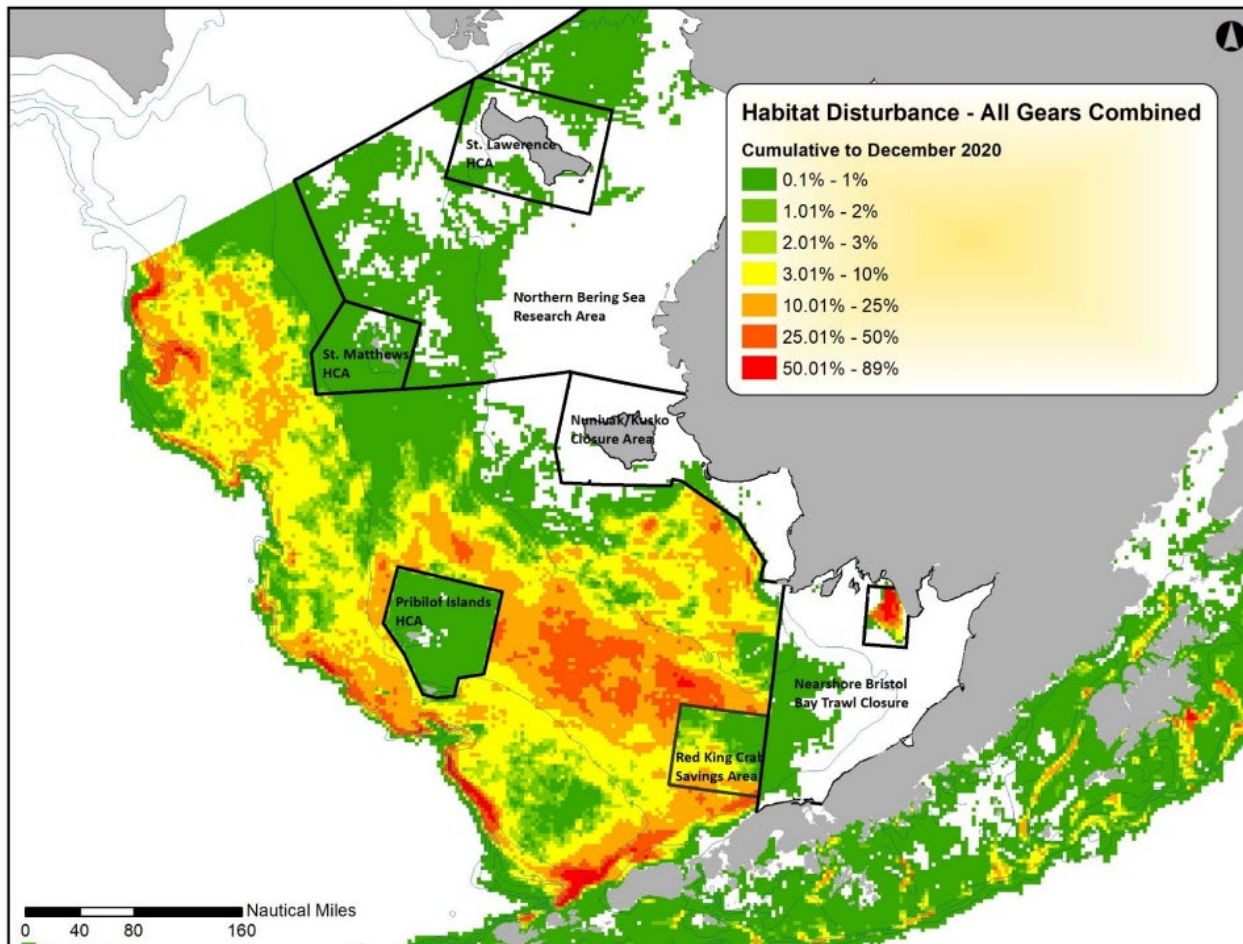
- Updates to the intermediate stage indicator analysis
- Producing a Request for Indicators in February 2023 to highlight data gaps and propose new indicator contributions
- Updating ecosystem and socioeconomic indicators and considerations prior to the 2023 Crab Plan Team meeting to inform BBRKC management
- Development of new indicators: predation, RKC-gear interactions

Indicator Development: Predation



Sockeye salmon diets consist of up to 17% crustaceans, many of which are commercial crab species

Indicator Development: RKC-gear interactions



Quantify spatiotemporal overlap of pelagic/non-pelagic gear and RKC using winter/spring tagging data and bottom contact estimates via the Fishing Effects model?