

# Identifying regional variation in harbor seal fatty acid signatures using analysis of similarity (ANOSIM)



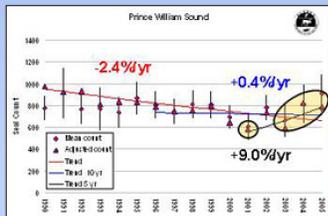
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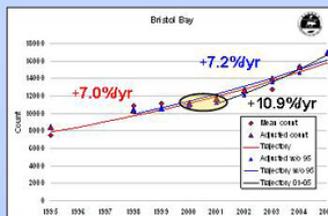
## BACKGROUND:

Harbor seal (*Phoca vitulina richardsi*) numbers have declined in several regions of Alaska over the past 2-3 decades (Frost et al. 1999, Matthews and Pendleton, 2006). A decline in prey availability and quality is a common hypothesis proffered to explain declines in several marine mammal populations (Trites 1992, Merrick et al. 1997, Pitcher et al. 1998). Fatty acid (FA) patterns in prey influence the lipid stores of their predators and inferences about diet and foraging ecology can be made (Iverson et al. 2002). Small blubber samples collected from free-ranging animals can supply information about diet that is not limited to the last meal or dependent on the recovery and identification of undigested material or durable prey pieces.

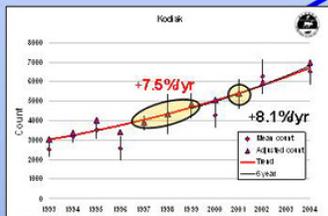
Harbor seal population trend data courtesy of Grey Pendleton, Alaska Department of Fish and Game, Douglas, AK



Blubber samples were collected in Prince William Sound (PWS) during 2001, 2002, 2003 and 2005, n = 133.



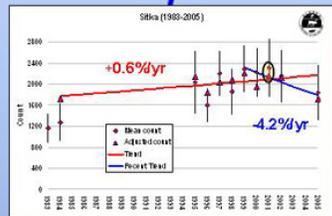
Blubber samples were collected in Bristol Bay (BB) during 2000 and 2001, n = 85.



Blubber samples were collected on Tugidak Island (TUG) from pups during 1997, 1998, 1999 and 2001, n = 63.



Blubber samples were collected in Glacier Bay (GB) during 2004 and 2005, n = 63.



Blubber samples were collected in Southeast (SE) near Sitka during 2001, n = 8.

## METHODS:

Blubber FA composition was compared from 352 harbor seals sampled in 5 regions of Alaska with differing population trends. Samples were analyzed at the ASET lab, University of Alaska Anchorage, using GC-FID and MS.

## DATA ANALYSIS:

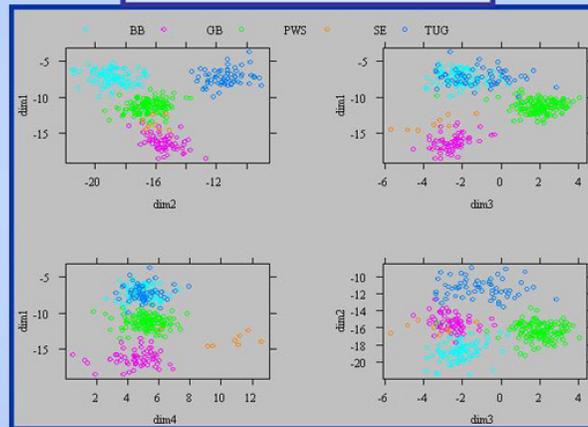
Analysis of similarity (ANOSIM) and discriminate function analysis were used to compare harbor seal blubber FA signatures from five regions of Alaska with differing population trends.

ANOSIM R values for fatty acid signatures from five regions in Alaska, p values in parenthesis. (R values range from -1 to 1, positive values indicate a difference between groups, if no difference R=0, and p values test whether R=0.)

	BB	GB	PWS	SE
GB	0.568 (0.000)			
PWS	0.644 (0.000)	0.355 (0.000)		
SE	0.666 (0.000)	0.769 (0.000)	0.779 (0.000)	
TUG	0.526(0.000)	0.82 (0.000)	0.837(0.000)	0.59 (0.003)



## Discriminate Analysis



	BB	GB	PWS	SE	TUG	Error
BB	83	0	1	0	0	0.012
GB	0	61	1	0	0	0.016
PWS	1	0	131	1	0	0.015
SE	0	0	1	7	0	0.125
TUG	1	0	2	1	59	0.063
Overall						0.026

Cross-validation table: DFA assigned seals to correct region 97% of the time.

## PRELIMINARY CONCLUSIONS:

1. Harbor seal blubber FA signatures are significantly different between all five regions, suggesting a difference in diet among these five regions.
2. Harbor seal blubber FA signatures for GB and PWS, the two decreasing populations, are the most similar and the most different from the increasing population in Tug. This suggests that diet may, in part, explain why different harbor seal populations in Alaska are behaving differently.

The next steps.....

The Tugidak sample was composed of pups, in PWS pups differed from non-pups, thus Tugidak may not be directly comparable to the other regions. Data will be separated into sex and age groups and re-analyzed.

QFASA analysis will be performed paired with information from stomach content and scat analysis.

## ACKNOWLEDGEMENTS:

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