Implementation of Rigorous Sampling Designs under Adverse Conditions

Monitoring the Federal Groundfish Fisheries off Alaska

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Protected Species Assessment Workshop

February 12 – 14, 2019, La Jolla CA

Revised 14March2019

- Effort and Fishing Locations
- Species Composition
- Length Distributions
- Age Structure Collections
- Tissue Samples (Genetics)
- Diet
- Maturity
- Seabird Interactions
- Marine Mammal Interactions

Observer-Collected Data

Primary Recipients:

- Alaska Regional Office
- Alaska Fisheries Science Center
- International Pacific Halibut Commission
- North Pacific Fishery Management Council
-  Fishing Industry
- PSMFC AKFIN Database

Secondary Recipients:

State and Federal Agencies:

- NOAA Fisheries HQ
- USFW, USGS,
- Sea Grant

Other Organizations

- Researchers,
- Universities

Hierarchical Sampling

Random selection of trips

Selection determined by
Observer Program (ADP)

Random sample of hauls

Fishing Effort and Location
Protected Species Data

Random sample of the catch of each haul

Species Composition Data
Inclusive of protected species in catch
Ecosystem components
Higher Resolution Species Identification (subsamples)

Random sample of individual fish

Length and Age distributions
Maturity data
Data for ecosystem modeling (diet)
Other Biological Specimens

Research Projects
Special Data Collections

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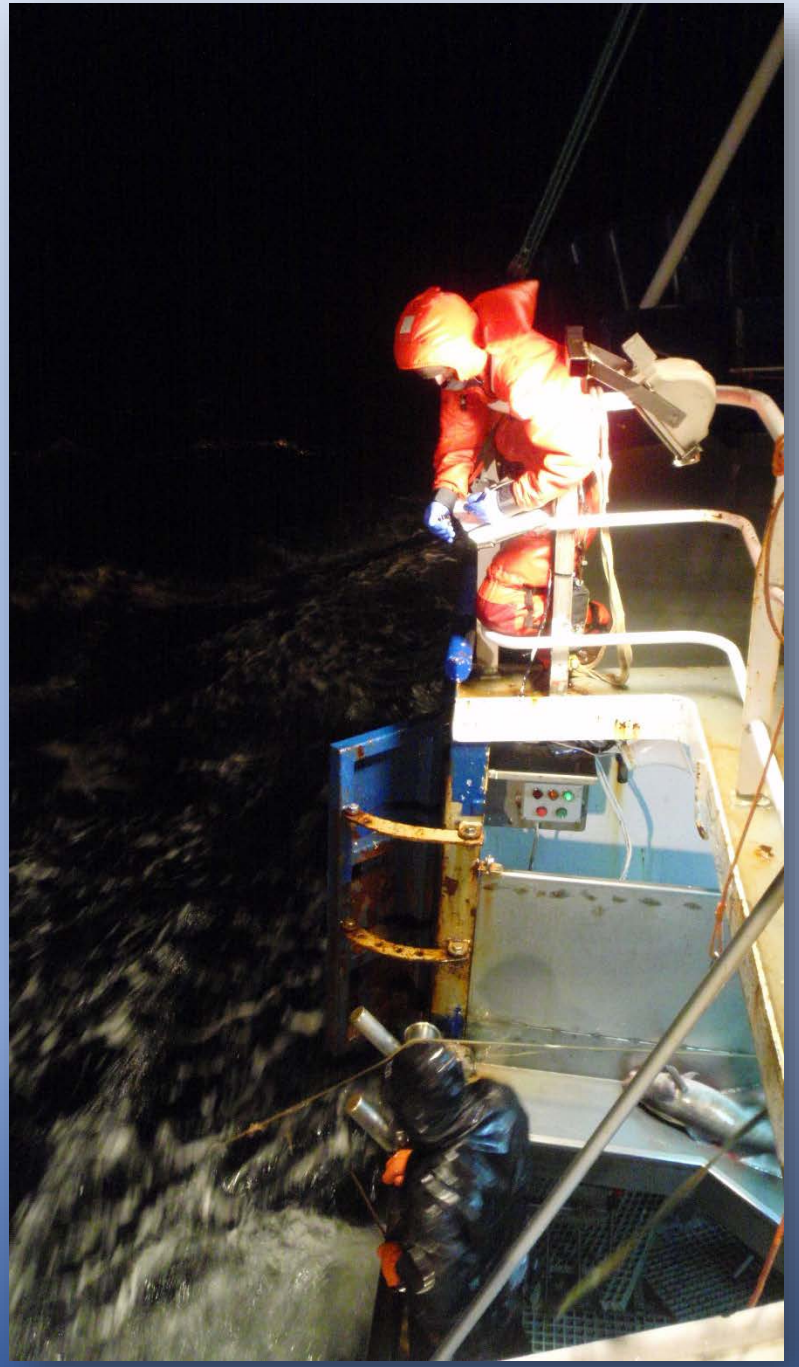
Stratified Sampling Design

- *Full Coverage*: All trips observed (3,422 trips)
  - 29.5% of fishing trips
  - CPs, Motherships, and Vessels in LAPs
- *Partial Coverage*: Randomized deployments
  - Selection rate - Annual Deployment Plan
  - Catcher Vessels over 40ft (5,468 trips – 47%)
    - Gear-based strata
  - Catcher Vessels under 40ft (2,022 trips – 17.5%)
    - 0% trips monitored
  - EM Catcher Vessels (683 trips – 6%)
    - Regulated program in 2018 longline; 2019 pot gear



ALASKA FISHERIES SCIENCE CENTER and ALASKA REGIONAL OFFICE. 2018. North Pacific Observer Program 2017 Annual Report. AFSC Processed Rep. 2018-02, 136 p.

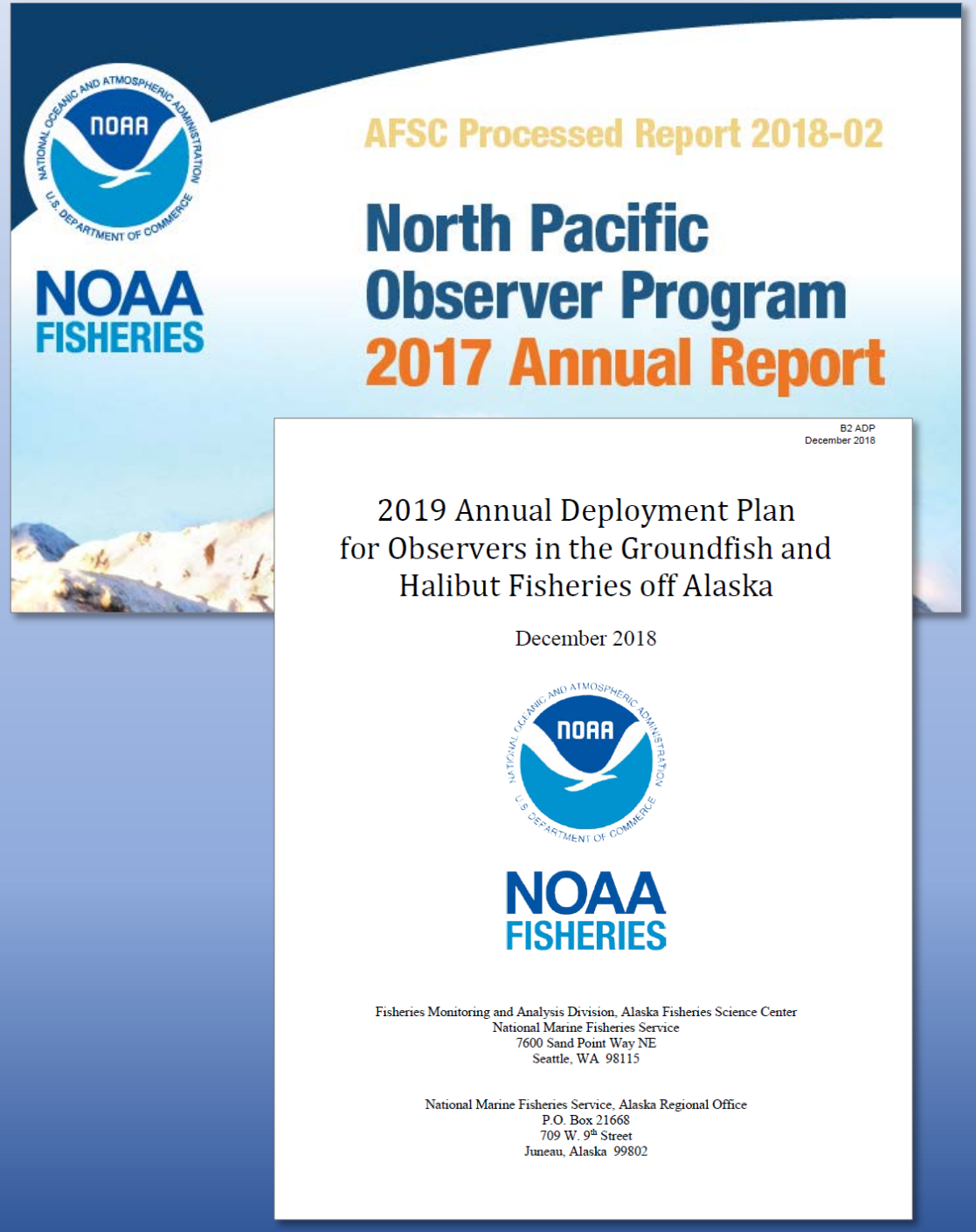
Annual Deployment Cycle

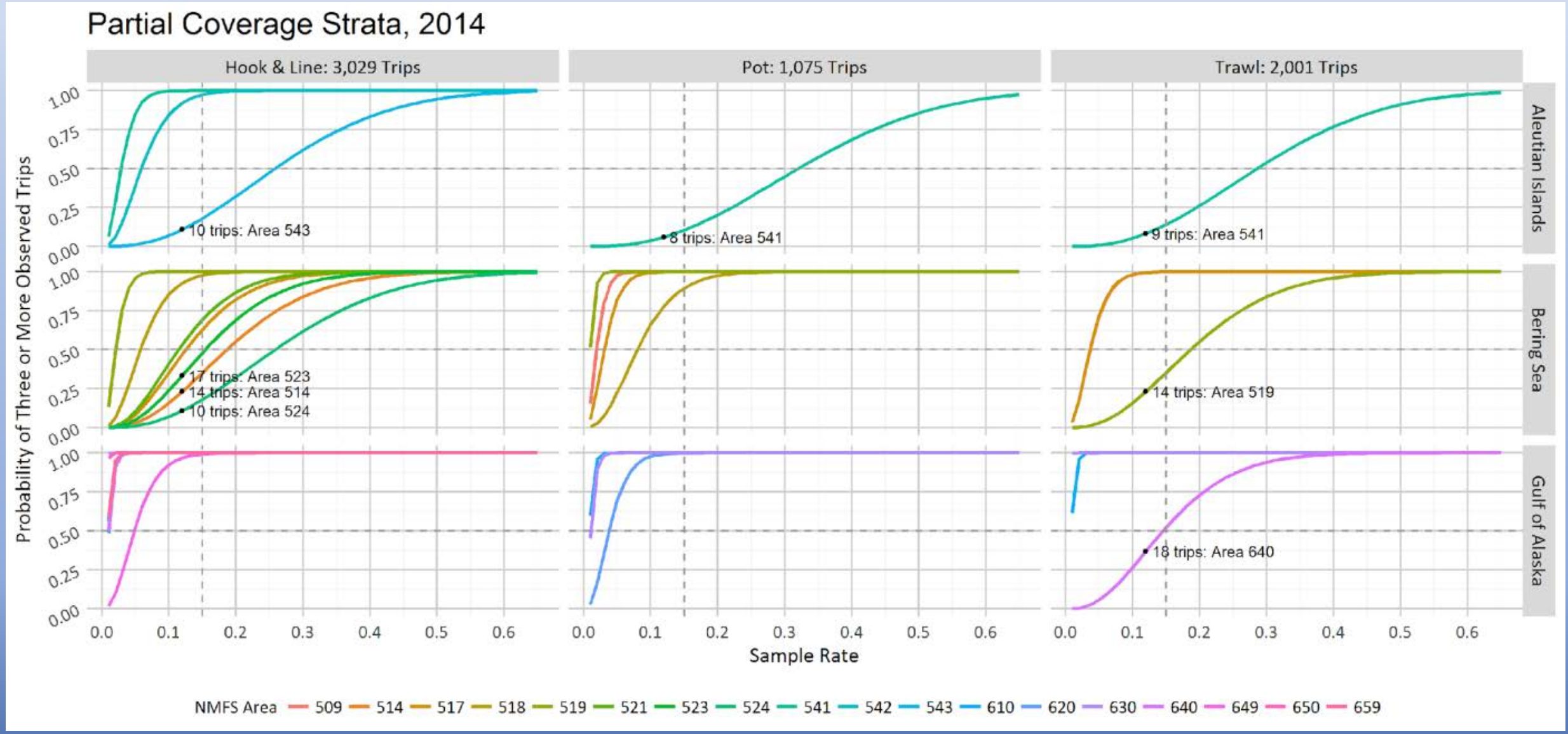
Review previous year deployment (2017)

- Representativeness of selected trips
- Spatial and temporal coverage (gaps)
  - Departures from expectations
- Trip characteristics
  - Differences observed and unobserved

Design for next year (2019)

- Strata definitions
- Sample allocation
  - Base deployment rate – minimize gaps
  - Additional allocation to meet Council priorities – if funding available





NMFS (National Marine Fisheries Service). 2018. *Draft* 2019 Annual Deployment Plan for Observers in the Groundfish and Halibut Fisheries off Alaska. Appendix E.

Hierarchical Sampling

Random selection of trips

Selection determined by
Observer Program (ADP)

Random sample of hauls

Fishing Effort and Location
Protected Species Data

Random sample of the catch of each haul

Species Composition Data
Inclusive of protected species in catch sample
Ecosystem components
Higher Resolution Species Identification (subsamples)

Random sample of individual fish

Length and Age distributions
Maturity data
Data for ecosystem modeling (diet)
Other Biological Specimens

Research Projects
Special Data Collections

Sample Designs

Systematic Random
Simple Random
Other Random
Opportunistic
Census

Sample Units

Gear
Weight

Data Collection Priorities

1. Record takes of marine mammals
2. Record takes of short-tailed albatross, other seabirds of interest
3. Record fishing effort, catch information
4. Collect salmon data in the pollock fishery
5. Sample for species composition
6. Send data to Observer Program
7. Collect biological data on prohibited species
8. Collect otoliths,* specified species
9. Collect sexed-length frequency data,* specified species
10. Record seabird specimen and tag information*
11. Collect stomachs
12. Record sightings of marine mammals
13. Record sightings of seabird species of interest
14. Complete research projects
15. Record sightings of interactions, other seabirds

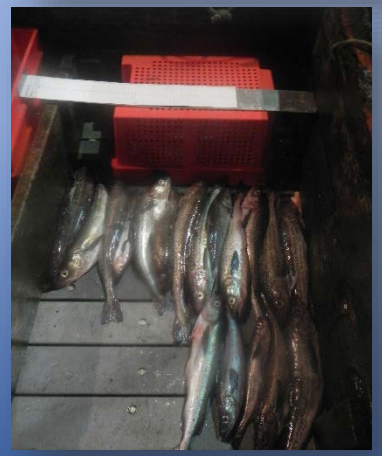
* sampled hauls

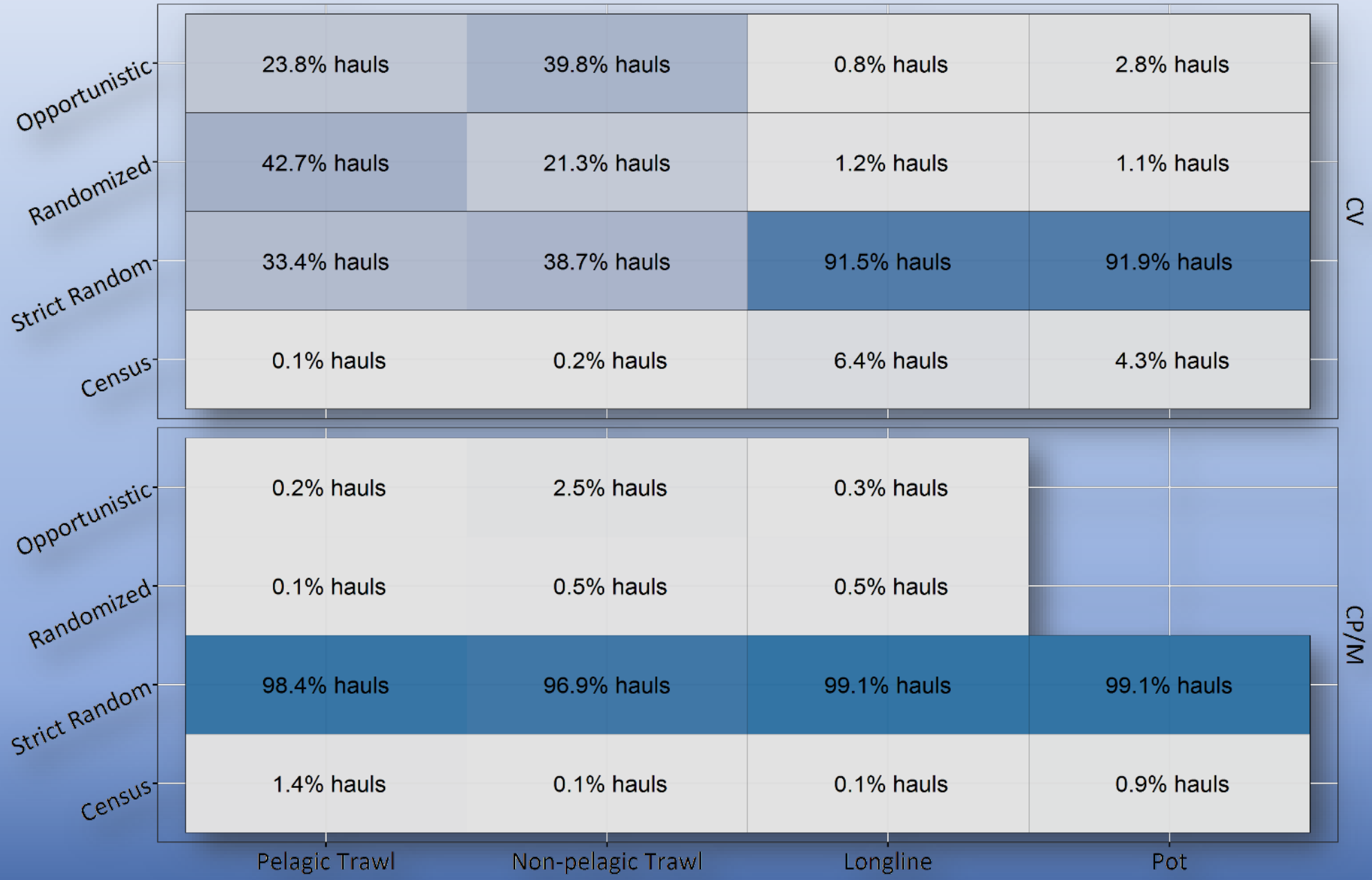
(AFSC) Alaska Fisheries Science Center. 2019 Observer Sampling Manual. Fisheries Monitoring and Analysis Division, North Pacific Groundfish Observer Program. AFSC, 7600 Sand Point Way N.E., Seattle, Washington, 98115.

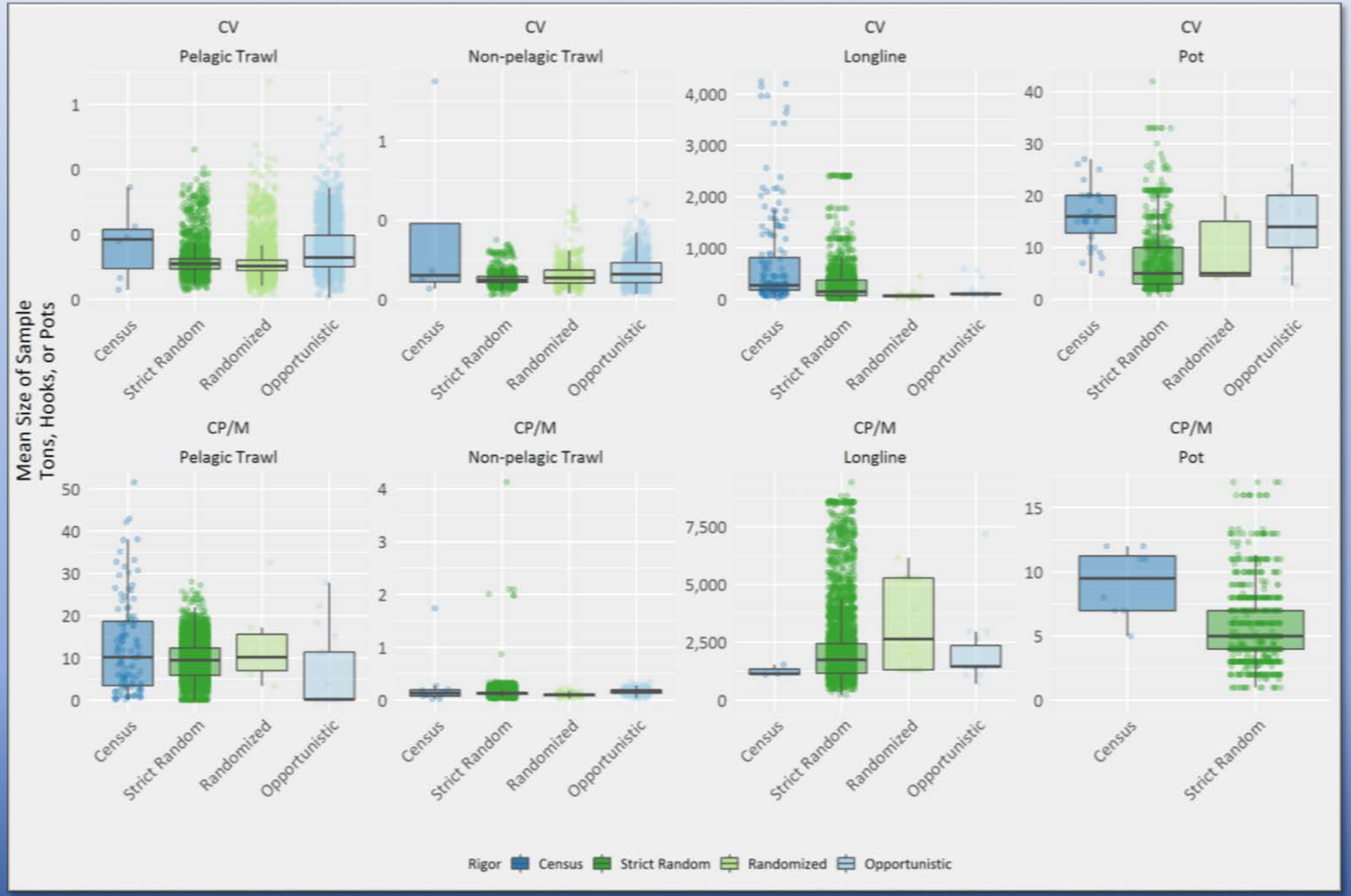
Sampling Onboard Commercial Fishing Vessels: Fixed Gear Vessels

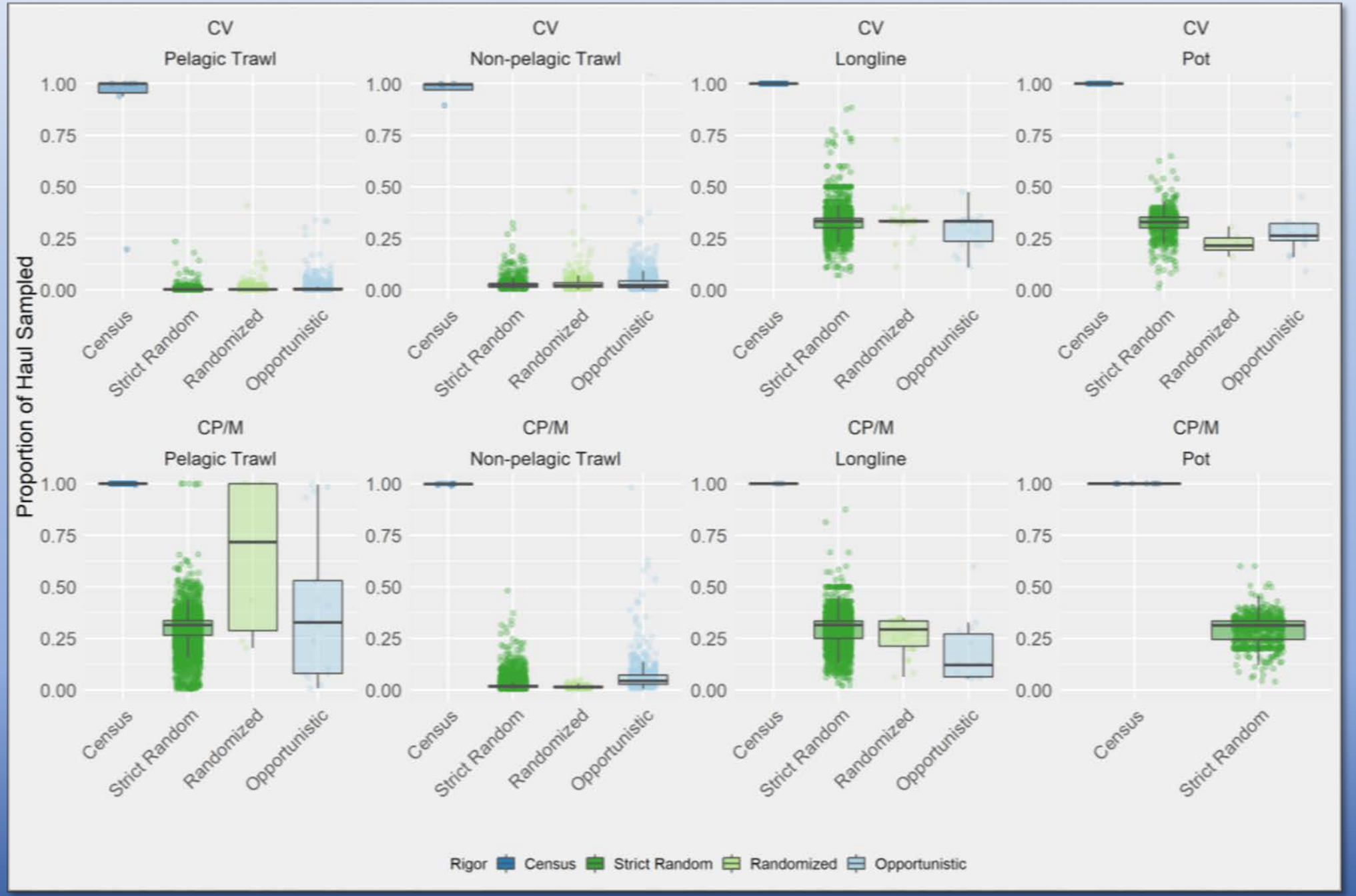
Sampling Onboard Commercial Fishing Vessels: Trawl Factory Vessels (CP/Ms)

Sampling Onboard Commercial Fishing Vessels: Trawl Catcher Vessels (CVs)




CV
Opportunistic
Randomized
Strict Random
Census
23.8% hauls
39.8% hauls
0.8% hauls
2.8% hauls
42.7% hauls
21.3% hauls
1.2% hauls
1.1% hauls
33.4% hauls
38.7% hauls
91.5% hauls
91.9% hauls
0.1% hauls
0.2% hauls
6.4% hauls
4.3% hauls
CP/M
Opportunistic
Randomized
Strict Random
Census
0.2% hauls
2.5% hauls
0.3% hauls
0.1% hauls
0.5% hauls
0.5% hauls
98.4% hauls
96.9% hauls
99.1% hauls
99.1% hauls
1.4% hauls
0.1% hauls
0.1% hauls
0.9% hauls
Pelagic Trawl
Non-pelagic Trawl
Longline
Pot


CV
Pelagic Trawl
CV
Non-pelagic Trawl
CV
Longline
CV
Pot
CP/M
Pelagic Trawl
CP/M
Non-pelagic Trawl
CP/M
Longline
CP/M
Pot
Mean Size of Sample
Tons, Hooks, or Pots
Census
Strict Random
Randomized
Opportunistic
Rigor
Census
Strict Random
Randomized
Opportunistic


CV
Pelagic Trawl
Non-pelagic Trawl
Longline
Pot
CP/M
Pelagic Trawl
Non-pelagic Trawl
Longline
Pot
Proportion of Haul Sampled
1.00
0.75
0.50
0.25
0.00
Census
Strict Random
Randomized
Opportunistic
Rigor
Census
Strict Random
Randomized
Opportunistic

Sample Design and Estimation

Hierarchical Design

- Efficient – amount and types of data collected
- Complex – differential inclusion probabilities at each level
- Design elements part of estimation process -
- Opportunities for different types of estimators
  - Dominant species – ratio estimators
  - Rare catches - more design-based

Summary

- Obligations to collect data for diverse set of data users
  - Magnuson-Stevens, Marine Mammal Protection Act, Endangered Species Act
- Randomization possible
  - Throughout hierarchy
  - Ability to assess effectiveness of design
  - Estimation tied to design
- Design considerations differ with hierarchy level

- Deployment Considerations
  - Randomize within strata
  - Set base rate to cover time and space
  - Allocate any additional sample effort for Council/policy needs
- Considerations at Other Levels
  - Observers assess situation and make sampling decisions
  - Incorporate sampling into work flow
  - Maximize number and size of samples
    - Variance estimation
    - Detection of less common catch elements

Upcoming Challenges

- Increasing data needs
  - Balancing trade-offs; more of one thing equates to less of others
  - Observer health and safety
- Integration of EM
  - Shared funding and resources
- New fishing operations
  - Deck sorting halibut
- New fisheries
  - Longline pots

Acknowledgements

We thank the many groundfish observers who are deployed to commercial fishing vessels in Alaska and the staff of the AFSC Observer Program who train, provide field support, debrief observers, and make observer data available to our many end-users.

NOAA NMFS Alaska Fisheries Science Center (AFSC)

Fisheries Monitoring and Analysis Division (FMA)

Resource Ecology and Fisheries Management Division (REFM)

NOAA NMFS Alaska Regional Office, Sustainable Fisheries Division (AKRO)

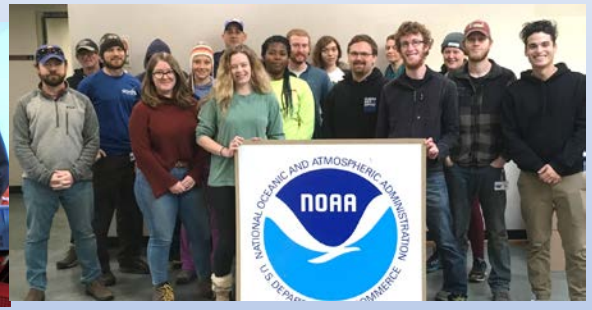
Pacific States Marine Fisheries Commission (PSMFC)

Observer Science Committee

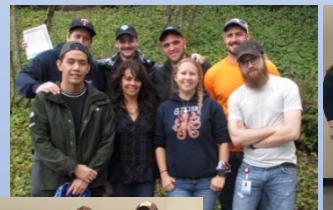
Members from FMA, AKRO, REFM, PSMFC, International Pacific Halibut Commission





NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE




ROLL TIDE




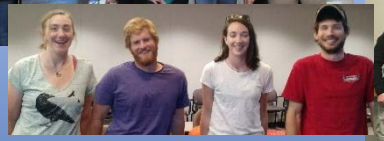


NOAA






DALLAS COWBOYS





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