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FISHERIES**

# Results of the 2022 Winter Shelikof Strait Pollock Pre-Spawning Acoustic-Trawl Survey

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**September 21, 2022**



Russia  
USA

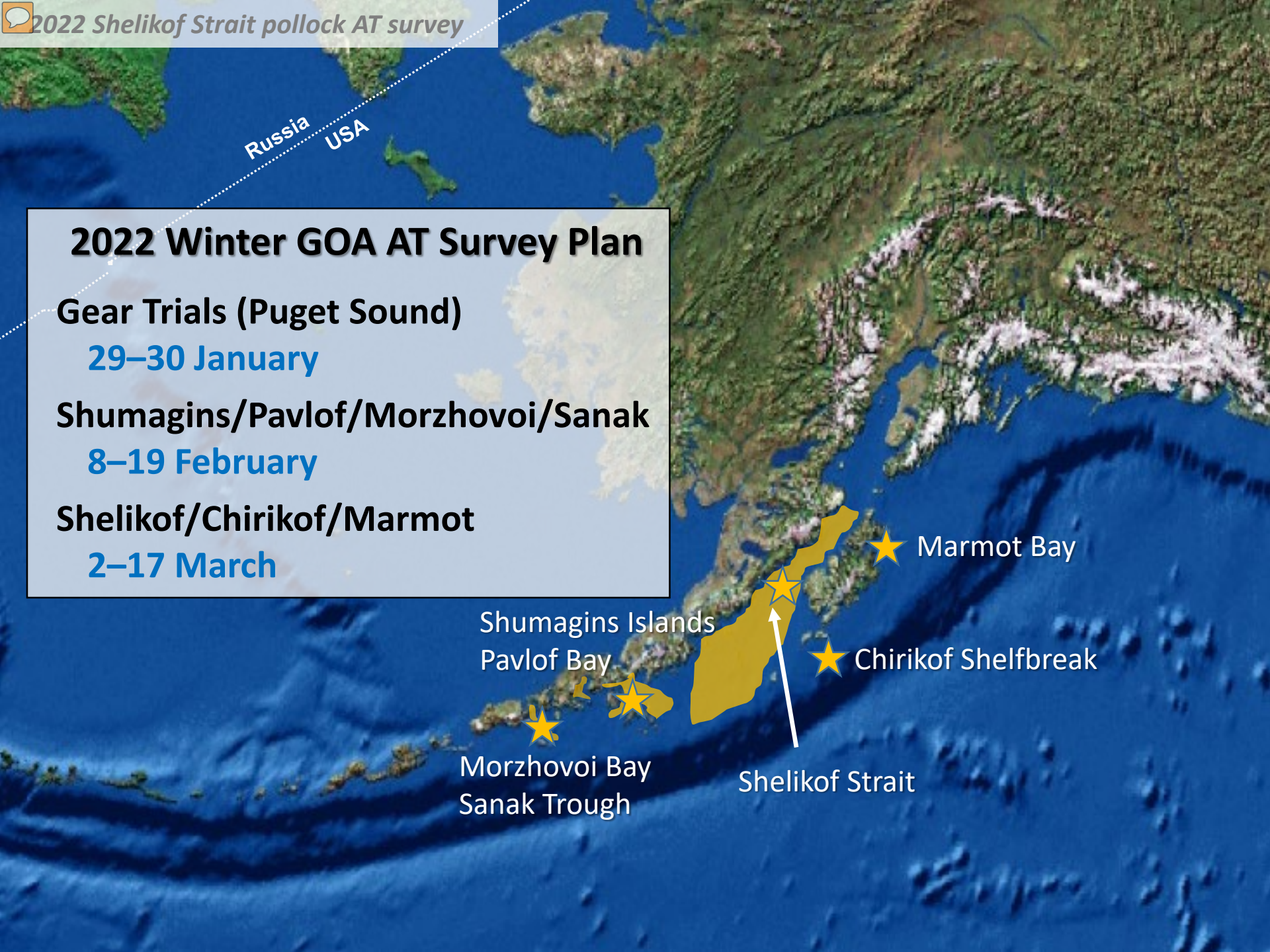
**2022 Winter GOA AT Survey Plan**

**Gear Trials (Puget Sound)**  
29–30 January

**Shumagins/Pavlof/Morzhovoi/Sanak**  
8–19 February

**Shelikof/Chirikof/Marmot**  
2–17 March

Shumagins Islands  
Pavlof Bay  
Morzhovoi Bay  
Sanak Trough  
Shelikof Strait  
Chirikof Shelfbreak  
Marmot Bay



Russia  
USA

## 2022 Winter GOA AT Survey Plan

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~~2–17 March~~ 8–17 March

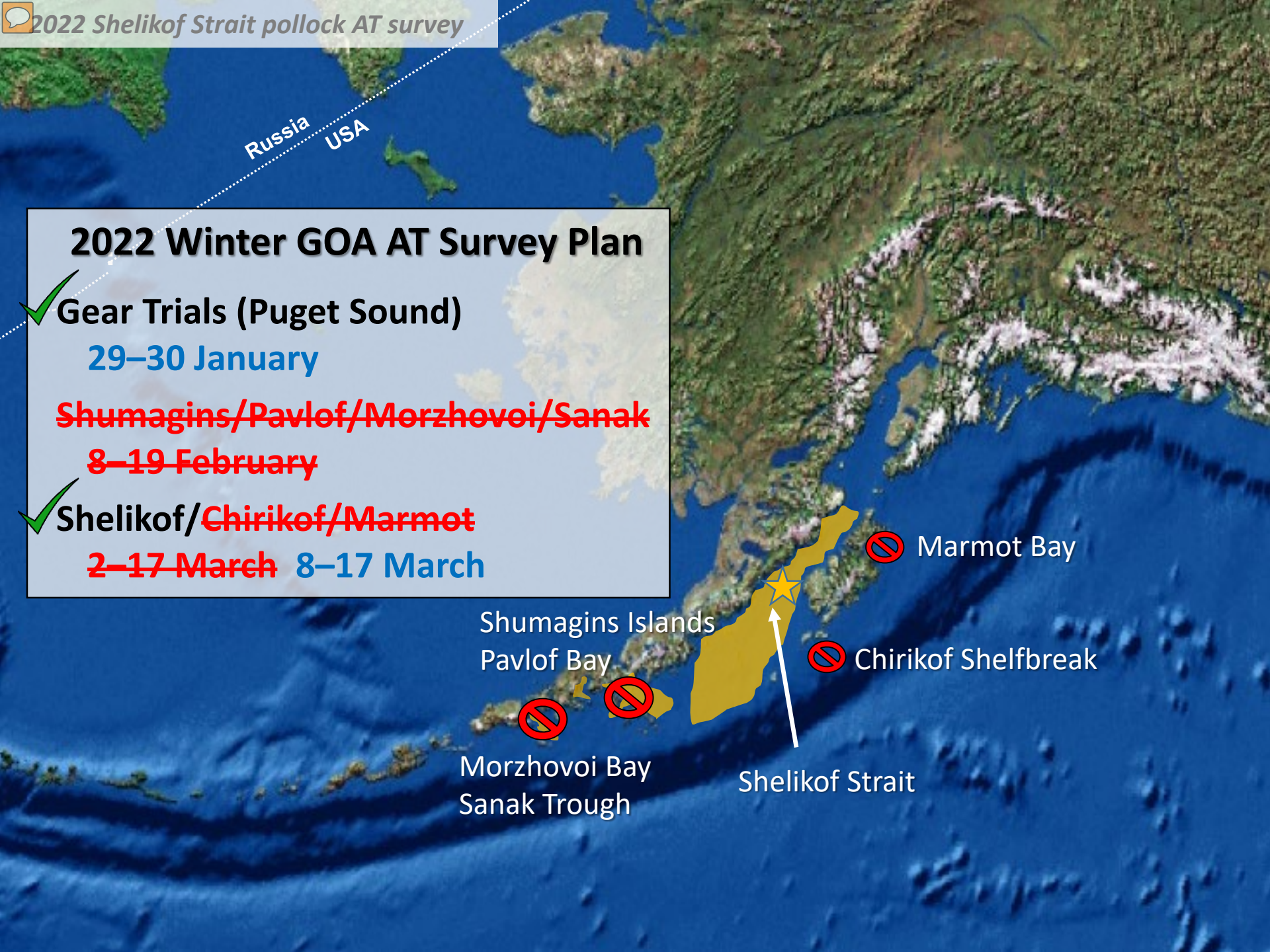
Shumagins Islands  
Pavlof Bay

Morzhovoi Bay  
Sanak Trough

Shelikof Strait

⊘ Marmot Bay

⊘ Chirikof Shelfbreak



# Acoustic-Trawl Survey Methods

7.5 nmi spacing between transects

Survey 24 hrs/day

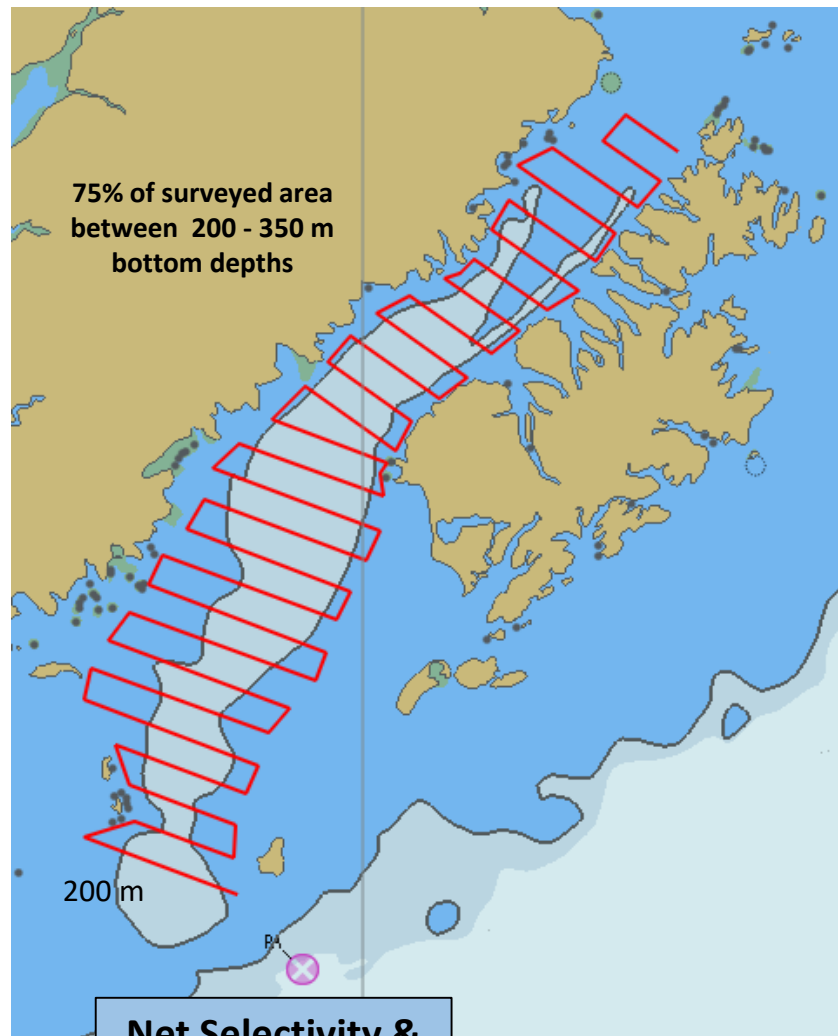
Abundance estimates use 38 kHz

- 16 m below surface to 0.5 m above seafloor

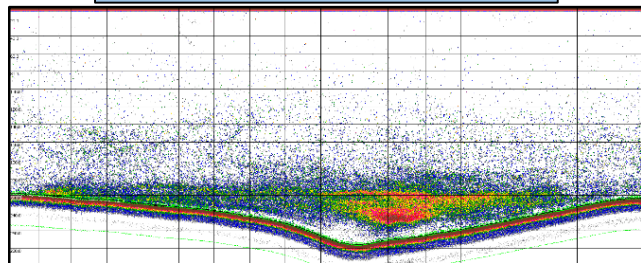
High backscatter “targeted” hauls

Physical oceanographic data

- Continuous SST from ship’s flow-through system
- Temp profile at trawl locations



Acoustic data collection along parallel transects

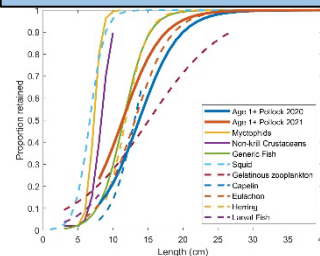


+

Nearest Haul



Net Selectivity & Target Strength



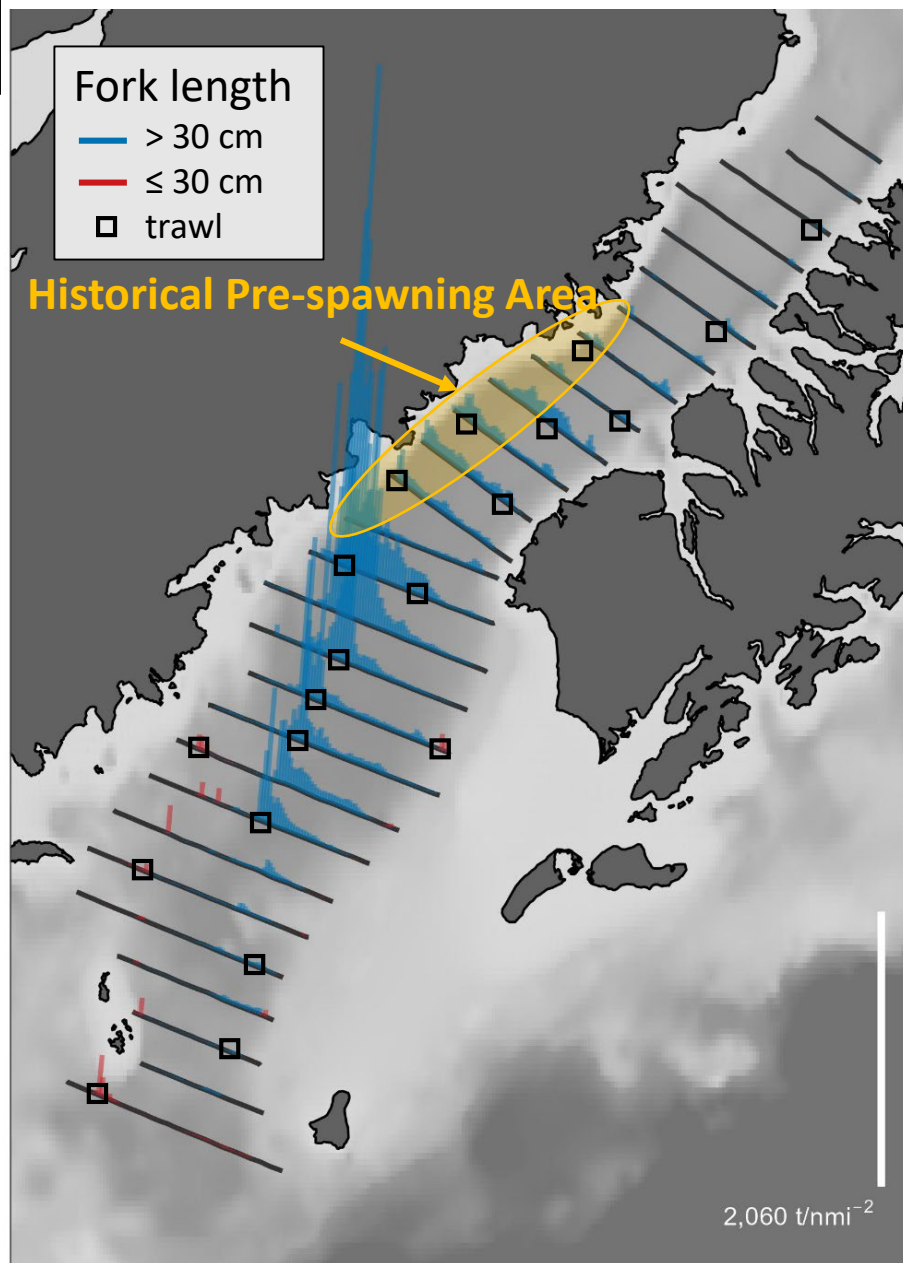
Survey estimate

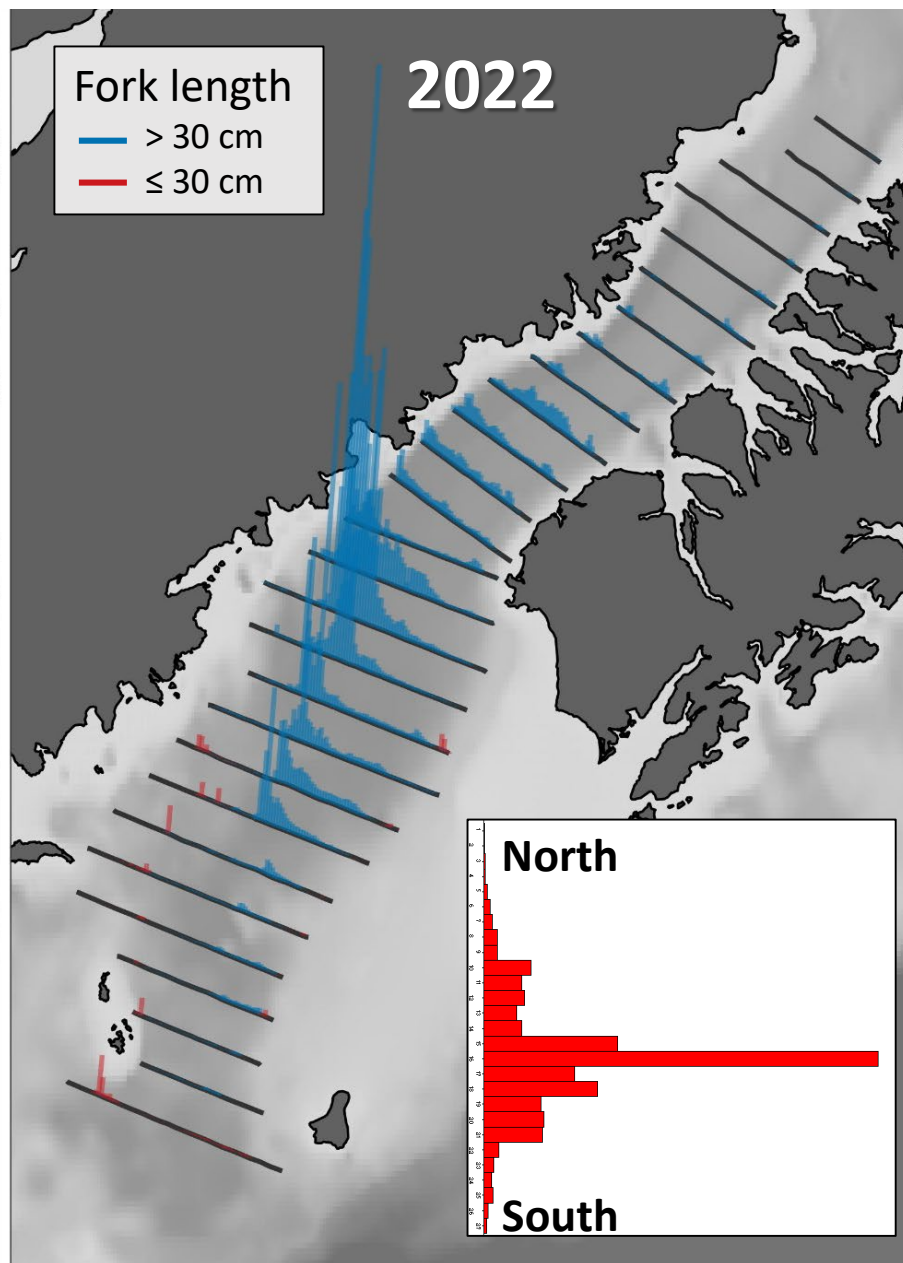
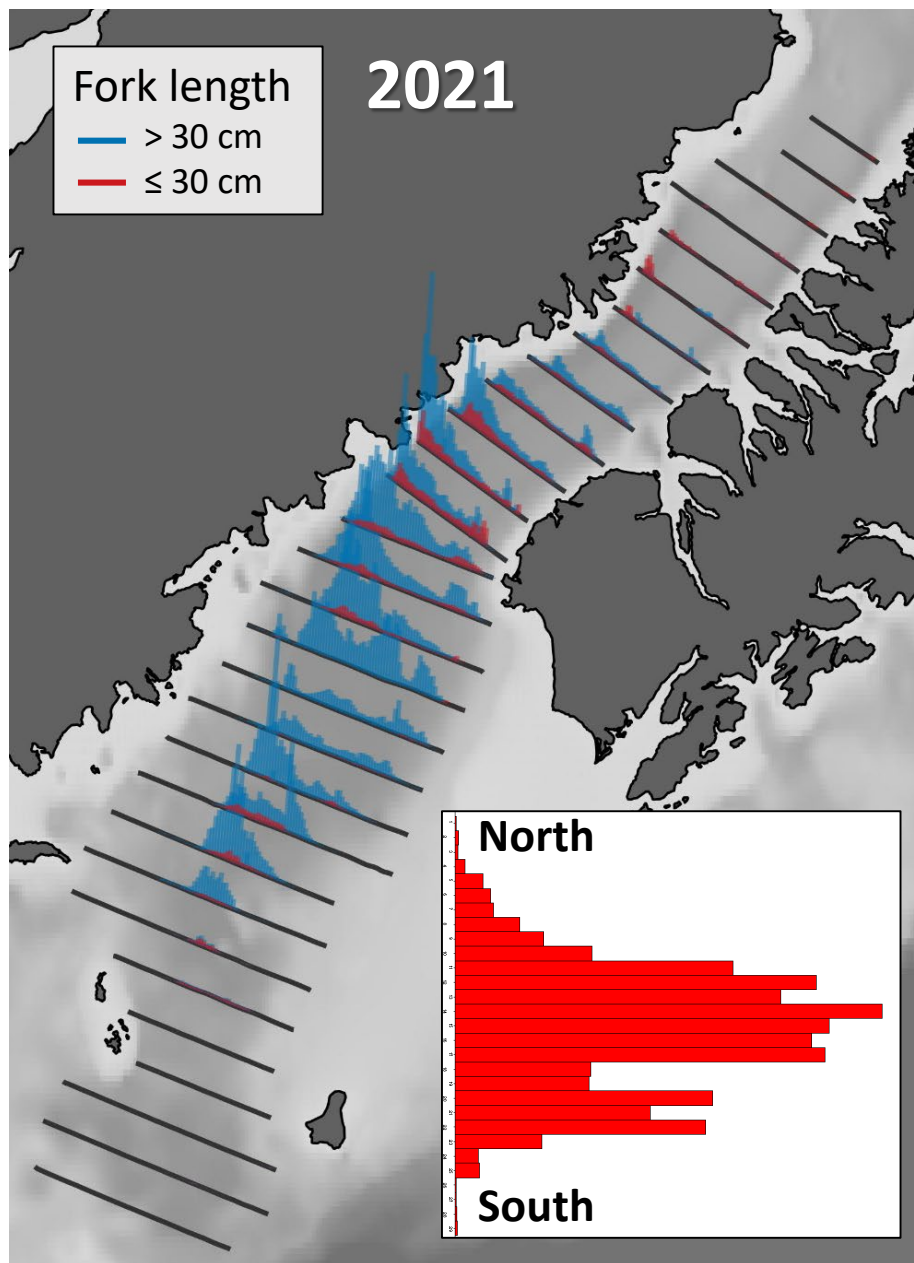
# Pollock Distribution

20 hauls (19 midwater, 1 bottom)

~815 nmi trackline

- Pre-spawning aggregation of adults (> 30 cm, **blue sticks**) concentrated in the center of the Strait, southwest of historical area
- Low density adults to north & south of pre-spawning aggregation
- Juv. pollock ( $\leq 30$  cm, **red sticks**) observed at ends of transects to the south, separate from adults
  - No vertical layering of juveniles above adults observed



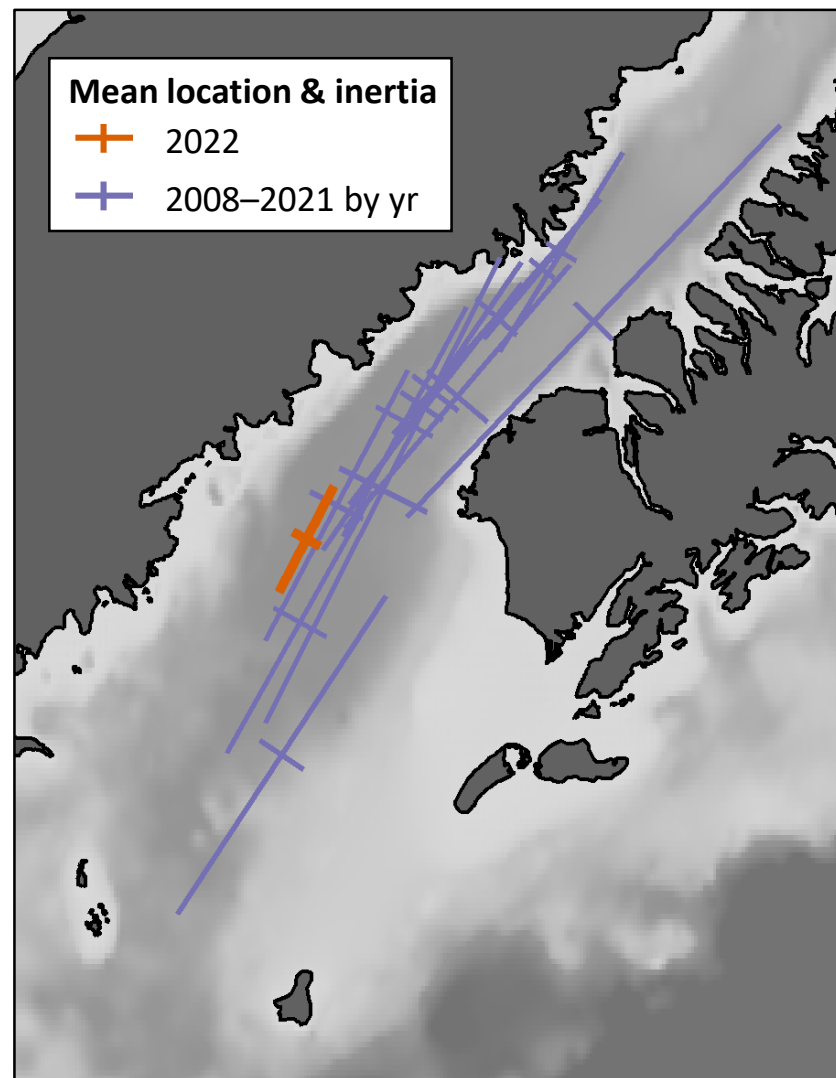
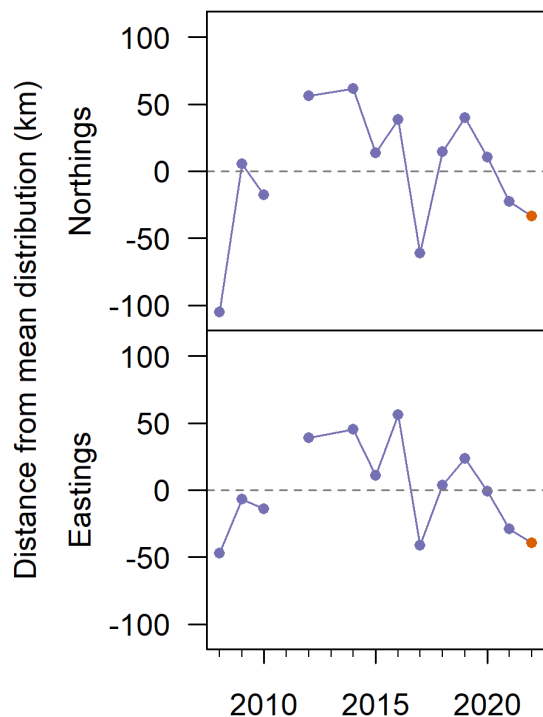


# Geostatistical Characterization of Pollock Distribution

**2022 weighted mean location of pollock biomass shifted by:**

- 10.0 km W & 11.2 km S from 2021
- 42.4 km W & 36.5 km S from 2008–2021 mean

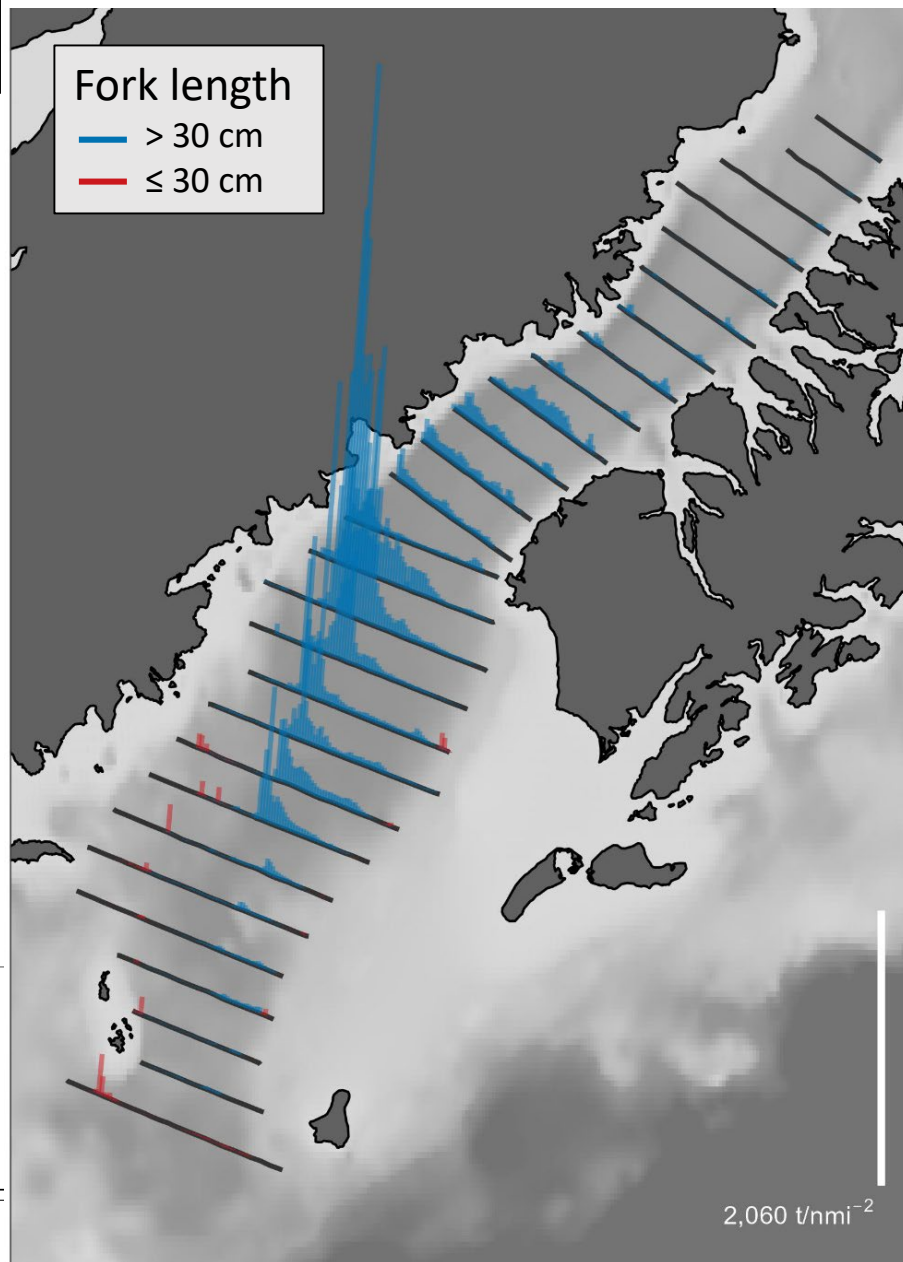
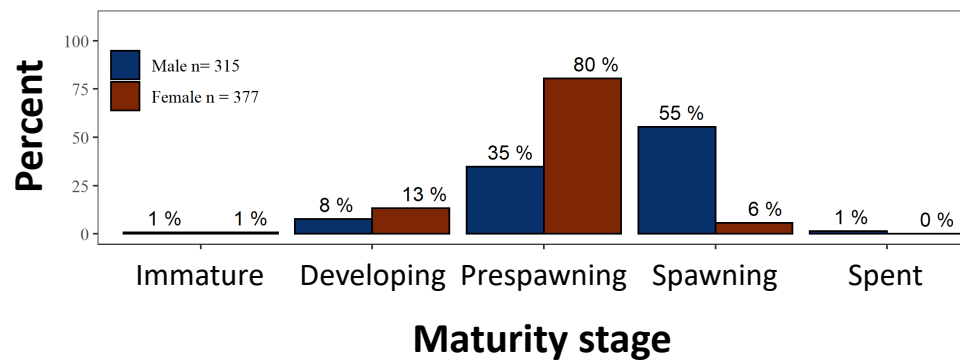
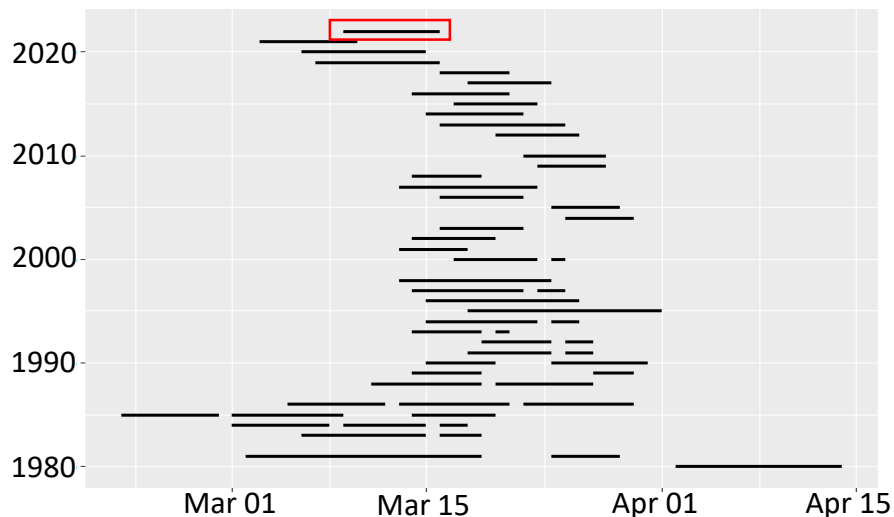
**Reduced inertia axes (i.e. dispersion) indicate pronounced contraction of distribution – atypical over past 15 years**



# Survey Timing

Survey started 1-week later than planned, but closer to historical survey period

80% females (> 40 cm) pre-spawning, indicates survey timing was appropriate

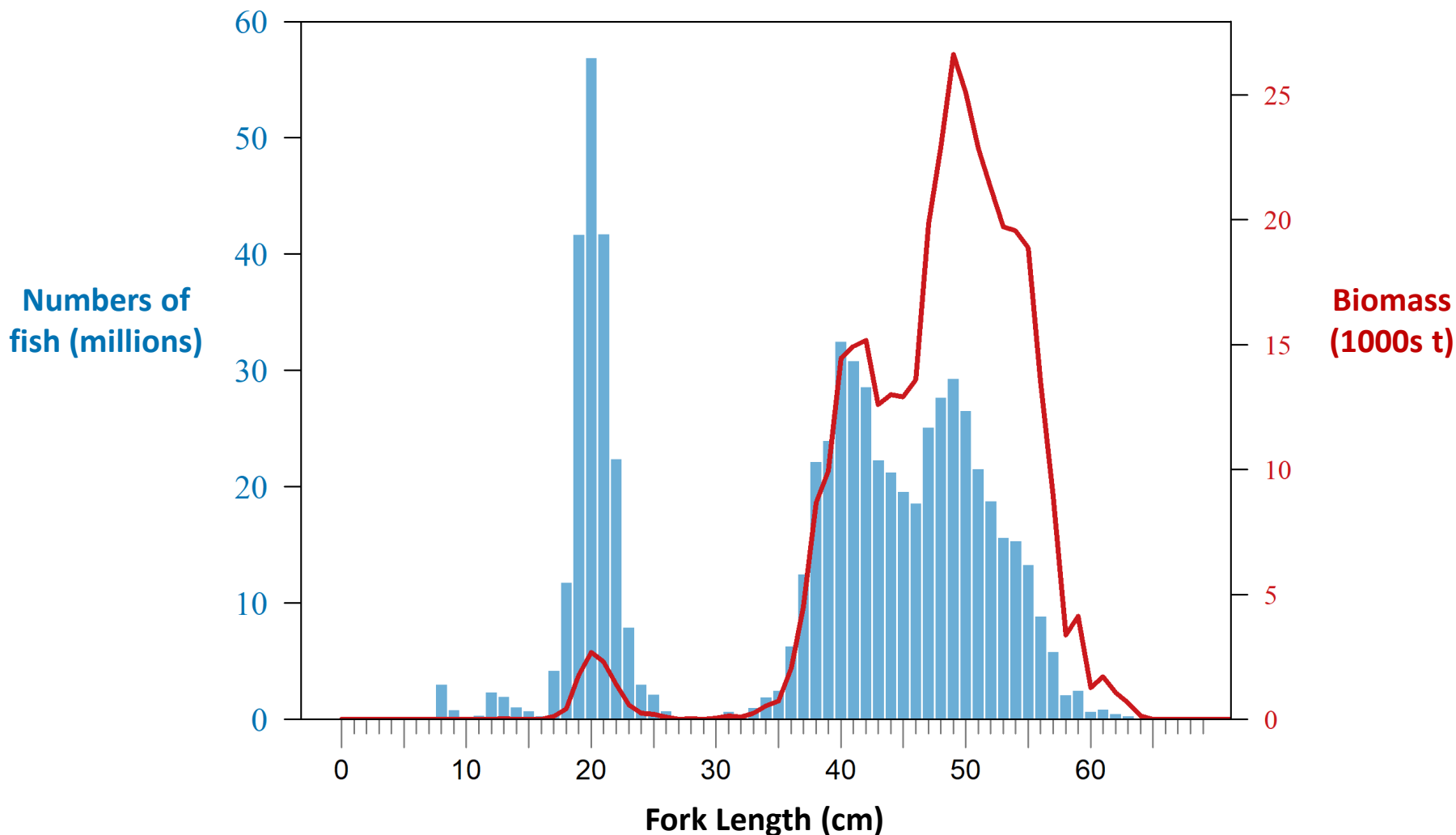




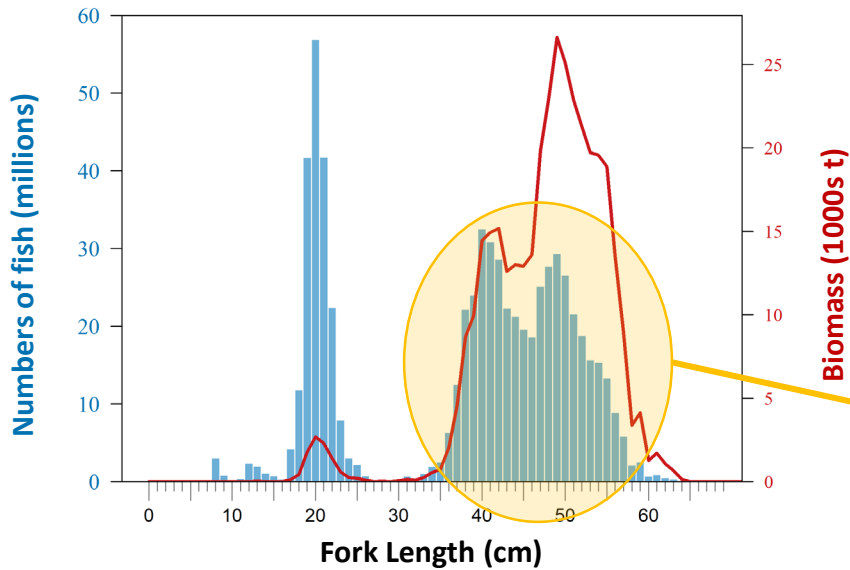
## 2022 Survey Estimates by Length

Abundance = 666.6 million age-1+ fish (length modes at 20, 40, 49 cm)

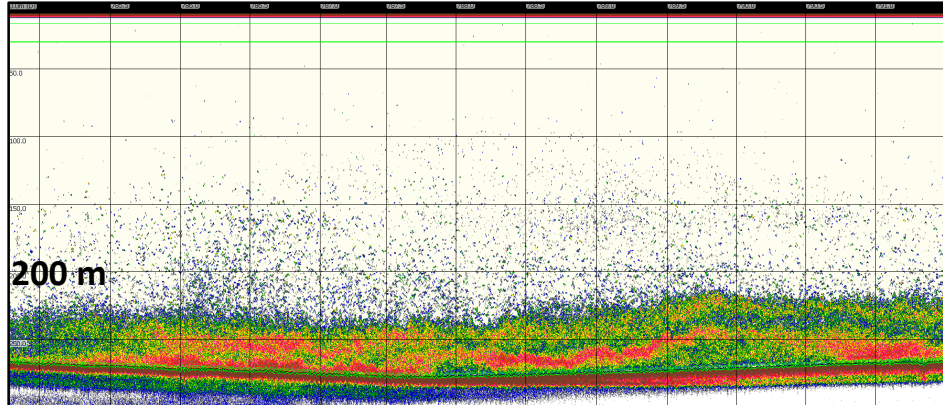
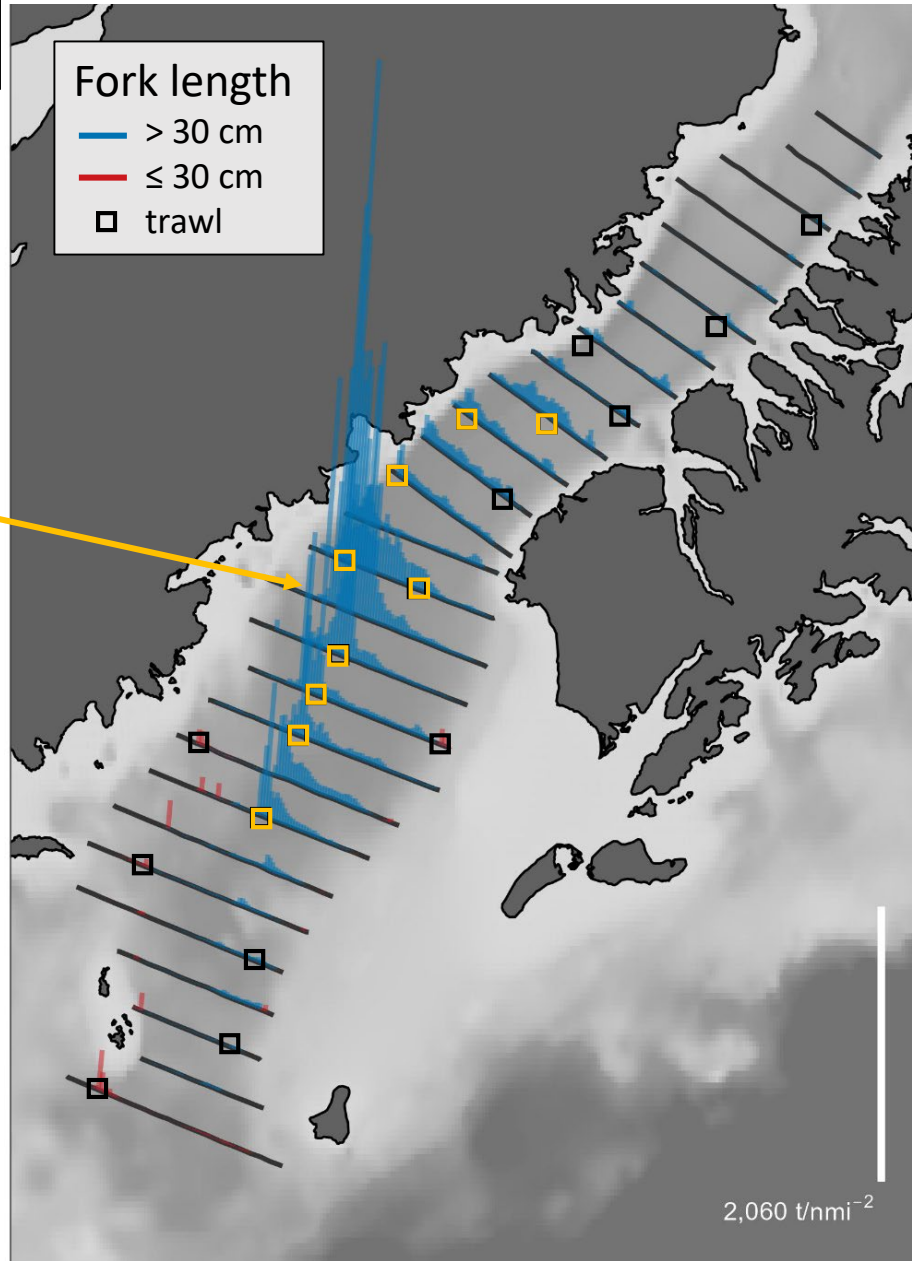
Biomass = 365,400 t (10.3% est. error) → **30.7% decrease from 2021**



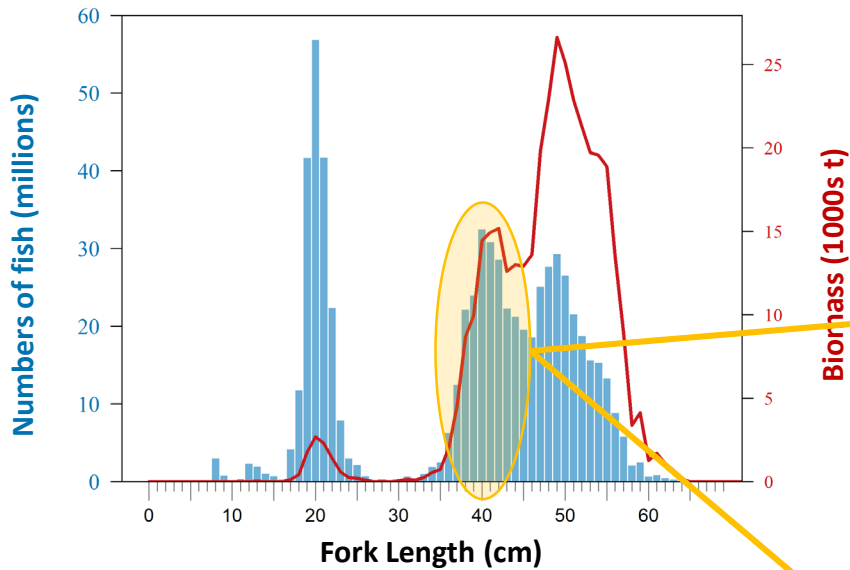
# Distribution of Length Modes



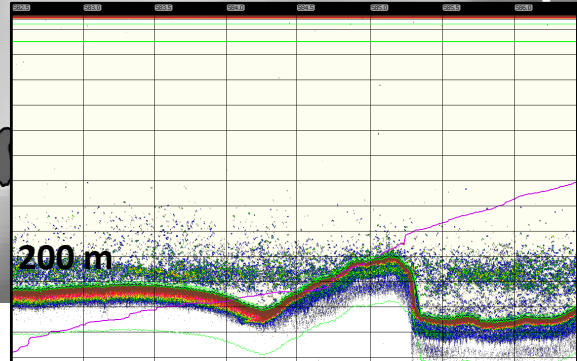
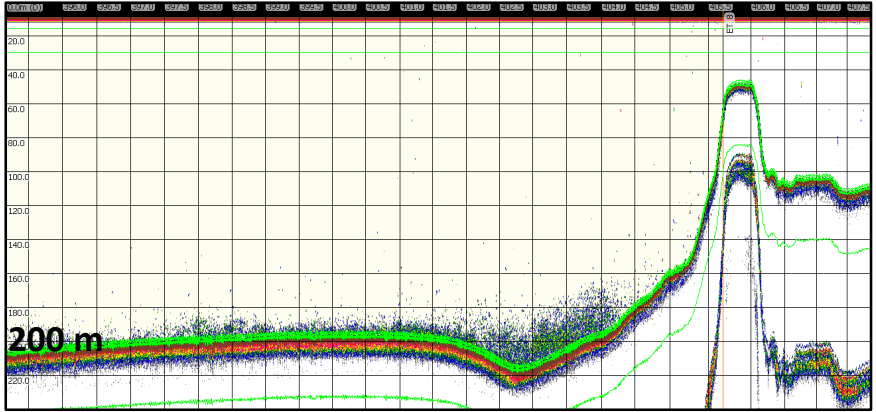
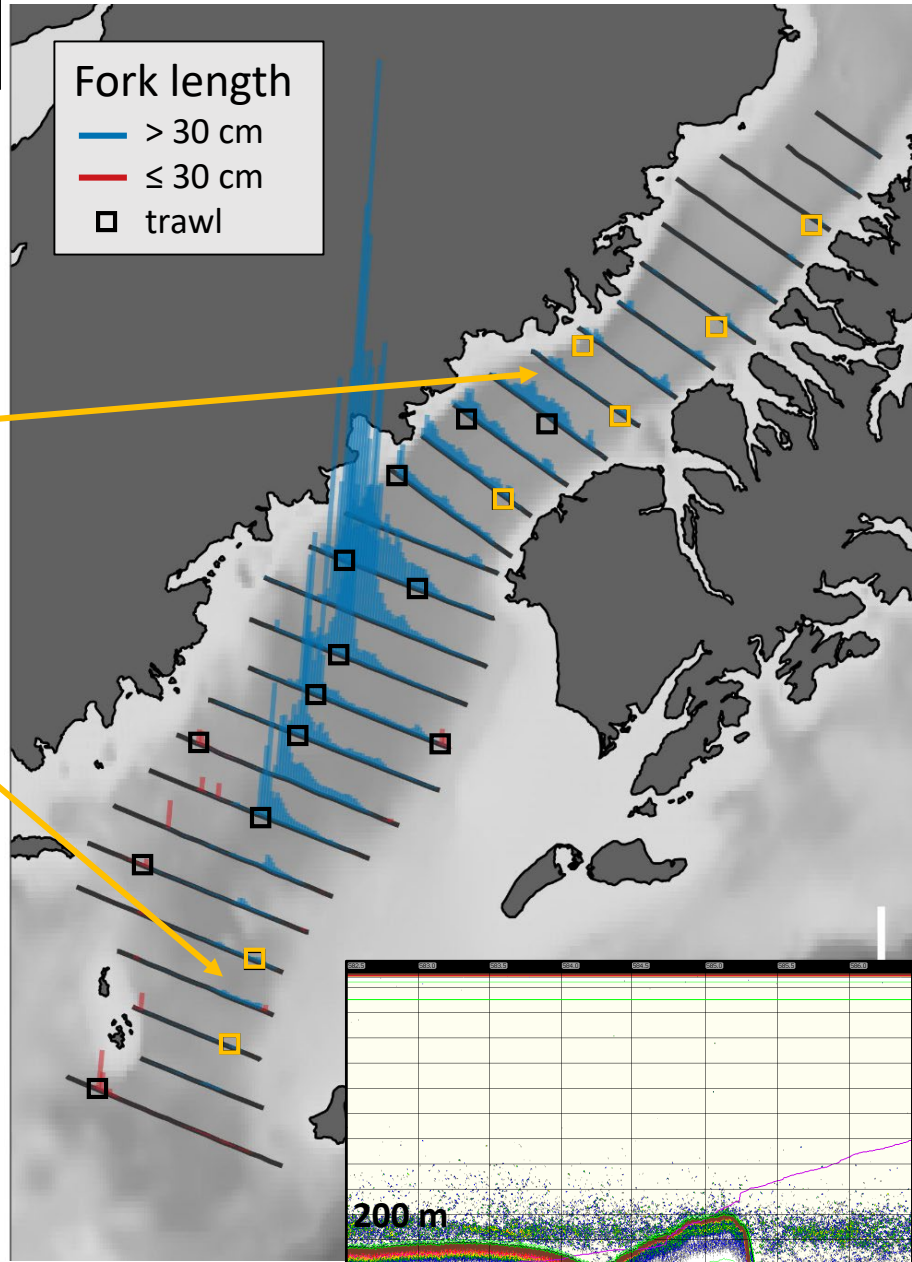
Hauls in center aggregation:  
40 & 49 cm modes



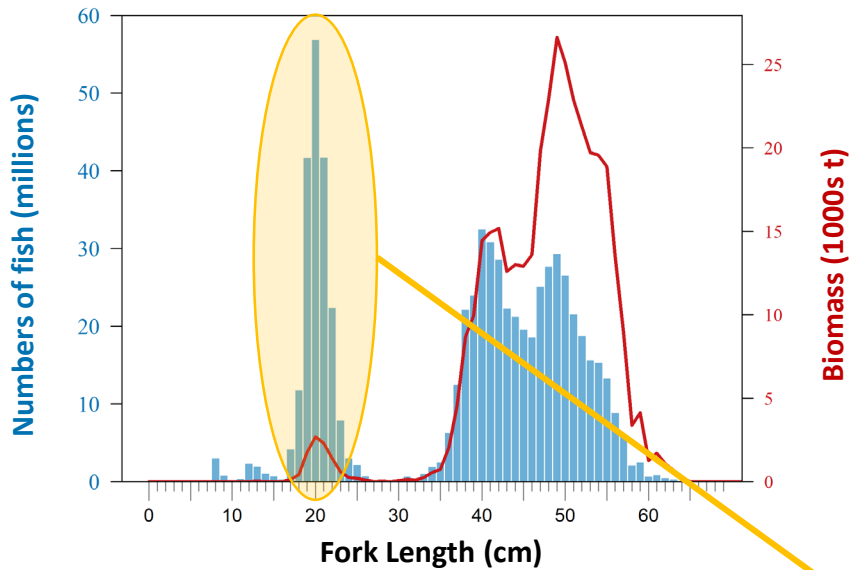
# Distribution of Length Modes



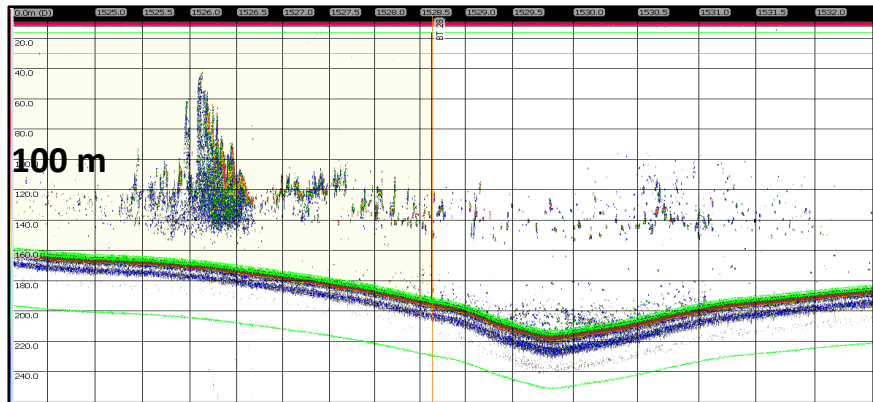
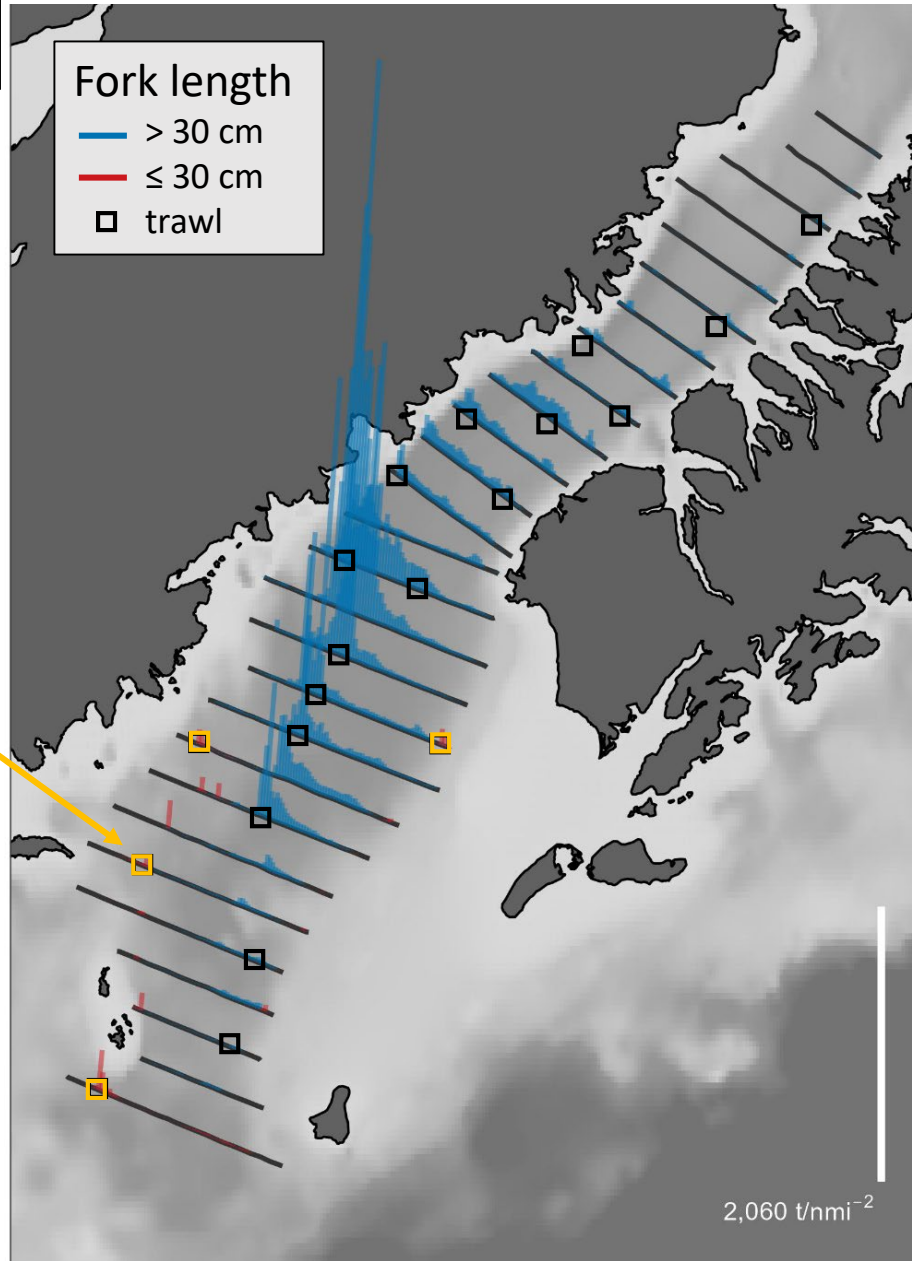
Hauls N & S of aggregation:  
low density, 40 cm mode



# Distribution of Length Modes

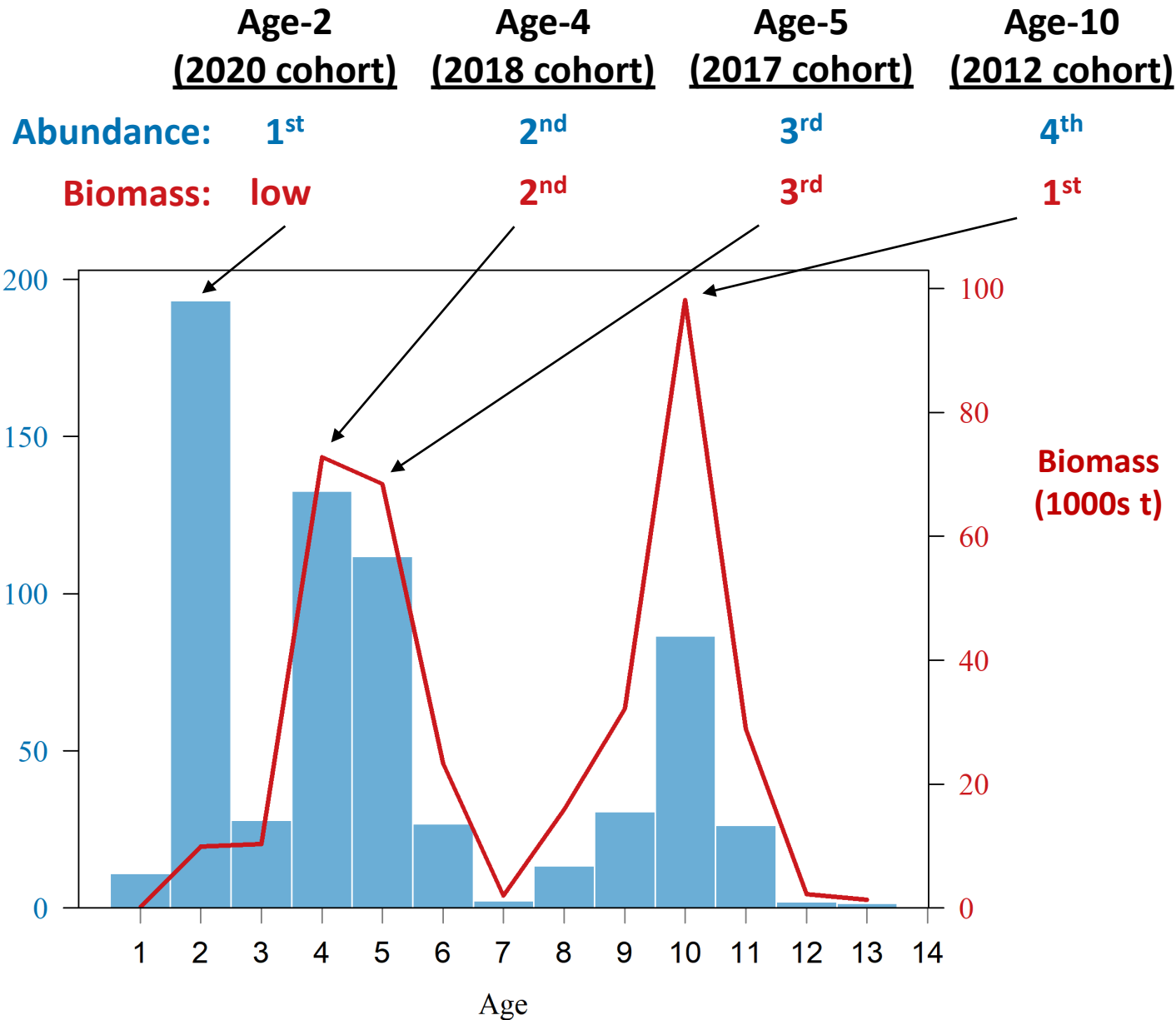


**Hauls at ends of transects:  
~20 cm mode**

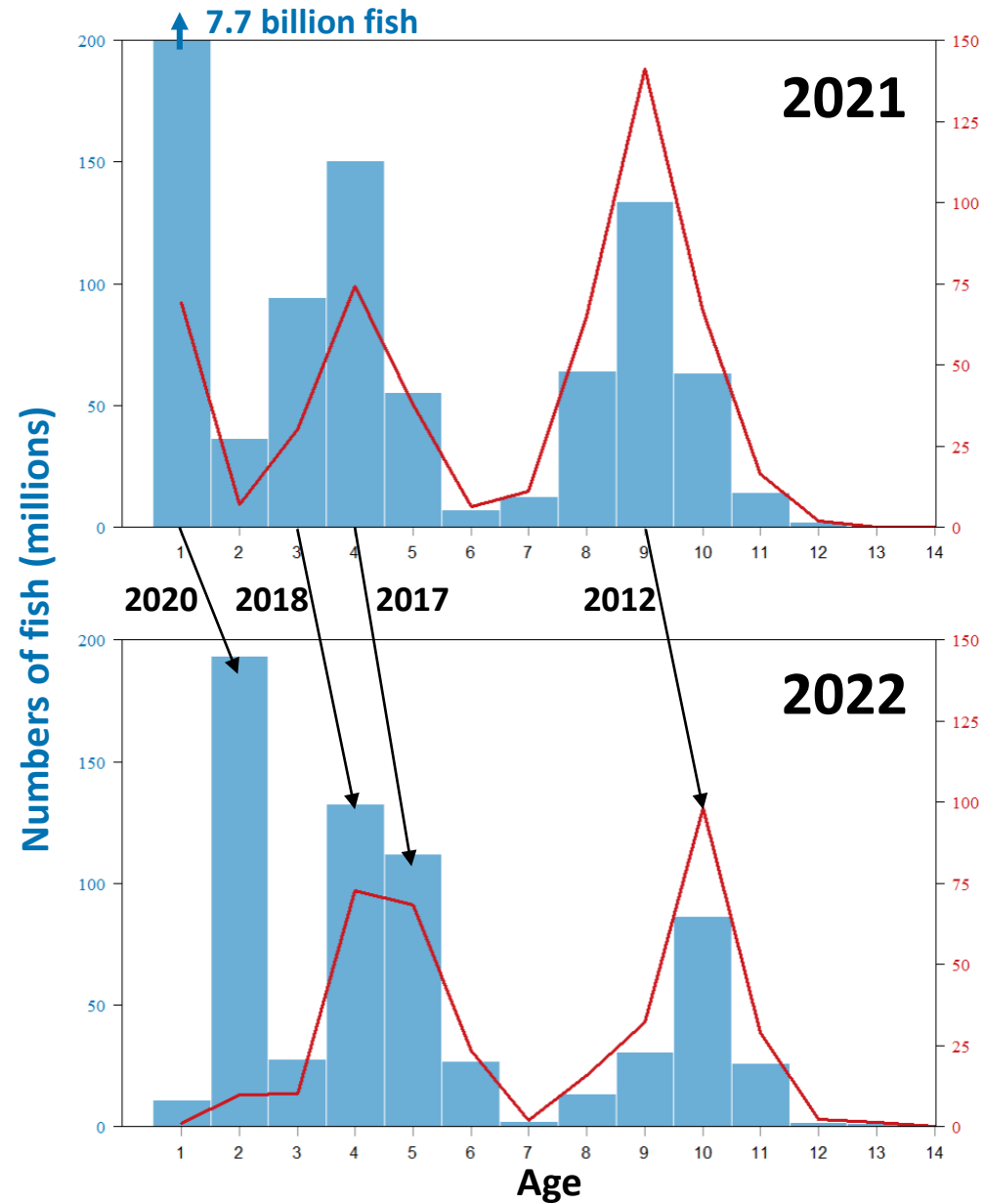


# 2022 Survey Estimates by Age

**Age-1**  
**(2021 cohort)**  
**low**



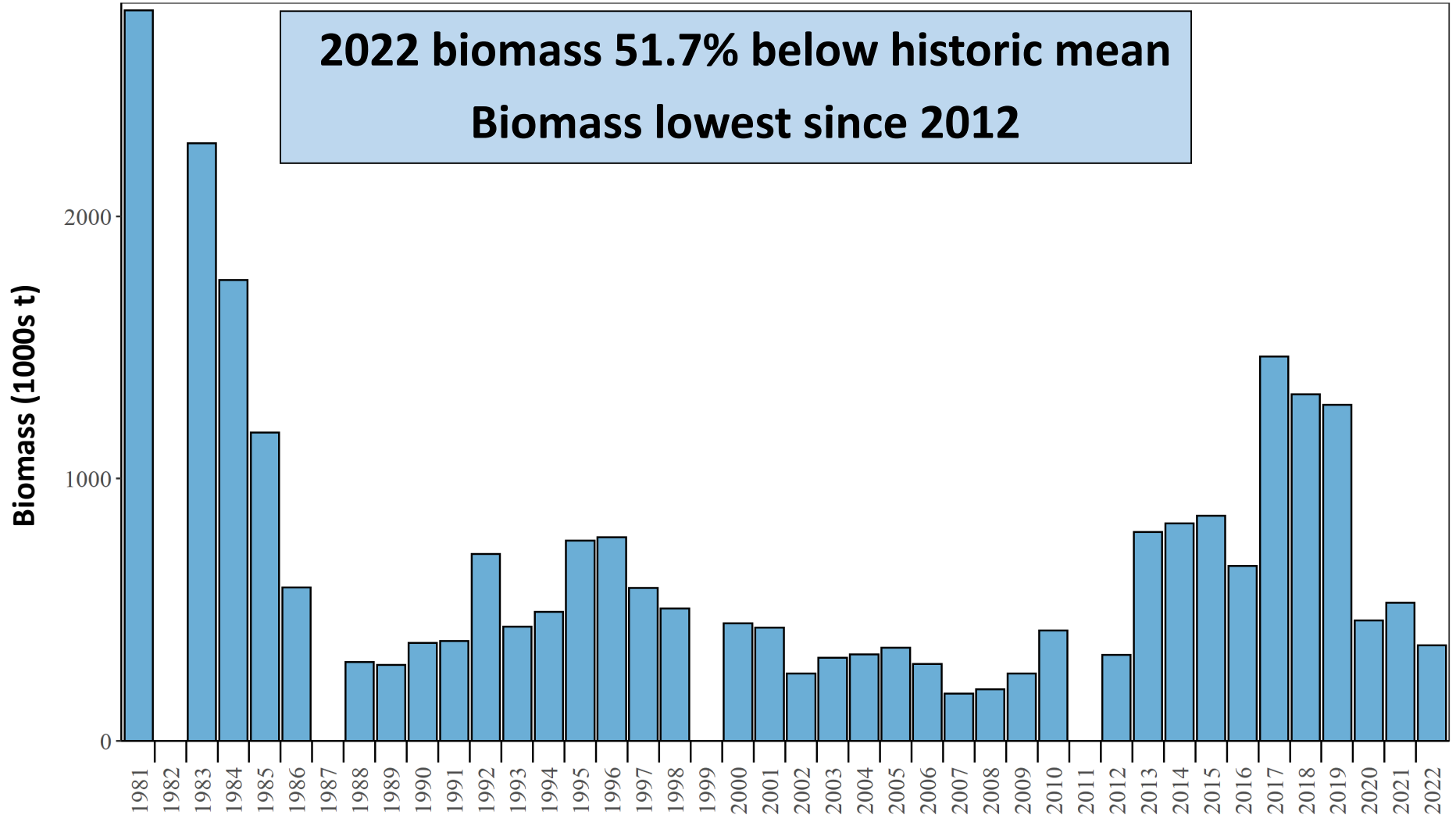
# Changes in Estimates from 2021 to 2022 by Cohort



Cohort	# fish	Biomass
2020 (age-1 to -2)	- 97.5%	- 85.7%
2018 (age-3 to -4)	+ 40.9%	+141.1%
2017 (age-4 to -5)	- 25.7%	- 8.1%
2012 (age-9 to -10)	- 35.3%	- 30.5%

# Survey Time Series

**2022 biomass 51.7% below historic mean  
Biomass lowest since 2012**



# Survey Time Series – Net Selectivity Corrections

## Progression of Selectivity Corrections:

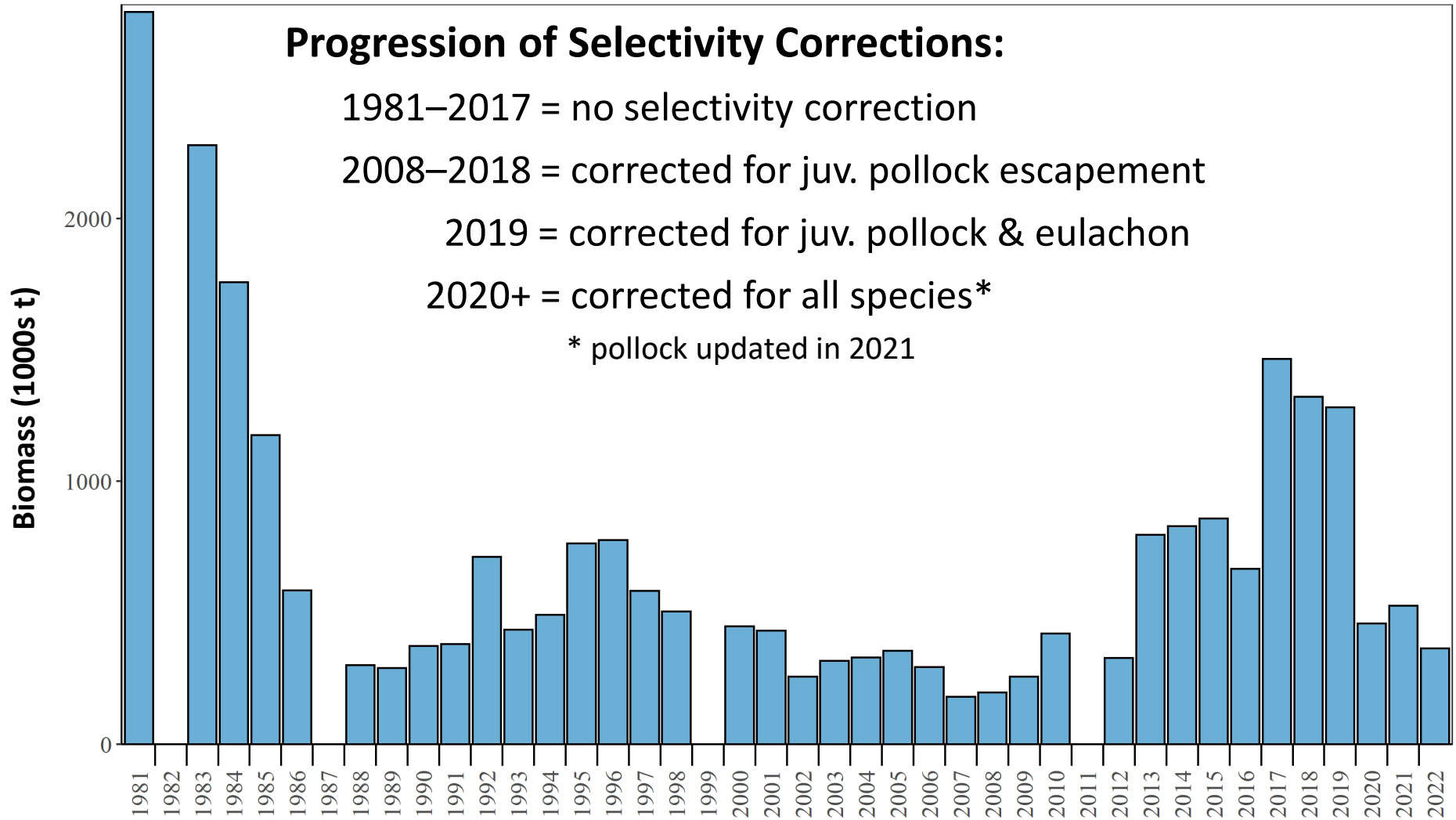
1981–2017 = no selectivity correction

2008–2018 = corrected for juv. pollock escapement

2019 = corrected for juv. pollock & eulachon

2020+ = corrected for all species\*

\* pollock updated in 2021

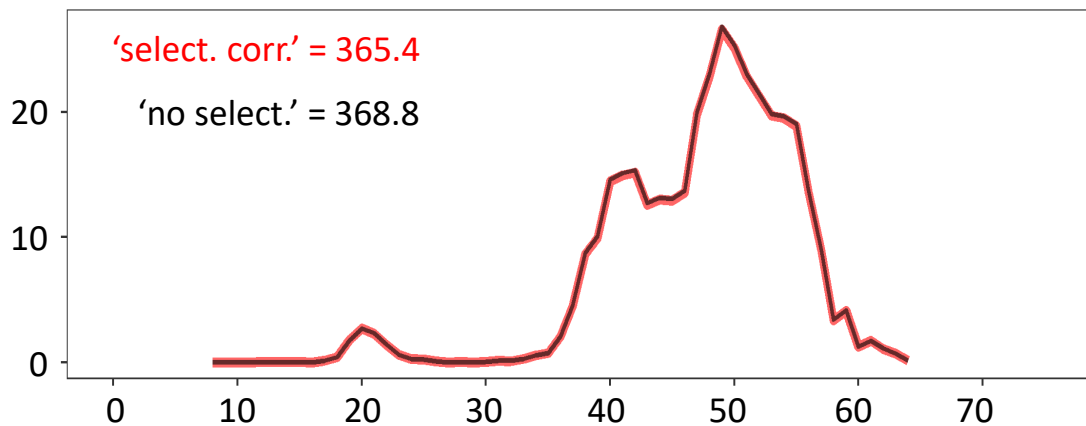




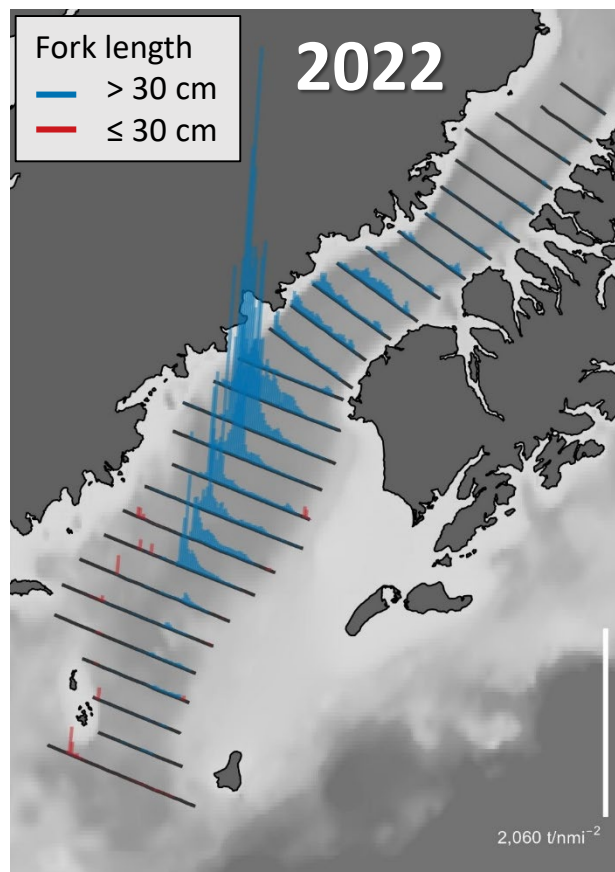
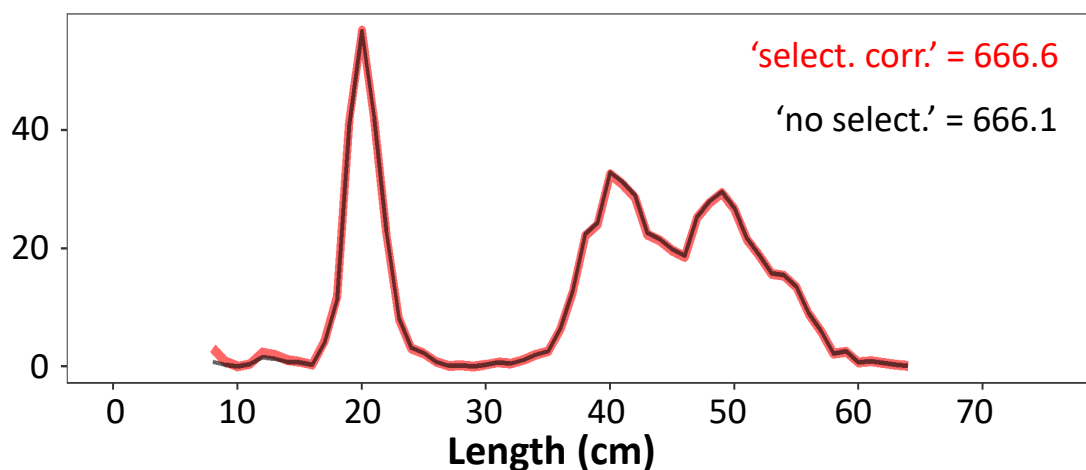
# Effects of Net Selectivity Corrections

2022 'selectivity corrected' (red line) vs. 'no selectivity' (black line):  
'No selectivity' = higher biomass by 0.9% & lower abundance by 0.1%

Biomass (1000s t)



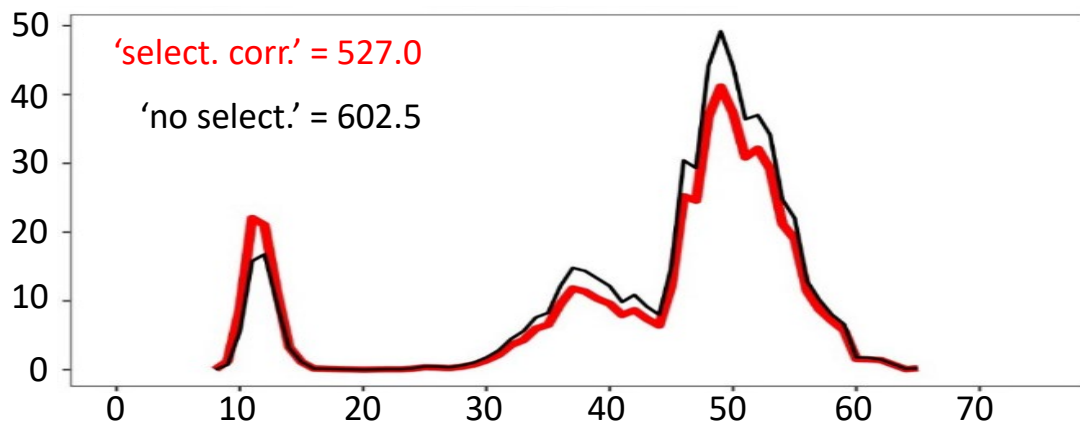
Numbers of fish (millions)



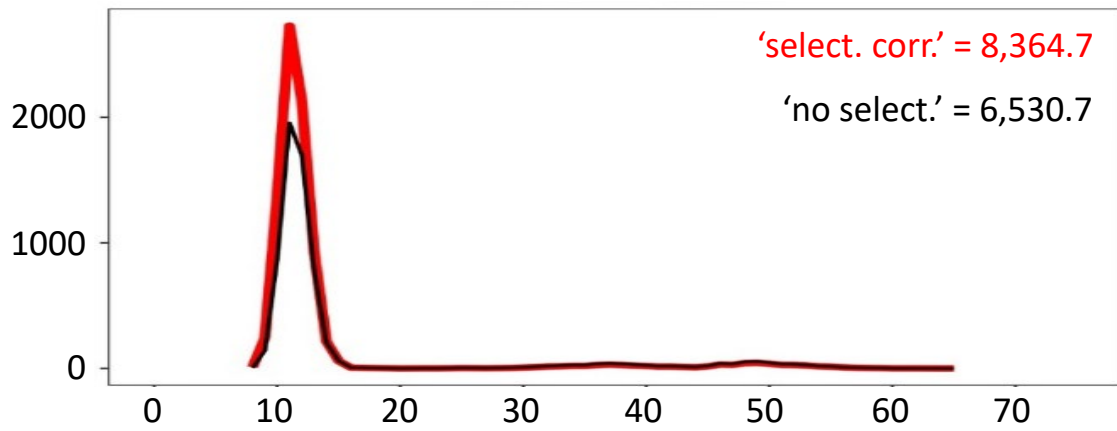
# Effects of Net Selectivity Corrections

2021 'selectivity corrected' (red line) vs. 'no selectivity' (black line):  
high age-1 abundance → biomass -12.5%, abundance +28.1%

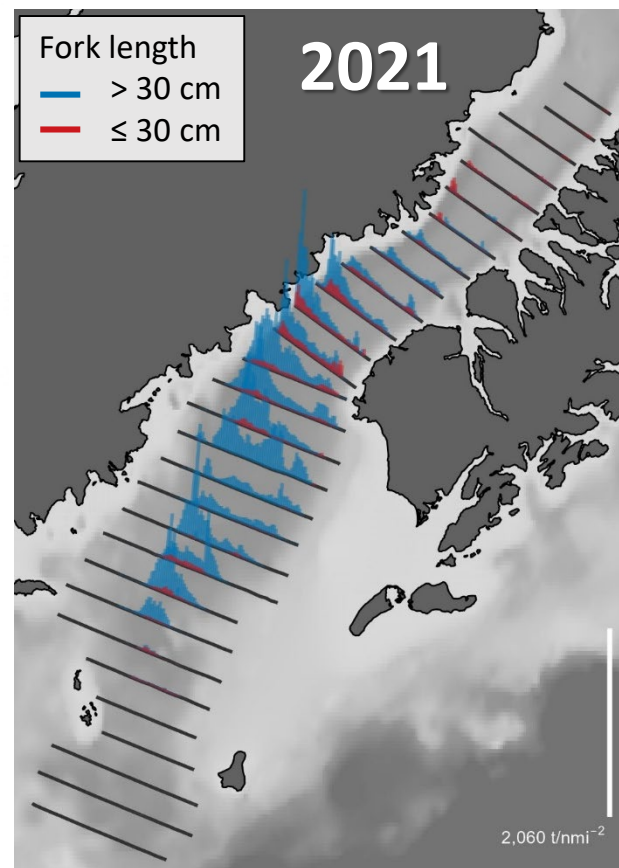
Biomass (1000s t)



Numbers of fish (millions)



Length (cm)

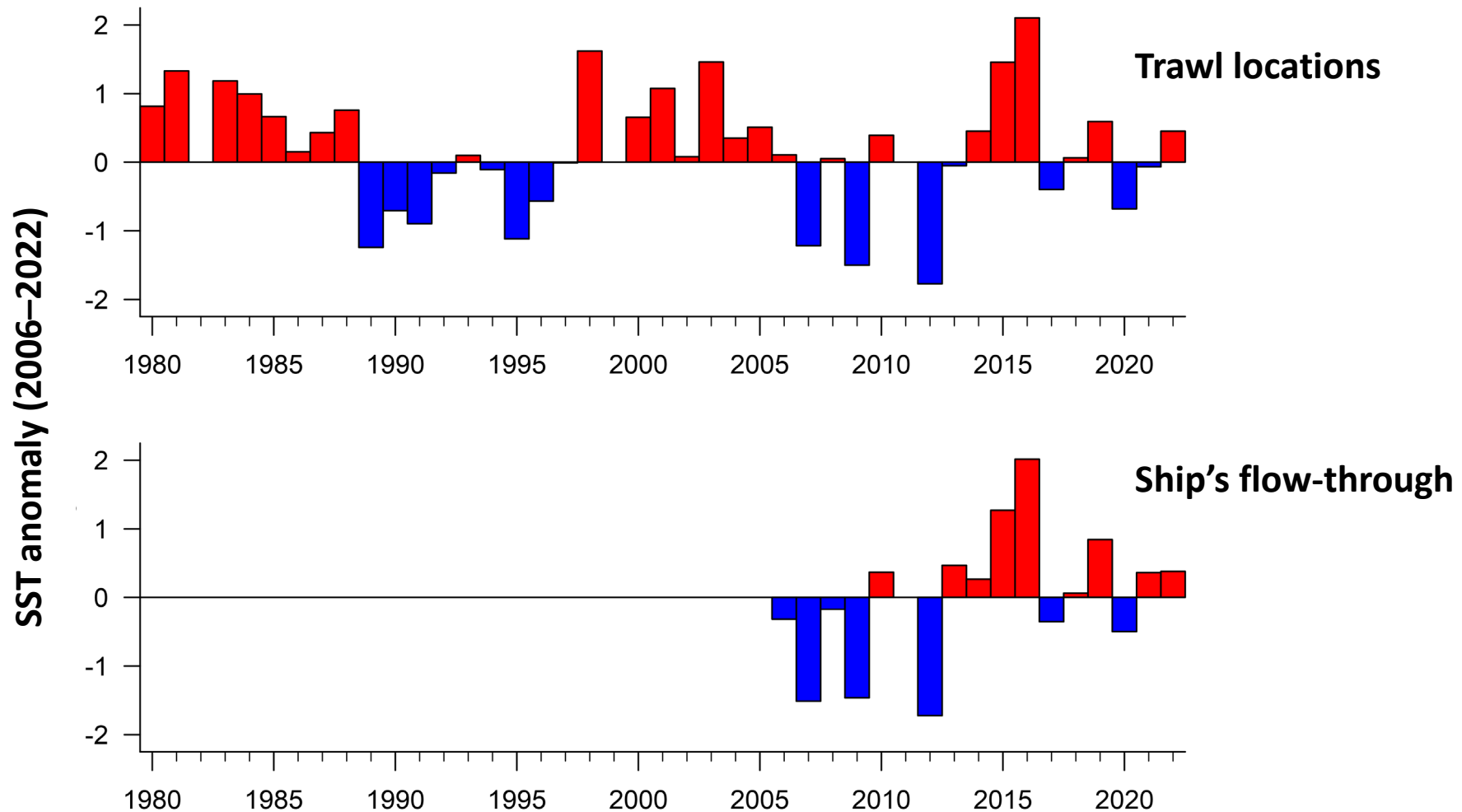


# Environmental Conditions - SST

2022 mean SST ( $4.1^{\circ}\text{C}$ ) was relatively warm, but not anomalously high (2006-2022)

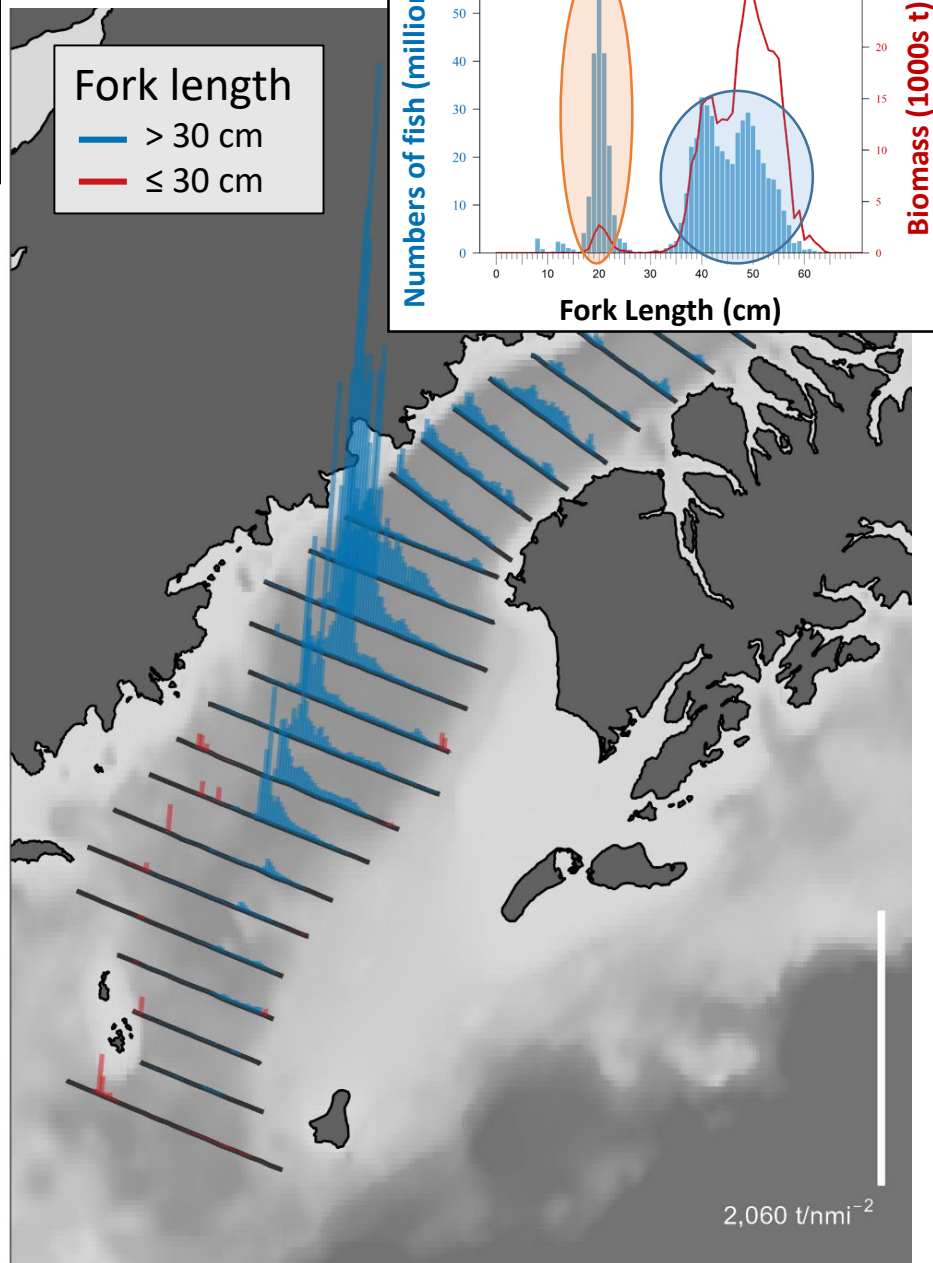
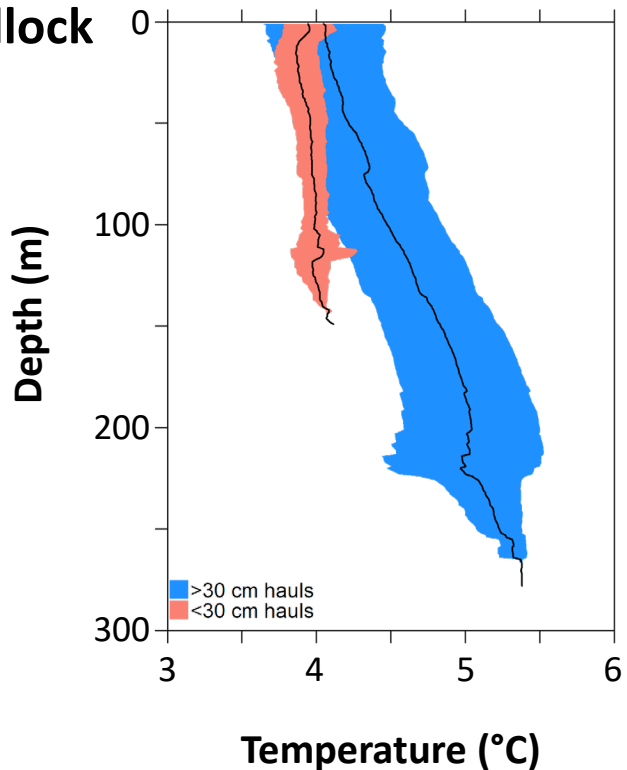
SSTs from trawl locations similar to ship's flow-through system

- Temperature/Salinity indices for both instruments in development



# Temperature Differences in Juvenile Distributions

- Strong horizontal separation between juv. and adult pollock with no vertical layering in Strait was not expected
- Juv. pollock occupied waters  $\sim 1^\circ\text{C}$  cooler than at similar depths above adult pollock



Russia  
USA

# 2023 AT Survey Plan

**Gear Trials (Jan, w/ USV\*)**

**Winter surveys (Feb-Mar, 3 legs):**

Shumagins/Pavlof/Morzhovoi/Sanak

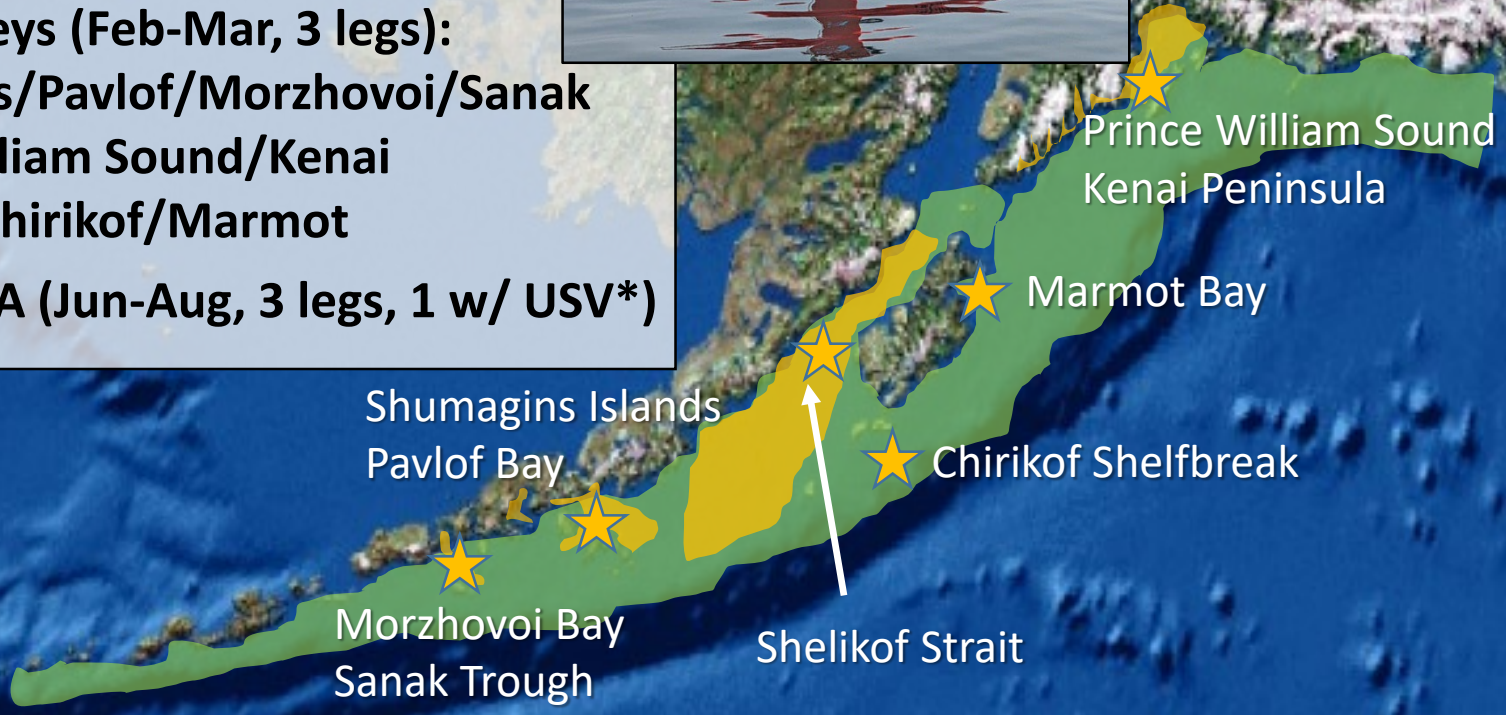
Prince William Sound/Kenai

Shelikof/Chirikof/Marmot

**Summer GOA (Jun-Aug, 3 legs, 1 w/ USV\*)**



**\* DriX USV research & testing**



# Acknowledgements

Many thanks to the science parties:

*Shumagins (canceled but stranded in Kodiak)*

Denise McKelvey (MACE)

Abigail McCarthy (MACE)

Alex De Robertis (MACE)

Jerry Hoff (GAP)

Matthew Phillips (AIS)

Laura Guertin (Teacher-at-Sea)

*Shelikof*

Darin Jones (MACE)

Taina Honkalehto (MACE)

Scott Furnish (MACE) \*

Mike Levine (MACE)

Cecilia O'Leary (GAP)

Ryan Byrne (AIS) \*

\* Also on Shumagins

And a special thank you to  
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