



**NOAA
FISHERIES**

February 16th 2015, Seattle

North Pacific Observer Program Sampling Design: BSAI Pacific Cod

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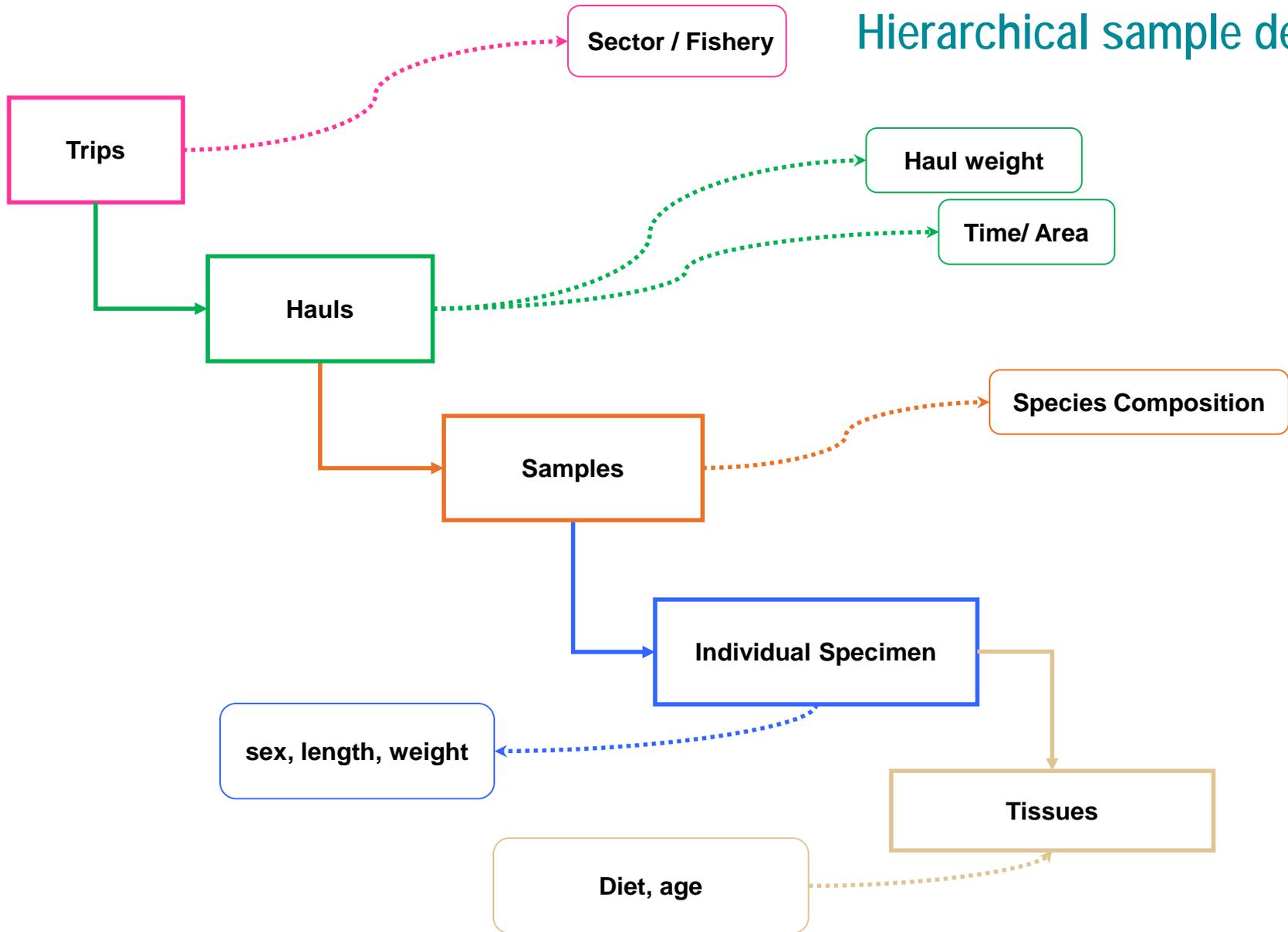


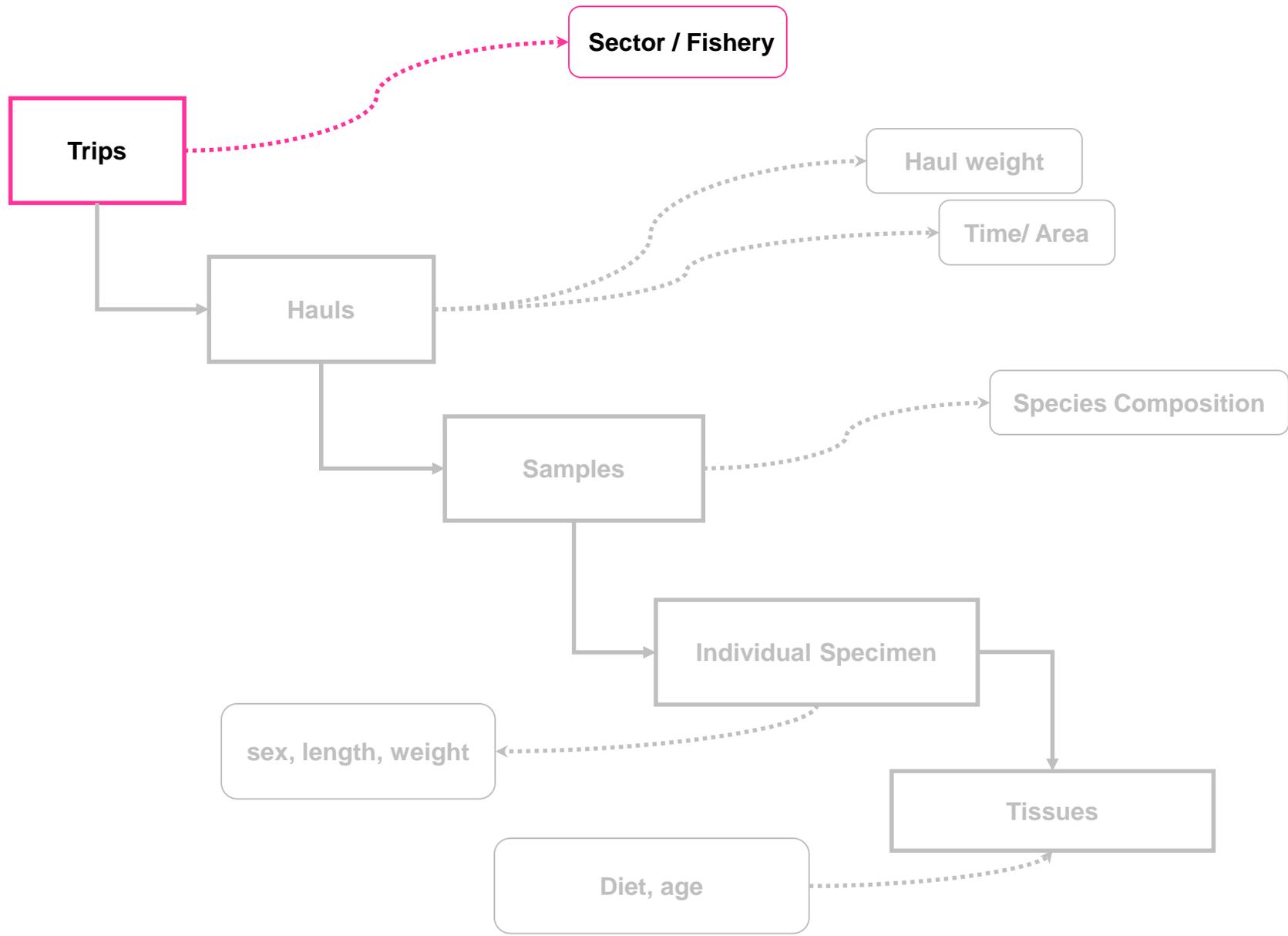


The Observer Program employs a hierarchical design
with randomization at all levels

Sample Level	Sample Frame	Sample Unit	Sample Selection	Data / Observation
1° Unit: Trips	Set of all trips taken by CVs outside of state and catch share fisheries	Fishing trip	Bernoulli Sample	Departure and delivery ports, trip dates, <i>etc</i>
1° Unit: Vessels	Set of all vessels that fished the previous year in the same two month period	Two months of fishing activity (all trips taken by the selected vessel)	Simple Random Sample (SRS)	Departure and delivery ports, trip dates, <i>etc</i>
2° Unit: Hauls	Set of all fishing events on trip	Fishing event (haul, set)	Constrained SRS of set of all hauls	Effort data (total catch size, gear deployed, fishing location, <i>etc</i>)
3° Unit: Sample	Set of all sample units in the haul	Predefined weight, volume, or gear segment	Systematic Random Sample (SYS) / SRS / opportunistic from haul	Species composition data
4° Unit: Length Sample	All fish of given species within a sample	Individual fish	SRS generally from 3° sample	Sex, length, and weight
5° Unit: Otolith Sample	All fish in length (SLW) sample	Individual fish	SRS, generally from 4° sampled fish	Otoliths

Hierarchical sample design





Trips are logged by phone or through the internet.

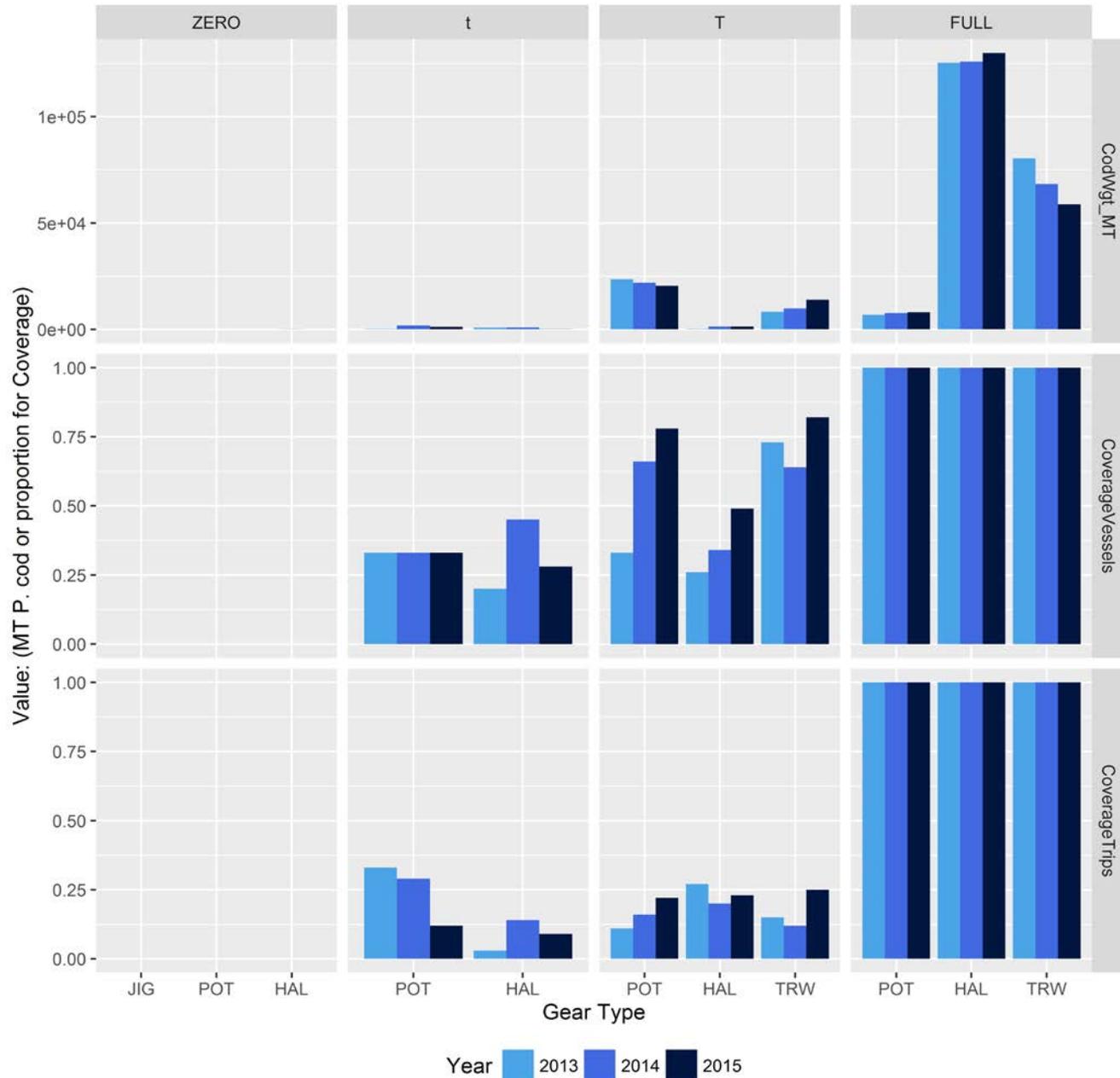
Users are notified immediately if their trip requires an observer

Expectation is Coverage Rate = Selection Rate
over entire strata

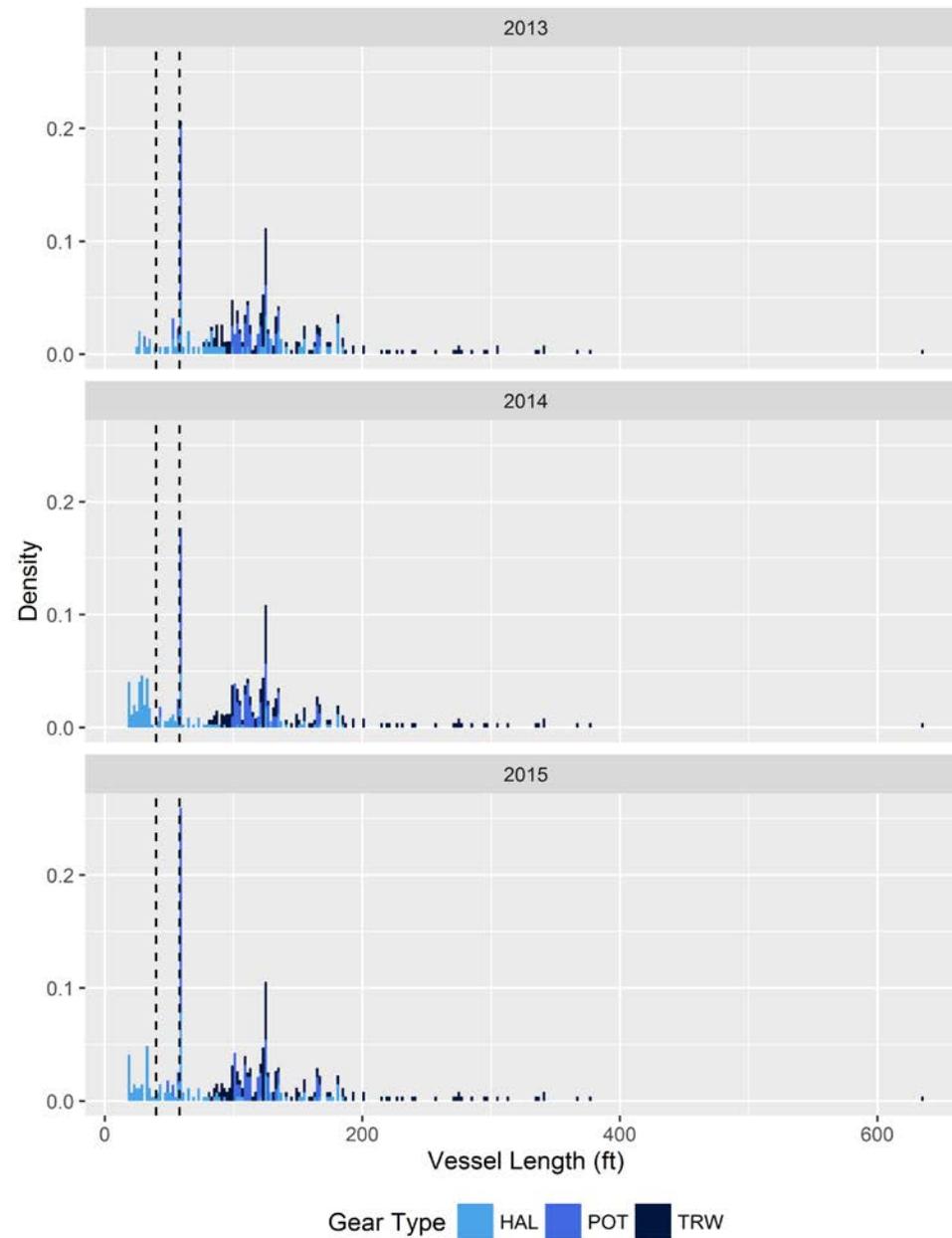
Strata defined before fishing begins (not fishery)

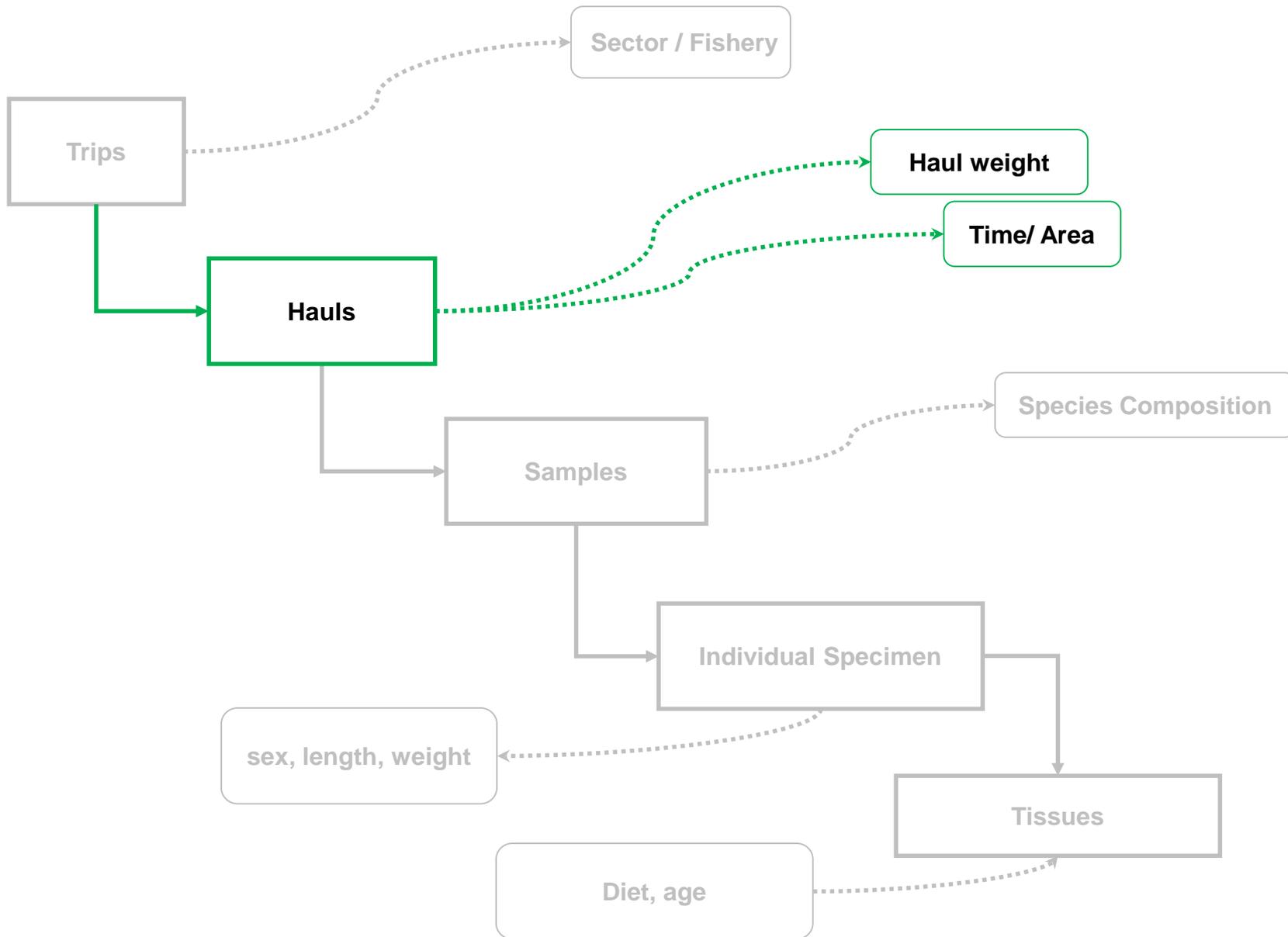
Element	1990-2012	2013	2014	2015
AFA pollock	100%	100%		
A80 BSAI flatfish				
Rockfish Prgm.				
CP Atka BSAI				
CP*	Dependent on vessel size			
CV > 125'	100%			
CV 60-125'	Self-selection: 30% days or gear /quarter + 1 trip/fishery	Randomly selected trips 14.8%	Randomly selected trips 15.1%	Randomly selected trips 24% expected
CV > 57.5'	(57-60'; 0%)			
CV 40-57.5'	0%	Randomly selected vessels 2 month period 10.6%	Randomly selected vessels 2 month period 15.6%	Randomly selected trips 12% expected
CV < 40'	0%	0%		
Halibut fishery	no	yes		
Dockside	Days / month by tons processed to collect delivery information and tissues	All pollock deliveries for salmon bycatch genetics 100% BSAI; 73% GOA	AFA (A91) and trips observed at-sea for salmon bycatch genetics	

BSAI P. cod Catch and Observer Coverage 2013 - 2015



Vessel size







Haul information

- When, where, how much and by whom
- All hauls or a random selection of hauls are sampled



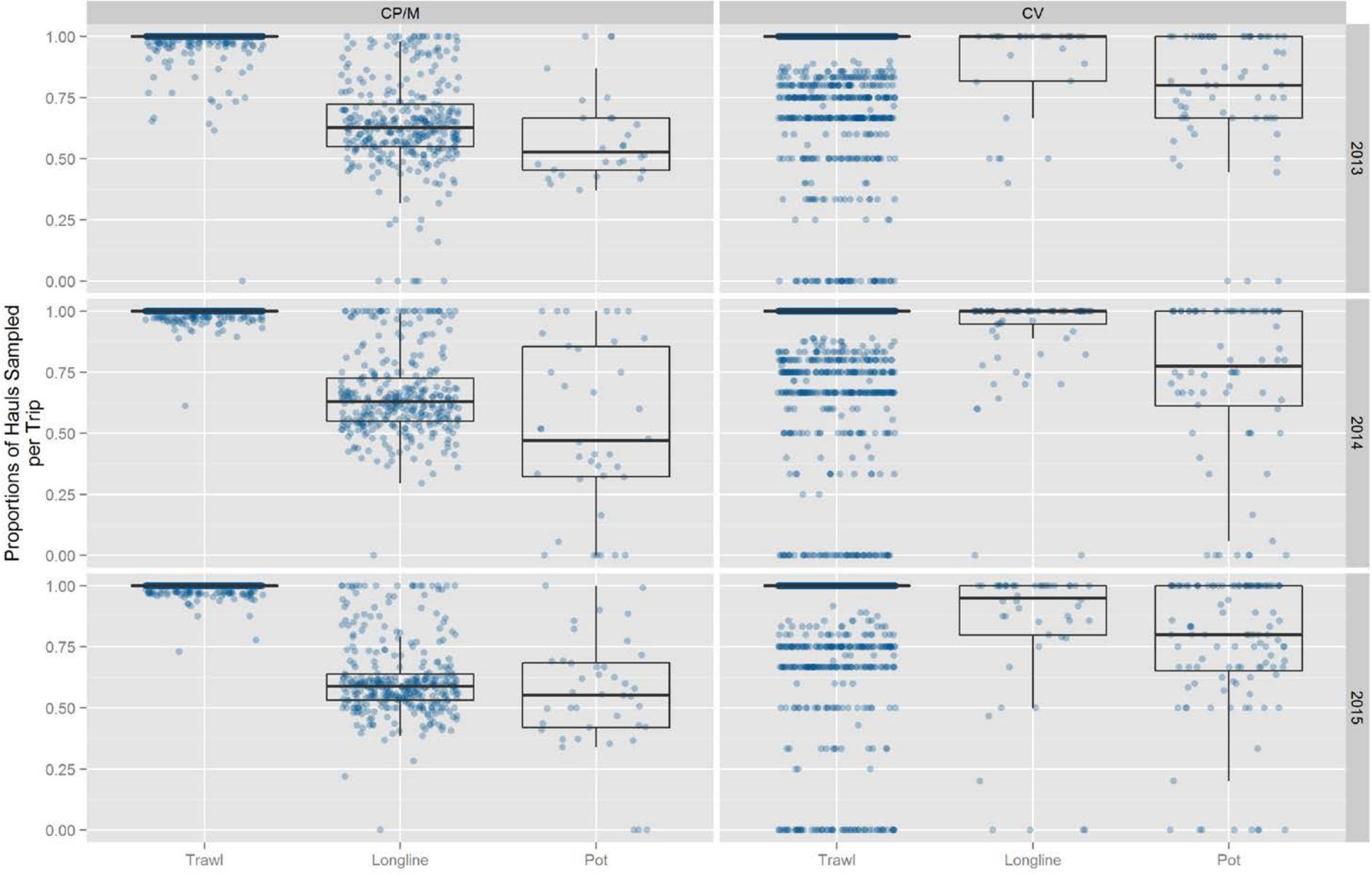
NOAA FISHERIES







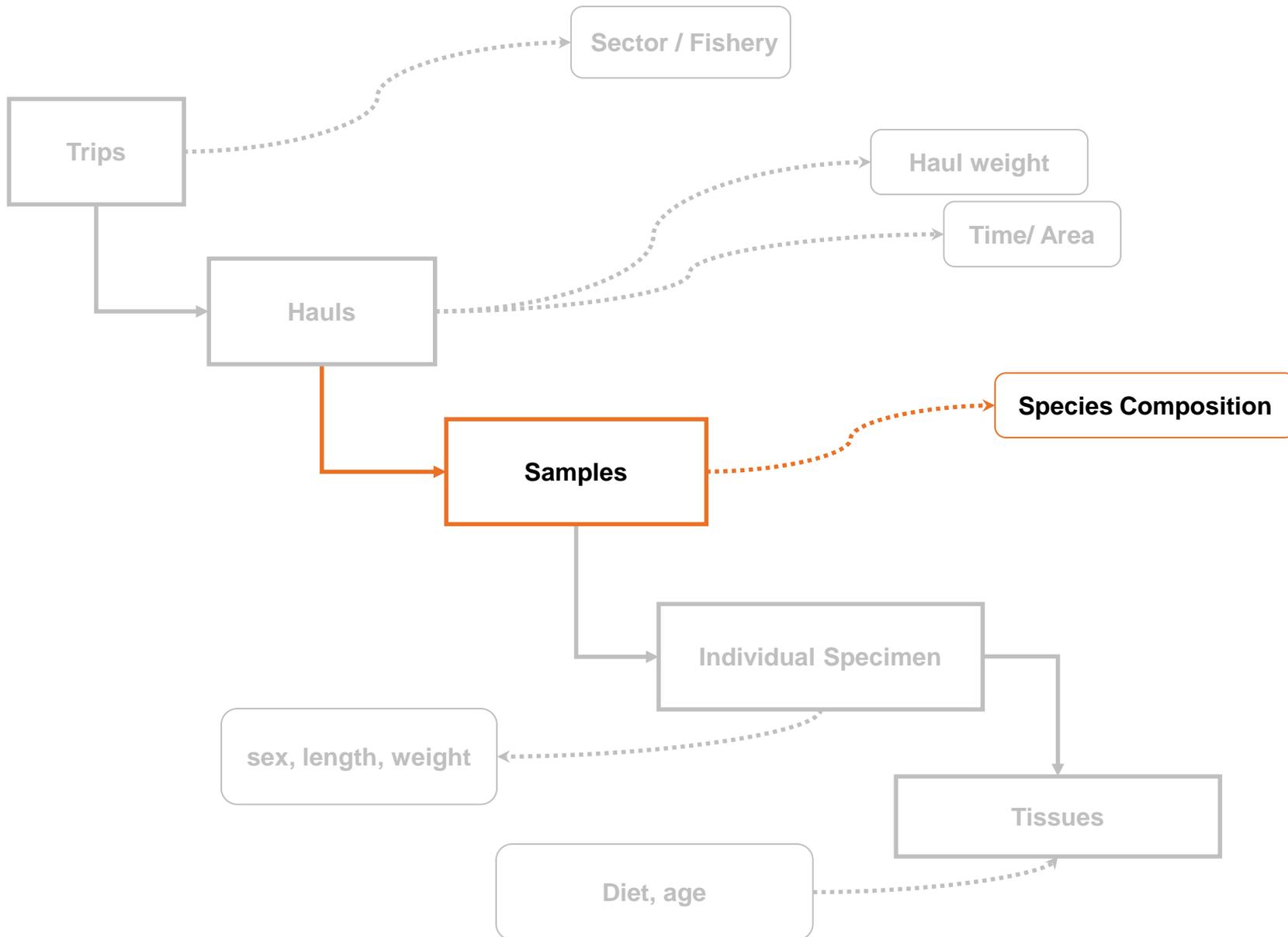




2013

2014

2015



Species Composition Samples

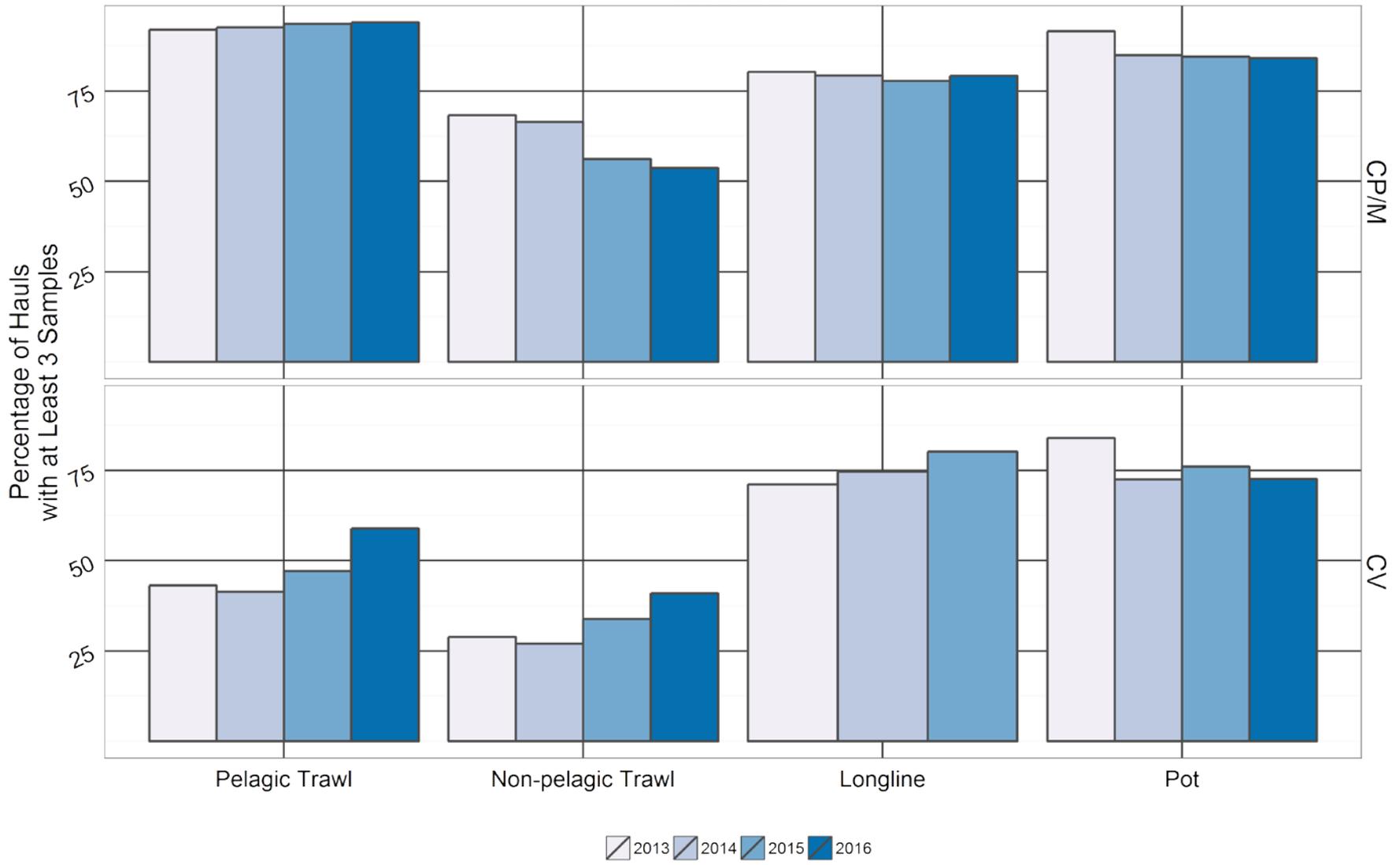
Identity, quantity and disposition of the total catch



BSAI 2015

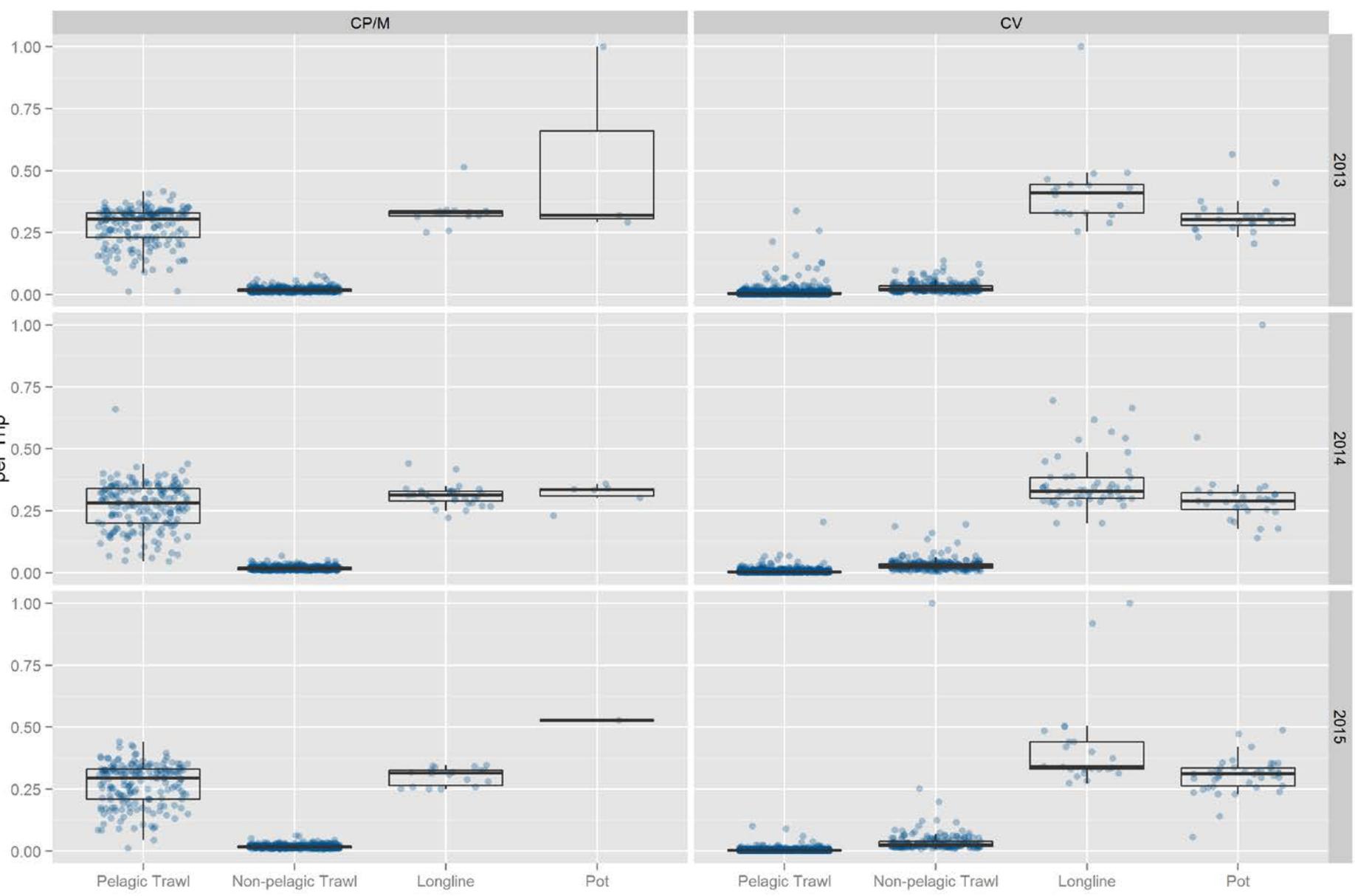
	Pelagic Trawl	Non-pelagic Trawl	Longline	Pot	
Opportunistic -	0.2%	1.1%	0.1%	0.9%	CP/M
Randomized -		1%	0.1%	0.4%	
Strict Random -	98.2%	97.9%	99.7%	98.6%	
Census -	1.6%	0%	0.1%	0.1%	
Opportunistic -	23.7%	43.1%	1.4%	1.6%	CV
Randomized -	72.8%	53%		1.6%	
Strict Random -	3.4%	3.8%	95.9%	94.2%	
Census -	0%	0.1%	2.7%	2.6%	

BSAI 2015





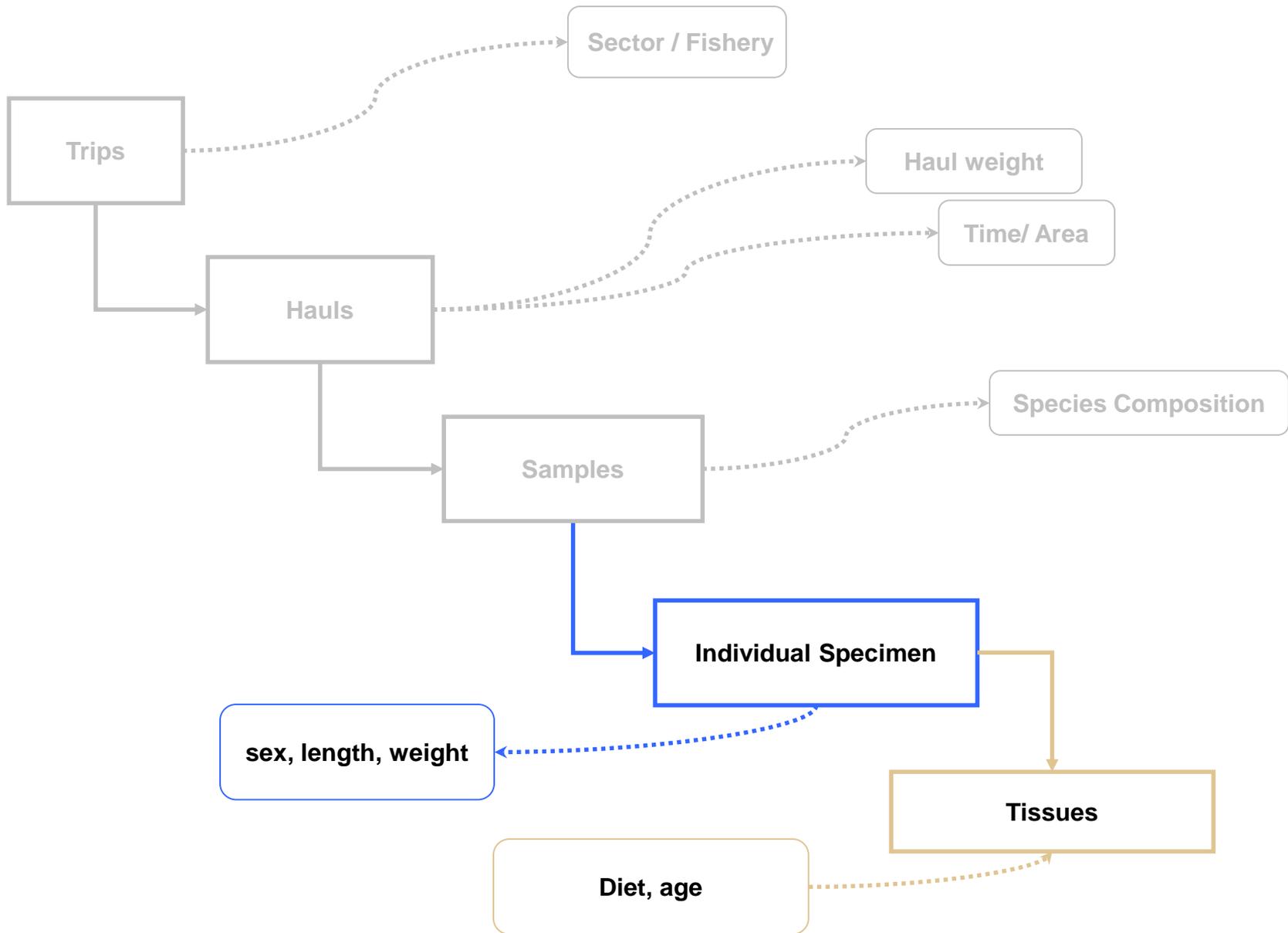
Mean Sample Fraction
per Trip



2013

2014

2015



Individual Biometrics and Tissues

Sampling effort is under the control of stock assessment authors within logistical limits

Based on predominant species and area:

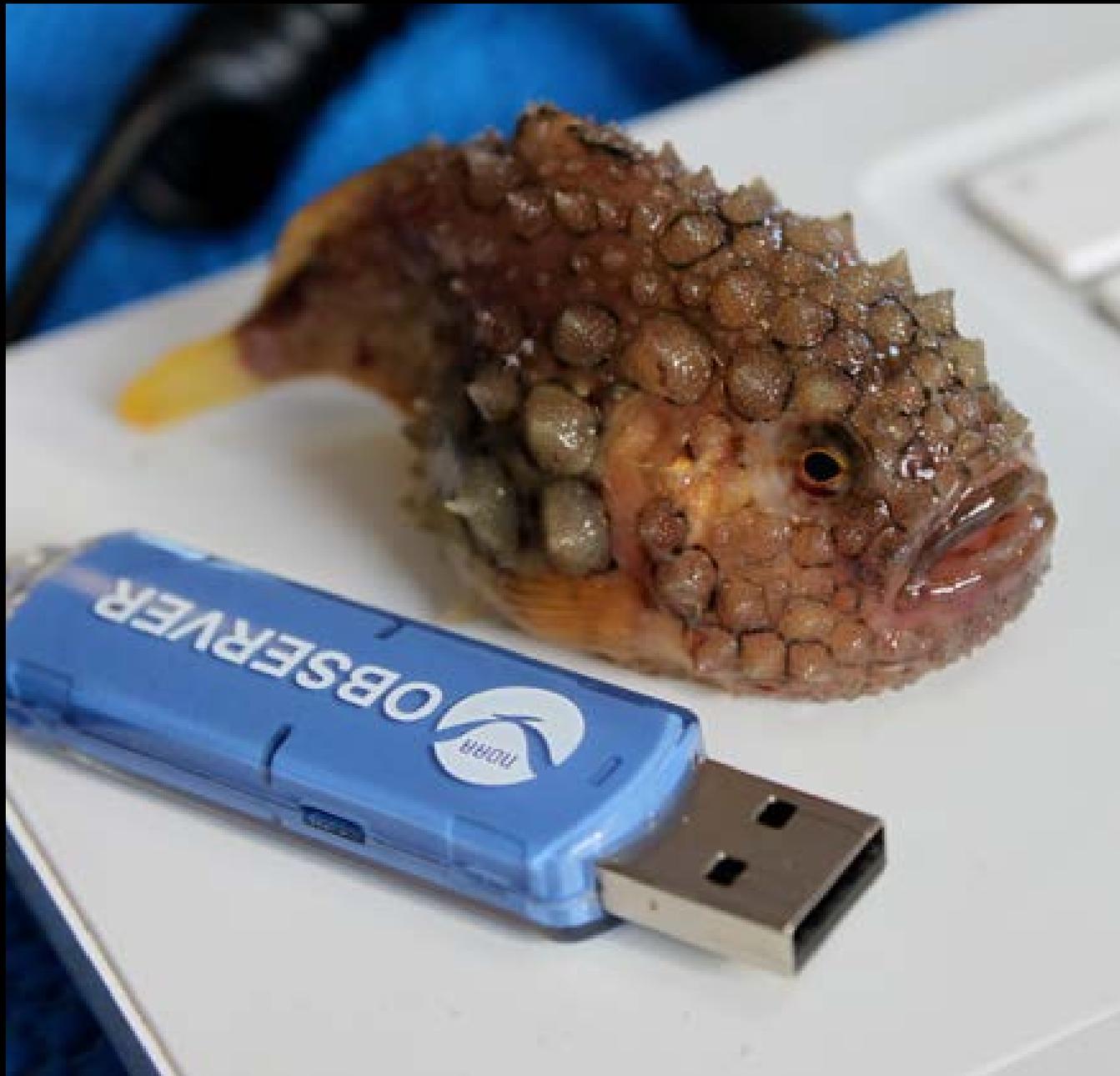
Here is BSAI P. cod:

Pacific Cod...		<u>Sex/Lengths:</u>	<u>Otoliths (taken from s/l fish):</u>	<u>Other Biological Data:</u>	<u>Halibut condition</u>
Then Take:	→	~ 20 Pacific Cod	3 pairs	assess maturity of all female Pacific cod otolith fish	~ 10 Viability or Injury Assessments
Any From Another Species?	→	~ 10 from Shortraker/Rougheye	2 Shortraker/Rougheye otolith pairs	none	none
	→	~ 5 from skates of any species	none	none	none
How Often?		Every Sampled Haul	Every 5th Sampled Haul	Every 5th Sampled Haul	Every 2nd Sampled Haul Every Sampled Haul if < 4 sets a day

Observer Otoliths: BSAI P. cod

Year	Aged	Collected
2015	0	6636
2014	0	7263
2013	0	6772
2012	0	6395
2011	1197	2436
2010	594	2549
2009	684	2219
2008	700	3453







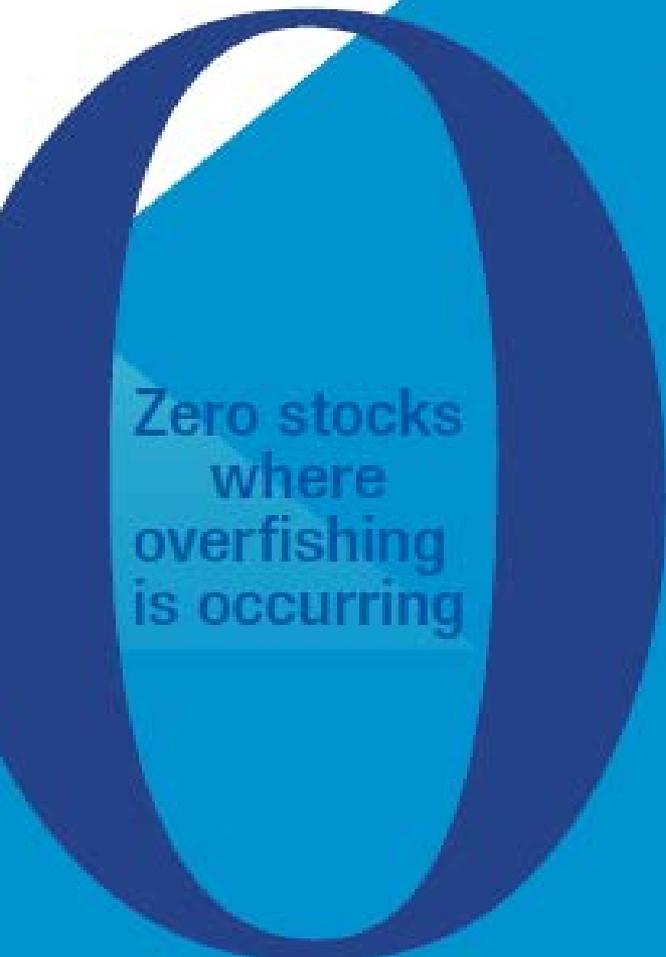
418

Observers deployed



46,640
days

Observer
coverage



Zero stocks
where
overfishing
is occurring

ALASKA FISHERIES SCIENCE CENTER



2015
Year in
Review



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Haul-Specific Estimates of Groundfish Catch for species i on Observed Trips

- Catcher Processors
 - Expansion of sample j to haul based on sample fraction:

$$\hat{W}_i = W \frac{\sum_{j=1}^J \hat{w}_{ij}}{\sum_{j=1}^J w_j} = W \frac{\hat{\bar{w}}_i}{\bar{w}}$$