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Adult pink salmon predation on juvenile salmon and herring in marine waters of Alaska

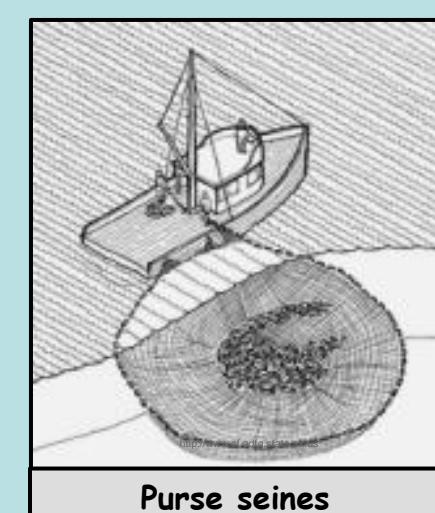
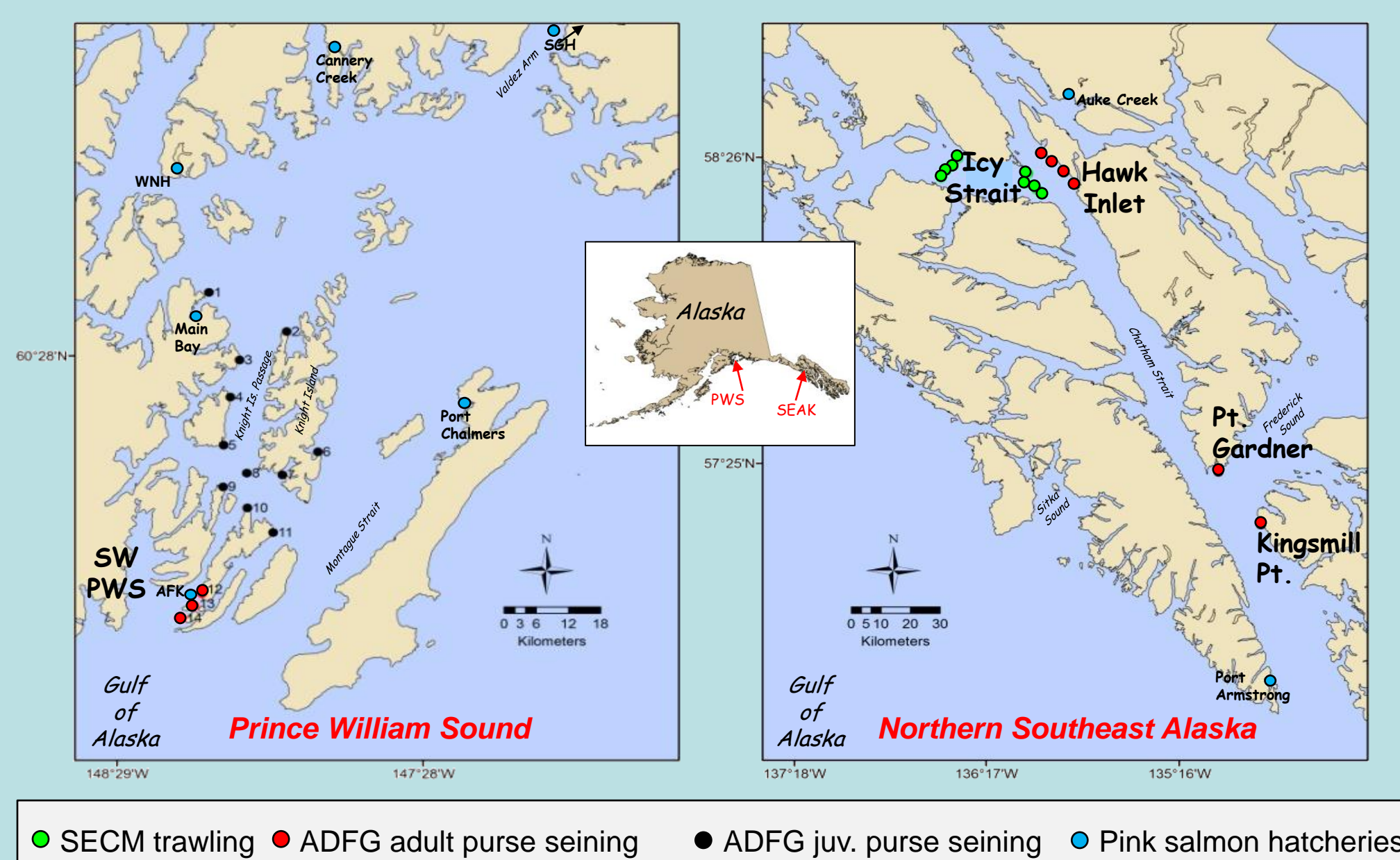


Acknowledgments
We thank the crews of the NOAA Ship *John N. Cobb* & chartered fishing vessels, many biologists who assisted with sample collecting & processing for the Southeast Coastal Monitoring project (SECM), our funding sources, and collaborating agencies. Special thanks to J. Joyce (NOAA), and D. Harris, S. Moffitt, and D. Buetner (ADF&G) for supplementary data.

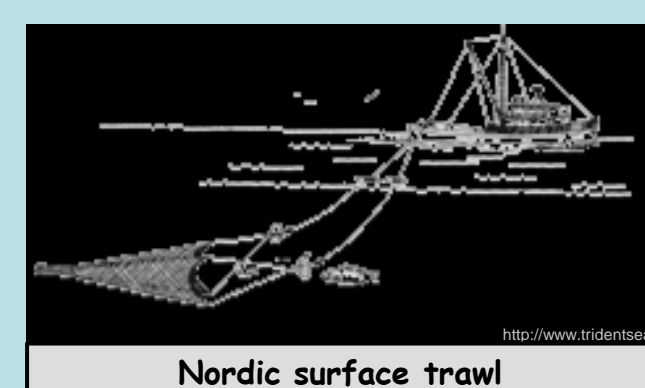
Overview

Homing adult salmon overlap in space & time with out-migrating juvenile pink salmon & herring, & relative size is appropriate for predation. However, climate can impact predation events by shifting the abundance, timing, & behavior of both predators & prey. We compare diets of adult pink salmon (%weight, %FO of prey) between two coastal regions of Alaska from samples collected in epipelagic trawls and neritic purse seine test fisheries (TF) during their homing migrations to assess potential impact on these juvenile fish. We also contrast predation incidence for abundant pink salmon with that of less abundant adult coho & immature (age-1+) Chinook salmon. Finally, we provide examples of climate mechanisms that could influence predation through predator-prey spatial & temporal overlap.

Study regions for adult salmon diet samples from migration corridors of PWS and SEAK



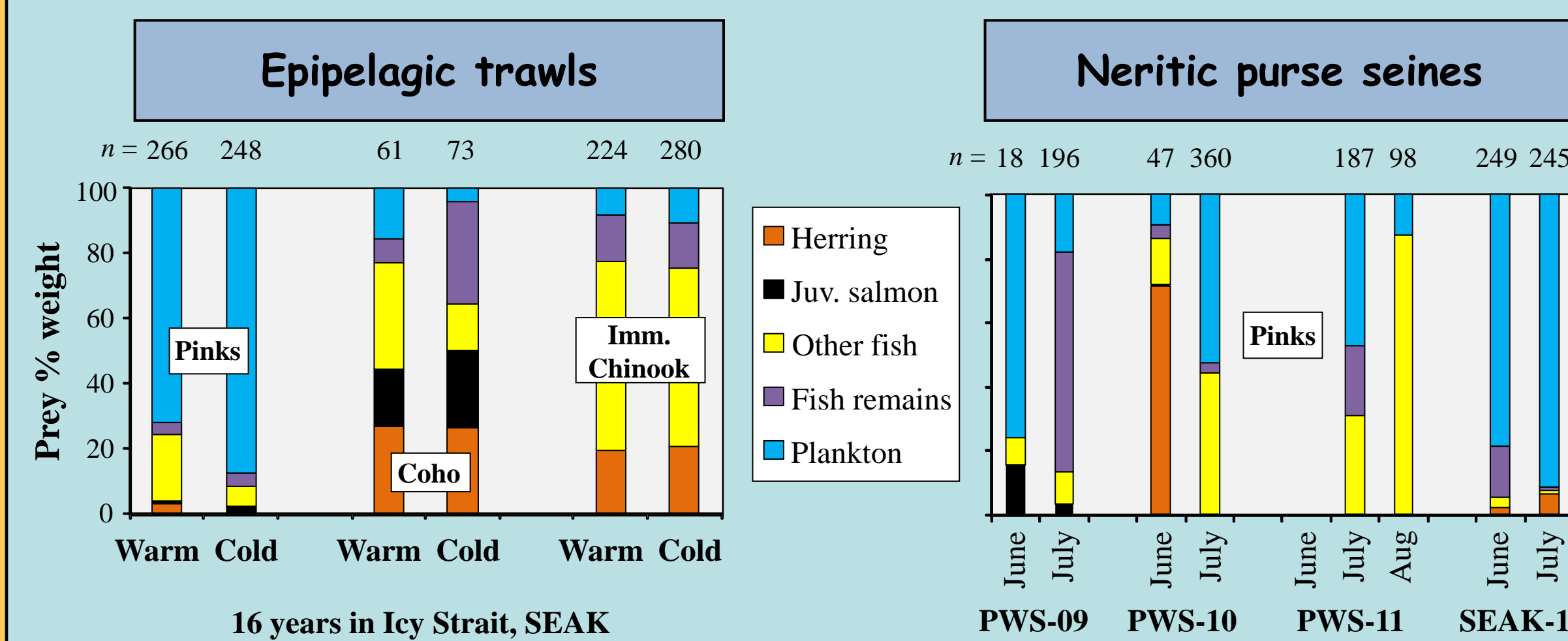
ADF&G 2009-2011



SECM 1997-2012



Diet composition of adult salmon species



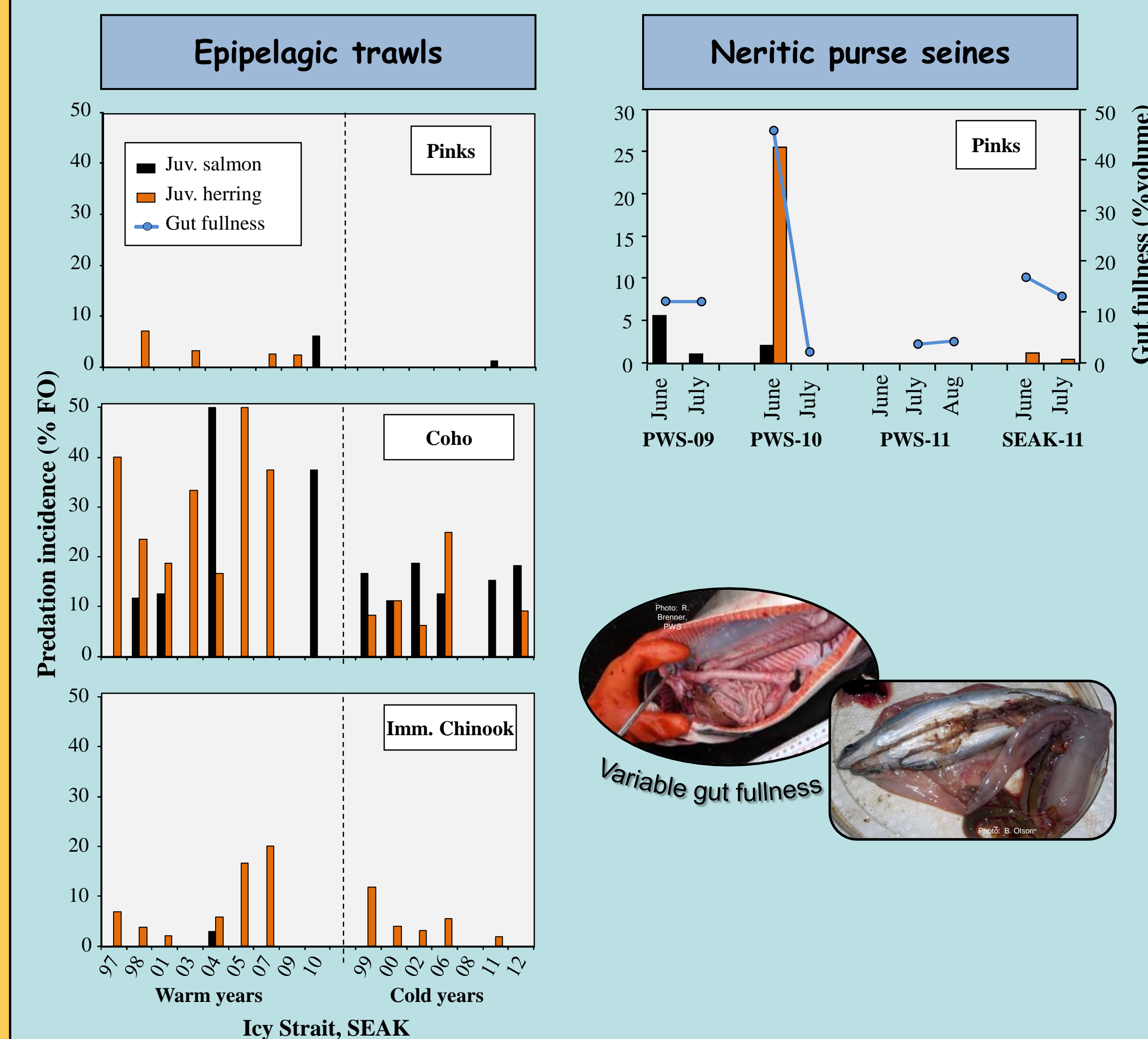
Potential predation impact* of neritic adult pink salmon

Purse seine test fisheries	Return year	Harvest (millions of fish)	# predator guts	%Empty	%FO salmon	Potential Millions consumed	%FO herring	Potential Millions consumed
PWS	2009	19.0	214	56	1.4	0.35	0	0
	2010	71.3	407	79	0.3	0.18	2.9	6.41
	2011	32.8	400	20	0	0	0	0
SEAK	2011	47.7	494	64	0	0	0.8	0.38

Harvest data from <http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisherySalmon.exvesselquery>

Predation impact = (%FO*mean number/gut*adult harvest)

Predation frequency of adult salmon species



Variable gut fullness

Conclusions

Overall, adult coho salmon in SEAK had the most consistent annual predation & highest %FO on both juvenile salmon & herring. Weak data support for local predation impact on herring populations by adult pink salmon. Climate may influence predation intensity via effects on both predator & prey.

Summary

Adult pink salmon

Predation on juvenile salmon & herring occurred in both epipelagic & neritic waters

- Overall incidence was <1.1 %FO among 645 epipelagic & 1,400 neritic pink salmon

Cannibalism was rare in both PWS and SEAK

- Occurred during years with low adult/high juv. abundance and years with high adult/low juvenile abundance
- Rates were out-of-sync with subsequent adult returns to PWS
- Therefore, no oscillating broodline control is suggested

Neritic predation on herring was greatest in PWS in June 2010

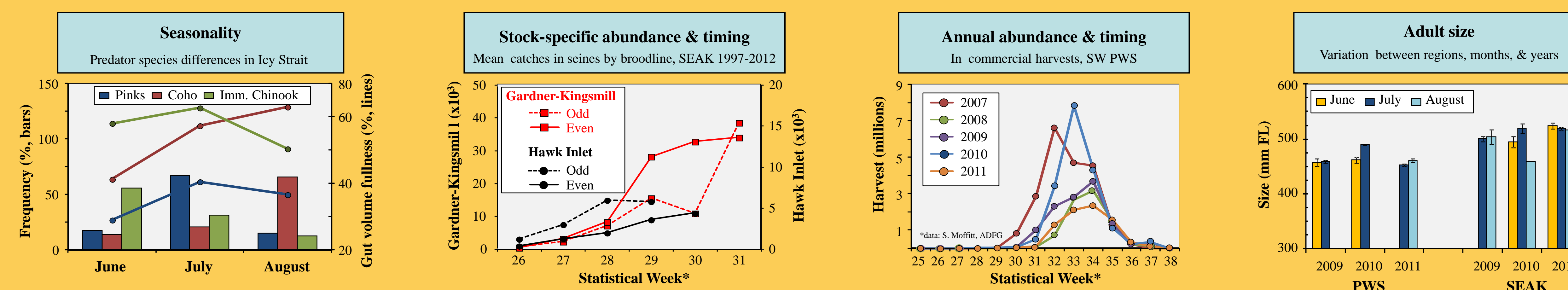
- Occurred mainly at Herring Bay: 69% of adult pinks averaged 4 herring/gut
- Adult salmon were not yet present at this location during June 2009 sampling
- Therefore, localized predation impact on herring in PWS is possible in some years

Adult coho salmon

- Had the most consistent predation on both juvenile pink salmon & herring
- Higher incidence of predation on herring in 9 warm years vs. 7 cold years suggests an effect of herring behavior or timing
- More common predation on juvenile salmon in cold years suggests size-selectivity or greater temporal overlap with small & late juveniles

Adult pink salmon predator metrics potentially influenced by climate

*Statistical Week 26 ~ June 21



Juvenile salmon & herring prey metrics potentially influenced by climate

