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**Aleutian and Bering Sea Islands
Landscape Conservation Cooperative**

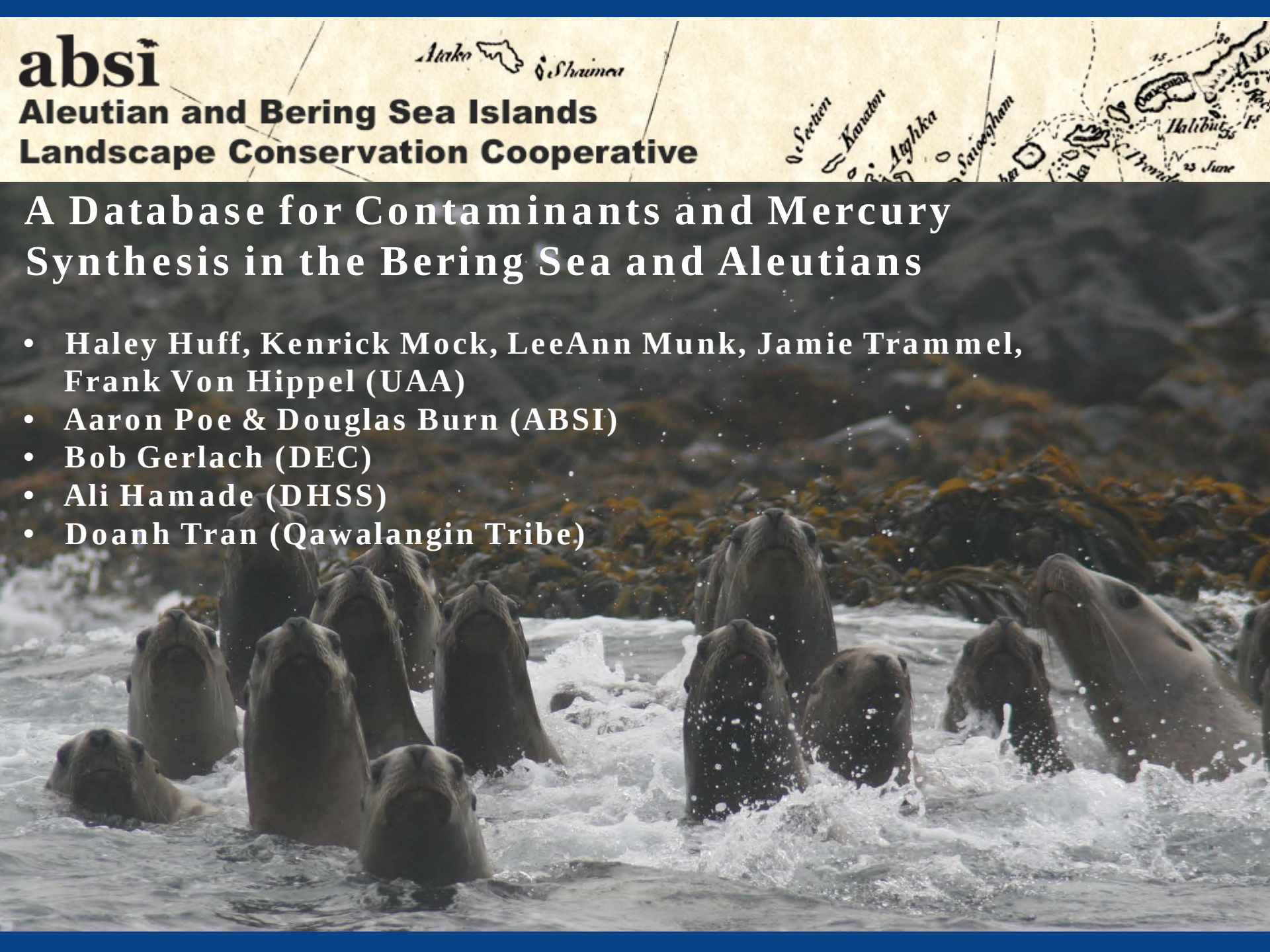
Atka  *Shumagin*

Seiden
Karaton
Agikha
Sivogham

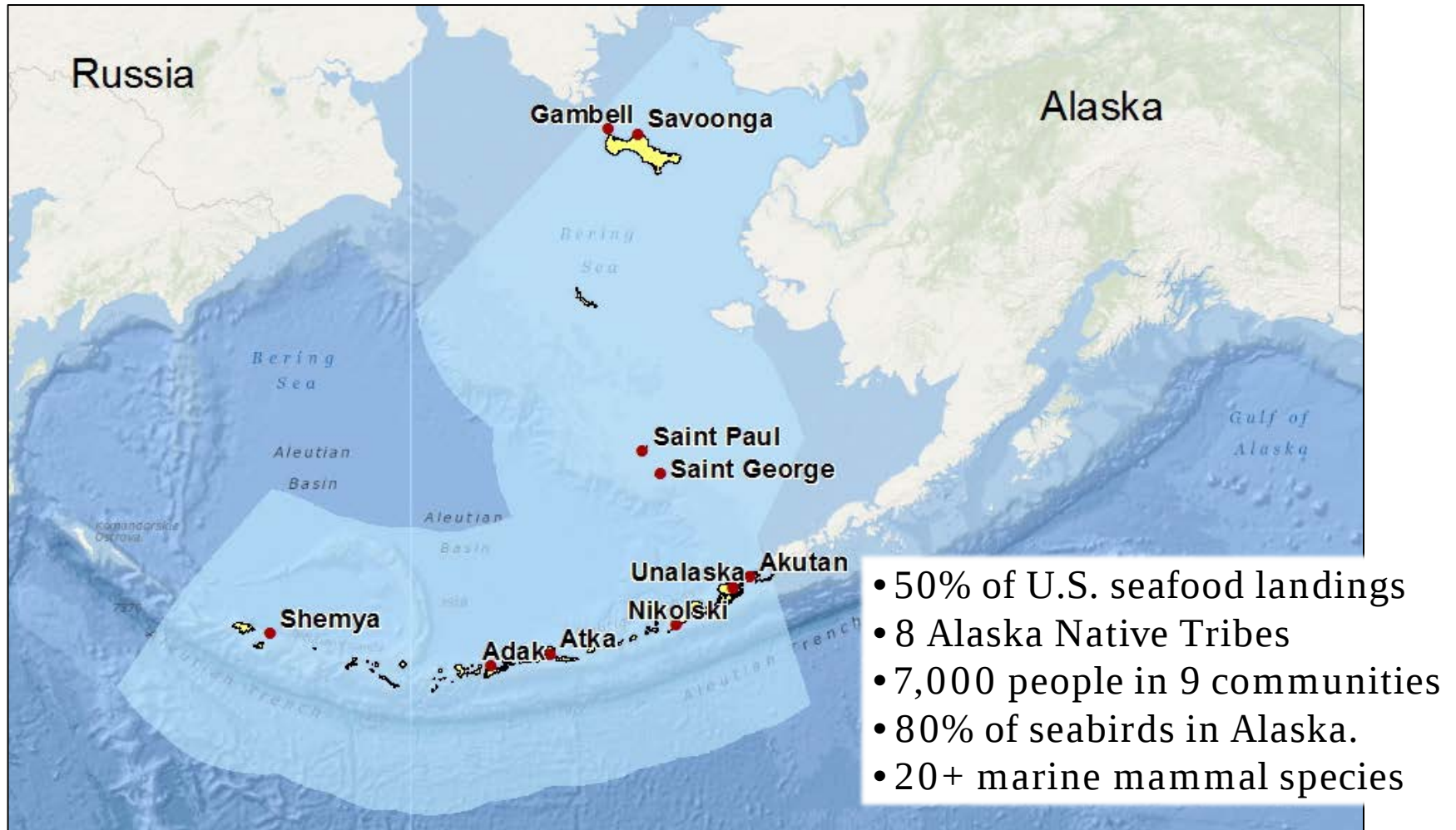
Halibut
23 June

A Database for Contaminants and Mercury Synthesis in the Bering Sea and Aleutians

- Haley Huff, Kenrick Mock, LeeAnn Munk, Jamie Trammel, Frank Von Hippel (UAA)
- Aaron Poe & Douglas Burn (ABSI)
- Bob Gerlach (DEC)
- Ali Hamade (DHSS)
- Doanh Tran (Qawalangin Tribe)



Our geography, resources and communities



Our Conservation Priorities

Key Resources

- Seabirds
- Marine Mammals
- Fish/Shellfish
- Terrestrial vegetation
- Cultural Artifacts/Sites

Key Ecosystem Services

- Commercial Fishing
- Subsistence Culture
- Food Webs
- Human Community Sustainability



Read more:

<http://absiLCC.org>

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We are concerned about:

Emerging Landscape-Scale Environmental Threats:

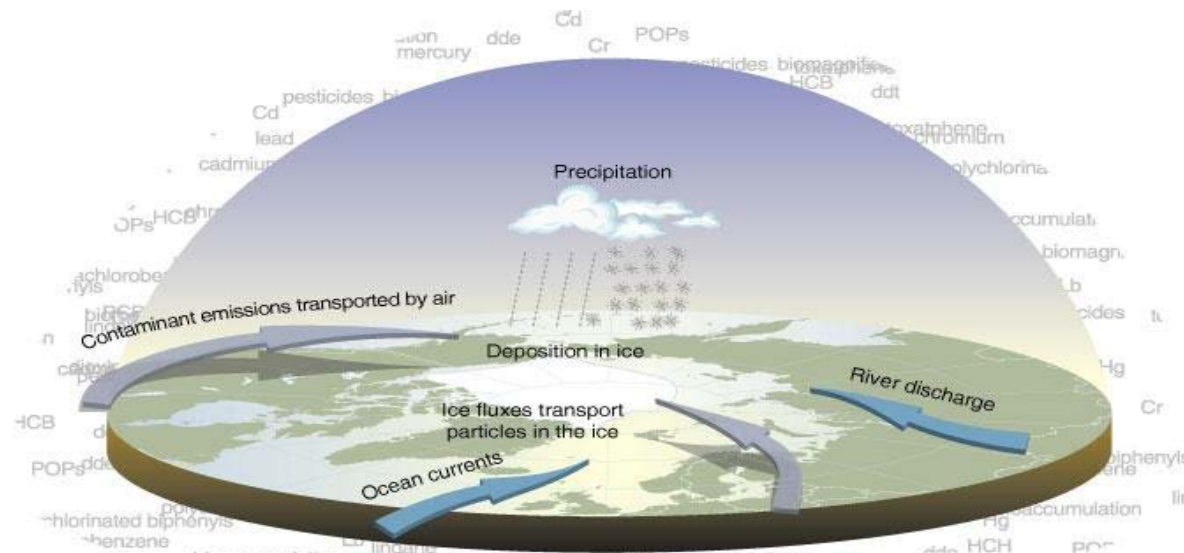
- Climate Change
- Marine Vessel Traffic
- Invasive and Introduced Species
- **Contaminants and Pollutants**



Contaminants risks to species and the communities that depend on them...

A partnership with 3 interconnected parts:

- 1) Building and populating a database of “PTEs” (metals) populated with water, soil, rock sample data for the Aleutians
- 2) A regional metadata, database of contaminants data sets
- 3) A spatial & seasonal synthesis of mercury from fish, seabird, and marine mammal tissue data



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Alaska  *Shumner*



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absilcc.org and [@ABSILCC](https://www.instagram.com/ABSILCC)**



A Database for the Distribution of Potentially Toxic Elements in the Aleutian Volcanic Arc Terrestrial Ecosystem

LeeAnn Munk

Haley Huff

Kenrick Mock

Evan Riley



UNIVERSITY *of* ALASKA
ANCHORAGE

UAA Connection

- Ongoing study to understand carbon dioxide consumption through the weathering processes on high latitude volcanic arcs
- Research in the Aleutians
- Geochemical data and potentially toxic elements

Online database

- Vision is a clearing house for existing databases (e.g. USGS) and new data collected by researchers, all accessible online

Eg, rock and sediment USGS data:

SampleID	SampleType	SampleDate	Latitude	Longitude	Location	SampleSource	SampleDepth	Si_pct	Si_AM	Ti_pct	Ti_AM	Al_pct	Al_AM
P124-0	sediment	5/6/1965	50	-165	Aleutian Trench	marine	0 cm	10.11111	ES_SQ	0.3	ES_SQ	7	ES_SQ
P124-10	sediment	5/6/1965	50	-165	Aleutian Trench	marine	10 cm	10.11111	ES_SQ	0.3	ES_SQ	7	ES_SQ
P124-20	sediment	5/6/1965	50	-165	Aleutian Trench	marine	20 cm	10.11111	ES_SQ	0.3	ES_SQ	7	ES_SQ
P124-30	sediment	5/6/1965	50	-165	Aleutian Trench	marine	30 cm	10.11111	ES_SQ	0.3	ES_SQ	7	ES_SQ
P124-40	sediment	5/6/1965	50	-165	Aleutian Trench	marine	40 cm	10.11111	ES_SQ	0.2	ES_SQ	7	ES_SQ

Sample ID	Sample Type	Sample Date	Latitude	Longitude	Volcano	Location	SiO2_pct	SiO2_AM	TiO2_pct	TiO2_AM	Al2O3_pct	Al2O3_AM	FeTO3_pct
MW99-1	rock	2/7/2000	54.56028	-164.86917	Westdahl	Unimak	50.3	WDX_Fuse	1.38	WDX_Fuse	18	WDX_Fuse	11.5
MW99-2	rock	2/7/2000	54.52472	-164.35472	Westdahl	Unimak	54.6	WDX_Fuse	1.52	WDX_Fuse	17.7	WDX_Fuse	10
MW99-3	rock	2/7/2000	54.45361	-164.93306	Westdahl	Unimak	58.2	WDX_Fuse	1.44	WDX_Fuse	15.8	WDX_Fuse	9.72
MW99-4	rock	2/7/2000	54.43194	-165.8925	Westdahl	Unimak	54.7	WDX_Fuse	1.44	WDX_Fuse	18	WDX_Fuse	9.97
MW99-5	rock	2/7/2000	54.49611	-164.62778	Westdahl	Unimak	52.9	WDX_Fuse	1.43	WDX_Fuse	18.2	WDX_Fuse	10.7
MW99-7	rock	2/7/2000	54.54917	-165.44694	Westdahl	Unimak	54	WDX_Fuse	1.3	WDX_Fuse	18.7	WDX_Fuse	9.25
MW99-8	rock	2/7/2000	54.55361	-165.38194	Westdahl	Unimak	61.8	WDX_Fuse	1	WDX_Fuse	16	WDX_Fuse	8.14
MW99-9	rock	2/7/2000	54.55528	-165.60667	Westdahl	Unimak	58.1	WDX_Fuse	1.7	WDX_Fuse	15.4	WDX_Fuse	10.3

Web Interface

- Under development

Sample Type

- ☐ Rock
☐ Water

Location

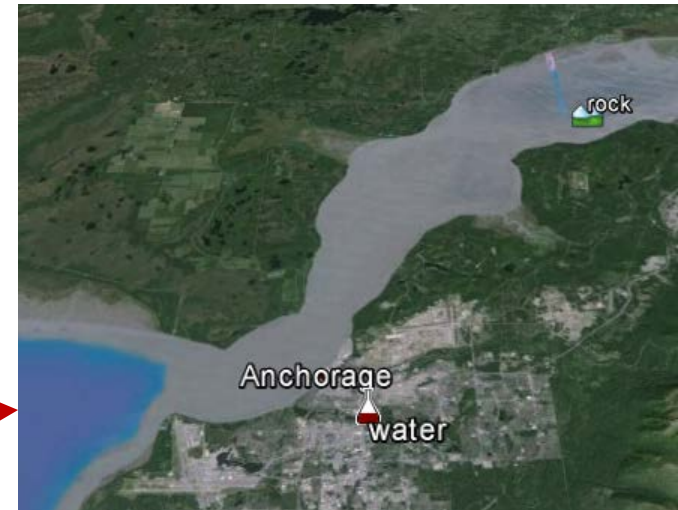
Augustine ▼

► Oxides

▼ Water

In Query	Min	Item	Max
☐	14.8	<= Temp <=	14.8
☐	3.21	<= pH <=	3.21
...			

KML HTML



Database Design

Sample Table

SampleID	TypeID	SampleDate	Latitude	Longitude	Source	SampleDescription	LocationID	LocationDescription	MetalID	Comment
1	1	1/1/1945	61.400381	-149.963129	outcrop	Medium gray pumice	1	West Island	100	Anything
2	2	2/1/1946	61.200381	-149.863129	marine	Water sample, very strong sulfur smell here!	2	Williwaw Cove formation on southeast coast 1 mile southwest of Pratt Point	100	Anything here

SampleType Table

TypeID	Name
1	rock
2	water

Location Table

LocationID	Name	Volcano	Description
1	Augustine	Augustine	
2	Little Sitkin	Little Sitkin	
3	Chiginagak		

Metadata Table

MetalID	DBName	Contact	Datum	CoordinateSystem	Zone	QueryFields	UnitsFields
100	USGS Geochem	Rachel Carson 907-999-9999, rc@epa.gov	WGS84	UTM	10	SiO2,Temp,pH,As_ppm, ...	(As,ppm), (Weight,pounds), (Hg,mg/L)

Database Design

WaterSample Table

SampleID	SampleDepth_cm	MeshPoreSize	pH	...
2	20	-80		

RockSample Table

SampleID	GeologicAge	Stratigraphy	...
1	Holocene	Westdahl volcanics	

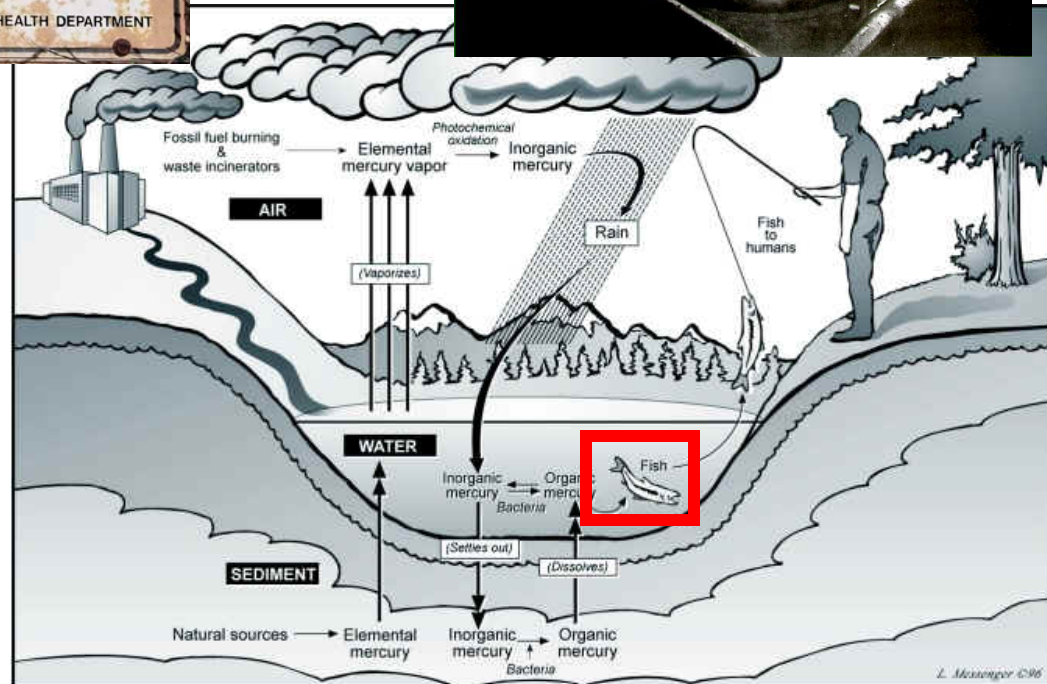
SampleData Table (may have holes)

SampleID	SiO2_pct	SiO2_AM	TiO2_pct	TiO2_AM	... big list continues
1	1.5	NN	0.61	XRF	
1	1.3	XRF	0.61	XRF	
2			1.2	ES_SQ	

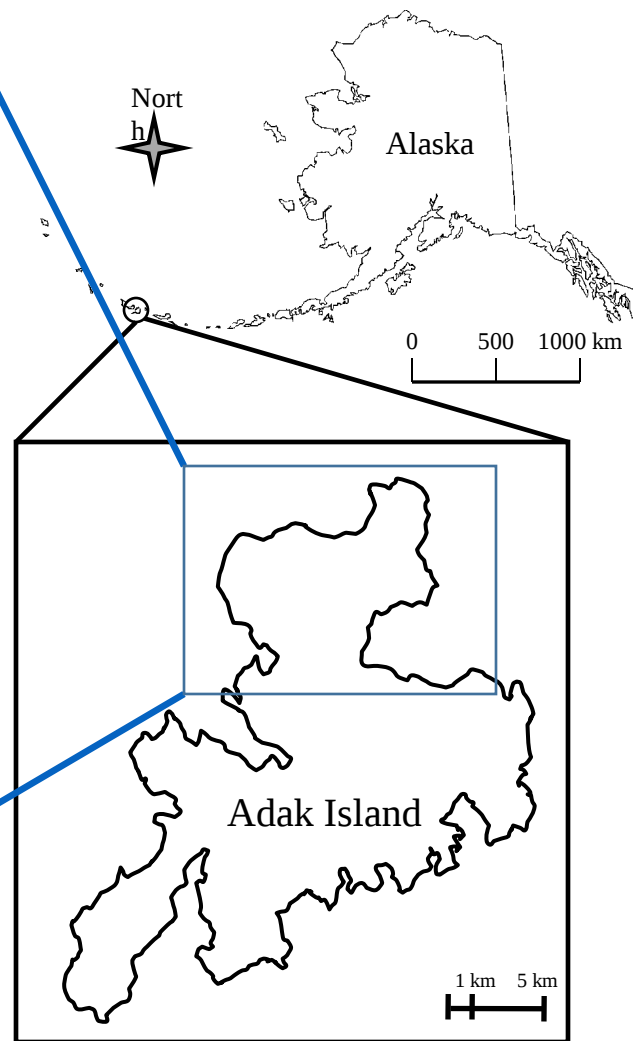
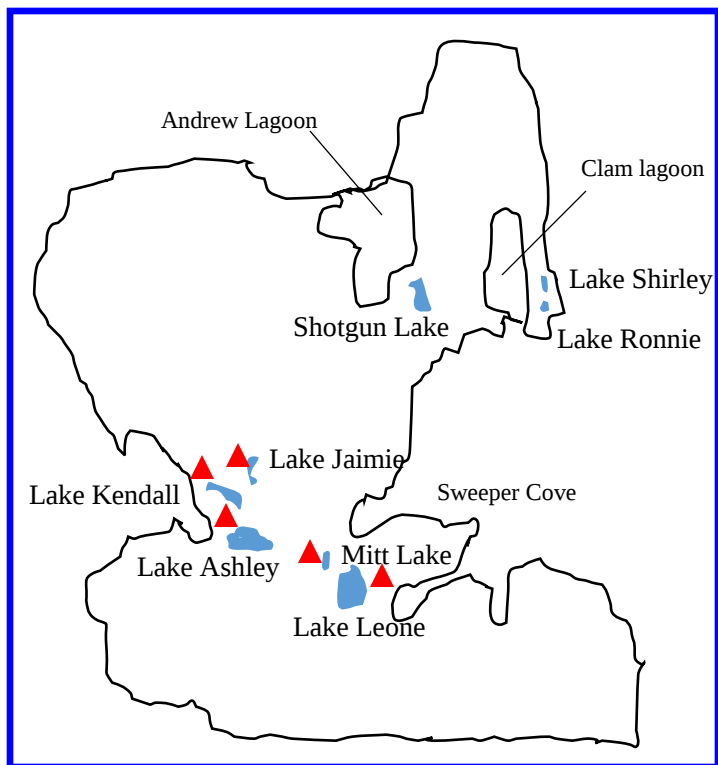
Metadata Database for Biological Data

- Parallel but connected effort
- Started to include actual biological data but instead linking to other databases/researchers
 - Geospatial query
 - Fields indicating database content
 - Option to upload data
- Build social network of researchers

Why study Hg?



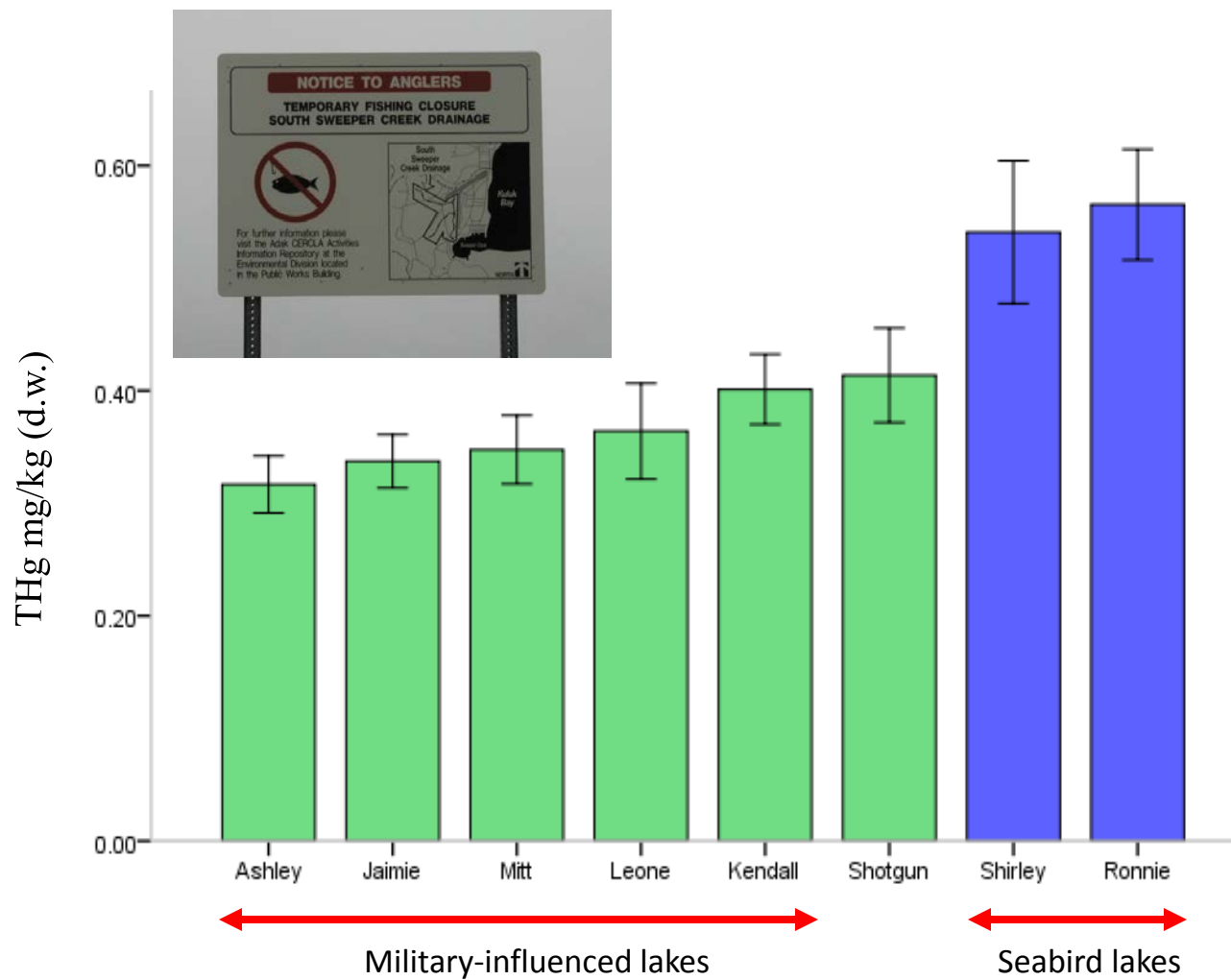
<http://health.state.tn.us/environmental/mercury.htm>

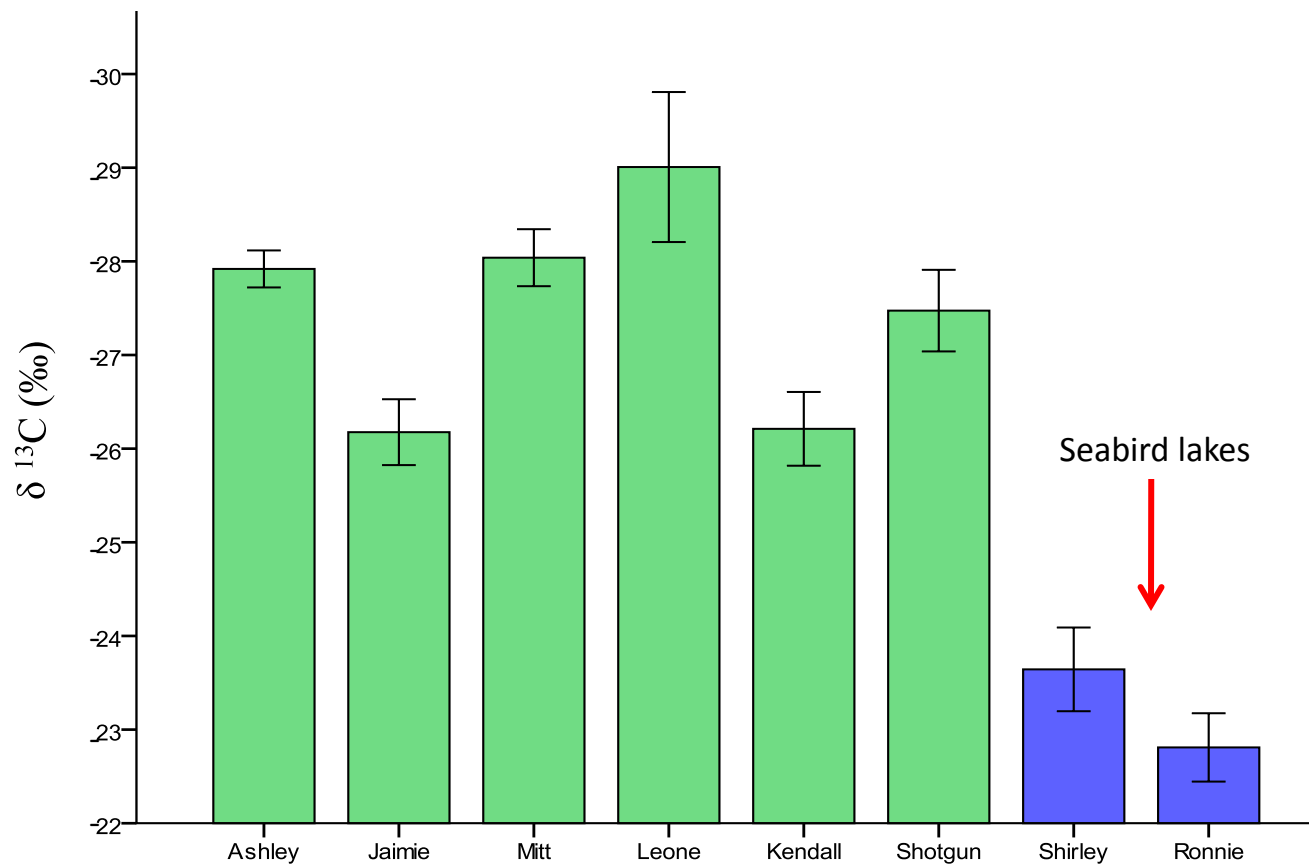


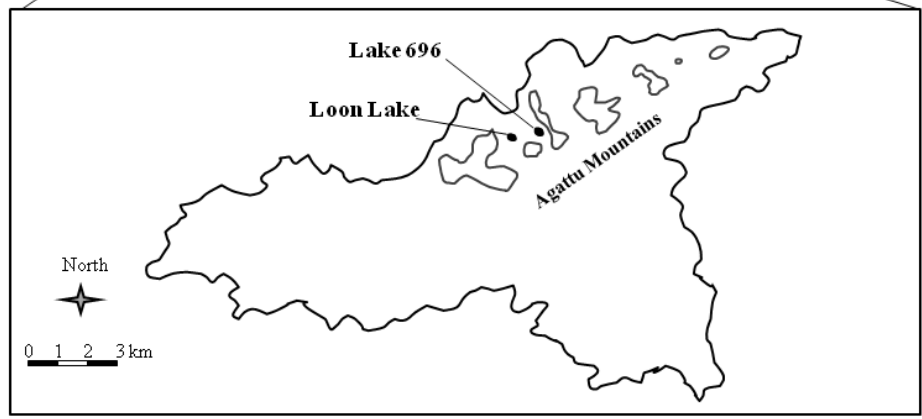
Kenney, L.A., von Hippel, F.A., Willacker, J.J. & O'Hara, T.M. (2012). Mercury concentrations of a resident freshwater forage fish at Adak Island, Aleutian archipelago, Alaska. *Environmental Toxicology and Chemistry* 31(11):2647-2652.

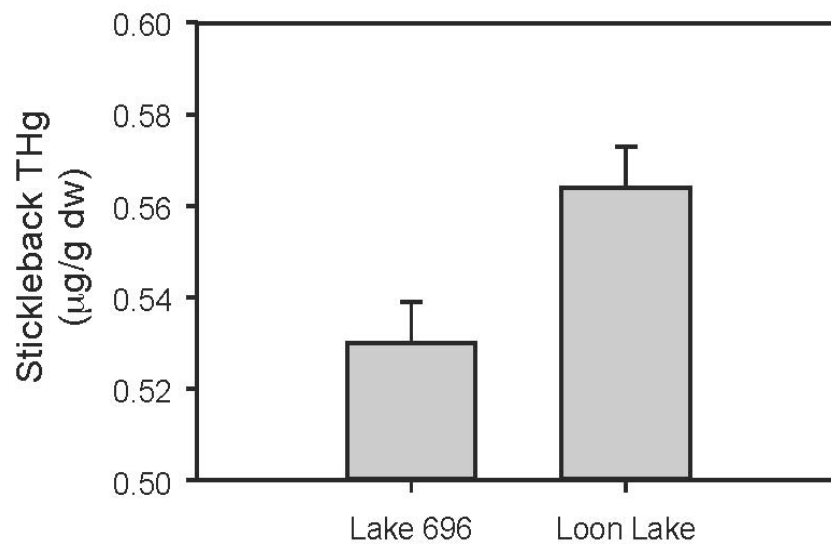
Formerly used defense sites (FUDS) vs. seabirds



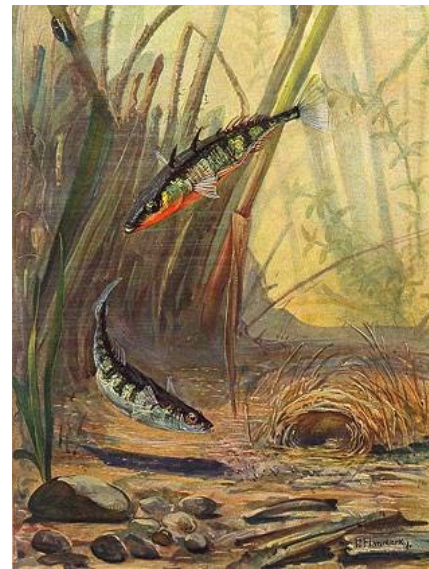
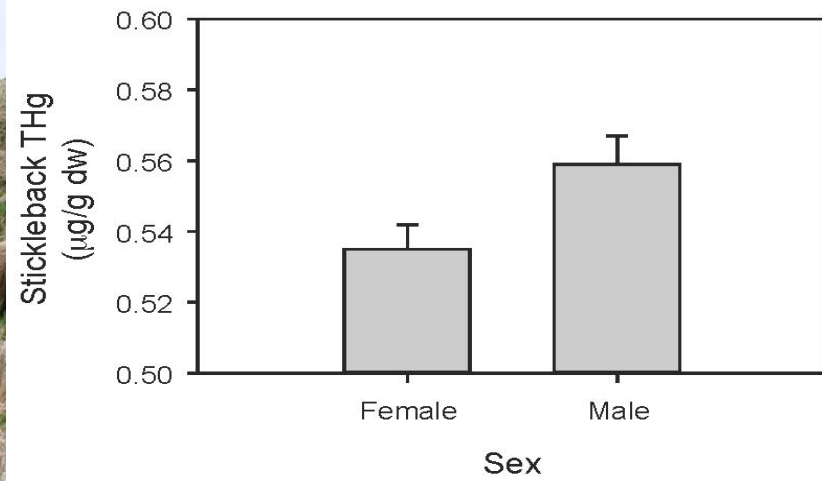






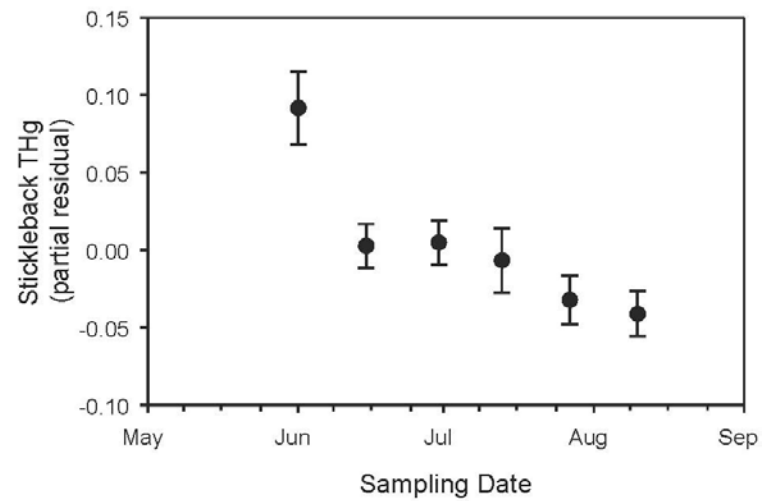


Kenney, L.A., Eagles-Smith, C.A., Ackerman, J.T. & von Hippel, F.A. (2014). Temporal variation in fish mercury concentrations within lakes from the western Aleutian archipelago, Alaska. *PLoS One* 9(7):e102244.





The Okay News and the Bad News for Fish-Eating Birds



Collaborators:
Leah Kenney
Collin A. Eagles-Smith
Josh Ackerman
Robb Kaler





What are the effects of:

- o military vs. non-military sites?
- o seabird use of lakes?
- o proximity to volcanic activity?
- o east-west trend related to atmospheric deposition from China?
- o within-island vs. between-island variation?



n = 1121 Dolly Varden and stickleback

Longitudinal gradient of 11 islands spanning over 3,000km and including islands with and without a history of military occupation

North Pacific Hg modeling conclusions:

- Mercury concentrations for stickleback and Dolly Varden differed significantly among islands, but...
 - no apparent longitudinal trends in mercury concentrations related to potential long-range transport from Asia
 - nor were there differences in fish mercury concentrations between military and non-military islands
 - nearest active volcano to the east a significant factor
- Greater variation within islands than among islands...
 - Whatever the patterns of atmospheric deposition of inorganic Hg, local processes appear to govern bioavailability
- Fish mercury concentrations were higher throughout our sampled islands than in lakes in mainland Alaska
- At all islands, mean fish mercury levels exceeded Environment Canada's advisory level for fish-eating wildlife (0.033 mg/kg ww)
 - ABSI region is habitat for 80% of seabirds in the United States