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The following slides were provided by Ned Laman and modified slightly, with permission, by Cole Monnahan for the 2024 GOA pollock CIE review

Science, Service, Stewardship

Gulf of Alaska and Aleutian Islands Bottom Trawl Surveys

Gulf of Alaska – Aleutian Islands Survey Team

Alexandra Dowlin, Bethany Riggle, Christina Conrath, Susanne McDermott, Cecilia O'Leary, Sean Rooney, Margaret Siple, Nate Raring, Paul von Szalay, Sarah Friedman, Zack Oyafuso, Mark Zimmermann

April 22, 2024

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Survey Team Leader – Ned Laman

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Survey Purpose

To collect standardized and fishery-independent time series of

- Relative Abundance
- Distribution
- Age and Biological Condition

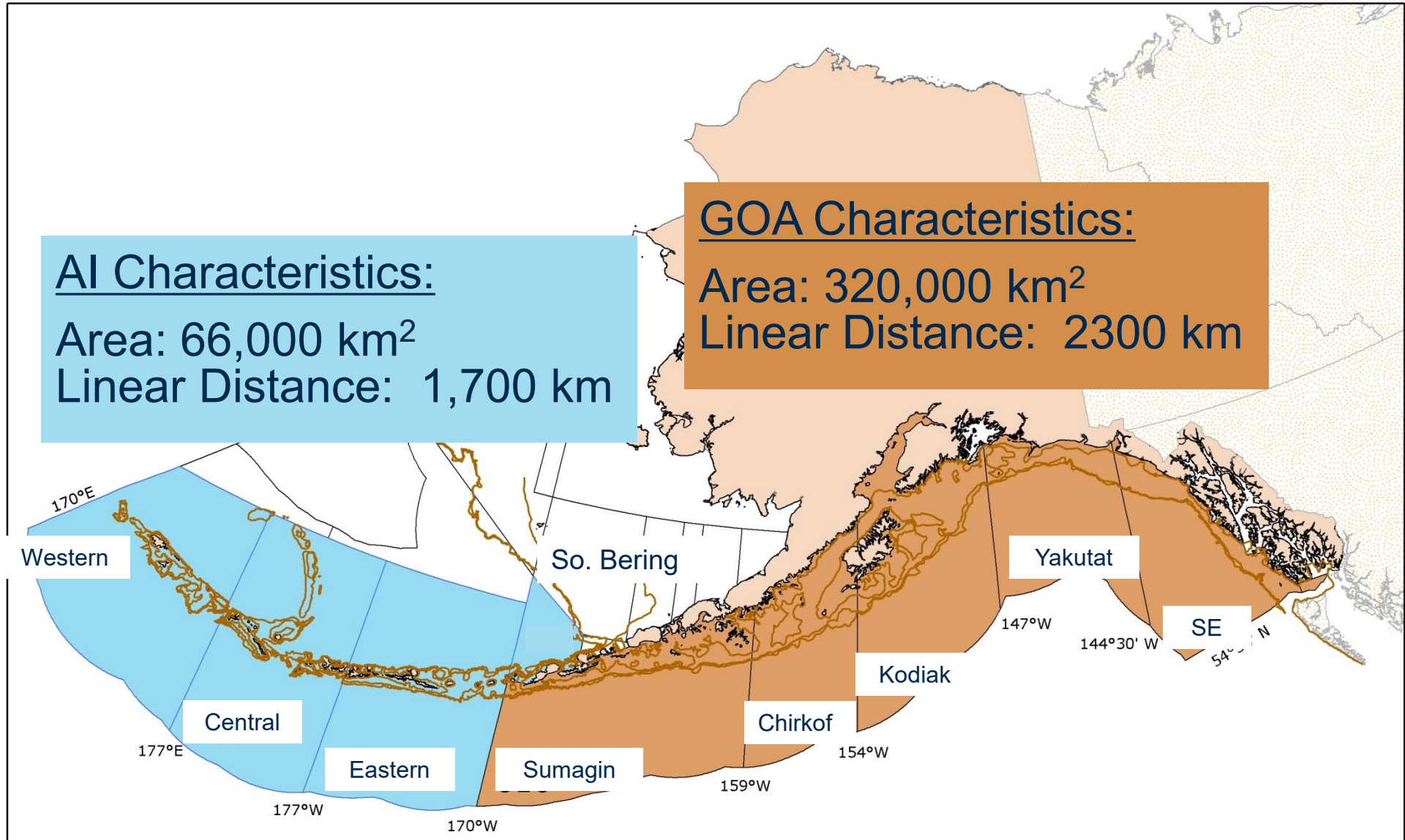
In support of >20 species / species complex stock assessments in the Gulf of Alaska (or Aleutian Islands)

AI Characteristics:

Area: 66,000 km^2
Linear Distance: 1,700 km

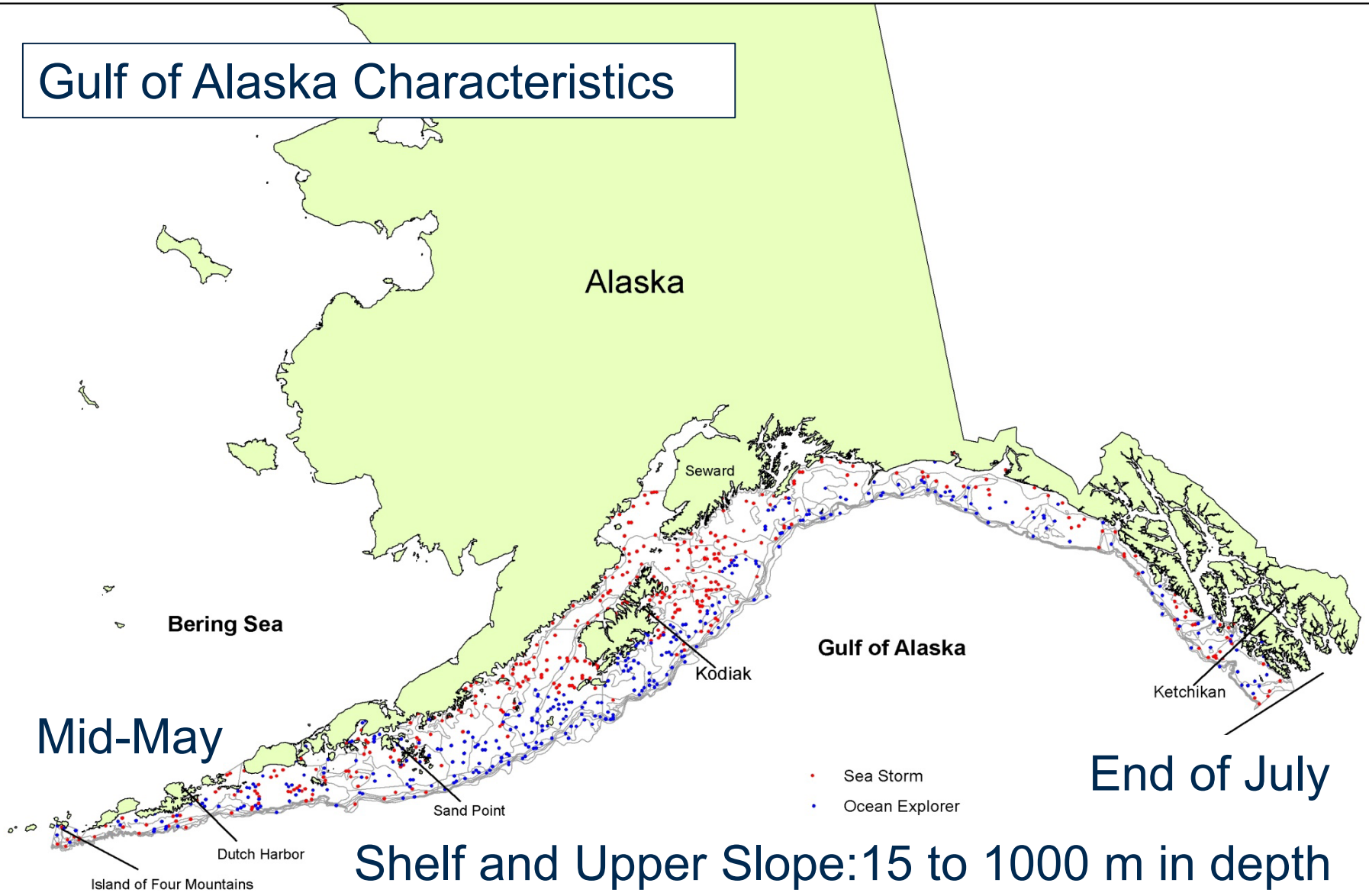
GOA Characteristics:

Area: 320,000 km^2
Linear Distance: 2300 km



Aleutian and GOA Statistical Areas

Gulf of Alaska Characteristics



Shelf and Upper Slope:15 to 1000 m in depth

Extends 40 to 240 km offshore

Since 1984, Standardized since 1990

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Survey Frequency

- Aleutian Islands
  - ~Triennial from 1980 to 2002
  - Biennial thereafter
  - Even years
- Gulf of Alaska
  - Triennial from 1984 to 1999
  - Biennial thereafter
  - Odd years

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General Survey Design

- Chartered commercial fishing vessels
- Vessels must be at least 36.5 m in length, 1000 HP
- 5-6 crew + 6 scientists

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General Survey Design

- Stratified-random survey
- 45-59 Strata based on geography, habitat, and depth
- Station allocation based upon abundance, variance, survey area, and economic value
- 15 minute trawl, usually 1.5 km distance
- Poly Nor ‘Eastern net with rollers & bobbins
- 2 vessels in AI, 3 vessels in GOA
- Estimate catch per unit effort (kg/km^2)
- Length, age, and other biological samples

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Sample Allocation: Stratified-Random w/o Replacement

By regulatory area (INPFC areas)

By depth zone

- Shelf: 10-100, 101-200, 201-300 & 301-500 m
- Slope (GOA only) 501-700 & 701-1000 m

(GOA only) By habitat classification

- Shelf - 74% of survey area
- Gullies – 20% of survey area
- Slope – 6% of survey area

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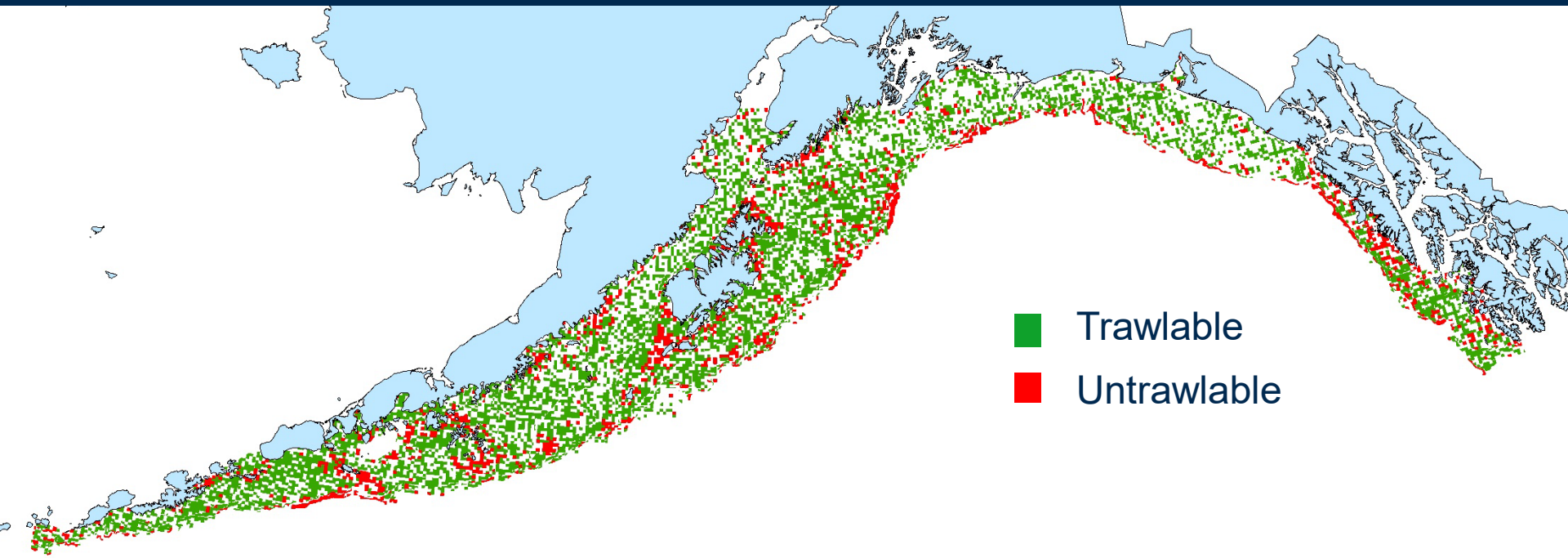
GOA Trawlable Habitat



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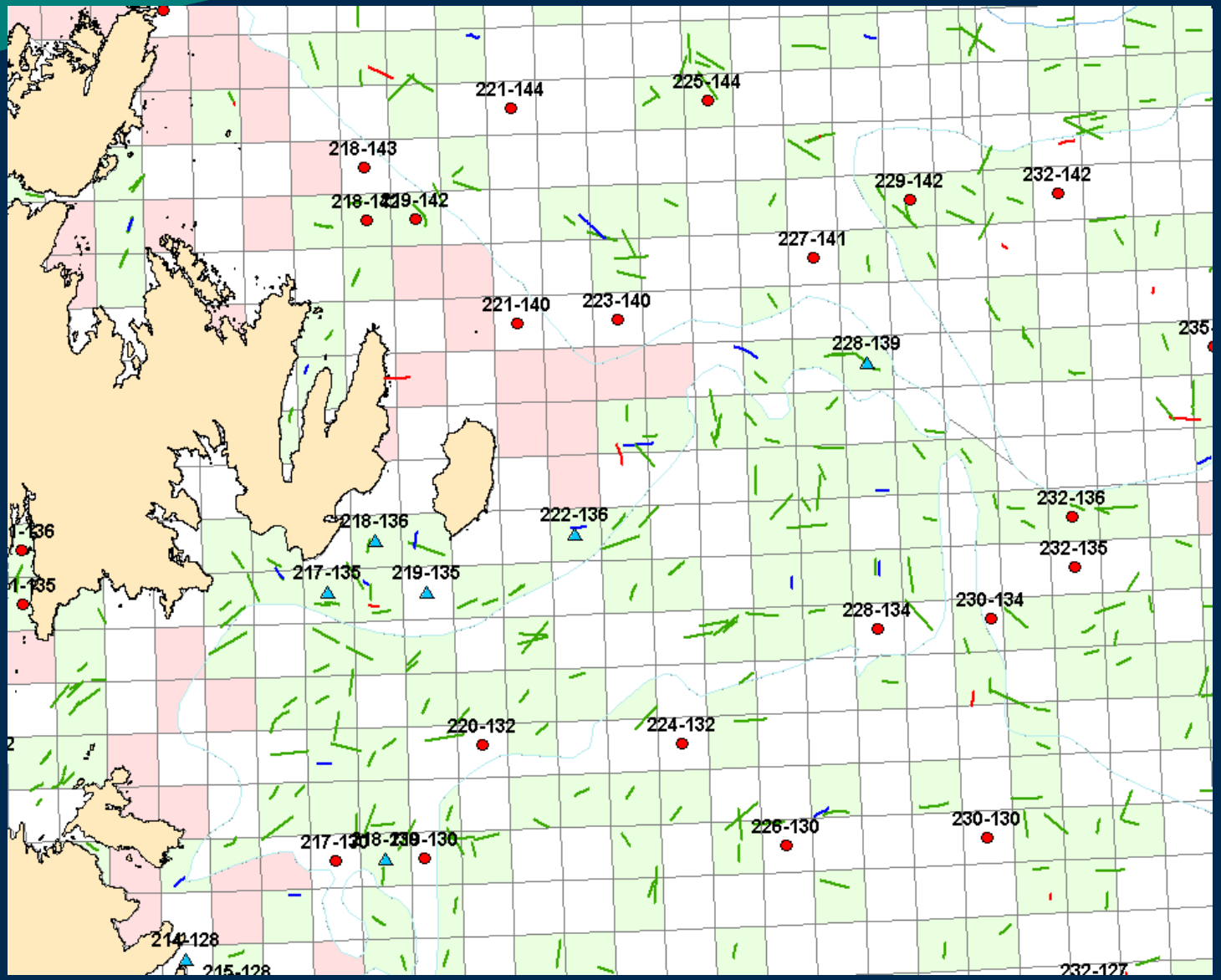
Overlaid 5x5 km grids = stations



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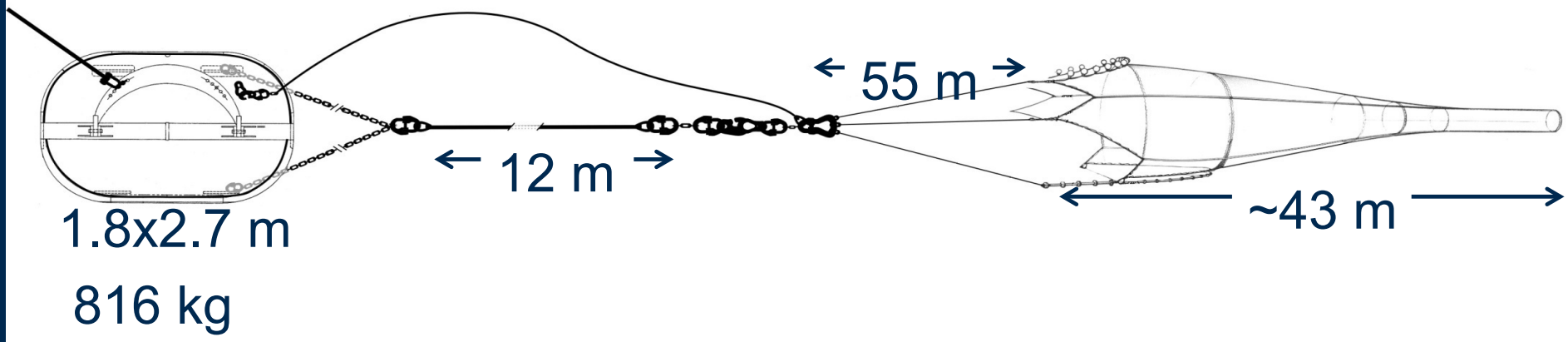
Poly Nor'eastern Net

- 12.7 cm mesh with
- 3.2 cm liner
- 4 seams/panels
- 3 bridles
- 36 cm bobbins
- 10 cm disks
- Net width 8 to 20 m
- Height ~ 7 m



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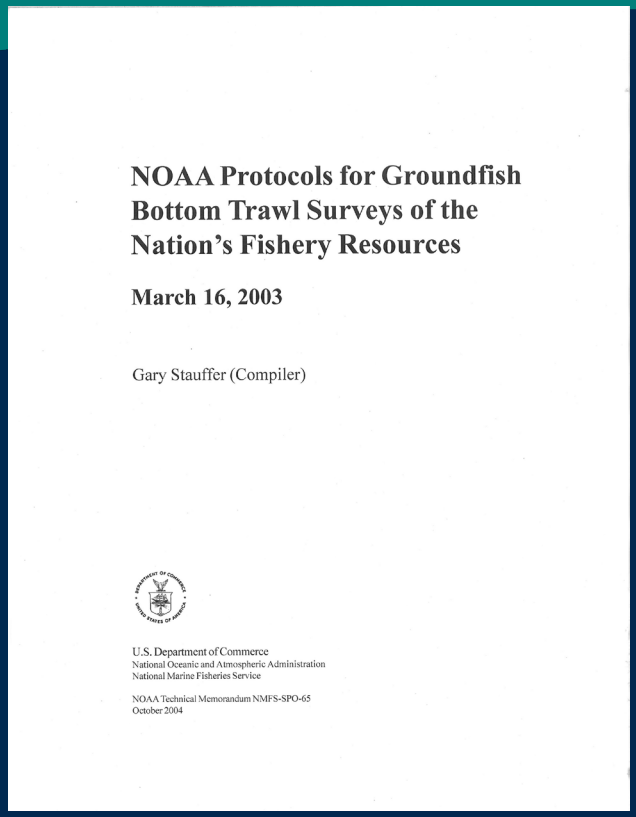
National Bottom Trawl Survey Protocols


NOAA Protocols for Groundfish Bottom Trawl Surveys of the Nation's Fishery Resources

March 16, 2003

Gary Stauffer (Compiler)

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

NOAA Technical Memorandum NMFS-SPO-65
October 2004

- Warp Measurement
- Bottom Contact Sensor
- Net width measurement (wing tips)
- Use and Maintenance of AutoTrawl System*
- Operations Procedures
- Trawl Construction & Repair
  - —Description of Trawls and Their Rigging
  - —Gear Repairs Monitored Aboard Vessels or New Nets Used

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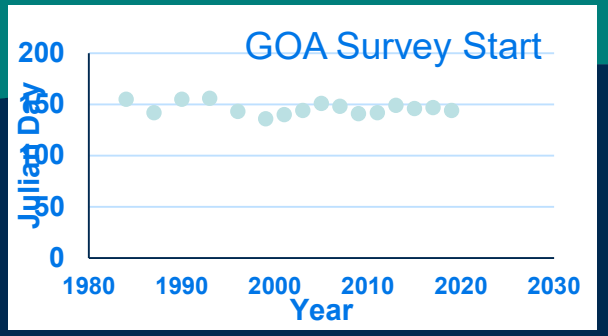
GOA Survey Start Dates



Year	Start Date	Vessel-Days	Boats
1984	3 June	235	4
1987	22 May	252	3
1990	4 June	204	3
1993	5 June	202	4
1996	22 May	210	3
1999	16 May	209	3
2001	20 May	129	2
2003	24 May	202	3
2005	21 May	210	3
2007	28 May	202	3
2009	21 May	212	3
2011	22 May	162	2
2013	29 May	132	2
2015	26 May	192	3
2017	27 May	138	2
2019	23 May	138	2

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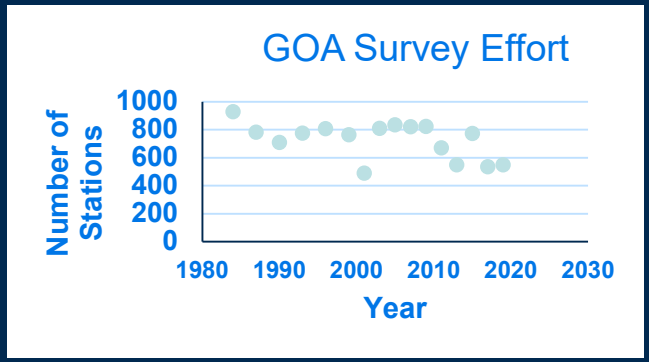
GOA Survey Characteristics

Year	Stations	Max Depth (m)	Comment
1984	929	1000	Duration 30 min
1987	783	1000	
1990	708	500	
1993	775	500	
1996	807	500	15 min duration
1999	764	1000	
2001	489	500	Not in SE AK
2003	809	700	
2005	835	1000	
2007	820	1000	
2009	823	1000	
2011	670	700	
2013	548	700	
2015	772	1000	
2017	536	700	
2019	541	700	



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Known and Trawlable Areas

Survey Region	Area (km^2)	%Known	%Trawlable
Aleutian Islands	66,636	19.3	
Gulf of Alaska	320,002	45.5	

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Catch Processing

- All living specimens are sorted to lowest possible taxon, weighed and counted
- Sub-sampling at various levels of catch and specimen numbers

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Specimen Information Yields:

- Sex and length (n=100-200/station)
- Age structure (otoliths)
- Diet (stomach scans)
- Life history (maturity, growth)
- Rare or undiscovered species
- Environmental data (Temp, Light)
- Bottom depth and hardness

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Bottom Trawl Surveys Yield Spatio-Temporal Information:

- Densities of groundfish and key invertebrates
- Gender
- Size
- Diet (stomach scans)
- Condition factors of key species
- Age structure (otoliths)
- Environmental data (SST, BT Light)

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Bottom Trawl Surveys Yield Other Information:

- Relative abundance
- Life history (maturity, growth)
- Ecological species trends
- Rare or undiscovered species
- Bottom depth and hardness

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Data Processing

- Electronic and Manual capture
- Interim Database at sea
- Data checking at sea
- Upload to main database at home
- Next round of data checks, logged changes
- Moving to mostly electronic entry directly to primary database at sea through wheelhouse and back deck programs

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Data Limitations

- Multi-species survey
- Availability to survey
- Distributional characteristics
- Catchability
- Survey Creep
  - —Technology
  - —Duration changed from 30 to 15 min in 1996

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Primary Estimation-Area Swept

For each Haul:

CPUE=Catch/Area Swept

For each Stratum:

Abundance = mean (CPUE) x Stratum Area

Var(Abundance)= Var(CPUE) x Stratum Area^2

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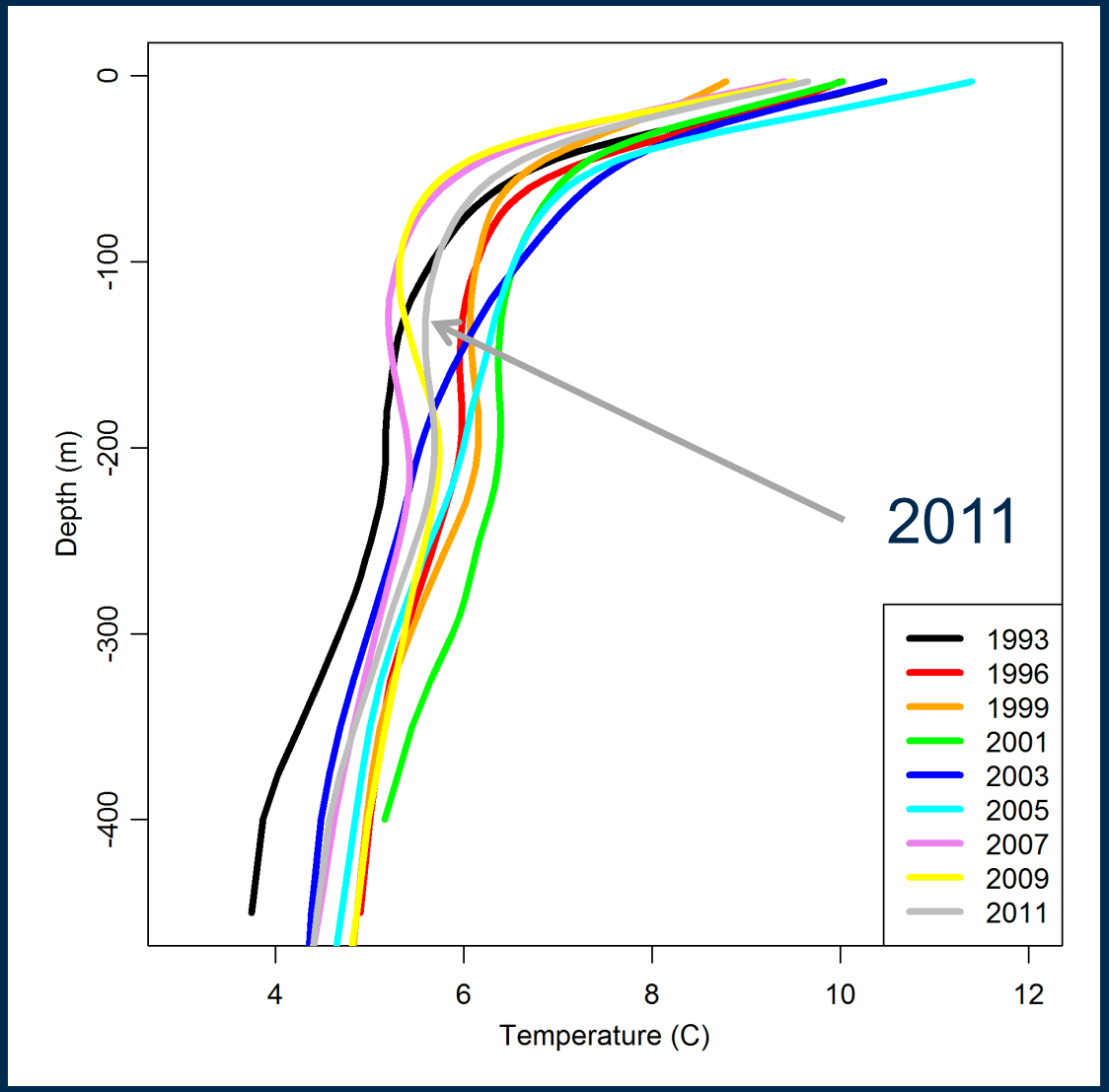
GOA Modeled Temperatures



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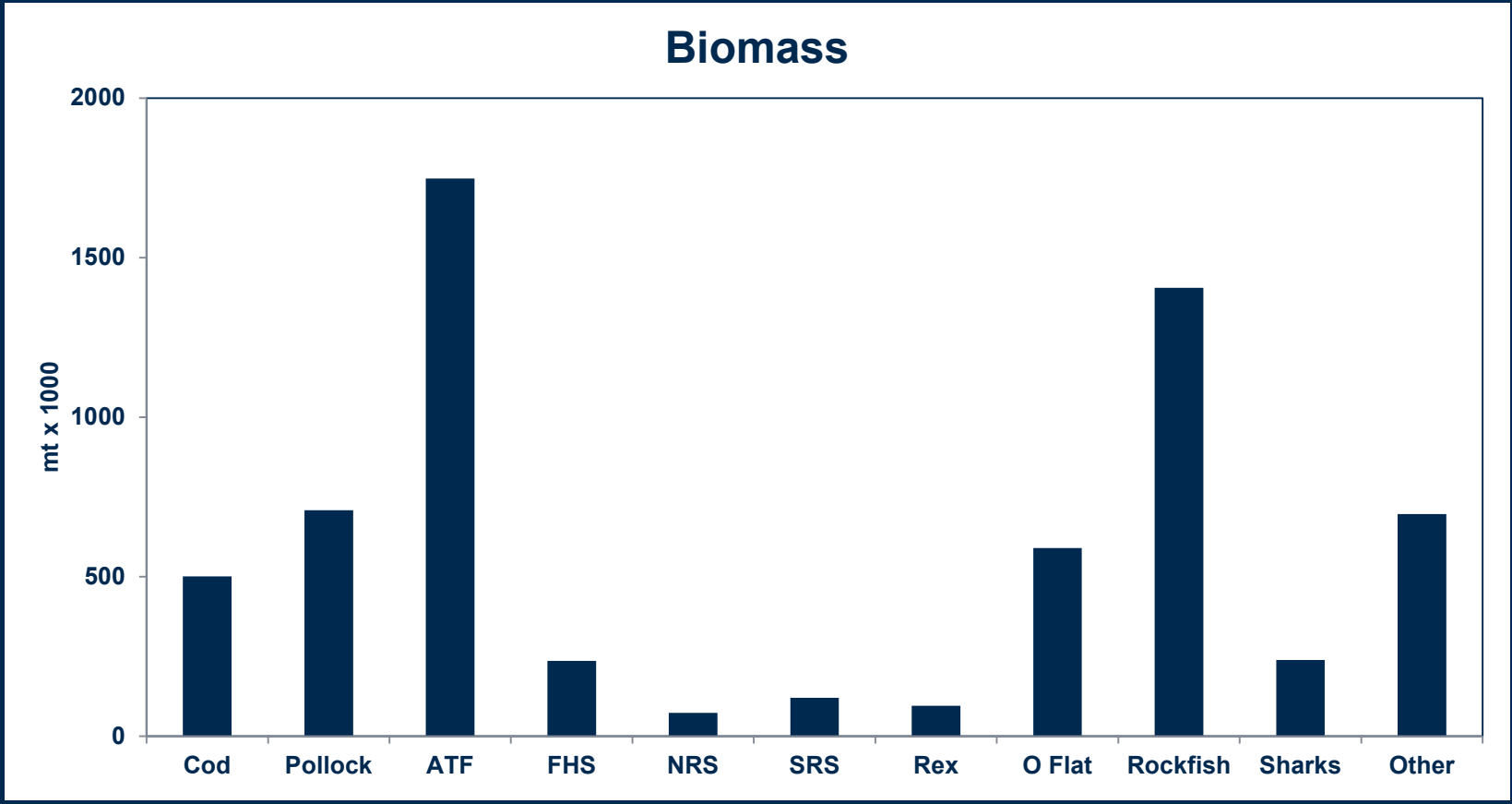
2011 GOA Species Composition
MSC species are 54% of Biomass



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Trends
Walleye Pollock
(95% CL)