Partial Coverage Fisheries Monitoring in the Federal Fisheries of Alaska

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Coverage type definitions

Full coverage: 100% of trips are monitored

- All motherships
- Most catcher-processors
- Catcher vessels while participating in the following rationalized fisheries:
  - Fishing pollock in the Bering Sea (trawl)
  - Fishing CDQ using trawl or hook-and-line gear with a vessel greater than 46 ft. length overall
  - Participating in the Rockfish Program (trawl in GOA)
- Vessels fishing in the BSAI that volunteer for full coverage (trawl vessels targeting cod, soon to be a rationalized fishery)

Partial coverage: less than 100% of trips are monitored

- Vessels not in full coverage

A Brief History of the Observer Program

- 1973: Observers first deployed on foreign vessels operating in the Bering Sea
- 1990: Fisheries become fully domestic and the North Pacific Observer Program is established
- 1992 – 2012: Many attempts to restructure the Observer Program in order to correct know biases in partial coverage data collection
- 2013 - Present: Data collected under the restructured Observer Program

Source: NMFS 2012, p. 55-58

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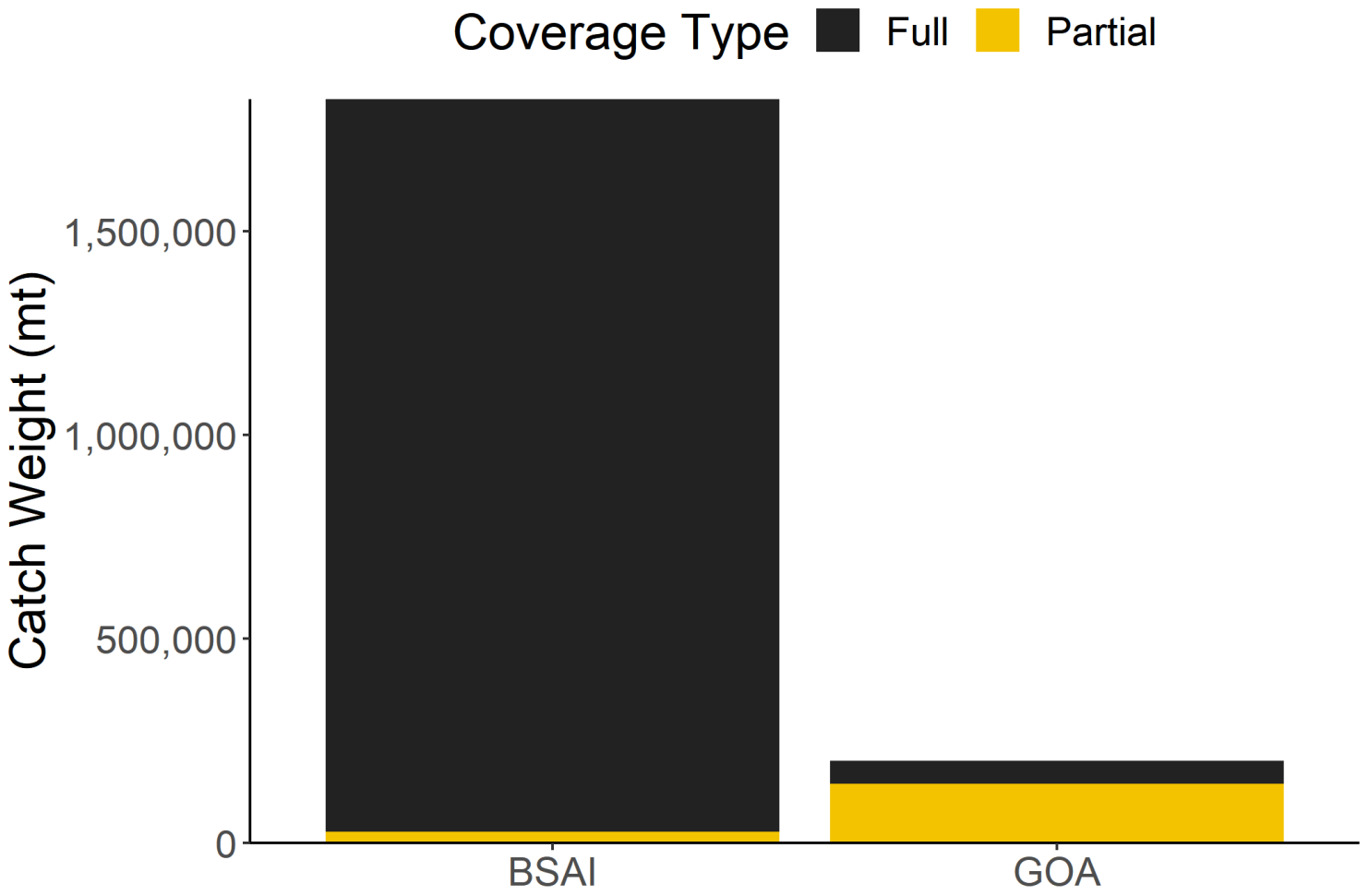
Effort in full and partial coverage



Source: 2021 data

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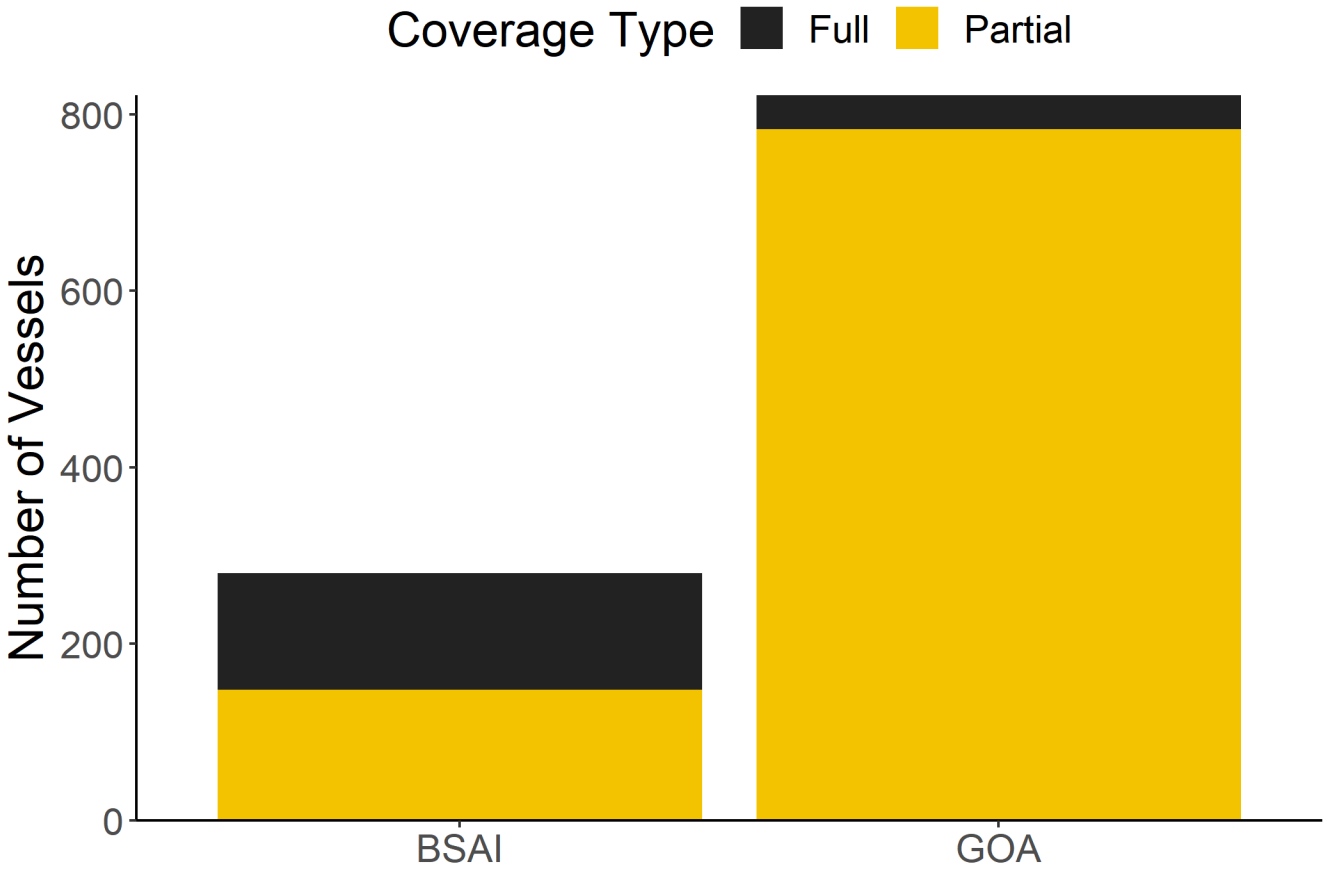
Effort in full and partial coverage



Source: 2021 data

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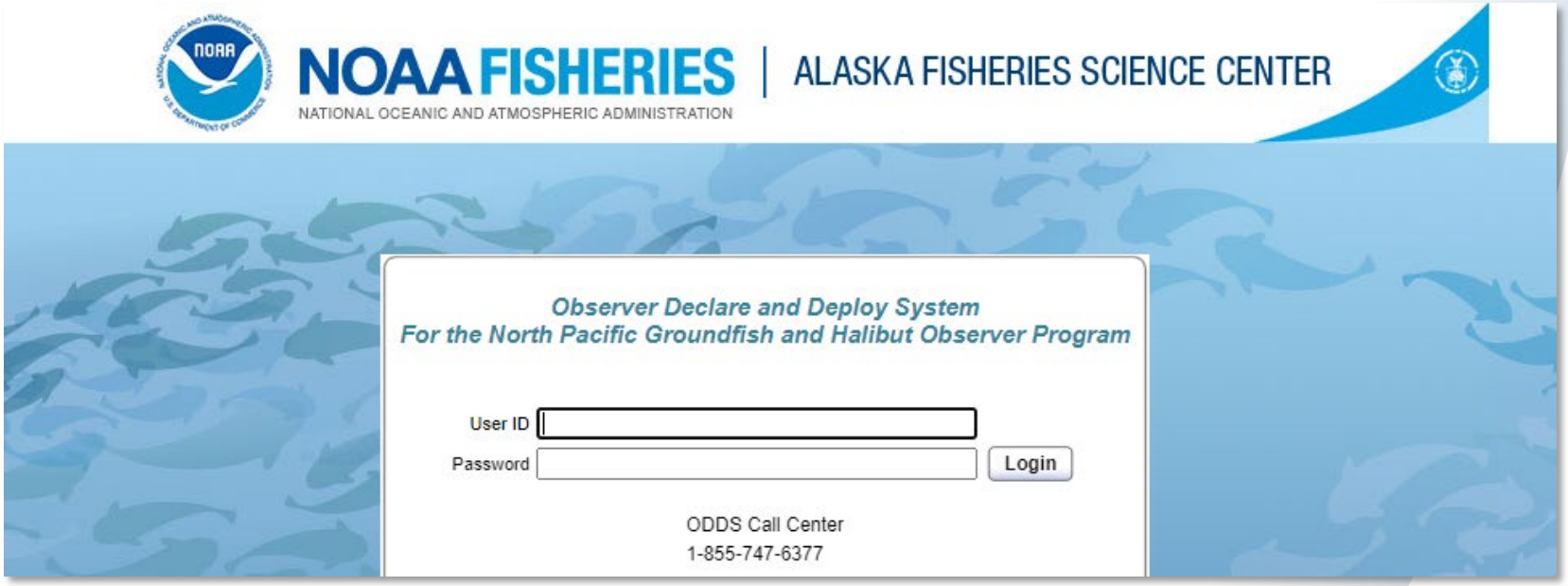
How partial coverage works

- Trips are randomly selected for monitoring
- Vessels declare in advance what trips they intend to take using the Observer Declare and Deploy System (ODDS)



Source: [ODDS Website]

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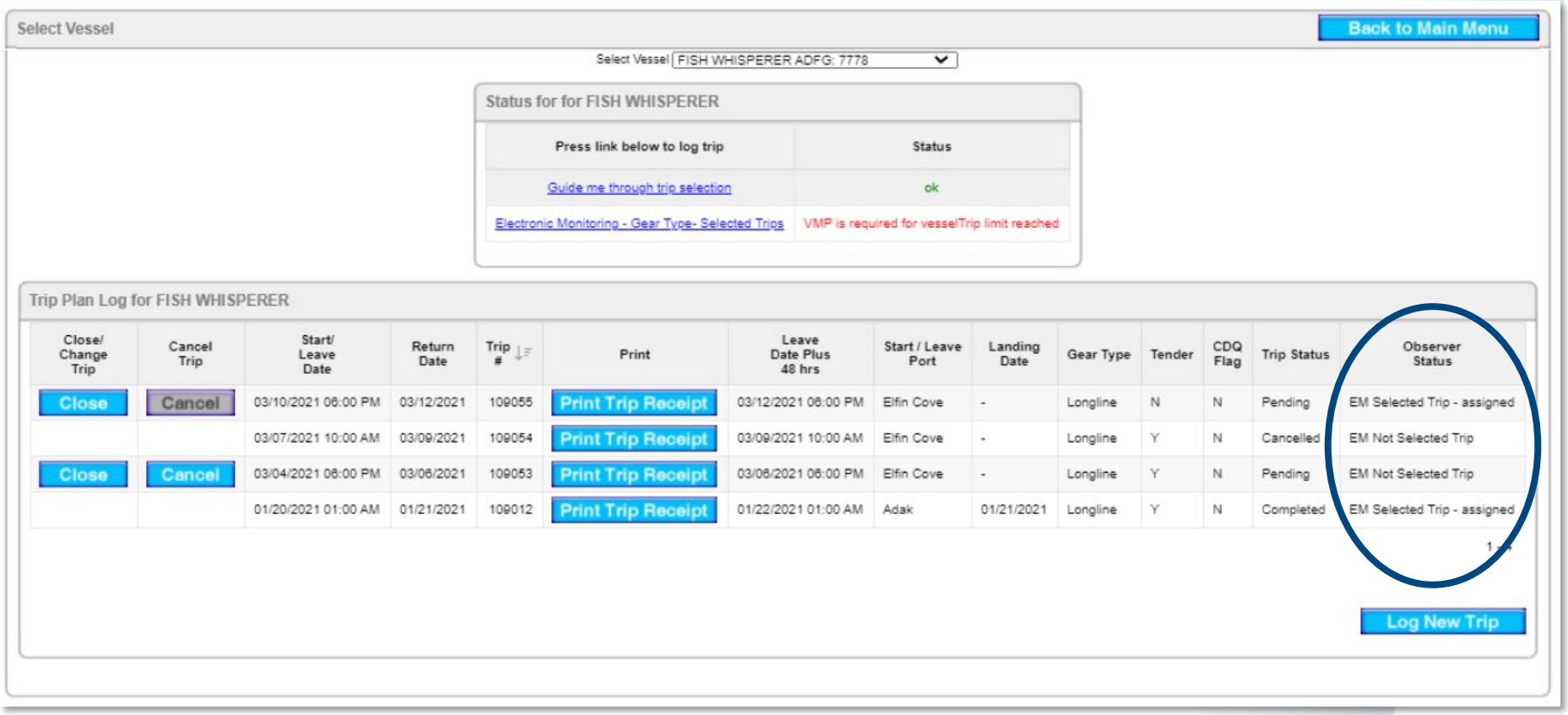
How partial coverage works



Select Vessel

Back to Main Menu

Select Vessel: FISH WHISPERER ADFG: 7778

Status for for FISH WHISPERER

Press link below to log trip	Status
Guide me through trip selection	ok
Electronic Monitoring - Gear Type- Selected Trips	VMP is required for vesselTrip limit reached

Trip Plan Log for FISH WHISPERER

Close/ Change Trip	Cancel Trip	Start/ Leave Date	Return Date	Trip #	Print	Leave Date Plus 48 hrs	Start / Leave Port	Landing Date	Gear Type	Tender	CDQ Flag	Trip Status	Observer Status
Close	Cancel	03/10/2021 06:00 PM	03/12/2021	109055	Print Trip Receipt	03/12/2021 06:00 PM	Elfin Cove	-	Longline	N	N	Pending	EM Selected Trip - assigned
		03/07/2021 10:00 AM	03/09/2021	109054	Print Trip Receipt	03/09/2021 10:00 AM	Elfin Cove	-	Longline	Y	N	Cancelled	EM Not Selected Trip
Close	Cancel	03/04/2021 06:00 PM	03/06/2021	109053	Print Trip Receipt	03/06/2021 06:00 PM	Elfin Cove	-	Longline	Y	N	Pending	EM Not Selected Trip
		01/20/2021 01:00 AM	01/21/2021	109012	Print Trip Receipt	01/22/2021 01:00 AM	Adak	01/21/2021	Longline	Y	N	Completed	EM Selected Trip - assigned

1

Log New Trip

Source: [Faunce et al. 2021]

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How partial coverage works

Observers

- If a logged trip is selected for observer coverage, the observer provider works to get an observer to that vessel
- Observers are instructed to submit their data to the National Marine Fisheries Service (NMFS) within 24 hours of completing 1 trip

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How partial coverage works

Fixed-gear electronic monitoring (EM)

- If a logged trip is selected for fixed-gear EM coverage, the vessel is notified to turn on their camera system for that trip
- Vessels are instructed to mail their hard drives to the video review provider after completing 1 monitored fixed-gear EM trip

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How partial coverage works

Trawl EM

- If a vessel is taking a trawl EM trip, their camera system must be on
- Vessels are instructed to mail their hard drives to the video review provider after completing 3 trawl EM trips

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Bycatch Terms

Prohibited Species Catch (PSC; when caught as bycatch)

- Halibut
- Salmon
- King crab
- Tanner crab
- Herring

Discards

- Non-PSC discards

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Estimation

- Data from monitored trips are used to make estimates of PSC and discards that occur on unmonitored trips
- The way that monitored trips are selected impacts the quality (accuracy and precision) of those estimates

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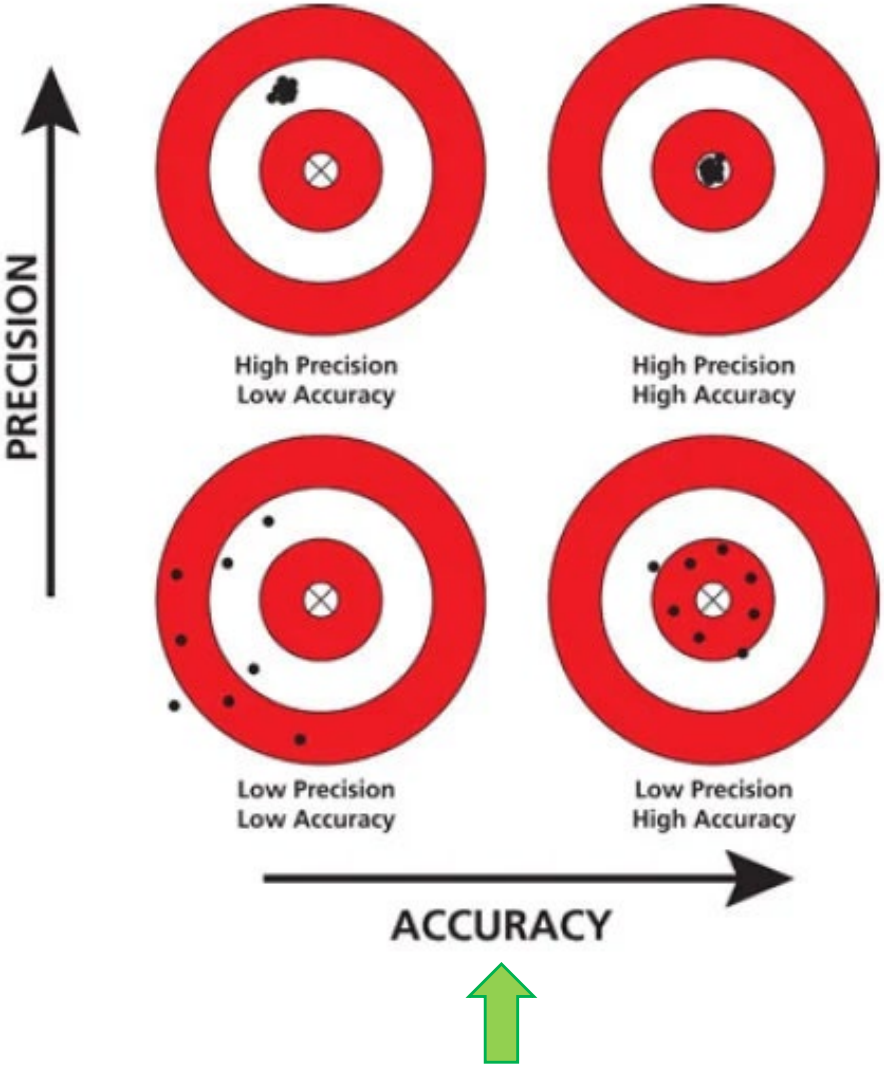
Accuracy and precision

More samples



Random sampling

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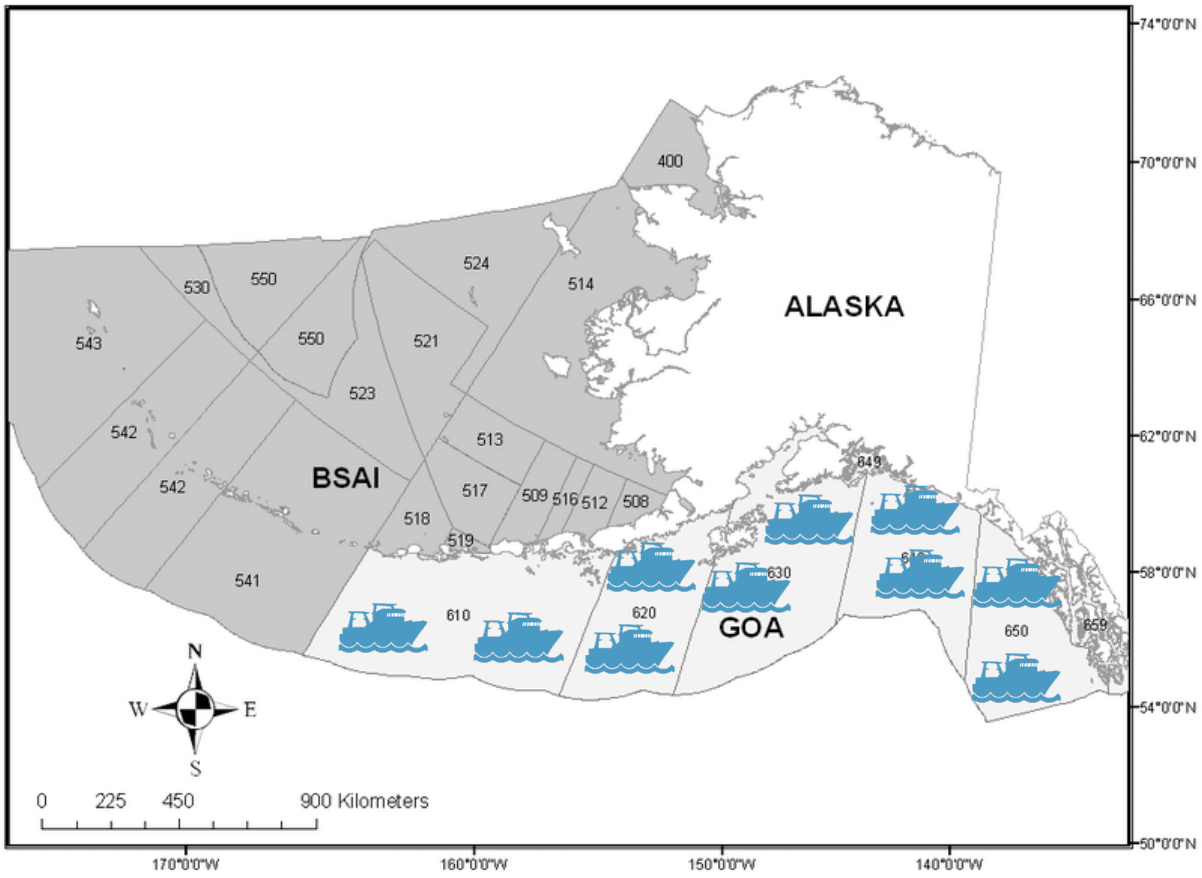
Random sampling promotes the **accuracy** of estimates

- If these boats signified all the trips that occurred in the GOA this year…



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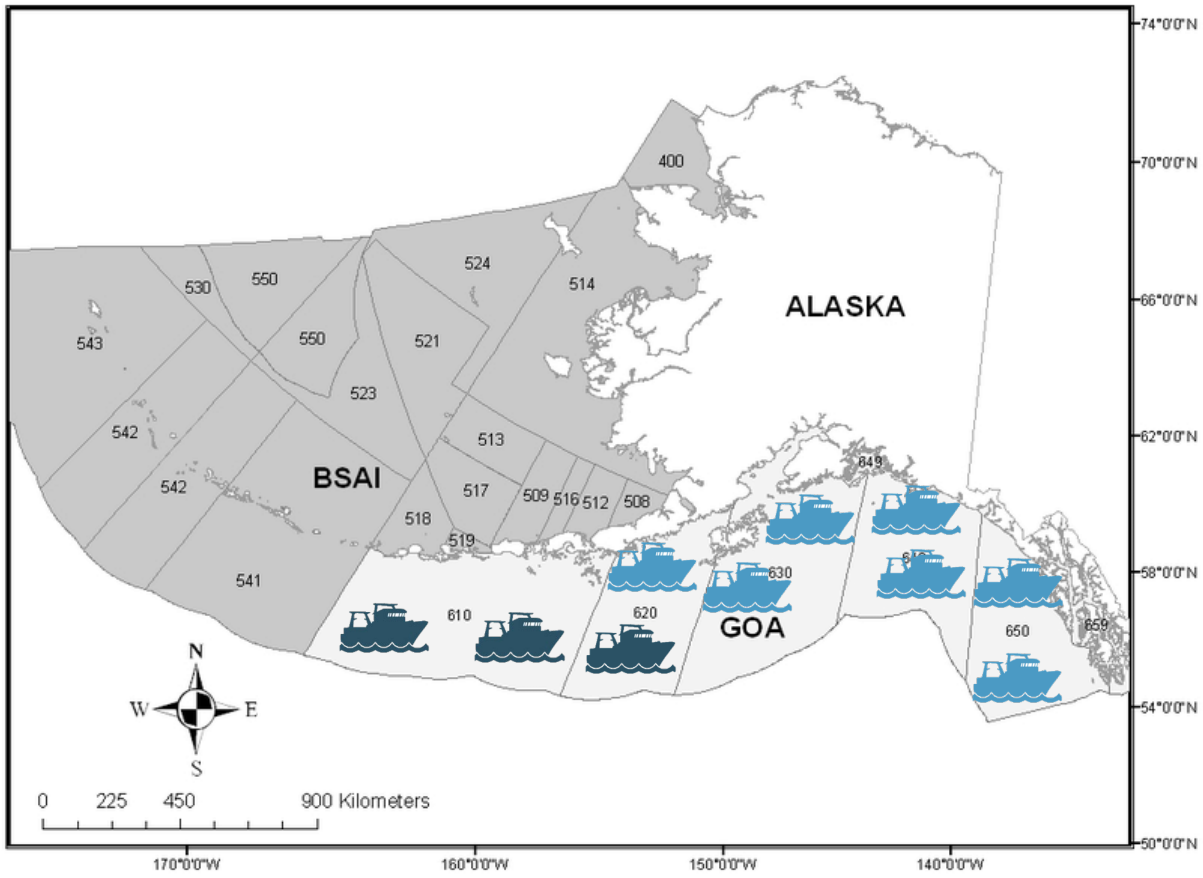
Random sampling promotes the **accuracy** of estimates

- …estimates of species-specific bycatch for the entire GOA from these sampled trips would likely be inaccurate (biased)



No Observer

Observed Trips

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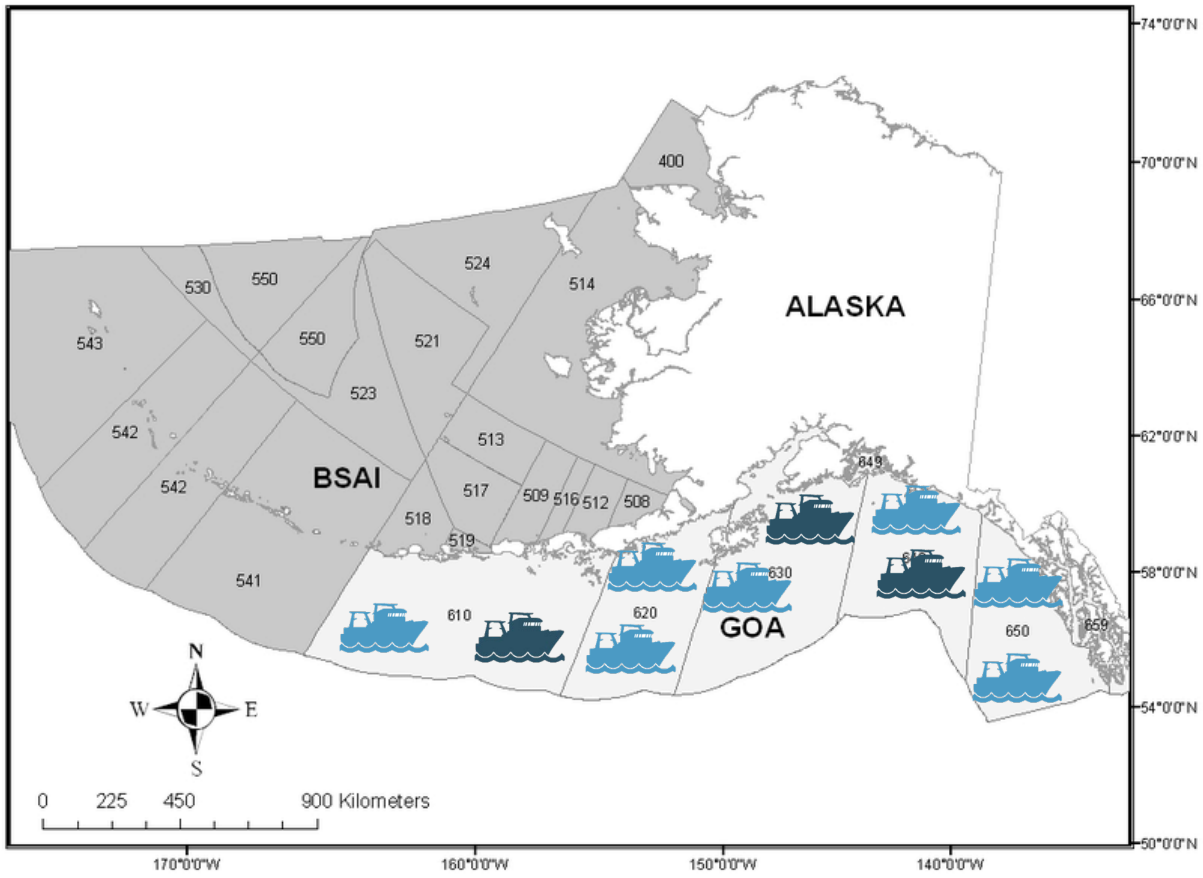
Random sampling promotes the **accuracy** of estimates

- ...compared to estimates made from a more random selection of trips. This is because different bycatch occurs in different areas.



No Observer

Observed Trips

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More samples increase the **precision** of estimates

- Once a baseline level of coverage is afforded, the Observer Program uses equations that allocate more sampling toward gear types that:
  - a) have more variable Chinook PSC, halibut PSC, and discards, and
  - b) are less expensive to observe

	Gear	Weighting	Rate
Observer	Hook-and-line	0.33	19.02
	Pot	0.05	17.48
	Trawl	0.62	29.65
	Total	**1.00**	**20.99**

+ complete count (census) of all salmon caught on observed pollock trips

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How selection rates are set for trips monitored by EM

- Selection rates for fixed-gear EM are set at 30%
- Selection rates for trawl EM are set at 100% for at-sea video monitoring for maximized retention compliance and 33% shoreside monitoring by observers

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Planned partial coverage rates in recent years

Monitoring Method	Gear Type	Data Collected	2020	2021	2022
Electronic Monitoring	Hook and Line	Counts, haul locations	30%	30%	30%
	Pot		30%	30%	30%
	Trawl (at-sea video)	Monitoring for compliance with maximized retention	100%	100%	100%
	Trawl (shoreside observers)	Salmon genetics, species composition, lengths, weights, and otoliths	33%	33%	33%
Observed	Hook and Line	Counts, haul locations, salmon genetics, species composition, lengths, weights, otoliths, marine mammal and bird interactions	15.40%	15.13%	19.02%
	Pot		15.23%	15.04%	17.48%
	Trawl		19.59%	16.12%	29.65%

Sources: NMFS 2019, NMFS 2020, NMFS 2021

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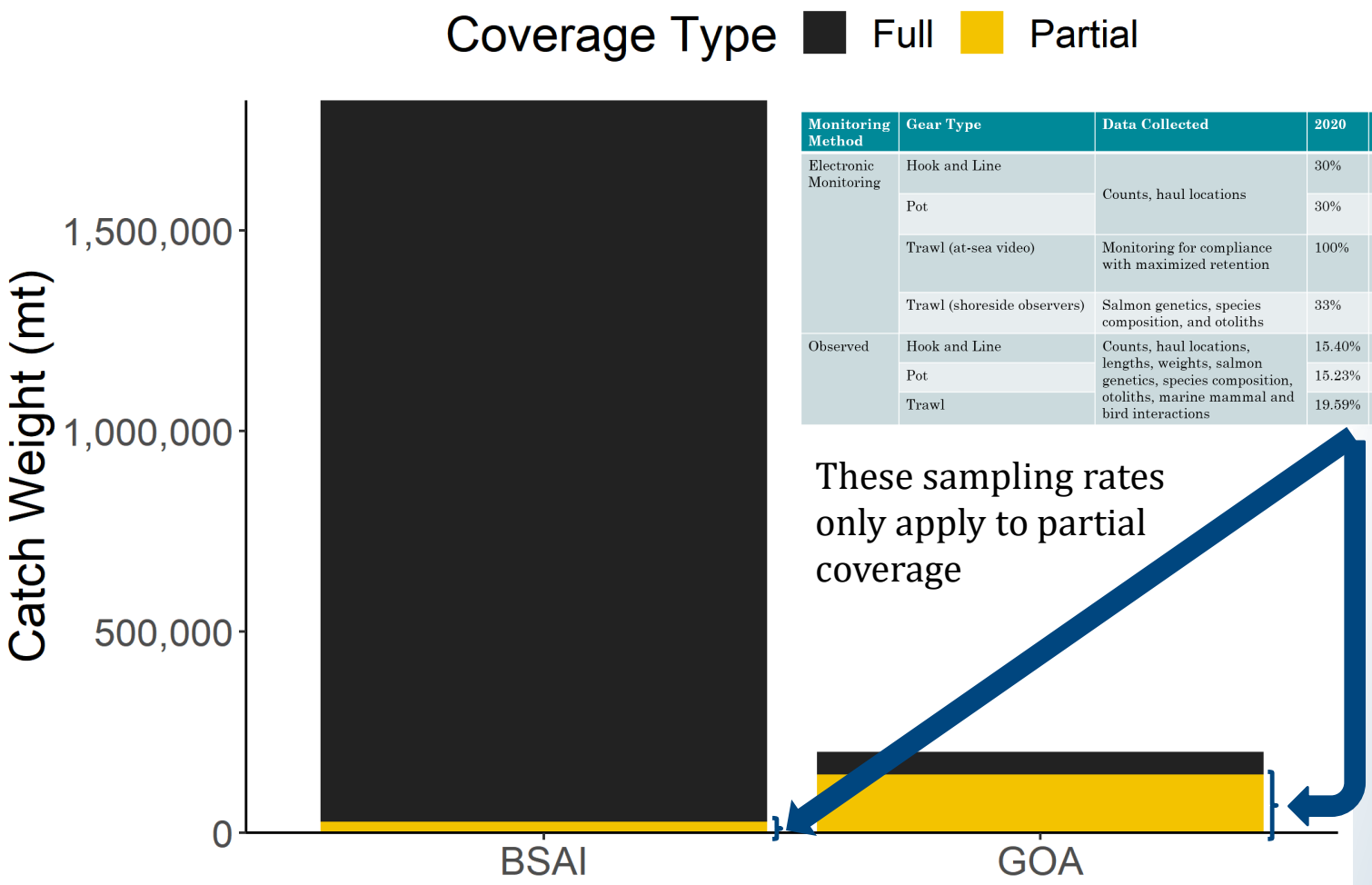
Effort in full and partial coverage



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	Pot		15.23%	15.04%	17.48%
	Trawl		19.59%	16.12%	28.10%

These sampling rates only apply to partial coverage

Sources: NMFS 2019, NMFS 2020, NMFS 2021, 2021 data

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Evaluating program performance

- The Alaska Regional Office (AKRO) and Alaska Fisheries Science Center (AFSC) produce an annual report that evaluates the performance of the Observer Program relative to its objectives
- This report contains information on program costs, coverage rates within different sectors, and distribution of sampling over time and space.

Source: Observer Program Annual Reports

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Did we meet expected coverage rates?

Coverage	Strata	*V*	*v*	*N*	*n*	Expected coverage	Realized coverage	95% confidence interval lower limit	95% confidence interval upper limit	Realized meets expected?
Full	Full	161	161	3,343	3,338	100.0	99.9			**No**
Partial	*HAL*	318	172	1,744	307	17.7	17.6	15.8	19.5	**Yes**
Partial	*EM HAL*	138	103	916	291	30.0	31.8	28.8	34.9	**Yes**
Partial	*POT - No Tender*	73	45	528	74	15.4	14.0	11.2	17.3	**Yes**
Partial	*POT - Tender*	30	12	44	13	16.1	29.5	16.8	45.2	**No**
Partial	*EM POT*	21	20	165	60	30.0	36.4	29.0	44.2	**Yes**
Partial	*TRW - No Tender*	78	70	1,568	395	23.7	25.2	23.1	27.4	**Yes**
Partial	*TRW - Tender*	26	12	56	20	27.1	35.7	23.4	49.6	**Yes**
	Gear-based Total	584	397	5,016	1,159		23.1			
Partial	Zero Coverage	393	0	2,005	0	0.0	0.0			**Yes**
Partial	Zero EM Research	4	0	29	0	0.0	0.0			**Yes**
	Total	**1085**	**510**	**10,393**	**4,497**		**43.3% Trips; 47.0% Vessels**			

Source: 2019 Annual Report

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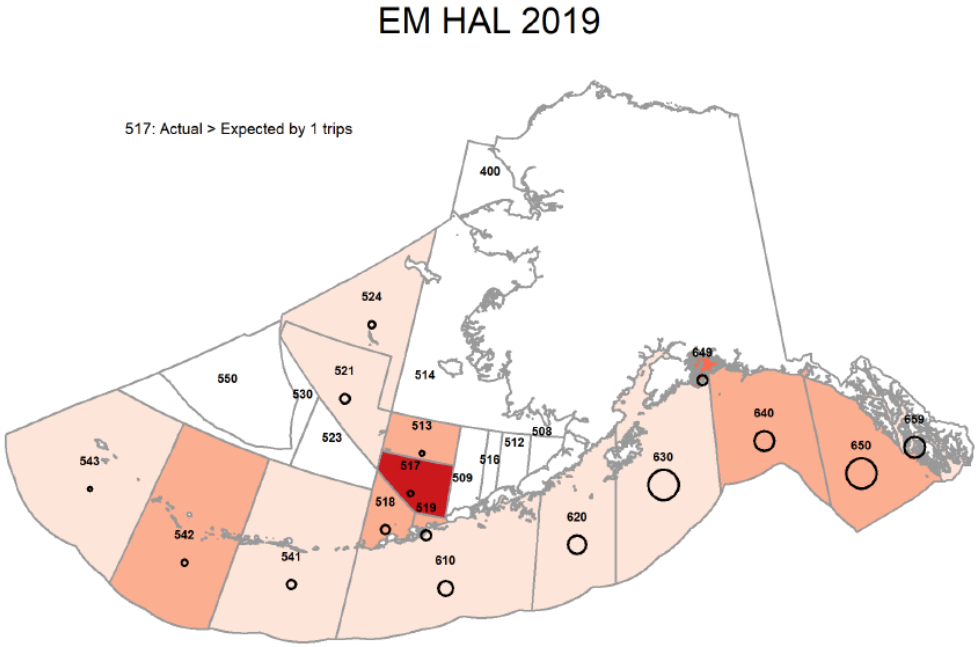
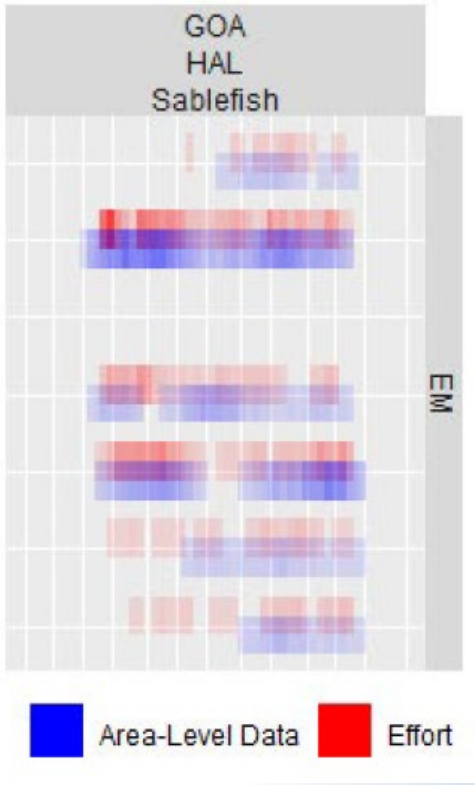
Was there evidence of spatial bias?





Source: [2019 Annual Report]

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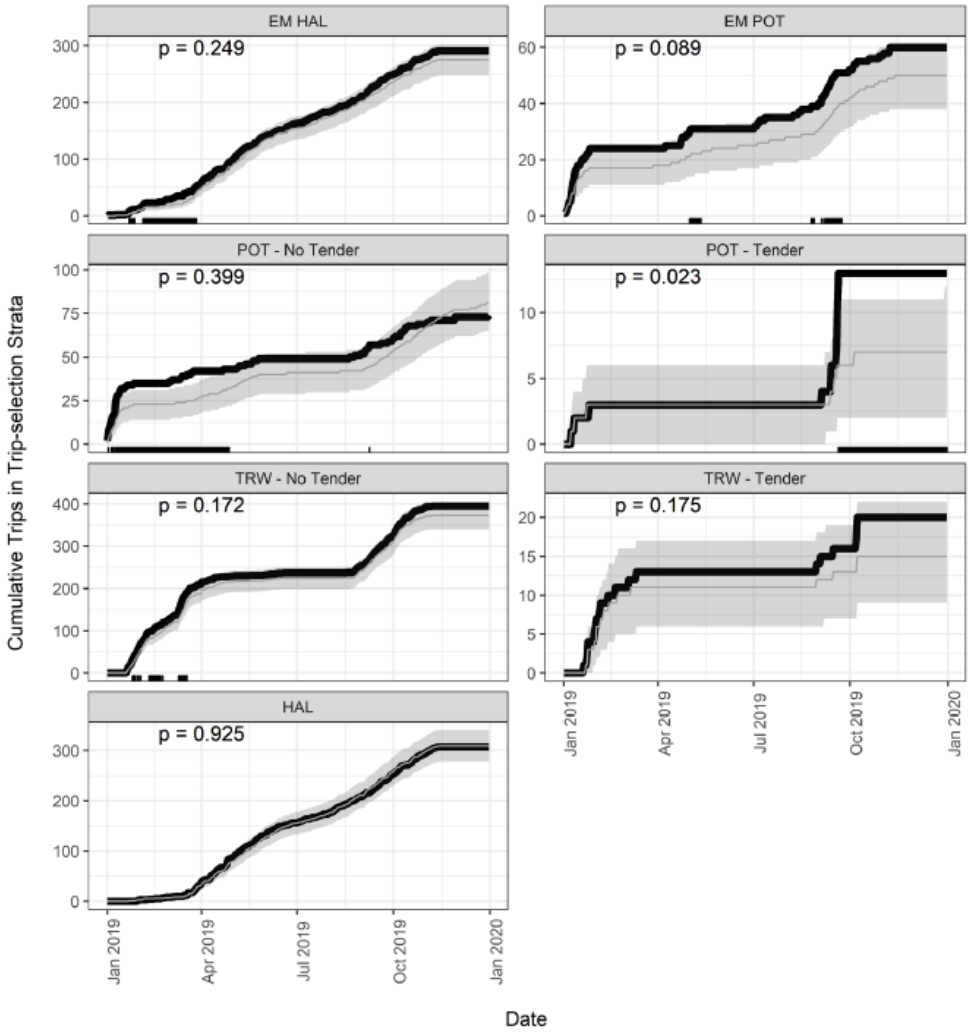
Was there evidence of temporal bias?



Source: [2019 Annual Report]

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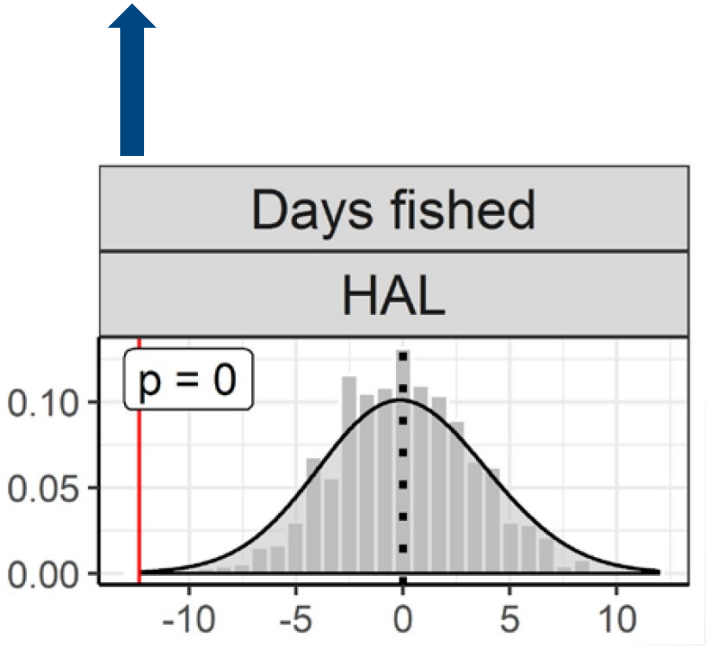
Were monitored trips similar to unmonitored trips in other ways?

Strata	Metric	NMFS areas	Days fished	Vessel length (ft)	Species landed	pMax species	Landed catch (t)
HAL	Observed difference	0.011	-0.662	0.849	-0.019	0.000	-0.905
	OD (%)	0.996	-12.334	1.530	-0.520	-0.056	-13.636
	p-value	1.000	< 0.001	1.000	1.000	1.000	0.030



Source: [2019 Annual Report]

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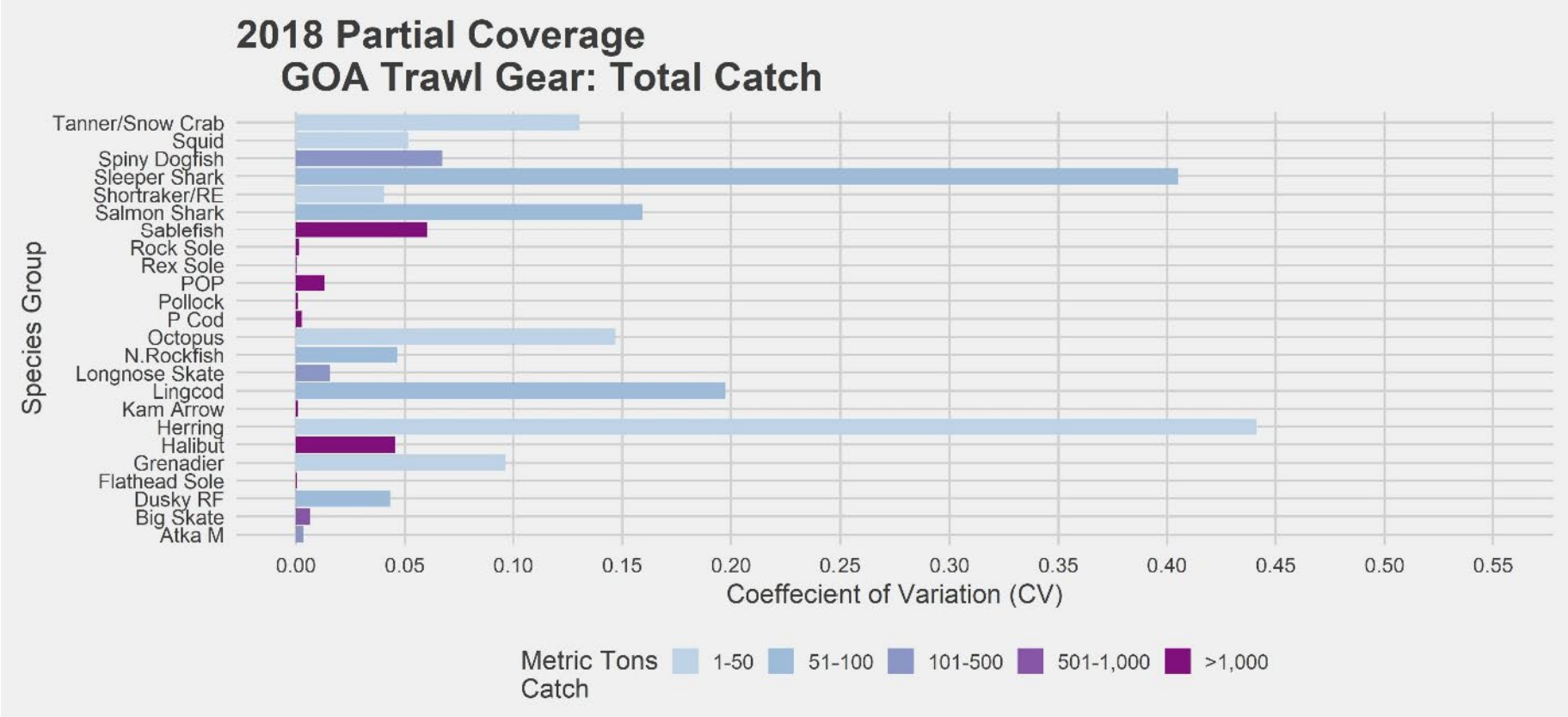
How precise were estimates?



Source: [2019 Annual Report](), Appendix C

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How does NMFS use partial coverage monitoring data?

- Inseason management
  - Estimates of discards are used to close fisheries under their Total Allowable Catch (TAC)
  - Estimates of PSC are used to close fisheries under their PSC limit
- Stock assessment
  - Catch estimates are used to estimate fishing mortality
  - Lengths, weights, and otoliths are used to describe the age structure of fish being removed by fishing
  - Gear measurements and fishing time are used to estimate fishing effort
  - Fishery catch per unit effort can be used to track fish abundance

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Acknowledgements

- Thank you to the observers, observer providers, captains, crew members, processing staff, EM providers, video reviewers, and agency staff who make this data collection possible

- Thank you to the following people for providing input on this presentation
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  - Jennifer Mondragon – NMFS, AKRO
  - Jane Sullivan – NMFS, AFSC

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Questions?

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