

crescendos

Increasing mercury concentrations in Steller sea lion pups at Agattu Island, western Aleutian Islands, Alaska



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CITATION
 Fritz et al. 2014. Recent increases in survival of western Steller sea lions in Alaska and implications for recovery. *Endangered Species Research*. 26 (1): 13-24.

INTRODUCTION

Mercury, a heavy metal, in methylated forms has well documented neurotoxic effects with potential to impact reproductive success in piscivorous mammals.

Low reproductive rates and/or poor fecundity may contribute to the lack of recovery of Steller sea lions (*Eumetopias jubatus*) in the western Distinct Population Segment (wDPS) (Fritz et al. 2014).

METHODS

Lanugo (natal fur), grown *in utero*, reflects the dam's diet during late gestation. Total mercury concentration ([THg]) of lanugo samples were determined via Direct Mercury Analyzer (Milestone).

Our focus was upon rookeries of the western Aleutian Islands; two nearby central Aleutian Islands are included for comparison.

Metapopulation	Island	Map	2011	2012	2013	2014	2015	2016	2017	2018
Western Aleutian (WAI)	Attu (A)			18						33
	Agattu (B)		32	51	53		53		50	42
Central Aleutian (CAI)	Kiska (C)									31
	Ulak (D)			53	61		55			49

*Islands not sampled in years shaded in grey

A reference threshold of 20 PPM [THg], at which clinical signs/adverse effects have been observed in other piscivorous mammals, is applied for assessing risk.

Data were analyzed using R (Version 3.5.2, 2018).

KEY
 Metapopulations (Dashed Circles):
 WAI (red), CAI (yellow)
 Islands:
 A = Attu; B = Agattu;
 C = Kiska; D = Ulak
 Solid Arrows:
 Population Trend

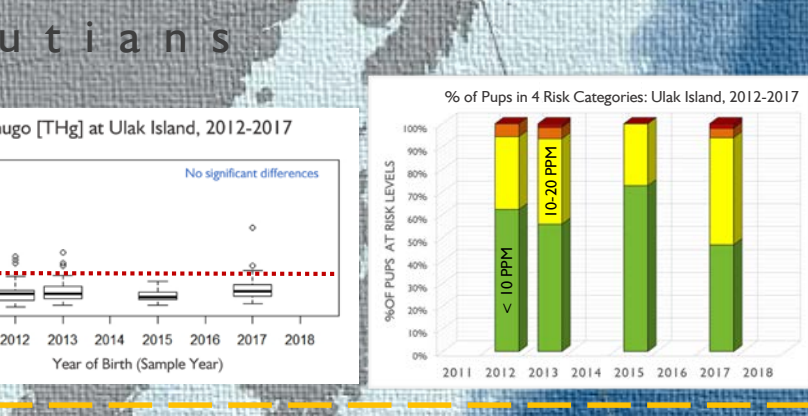
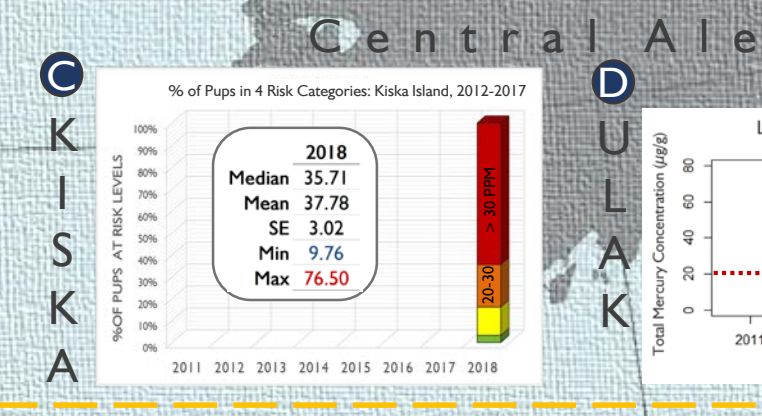
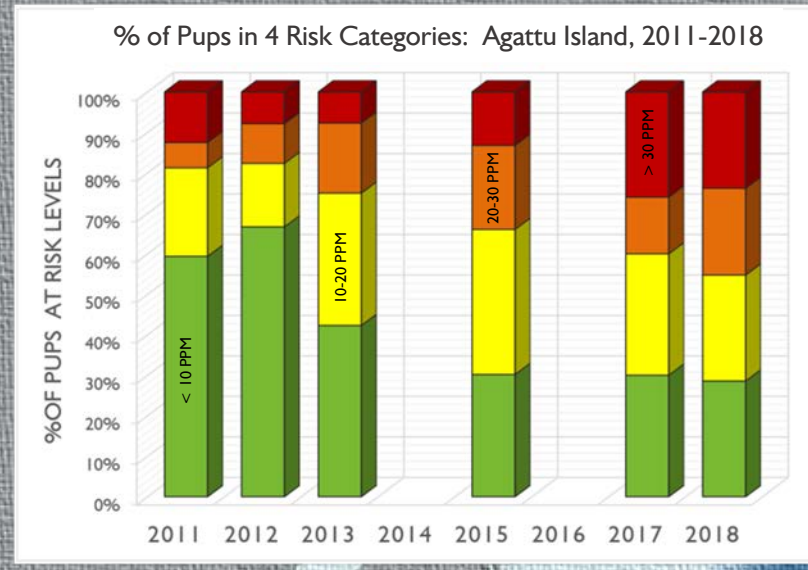
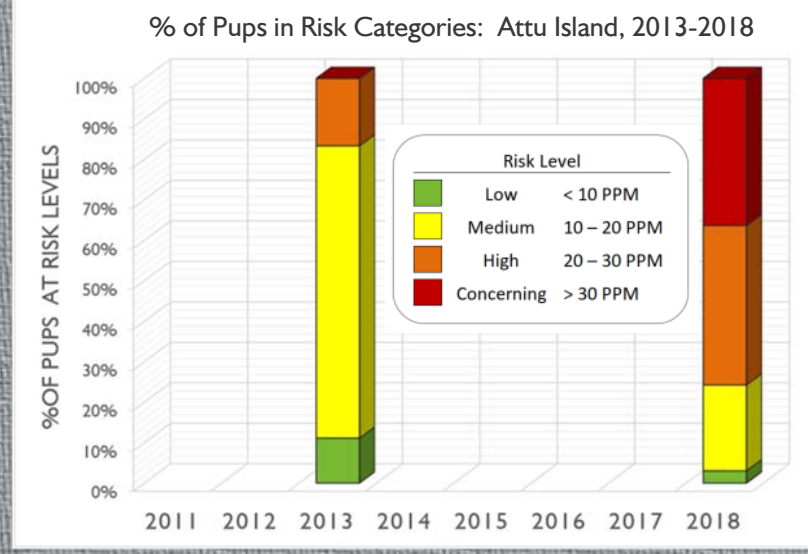
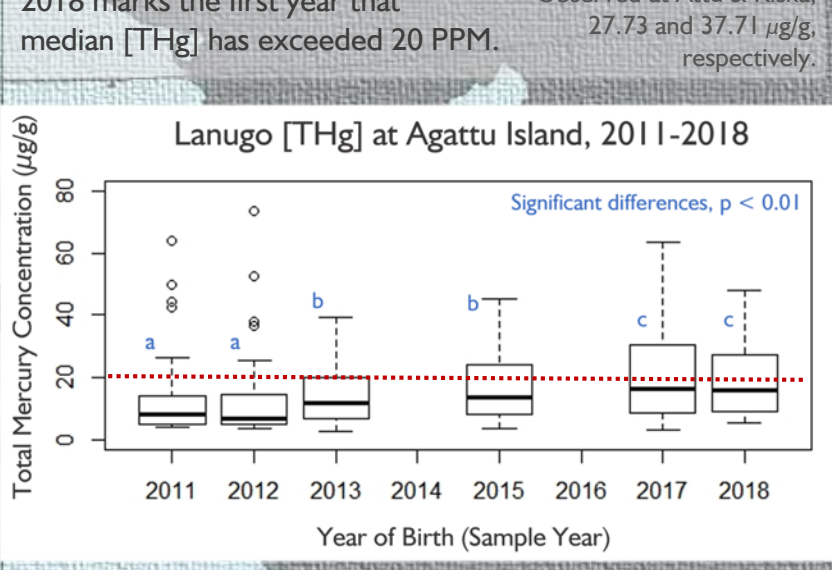
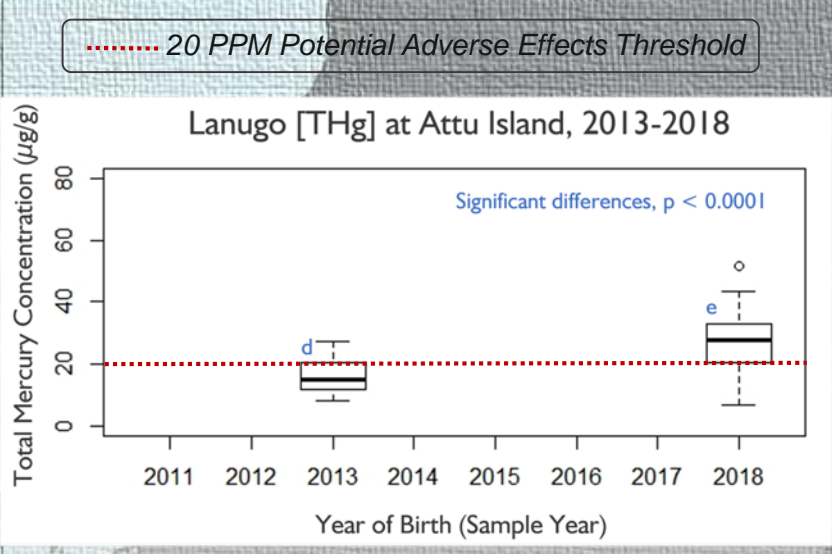
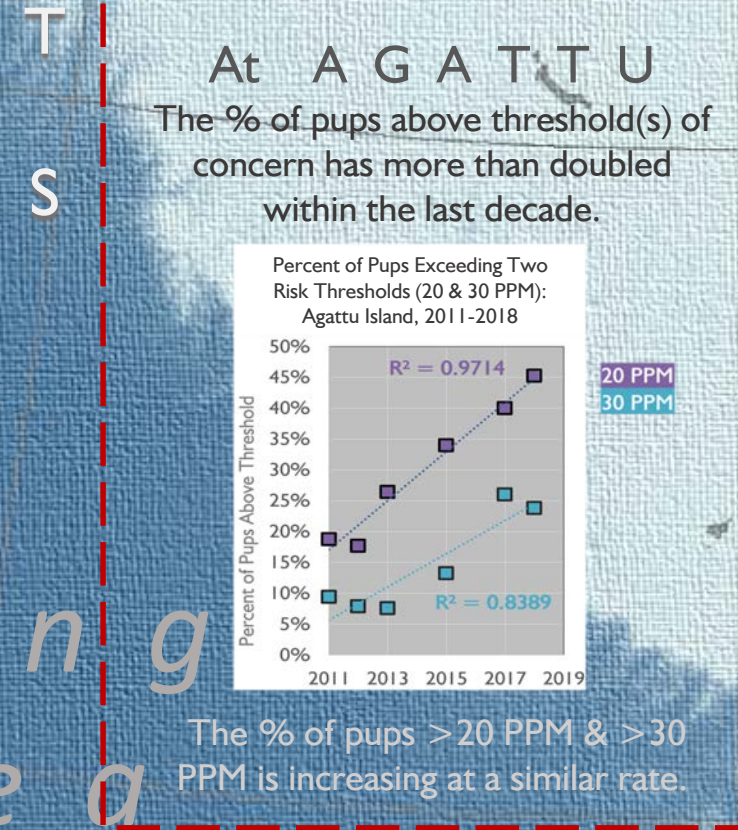
Units for all [THg] data are $\mu\text{g/g} = \text{mg/kg} = \text{PPM}$

A ATTU

Year	Median	Mean	SE	Min	Max
2011					
2012					
2013	15.11	15.99	1.24	8.27	27.23
2014					
2015					
2016					
2017					
2018	27.77	27.50	1.50	6.82	51.47

B AGATTU

Year	Median	Mean	SE	Min	Max
2011	8.01	14.27	2.67	3.92	63.95
2012	6.57	12.47	1.87	3.34	73.74
2013	11.96	13.93	1.27	2.55	39.32
2014					
2015	13.45	16.83	1.45	3.51	45.32
2016					
2017	16.19	20.25	2.05	3.21	63.67
2018	15.85	19.72	1.84	5.20	47.79



SUMMARY

The median [THg] & the percent of pups above the 20 PPM (potential adverse effects threshold) are both increasing in the western Aleutian Islands, but not at Ulak Island.

Steller sea lion trends over time (2011-2018)

	west	east
	Attu*	Agattu Kiska** Ulak
Median [THg]	↑	↑ TBD ↔
% pups > threshold	↑	↑ TBD ↔
Population trend	↓	↓ ↓ ↔

* limited to 2 time points ** limited to 1 time point

CONCLUSIONS

The RATE of change and PERCENT of PUPS with HIGH+ [THg] is CONCERNING, warranting further investigations into adverse effects assessments & pathways of mercury transfer throughout the food web in this region.