Trends in other Chinook salmon predators

Trends in other fish predators

1. Harbor seal abundance in BC and WA
2. Salmon in harbor seal diet in the San Juan Islands
3. Steller sea lion abundance
4. Salmon in Steller sea lion diet
5. California sea lion abundance

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In the 1970's, the BC harbor seal population was estimated at:
10,000

In 2010, the BC harbor seal population was estimated at:
105,000

Data Source: Peter Olesiuk, DFO survey data
DFO. 2010. Population Assessment Pacific Harbour Seal (*Phoca vitulina richardsi).* DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2009/011.

In the 1970's, the WA harbor seal population was estimated at:
5,000

In 1999, the WA harbor seal population was estimated at:
32,000

Data Source: Steven Jeffries, WDFW survey data
Jeffries et al. 2002. Trends and status of harbor seals in Washington state. J. Wildl. Manag. 67(1):208-219.

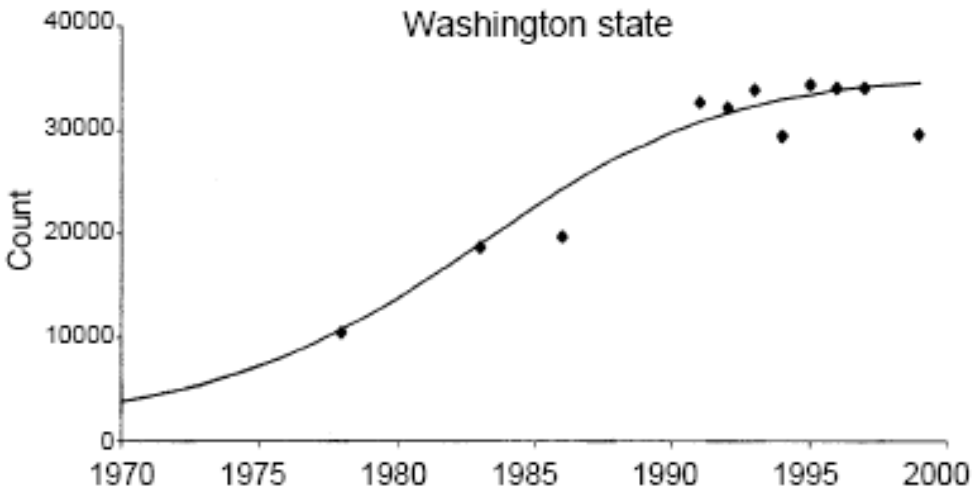
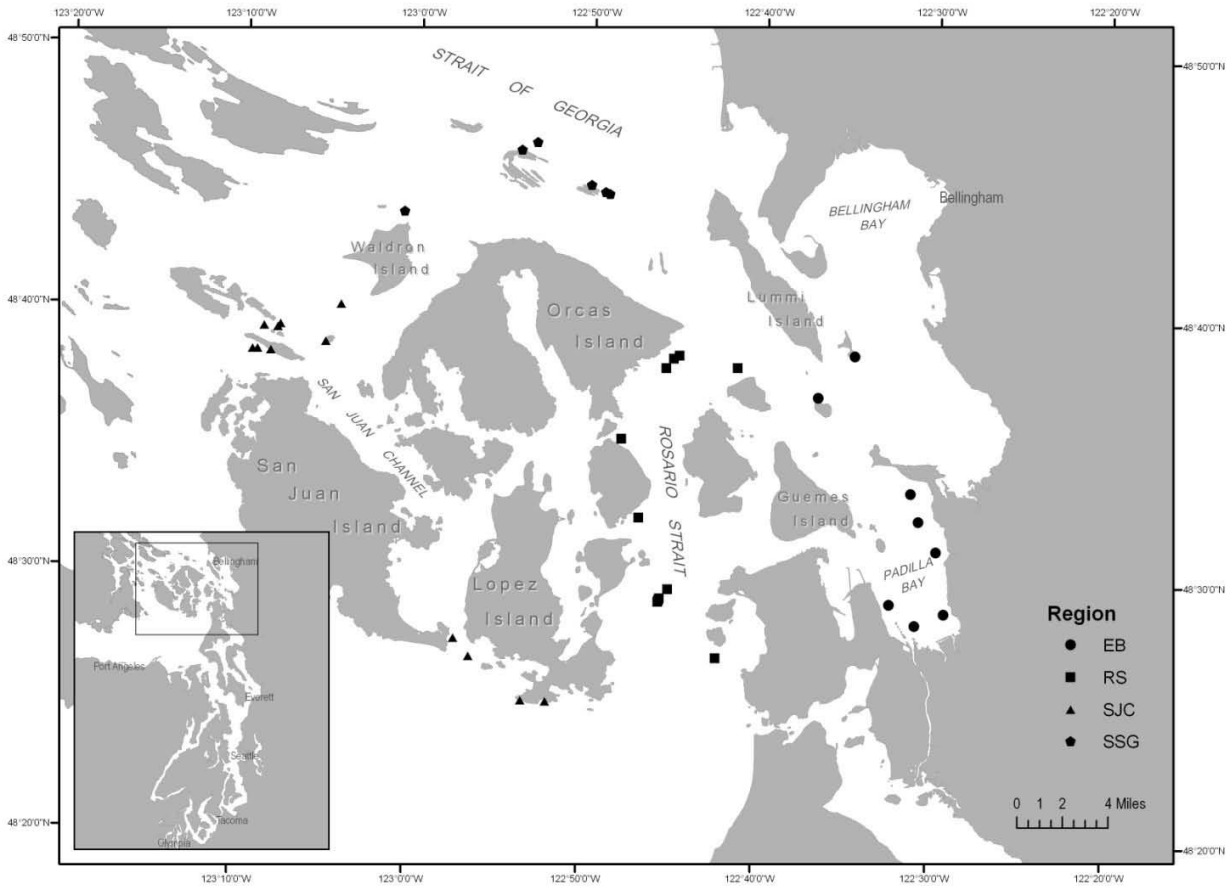


Fig. 5. Generalized logistic growth curve for harbor seals in Washington, USA, expressed population size. The observed values for 1978, 1983, 1986, 1994, and 1995 were supplemented with model predictions for regions with missing counts that accounted for 17, 12, 13, 5, and 8% of the total abundance.

Jeffries et al. 2002. Trends and status of harbor seals in Washington state. J. Wildl. Manag. 67(1):208-219.



Harbor seal scat collection sites in the San Juan Islands.

Lance et al. in prep

Frequency of occurrence (FO) of prey from scats collected at harbor seal haulout sites in the San Juan Islands by season from 2005 to 2008.

Prey	Summer/Fall	Winter	Spring
	n=1,193	*n=135*	*n=355*
Clupeids-mostly Herring with some Shad and Sardines	47.26	57.89	73.30
Add: Sandlance	16.06	32.83	25.02
Anchovy	1.19	17.50	10.02
Salmonids –			
Adults	57.95	11.24	4.16
Juveniles	16.61	1.46	2.65
Gadids - Walleye Pollack, Hake, Pacific Tomcod, Pacific Cod	21.05	28.88	35.67
Seasonally Important Prey-Skates, Stickleback, Sculpins, Flatfish, Rockfish, Snailfish, Shiner Perch and Dogfish	<5	5-15	5-10
Other Prey- Eelpouts, Gunnels, and Midshipman	<5	<5	<5

WDFW data; Lance et al. in prep

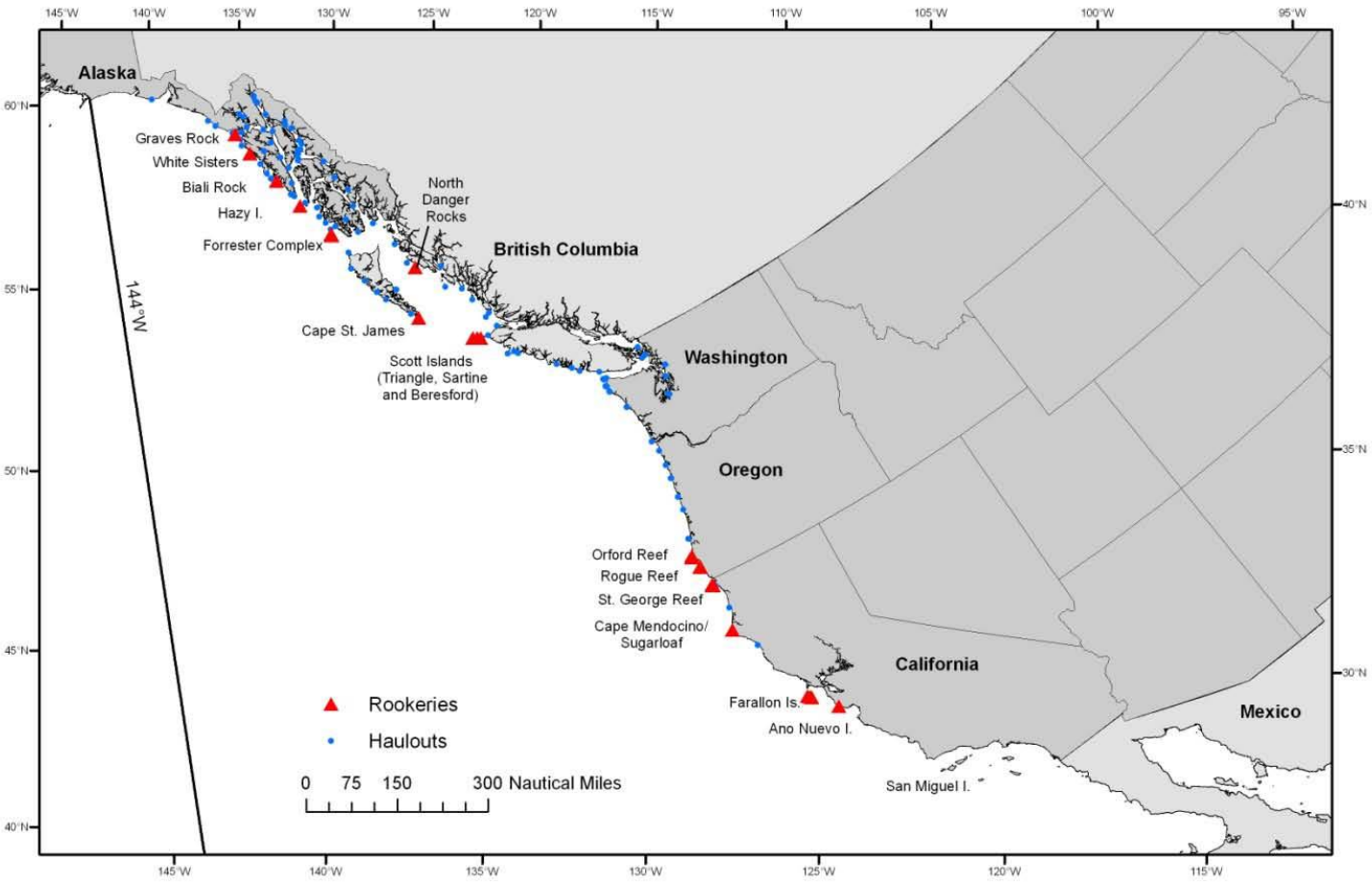
Salmon ID from Otoliths in Harbor Seal Scats from the San Juan Islands

		FO	
	n=1,193	n=135	n=355
	Summer/Fall	Winter	Spring
Adult Salmonids	57.95	11.24	4.16
No Otoliths=No Species ID	51.37	8.99	4.16
Species from Otoliths			
Pink n=22	2.00		
Coho n=19	1.60		
Chum n=19	1.59		
Sockeye n=9	0.81	2.25	
Chinook n=7	0.58		
Juvenile Salmonids	16.61	1.46	2.65
No Otoliths=No Species ID	11.58	0.73	1.09
Species from Otoliths			
Chinook n=57	4.75	0.73	1.56
Coho n=2	0.20		
Sockeye n=1	0.08		

In 1975, the eastern stock of Steller sea lions was estimated at:
12,000

In 2010, the eastern stock of Steller sea lions was estimated at:
53,000

Data sources: ADFG, DFO, WDFW, ODFW and NMFS;
NMFS 2010 SAR



Pitcher et al. 2007. Abundance and distribution of the eastern North Pacific Steller sea lion (*Eumetopias jubatus*) population. Fish. Bull. 107:102-115.

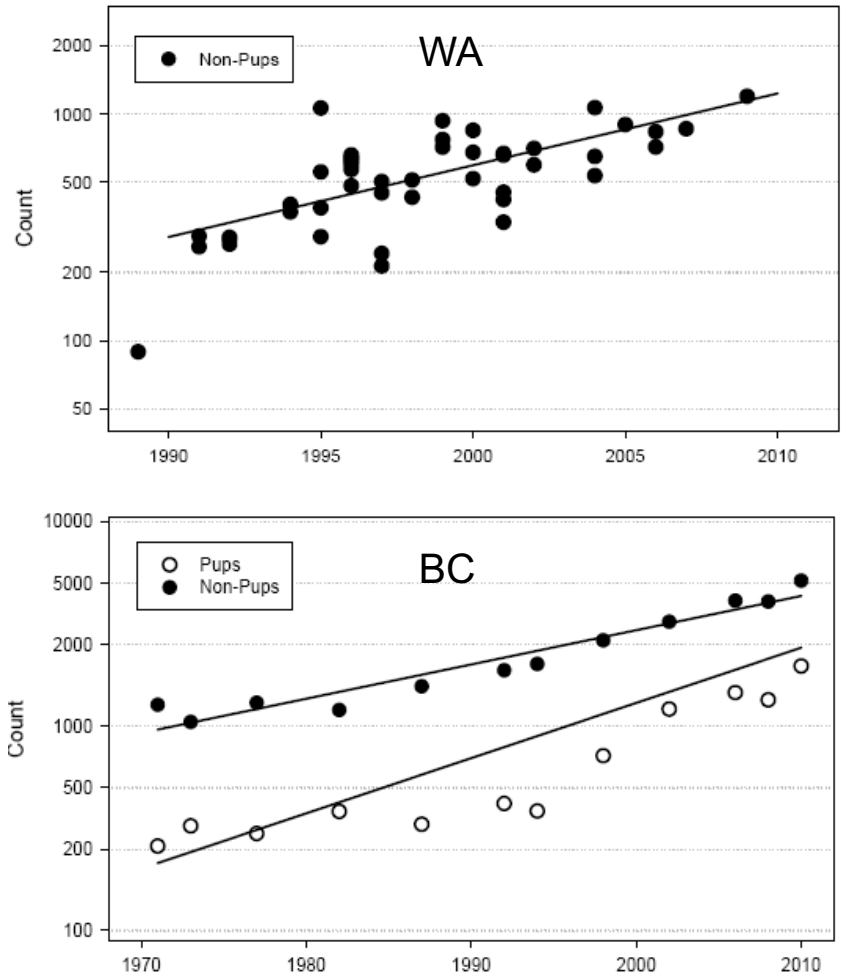


Figure 2. Trends in Steller sea lions in WA (top) and BC (bottom) based on aerial surveys conducted during summer breeding season.

WDFW and DFO unpublished survey data

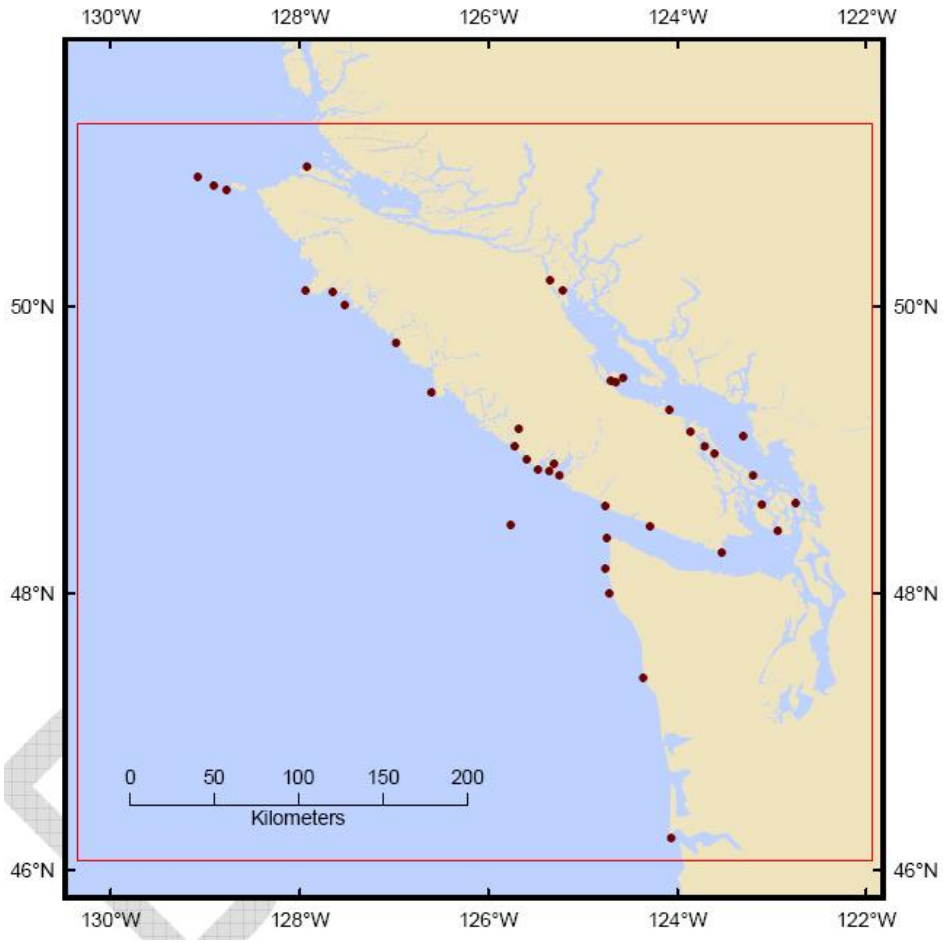


Figure 28. Steller sea lion scats collection sites in BC and WA.

From DFO and WDFW study for Pacific Salmon Commission

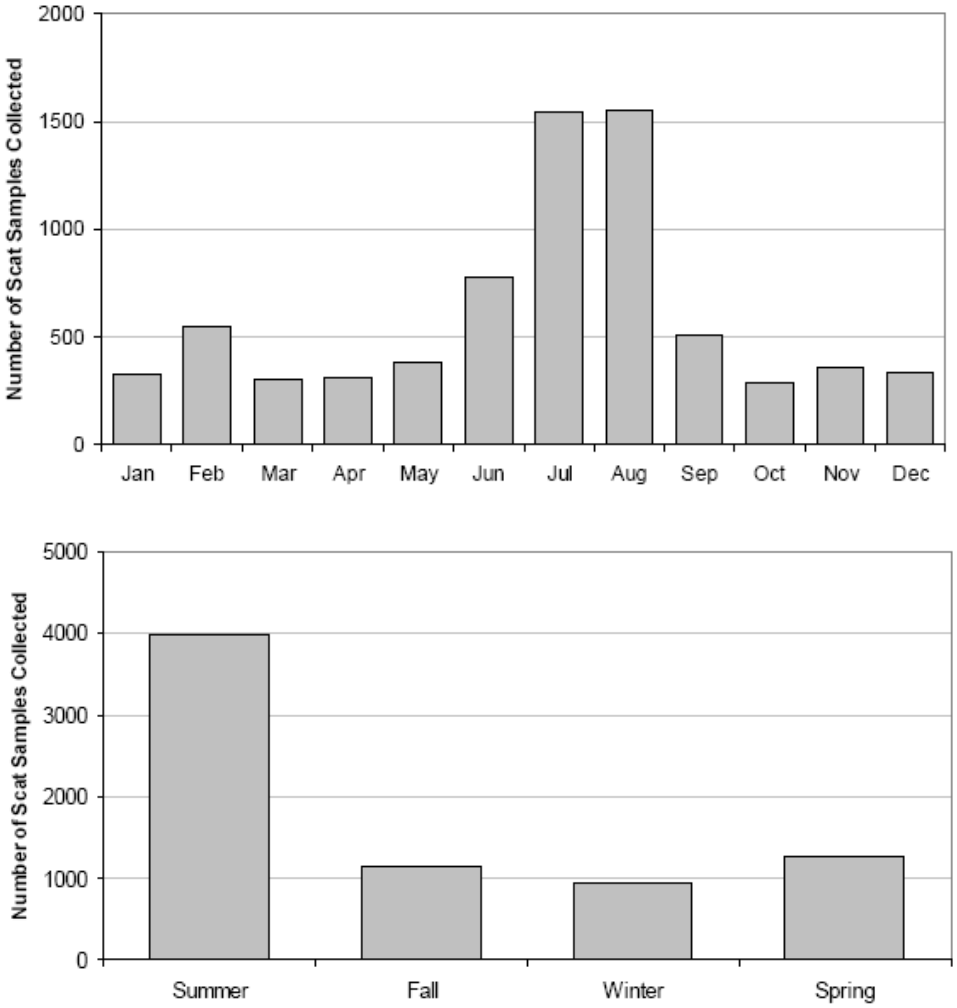


Figure 29. Histograms showing the number of Steller scats collected by month and season.

From DFO and WDFW study for Pacific Salmon Commission

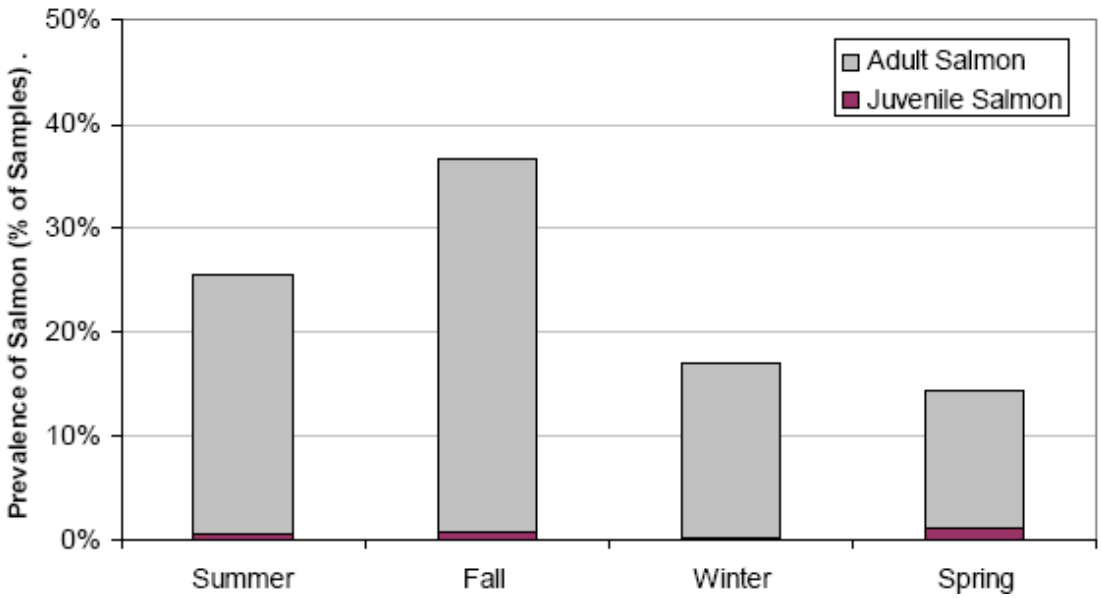


Figure 30. Prevalence of salmon in Steller sea lion scat samples by month.

From DFO and WDFW study for Pacific Salmon Commission

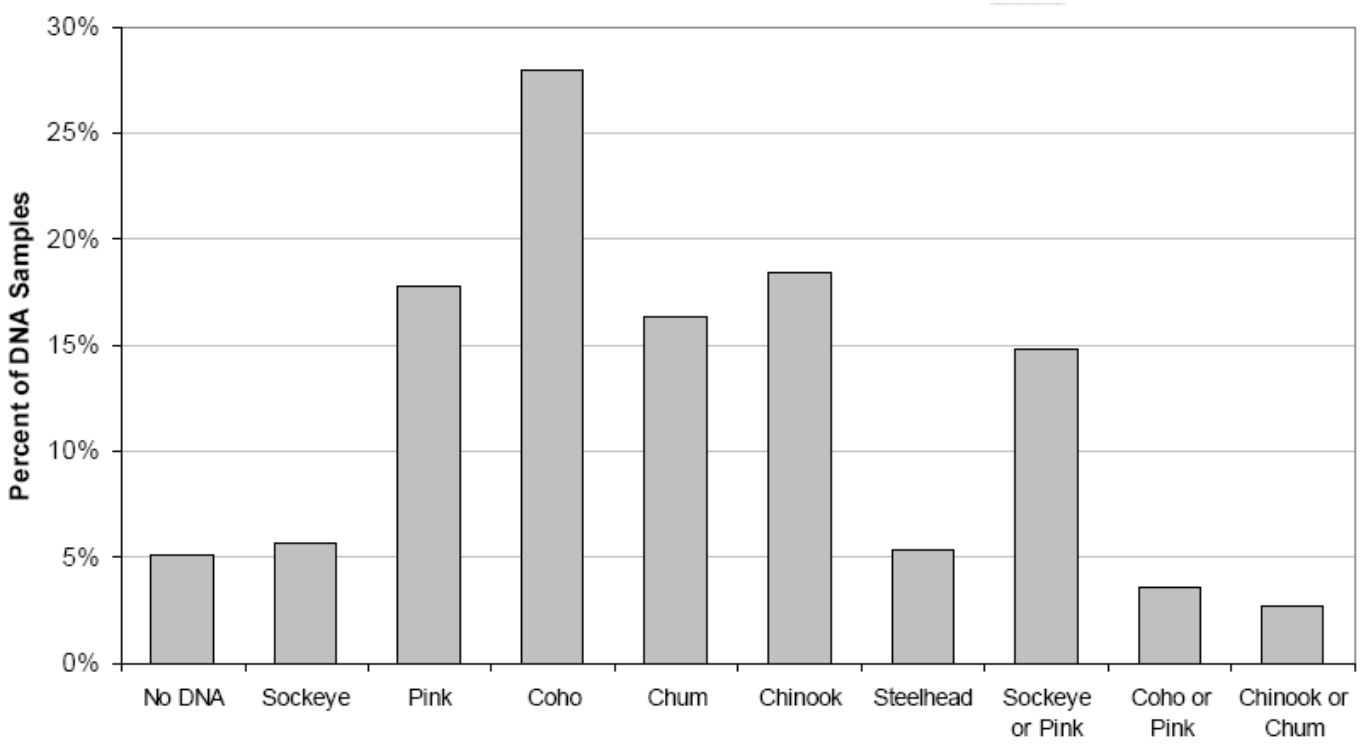


Figure 36. Species of salmon identified from DNA extracted from salmon bones.

From DFO and WDFW study for Pacific Salmon Commission

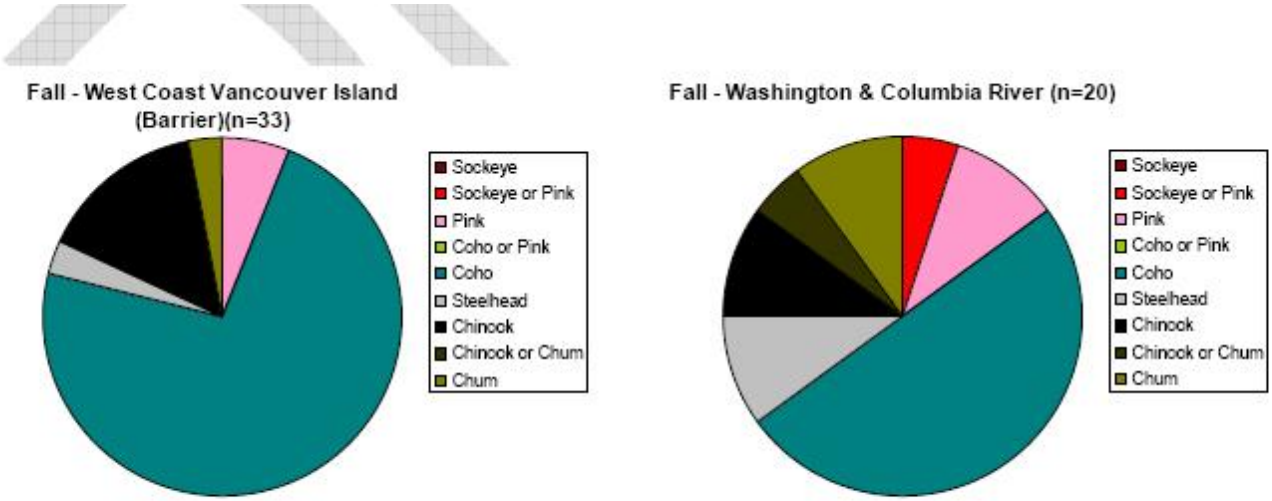


Figure 37b. Species of salmon consumed by Steller sea lions during fall on Barrier Islands off the west coast of Vancouver Island (left) and the Washington coast and Columbia River (right).

From DFO and WDFW study for Pacific Salmon Commission

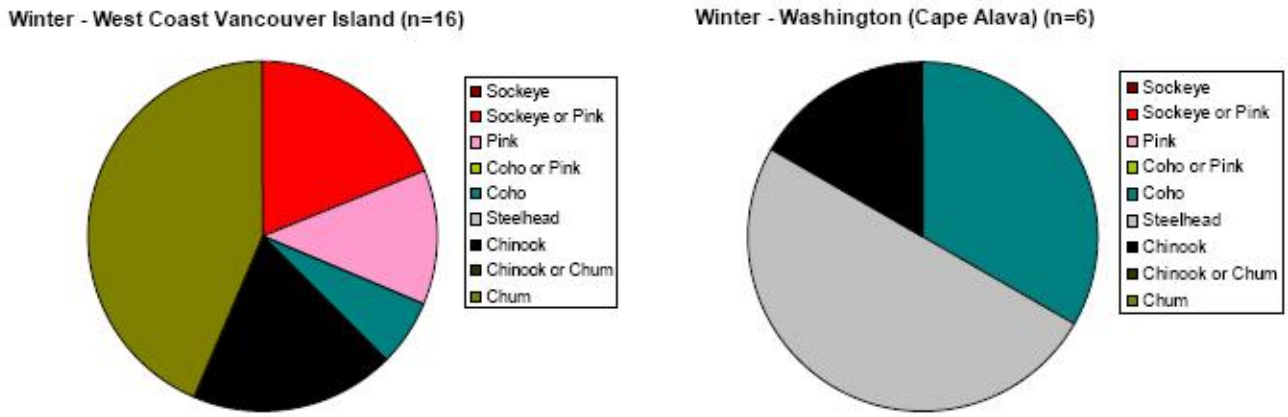


Figure 37c. Species of salmon consumed by Steller sea lions during fall based on very small numbers of samples off the west coast of Vancouver Island (left) and Cape Alava on the Washington coast (right).

From DFO and WDFW study for Pacific Salmon Commission

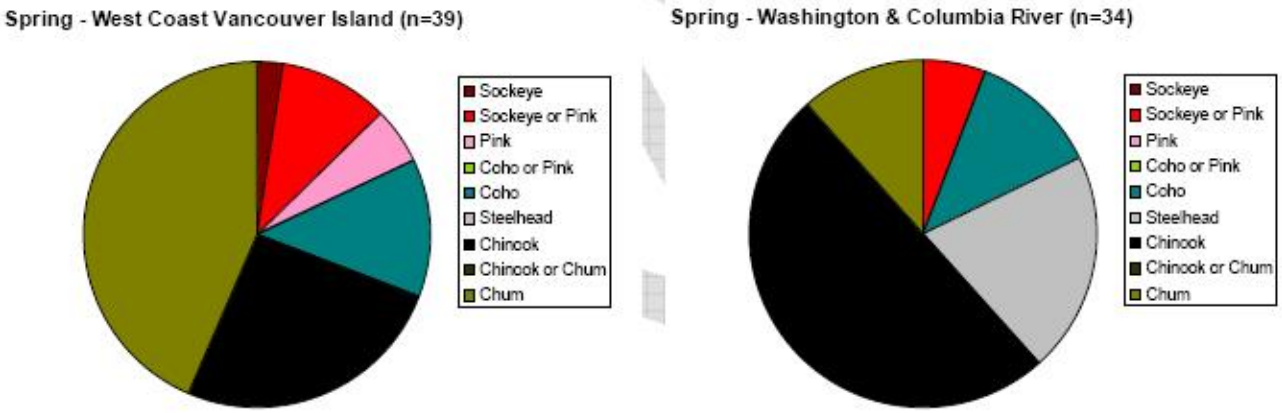


Figure 37d. Species of salmon consumed by Steller sea lions during spring off the west coast of Vancouver Island (left) and the Washington coast and Columbia River (right).

From DFO and WDFW study for Pacific Salmon Commission

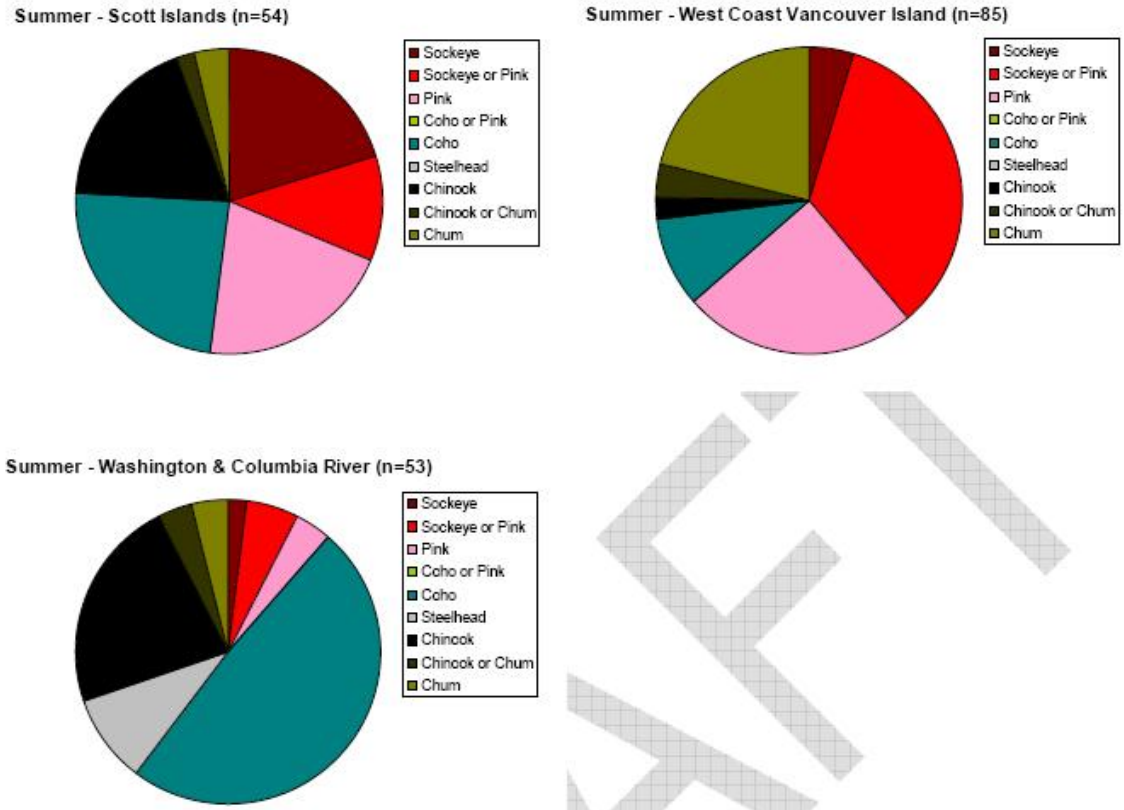


Figure 37a. Species of salmon consumed by Steller sea lions during summer at the Scott Islands (top left), northwest coast of Vancouver Island (top right), and Washington coast and Columbia River (lower left).

From DFO and WDFW study for Pacific Salmon Commission

In 1975, the U.S. California sea lion stock was estimated at:
50,000

In 2010, the U.S. California sea lion stock was estimated at:
297,000

Data sources: NMML and SWFSC, NMFS 2010 SAR


Questions/Discussion