

NOAA
FISHERIES

2024 Alaska Forage Fish Ecosystem Report

BSAI & GOA

J Vollenweider, C Szuwalski, E Yasumiishi, A Andrews,
J Murphy, A Dimond, E Farley, R Suryan

Forage Fish

- Large, diverse group of >50 species
- State and federal management
- Motivation for forage group FMP: prevent fishing-related impacts to AK forage base
- Excluded: juv. walleye pollock, juv. Pacific cod, juv. salmon, krill



| Scientific Name | Common Name |
|--------------------------------------|--------------------------|
| <i>Mallotus villosus</i> | capelin |
| <i>Hypomesus pretiosus</i> | surf smelt |
| <i>Osmerus mordax</i> | rainbow smelt |
| <i>Thaleichthys pacificus</i> | eulachon |
| <i>Spirinchus thaleichthys</i> | longfin smelt |
| <i>Spirinchus starksi</i> | night smelt |
| <i>Protomyctophum thompsoni</i> | bigeye lanternfish |
| <i>Benthoosema glaciale</i> | glacier lanternfish |
| <i>Tarletonbeania taylori</i> | taillight lanternfish |
| <i>Tarletonbeania crenularis</i> | blue lanternfish |
| <i>Diaphus theta</i> | California headlightfish |
| <i>Stenobranchius leucopsarus</i> | northern lampfish |
| <i>Stenobranchius nannochir</i> | garnet lampfish |
| <i>Lampanyctus jordani</i> | brokenline lanternfish |
| <i>Nannobranchium regale</i> | pinpoint lampfish |
| <i>Nannobranchium ritteri</i> | broadfin lanternfish |
| <i>Leuroglossus schmidti</i> | northern smoothtongue |
| <i>Lipolagus ochotensis</i> | popeye blacksmelt |
| <i>Pseudobathylagus milleri</i> | stout blacksmelt |
| <i>Bathylagus pacificus</i> | slender blacksmelt |
| <i>Ammodytes hexapterus</i> | Arctic sand lance |
| <i>Ammodytes personatus</i> | Pacific sand lance |
| <i>Trichodon trichodon</i> | Pacific sandfish |
| <i>Arctoscopus japonicus</i> | sailfin sandfish |
| <i>Apodichthys flavidus</i> | penpoint gunnel |
| <i>Rhodymenichthys dolichogaster</i> | stippled gunnel |
| <i>Pholis fasciata</i> | banded gunnel |
| <i>Pholis clemensi</i> | longfin gunnel |
| <i>Pholis laeta</i> | crescent gunnel |
| <i>Pholis schultzi</i> | red gunnel |
| <i>Eumesogrammus praecisus</i> | fourline snakeblenny |
| <i>Stichaeus punctatus</i> | arctic shanny |
| <i>Gymnoclinus cristulatus</i> | trident prickleback |
| <i>Chirolophis tarsodes</i> | matcheck warbonnet |
| <i>Chirolophis nugatory</i> | mosshhead warbonnet |
| <i>Chirolophis decoratus</i> | decorated warbonnet |
| <i>Chirolophis snyderi</i> | bearded warbonnet |
| <i>Bryozoichthys lysimus</i> | nutcracker prickleback |
| <i>Bryozoichthys majorius</i> | pearly prickleback |
| <i>Lumpenella longirostris</i> | longsnout prickleback |

| Scientific Name | Common Name |
|---------------------------------|-------------------------|
| <i>Poroclinus rothrocki</i> | whitebarred prickleback |
| <i>Anisarchus medius</i> | stout eelblenny |
| <i>Lumpenus fabricii</i> | slender eelblenny |
| <i>Lumpenus sagitta</i> | snake prickleback |
| <i>Acantholumpenus mackayi</i> | blackline prickleback |
| <i>Opisthocentrus ocellatus</i> | ocellated blenny |
| <i>Alectridium aurantiacum</i> | lesser prickleback |
| <i>Alectrias alectrolophus</i> | stone cockscomb |
| <i>Anoplarchus purpureus</i> | high cockscomb |
| <i>Anoplarchus insignis</i> | slender cockscomb |
| <i>Phytichthys chirus</i> | ribbon prickleback |
| <i>Xiphister mucosus</i> | rock prickleback |
| <i>Xiphister atropurpureus</i> | black prickleback |
| <i>Sigmops gracilis</i> | slender fangjaw |
| <i>Cyclothone alba</i> | white bristlemouth |
| <i>Cyclothone signata</i> | showy bristlemouth |
| <i>Cyclothone atraria</i> | black bristlemouth |
| <i>Cyclothone pseudopallida</i> | phantom bristlemouth |
| <i>Cyclothone pallida</i> | tan bristlemouth |
| <i>Euphausia pacifica</i> | krill |

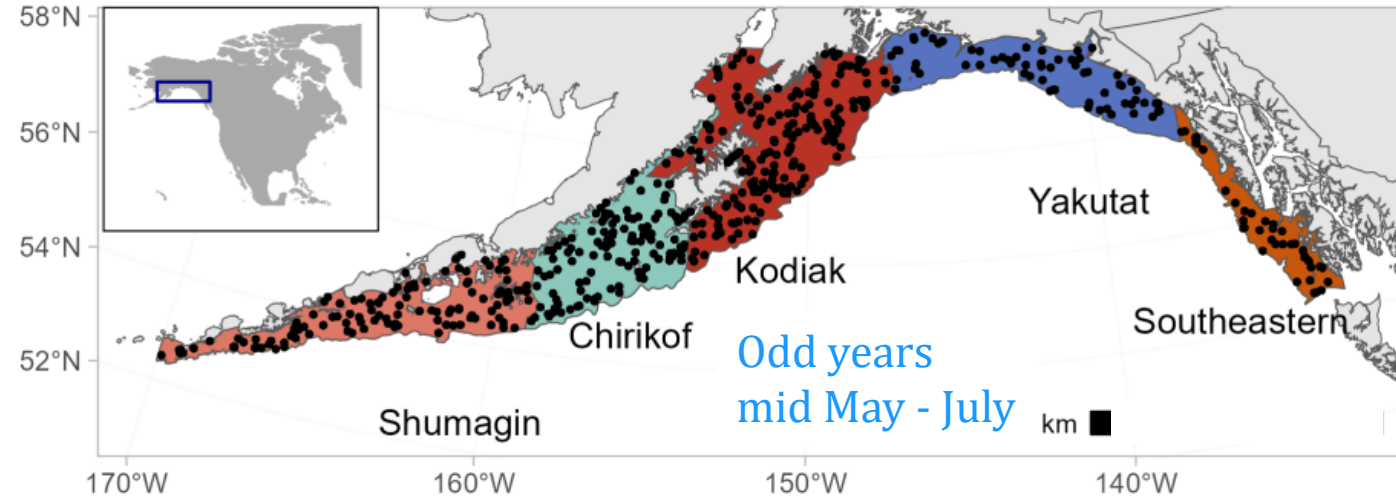


NOAA
FISHERIES

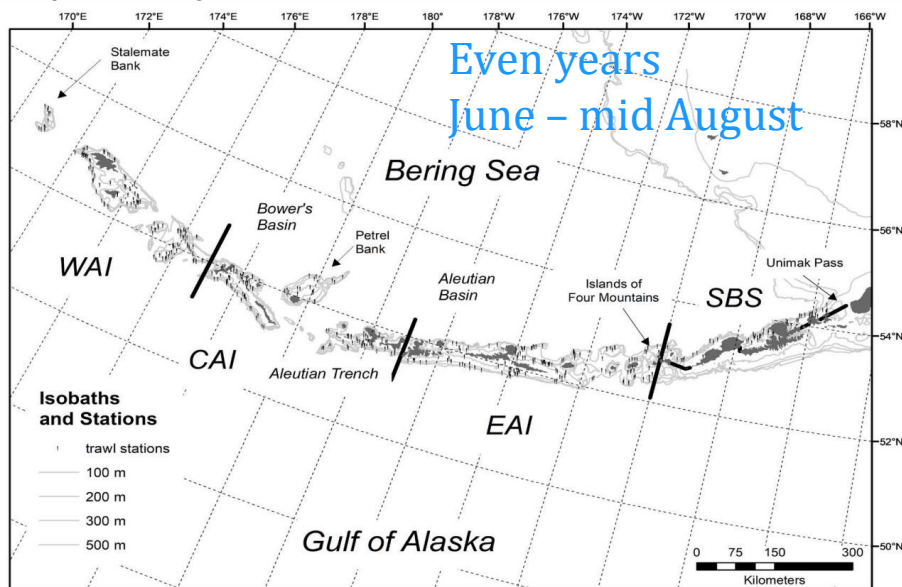
Data Sources

- NMFS Bottom Trawl Surveys
- Bering Sea Pelagic Trawl Surveys
- Incidental Catch in Federal Fisheries

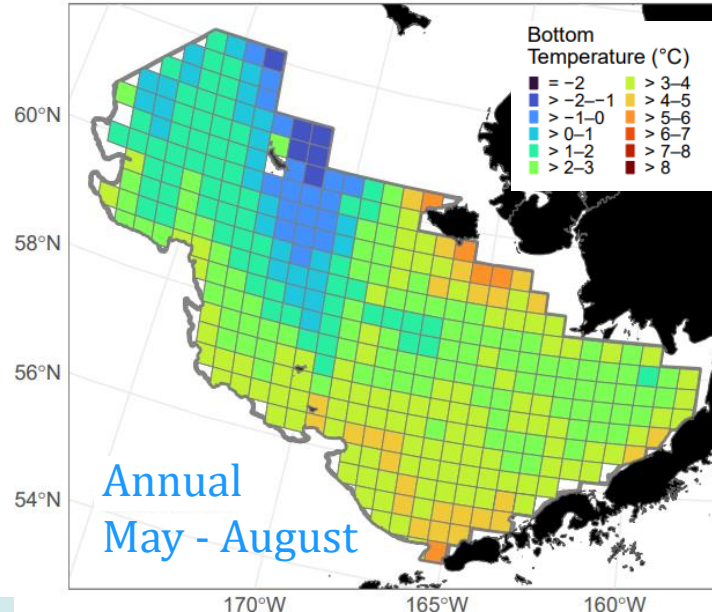
GOA Bottom Trawl Survey w/ INPFC Areas



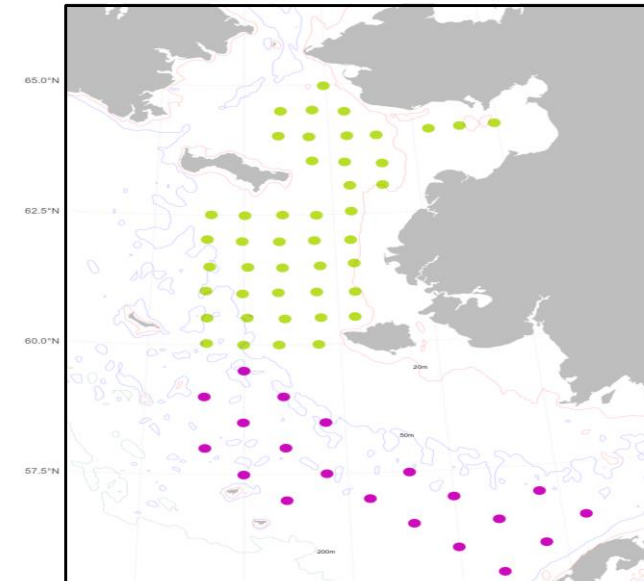
Aleutian Islands Bottom Trawl Survey w/ Survey Districts



Bering Sea Bottom Trawl Survey

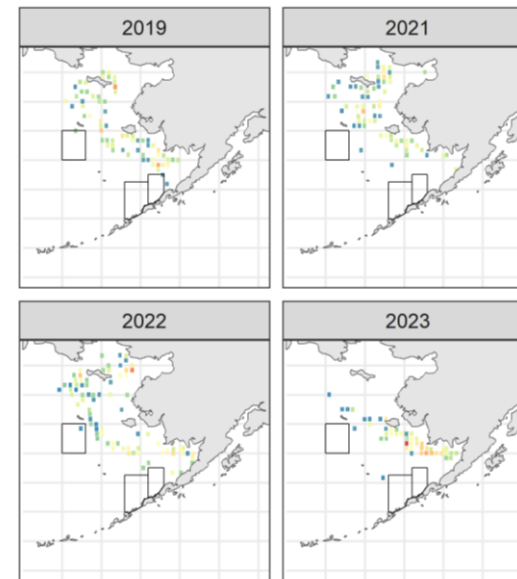
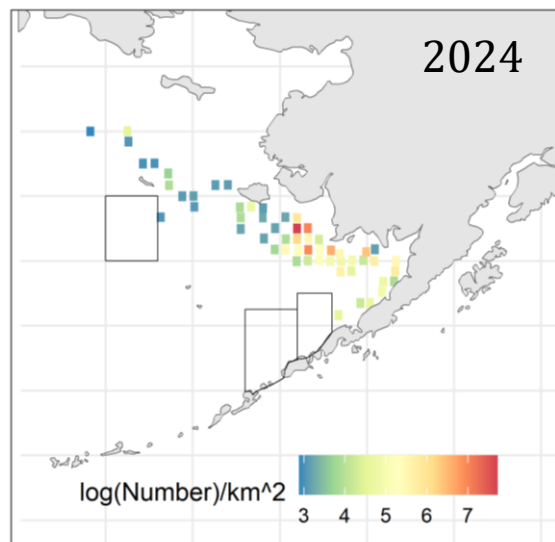


Bering Sea Pelagic Trawl Survey



North: Annual, September
South: Even years, mid Aug-Sept

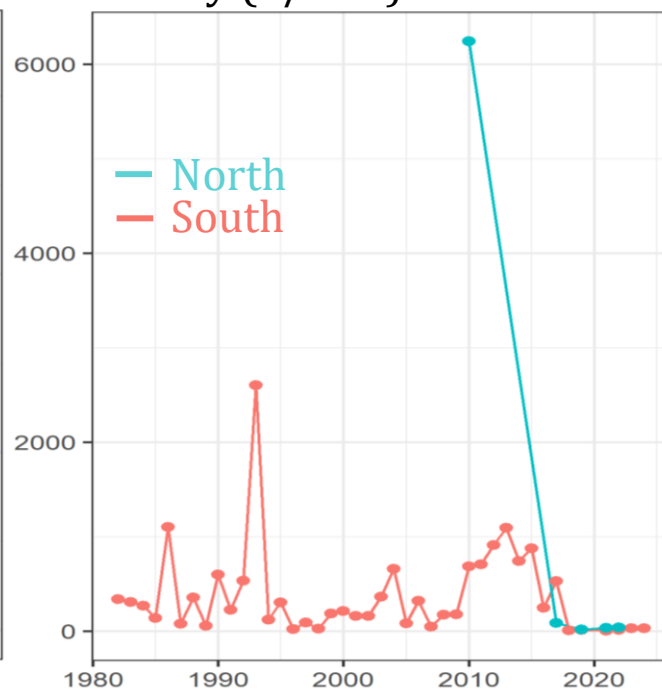
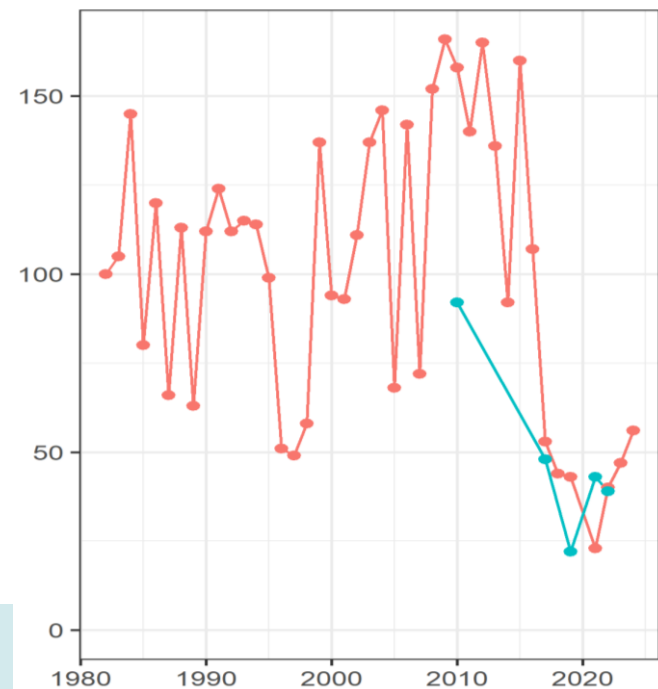
BSAI – Pacific Capelin



Brown et al. 2002

Prevalence

Density (n/km²)



- More confined to SEBS in 2023 & 2024



pelagic trawl surveys

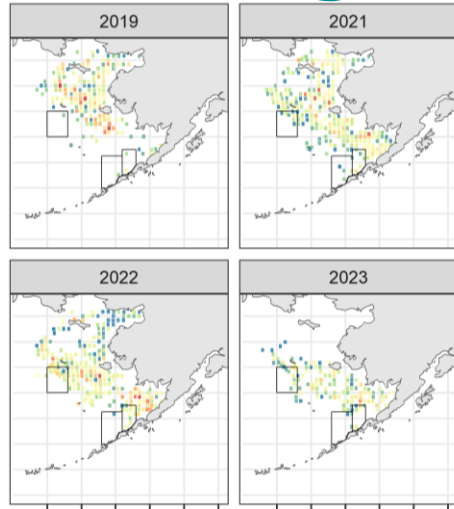
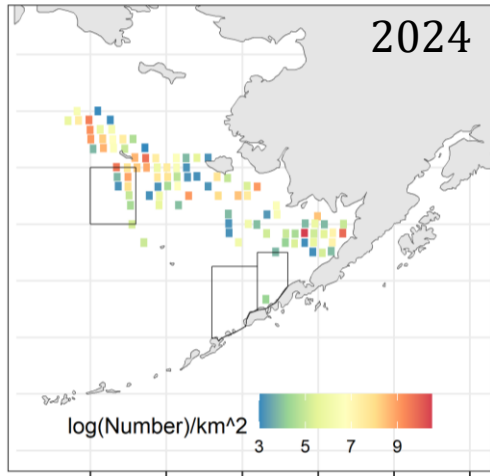
- High interannual variability

- Prevalence & density near all-time lows

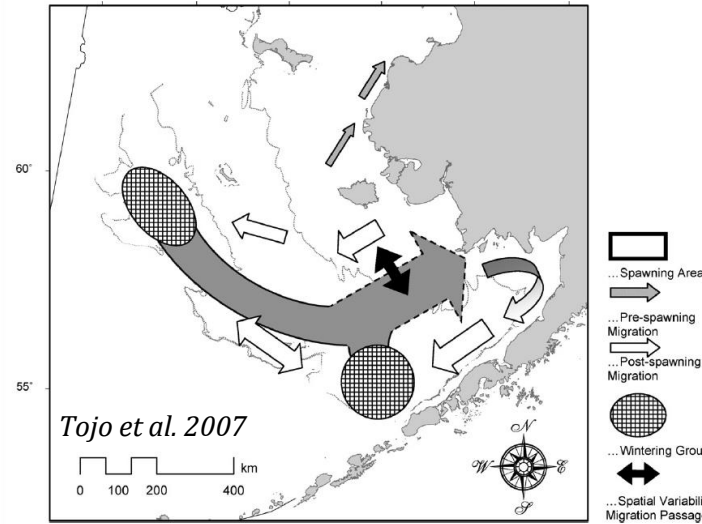


pelagic trawl surveys

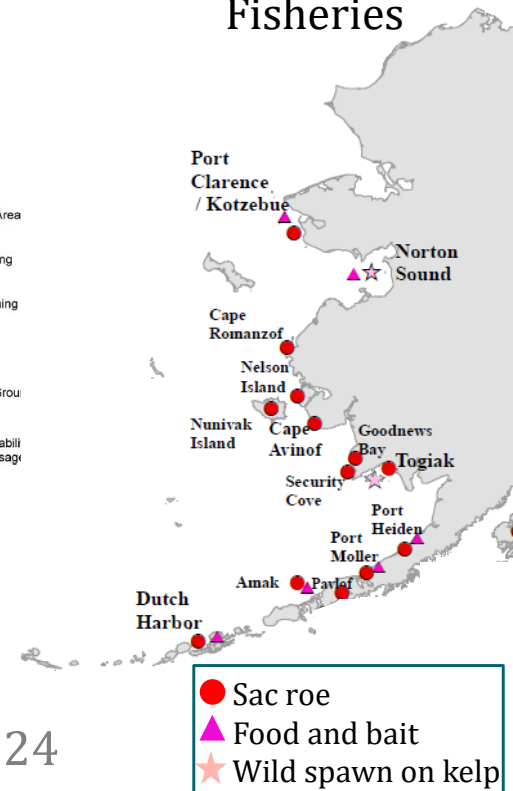
BSAI- Pacific Herring



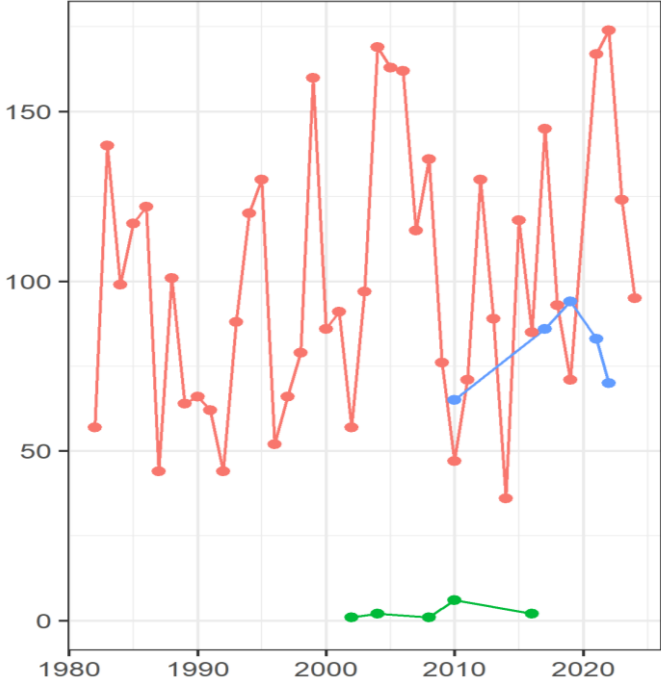
Herring Migration Route



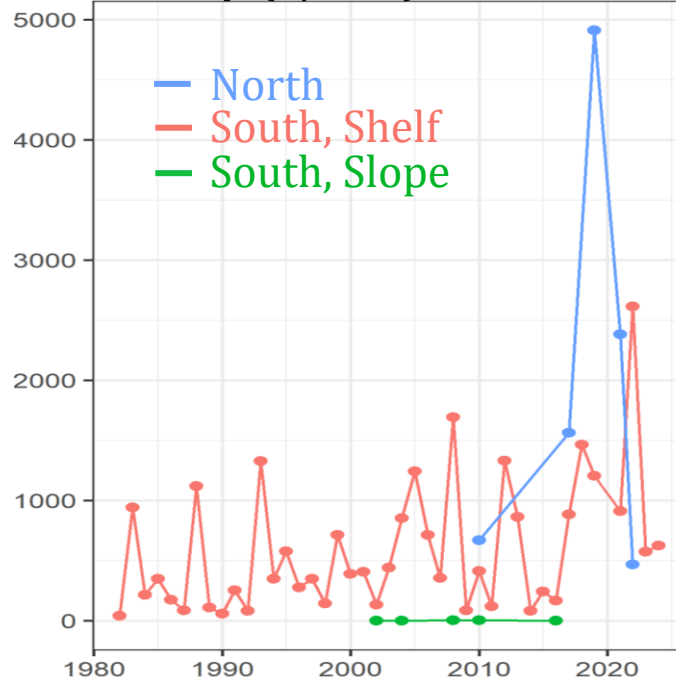
ADFG Commercial Fisheries



Prevalence



Density (n/km²)



- More confined to SEBS in 2024
- High interannual variability
- Prevalence & density above long-term mean



pelagic trawl surveys



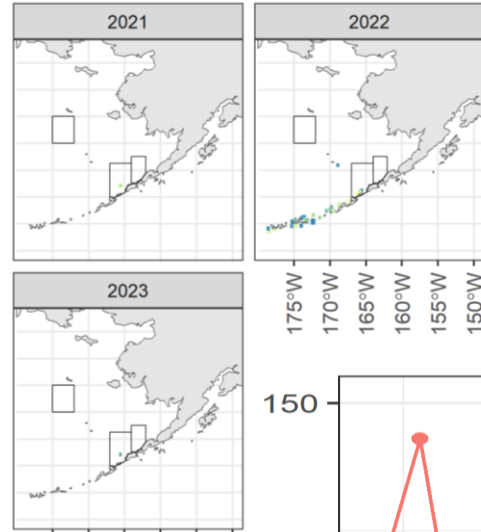
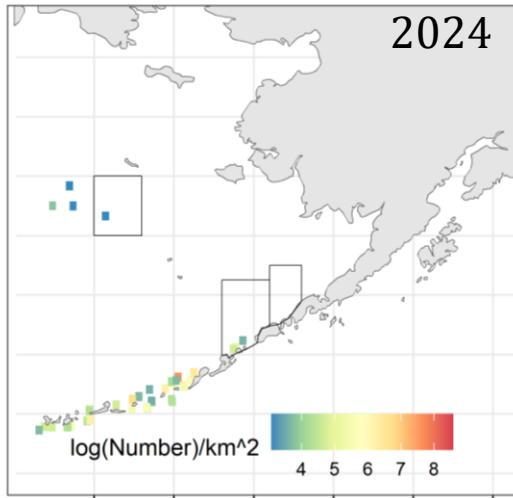
Togiak spawn biomass



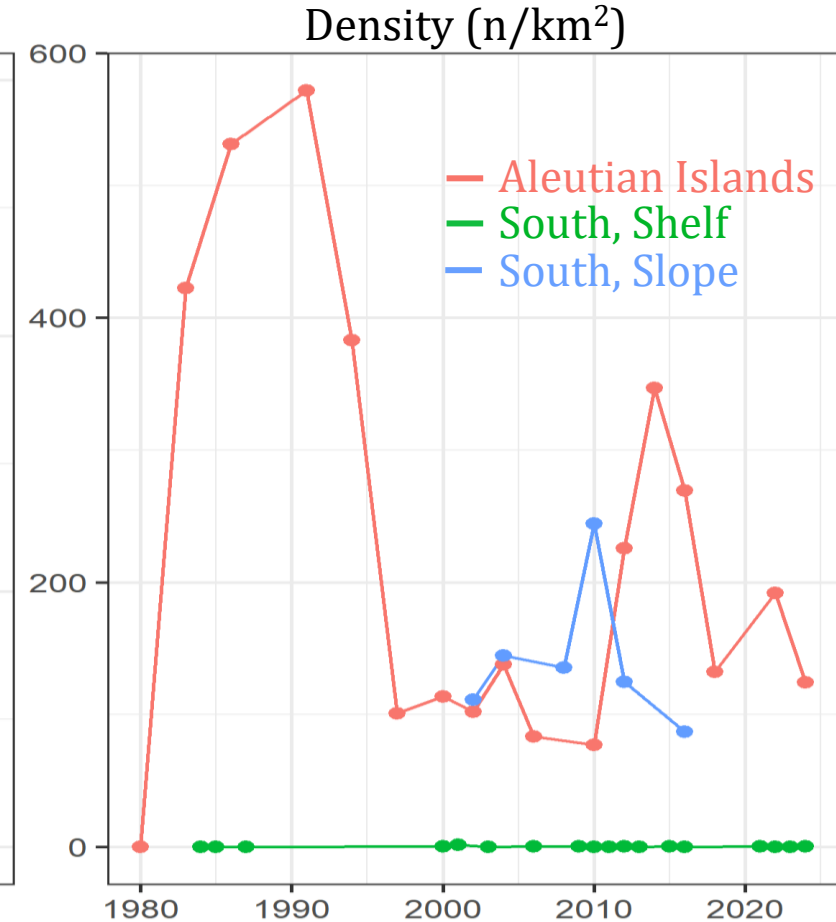
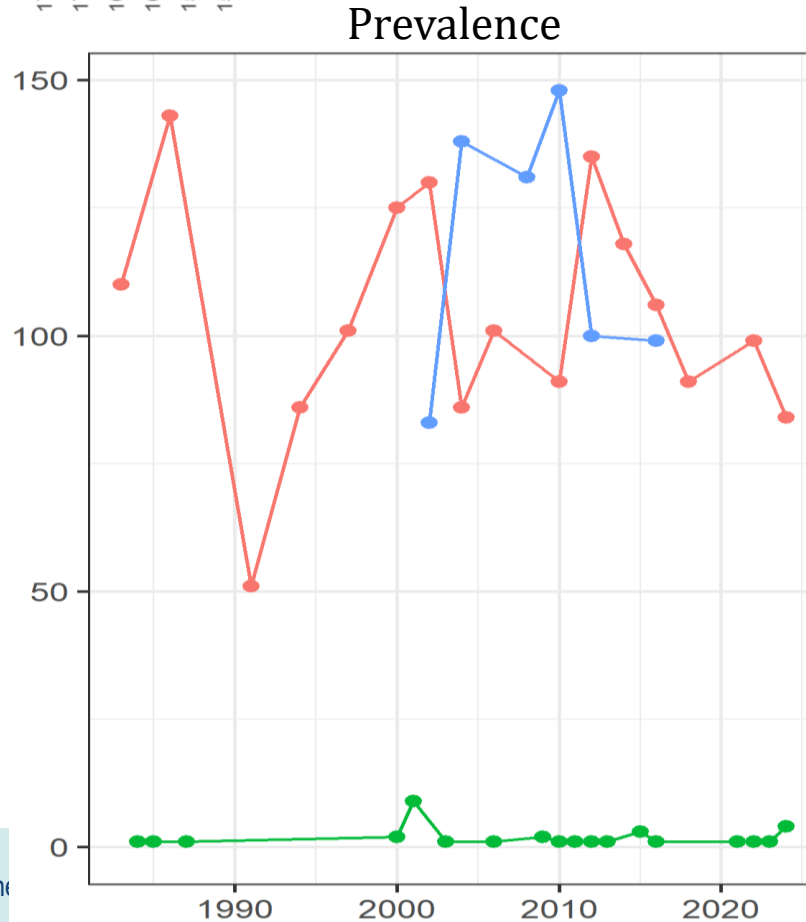
pelagic trawl survey

BSAI – Squid

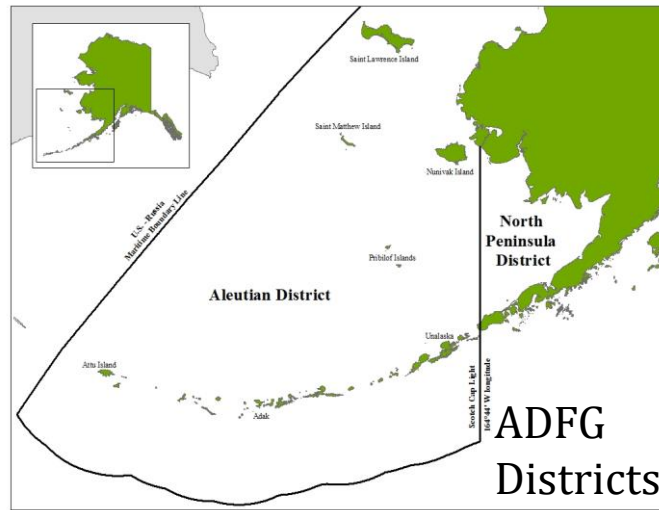
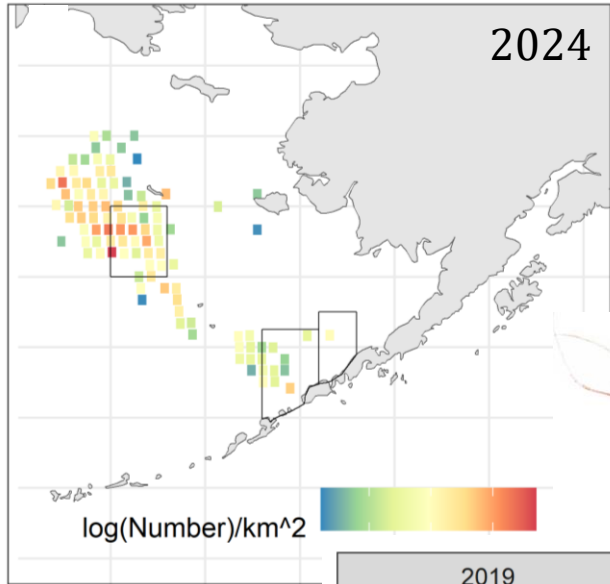
- Densities and prevalence highest in AI & slope
- Density slightly up from 2000's
- Prevalence remains relatively low



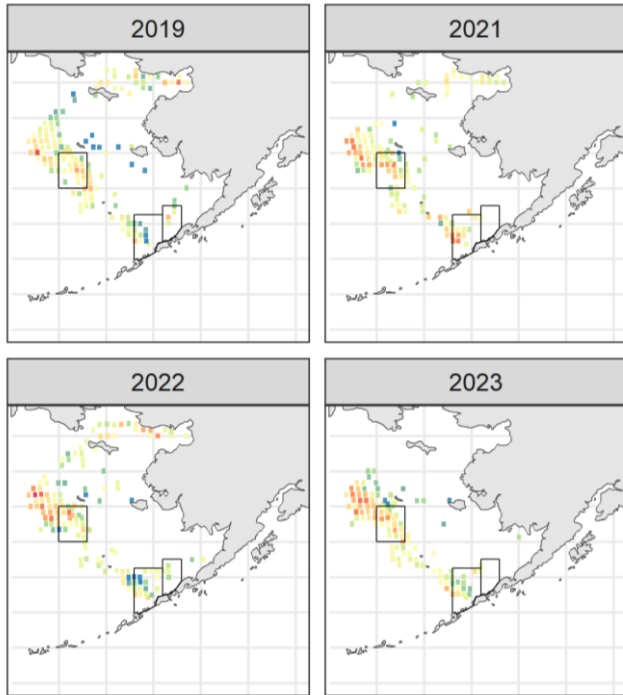
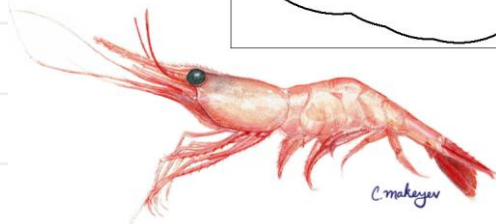
Magistrate armhook squid
(*Berryteuthis magister*)



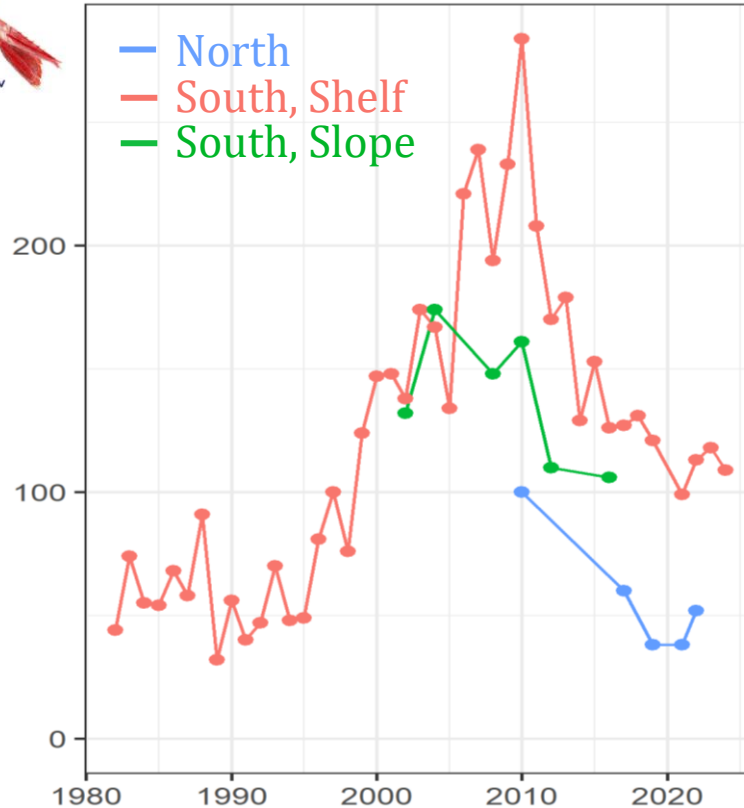
BSAI – Shrimp



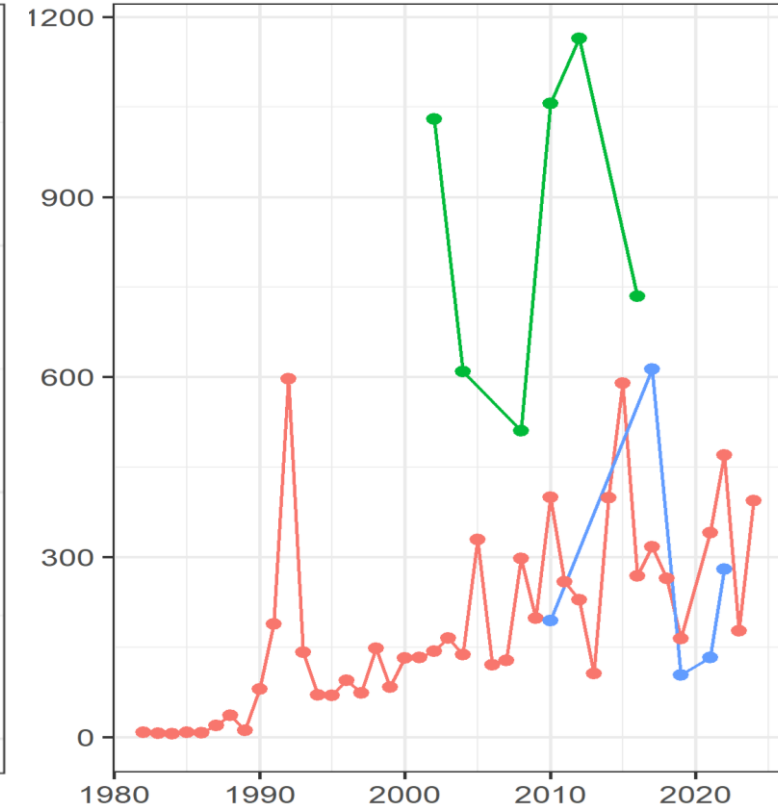
- Highest densities consistently in deep waters of outer domain
- Densities trending upwards since 1980s
- 2024 prevalence near long-term average



Prevalence



Density (n/km²)

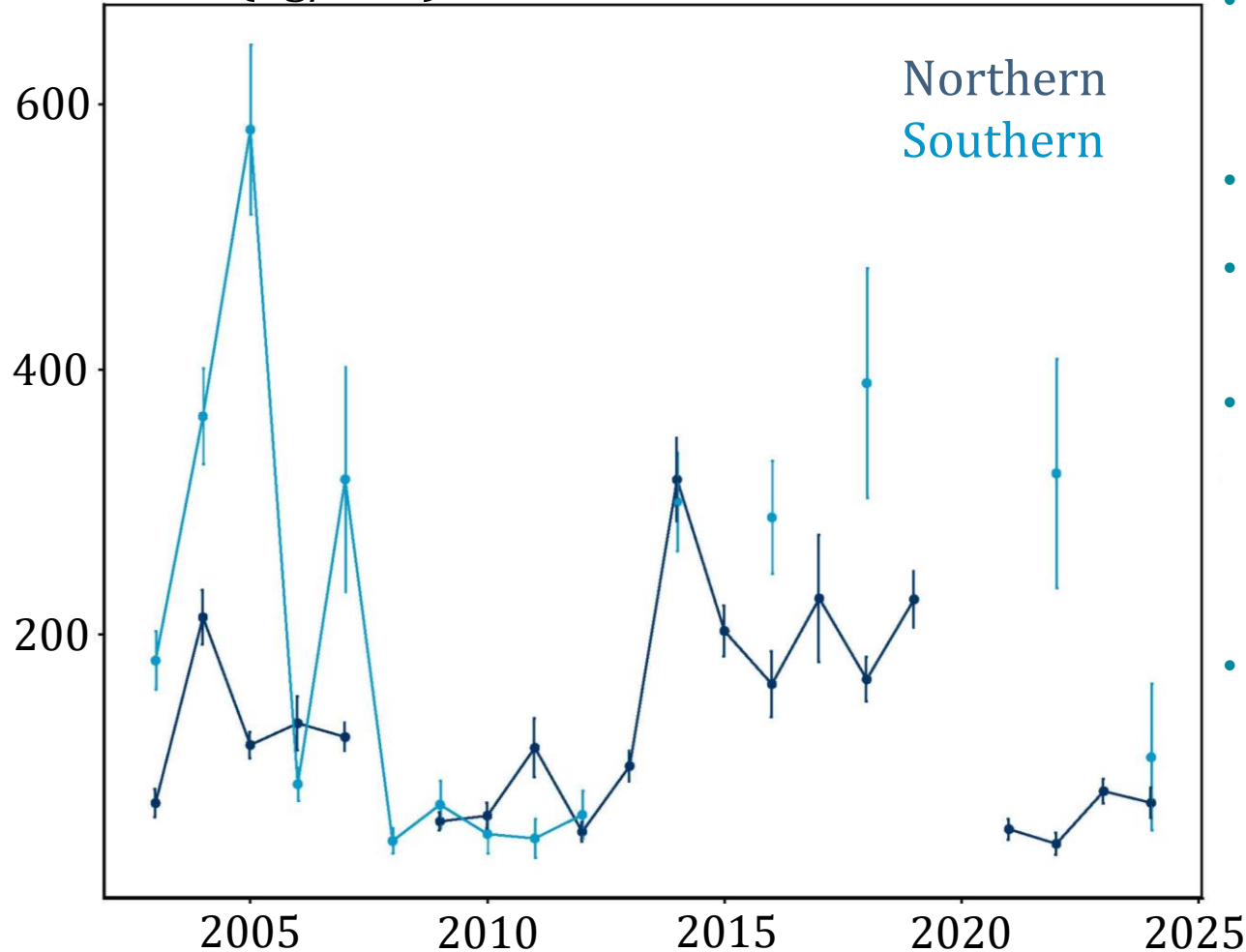


BS – Forage Fish Aggregate Index



Late Summer/Fall Pelagic Surveys

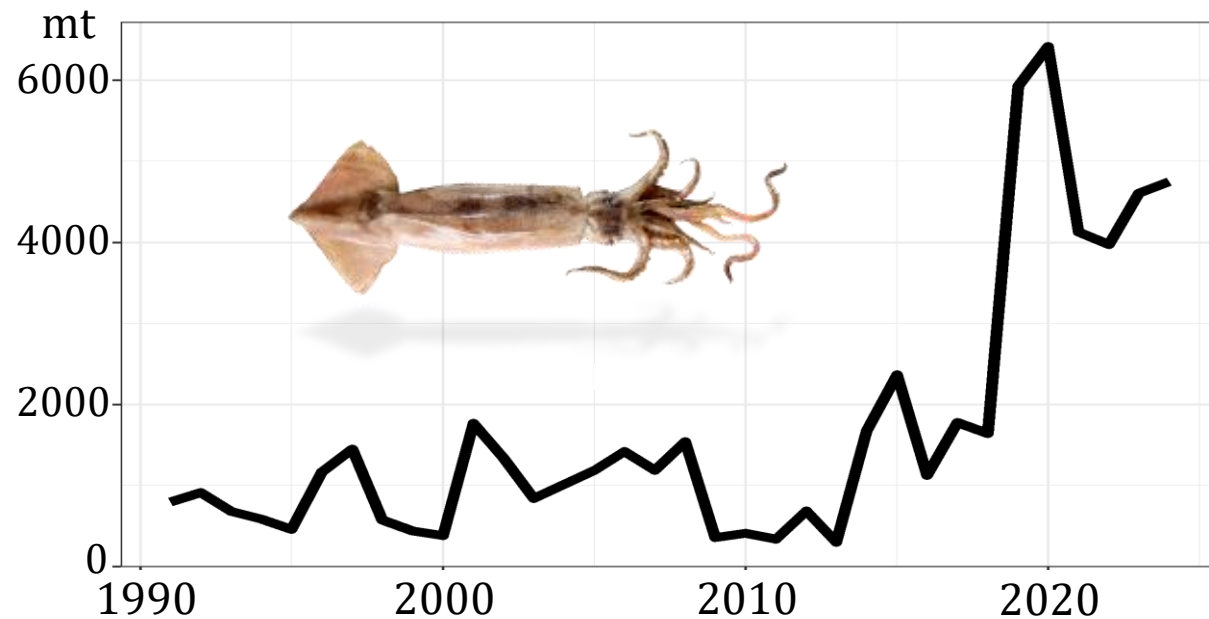
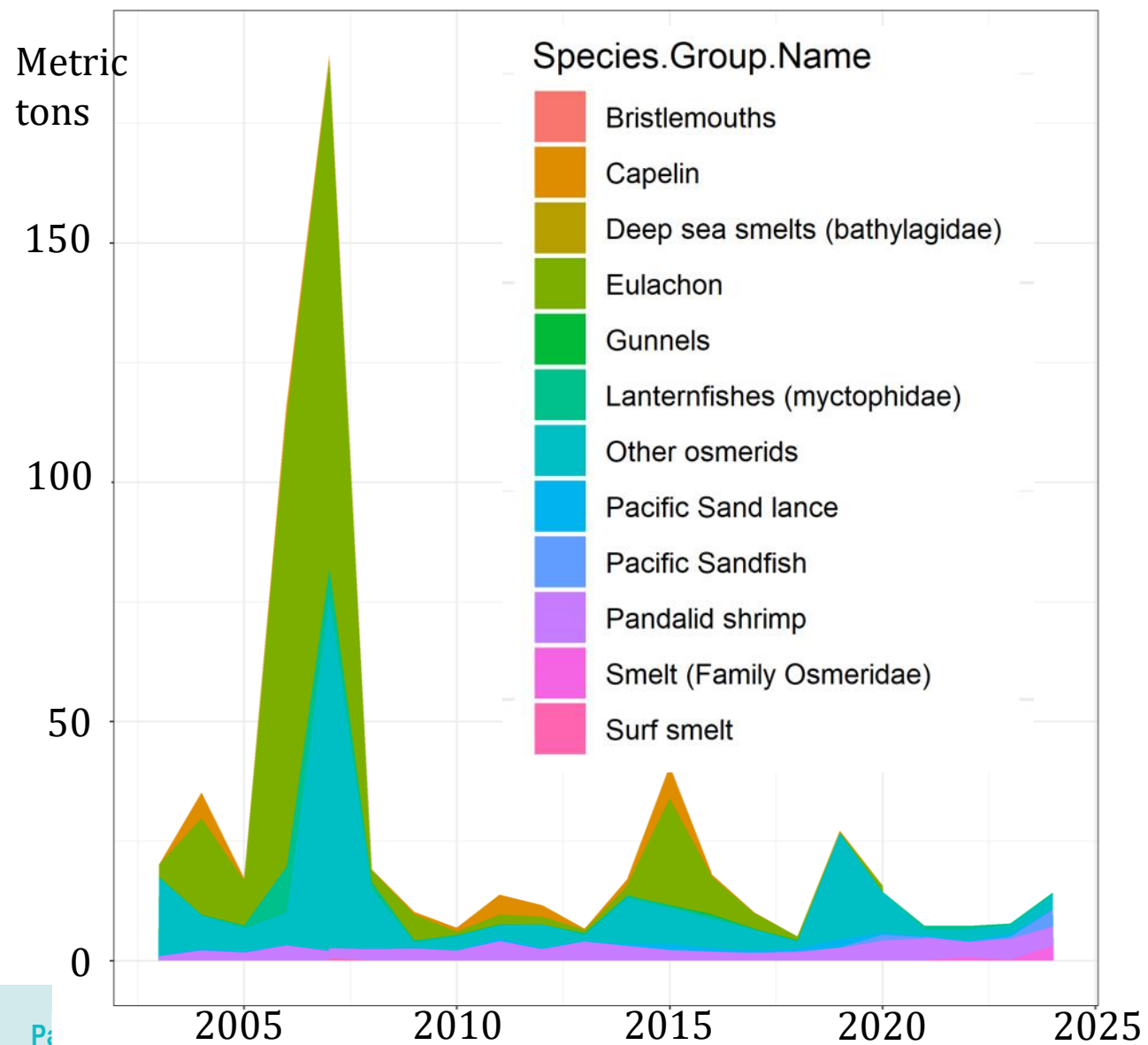
CPUE (kg/km²)



- Age-0 Pacific cod, age-0 pollock, capelin, herring, juv Chinook, sockeye, chum, coho & pink salmon, rainbow smelt, saffron cod
- 2024 precipitous drop in south
- Low densities correspond to cool conditions, especially in the south
- North
 - Cold: capelin
 - Warm: herring
- South
 - Warm: juv sockeye salmon and age-0 pollock

Yasumiishi et al.

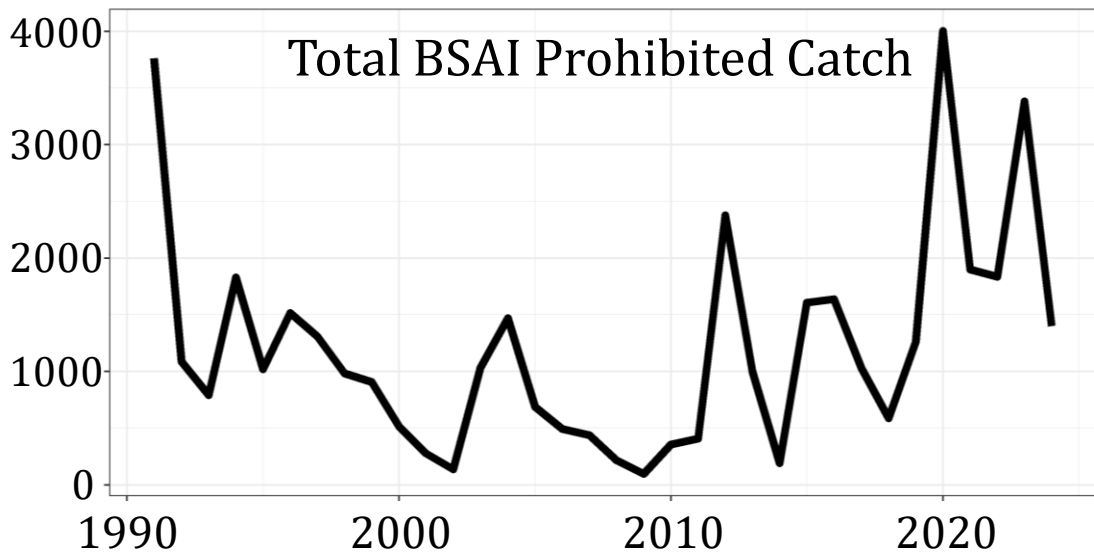
BSAI – ‘Forage Fish’ Bycatch in Federal Fisheries



BSAI – Forage Fish Bycatch in Federal Fisheries



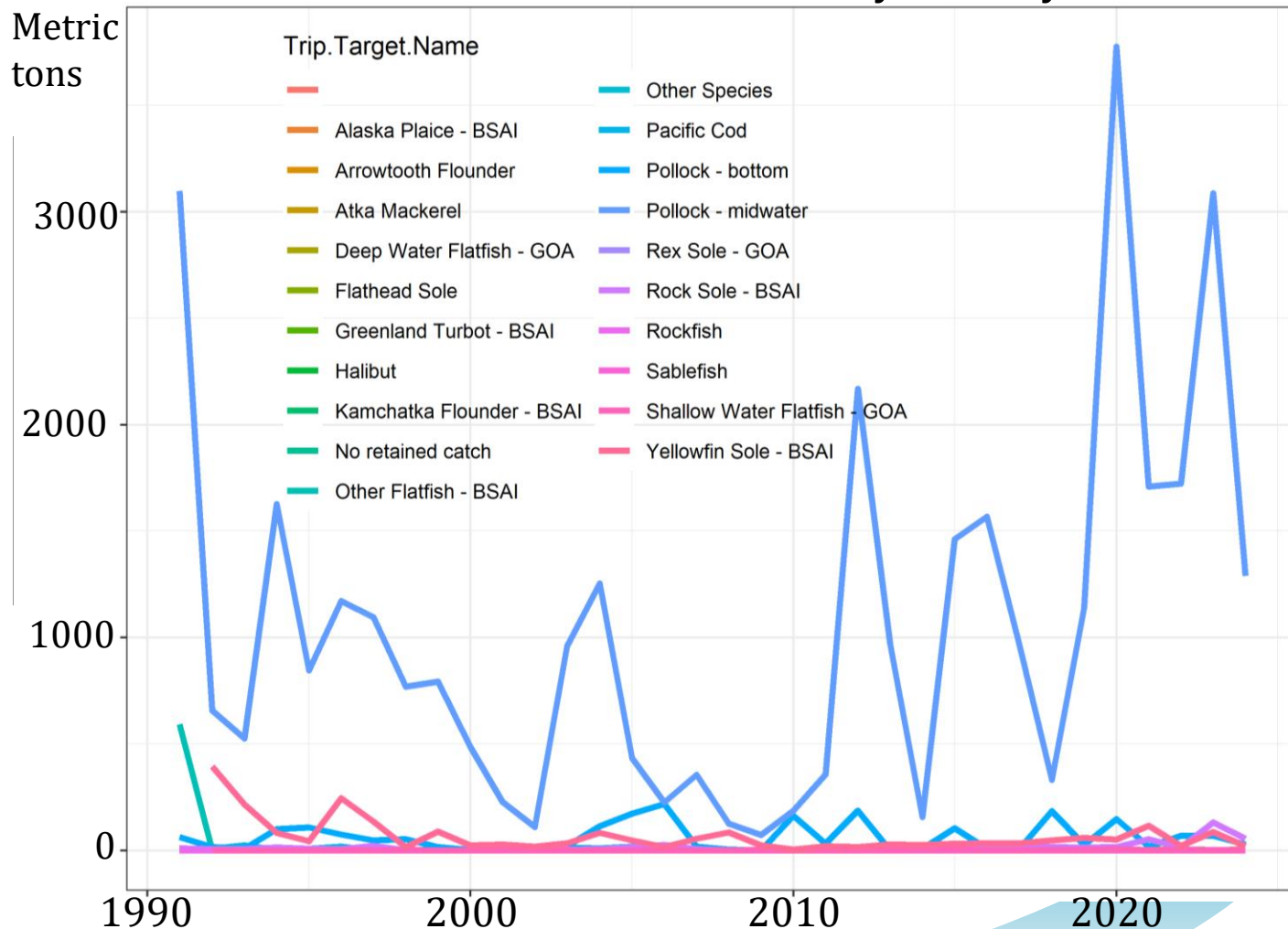
Metric tons



Total BSAI Prohibited Catch

- ~58% decrease in PSC since 2023
- Largest PSC is in pollock midwater trawl fishery

BSAI Prohibited Catch by Fishery

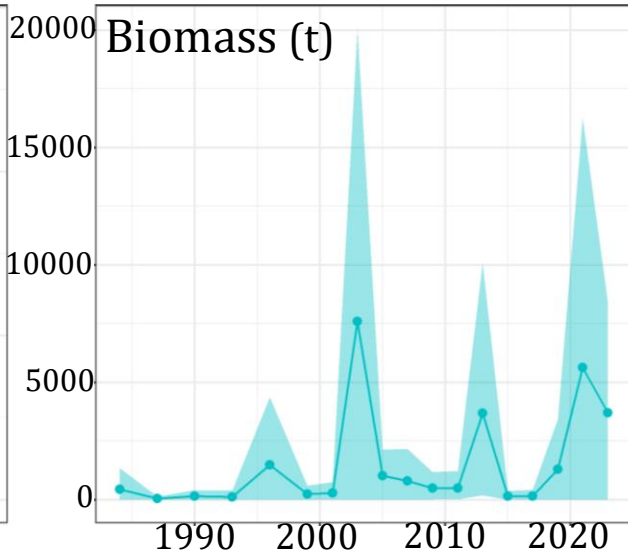
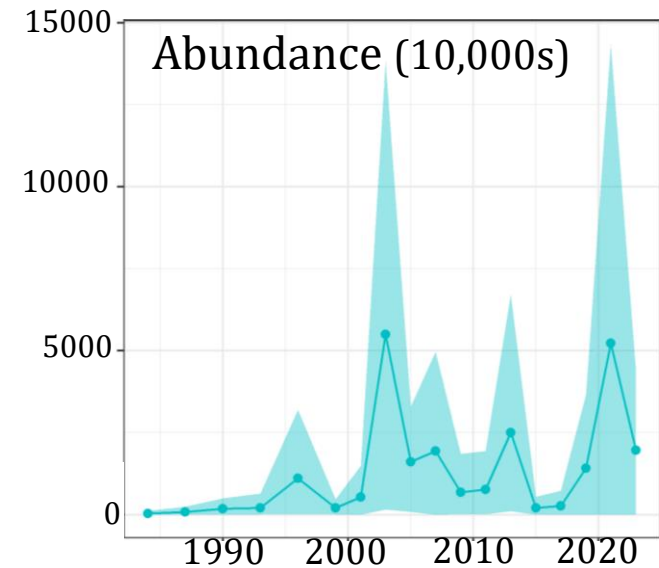
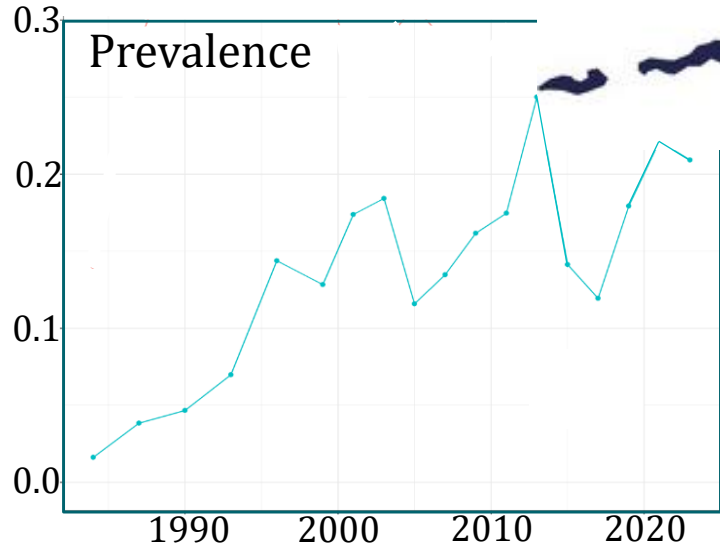
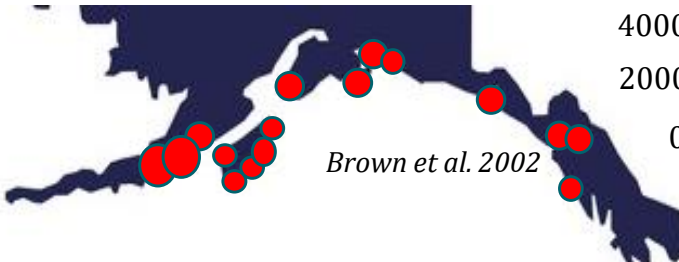


Metric tons

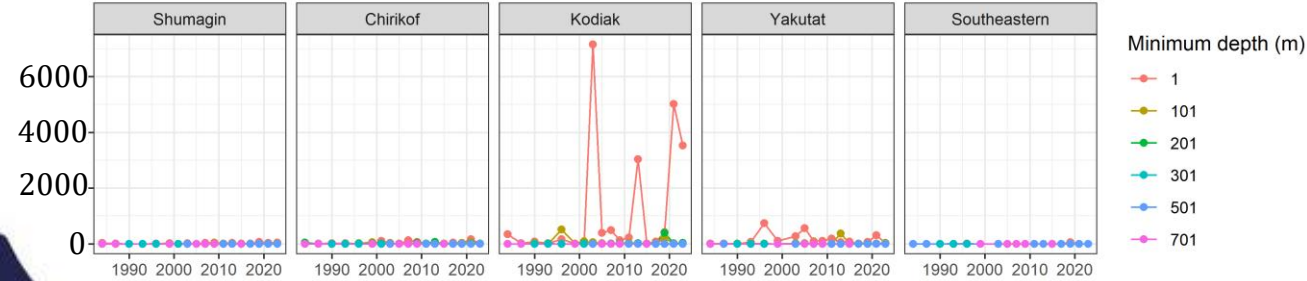
Trip.Target.Name

- Other Species
- Alaska Plaice - BSAI
- Arrowtooth Flounder
- Atka Mackerel
- Deep Water Flatfish - GOA
- Flathead Sole
- Greenland Turbot - BSAI
- Halibut
- Kamchatka Flounder - BSAI
- No retained catch
- Other Flatfish - BSAI
- Pacific Cod
- Pollock - bottom
- Pollock - midwater
- Rex Sole - GOA
- Rock Sole - BSAI
- Rockfish
- Sablefish
- Shallow Water Flatfish - GOA
- Yellowfin Sole - BSAI

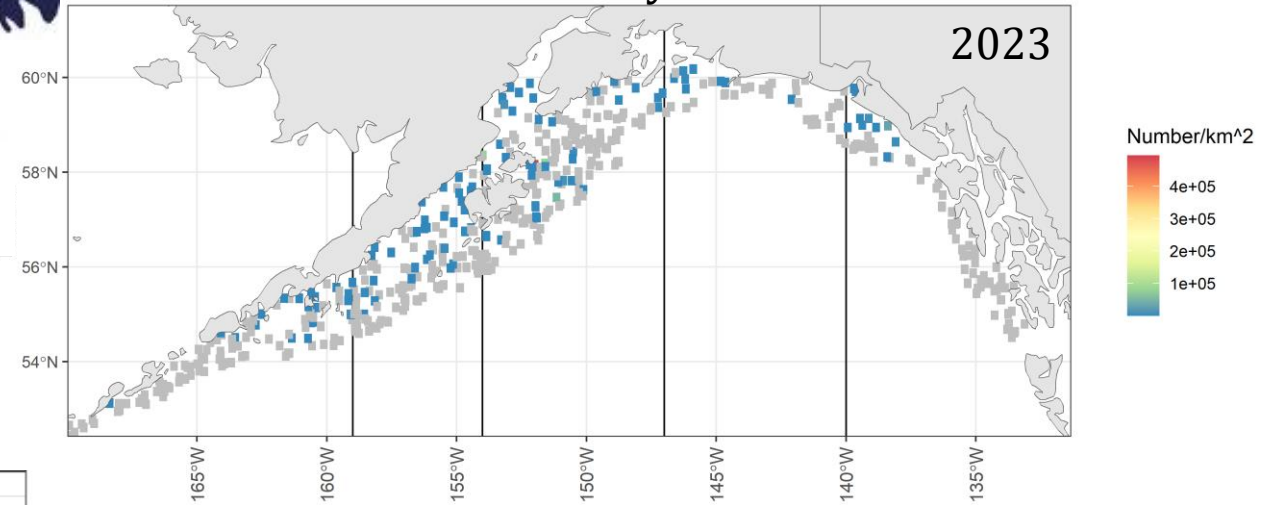
GOA – Pacific Capelin



Biomass (t) in INFPC Areas by Depth



Density



- Most abundant in Kodiak INFPC in shallow water



small mesh trawl survey

- Recovered since 2014-2016 heatwave

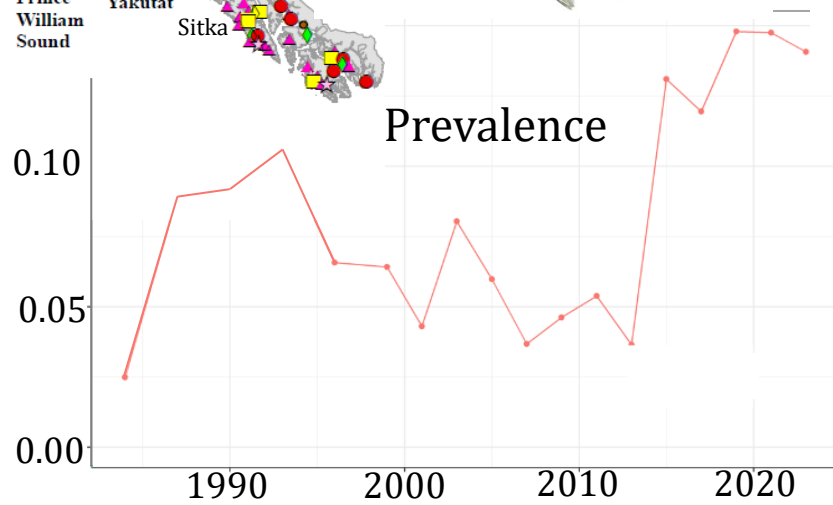
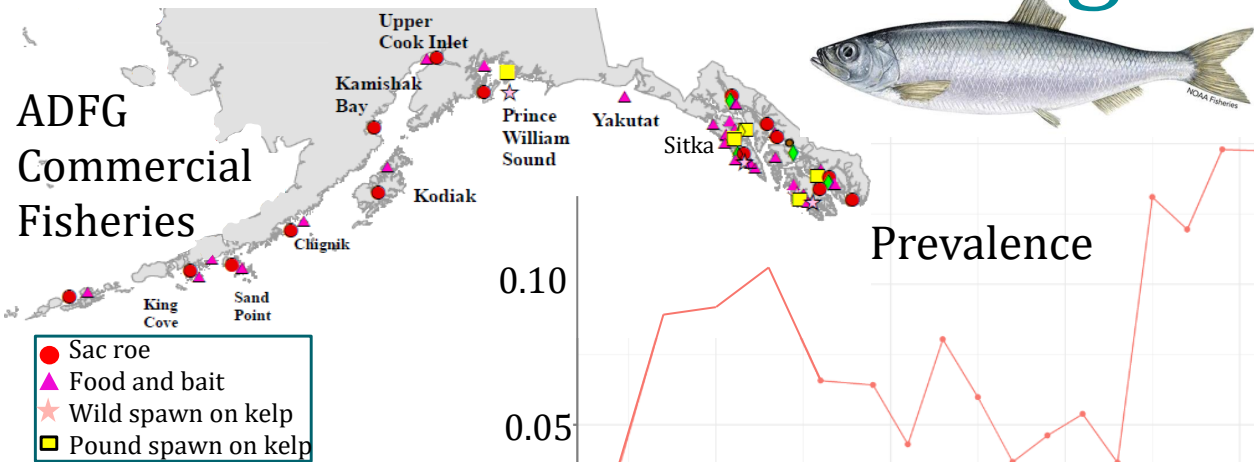


seabird diet

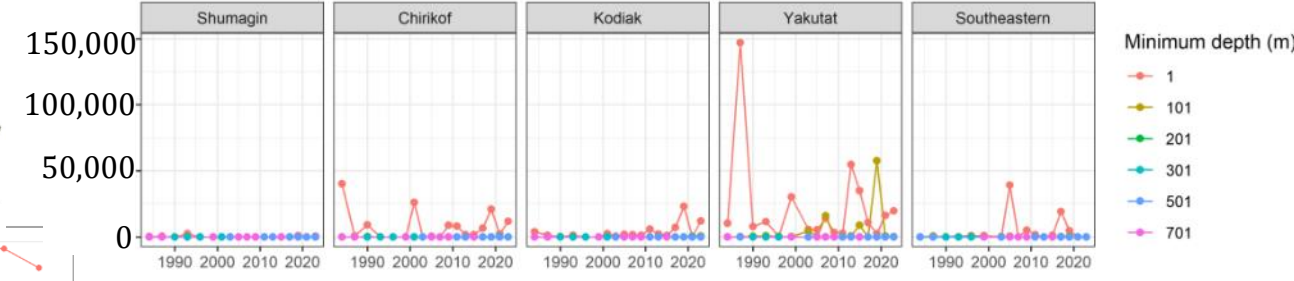


small mesh trawl survey

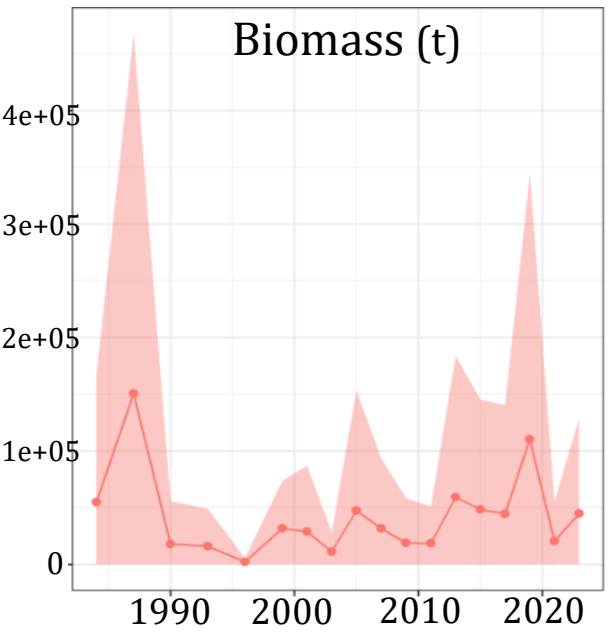
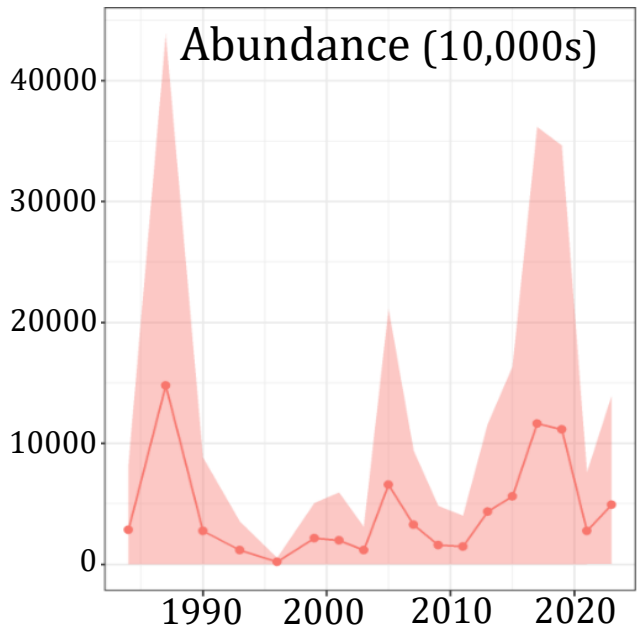
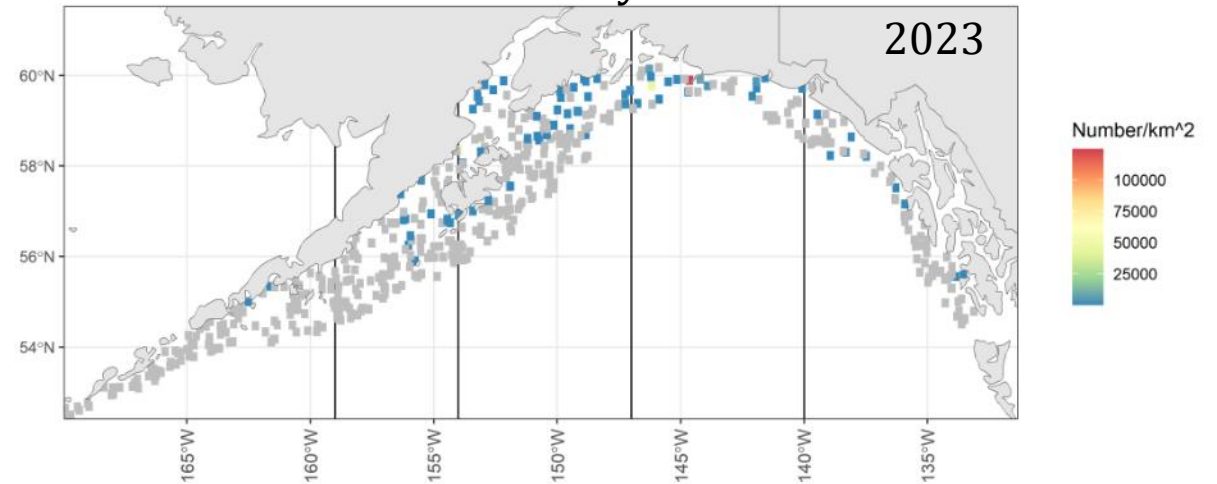
GOA – Pacific Herring



Biomass (t) in INFPC Areas by Depth

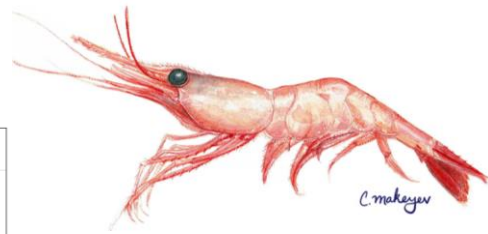


Density

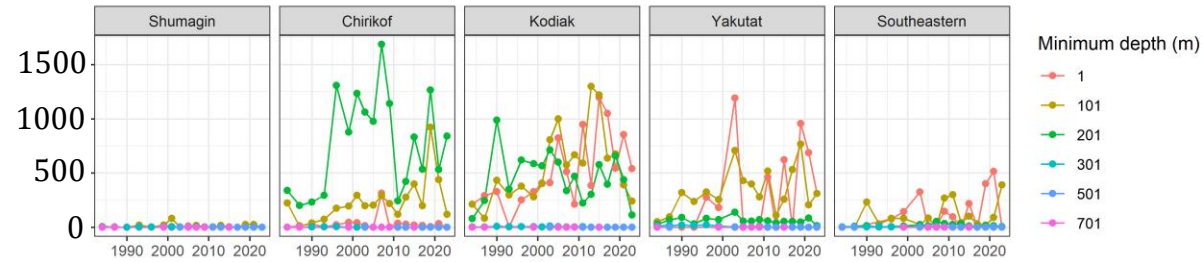


- Most abundant in Yakutat INFPC in shallow water
- Prevalence near record high
- Sitka, Craig & Kodiak spawning biomass (ADFG)
- Middleton seabirds
- Abundance and biomass average

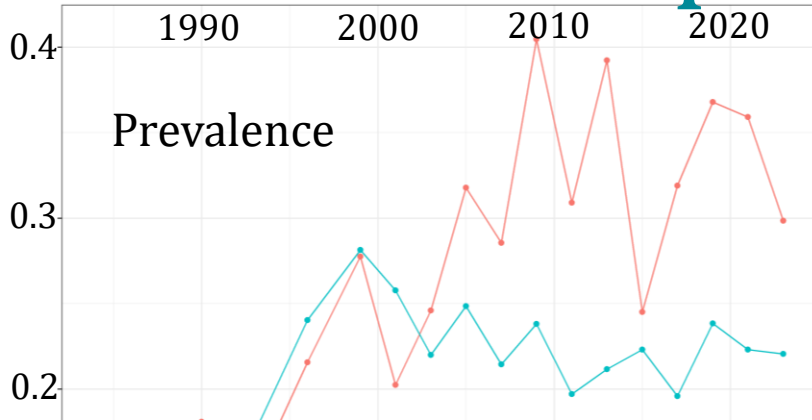
GOA – Shrimp



Sidestripe Shrimp Biomass (t) in INFPC Areas by Depth

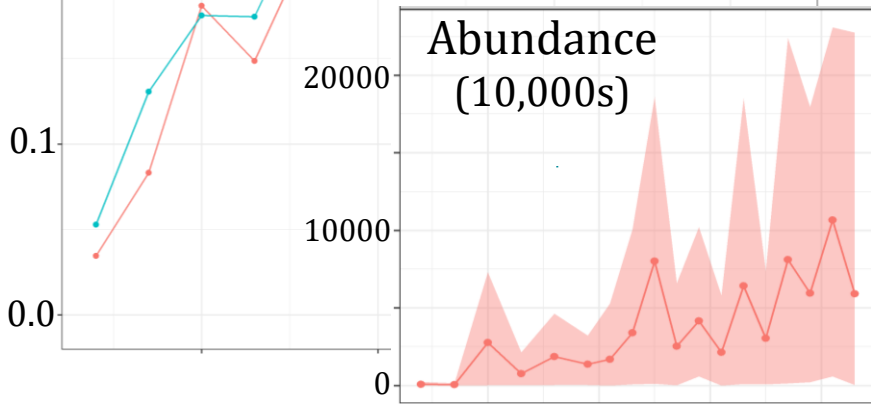


Prevalence

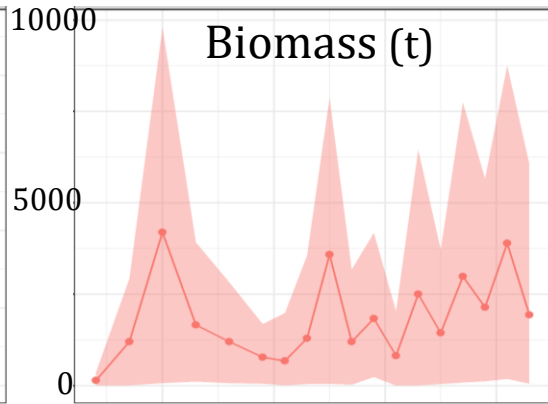


— Shrimp unid.
— Sidestripe shrimp
(*Pandalopsis dispar*)

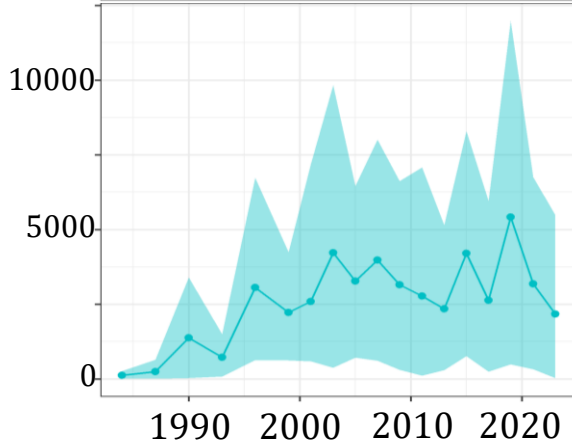
Abundance (10,000s)



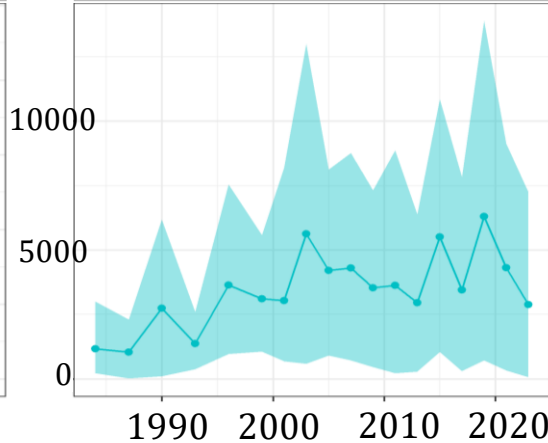
Biomass (t)



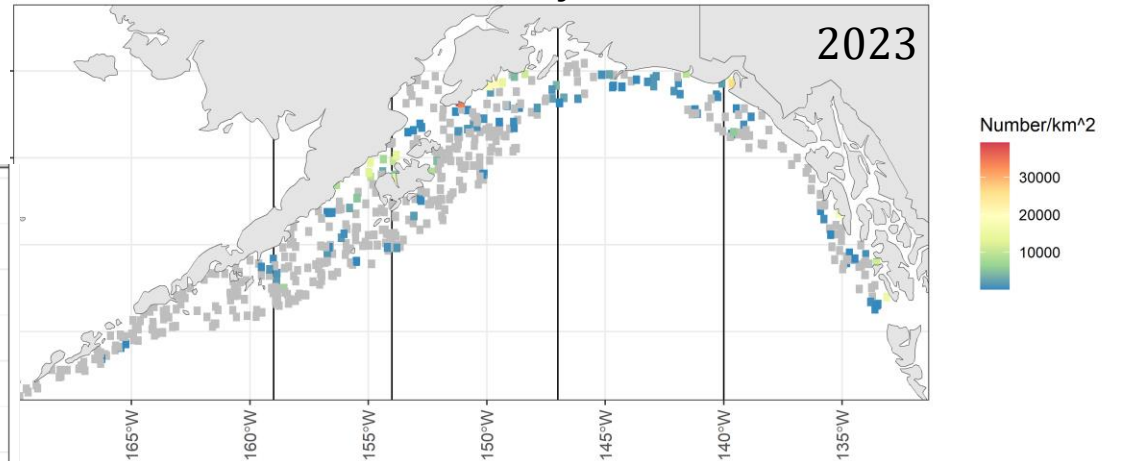
Abundance (10,000s)



Biomass (t)



Density

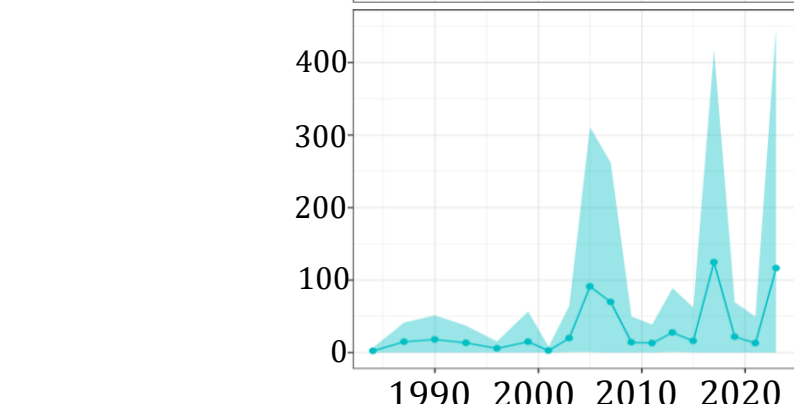
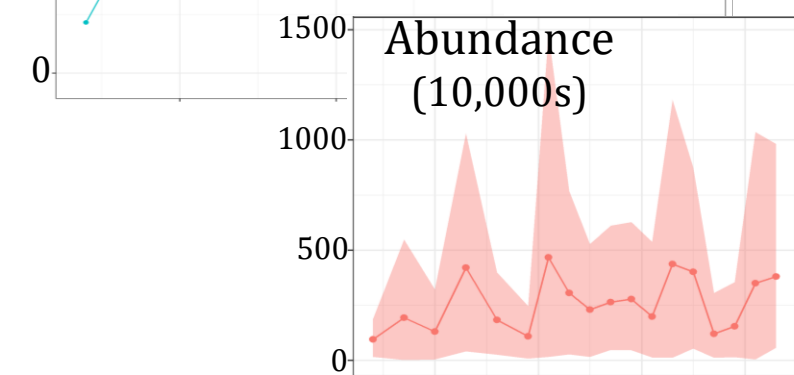
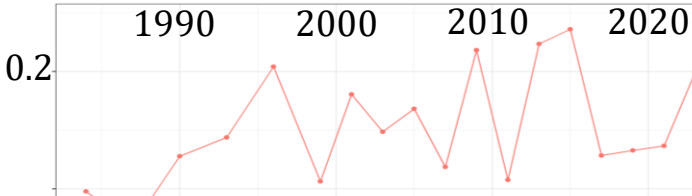


- Abundant throughout Gulf, <200m
- Prevalence remains high
- Abundance and biomass have declined recently but remain average or above average

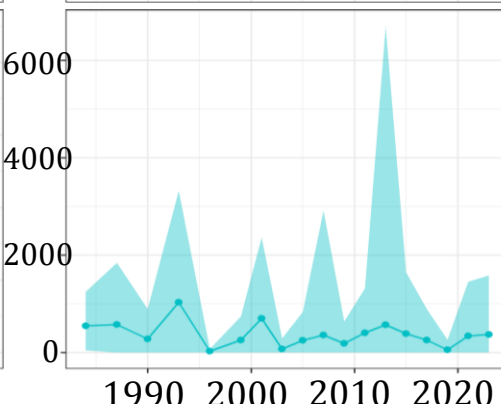
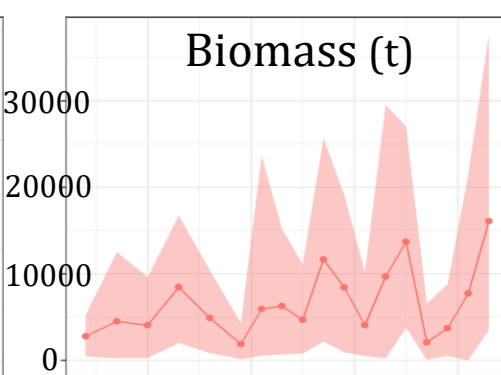
GOA – Squid



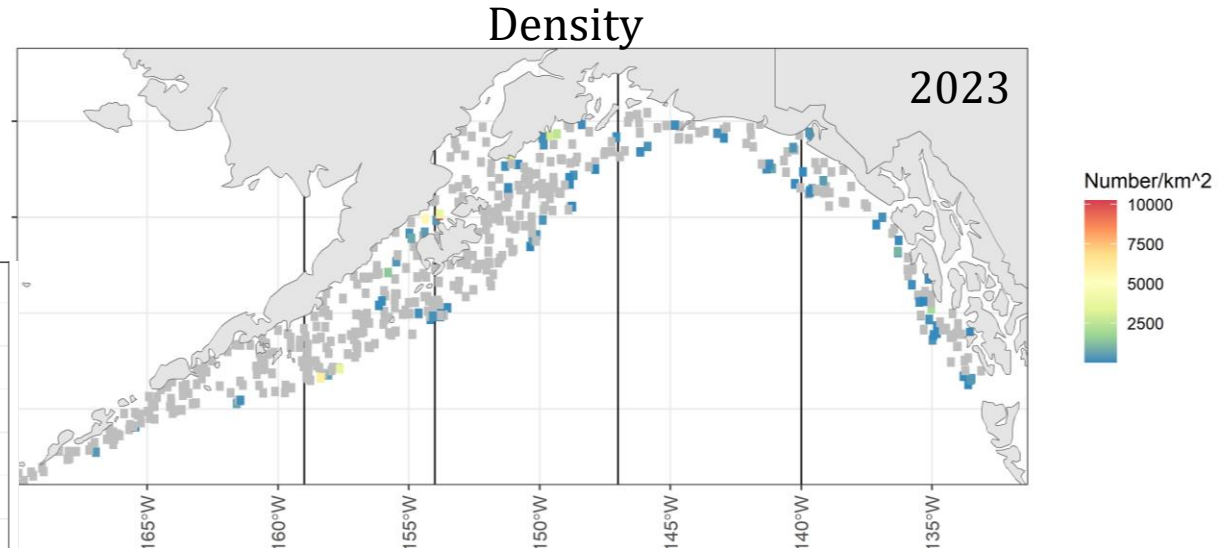
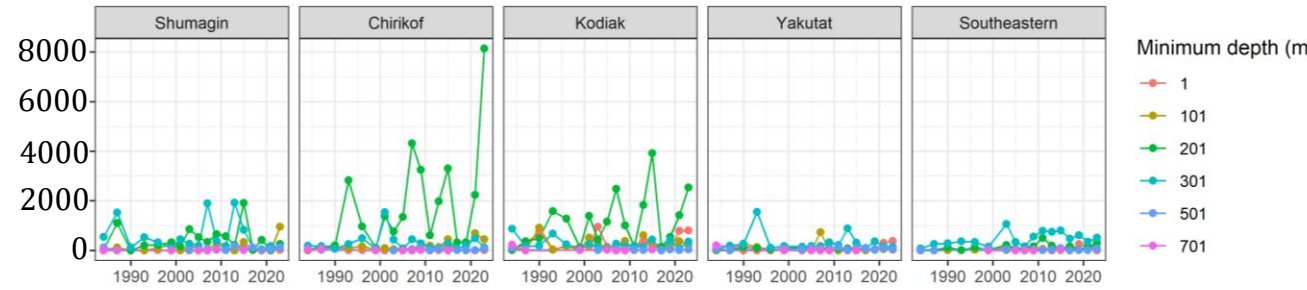
Magistrate Armoak Squid
(*Berryteuthis magister*)



— Magistrate Armoak
— Squid unid.

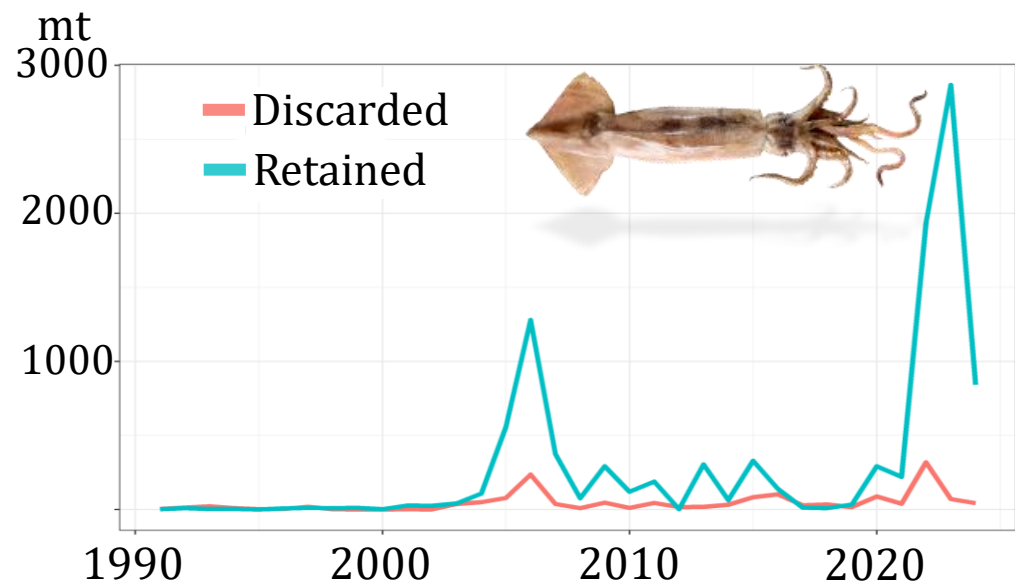
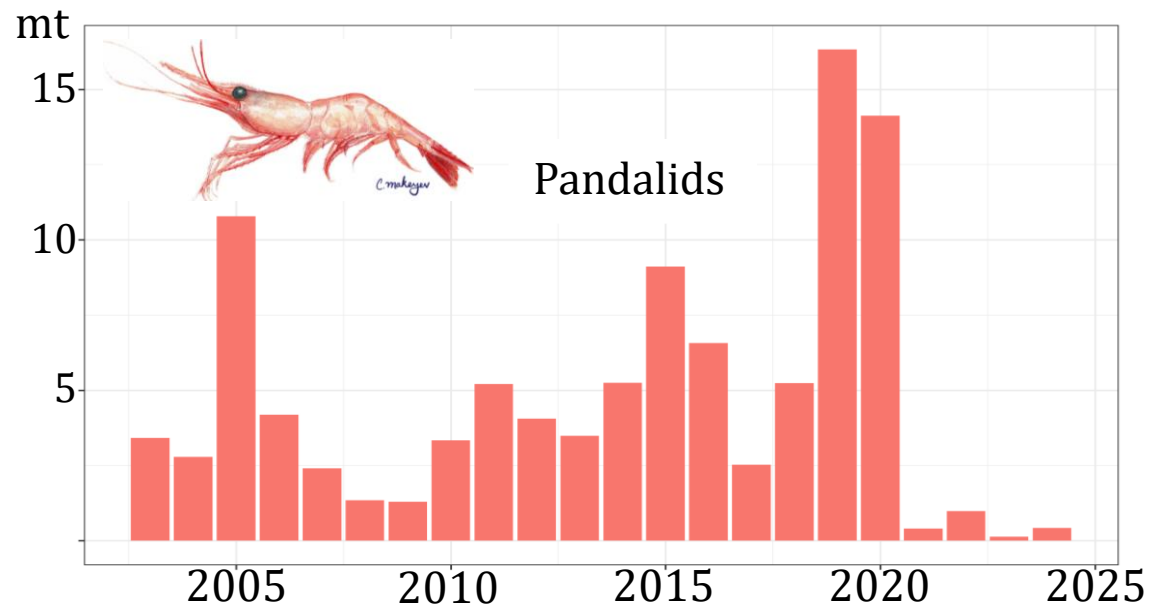
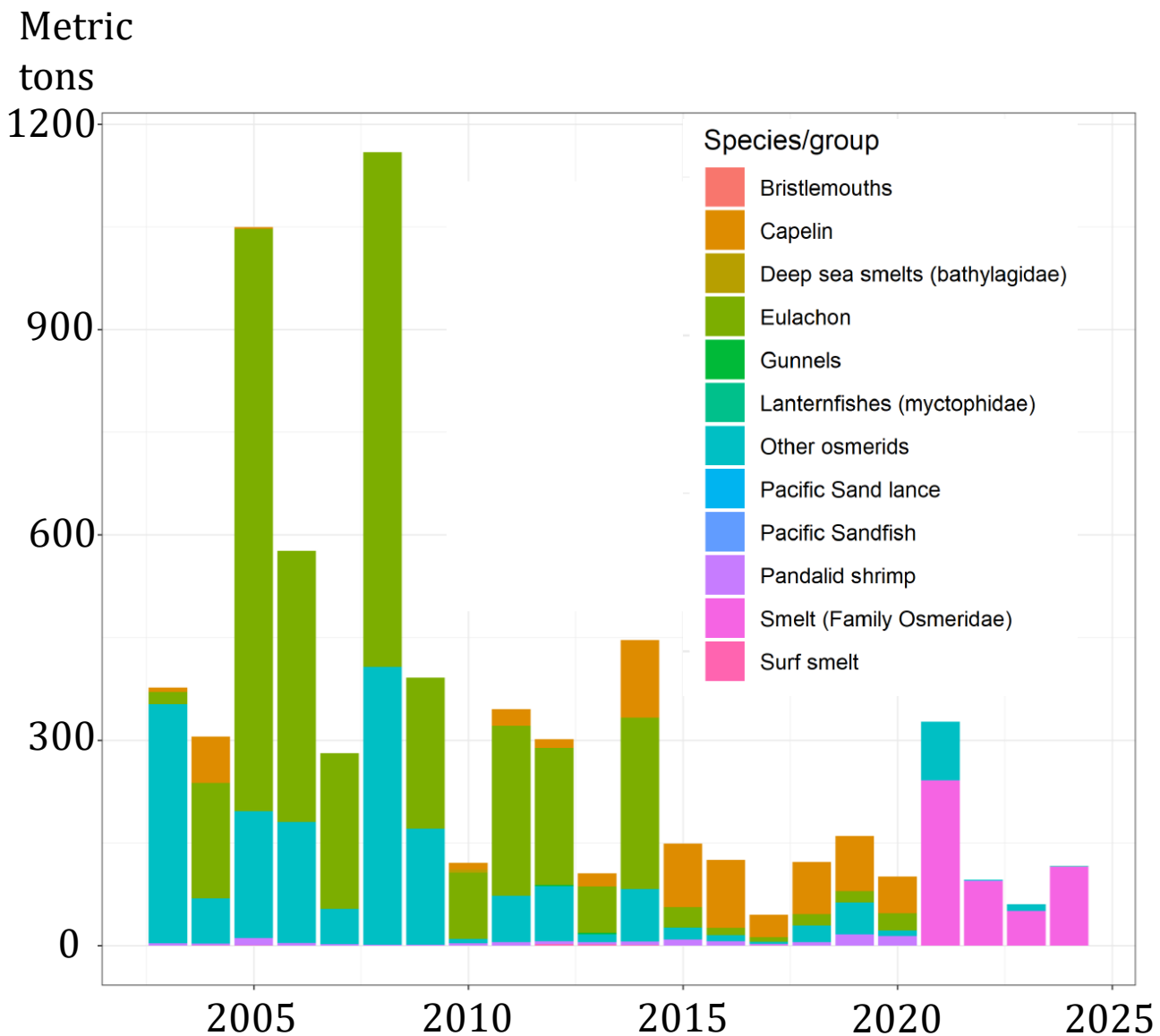


Magistrate Armhook Squid Biomass (t) in INFPC Areas by Depth

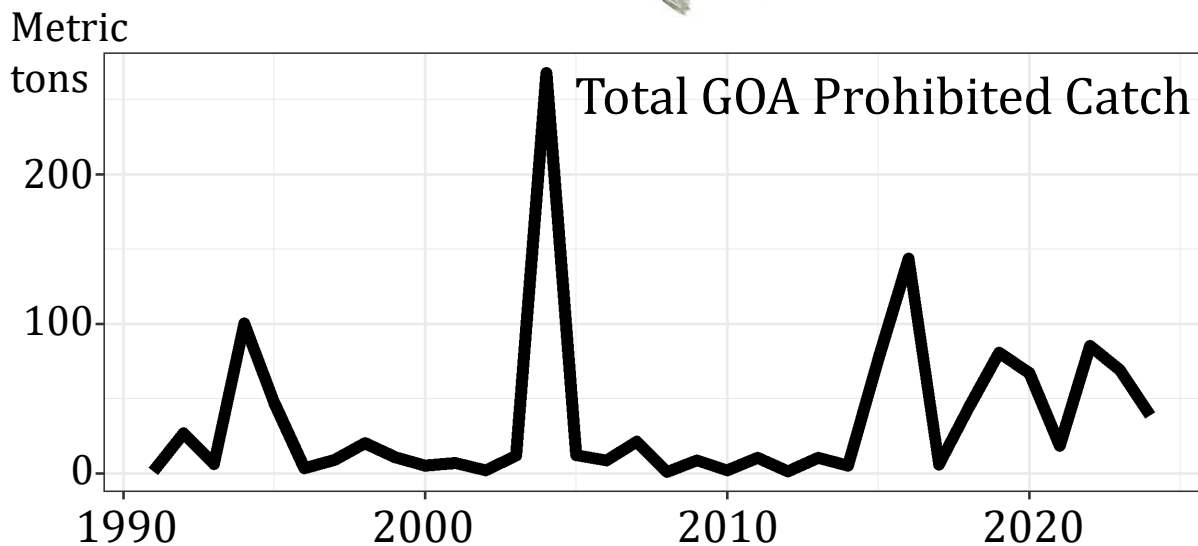


- Most abundant in western Gulf, 200-300m
- Prevalence at/near all-time high
- Abundance and biomass increasing, near all-time high

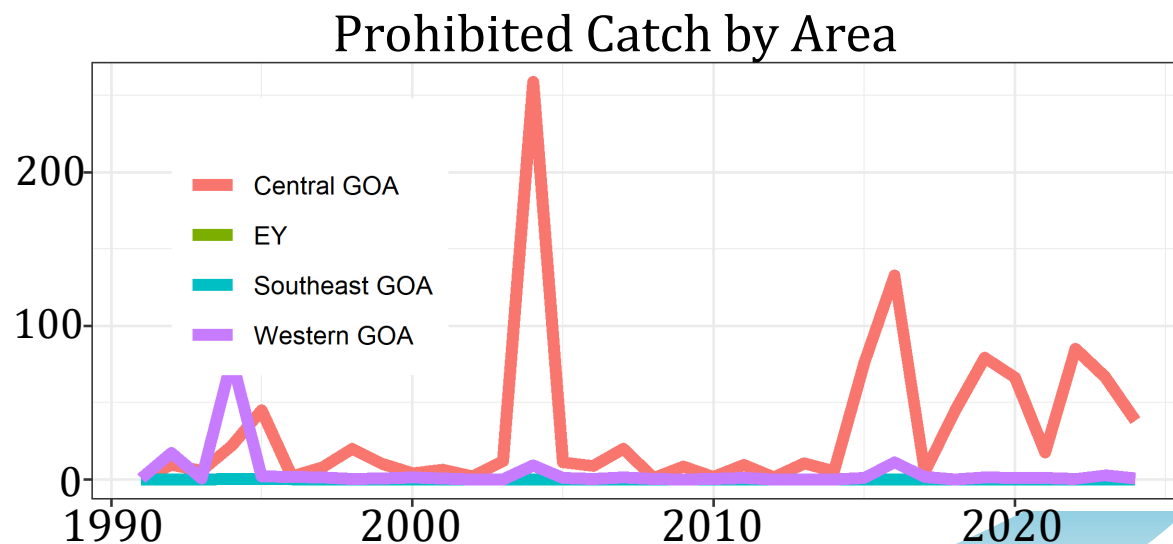
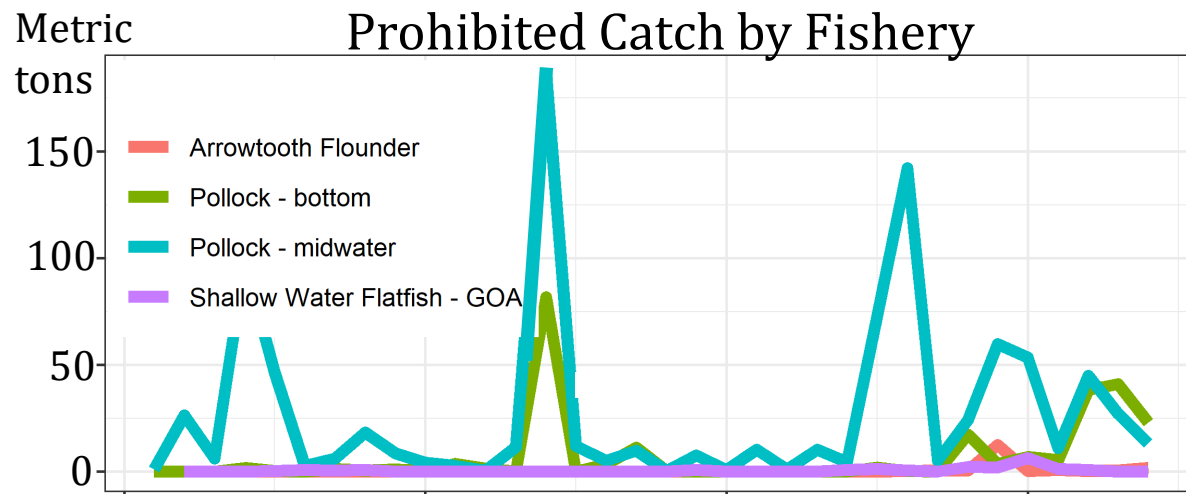
GOA – ‘Forage Fish’ Bycatch in Federal Fisheries



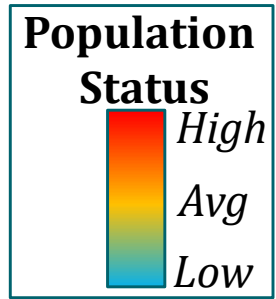
GOA – Forage Fish Bycatch in Federal Fisheries


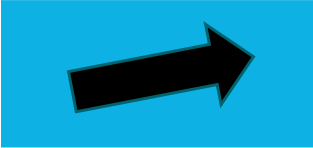
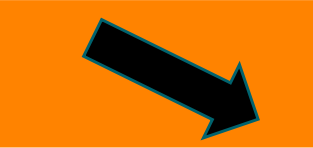

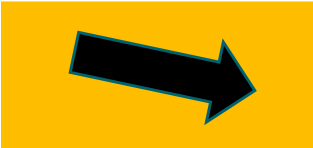


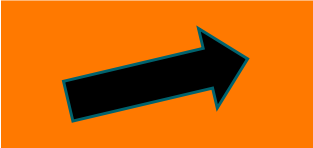
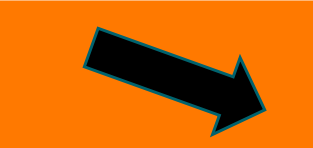
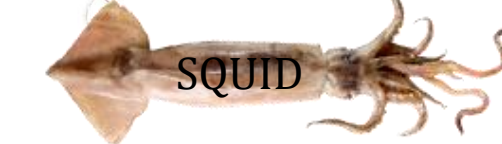
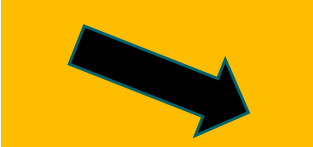
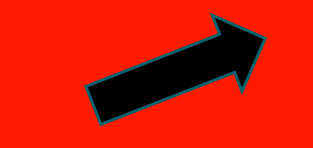

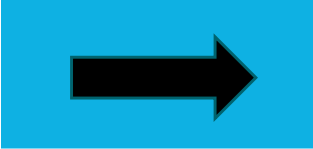
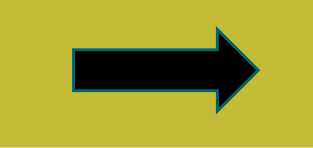



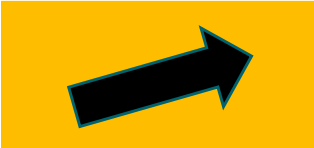


- ~30% decrease in PSC since 2023
- Largest PSC in pollock midwater trawl fishery in central GOA



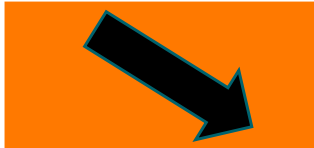
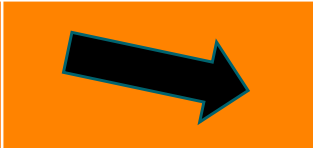


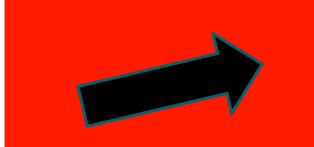









Summary



| | Trawl Surveys | |
|---|---|---|
| | BSAI | GOA |
|  CAPELIN |  |  |
|  HERRING |  |  |
|  SHRIMP |  |  |
|  SQUID |  |  |
|  EULACHON |  |  |
|  RAINBOW SMELT |  | n/a |
|  PACIFIC SAND LANCE |  | n/a |

Fisheries Bycatch

| | BSAI | GOA |
|--------------------|---|---|
| CAPELIN |  |  |
| HERRING |  |  |
| SHRIMP |  |  |
| SQUID |  |  |
| EULACHON |  |  |
| RAINBOW SMELT |  |  |
| PACIFIC SAND LANCE |  |  |

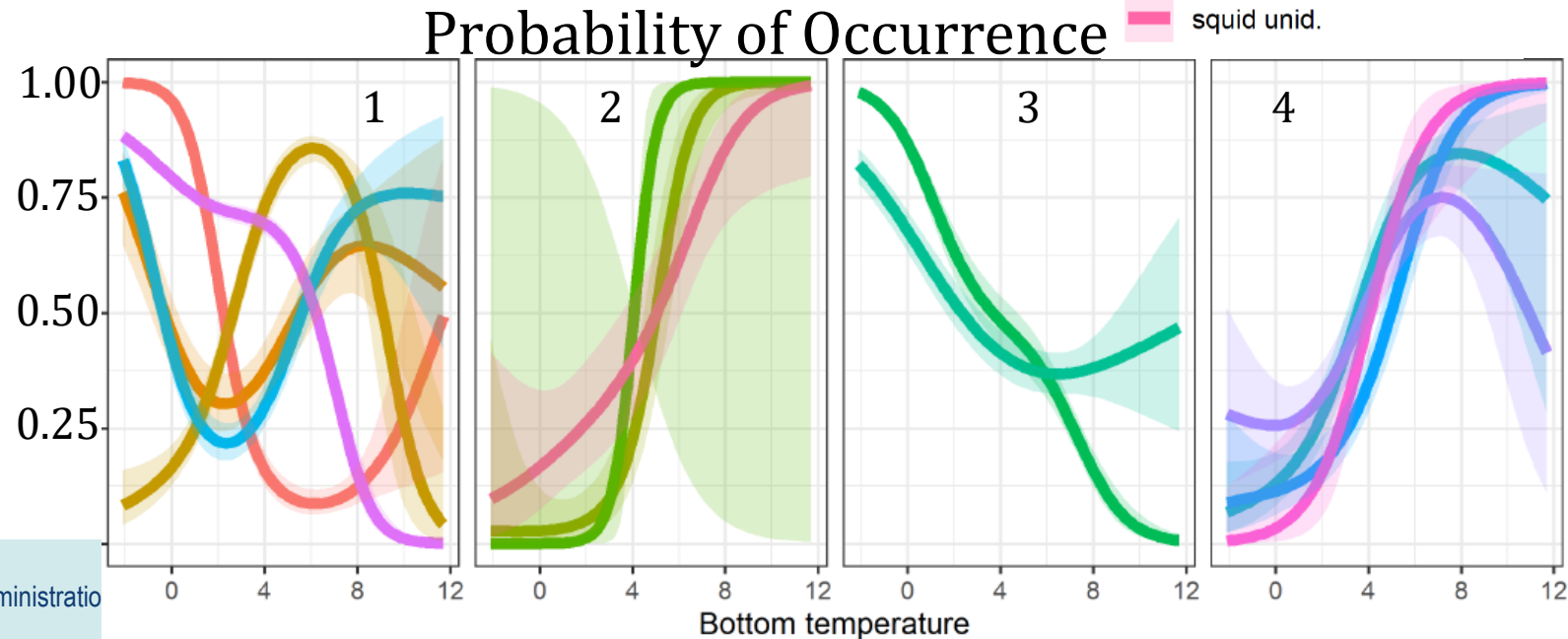
Moving Forward

- Next publication is 2026
- Issues:
 - *Incidental* catch in *bottom* trawls
 - Focal species (juv pollock, salmon, krill)
 - Balance content with Ecosystem Status Reports



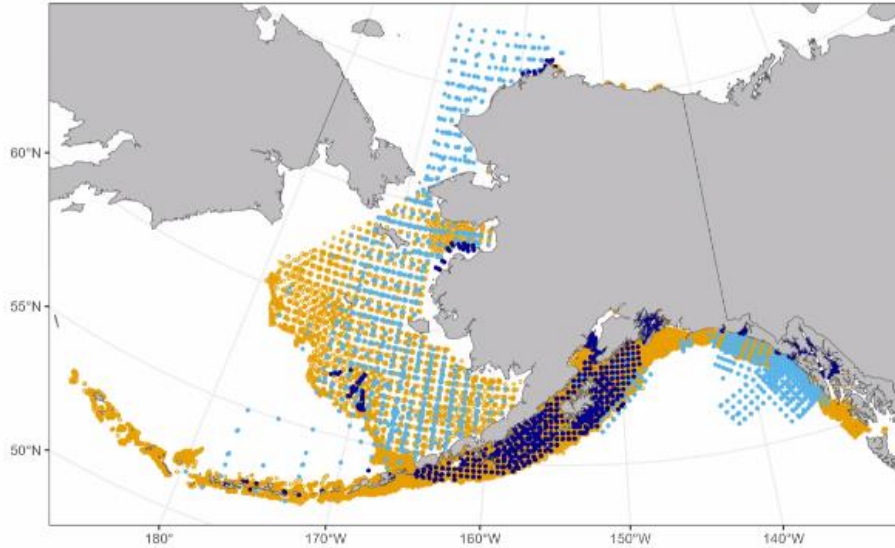
IMPROVEMENTS:

- Incorporate more data sources
- Predator component
- Environmental linkages



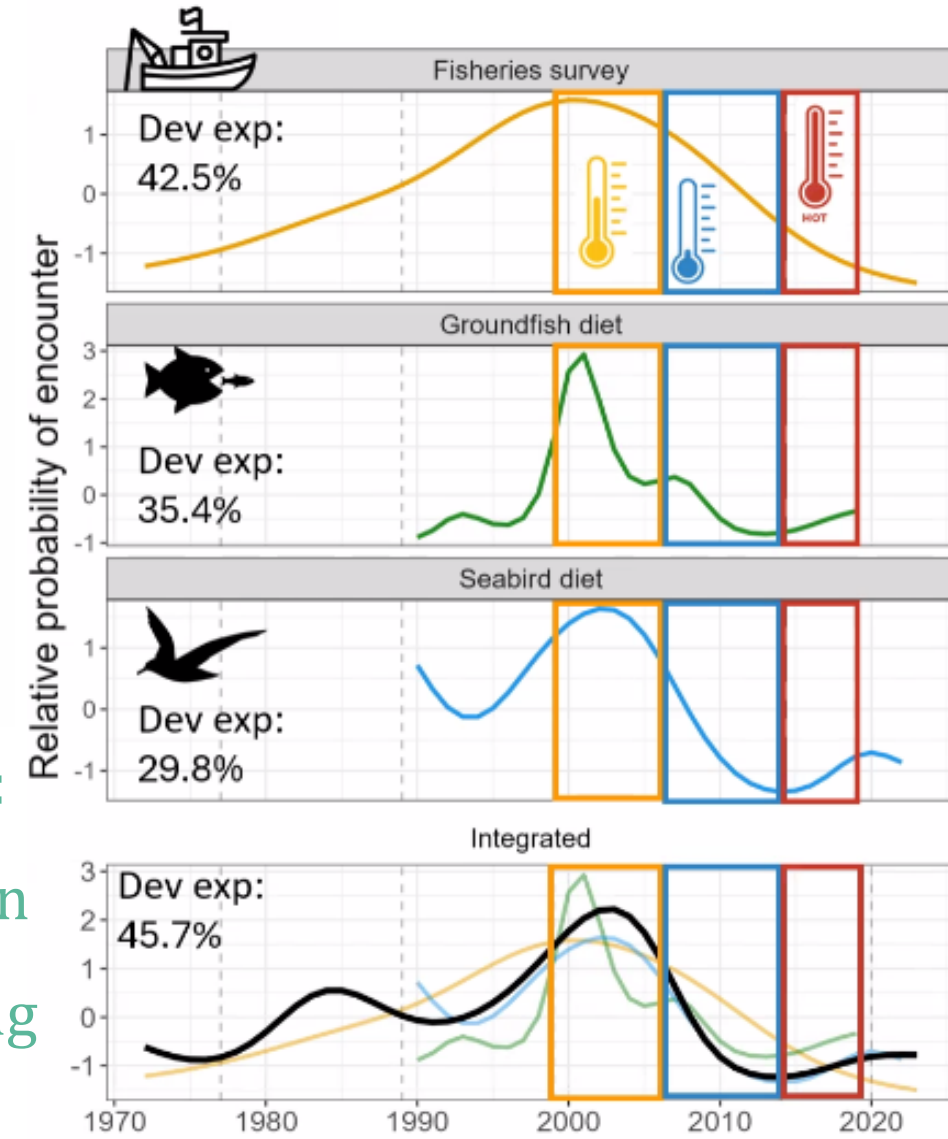
Alaska Forage Fish Database

- Fisheries Surveys
 - Surface trawl
 - Midwater trawl
 - Bottom trawl
 - Nearshore sampling
- Predator Diets
 - Groundfish (pollock, Pcod, ATF, halibut)
 - Seabirds (surface & divers)



• Forage Species:

- Pacific capelin
- Pacific herring
- Sand lance



Turner L, Arimitsu M, Piatt JF, Eckert GL, Cunningham CJ



Thank you!

Acknowledgements: All survey coordinators, sea-going personnel, vessel crew & data curators, AKFIN, Bridget Ferris (GOA Ecosystem Status Report), Ebett Siddon, Sherri Dressel ADF&G, Asia Beder ADF&G, Kyle Hebert ADF&G, Lauren Rogers, Todd Miller



**NOAA
FISHERIES**