



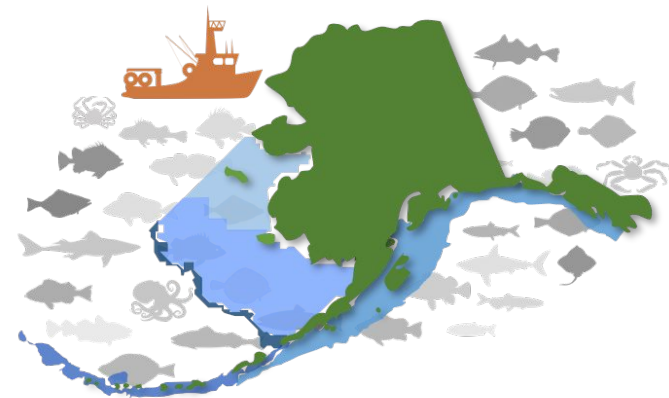
**NOAA
FISHERIES**

Results of the 2023 Eastern Bering Sea Bottom Trawl Survey

**Emily Markowitz, Liz Dawson,
Chris Anderson, and Duane Stevenson**

**Groundfish Assessment Program
RACE Division
Alaska Fisheries Science Center**

September 20, 2023



NOAA FISHERIES

Outline

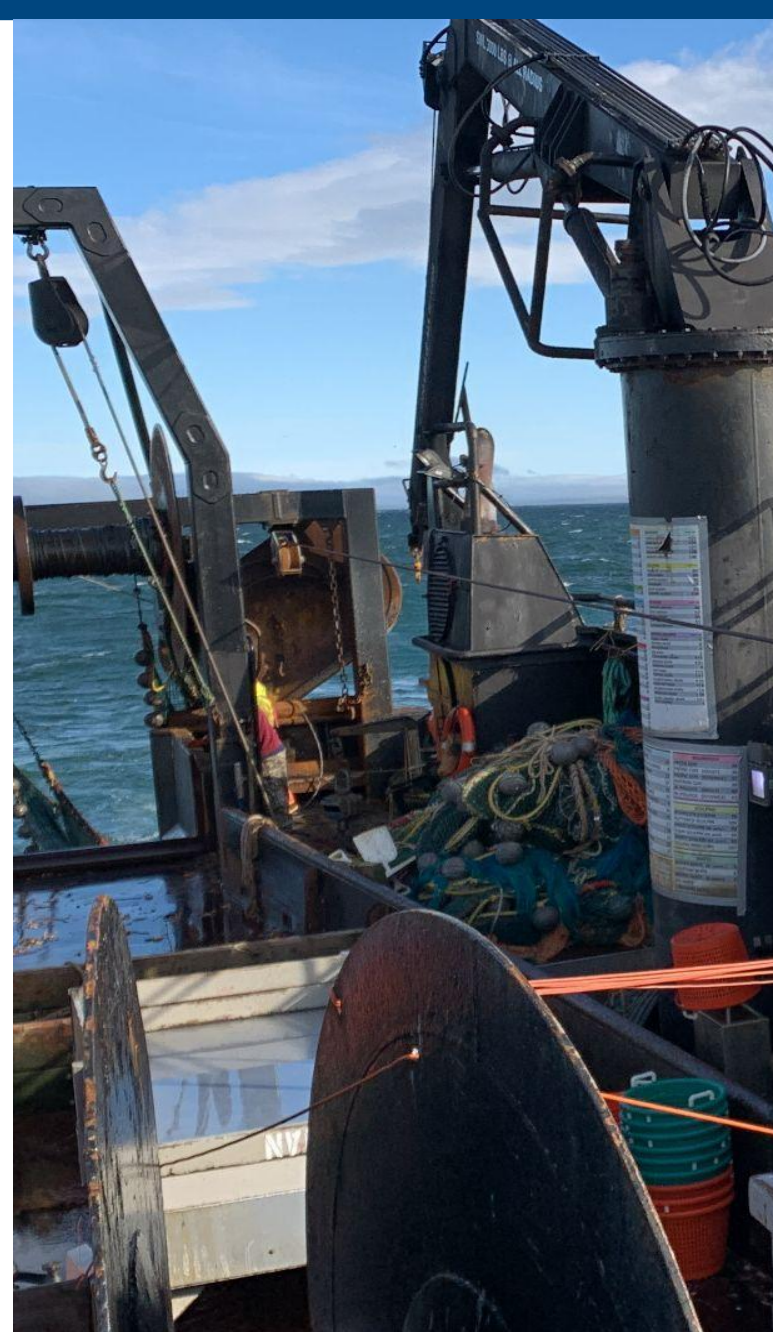
- Description of the survey
- Environmental data
- Updates to data calculations and delivery models
- Fish population data
- Additional research



Survey Purpose

To collect standardized, fishery-independent time series of:

- Relative biomass/abundance
- Distribution
- Length and age composition
- Environmental data



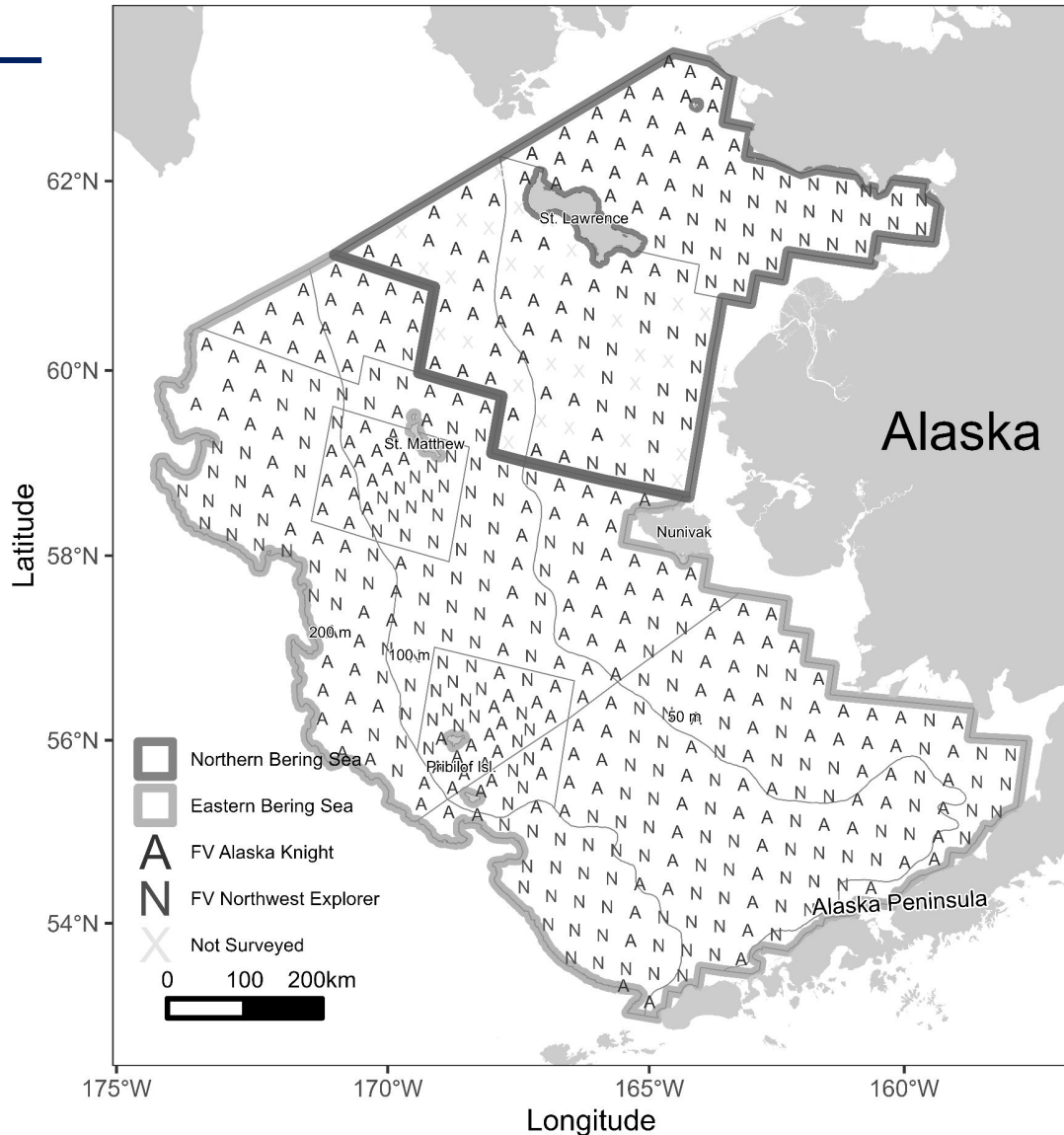
2023 Season

Eastern Bering Sea (EBS):

- 41st year of survey
(1982-2023)
- 376/376 stations sampled
- May 28 to August 3, 2023

Northern Bering Sea (NBS):

- 6th year of survey
(2010, 2017, 2019, 2021, 2022, 2023)
- 116/144 stations sampled
- August 1 to 21, 2023



Survey Charter Vessels



FV Alaska Knight
2010-present
12th year

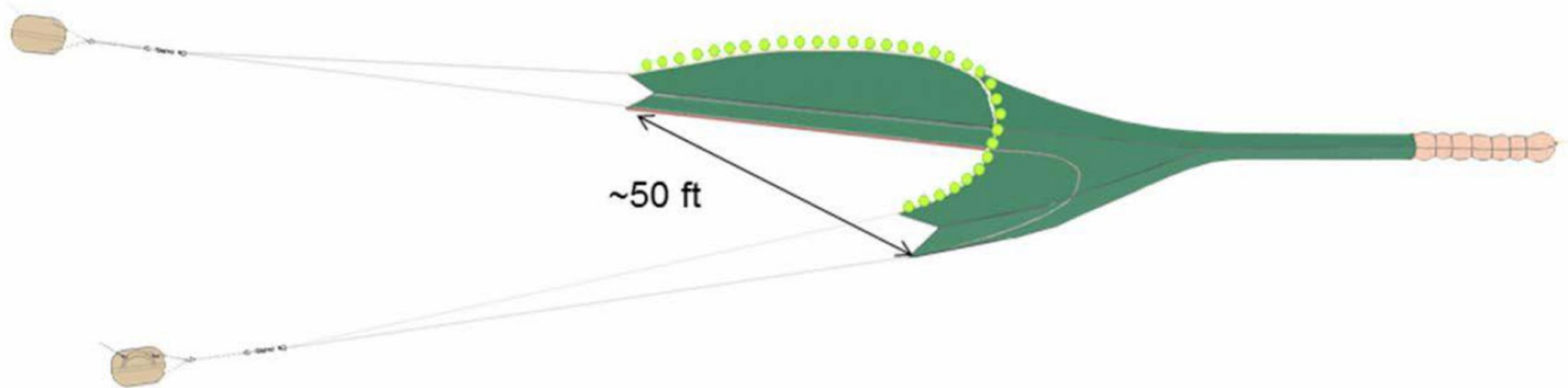


FV Northwest Explorer
2023
1st year



Trawl Gear

Bering Sea Shelf Research Bottom Trawl 83-112 Eastern

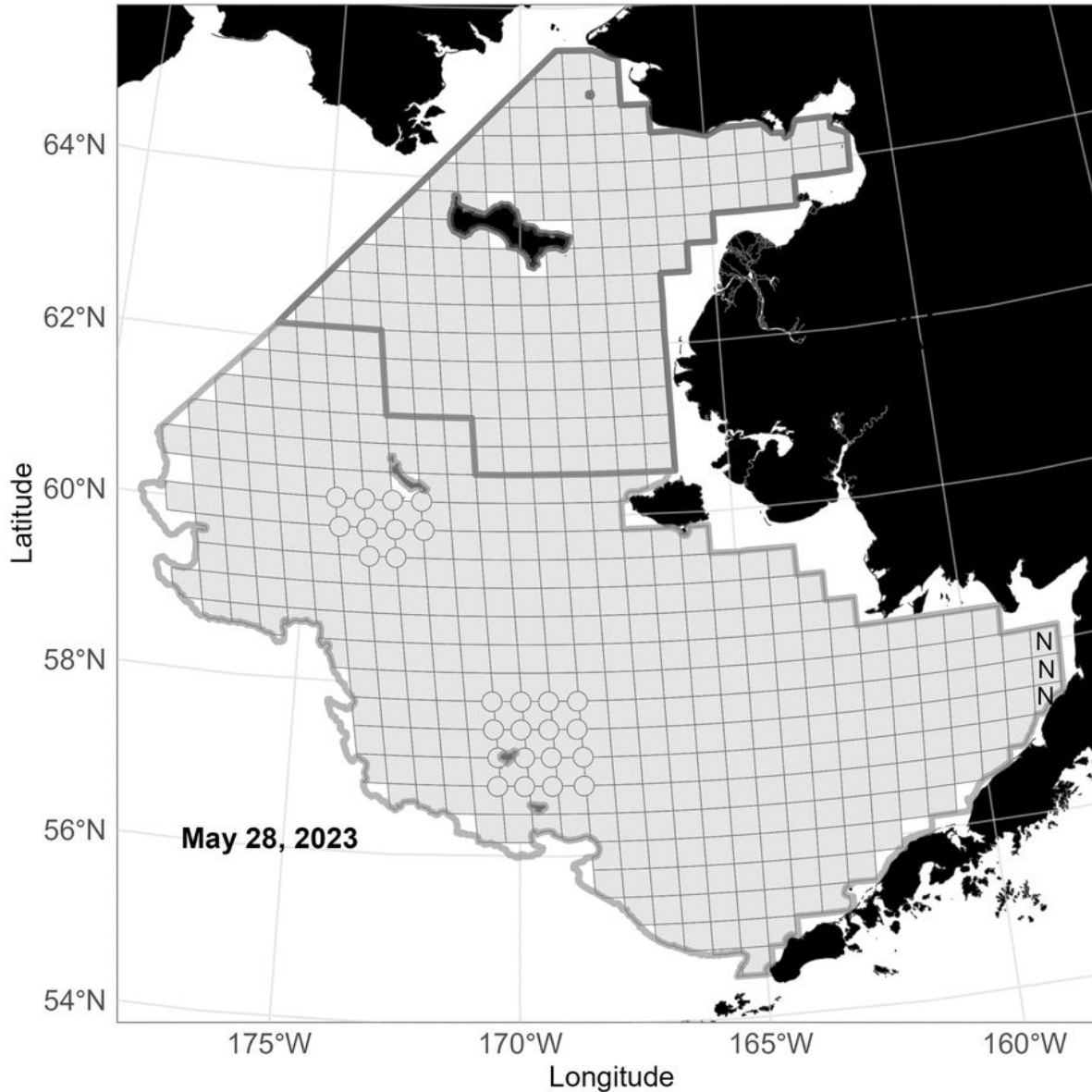


Characteristics

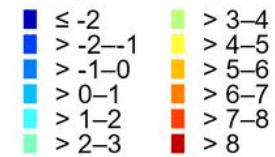
- Similar size and type used for Norton Sound red king crab survey
- Designed for being towed on smooth bottom
- Light footrope and bare wires with no ground gear - skims across bottom
- 6' X 9' doors for spreading trawl
- 0.75" braided nylon with 4" mesh body, 3.5" intermediate and 1.25" codend liner
- 83 ft headrope and 112 ft footrope
- Towed 30 minutes at 3 knots
- Area swept = net width (~50') X distance fished (~1.5 nm)

2023 Bottom Temperature (°C)

NOAA Fisheries Bering Sea Bottom Trawl Survey



Bottom Temperature (°C)



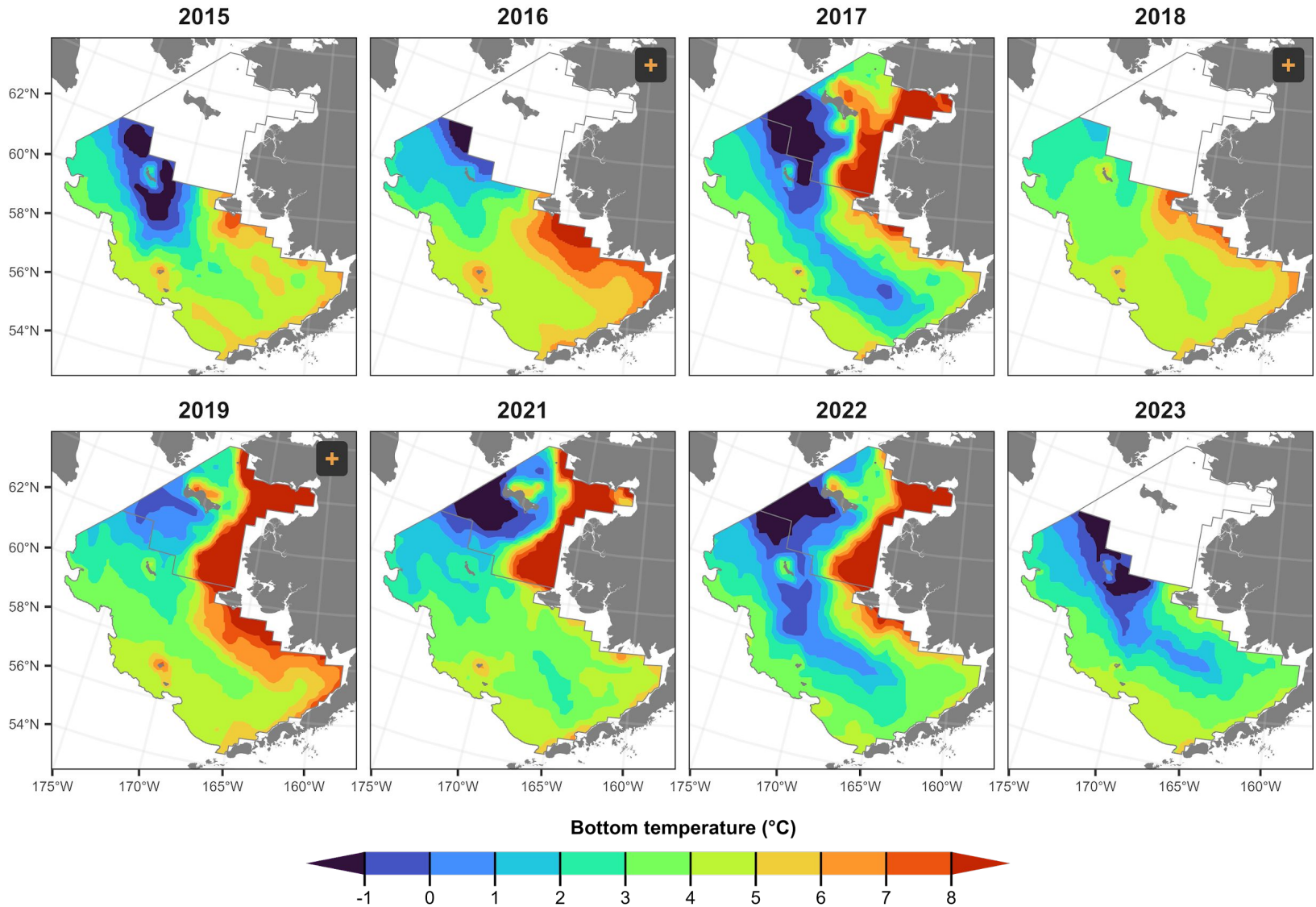
Survey Region



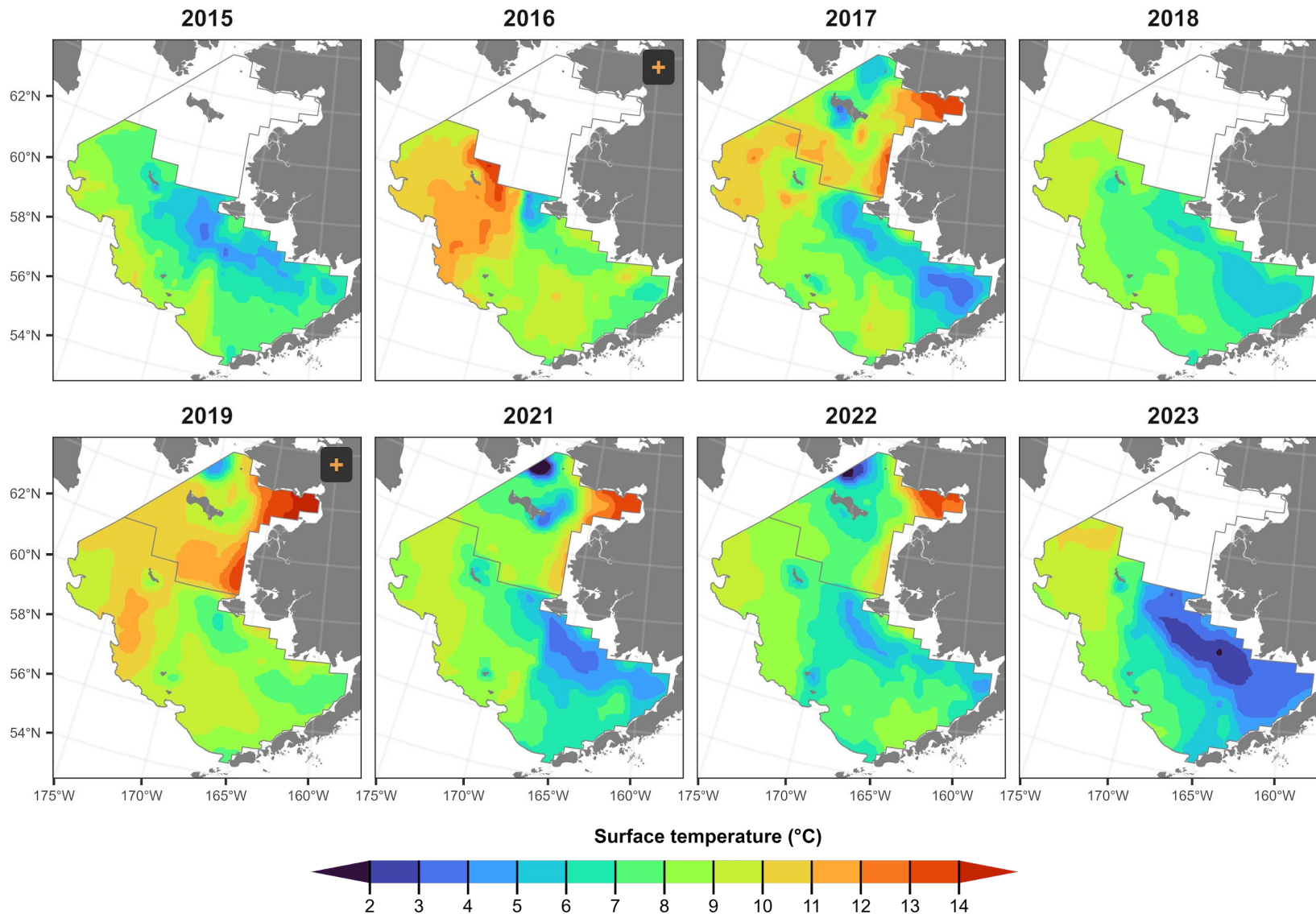
Planned Stations



Bottom Temperature

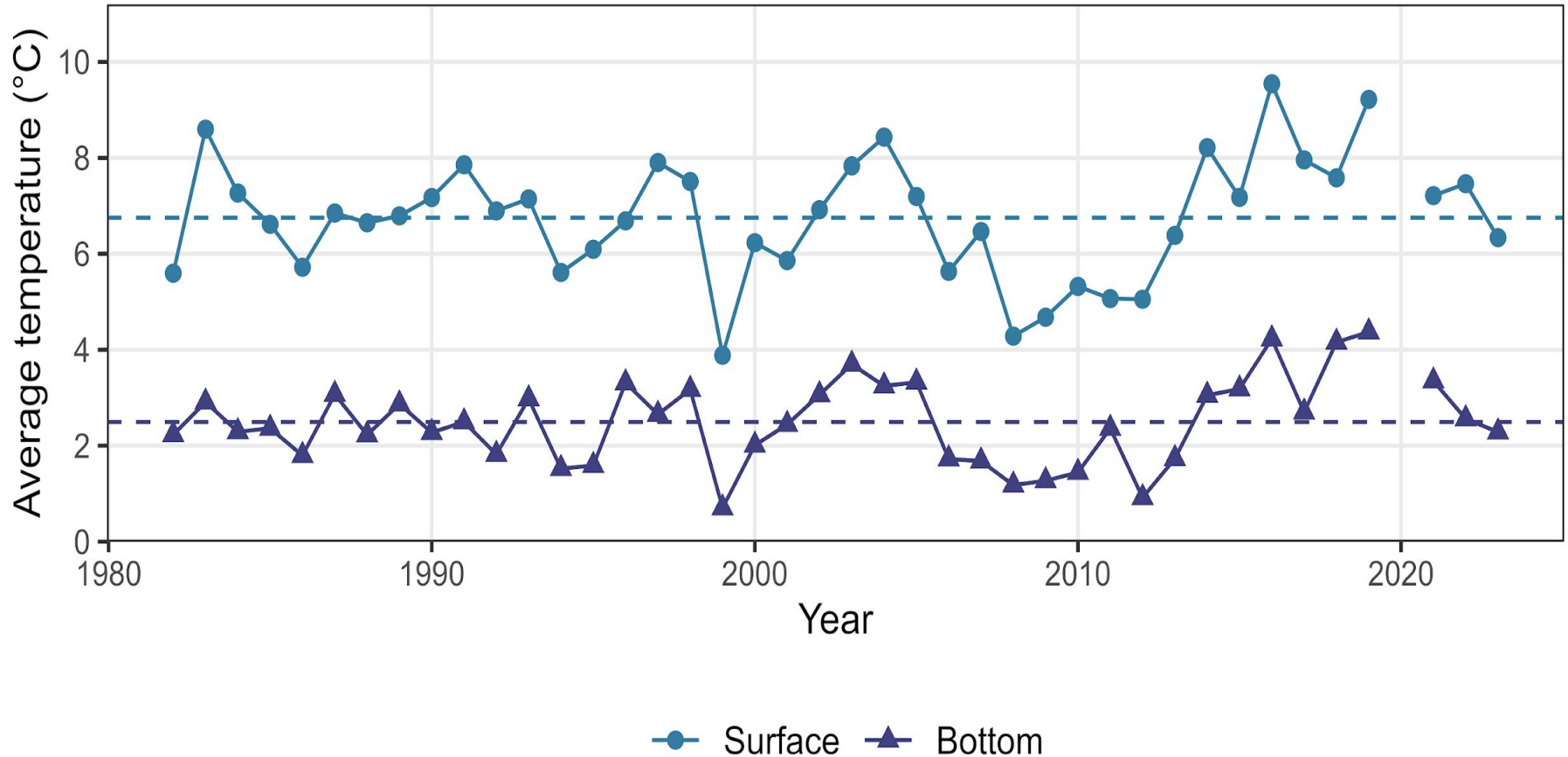


Surface Temperature

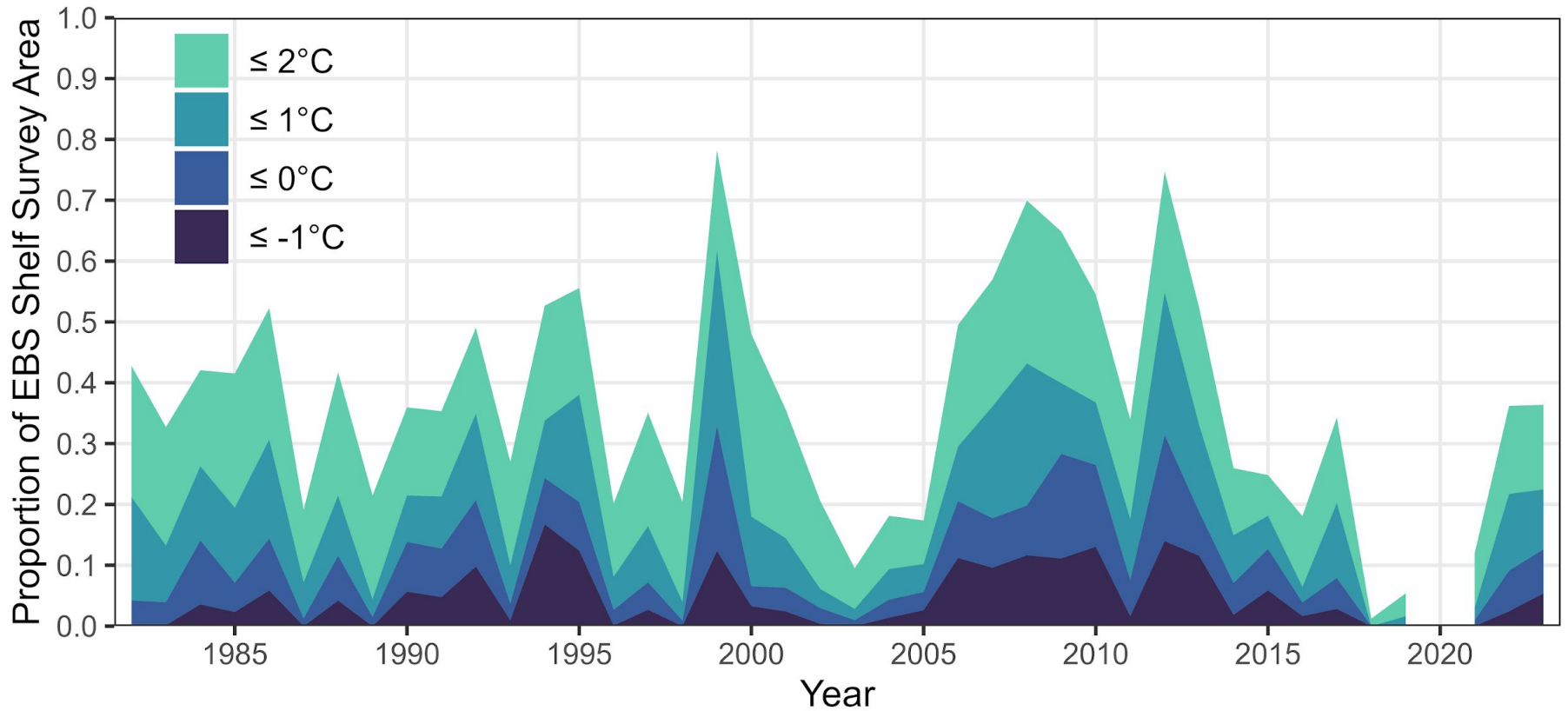


Annual Mean Temperature

Eastern Bering Sea



Cold Pool Area



Length Measurement Samples

Common name	EBS	
	2022	2023
walleye pollock	36,687	38,618
Pacific cod	12,375	14,398
yellowfin sole	16,765	15,501
northern rock sole	20,244	19,596
flathead sole	17,625	16,420
Bering flounder	1,107	1,095
Alaska plaice	8,116	7,092
Greenland turbot	73	127
arrowtooth flounder	10,165	10,217
Kamchatka flounder	1,159	906
Pacific halibut	3,248	3,435
Bering skate	201	281
Alaska skate	3,783	3,688
longhead dab	2,127	1,270
starry flounder	922	835
yellow Irish lord	1,000	683
other taxa (58)	6,275	4,625
TOTAL	141,872	138,787



Age Structures Samples

Common name	EBS	
	2022	2023
random-by-haul		
walleye pollock	1,614	1,688
Pacific cod	1,456	1,424
yellowfin sole	589	515
northern rock sole	866	841
flathead sole	748	670
Bering flounder	84	-
Alaska plaice	459	424
Greenland turbot	70	70
arrowtooth flounder	482	494
Kamchatka flounder	318	198
Pacific halibut	-	222
TOTAL	6,686	6,546



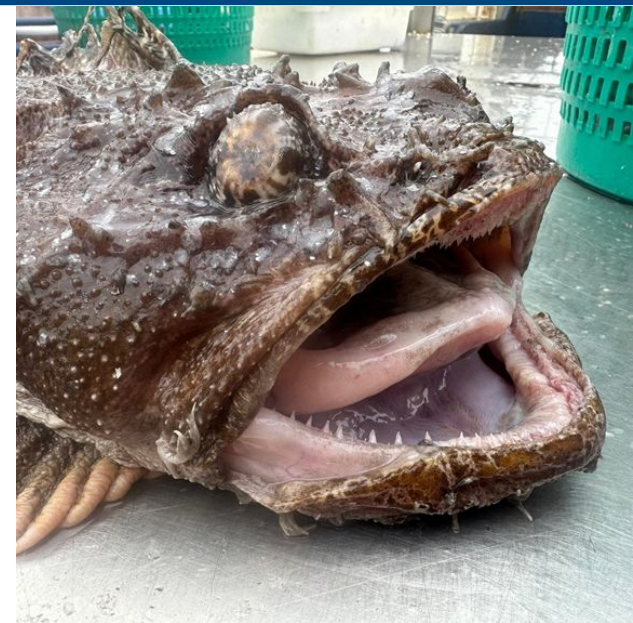
Changes to Data Calculations

- Updated stratum area calculations (2022)
 - Projection transformed into standard EPSG format
 - EBS, slope, and NBS shapefiles made contiguous
 - shapefiles updated to exclude island landmasses
 - overall survey area changed by <1.0%
- Length-weight regression parameters updated for halibut (2023)
 - IPHC guidance memo suggested new L/W parameters
 - ALL halibut weights derived from the parameters
 - ~3% of halibut biomass increase this year is procedural



Changes to Data Delivery Model

- No longer producing flat files for AFSC Dropbox (reach out if issue)
- Combining data from all regions into a single set of Oracle tables - single source for all outlets
- GAP_PRODUCTS schema will be ready for testing next week, to be used as primary delivery product next year



Data Documentation

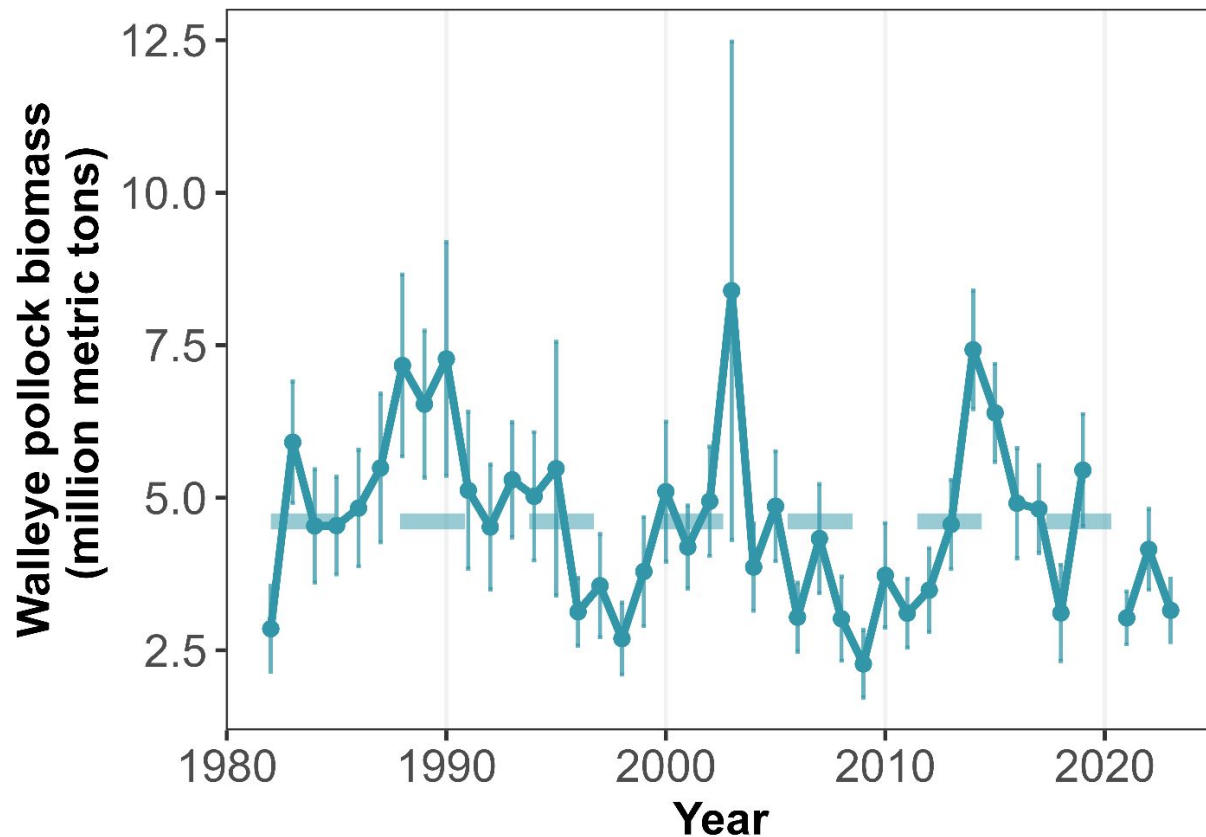
Documentation of our production data, data prepared for AKFIN and FOSS, and other data products are available on the GAP_PRODUCTS GitHub repository:

https://afsc-gap-products.github.io/gap_products/

Please consider this resource to be a living document. The code in this repository is regularly being updated and improved. Please refer to releases for finalized products and project milestones.



Walleye Pollock Biomass



EBS Biomass

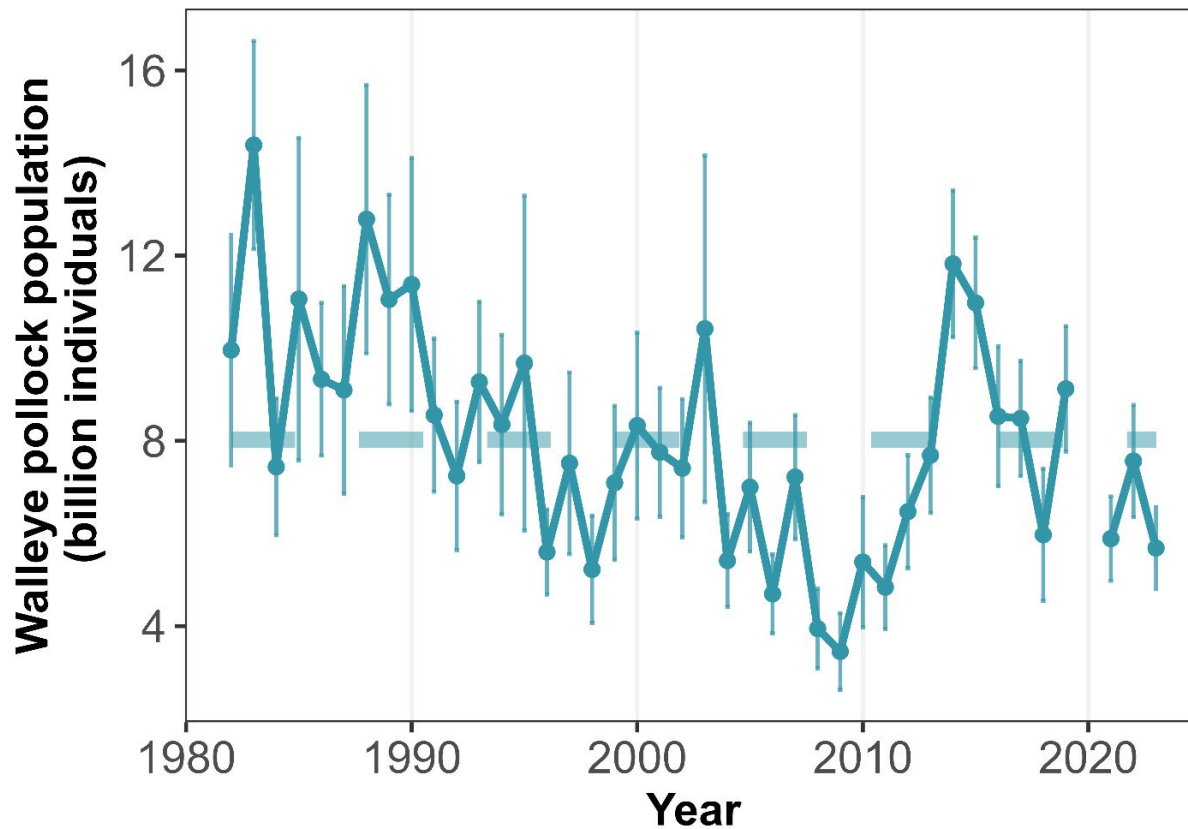
2022: 4.15 Mt

2023: 3.15 Mt

(-24.06%)



Walleye Pollock Population



EBS Population

2022: 7.56 B

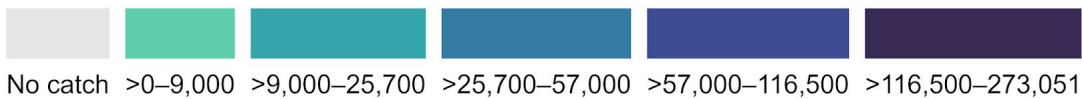
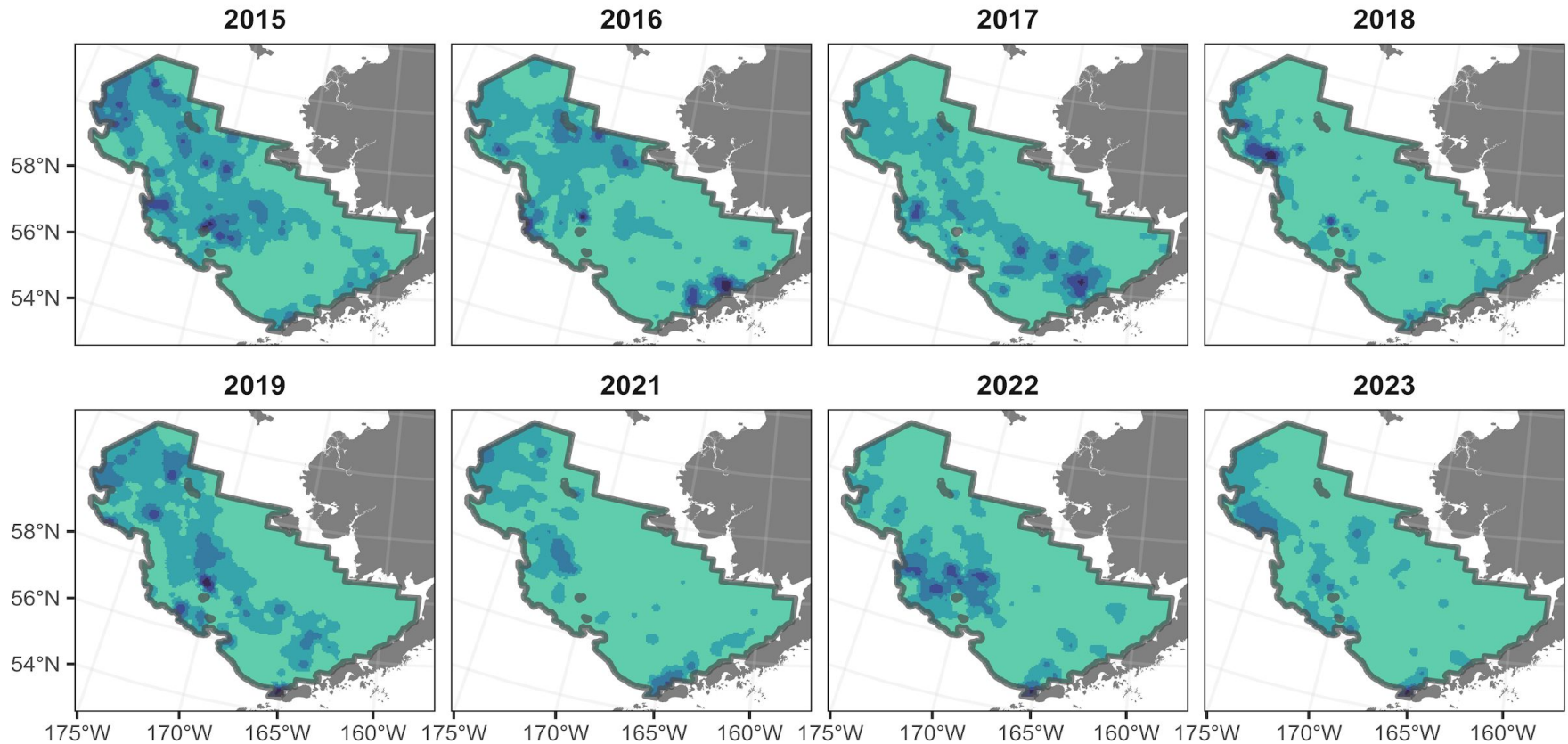
2023: 5.69 B

(-24.83%)

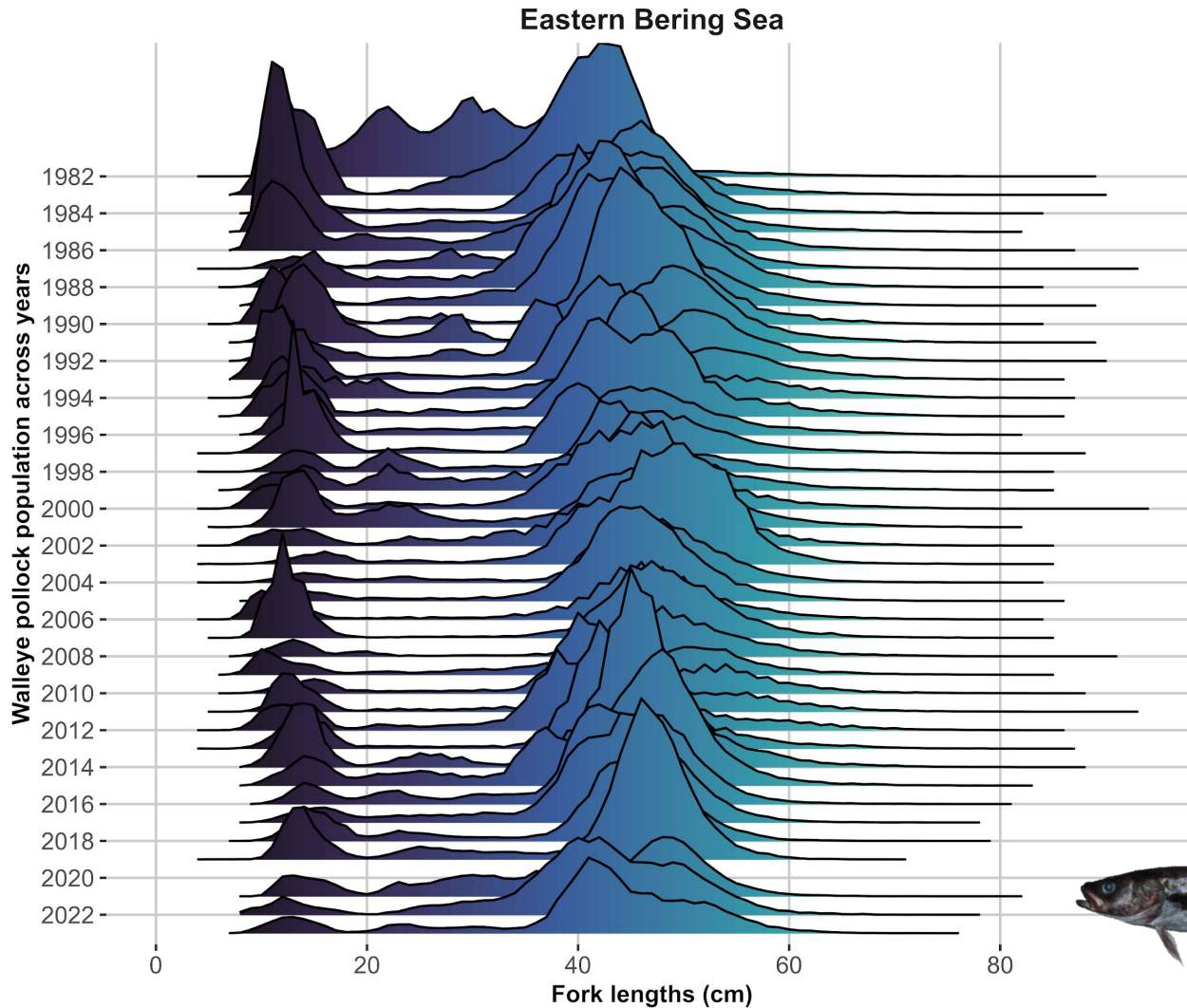


Walleye Pollock Distribution

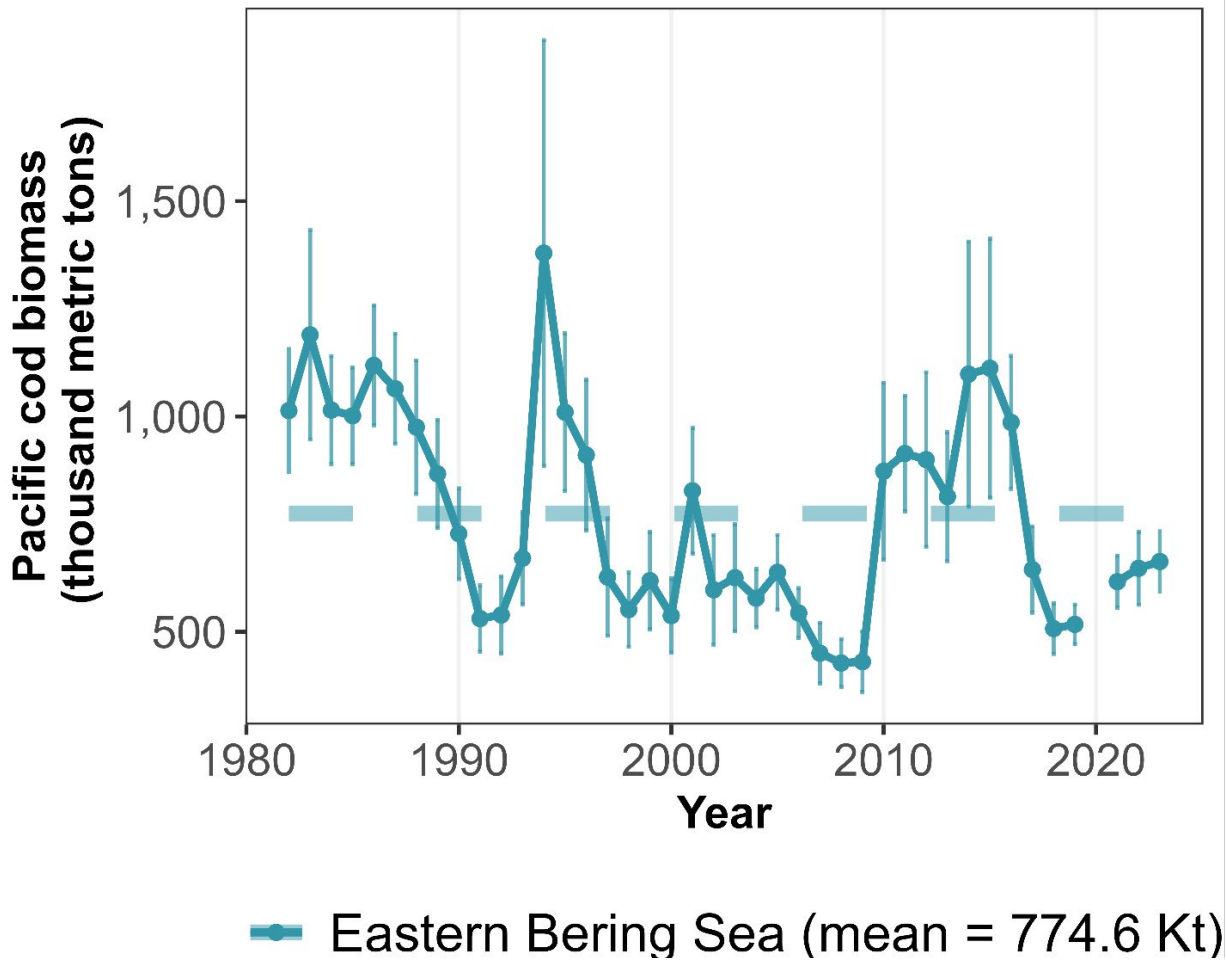
Walleye pollock Weight CPUE (kg/km²)



Walleye Pollock Lengths



Pacific Cod Biomass



EBS Biomass

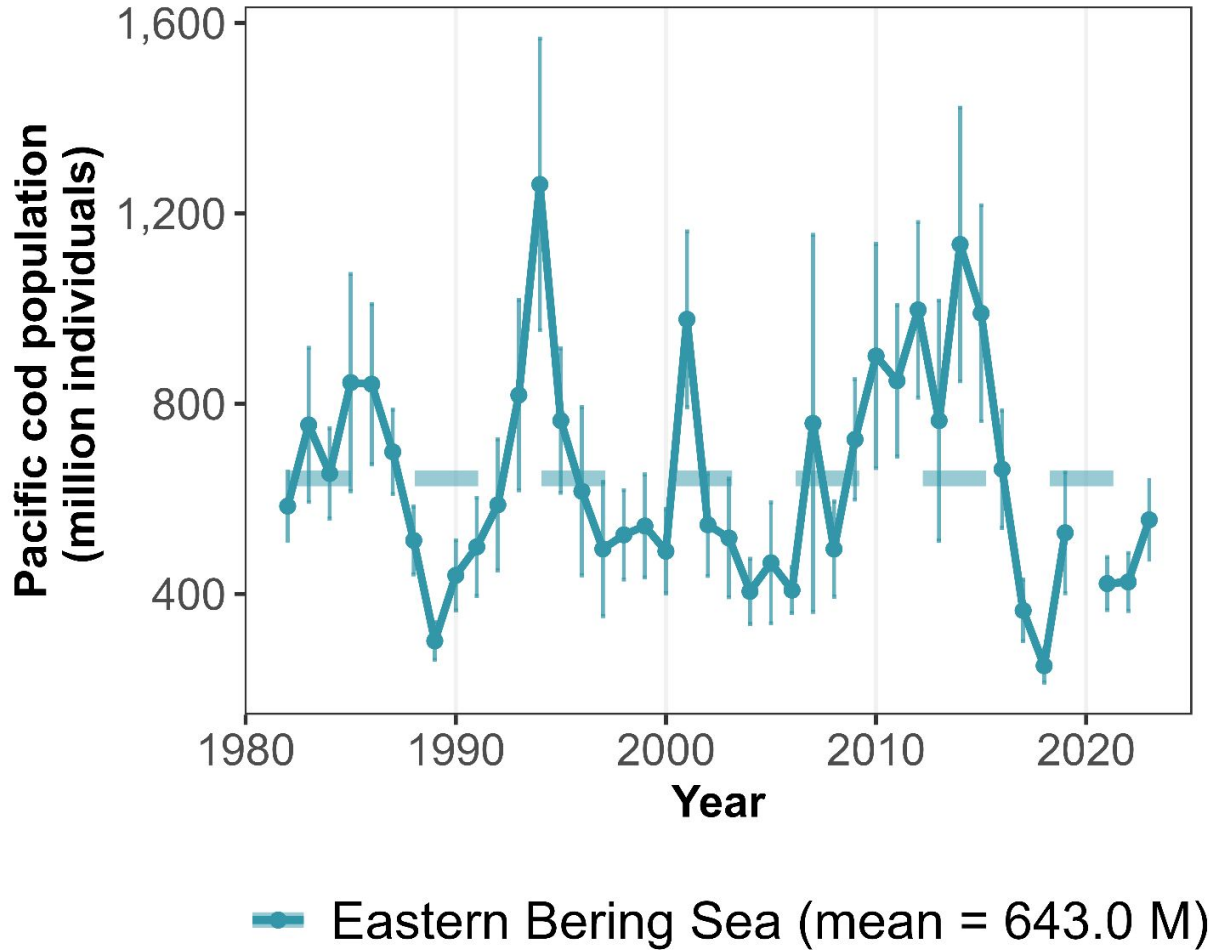
2022: 647 Kt

2023: 663 Kt

(2.42%)



Pacific Cod Population



EBS Population

2022: 425 M

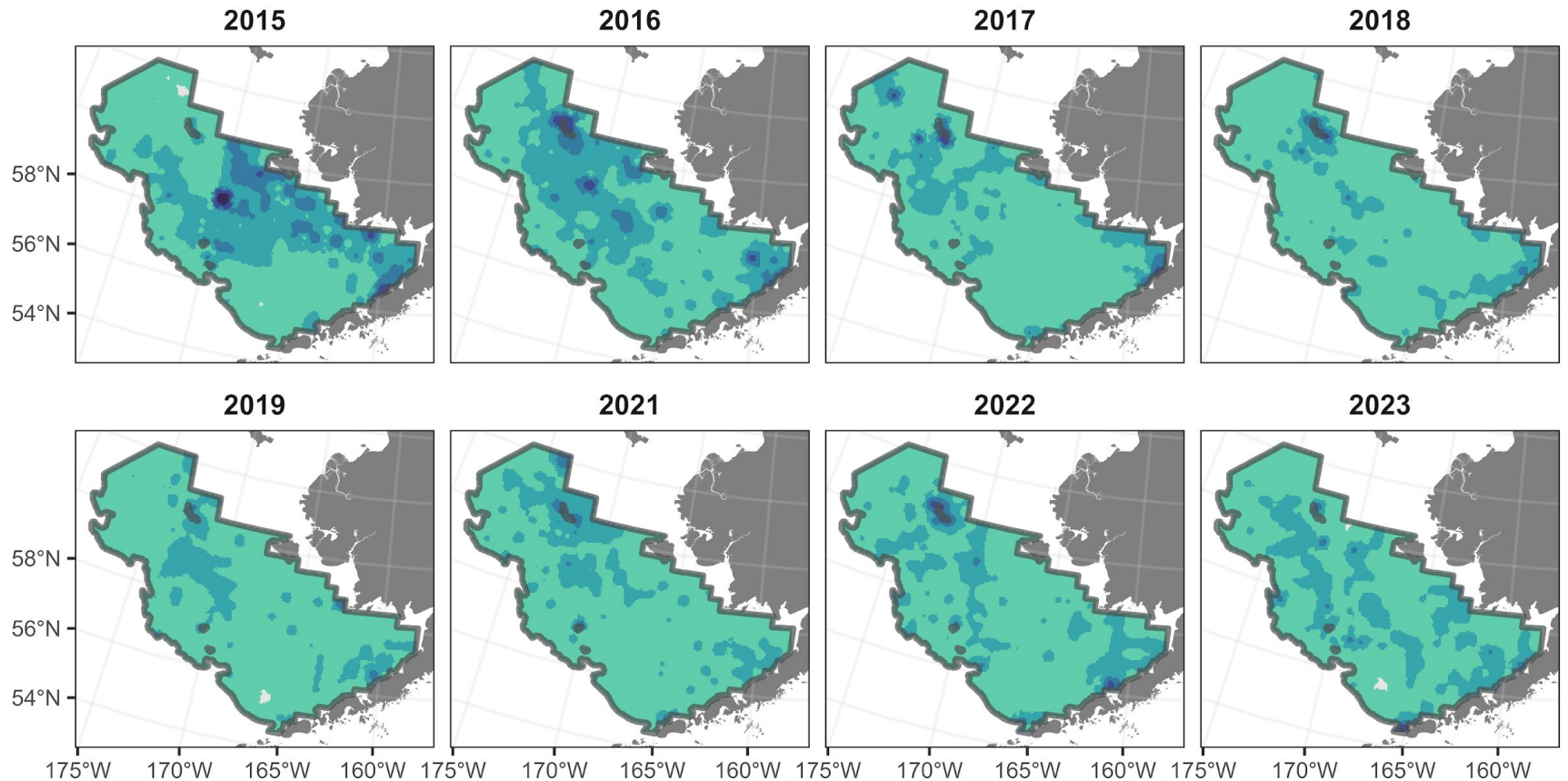
2023: 556 M

(30.71%)

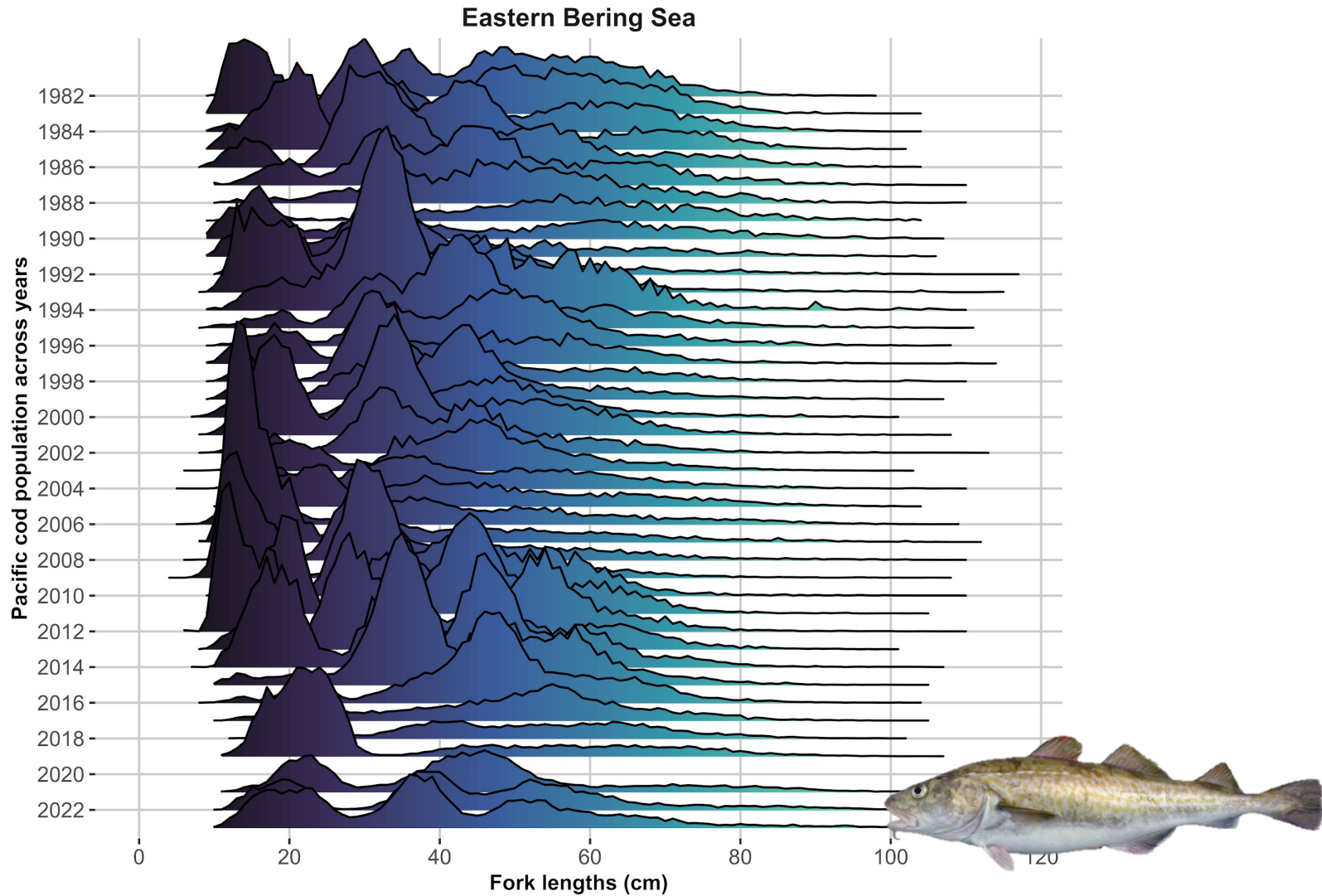


Pacific Cod Distribution

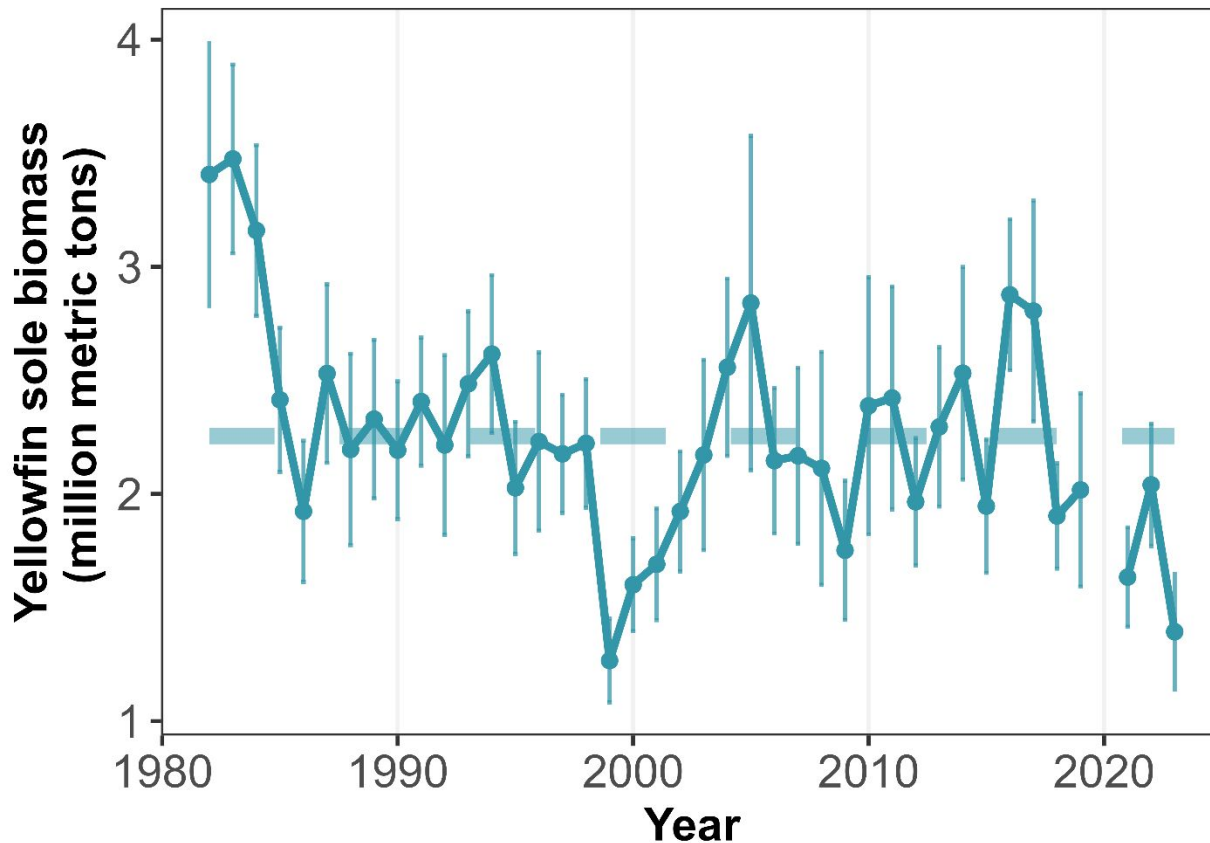
Pacific cod Weight CPUE (kg/km²)



Pacific Cod Lengths



Yellowfin Sole Biomass



— Eastern Bering Sea (mean = 2.3 Mt)

EBS Biomass

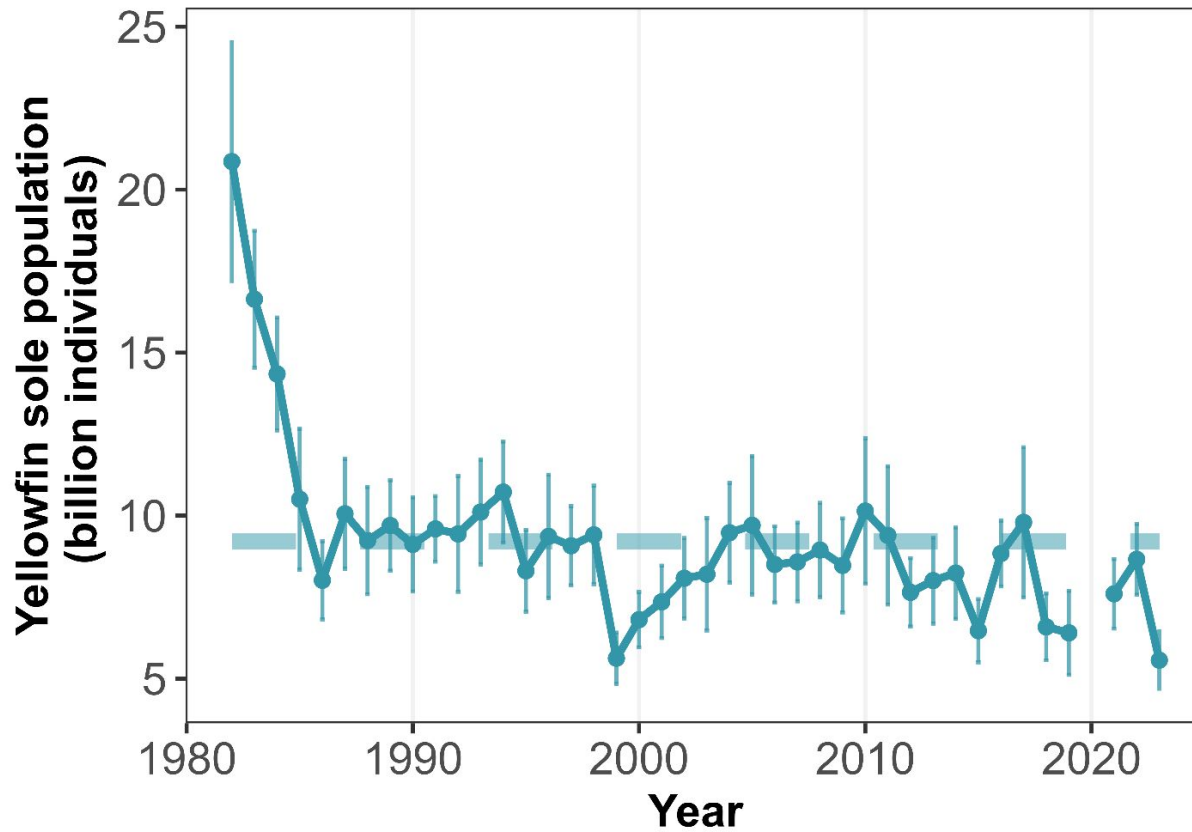
2022: 2.04 Mt

2023: 1.39 Mt

(-31.70%)



Yellowfin Sole Population



EBS Population

2022: 8.66 B

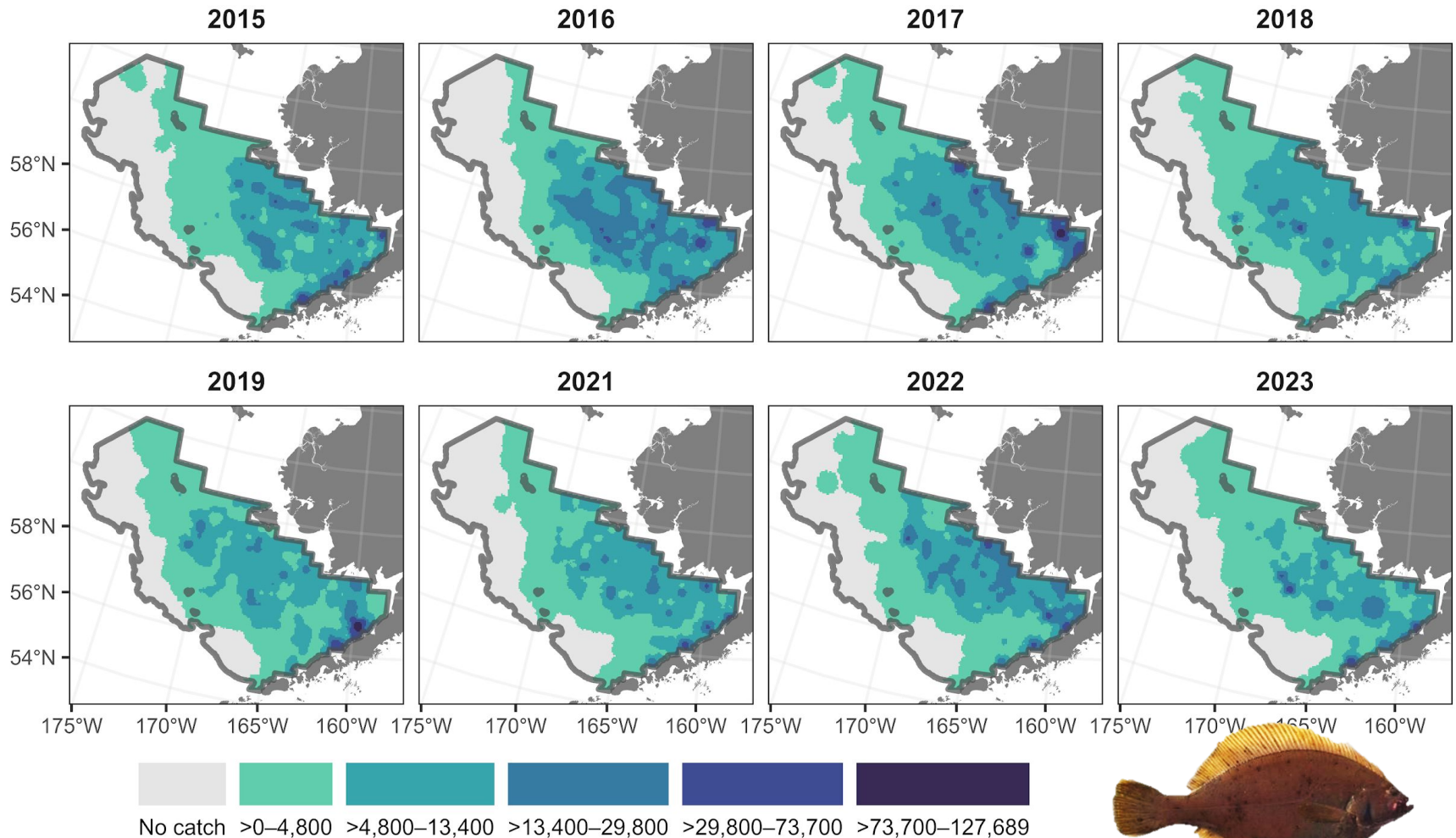
2023: 5.57 B

(-35.71%)

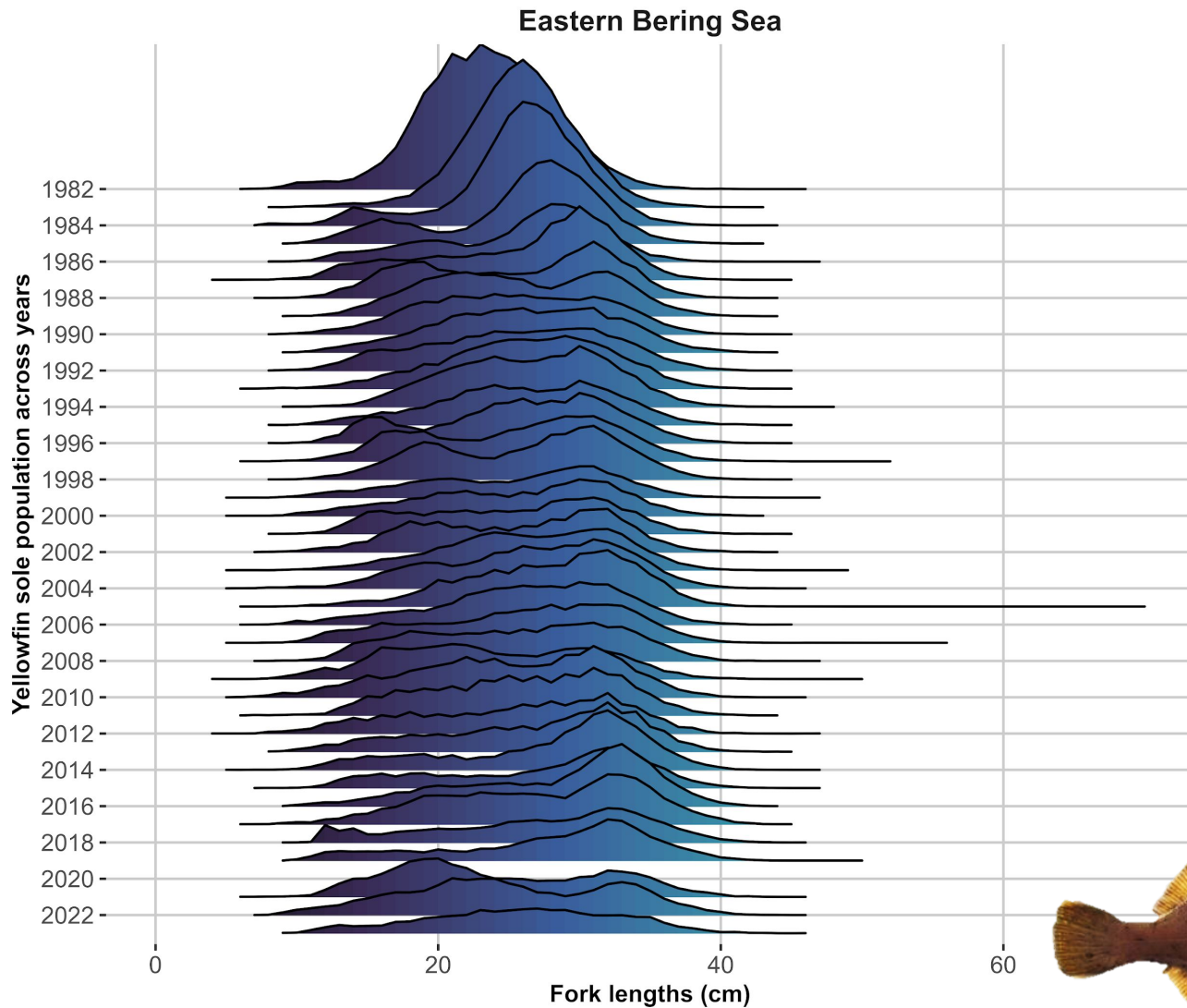


Yellowfin Sole Distribution

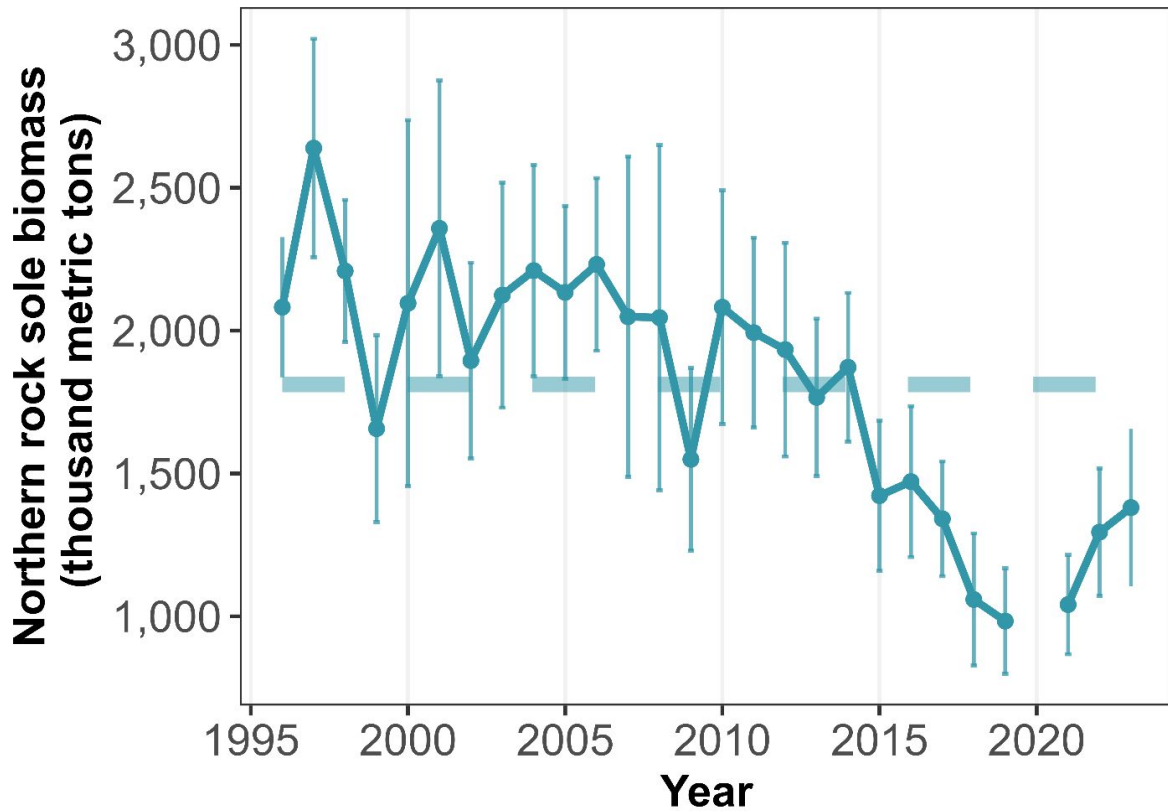
Yellowfin sole Weight CPUE (kg/km²)



Yellowfin Sole Lengths



Northern Rock Sole Biomass



— Eastern Bering Sea (mean = 1,811.8 Kt)

EBS Biomass

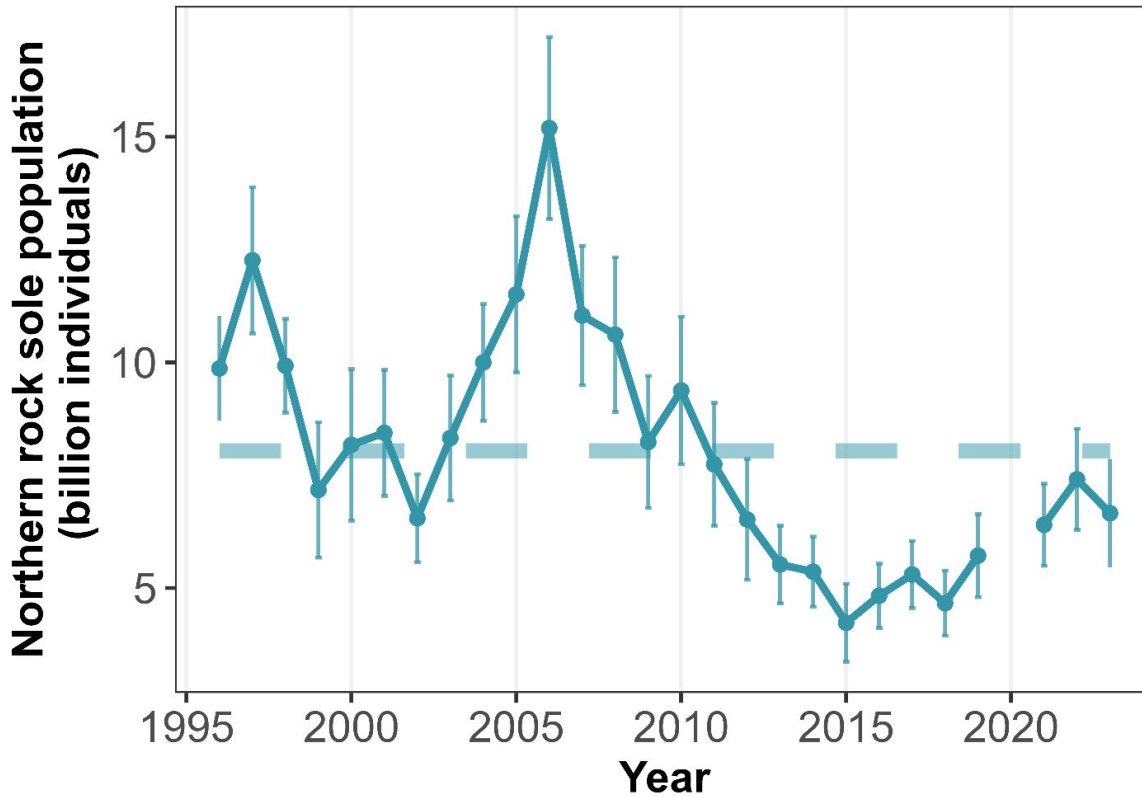
2022: 1,295 Kt

2023: 1,381 Kt

(6.65%)



Northern Rock Sole Population



EBS Population

2022: 7.41 B

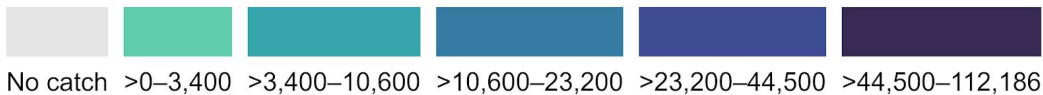
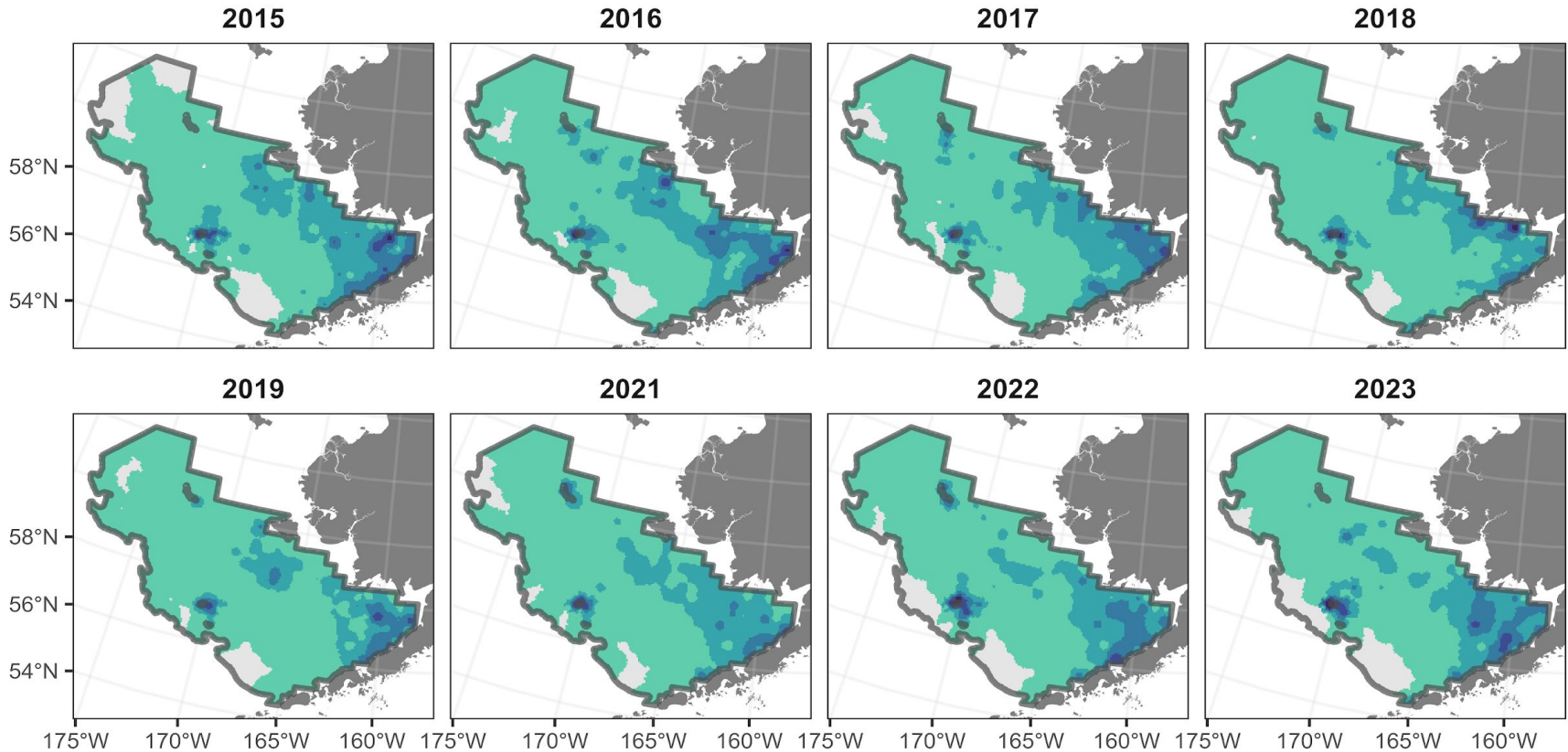
2023: 6.66 B

(-10.14%)

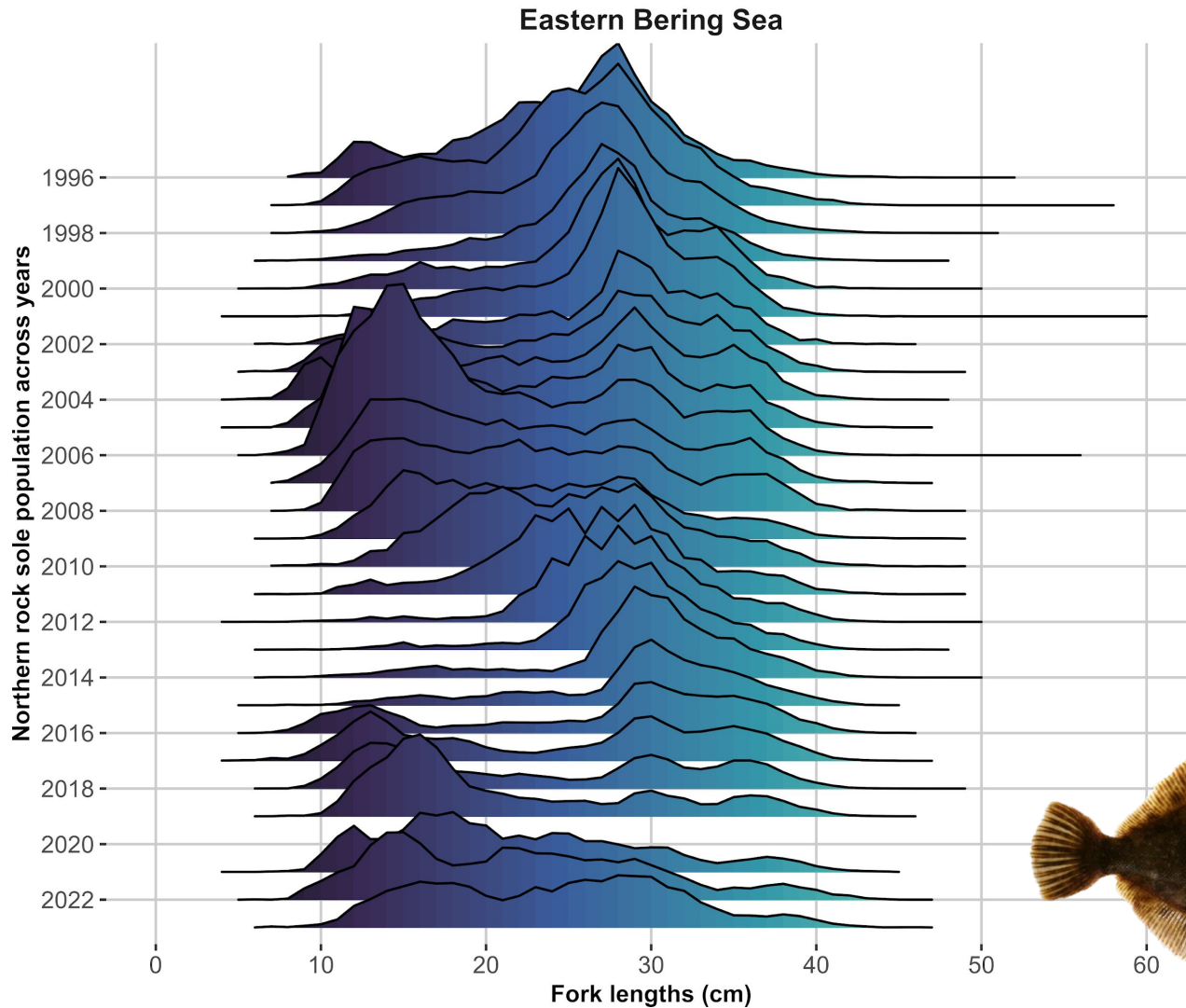


Northern Rock Sole Distribution

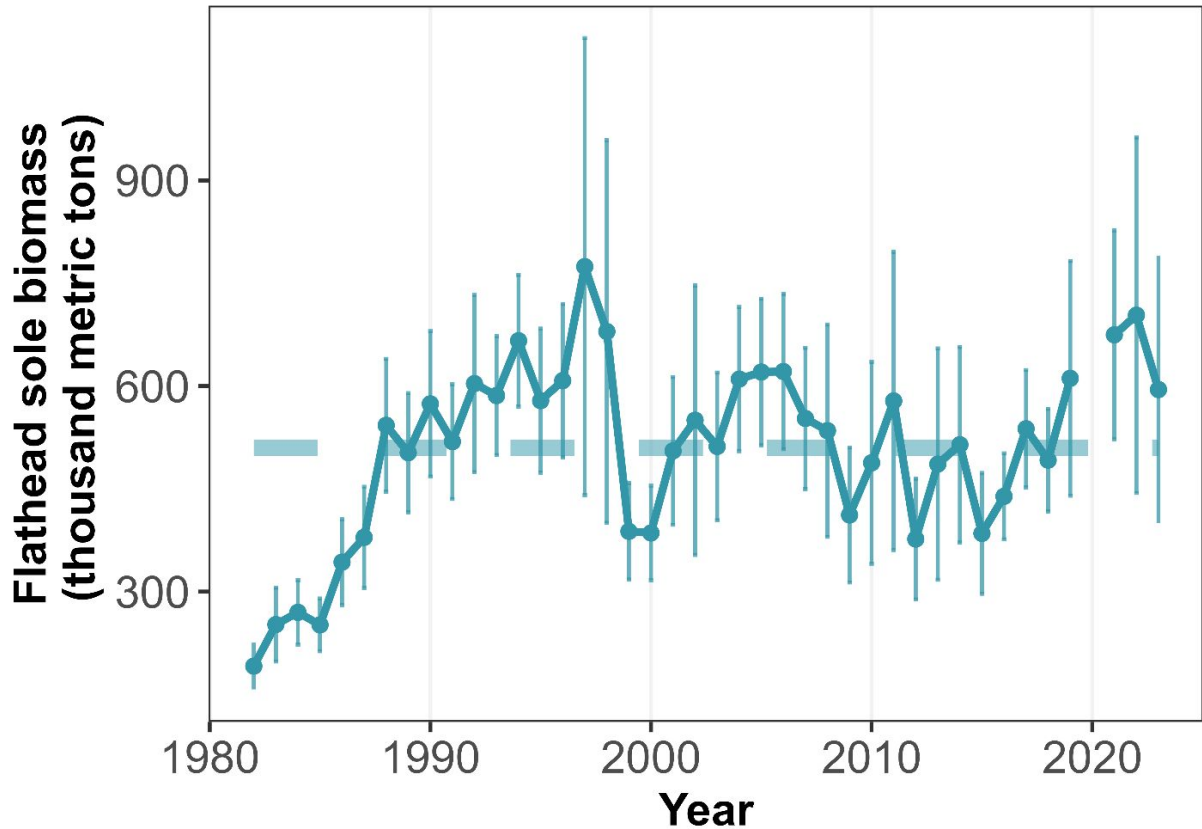
Northern rock sole Weight CPUE (kg/km²)



Northern Rock Sole Lengths



Flathead Sole Biomass

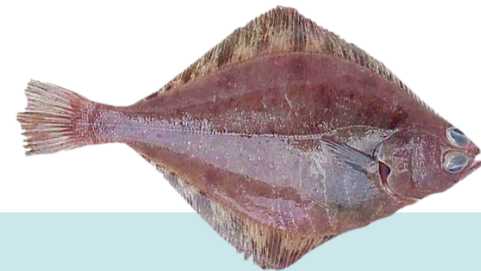


EBS Biomass

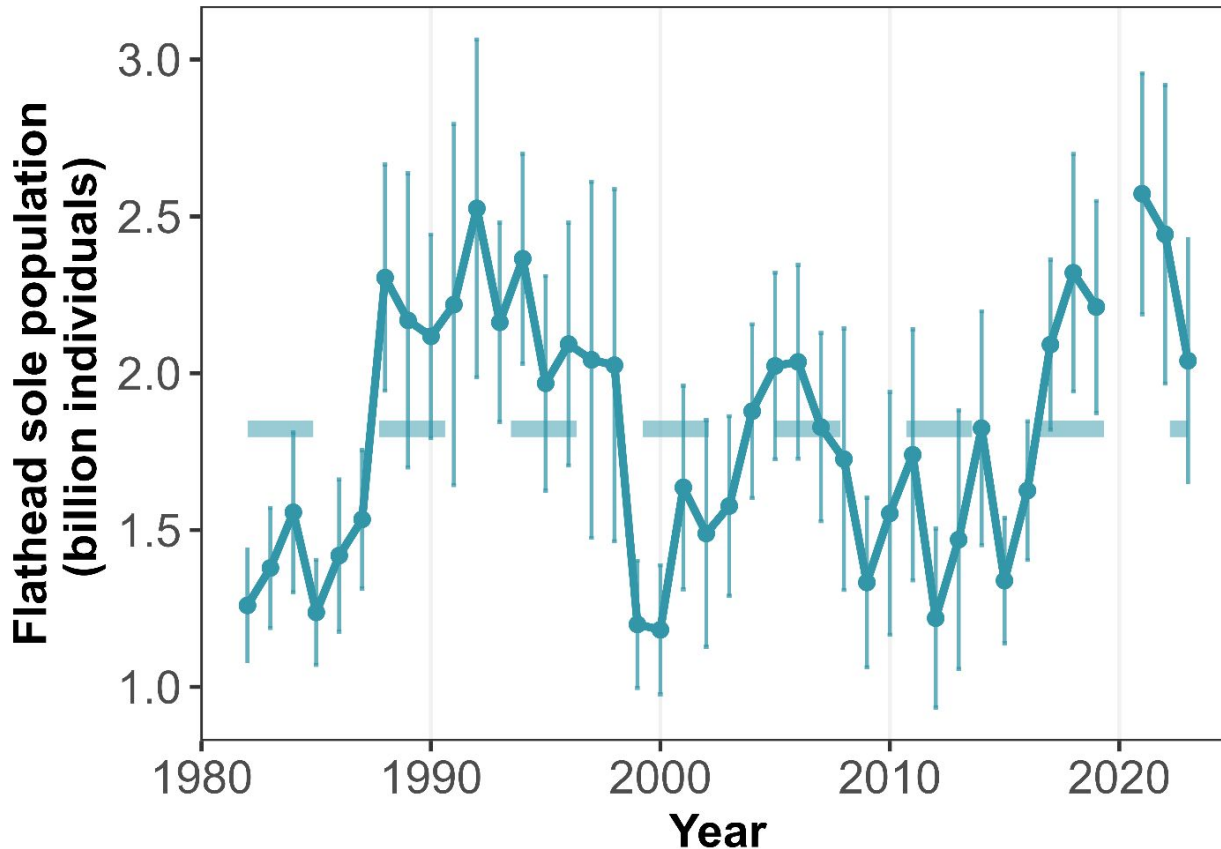
2022: 703 Kt

2023: 595 Kt

(-15.43%)



Flathead Sole Population



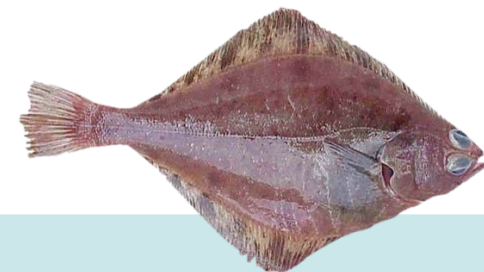
— Eastern Bering Sea (mean = 1.8 B)

EBS Population

2022: 2.44 B

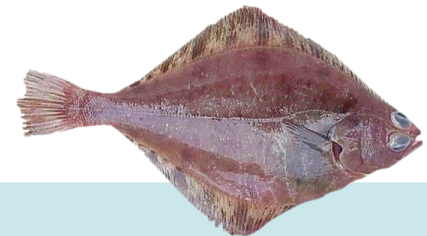
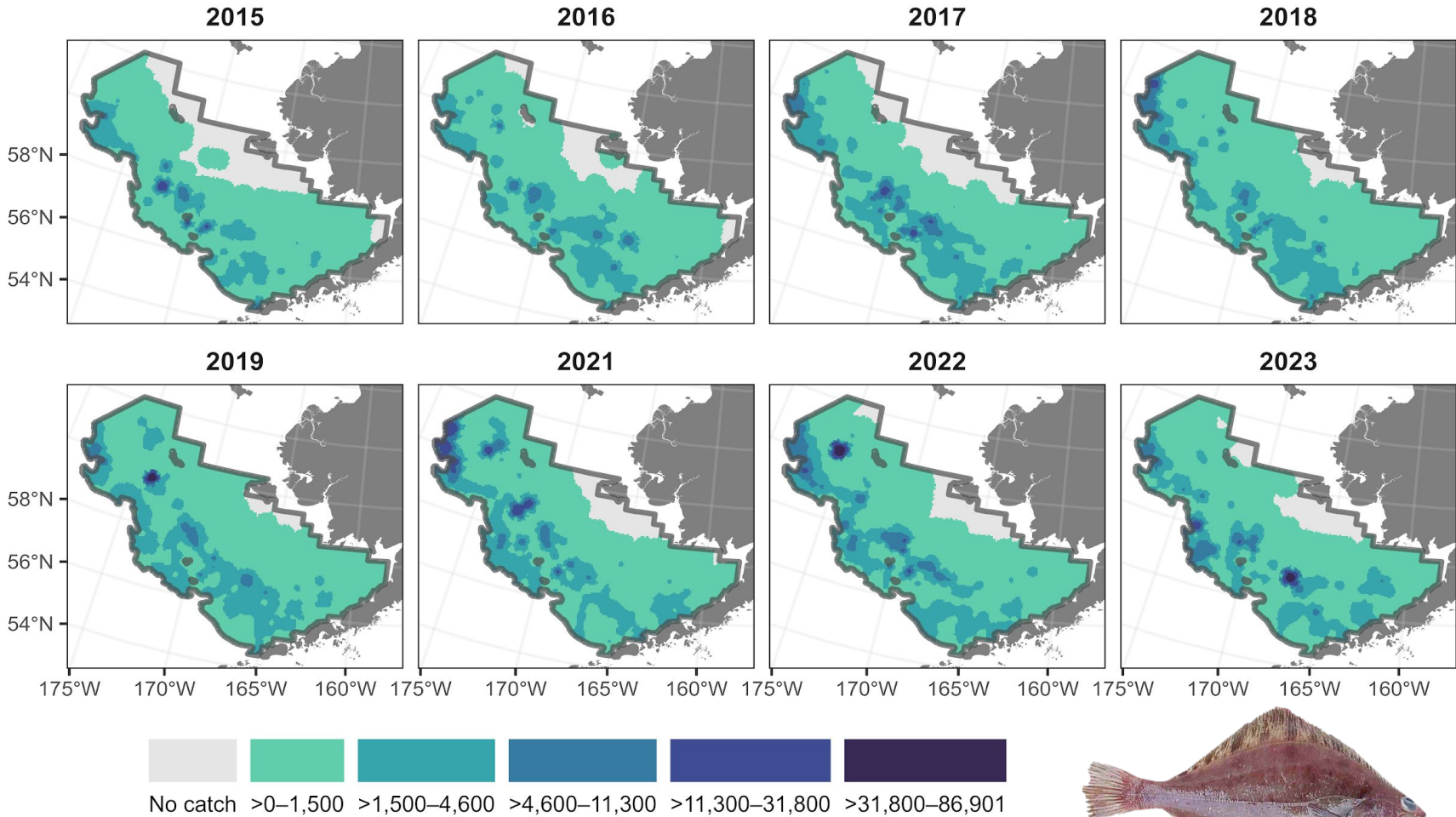
2023: 2.04 B

(-16.50%)

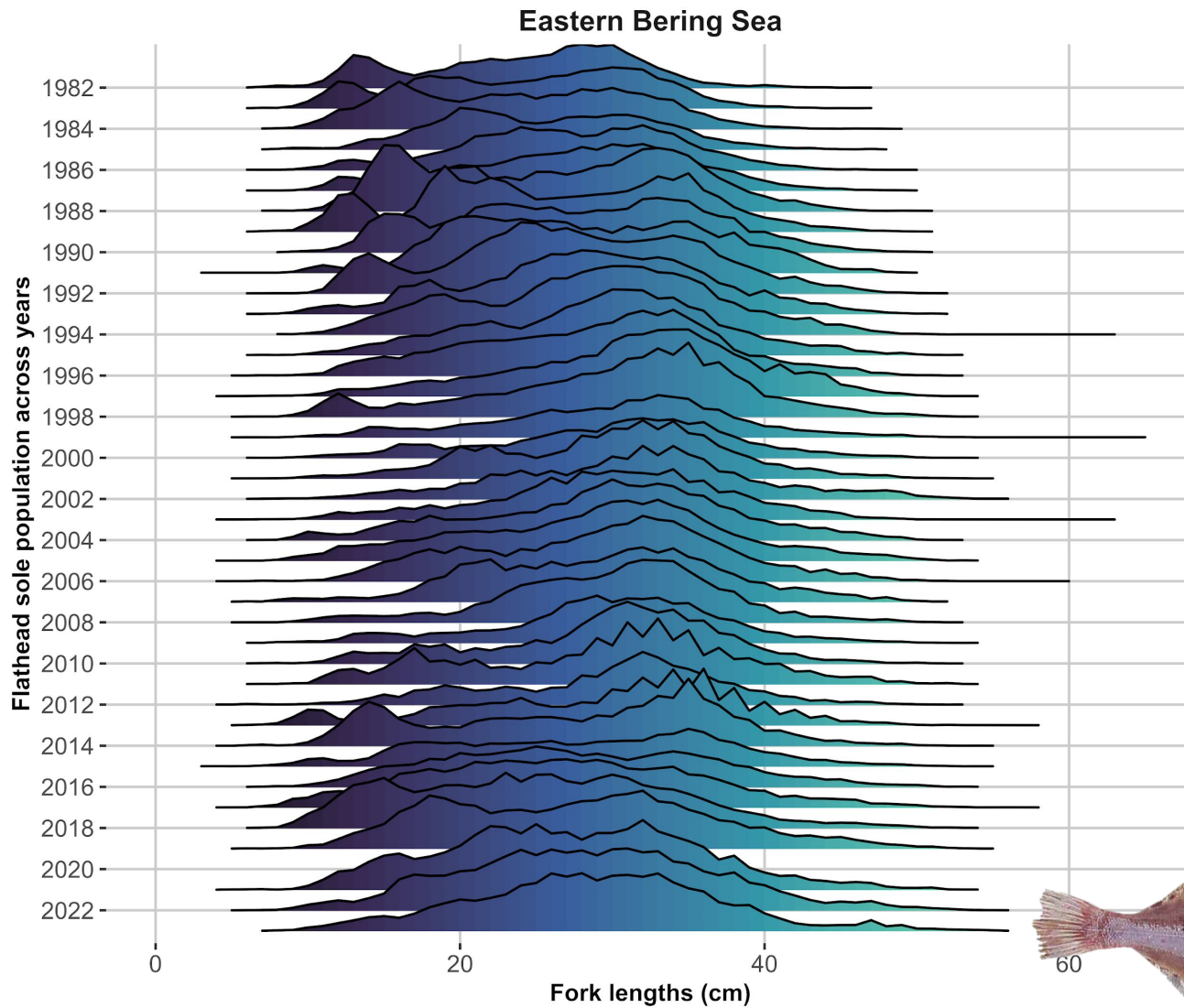


Flathead Sole Distribution

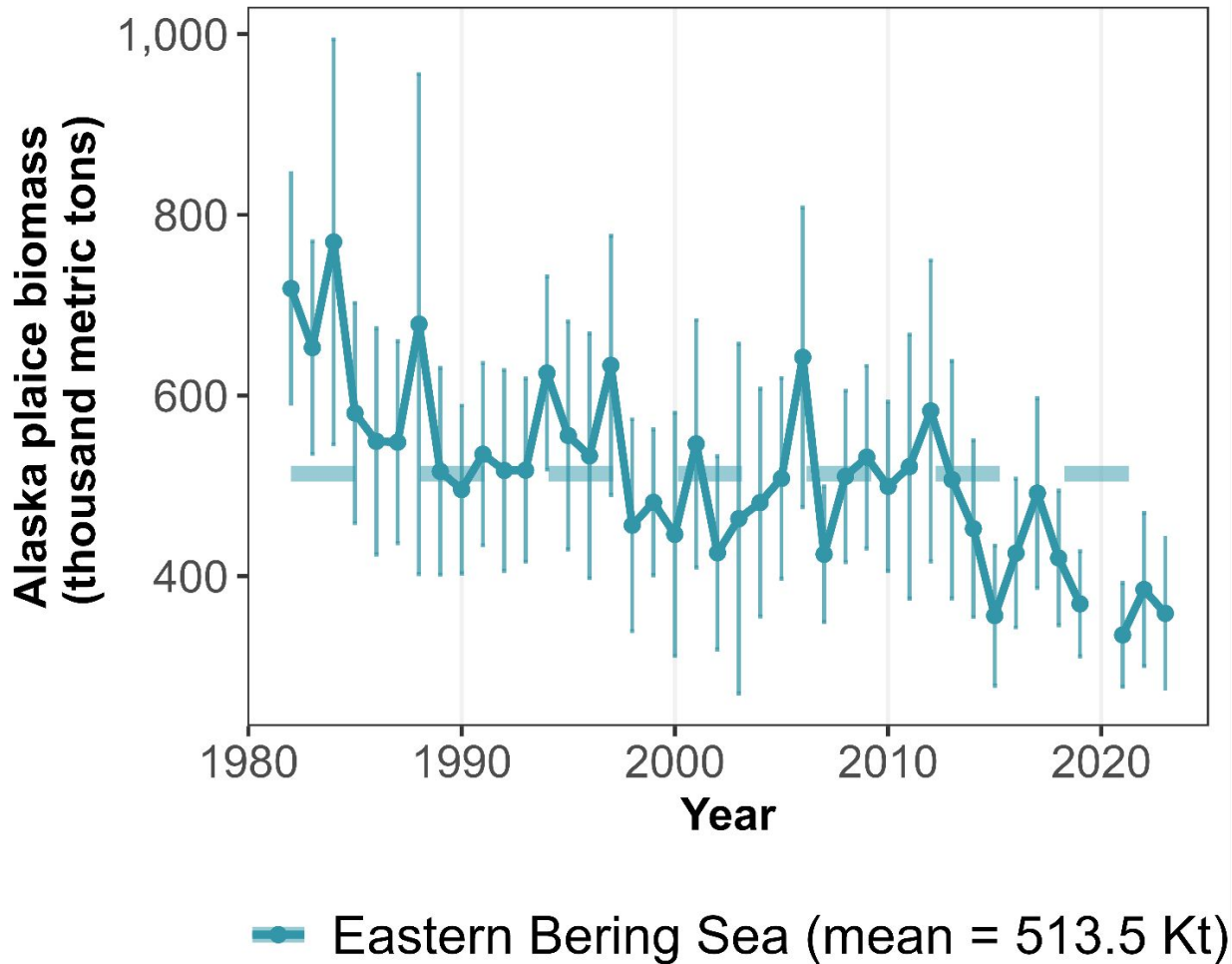
Flathead sole Weight CPUE (kg/km²)



Flathead Sole Lengths



Alaska Plaice Biomass



EBS Biomass

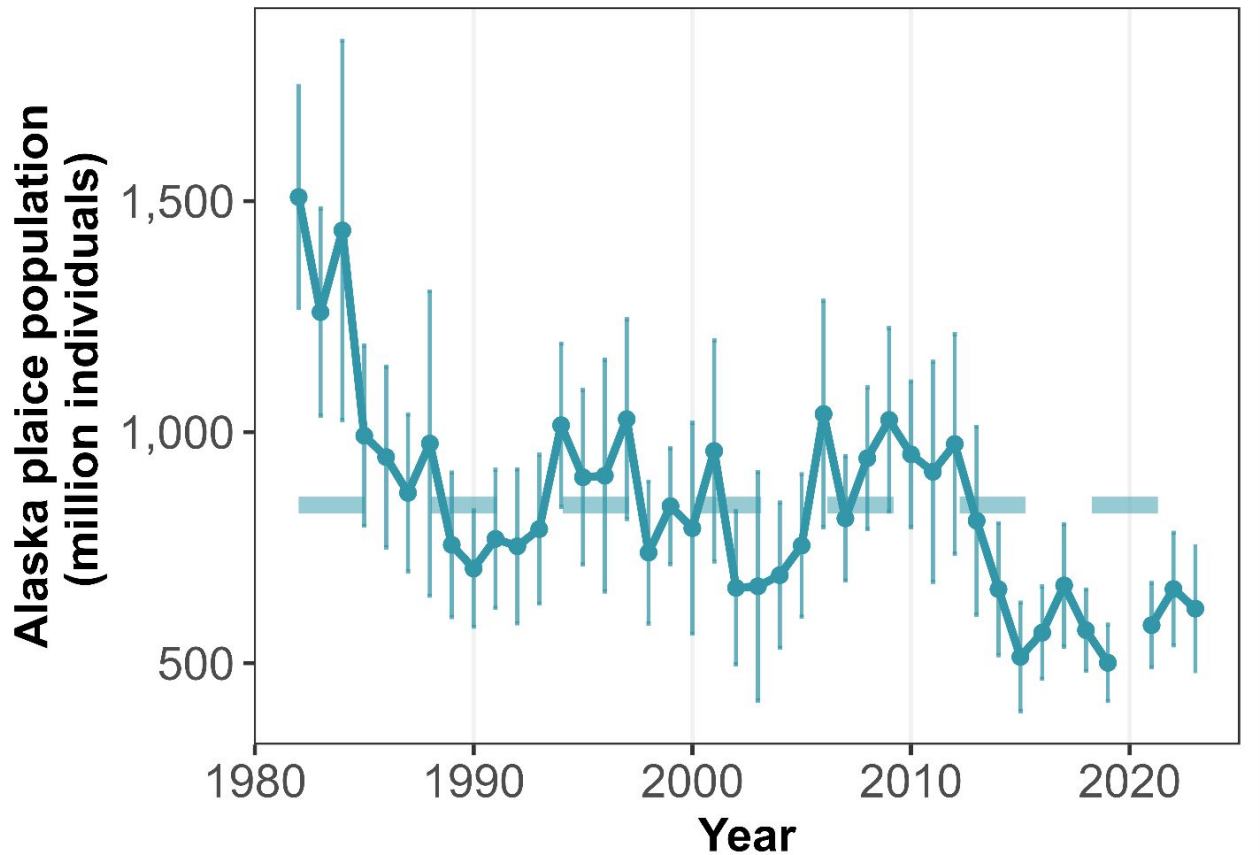
2022: 385 Kt

2023: 359 Kt

(-6.86%)



Alaska Plaice Population



EBS Population

2022: 660 M

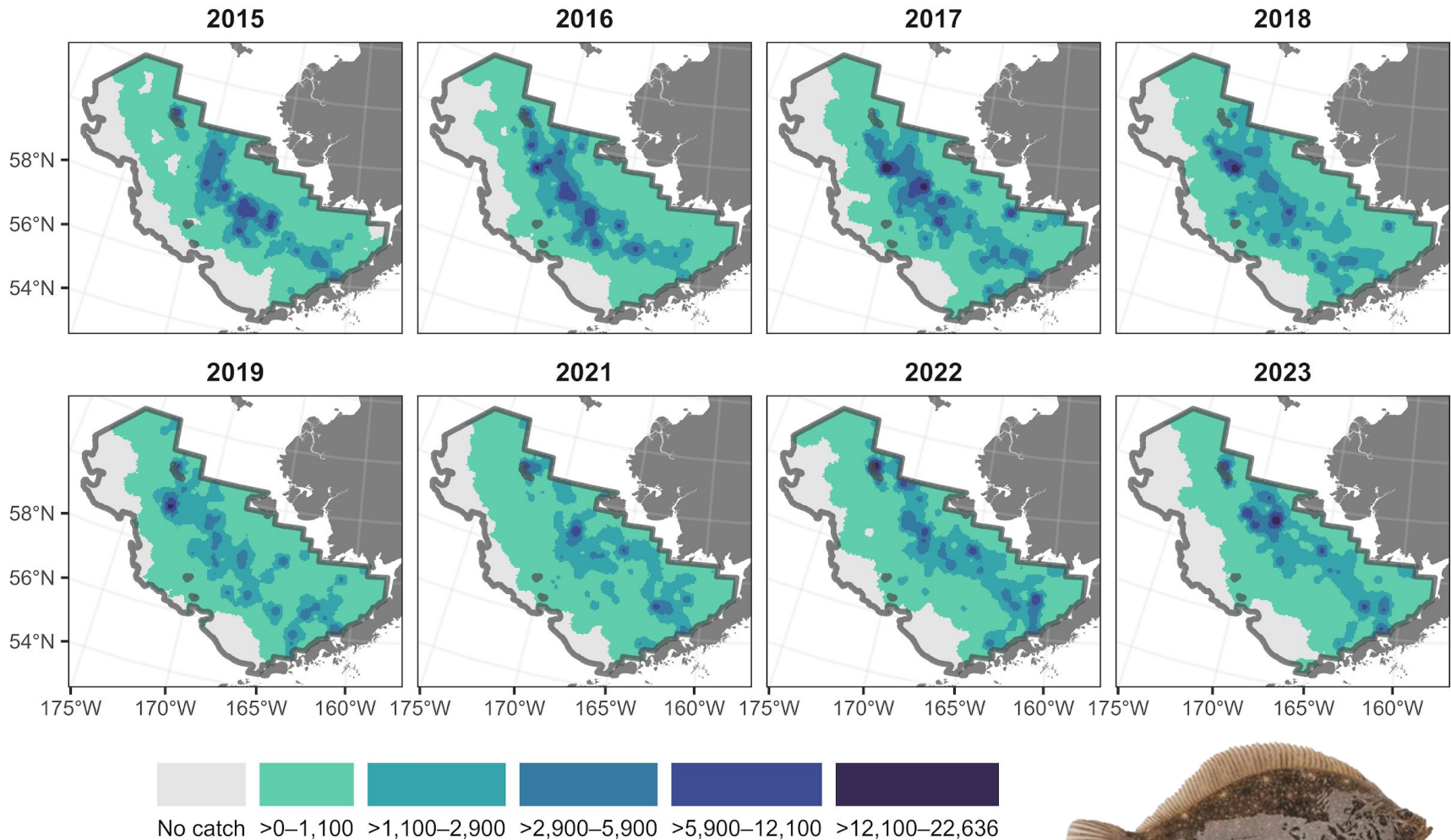
2023: 618 M

(-6.43%)

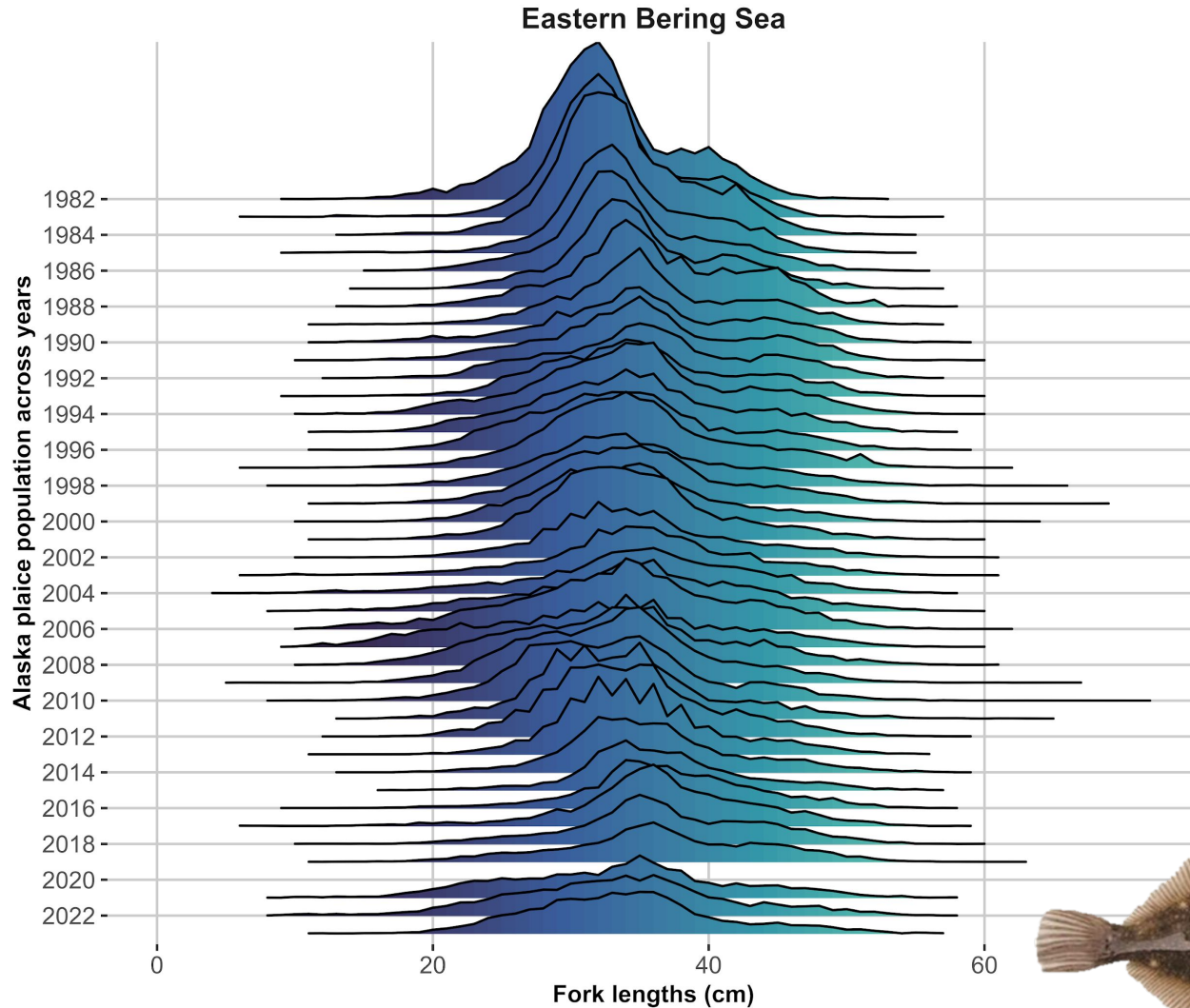


Alaska Plaice Distribution

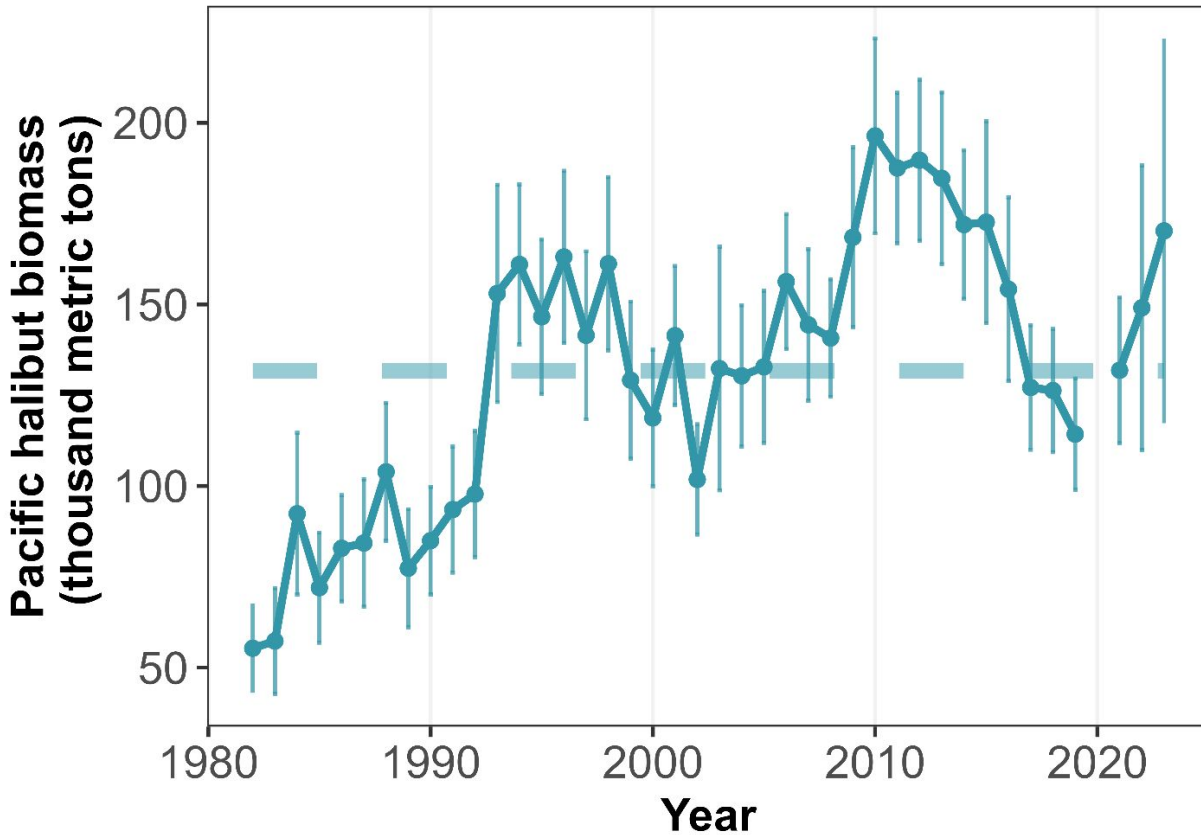
Alaska plaice Weight CPUE (kg/km²)



Alaska Plaice Lengths



Pacific Halibut Biomass



EBS Biomass

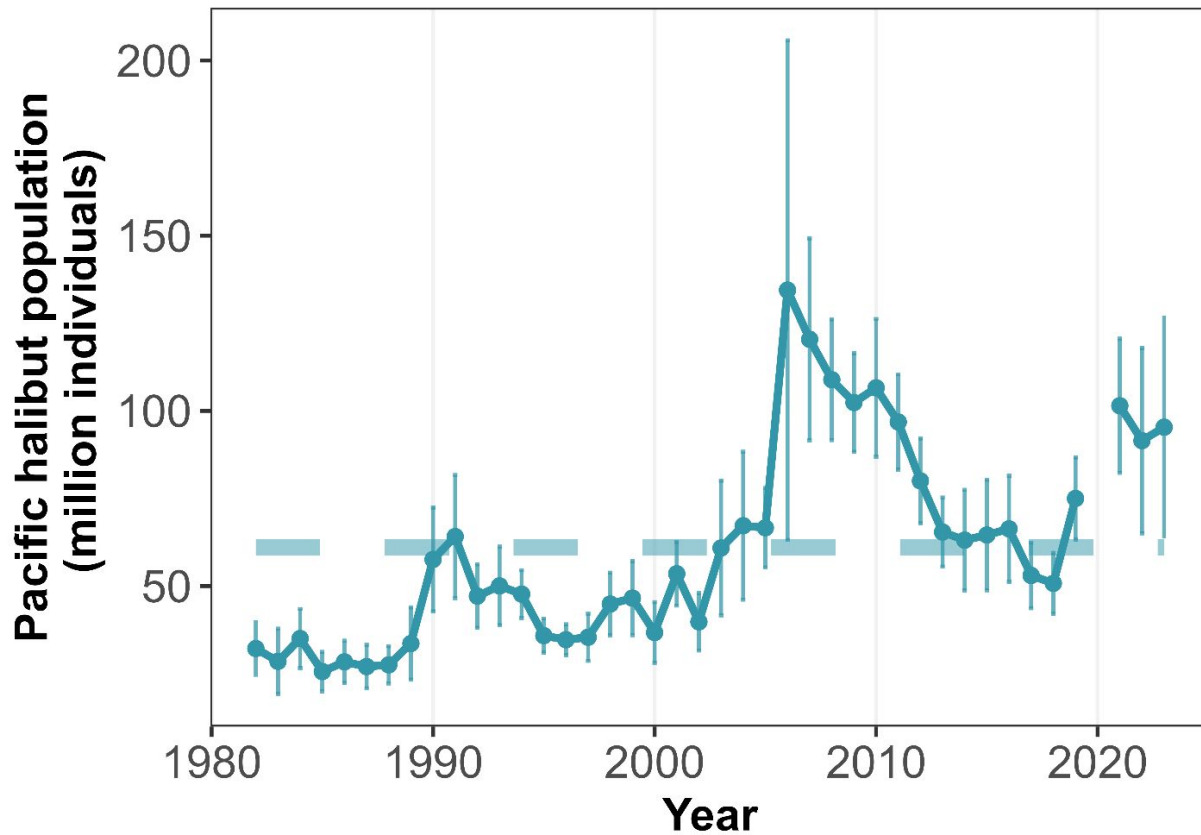
2022: 149 Kt

2023: 170 Kt

(14.20%)



Pacific Halibut Population



— Eastern Bering Sea (mean = 61.0 M)

EBS Population

2022: 91.5 M

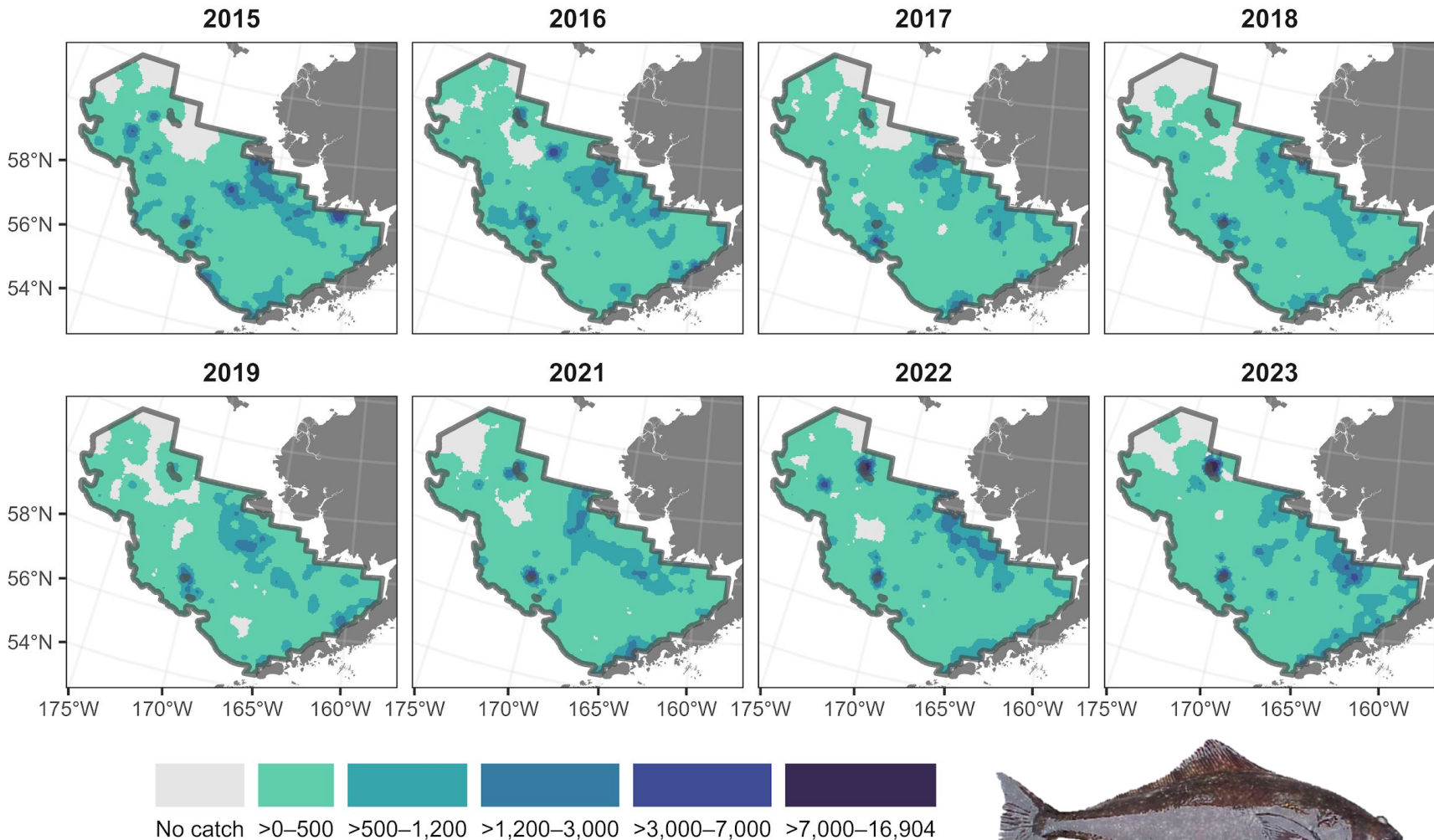
2023: 95.3 M

(4.21%)

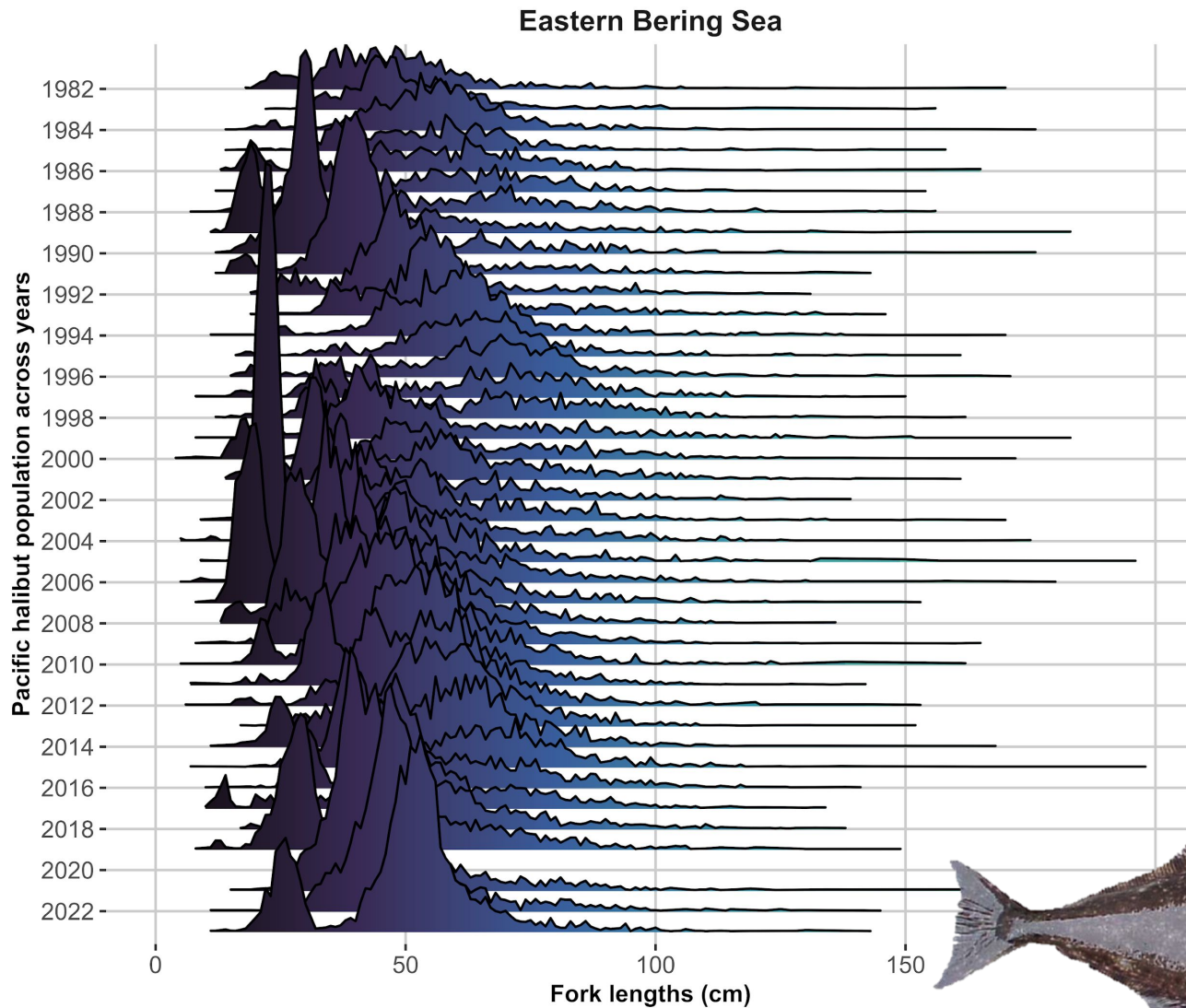


Pacific Halibut Distribution

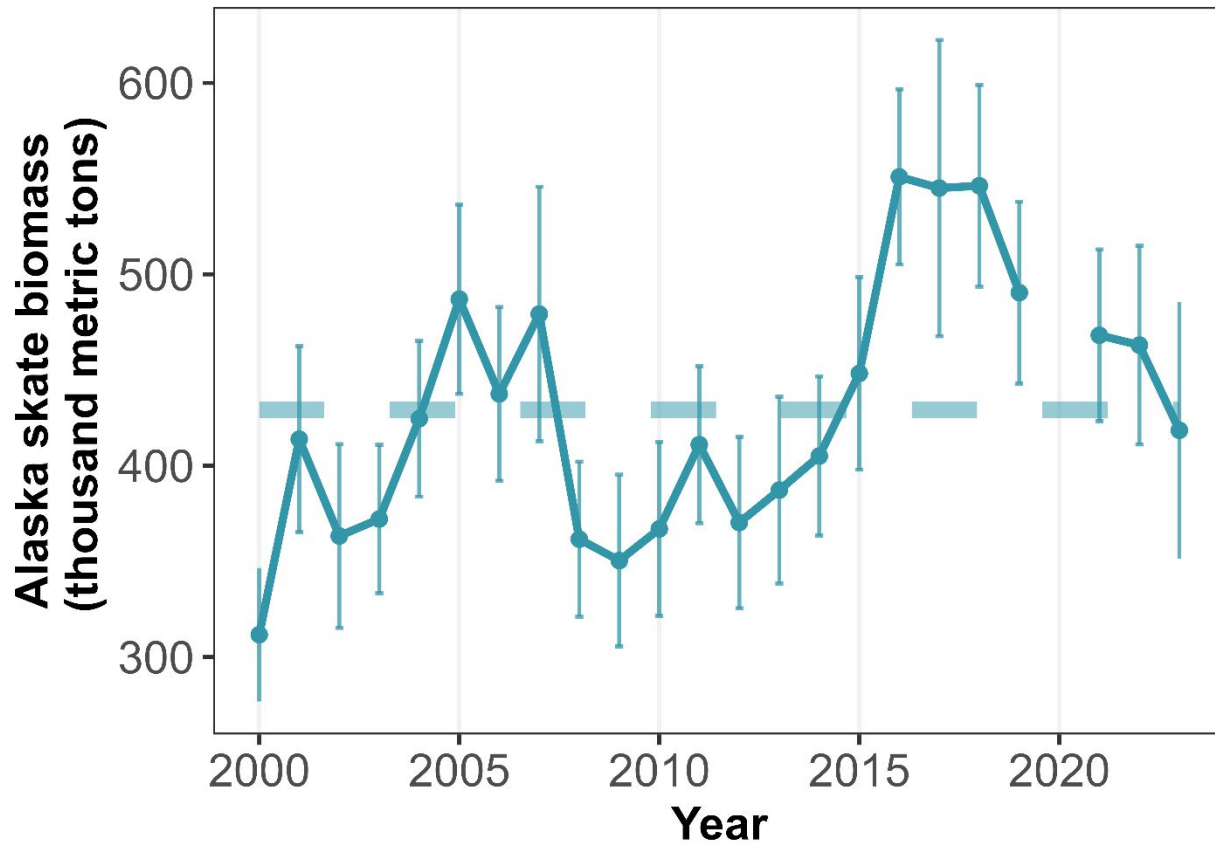
Pacific halibut Weight CPUE (kg/km²)



Pacific Halibut Lengths



Alaska Skate Biomass



EBS Biomass

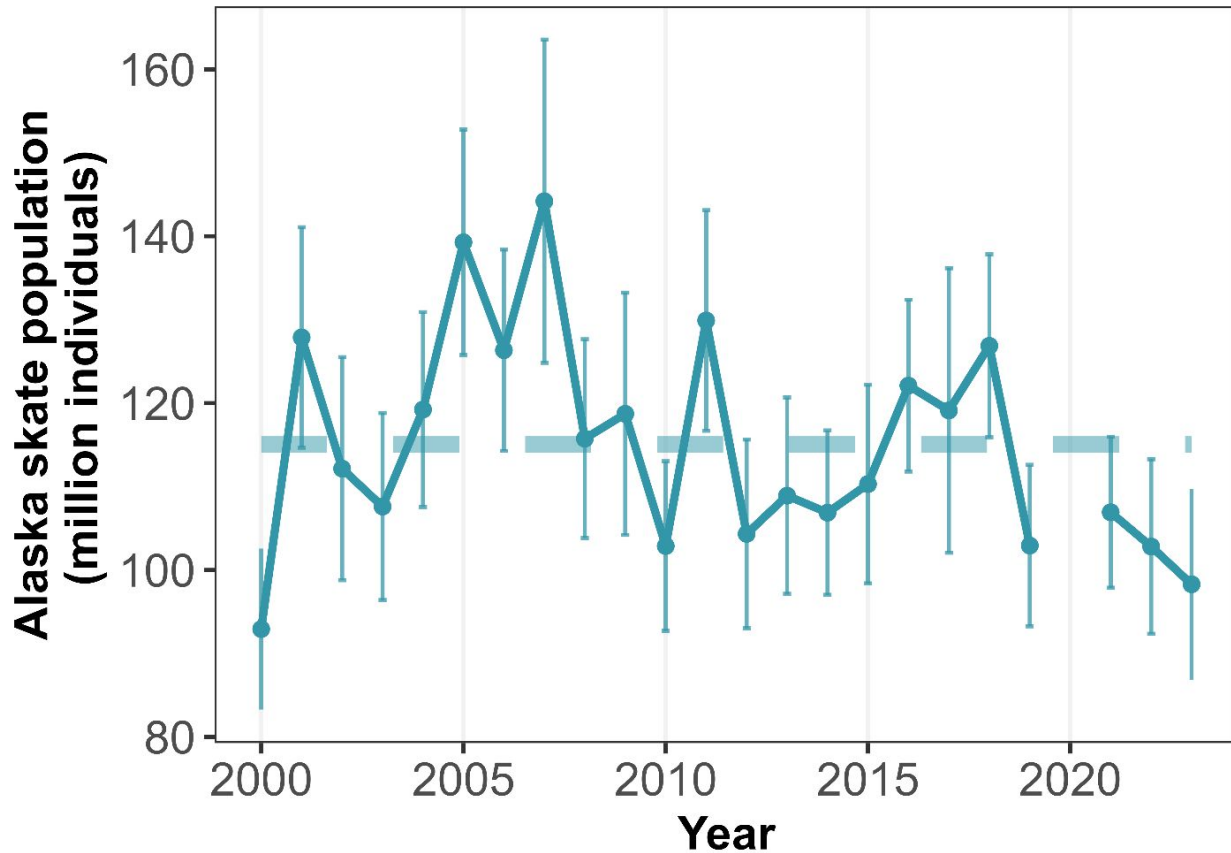
2022: 463 Kt

2023: 418 Kt

(-9.62%)



Alaska Skate Population



—●— Eastern Bering Sea (mean = 115.1 M)

EBS Population

2022: 102 M

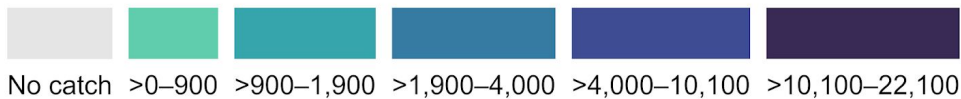
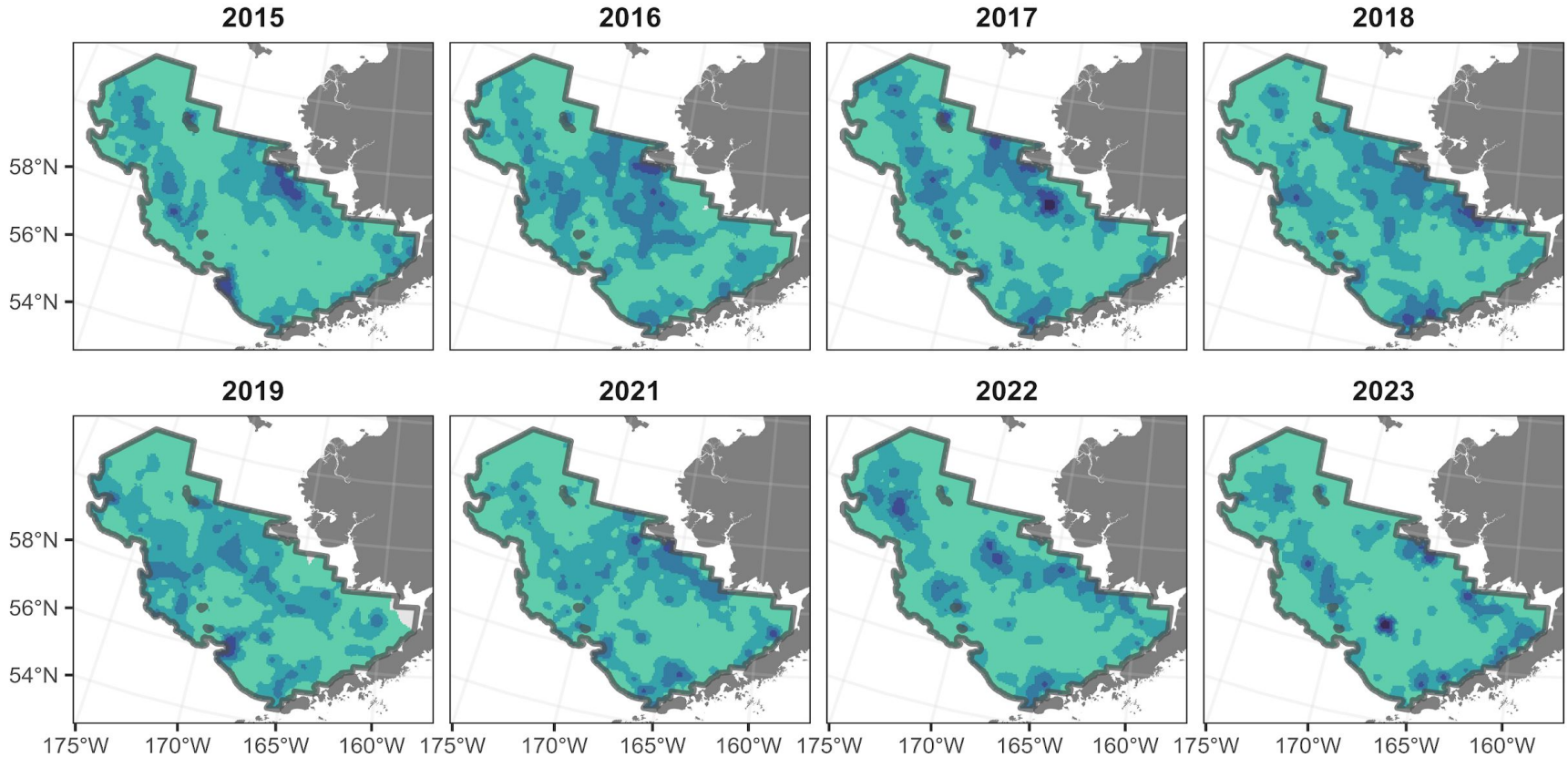
2023: 98.3 M

(-4.40%)

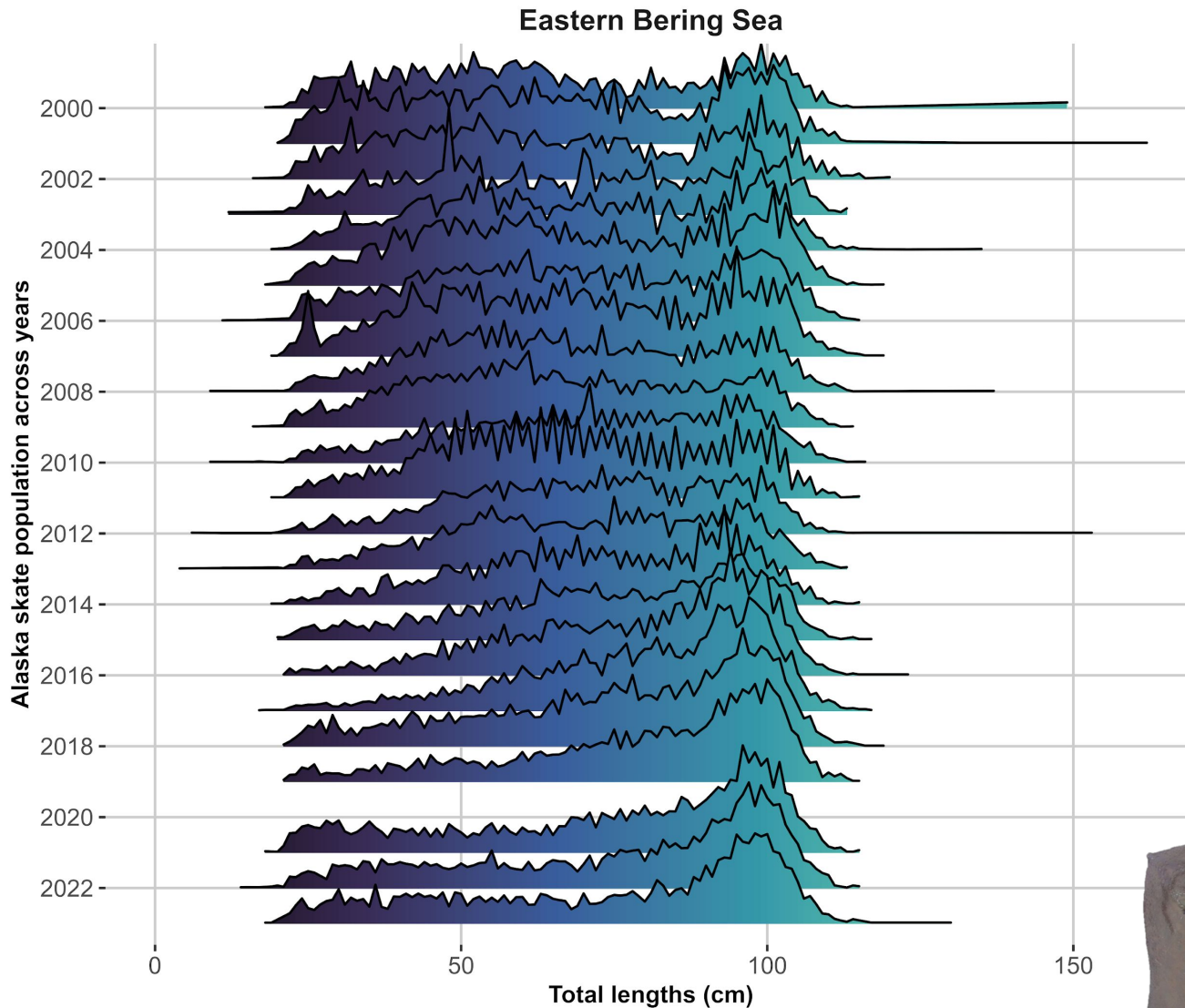


Alaska Skate Distribution

Alaska skate Weight CPUE (kg/km²)



Alaska Skate Lengths



Biomass/Population Changes

EBS			
Common name	Year	Biomass (mt)	Population (x1,000)
walleye pollock	2022	4,153,971	7,563,348
	2023	3,154,668 (-24%)	5,685,500 (-25%)
Pacific cod	2022	647,400	425,156
	2023	663,075 (2%)	555,739 (31%)
yellowfin sole	2022	2,039,968	8,660,407
	2023	1,393,379 (-32%)	5,567,596 (-36%)
northern rock sole	2022	1,294,581	7,408,458
	2023	1,380,684 (7%)	6,657,558 (-10%)
flathead sole	2022	703,375	2,442,797
	2023	594,851 (-15%)	2,039,623 (-17%)
Bering flounder	2022	6,237	36,007
	2023	6,813 (9%)	33,736 (-6%)
Alaska plaice	2022	385,294	660,307
	2023	358,845 (-7%)	617,849 (-6%)
arrowtooth flounder	2022	521,615	1,001,554
	2023	462,575 (-11%)	861,345 (-14%)
Kamchatka flounder	2022	29,699	45,293
	2023	24,875 (-16%)	40,128 (-11%)
Pacific halibut	2022	149,064	91,474
	2023	170,238 (14%)	95,321 (4%)
Alaska skate	2022	463,017	102,817
	2023	418,483 (-10%)	98,290 (-4%)
Pacific ocean perch	2022	126,805	242,638
	2023	18,914 (-85%)	23,560 (-90%)

Special Projects

Acoustics

EBS & NBS AVO index

Crab Disease

EBS & NBS Bitter Crab Disease Monitoring

EBS & NBS Bitter crab disease live collections

EBS & NBS Snow Crab Black Eye Lethal Sampling

EBS & NBS Snow Crab Black Eye Live Collection

Environmental Monitoring

EBS & NBS Ambient light monitoring

EBS & NBS CTD data collection

EBS & NBS Collecting dissolved oxygen and pH with CTDs

EBS & NBS ECOHAB 2023

Fish/Crab Condition

EBS & NBS Fish Condition Index-Pollock/Cod

EBS & NBS Juvenile yellowfin sole

EBS & NBS Snow Crab Condition

EBS Blood Collection for Stress Physiology

EBS Shell condition error rates in EBS opilio

Population Genetics

EBS & NBS Genetic identification of larval sandlance

EBS & NBS Genomic analysis of Alaska flatfish

EBS & NBS Shark genetics and age structure sampling

Miscellaneous

EBS & NBS Arctic and saffron cod growth

EBS & NBS IPHC sampling on the NOAA trawl surveys

EBS & NBS Invertebrate collections for lab OA experiment

EBS & NBS Marine Lampreys

EBS & NBS NWFSC + UW Voucher Collection

EBS & NBS Observer Collections

EBS & NBS Observer Specimen Collection

EBS & NBS Pacific cod tagging

EBS & NBS Specimen Collection for Outreach Events

EBS & NBS Suryan/Copeman/Stowell RWP Shrimp Lipids

EBS & NBS Temperature-diet effects on snow crab

EBS ADF&G Crab Observer Training Collections

EBS EBS Slope Tows

EBS EBS gear redesign

EBS JPA Isotopes

EBS Juvenile Prowfish, *Zaprora silenus*, as prey fish

EBS Observer Crab Collection

EBS Red King Crab Tagging

EBS Tanner Crab movement across the 166°W boundary

NBS Mollusk collection

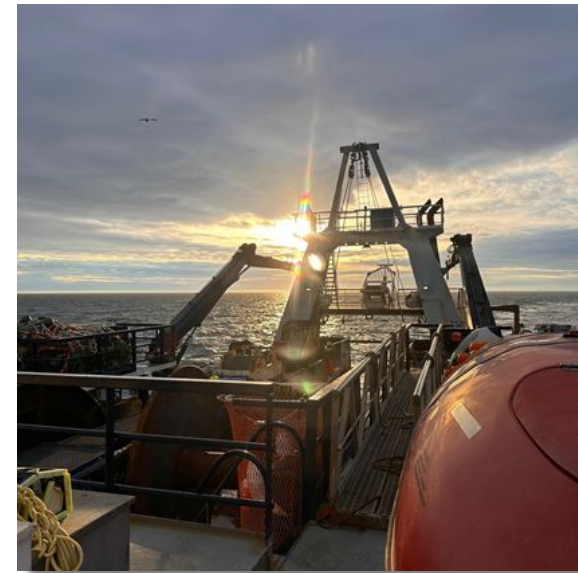
NBS NBS fish for Hg isotopes

NBS Norton Sound Red King Crab Live Collections



Survey Modernization Work

- Initial testing of new trawl doors
(Russell, Charriere)
 - Better hydrodynamic resistance
 - Versatility, consistency
 - Improved availability and maintenance costs
- Paired tows with shelf/slope gear
(NPRB - DeFilippo)
 - Estimate selectivity ratios for gear types
 - Confirm feasibility of using shelf gear on slope
 - Facilitate combined analysis of historical data
- 15/30 minute paired tows
 - Estimate catchability ratios for two haul durations



Access to Our Data

These data will soon be available to the public!

*Learn about
our data
products:*



*Public Historical
survey catch
data:*



*Mapping of
survey catch
data:*



*Request data
from us:*

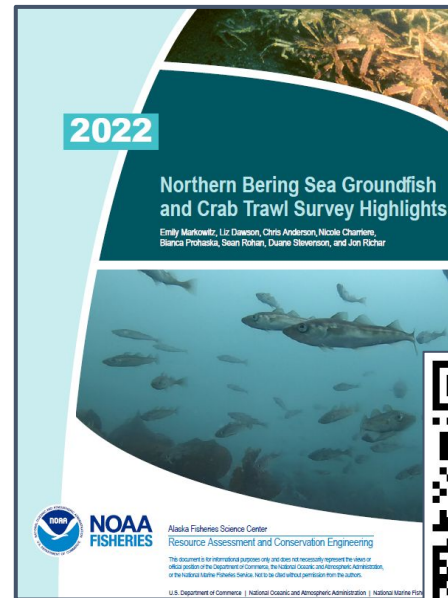
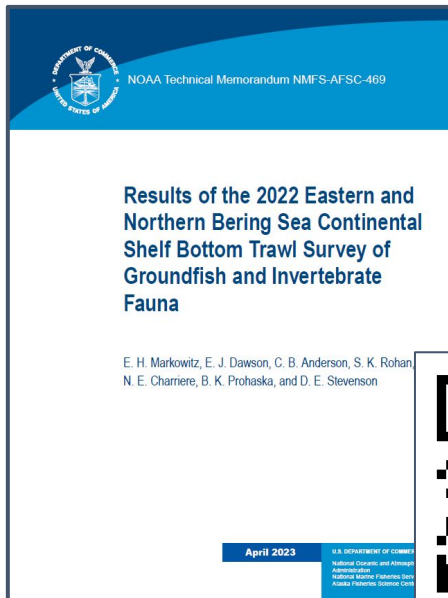
Or email:

afsc.gap.metadata@noaa.gov



Tech Memo and NBS Community Report

- New 2023 reports will be posted in the next few months
- 2022 reports available now



Summary

- EBS survey temps indicate cold pool is spatially similar to 2022, but colder
- Fish biomass in EBS has decreased for most species; although cod, NRS, and halibut show slight increases
- EBS results available now (not on FOSS yet), NBS results available soon



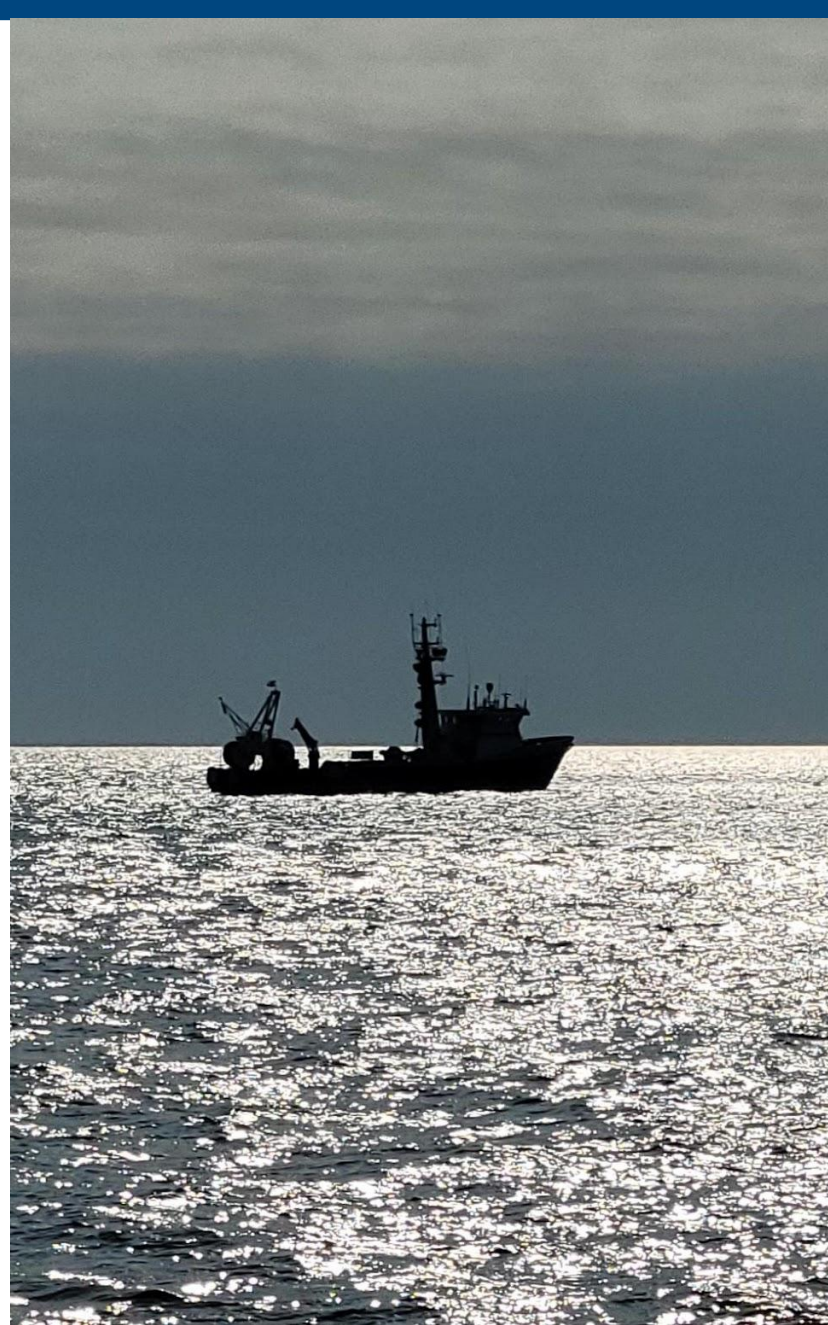
Thank you!



Questions?

Duane.Stevenson@noaa.gov

afsc.gap.metadata@noaa.gov



NOAA FISHERIES