

# Salmon Fishery Management Southern Resident Orca Consultation

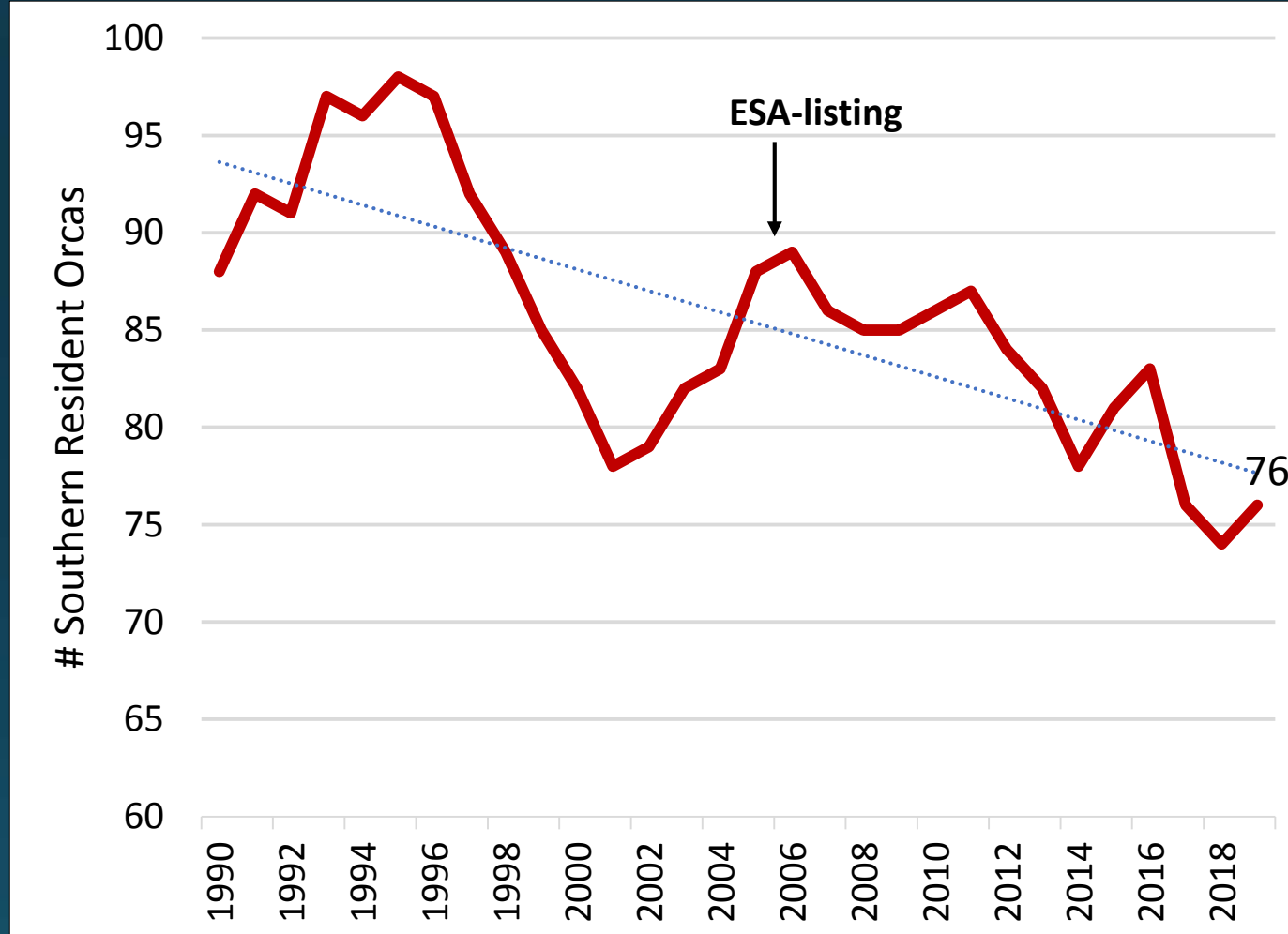


Ben Enticknap



Photo: John Forde and Jennifer Steven

# Southern Resident Killer Whale Population (J,K,L pods)



Adapted from Center For Whale Research

- **Fecundity rates have declined:** 69% of detectable pregnancies unsuccessful, linked to nutritional stress (Wasser et al. 2017)
- **Good news:** Two orca births in 2019 (L & J pods); first successful births since 2016
- **Estimated extinction risk of 49% in 100 years** under status quo, and an expected minimum abundance of 15 individuals during a 100-year period (Valez-Espino 2014)

# Threats

- Lack of prey
- Vessel interactions and noise
- Contamination
- Small population size

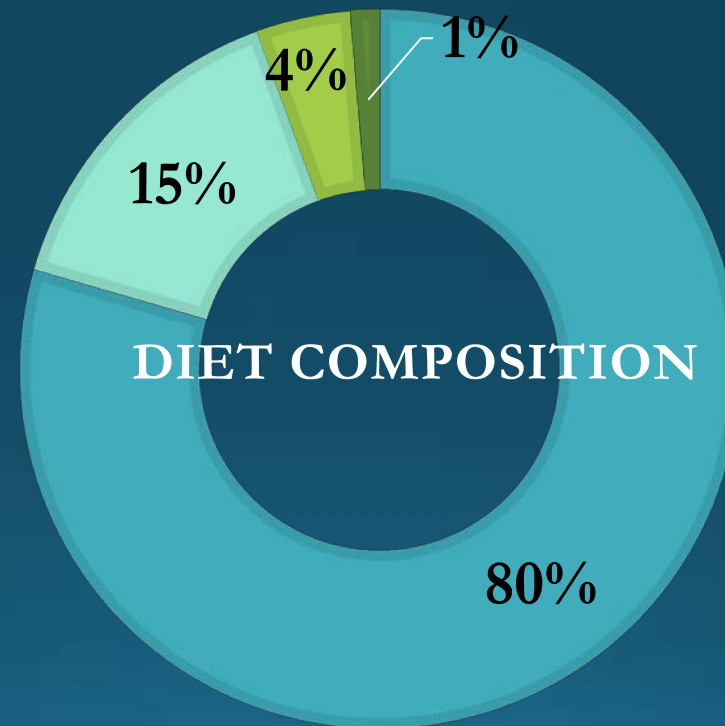


Last summer, 3-year old Scarlet, or J50, was so emaciated that she lost the fat at the base of her head - what scientists call "peanut head." Declared dead September 13, 2018.

*Photo: Katy Foster/NOAA Fisheries Permit No. 18786-03*

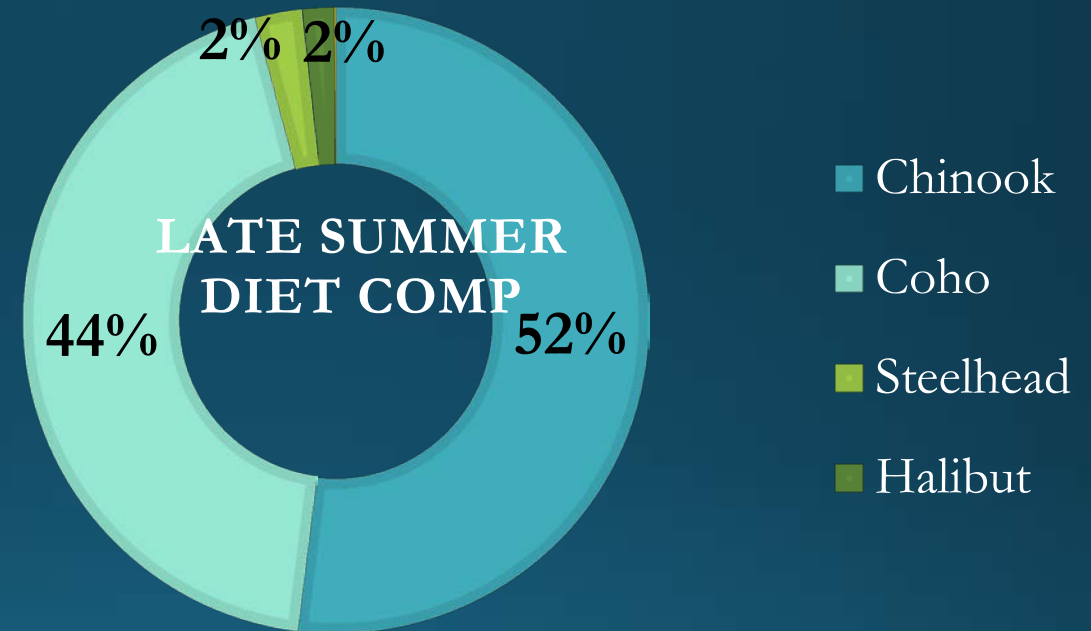
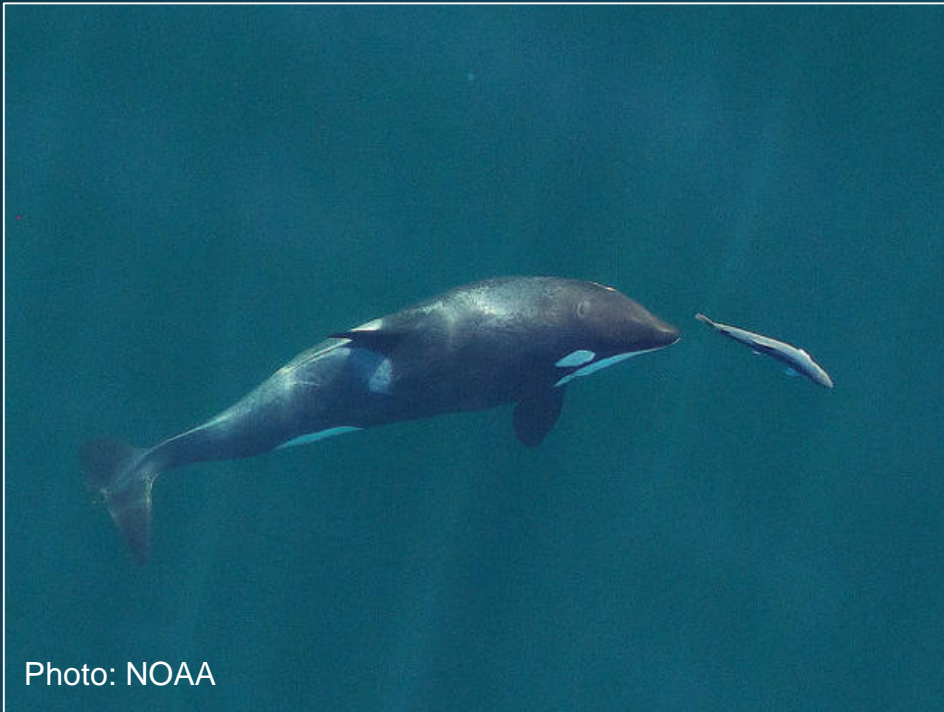


# Ecology: Foraging Selectivity



- Chinook salmon
- coho salmon
- other salmonids including steelhead
- other fish including flatfish, halibut, and herring

# Seasonal Diet Composition



Ford MJ, et al. (2016) Estimation of a Killer Whale (*Orcinus orca*) Population's Diet Using Sequencing Analysis of DNA from Feces. PLoS ONE 11(1): e0144956.  
doi:10.1371/journal.pone.0144956



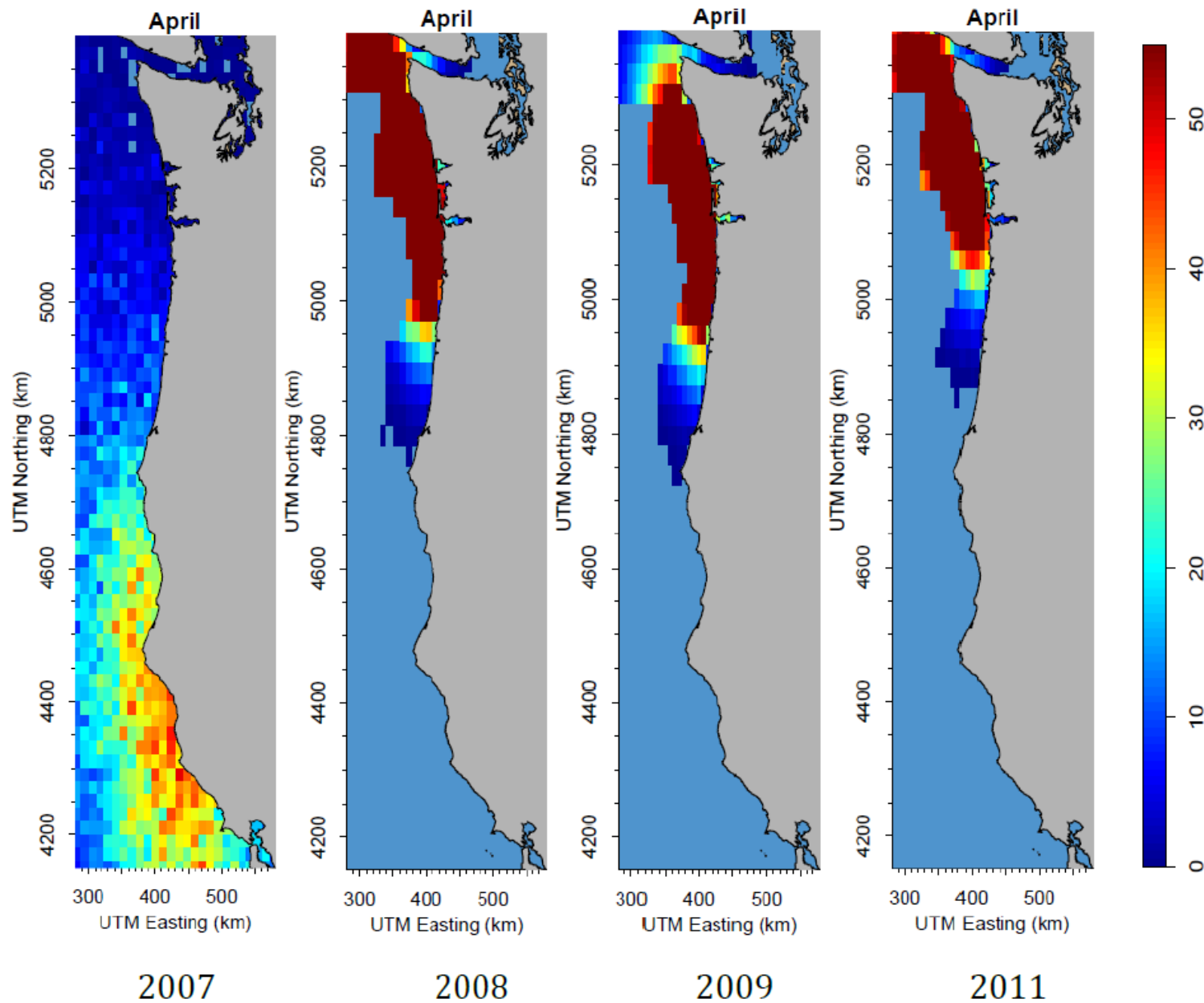
# Ecology: Range



*Photo: Miles Ritter / Creative Commons*



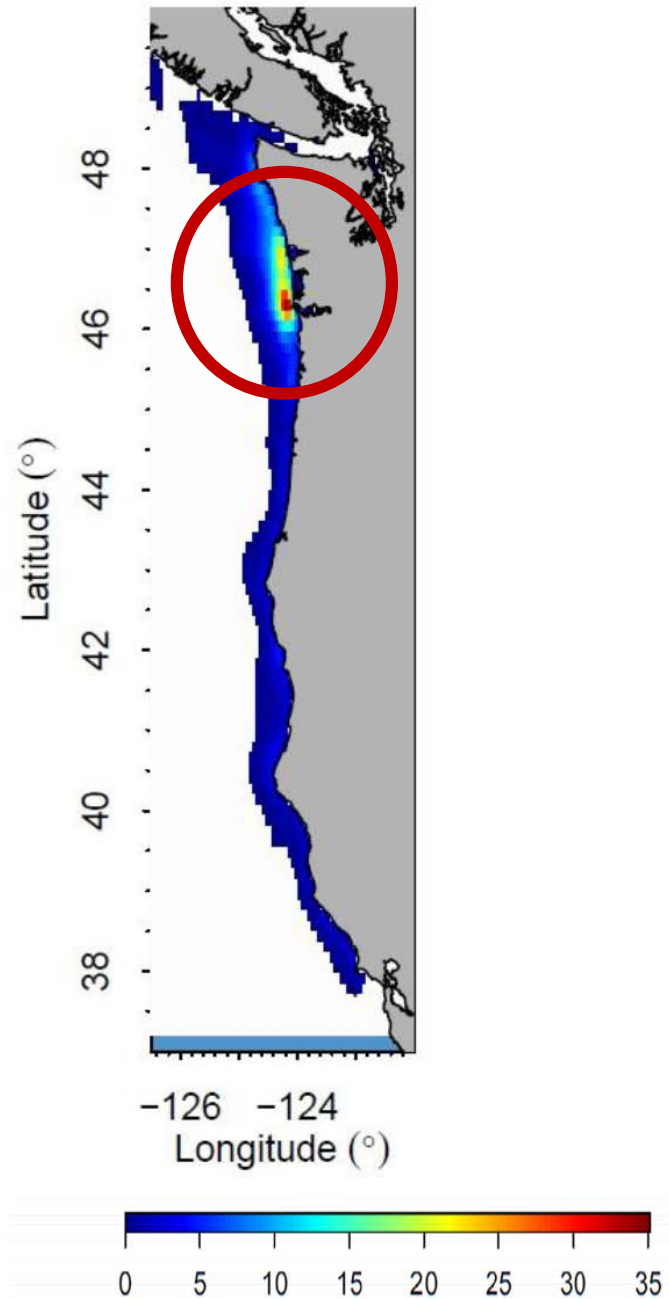
Source: NMFS 2008, SRKW Recovery Plan



Estimated Southern Resident orca spatial distribution for April 2007-2011 using simulated movement tracks, acoustics detections and confirmed sighting reports.

Hanson, M.B., E.J. Ward, C.K. Emmons, and M.M. Holt. 2018. Modeling the occurrence of endangered killer whales near a U.S. Navy Training Range in Washington State using satellite-tag locations to improve acoustic detection data. Prepared for: U.S. Navy, U.S. Pacific Fleet, Pearl Harbor, HI. Prepared by: National Oceanic and Atmospheric Administration, Northwest Fisheries Science Center under MIPR N00070-17-MP-4C419. 8 January 2018. 33 p.





Estimated density for K25 and L84 movement tracks. Heat map is scaled to a uniform distribution of habitat use. Dark red values indicate 35x higher than expected by chance.



Photo: Holly Fearnbach, NOAA



# Orca Need More Salmon Now

- SRKW U.S. recovery goal of 2.3% annual population growth over 28 years implies a 75% increase in energetic requirements. (Williams et al. 2011)
- Reducing salmon fisheries should be considered a precautionary and temporary mitigation measure while longer-term actions to improve salmon productivity take effect.



Photo: USFWS

“Relative importance of chinook salmon abundance on resident killer whale population growth and viability”

**Population Viability Analysis scenario:** A 51% reduction of ocean harvests rates on 5 large Chinook stocks: West Coast Vancouver Is., Columbia Upriver Bright, Fraser Late, Oregon Coastal and Puget Sound.

**Result:** “Mean stochastic population growth indicated a 1.80% annual increase with a mean expected population size of 166 [SRKW] in 35 years”

(Vélez-Espino et al. 2014)

# 12 of 16 priority Chinook stocks below the median

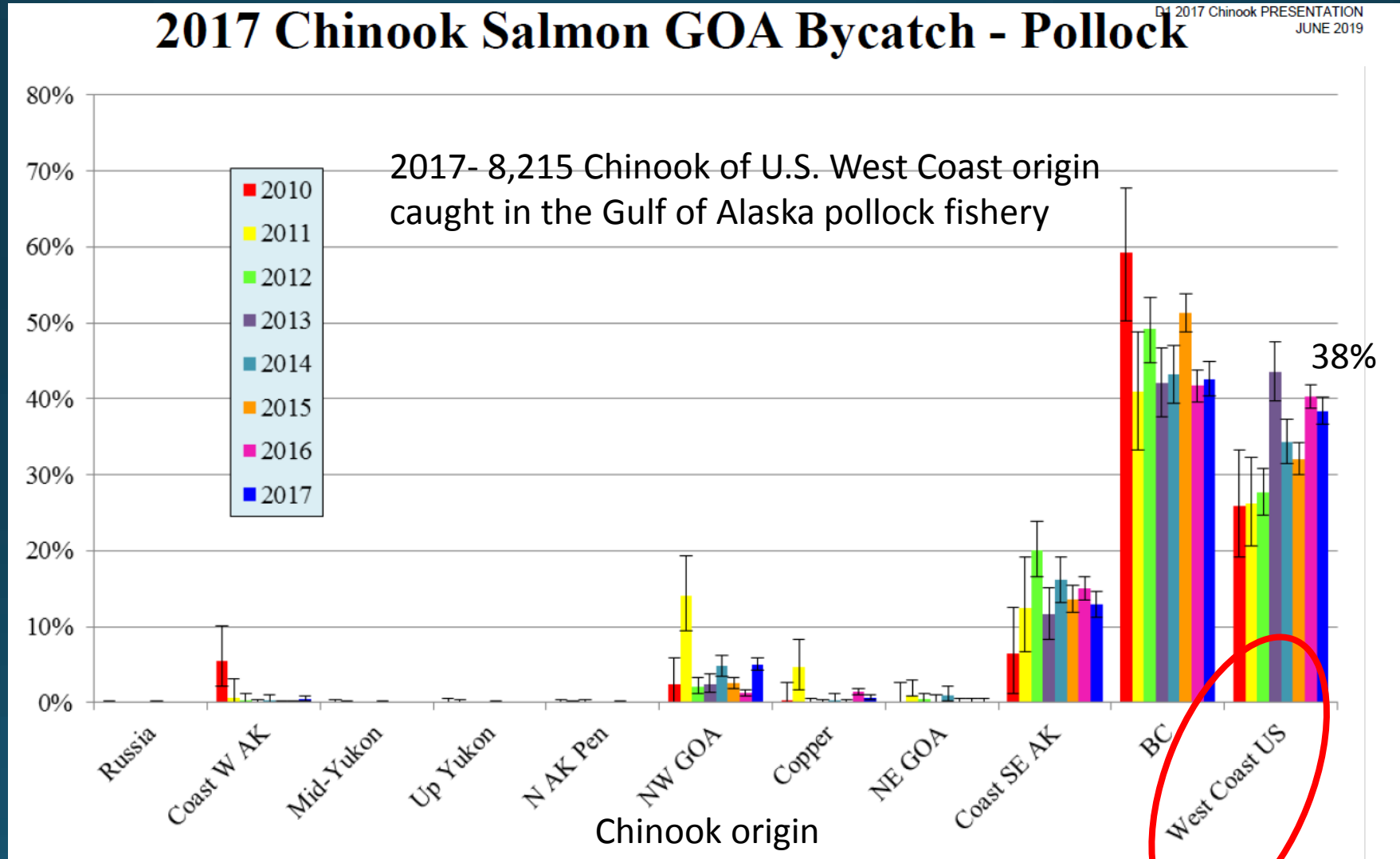
THOUSANDS OF FISH	1992-2016 Post Season			2019 Preseason	Percent increase/ decrease from median
	Q1	Q2	Q3		
	0-25%	25-75%	75-100%		
Priority Chinook Stock	Lower Quartile	Median	Upper Quartile		
Northern Puget Sound Fall	63.7	69.3	78.7	67.6	-2%
Southern Puget Sound Fall	98.6	142.2	162.6	175.5	23%
Lower Columbia Fall	96.1	139.4	234.9	116.6	-16%
Strait of Georgia Fall	131.3	172	234.5	167	-3%
Lower Columbia Spring	6.8	10.7	19.6	4.2	-61%
Upper Columbia/ Snake & Middle Columbia Fall	193.8	309.1	409.6	223.1	-28%
Northern Puget Sound Spring	4.9	6.8	8.6	13.4	97%
Washington Coast Fall	67.2	84.6	94.7	70.6	-17%
Fraser Spring & Fraser Summer	121.8	160.1	202.3	138.3	-14%
Middle & Upper Columbia Summer	17.7	55.5	77.6	35.9	-35%
Upper Willamette Spring	47	59.5	82	40.2	-32%
Southern Puget Sound Spring	1.3	2	3	4.3	115%
North & Central Oregon Coast Fall	117.3	162.2	181.7	139.3	-14%
West Coast Vancouver Island Fall	99.3	157.9	195.1	195.1	24%
Sacramento Fall	131	319.9	460.6	190	-41%
Klamath	65.2	90.9	165	98	8%
<b>Grand Total (not a sum of above quartiles)</b>	<b>1625.9</b>	<b>1843.5</b>	<b>2576.5</b>	<b>1679.1</b>	<b>-9%</b>



# Recommendations for analysis...

- Recent and below average priority Chinook runs should be a concern
- Shifted baseline: identify the correct “baseline”; one that reflects healthy and abundant Chinook salmon runs that provide for Southern Resident orca population growth.
- Include all priority Chinook stocks in the analysis even if not a major component of the fishery.

Cumulative effects: consider all sources of ocean fishing mortality, e.g...



# Recommendations for conservation and management...

- Identify and implement a critical Chinook abundance threshold – similar in concept to the ‘cutoff’ factor for forage fish in CPS FMP.
- Consider time and area closures to avoid competition with Southern Resident orca
- Amend salmon FMP with an objective of managing and regulating salmon fisheries in a manner that accounts for the foraging needs of Southern Resident orca.





Photo: Rachel Merrett