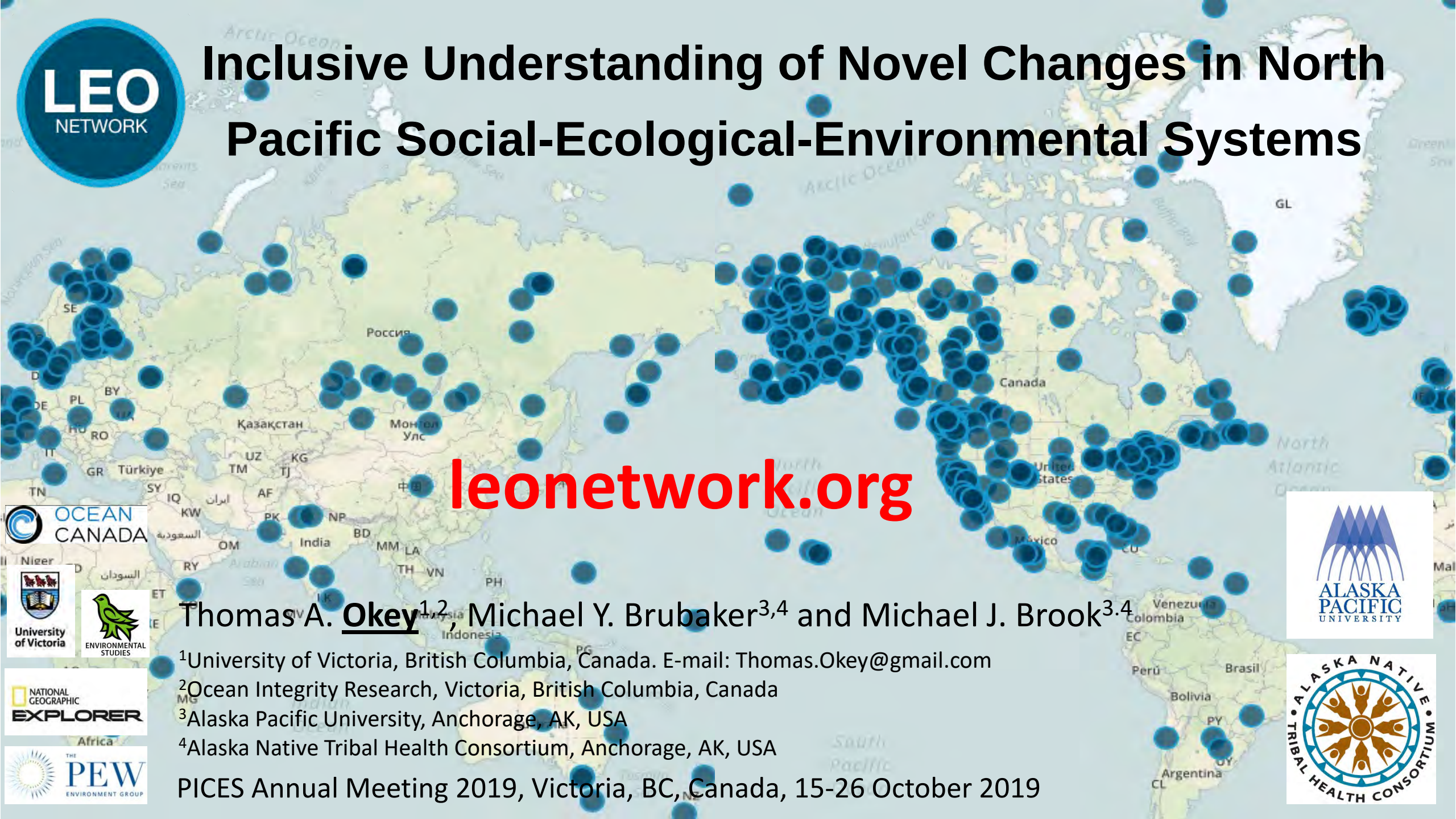
Inclusive Understanding of Novel Changes in North Pacific Social-Ecological-Environmental Systems

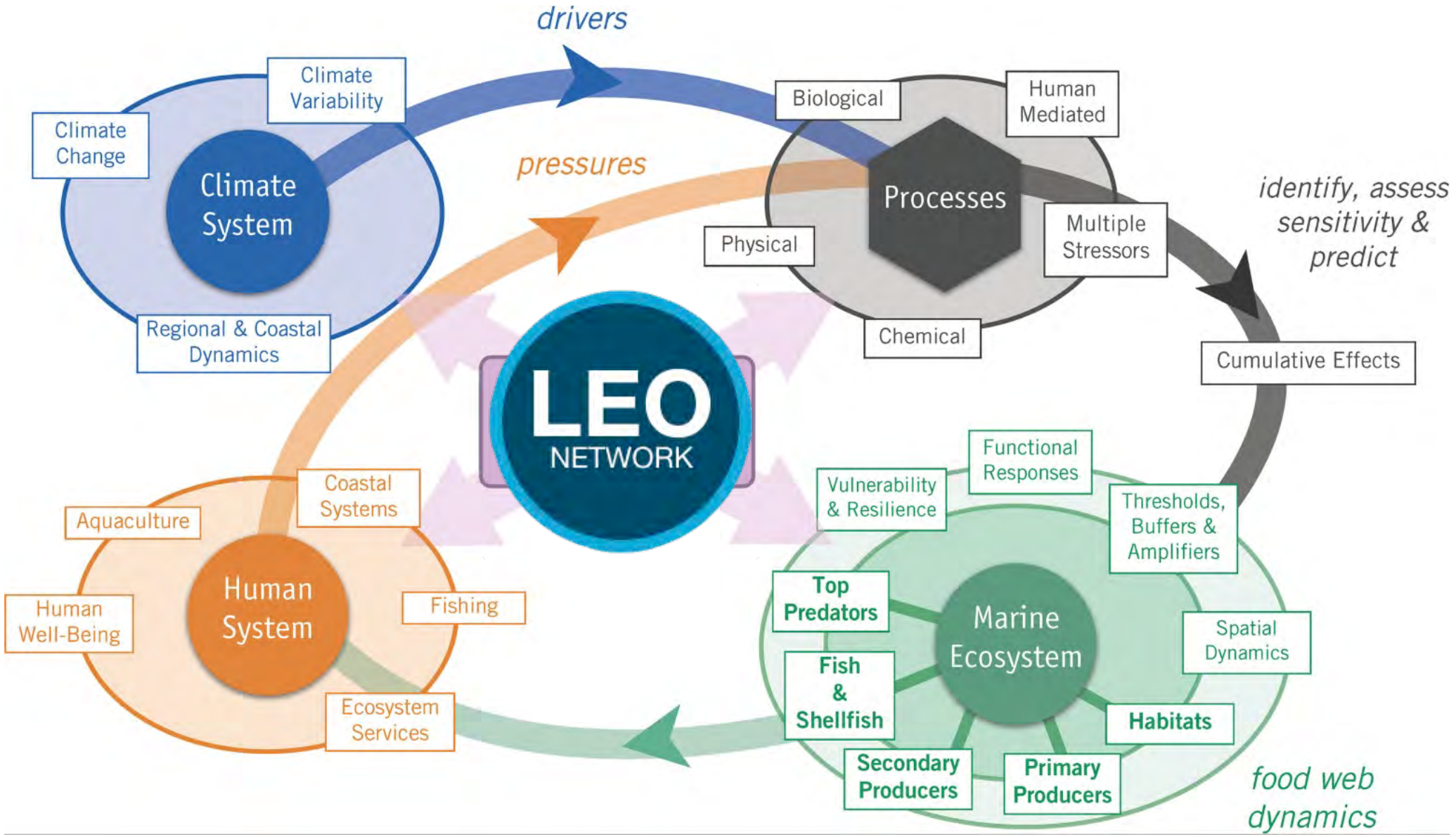


Thomas A. **Okey**[1,2], Michael Y. Brubaker[3,4] and Michael J. Brook[3,4]

[1]University of Victoria, British Columbia, Canada. E-mail: Thomas.Okey@gmail.com
[2]Ocean Integrity Research, Victoria, British Columbia, Canada
[3]Alaska Pacific University, Anchorage, AK, USA
[4]Alaska Native Tribal Health Consortium, Anchorage, AK, USA

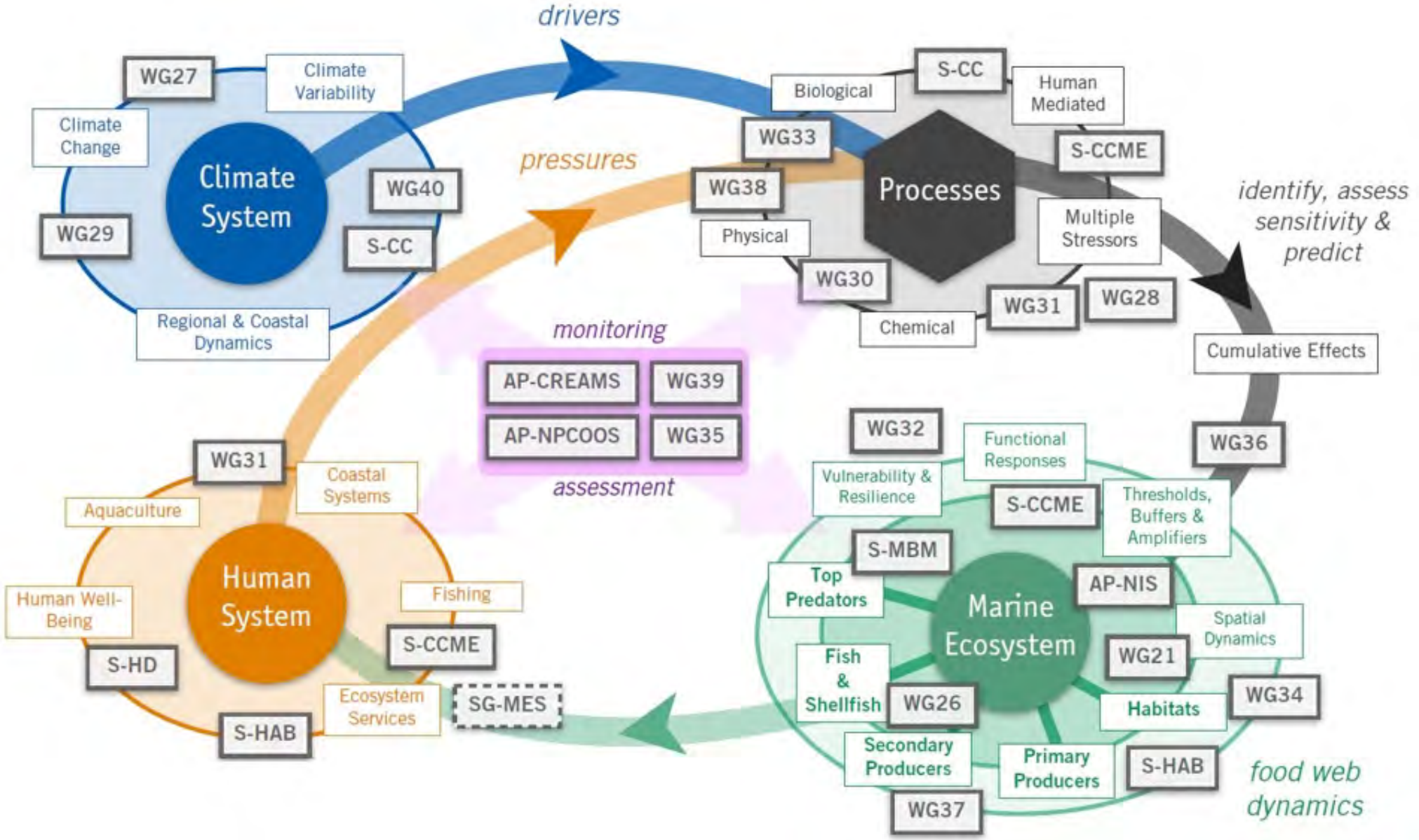
PICES Annual Meeting 2019, Victoria, BC, Canada, 15-26 October 2019

The North Pacific Social–Ecological–Environmental System



Bograd et al. 2019. Developing a Social–Ecological–Environmental System Framework to Address Climate Change Impacts in the North Pacific. Frontiers in Marine Science 6.

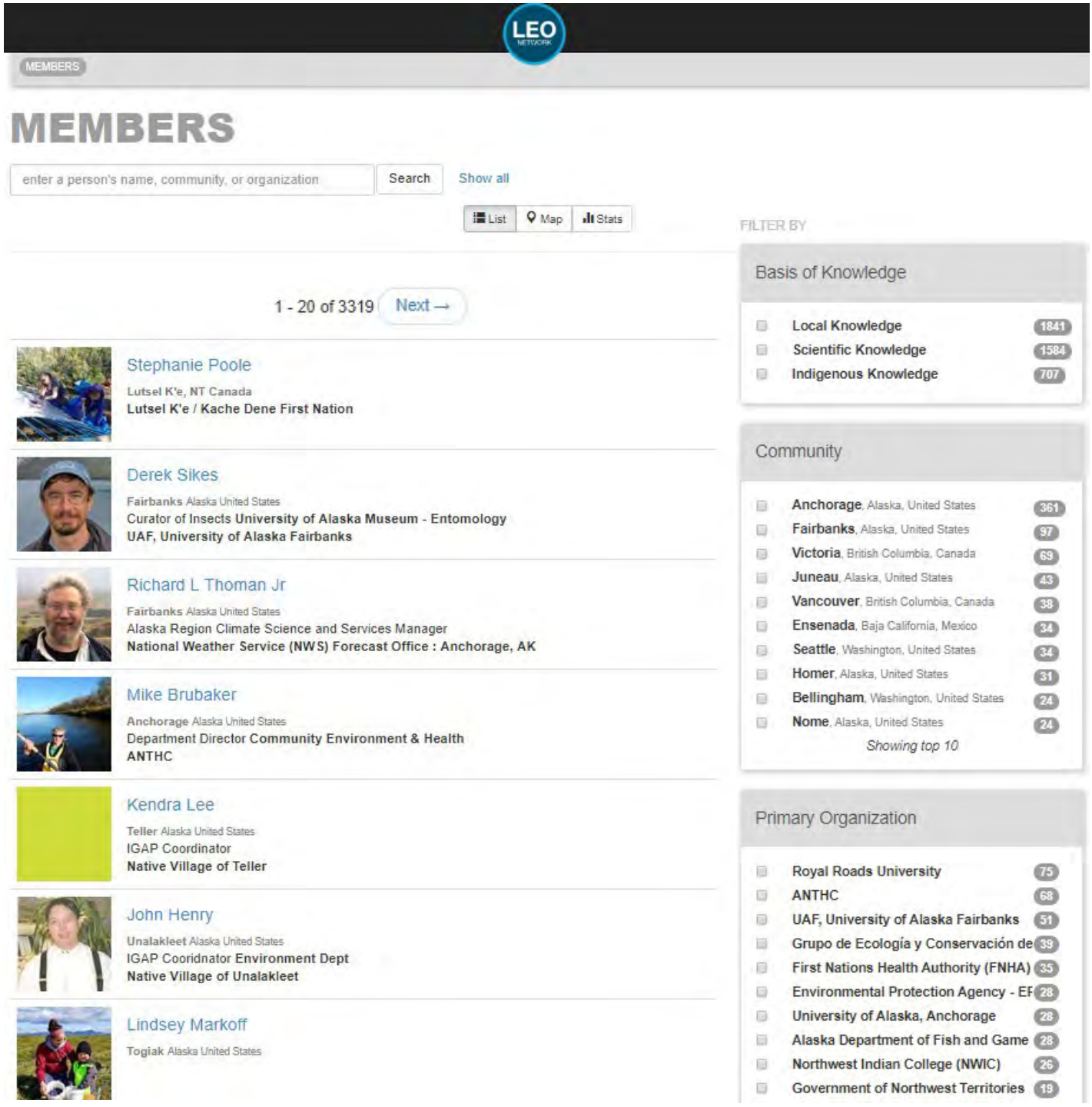
LEO and the Elements of the FUTURE Science Program



Bograd et al. 2019. Developing a Social–Ecological–Environmental System Framework to Address Climate Change Impacts in the North Pacific. Frontiers in Marine Science 6.

A Network of People

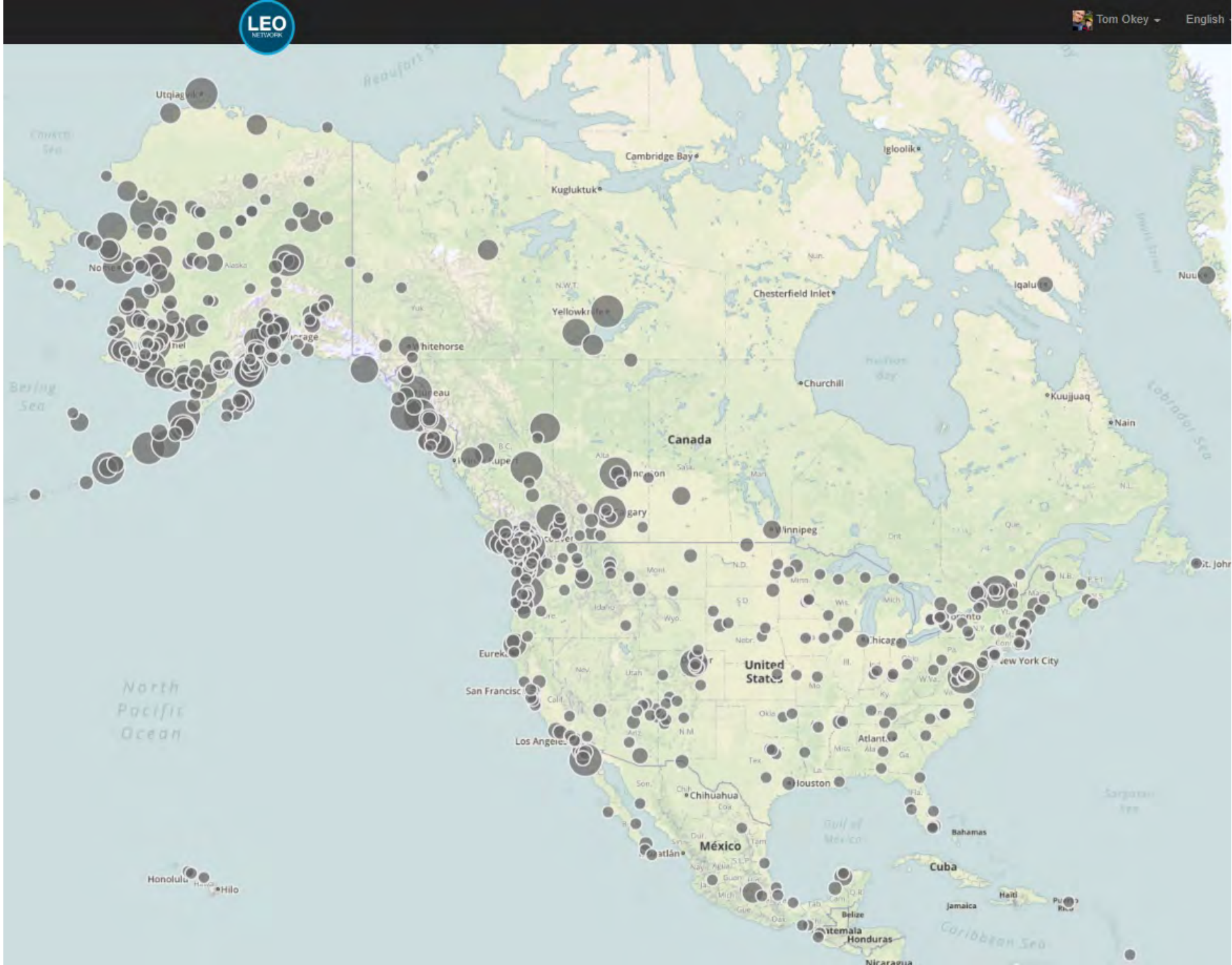
- Over 3,300 members
- Over 1,000 affiliations
- LEO is like a talking circle



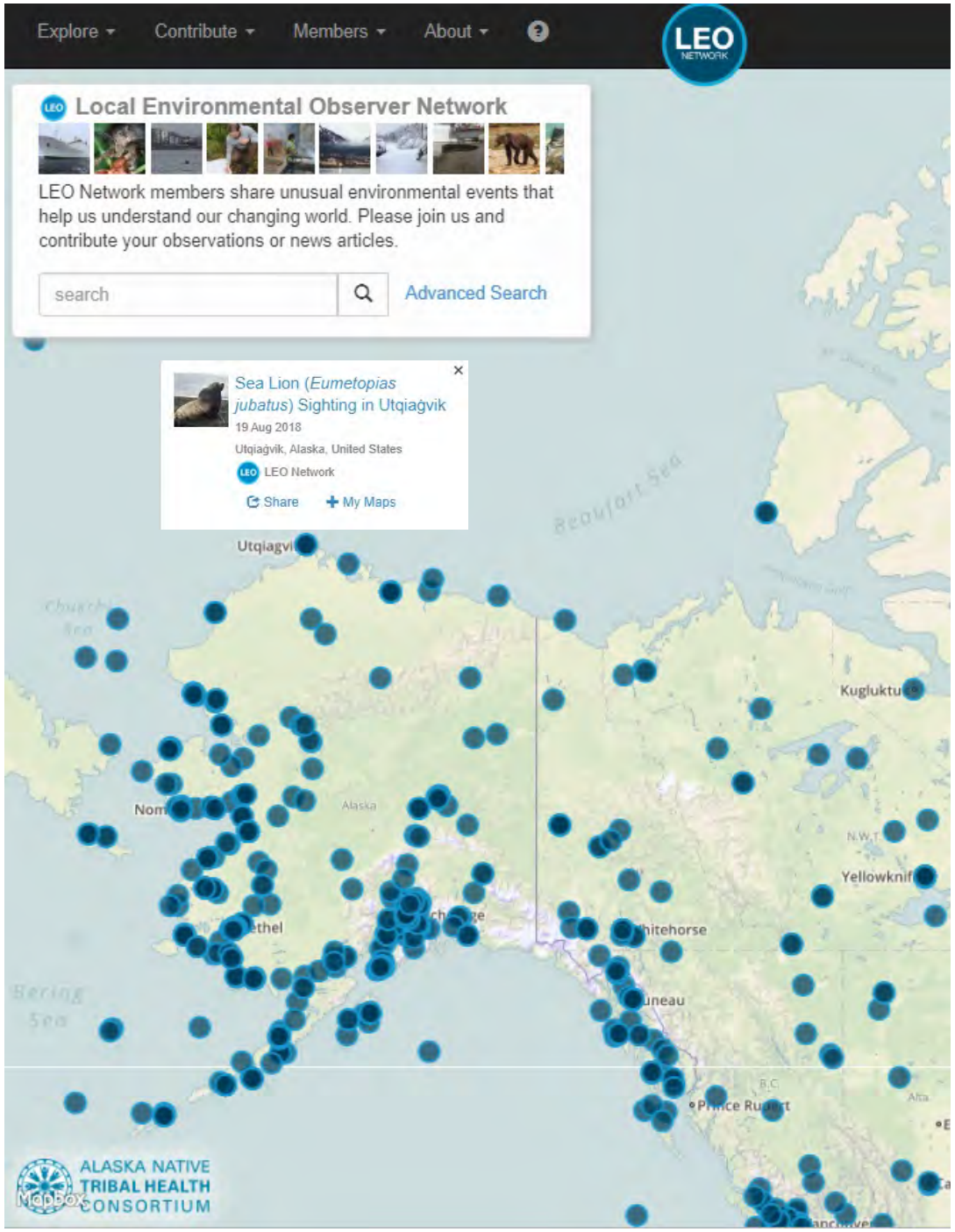
Growing Global Distribution of Communities

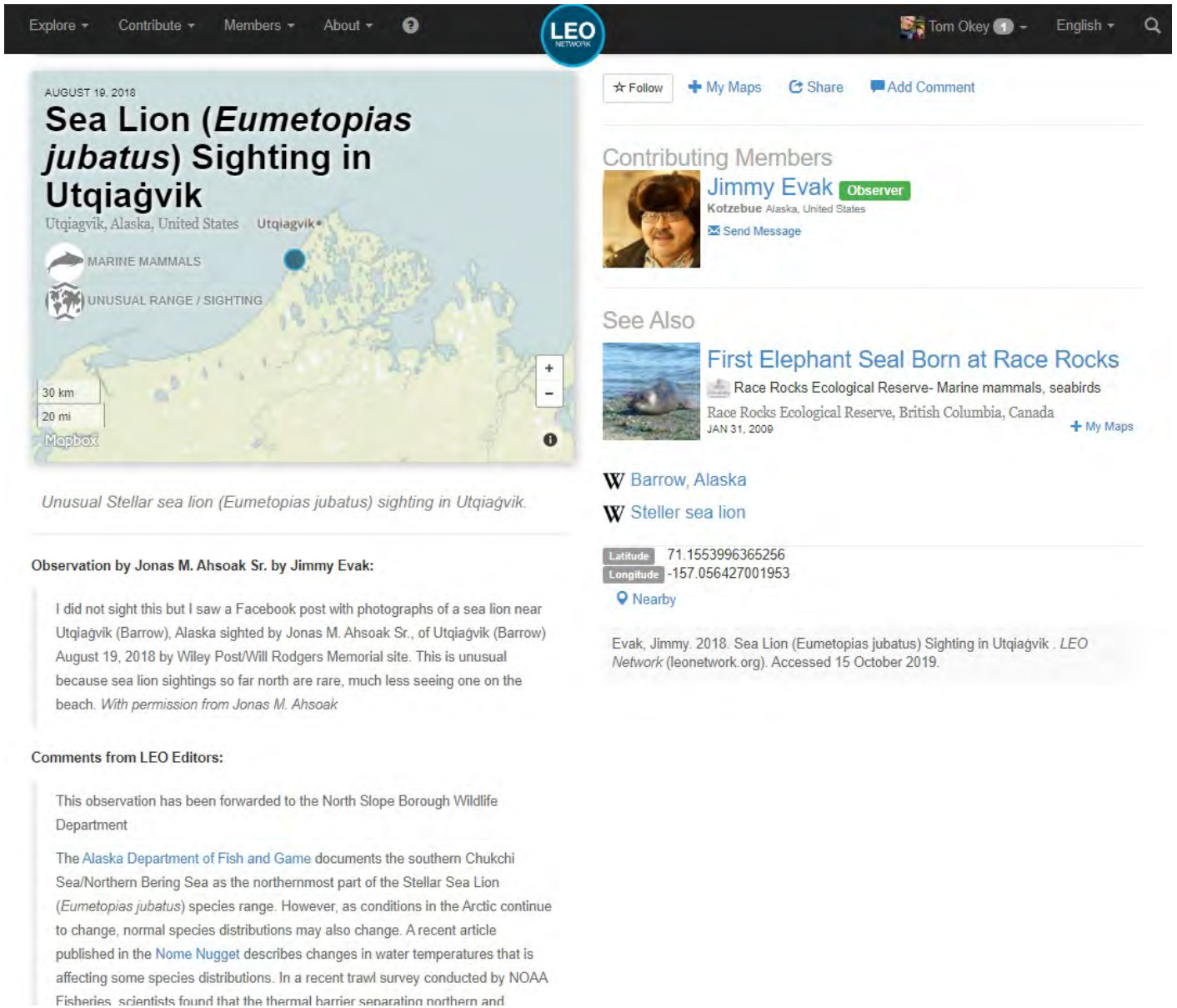
Communities

- **Surveillance across whole landscapes**
- **Along coastlines**



Accessible Stories of Change





A Stellar Sea Lion (*Eumetopias jubatus*) in a new region

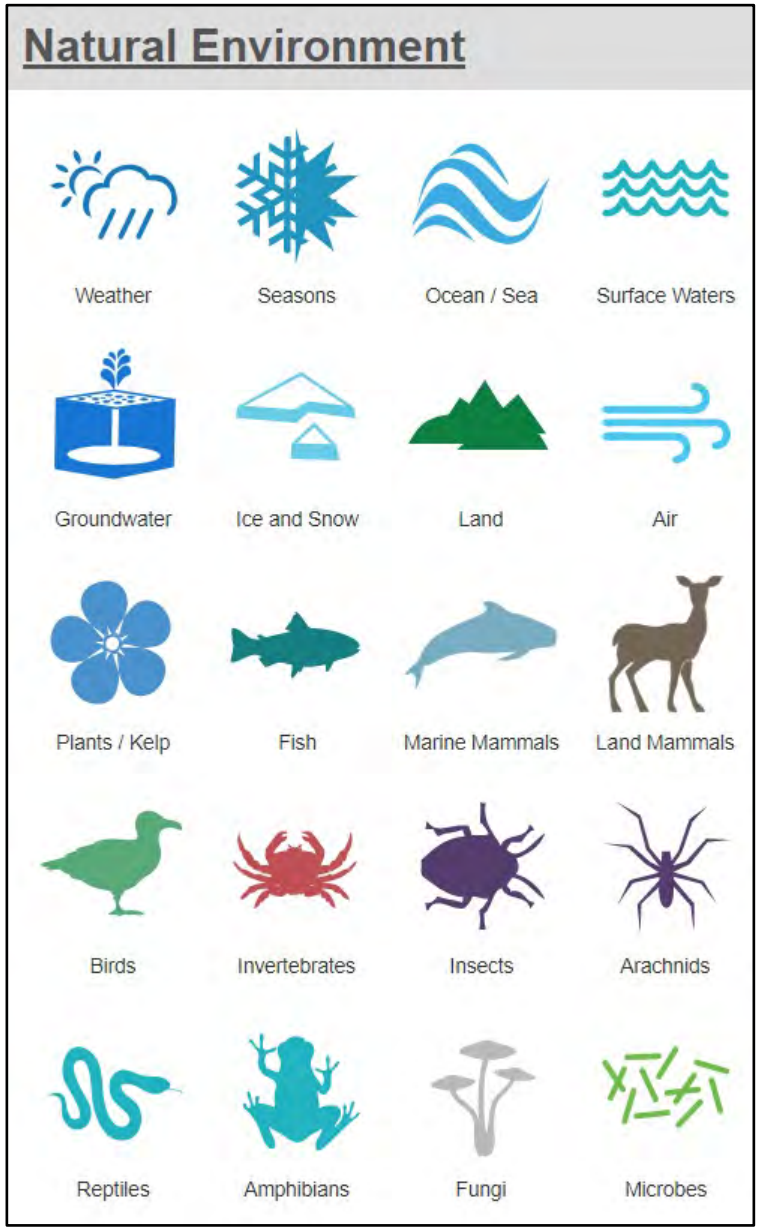
sighting and photo by Jonas M Ahsoak, Sr. of sea lion near Utqiaġvik (Barrow), August 19, 2018

Photo courtesty of Jonas M Ahsoak, Sr. via Jimmy Evak

Stellar Sea Lion Range

Alaska Department of Fish and Game

Each post is indexed – consistent with SEES components



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Observation: About 8 air miles to the east northeast of Seldovia, up the head of Jakolof Bay is the mouth of Jakolof/Kingfisher Creek. With low and no water flow going down the streams because of no snow pack and no amounts of rain, the stream system is drying out. 2000 or more salmon and dolly varden have died in the struggle to get up stream and spawn. These salmon have become an even more important resource with no coho salmon being stocked in Seldovia Lake, located to the southeast, about 7.5 air miles. With an aging population that can more easily access this site and its resources, people rely on this creek to help fill the drying racks, jars, freezers, or smokehouses. Mike Opheim, LEO - Seldovia Native Tribe

Alaska Department of Fish & Game Consult: "We have had a record return of pink salmon (*Oncorhynchus gorbuscha*) in lower Cook Inlet in 2015. Most of our major streams either are in the upper end of their escapement goals or are higher. Many of the smaller systems also have significantly more fish than they normally do. This combined with low snowfall last winter, and modest amounts of rain this summer have made it difficult (or impossible) for some of the smaller returns to reach spawning areas that might be accessible in years of adequate rainfall or greater snow pack. During years of low water flow, pink salmon have the ability to spawn in gravel in the inter-tidal areas. Additionally, wild pink salmon are known to stray to neighboring streams. This may allow fish to return to Jakolof Creek from other returns and repopulate it if this year's return does not put any eggs into Jakolof Creek itself. Lastly, pink salmon within a diverse population have different run timings. Some fish will migrate into the streams earlier in the season to spawn, and others will migrate later. When streams dry up as the result of

Contributing Members

Ryan Brubaker Observer
Anchorage Alaska, United States
Student
Service High School

Stephen Payton Observer
Seldovia Alaska, United States
Fisheries Technician
Seldovia Village Tribe

Kris Holdreid Consultant
Homer Alaska, United States
Director
Kasitsna Bay Marine Lab

Glenn Hollowell Consultant
Homer Alaska, United States
Commercial Salmon and Herring Management Biologist
Alaska Department of Fish and Game
Send Message

Michael Opheim Consultant
Seldovia Alaska, United States
Environmental Coordinator
Seldovia Village Tribe
Send Message

See Also

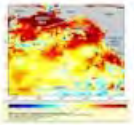
Late Run of Abundant Pink Salmon (*Oncorhynchus gorbuscha*)
Nanwalek, Alaska, United States
SEP 19, 2017
+ My Maps

Parasites on Pink Salmon (*Oncorhynchus gorbuscha*)
Whipple Creek, Alaska, United States
SEP 3, 2017
+ My Maps

Videos

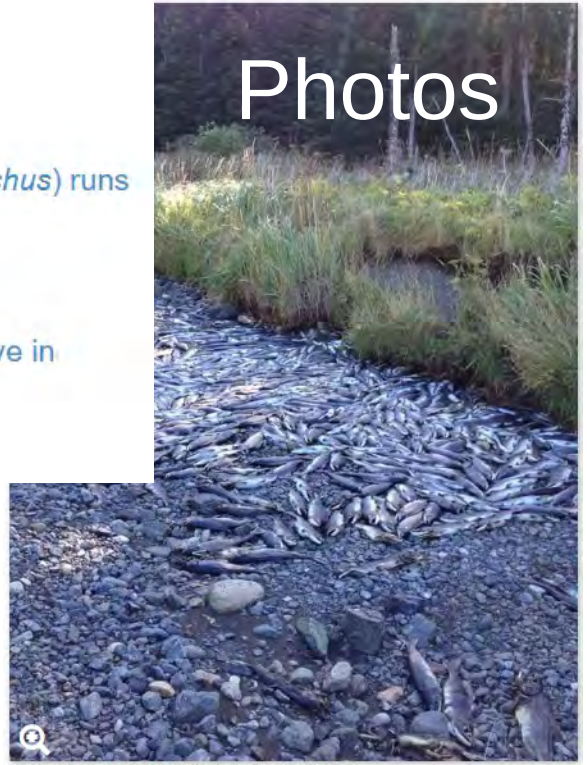
Salmon Die-Offs
AUG 27, 2015
5 Observations

Changing Salmon (*Oncorhynchus*) runs in the Northeast Pacific
Northeast Pacific and Bering Sea
APR 4, 2017
31 Observations



The Blob - A Marine Heat Wave in Alaska, 2013-2016
OCT 1, 2013
131 Observations

Photos



View southeast - creek bed (Photo by Stephen Payton)

This catch in a Tatitlek herring net places a school of shiner surfperch about 700 km north of their normal range.

Observation by Ricky Komkoff:

> This fish was caught in a school of herring and there seems to be quite a few of them. We have never seen this fish around our community waters before.

Tom Okey, with Ocean Integrity Research, writes:

> That, my friend, is a shiner surfperch (*Cymatogaster aggregata*). This observation is way north of the species' estimated native range, which doesn't extend north of Glacier Bay. This means that this nearshore demersal fish, which I used to commonly see while diving in Monterey Bay, is about 700 km up the outer Alaskan coast from the northernmost extent of its native range (measured with Google Earth). The Aquamaps projected year 2100 native range places them as far north as Prince William Sound -- but this ain't 2100, so that fish is there a few decades early. That's the thing about science, though: we need real data to 'ground truth'

Contributing Members

Ricky Kompkoff Observer
Tatitlek Alaska, United States
IGAP Coordinator
Native Village of Tatitlek
Send Message

Tom Okey Consultant
Victoria British Columbia, Canada
Principal
Ocean Integrity Research
Send Message

See Also

Brown Booby (*Sula leucogaster*) North of Usual Range
Sitka, Alaska, United States
NOV 3, 2018
+ My Maps

Ocean Sunfish (*Mola mola*) off Masset, Haida Gwaii
near Masset, Haida Gwaii
AUG 1, 2017
+ My Maps

Blue Sail (*Velella*) Jellyfish
Seldovia, Alaska, United States
OCT 9, 2015
+ My Maps

Leatherback (*Dermochelys coriacea*) Sighted
Southeast Region, Alaska, United States
AUG 24, 2015
+ My Maps

A new arrival!
Ricky Kompkoff

Native Range of Shiner Perch
https://www.fishbase.se/summary/3626

AUGUST 29, 2019

Slender armorhead (*Pentaceros wheeleri*) caught in purse seine

Chignik Lake, Alaska, United States

Juveniles and sub adults live and migrate in open water at shallow to moderate depths. They move to the bottom as adults when they settle around sea mounts in the North Pacific.

Observation by Edgar Smith:

> This fish was caught in a purse seine at Jack Point near Chignik Alaska. The markings appear to be tropical.

Andrés López, Curator of Fish with the University of Alaska Museum, writes:

> I am thinking it is a slender armorhead (Pentaceros wheeleri) subadult. See Figure 1B in the attached article. It makes sense based on location of the observation and the color pattern. P.S. Any chance the fish is still in somebody's freezer? *9-18-19*

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Contributing Members

Edgar Smith Observer
Chignik Lagoon Alaska, United States
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Andrés López Consultant
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Curator of Fishes **Ichthyology and Fisheries**
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Tom Okey Consultant
Victoria British Columbia, Canada
Principal
Ocean Integrity Research
Send Message

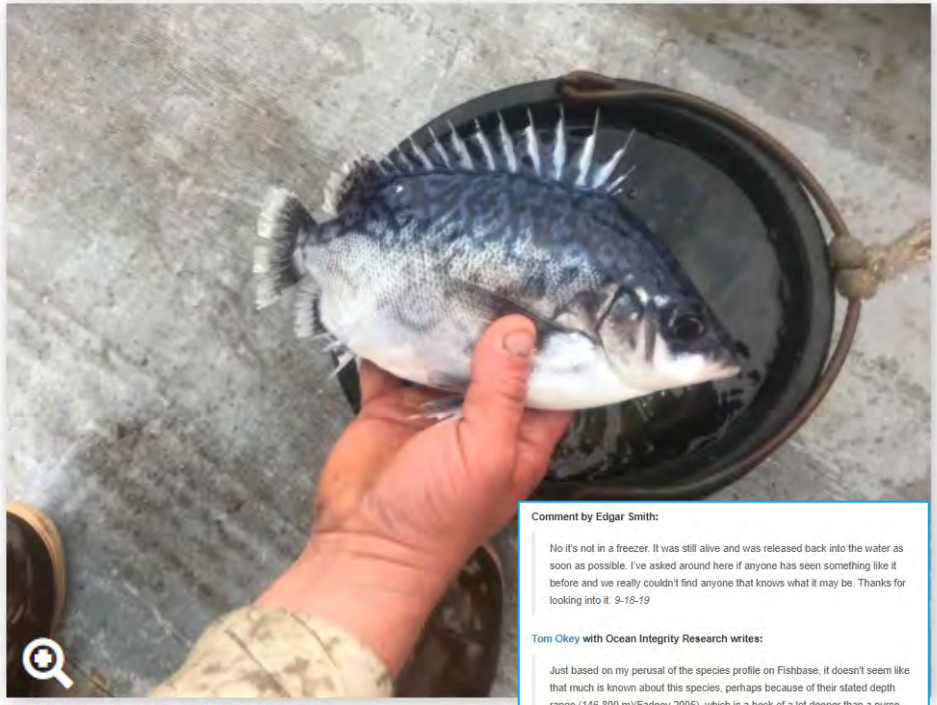
See Also

Pentaceros

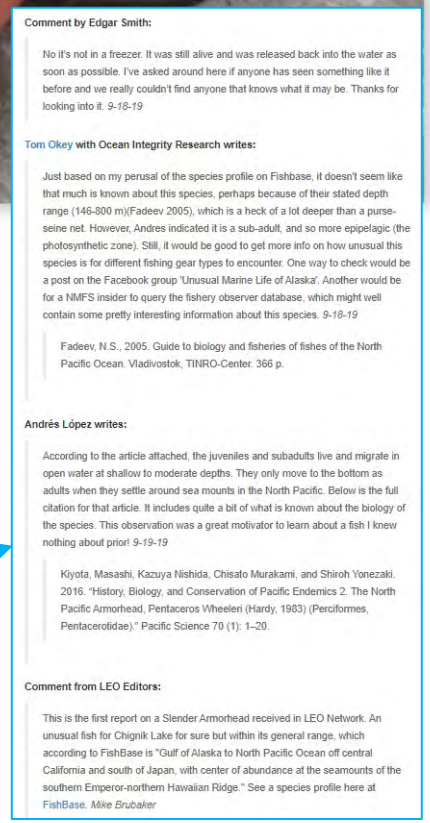
Smith, Edgar, Andrés López and T.A. Okey. 2019. Slender armorhead (Pentaceros wheeleri) caught in purse seine. *LEO Network* (leonetwork.org). Accessed 15 October 2019.

Documents

70.1.1.pdf



A fish unknown to Chignik Lake
Edgar Smith



Comment by Edgar Smith:

> No it's not in a freezer. It was still alive and was released back into the water as soon as possible. I've asked around here if anyone has seen something like it before and we really couldn't find anyone that knows what it may be. Thanks for looking into it. *9-18-19*

Tom Okey with Ocean Integrity Research writes:

> Just based on my perusal of the species profile on Fishbase, it doesn't seem like that much is known about this species, perhaps because of their stated depth range (146-800 m)(Fadeev 2005), which is a heck of a lot deeper than a purse-seine net. However, Andres indicated it is a sub-adult, and so more epipelagic (the photosynthetic zone). Still, it would be good to get more info on how unusual this species is for different fishing gear types to encounter. One way to check would be a post on the Facebook group 'Unusual Marine Life of Alaska'. Another would be for a NMFS insider to query the fishery observer database, which might well contain some pretty interesting information about this species. *9-18-19*
>
> > Fadeev, N.S., 2005. Guide to biology and fisheries of fishes of the North Pacific Ocean. Vladivostok, TINRO-Center. 366 p.

Andrés López writes:

> According to the article attached, the juveniles and subadults live and migrate in open water at shallow to moderate depths. They only move to the bottom as adults when they settle around sea mounts in the North Pacific. Below is the full citation for that article. It includes quite a bit of what is known about the biology of the species. This observation was a great motivator to learn about a fish I knew nothing about prior! *9-19-19*
>
> > Kiyota, Masashi, Kazuya Nishida, Chisato Murakami, and Shiroh Yonezaki. 2016. "History, Biology, and Conservation of Pacific Endemics 2. The North Pacific Armorhead, Pentaceros Wheeleri (Hardy, 1983) (Perciformes, Pentacerotidae)." Pacific Science 70 (1): 1–20.

Comment from LEO Editors:

> This is the first report on a Slender Armorhead received in LEO Network. An unusual fish for Chignik Lake for sure but within its general range, which according to FishBase is "Gulf of Alaska to North Pacific Ocean off central California and south of Japan, with center of abundance at the seamounts of the southern Emperor-northern Hawaiian Ridge." See a species profile here at FishBase. *Mike Brubaker*

Dimensions of Knowledge

- Three Knowledge Dimensions
- Distribution of Interests and Expertise

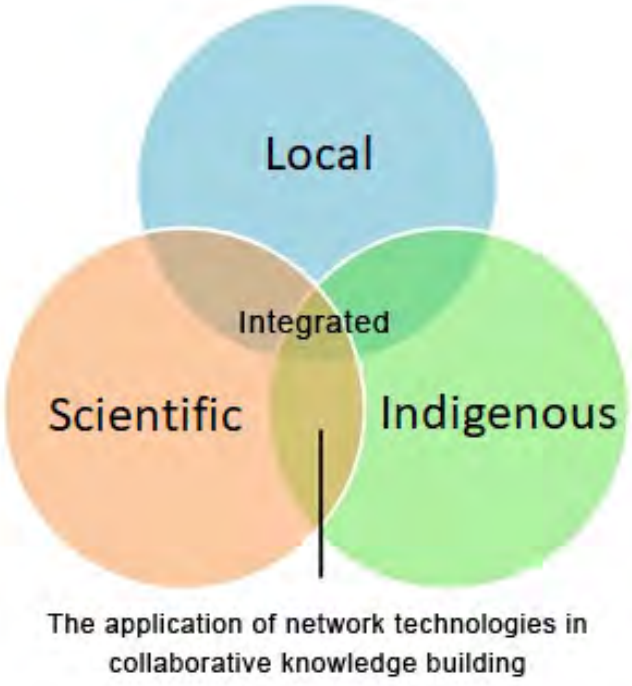
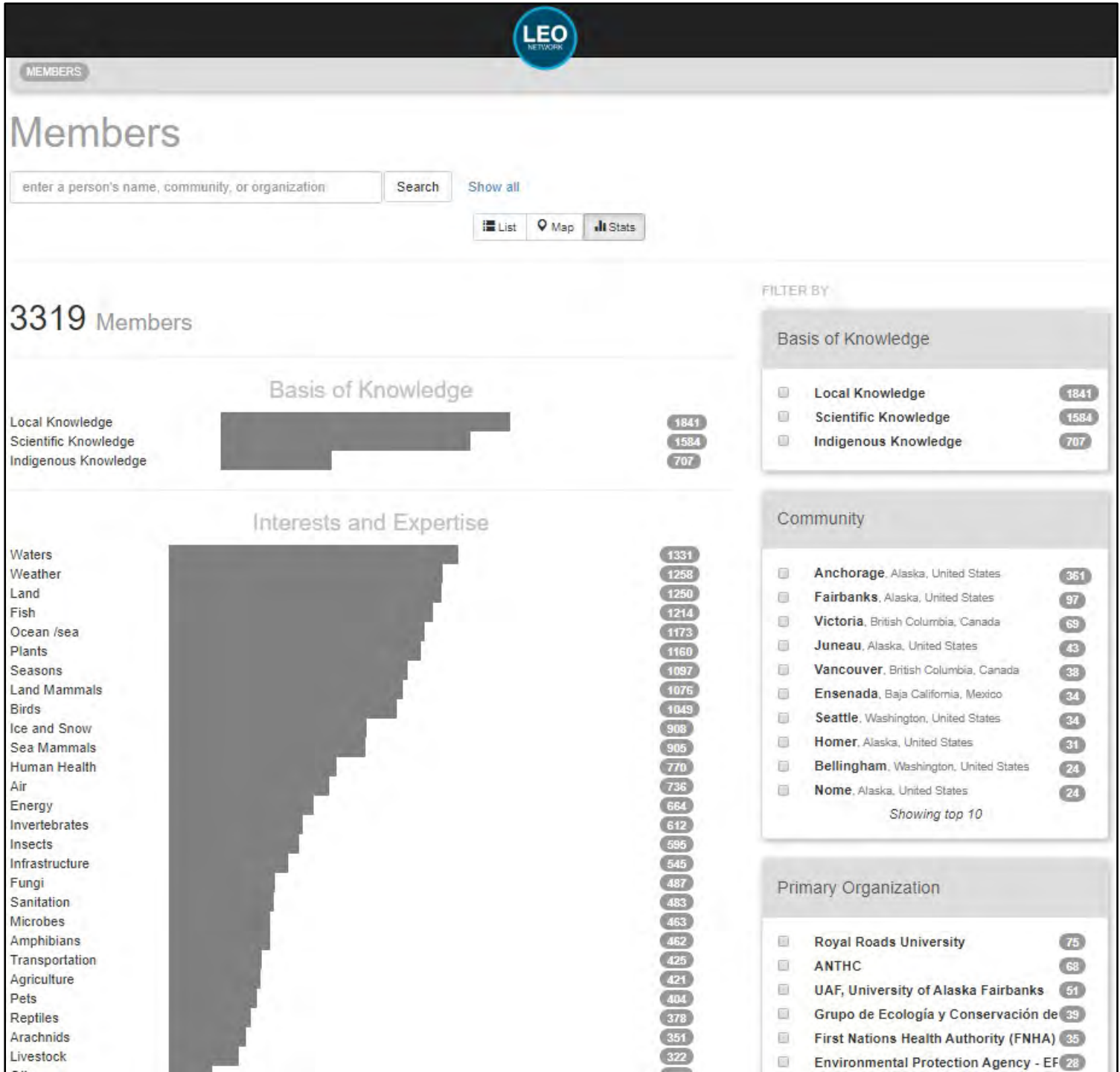
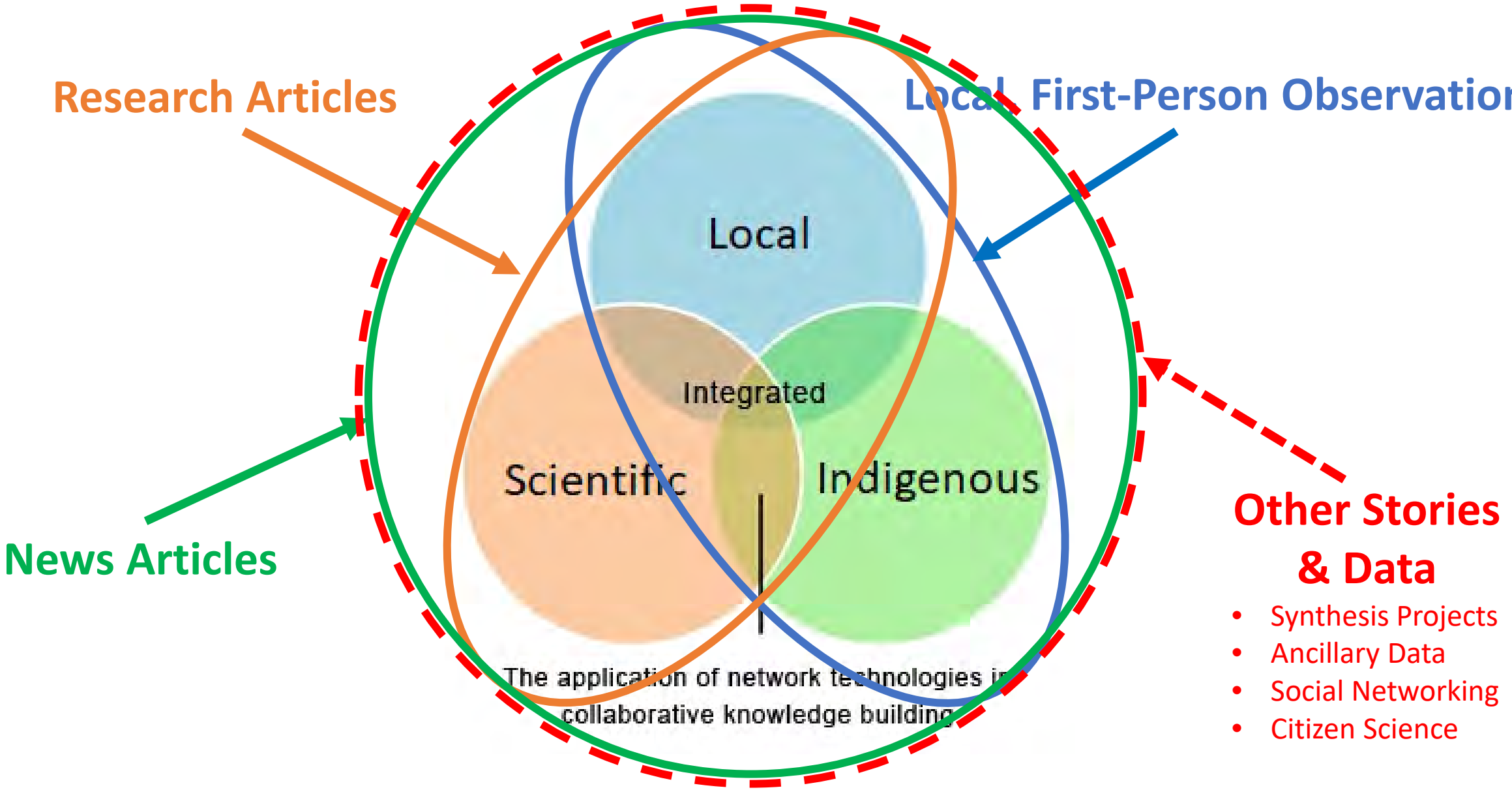


Figure modified from Calvani et al 2008 Models and Instruments for Assessing Digital Competence at School, *Journal of e-Learning and Knowledge Society* - Vol. 4, n. 3, September 2008 (pp. 183 - 193)



LEO Data Layers by Knowledge Dimensions

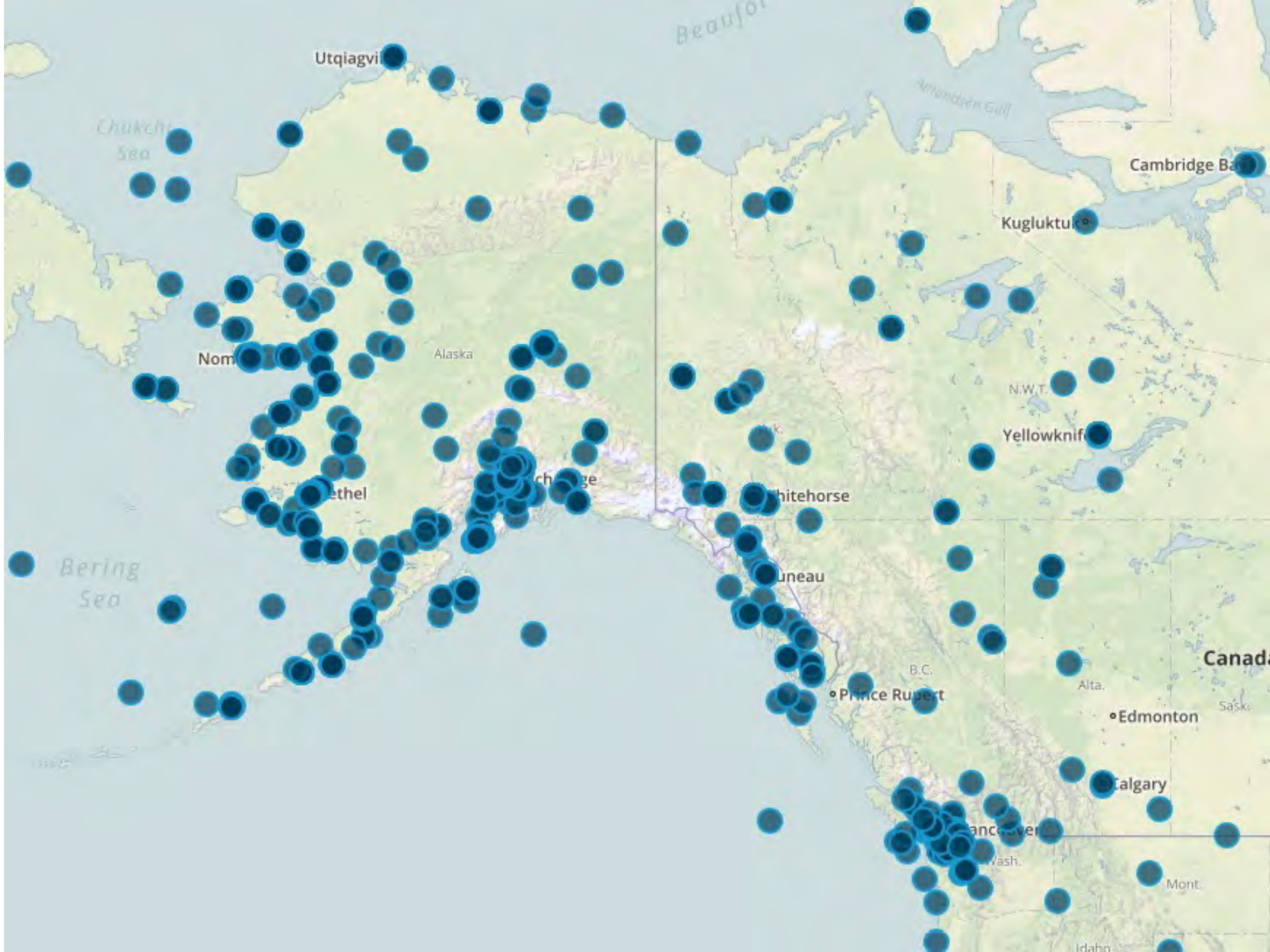


Observations that Matter Locally

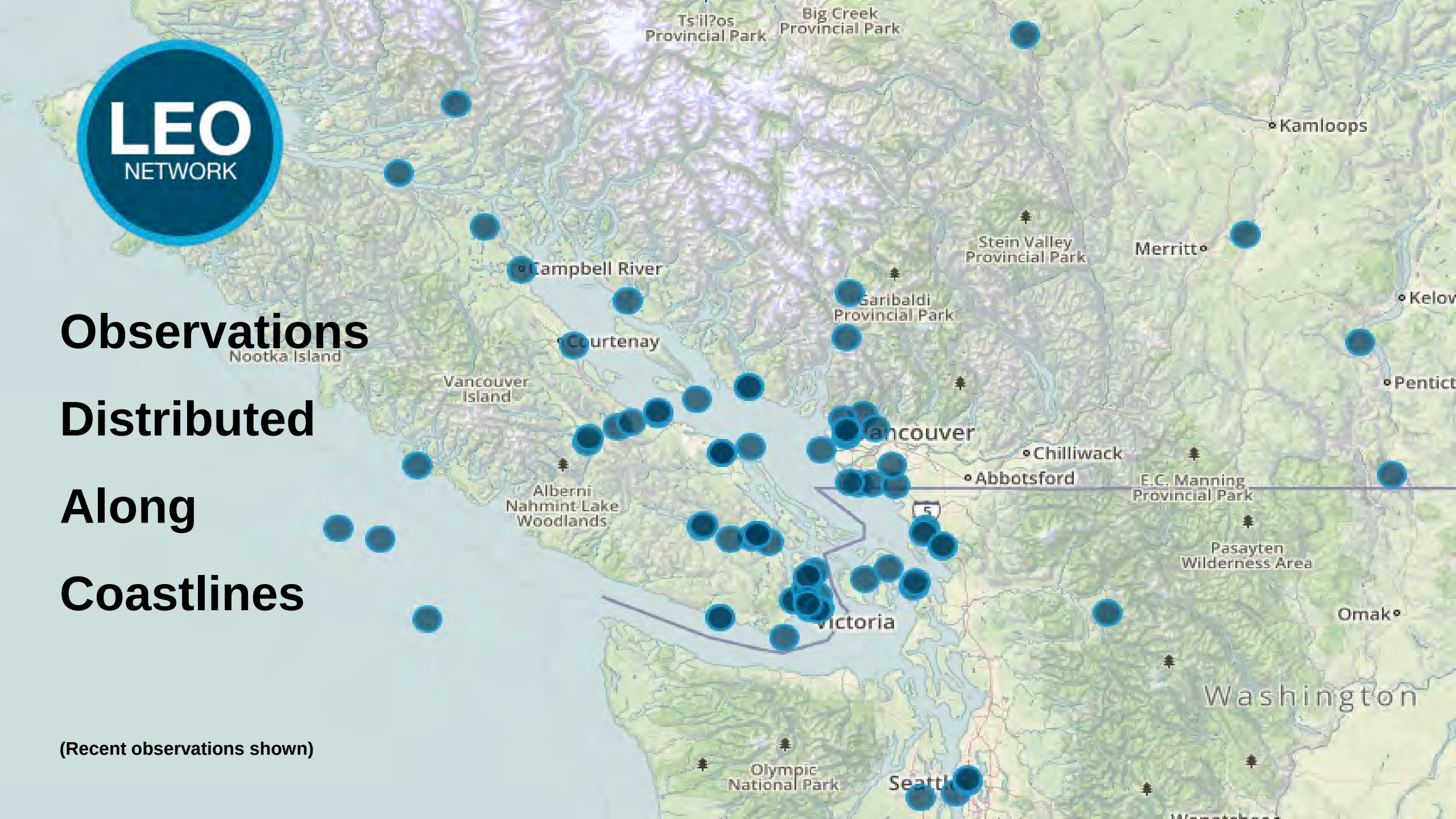
- First Person Observations of Unusual Changes in Ecosystems
- A Distribution of Topics

LEO NETWORK

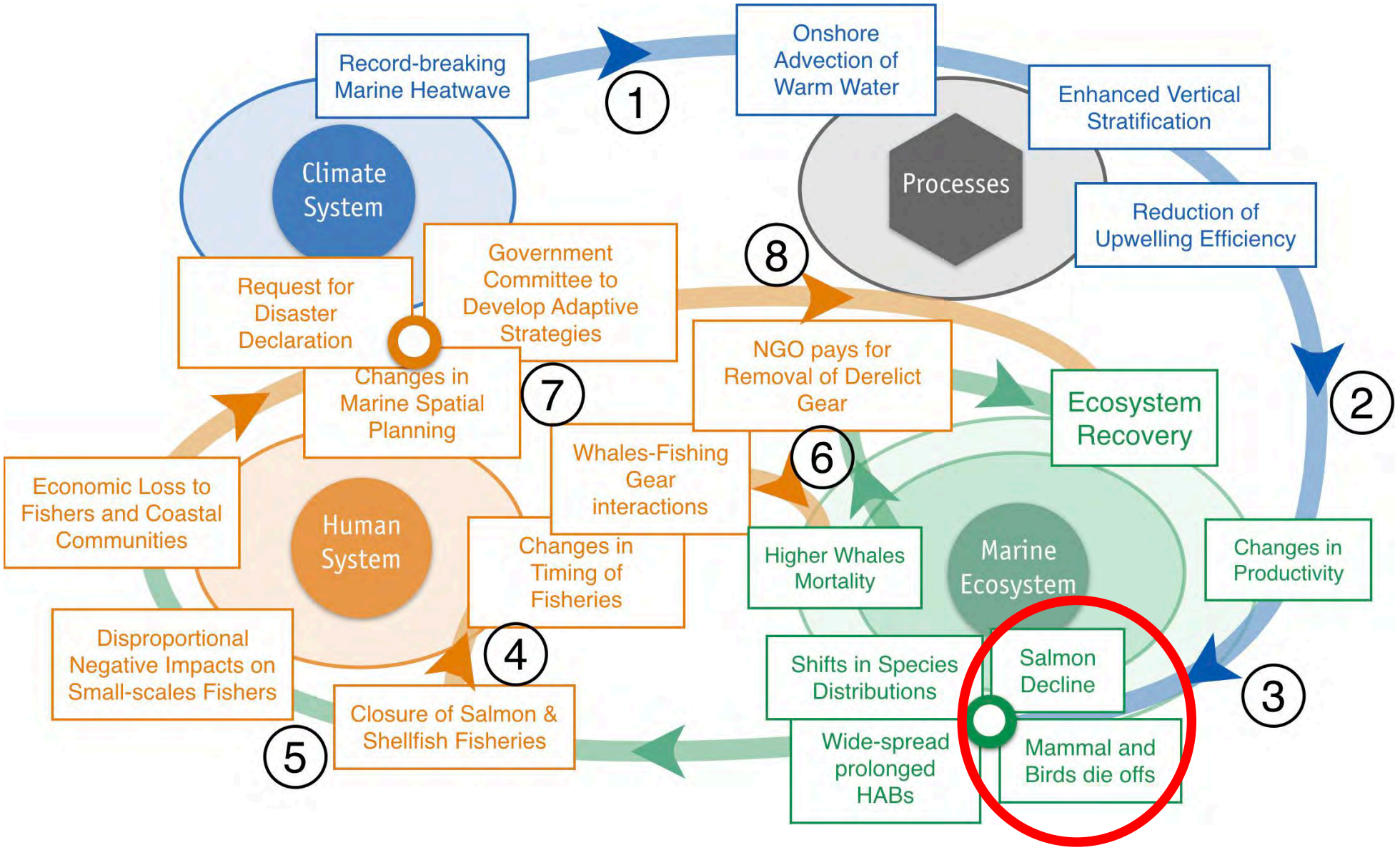
Observations Distributed Along Coastlines



(Recent observations shown)

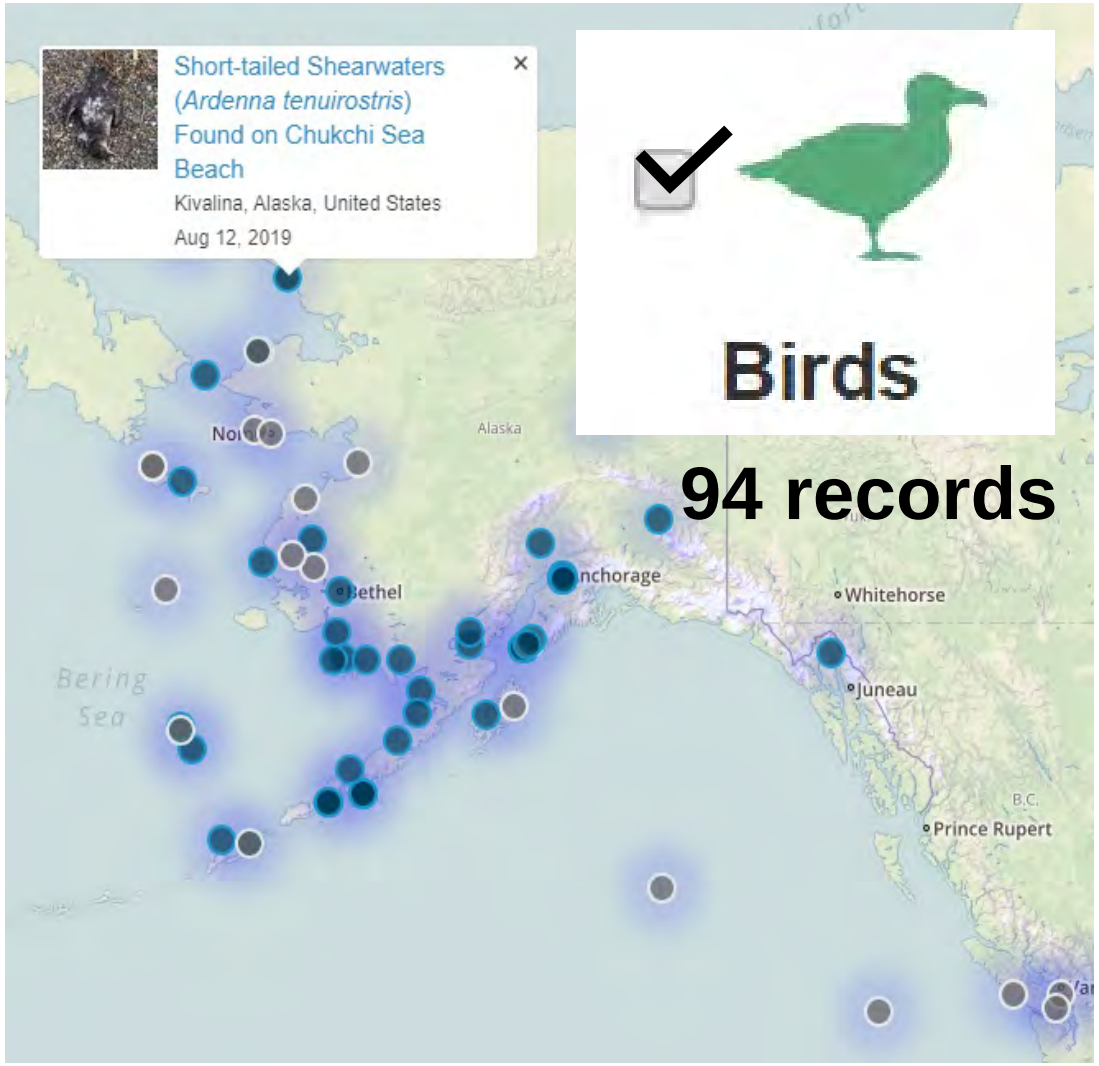

LEO
NETWORK
Observations
Distributed
Along
Coastlines
(Recent observations shown)
Ts'il?os
Provincial Park
Big Creek
Provincial Park
Kamloops
Stein Valley
Provincial Park
Merritt
Campbell River
Garibaldi
Provincial Park
Courtenay
Nootka Island
Vancouver
Island
Chilliwack
Abbotsford
E.C. Manning
Provincial Park
Alberni
Nahmint Lake
Woodlands
Pasayten
Wilderness Area
Victoria
Omak
Washington
Olympic
National Park

FUTURE SEES case study 2: Ecosystem impact of a marine heat wave in the eastern Pacific



Bograd et al. 2019. Developing a Social–Ecological–Environmental System Framework to Address Climate Change Impacts in the North Pacific. Frontiers in Marine Science 6.

Example LEO Search: “Die | Dead”



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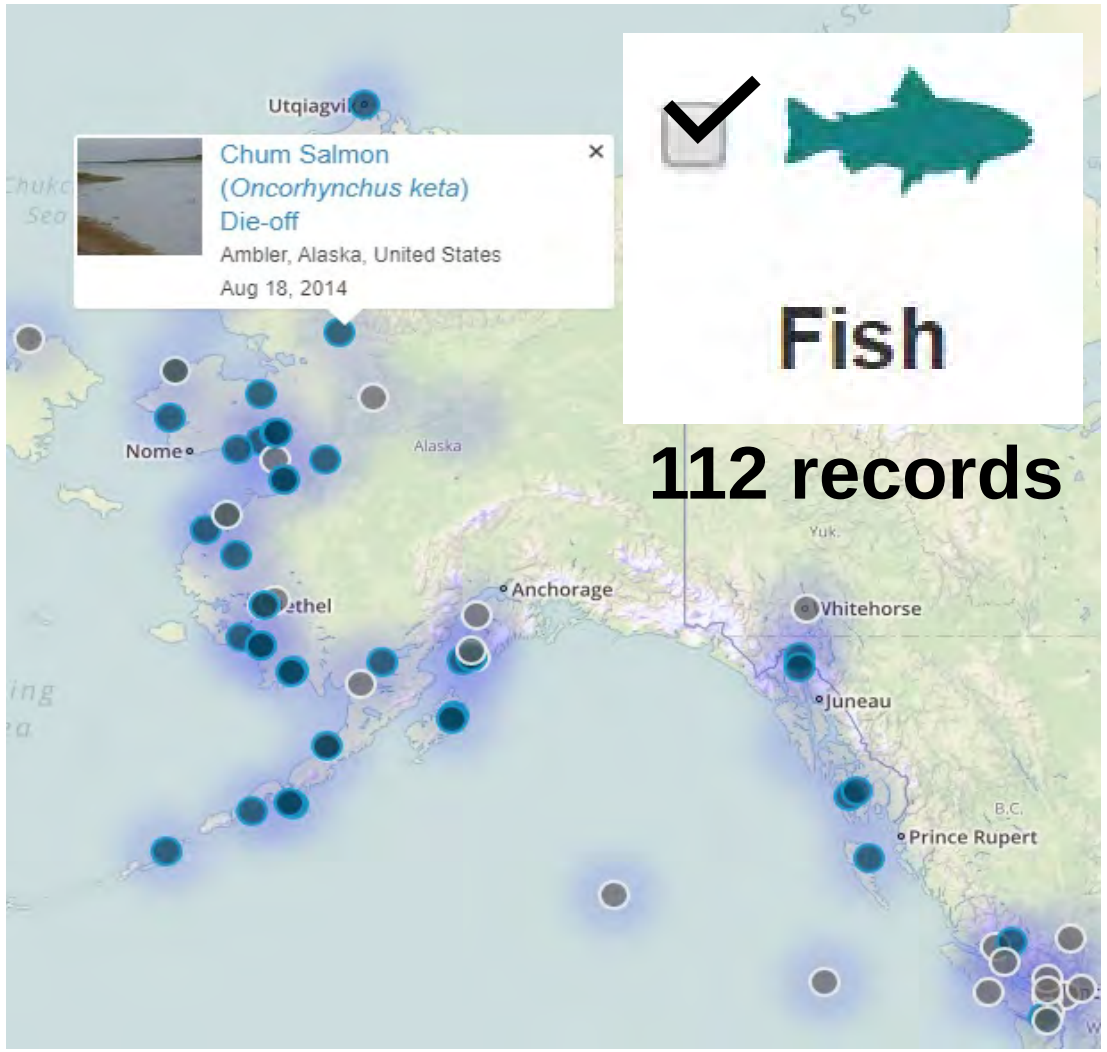
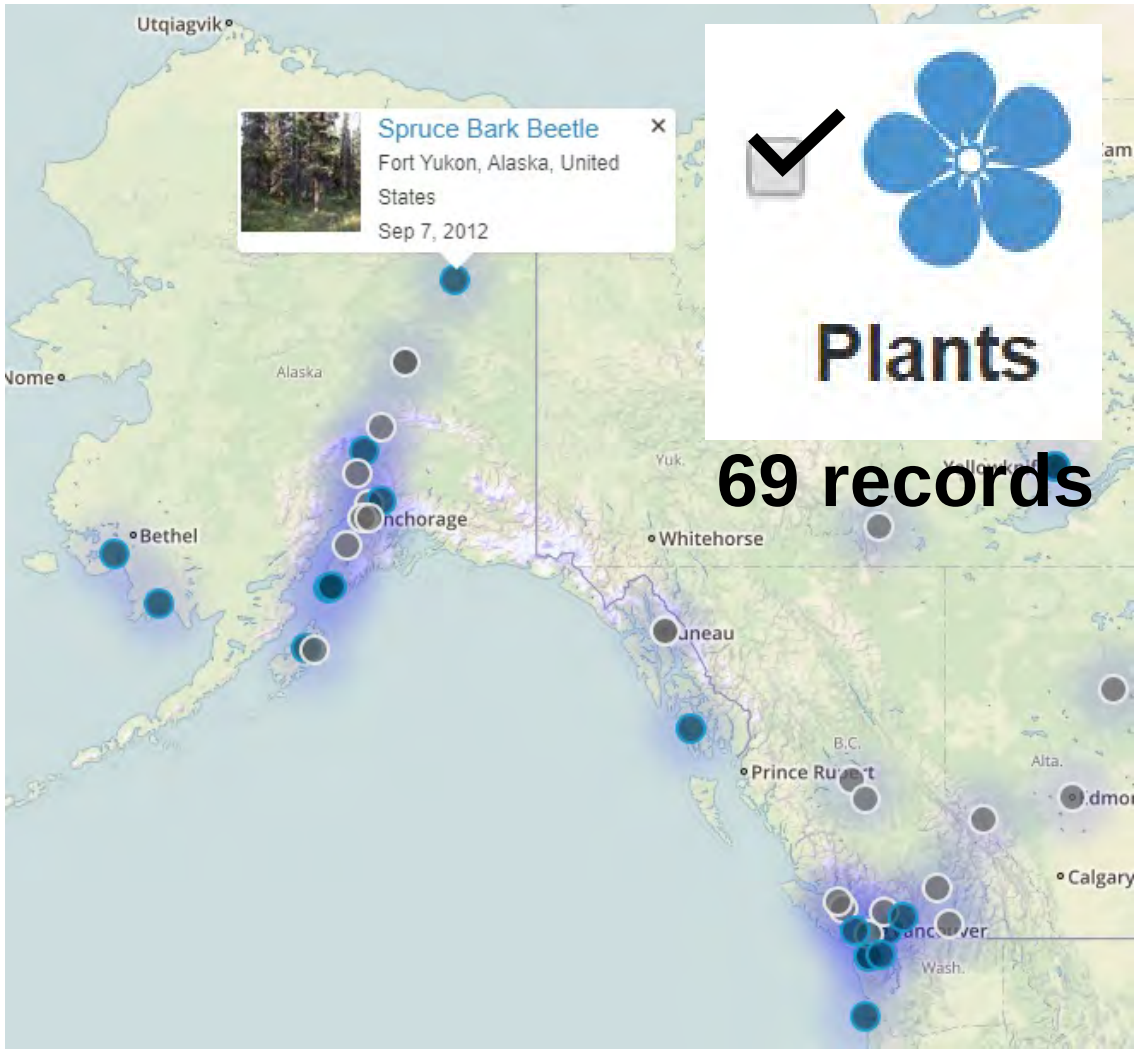
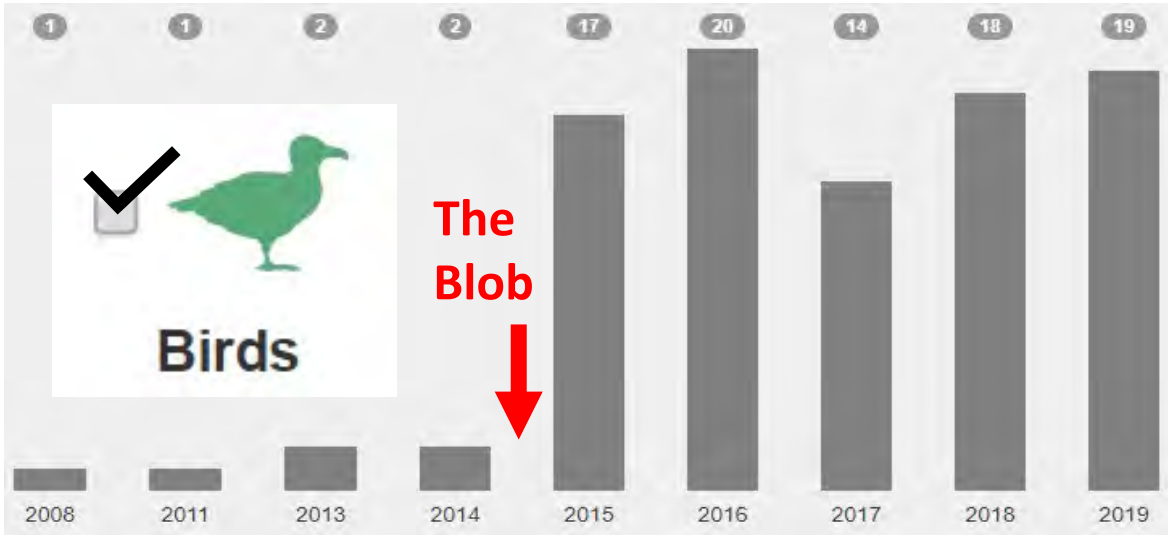
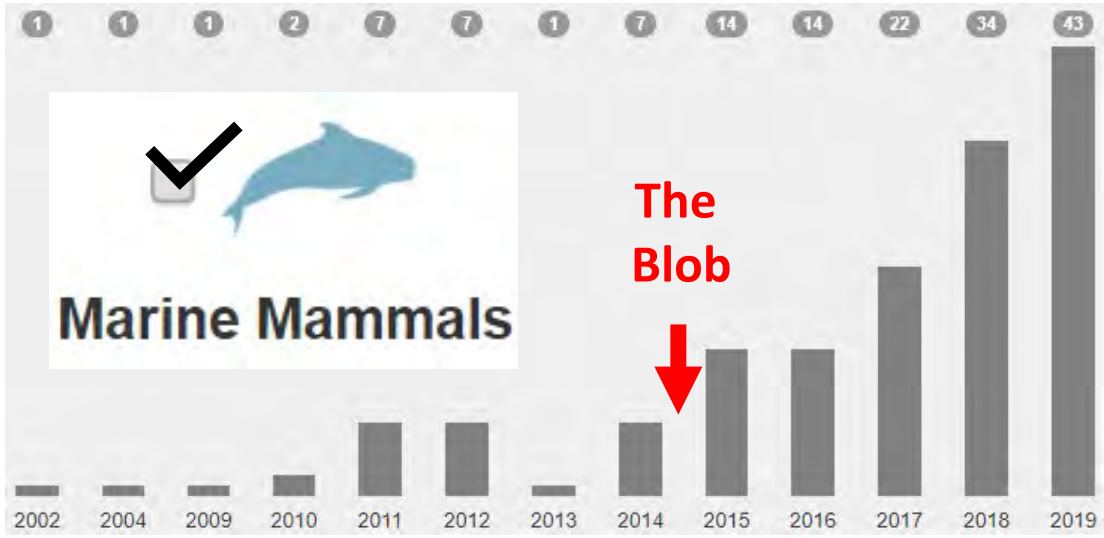
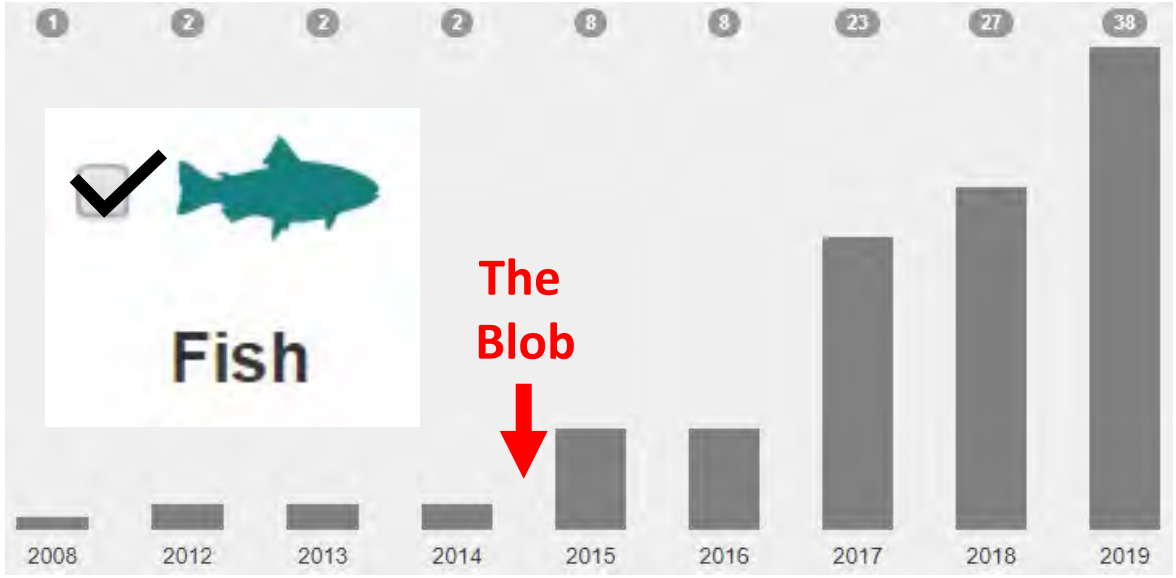


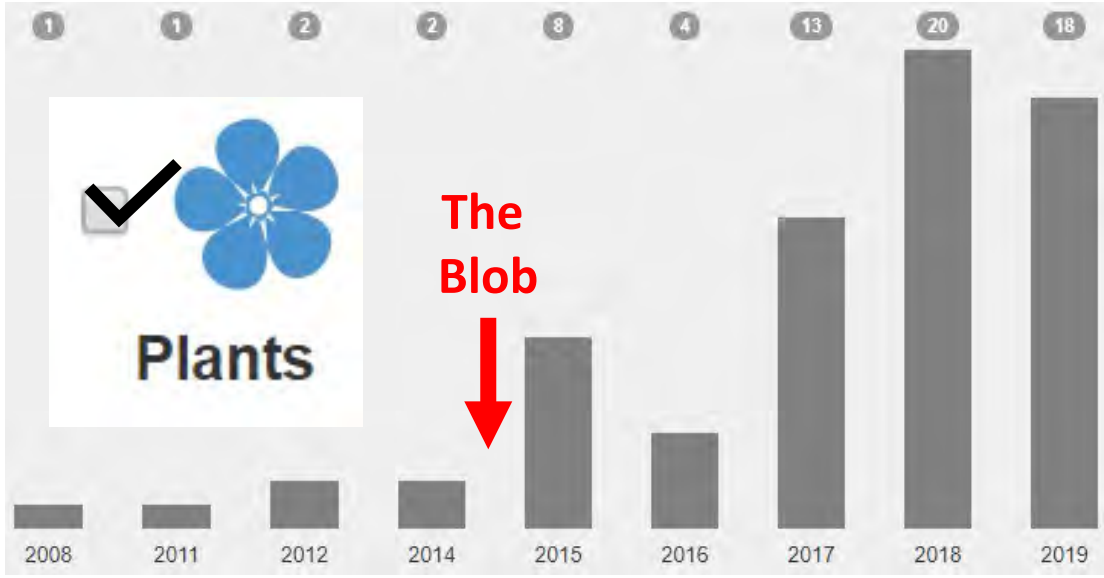


Example LEO Search: “Die | Dead”

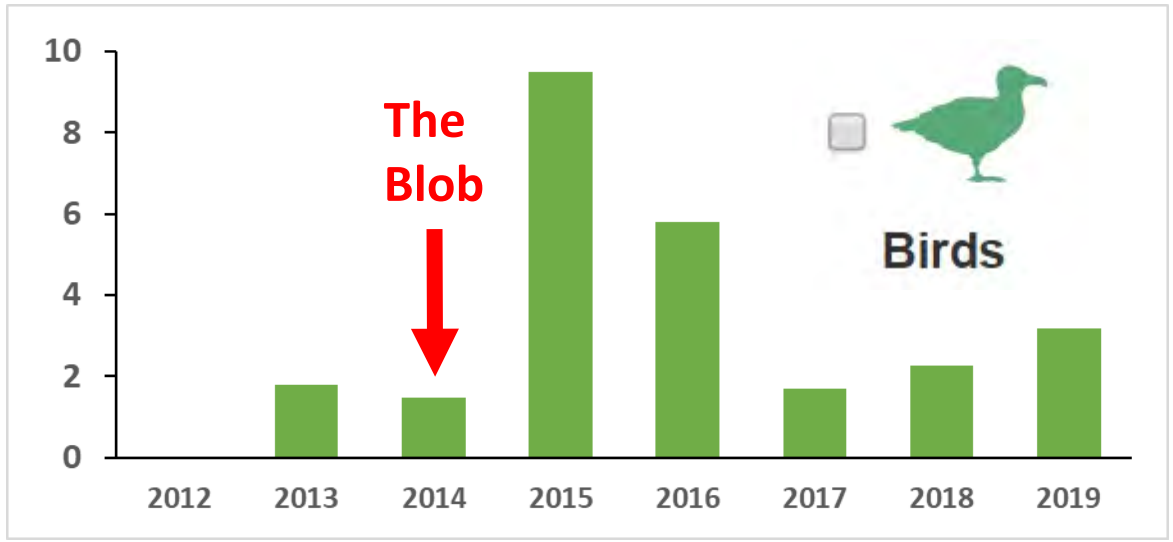


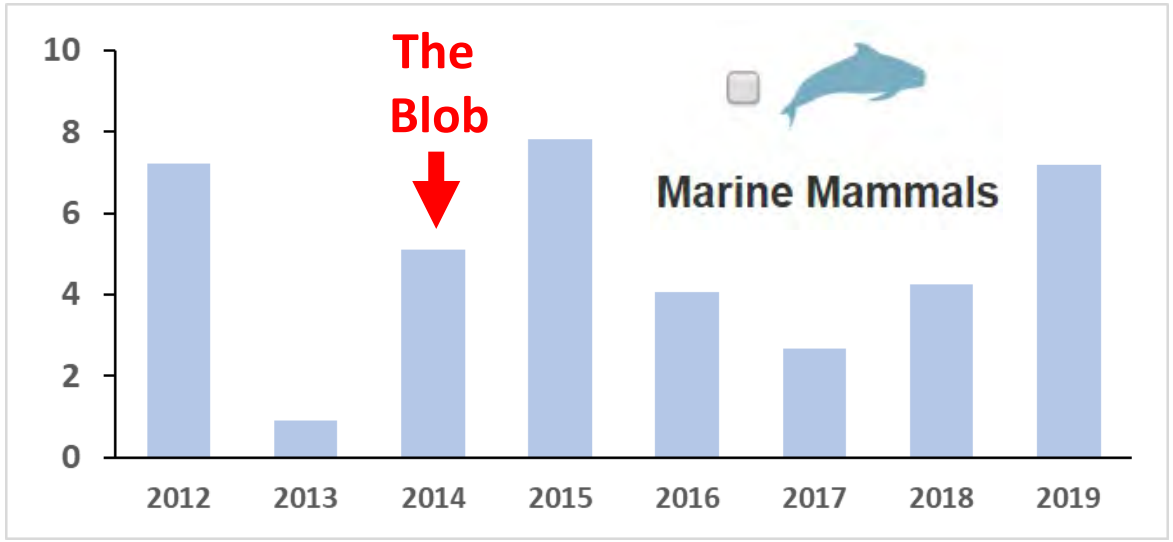


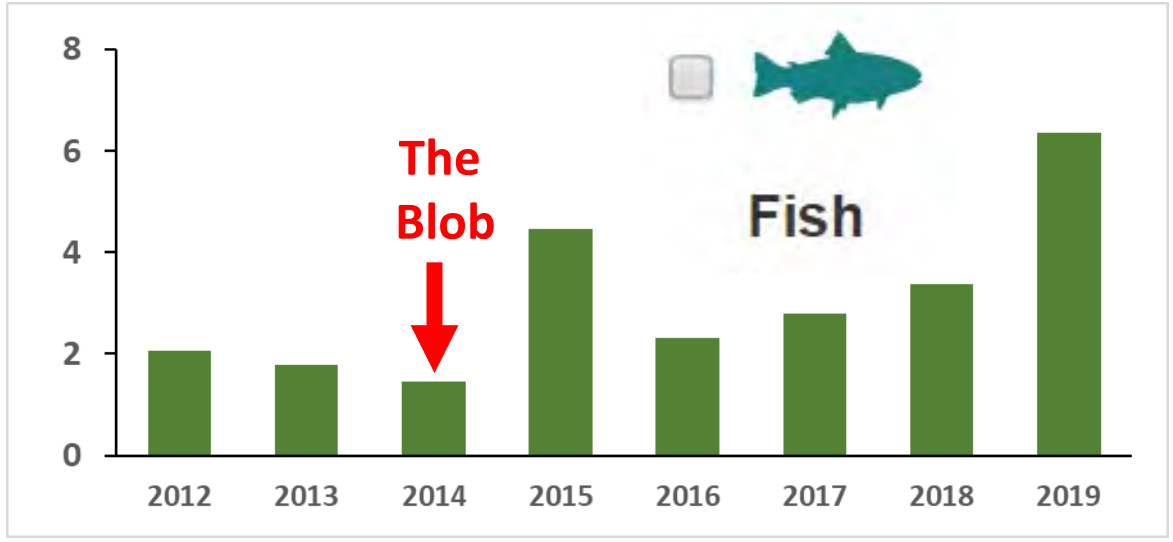


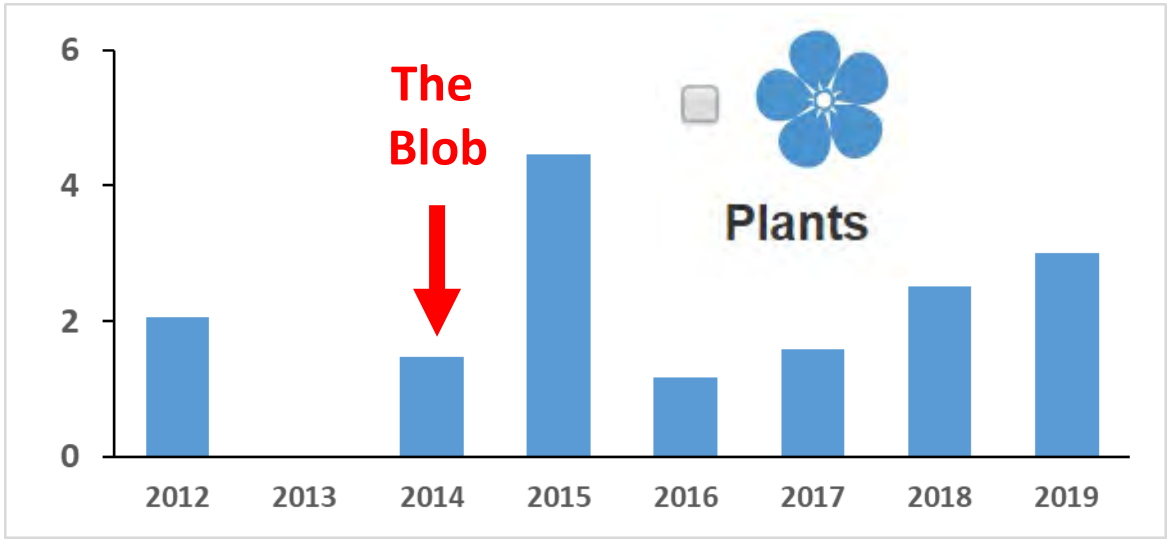


Percentage of annual LEO Posts with terms “Die | Dead”



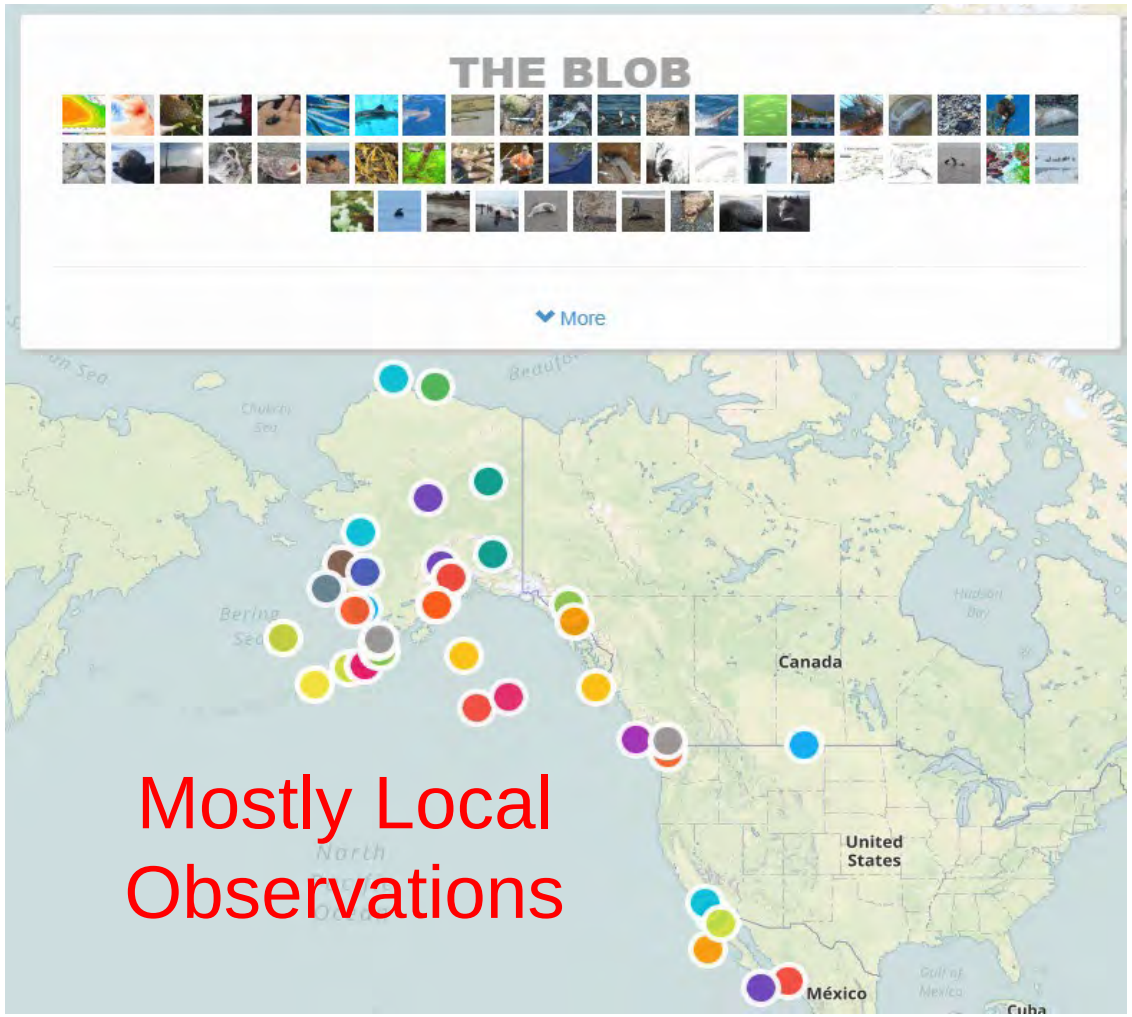






Example LEO ‘Project Maps’

The Blob



Sargassum in Caribbean

Example LEO ‘Project Maps’

Explore Contribute Members About LEO NETWORK Tom Okey 1 English

NE Pacific Ocean Acidification

Share Settings Search/Filter Stats

Thumbnails People

A growing collection of literature on ocean acidification in the Northeast Pacific. First Person Observations and News Articles on the topic can be added, in addition to a more complete sampling of the OA scientific literature.

Ocean acidity wipes out 10 million scallops near Qualicum Beach

Island Scallops Ltd., Vancouver Island, Canada

26 FEB 2014

Ten million scallops that have died in the waters near Qualicum Beach due to rising ocean acidity are the latest victims in a series of marine die-offs that have plagued the West Coast for 10 years. . .

Times Colonist

Related Posts + My Maps

The combined effects of ocean acidification, mixing, and respiration on pH and carbonate saturation in an urbanized estuary

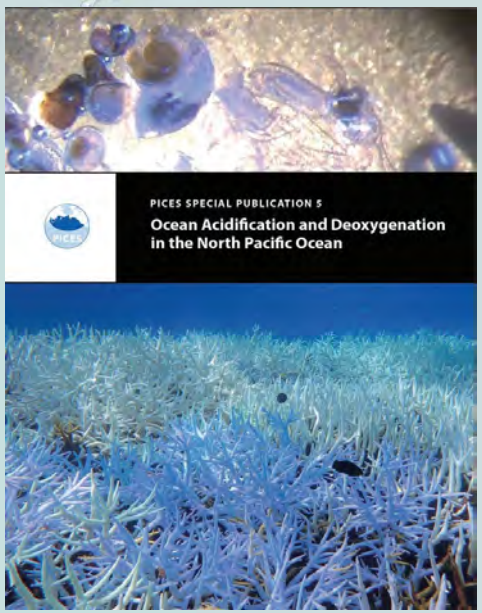
Puget Sound, United States

1 AUG 2010

Puget Sound is a large estuary complex in the U.S. Pacific Northwest that is home to a diverse and economically important ecosystem threatened by anthropogenic impacts associated with climate change, urbanization, and ocean acidification. While ocean acidification has been studied in oceanic waters, little is known regarding its status in estuaries. Anthropogenically acidified coastal waters upwelling along the western North American continental margin can enter Puget Sound through the Strait of Juan de Fuca. In order to study

Mapbox

Ocean Acidification



Mostly Research Articles

Anchorage Bethel Whitehorse Homer Juneau Sitka Fort St. John British Columbia Grande Prairie Prince Rupert Prince George Vancouver Washington Spokane Oregon Boise Nevada Sacramento San Francisco

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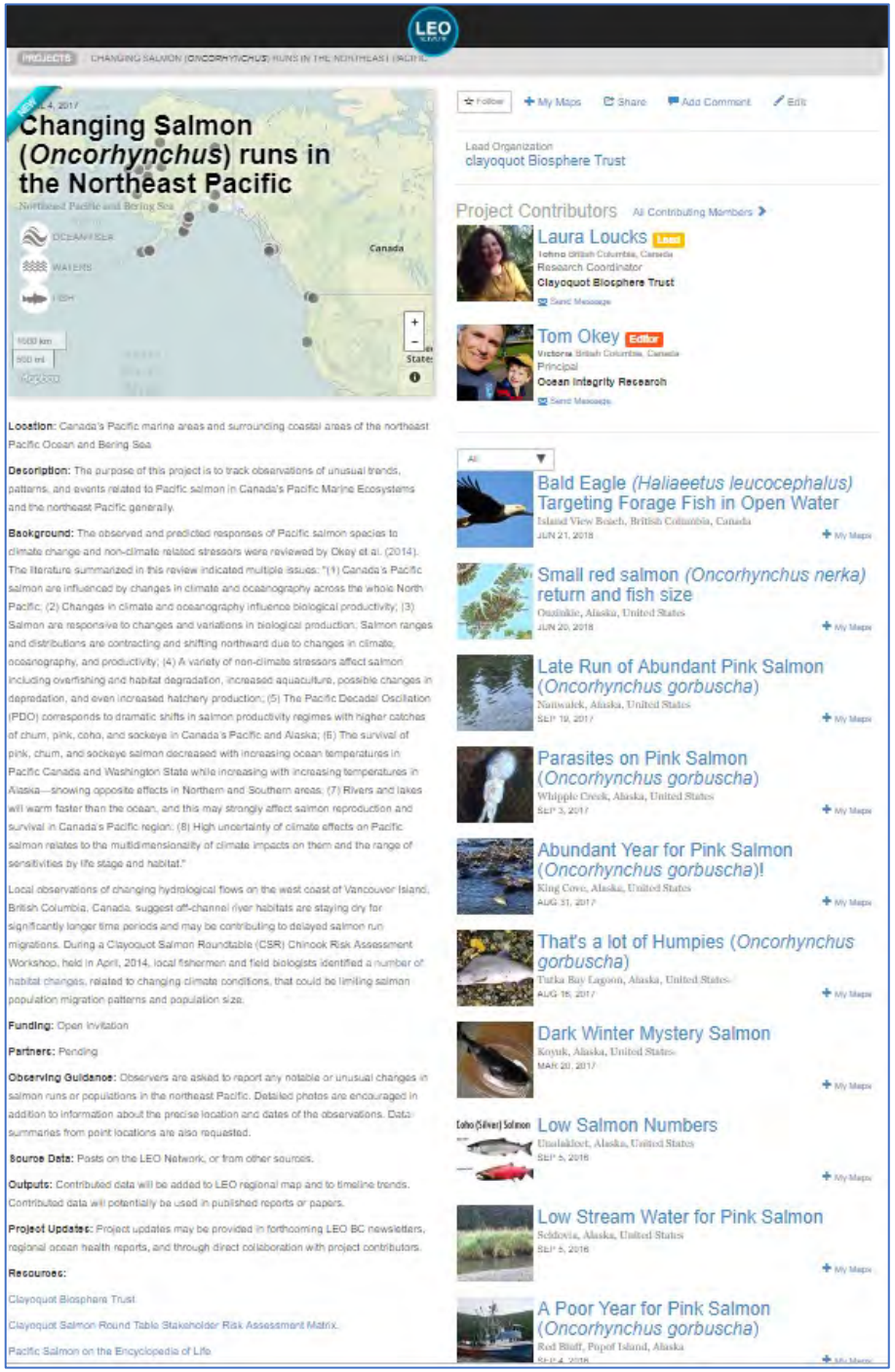
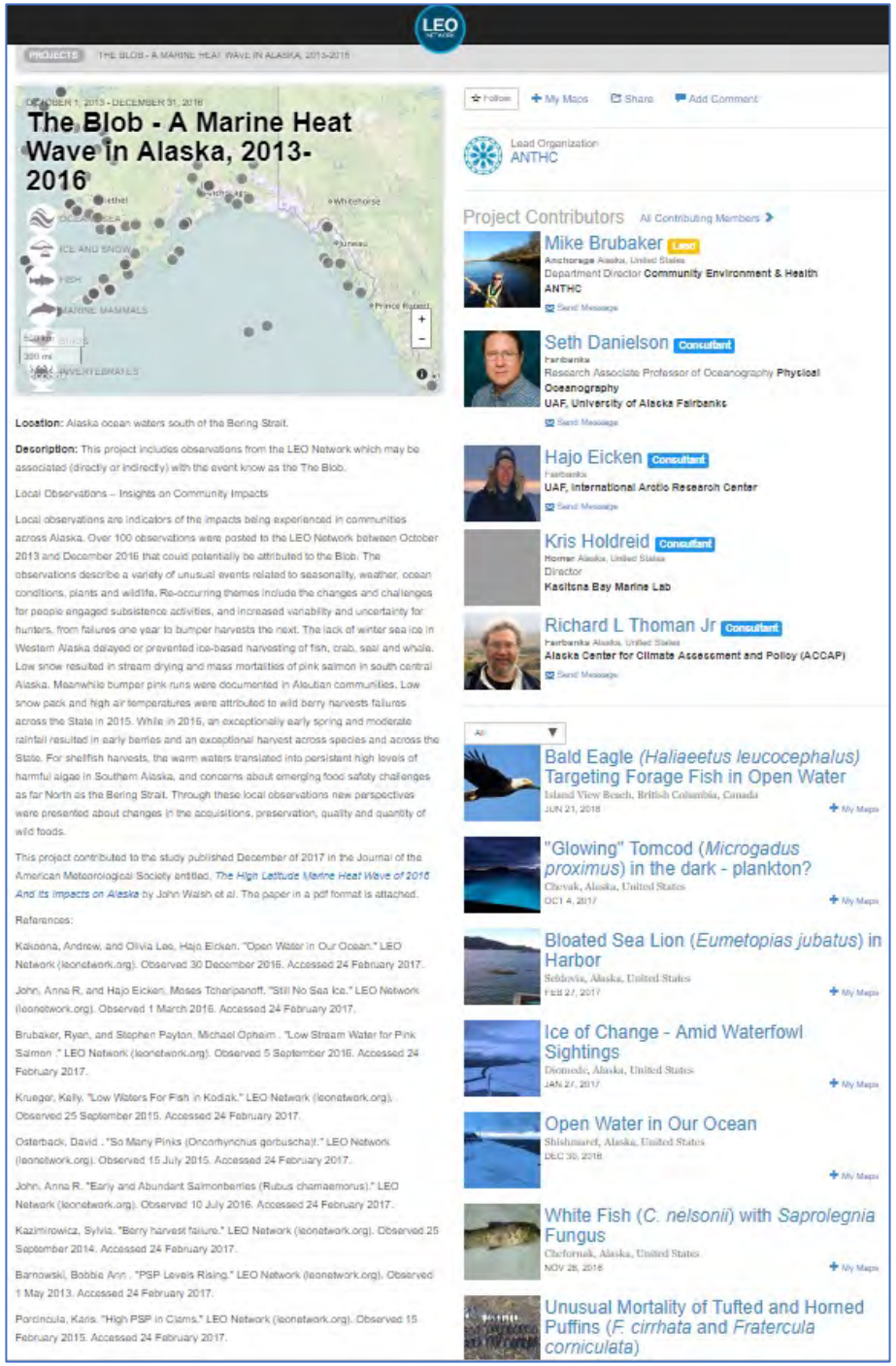
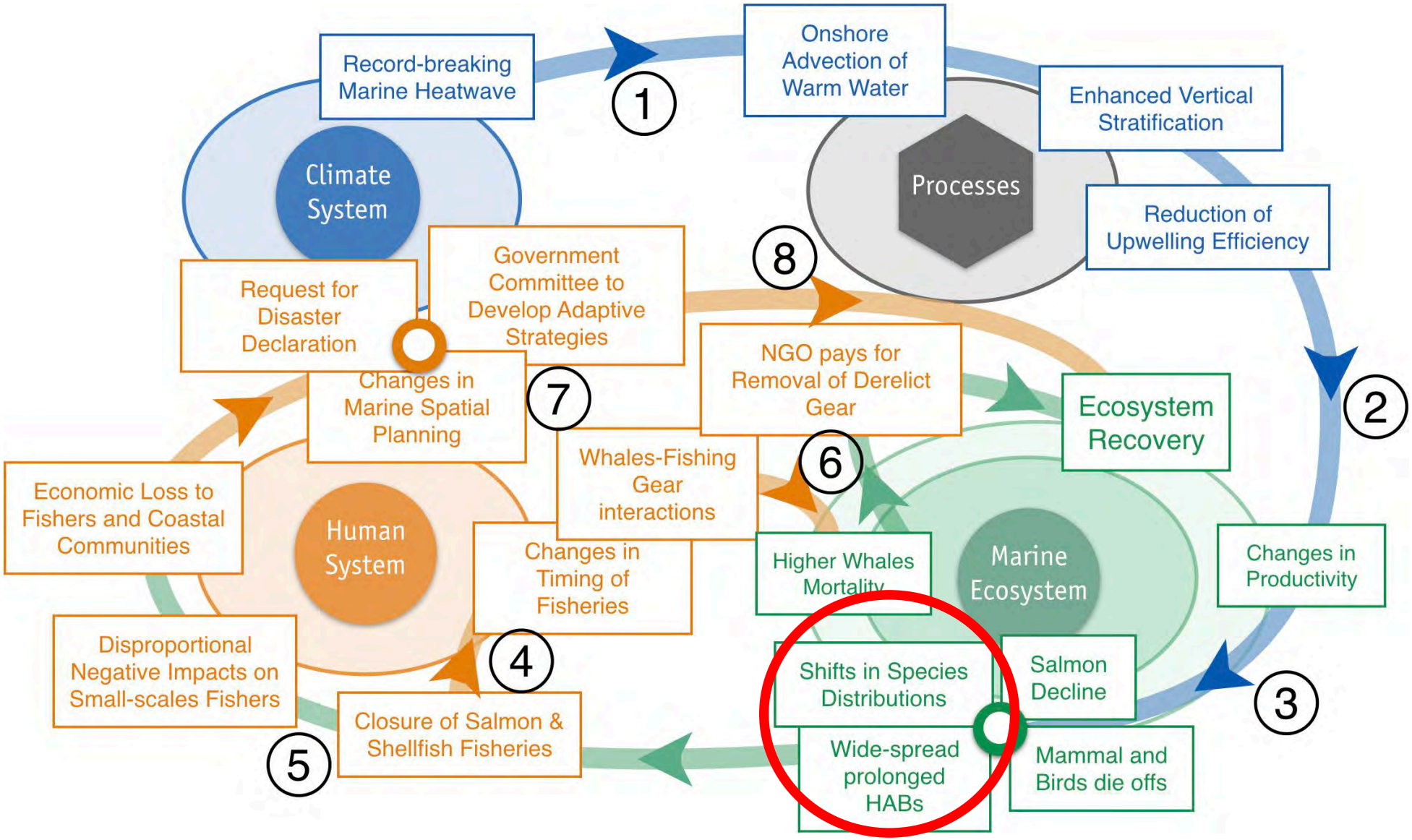
Projects

- Harnessing the LEO Network
- Changing Salmon Runs
- The Blob – Marine Heat Wave





FUTURE SEES case study 2: Ecosystem impact of a marine heat wave in the eastern Pacific



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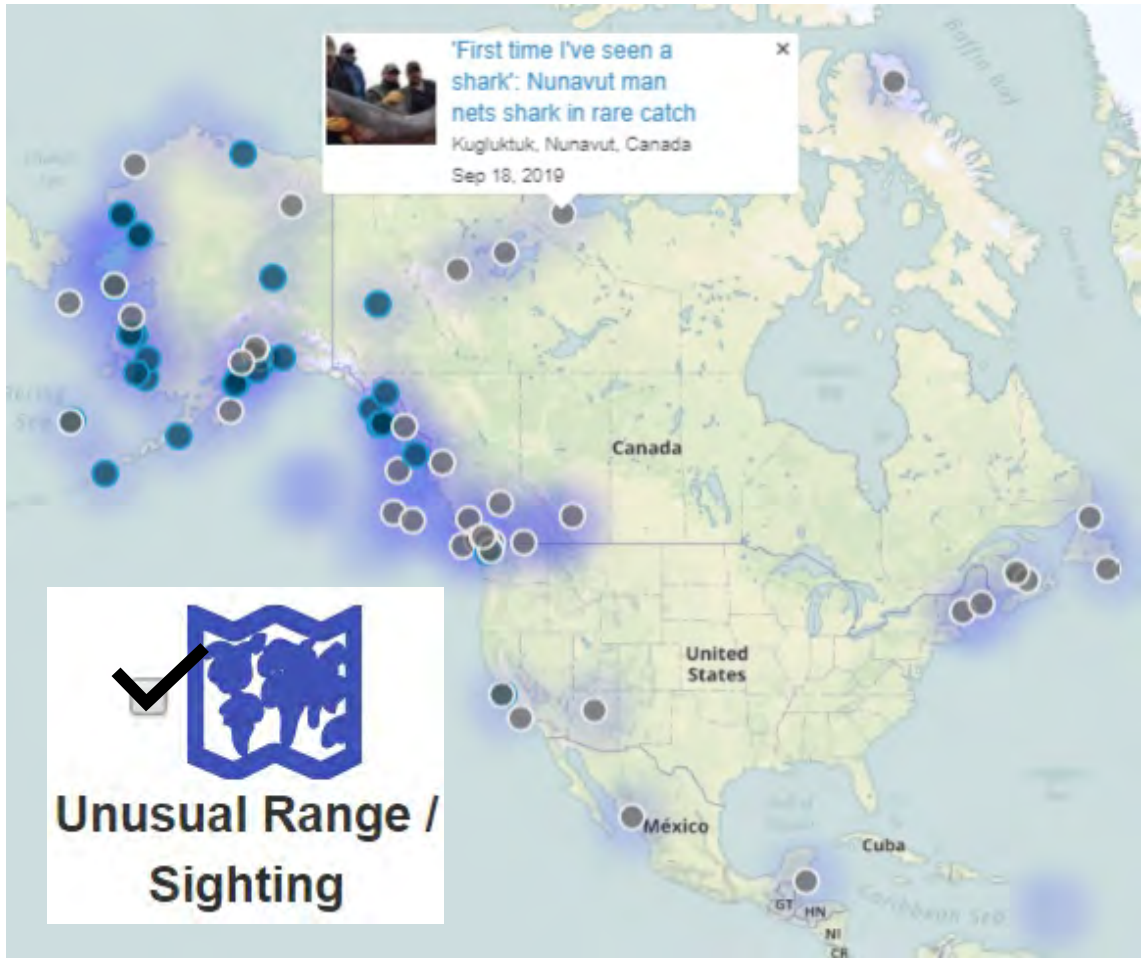
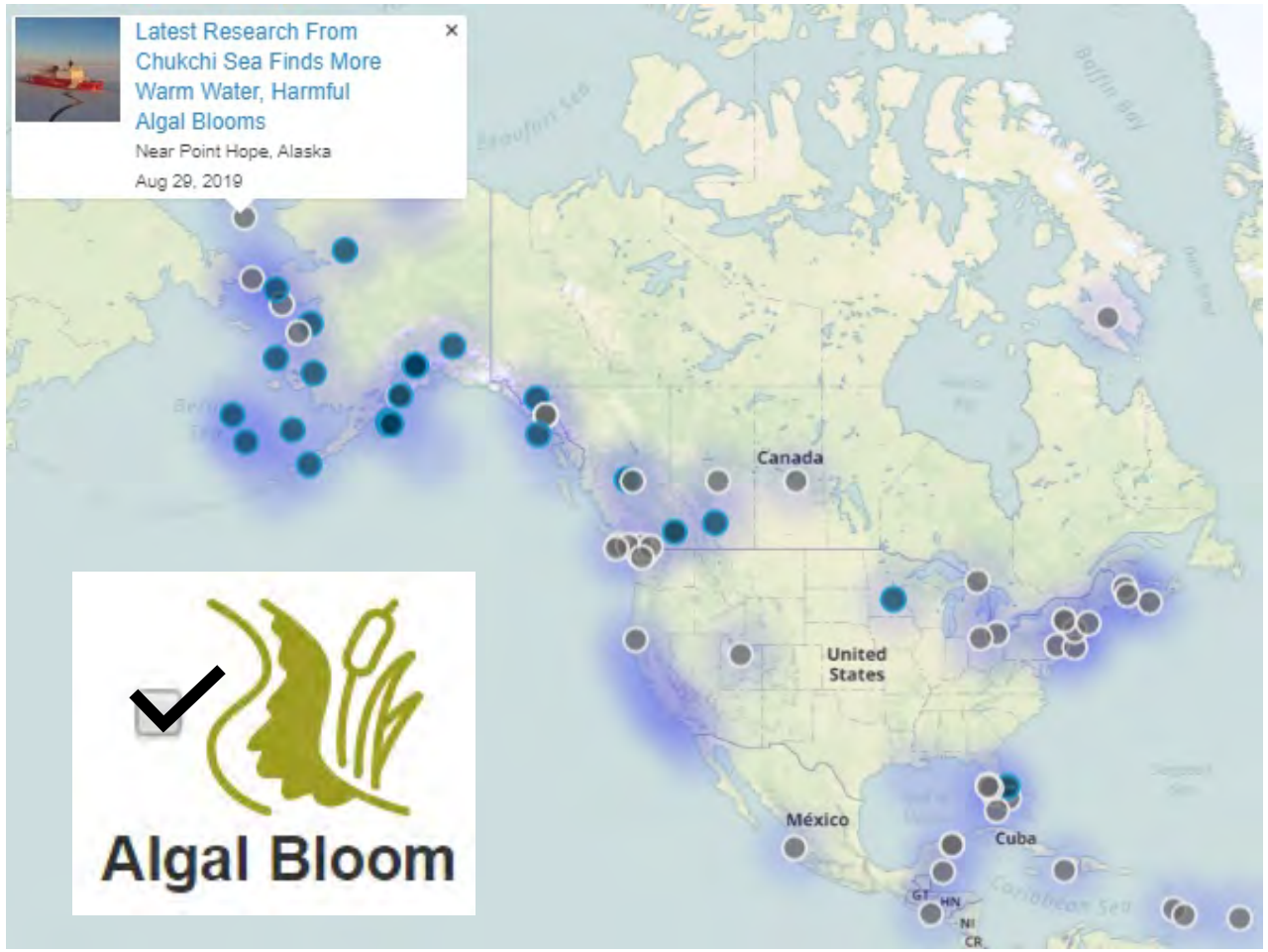
Example LEO Categories

Range shifts



Harmful Algae Blooms



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Projecting future changes in distributions of pelagic fish species of Northeast Pacific shelf seas

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Ric Brodeur

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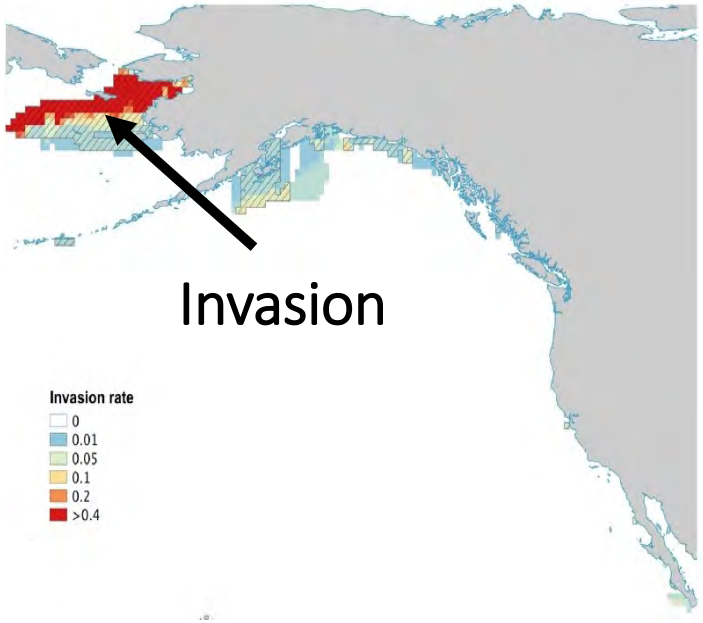
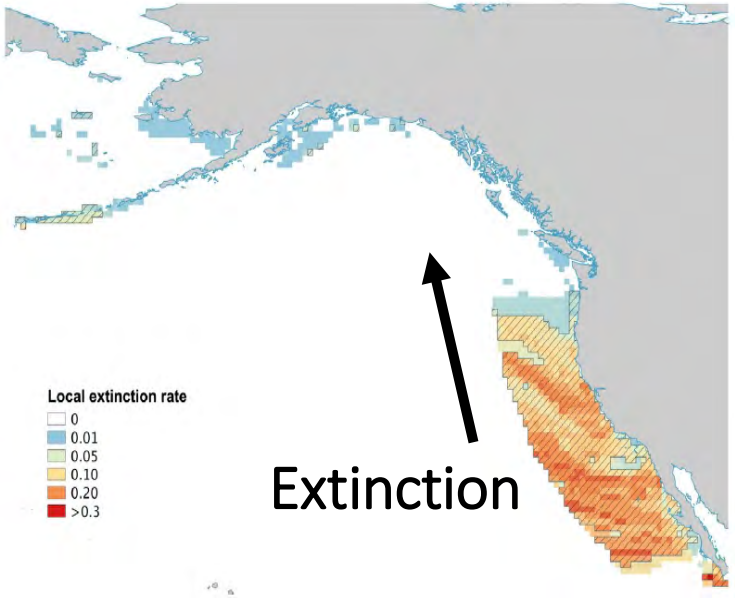
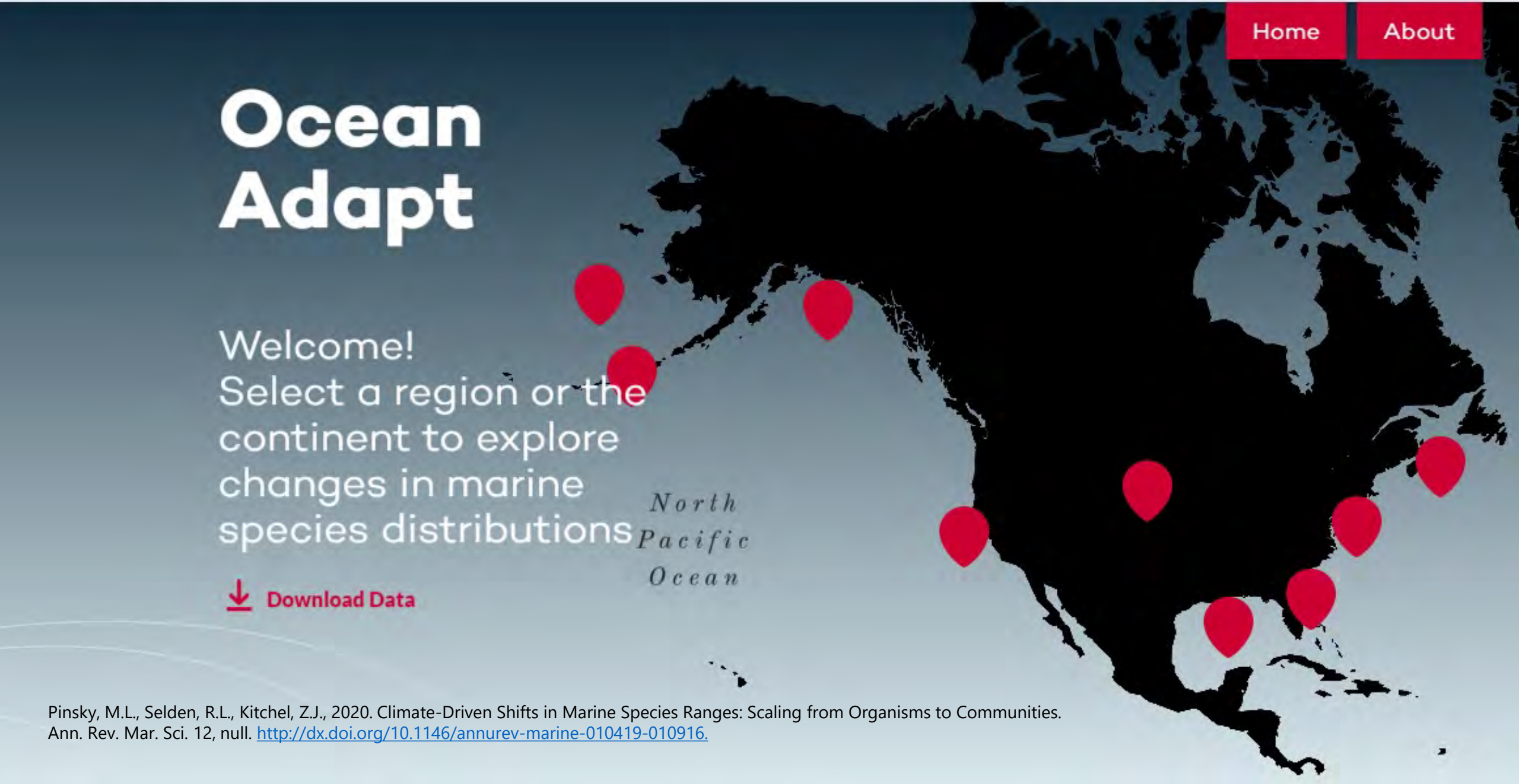




Daniel Pauly

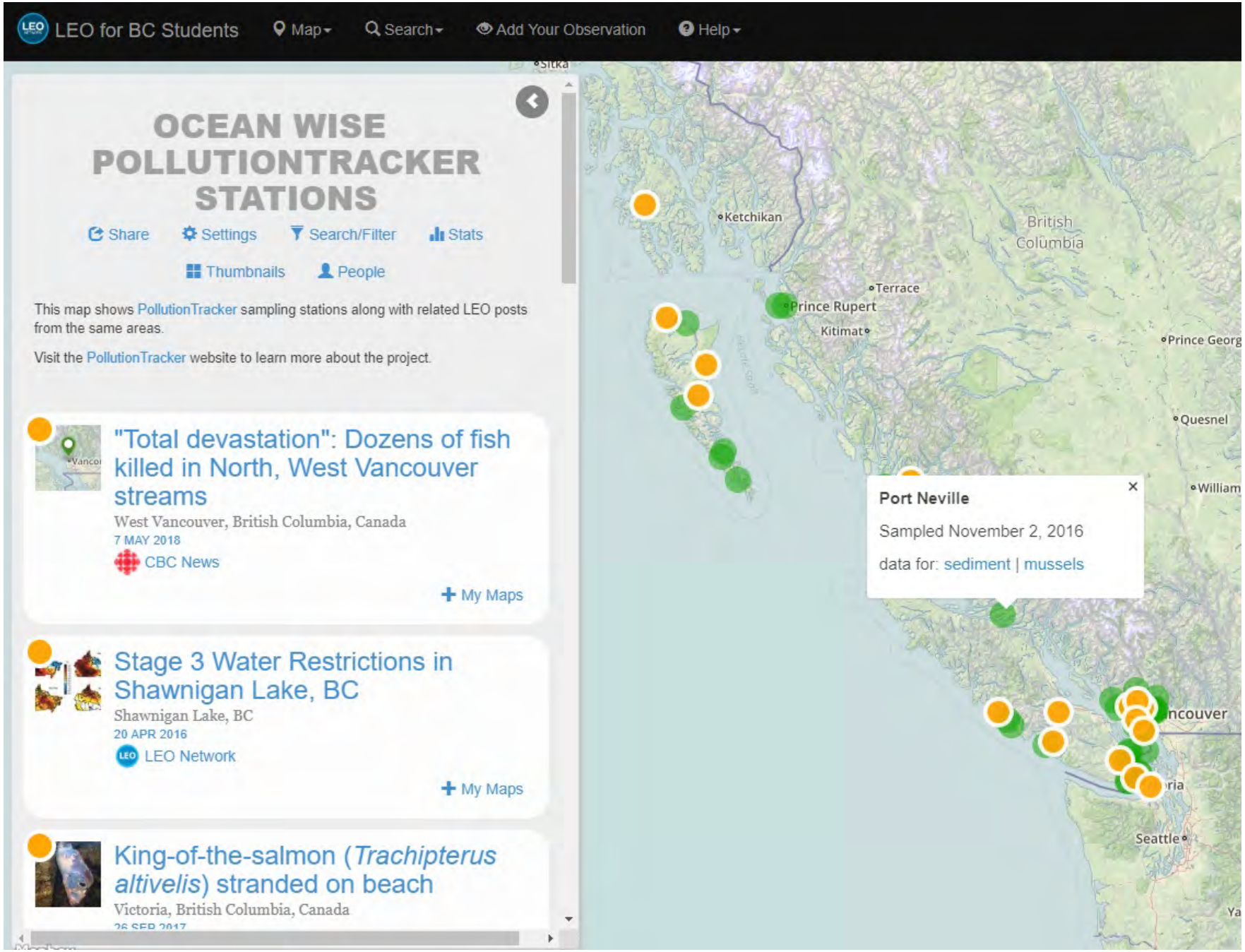
RUTGERS



Pinsky, M.L., Selden, R.L., Kitchel, Z.J., 2020. Climate-Driven Shifts in Marine Species Ranges: Scaling from Organisms to Communities. Ann. Rev. Mar. Sci. 12, null. http://dx.doi.org/10.1146/annurev-marine-010419-010916.

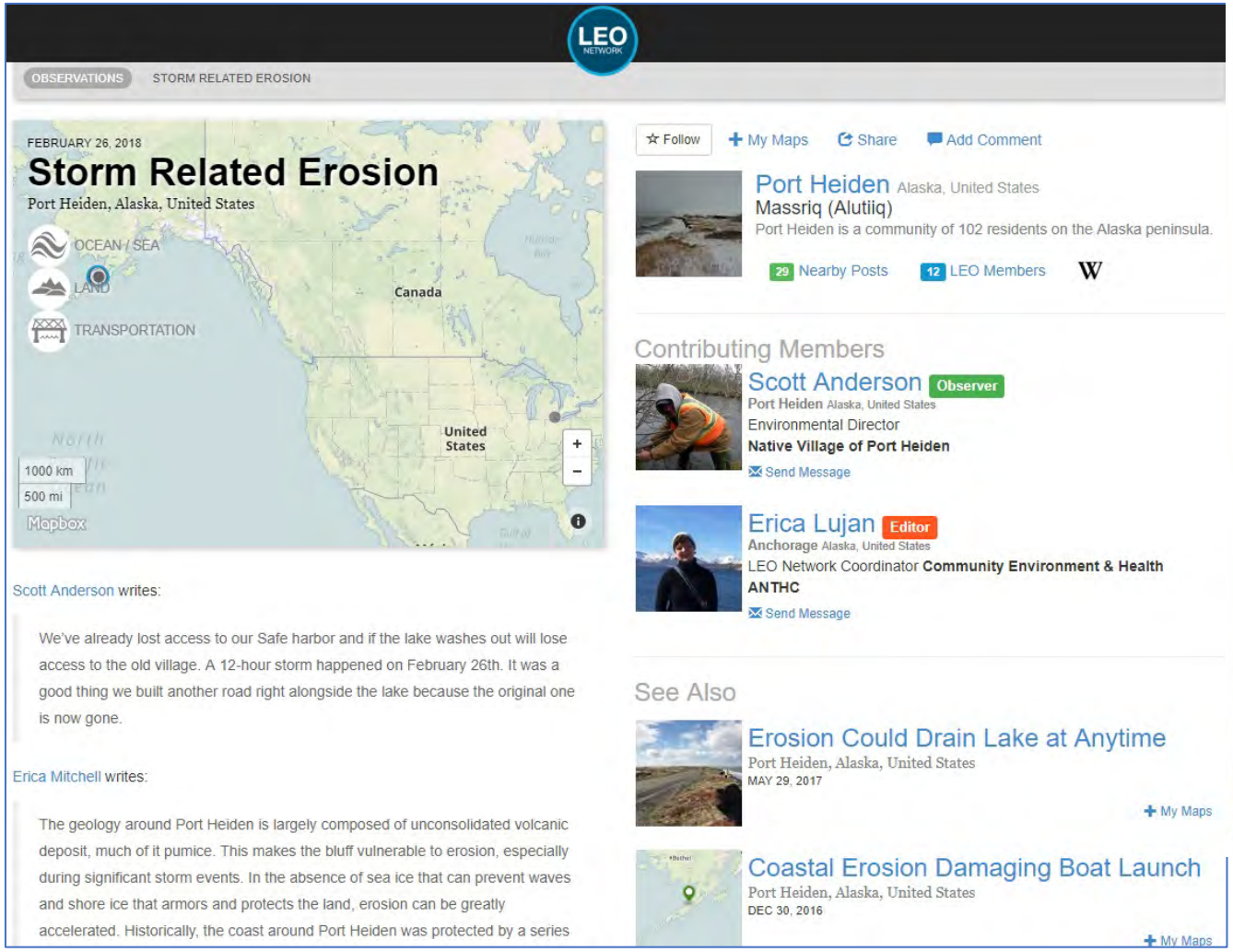
Interfacing with Other Data and Platforms

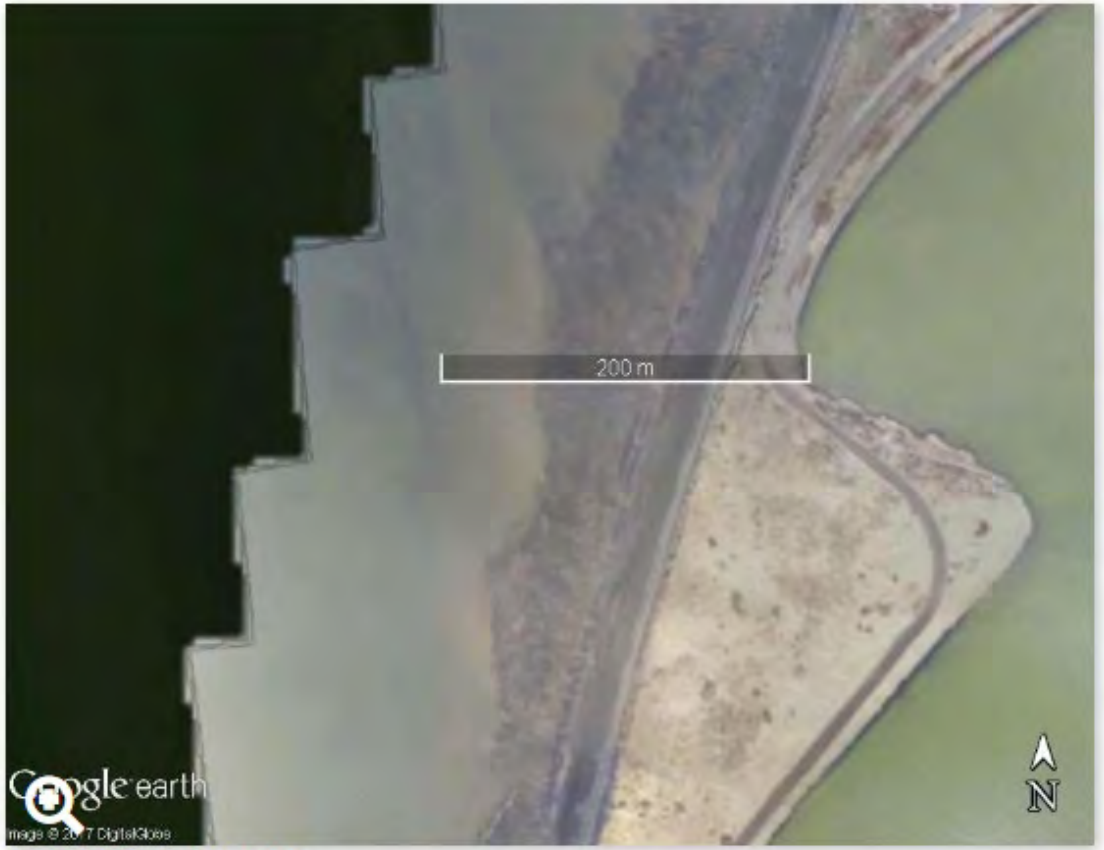
- Direct links to other platforms
- Co-locating data points
- Understanding relationships



We can include all knowledge of change that is accessible or shared in the North Pacific

Our understanding is incomplete without local observations





Port Heiden Coast, 2017
Alaska Division of Geological and Geophysical Surveys, via Google Earth

The Eyes, Ears, and Voice Our Changing Environment

Understanding environmental changes should be accessible by everyone

LEO NETWORK

First Nations Health Authority
Health through wellness

For more about LEO:

leonetwork.org

ALASKA NATIVE TRIBAL HEALTH CONSORTIUM

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