

About LEO

The Local Environment Observer Network

Mike Brubaker

Center for Climate and Health

Alaska Native Tribal Health Consortium



May 21, 2014
Google us at “LEO Network”



The Alaska Tribal Health System applies a “One Health” approach recognizing that healthy environment,



Photo courtesy Nikolski IRA

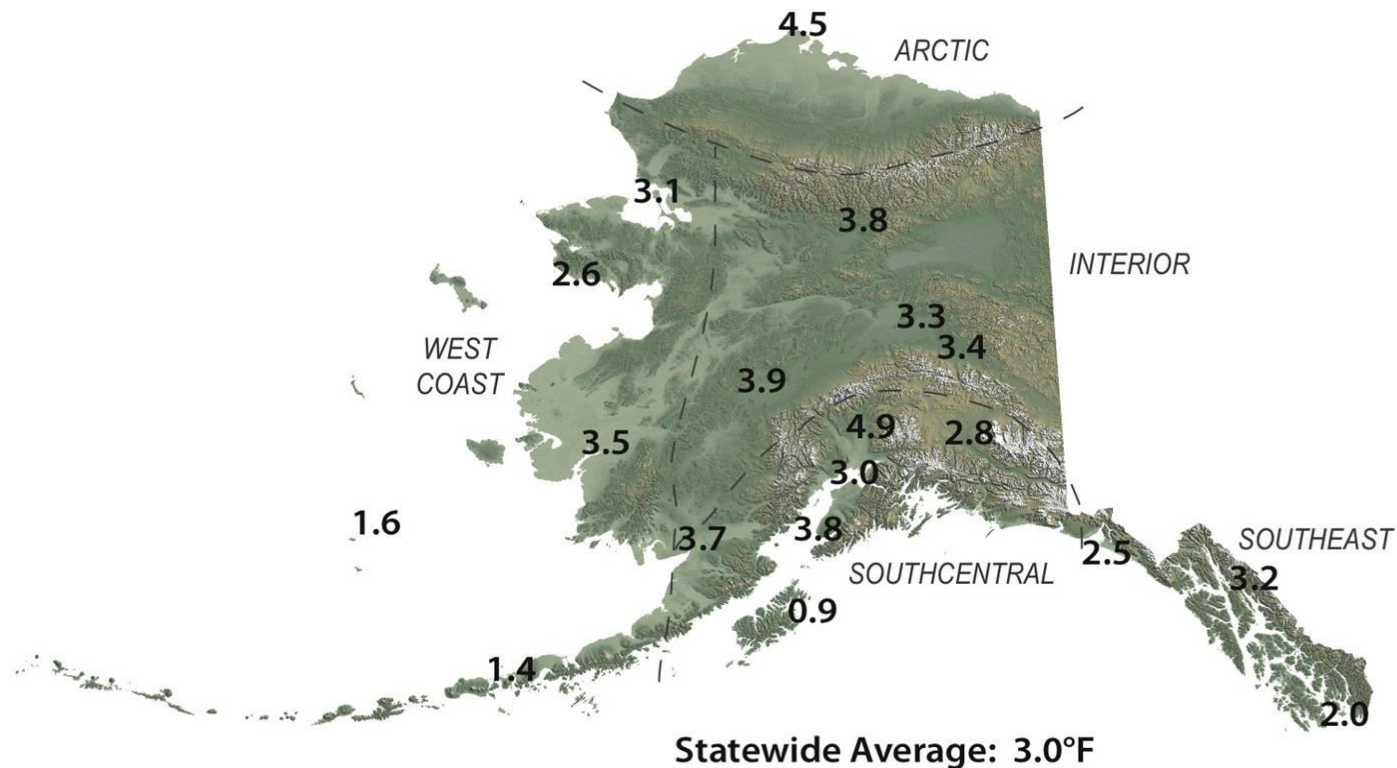
and healthy wildlife, is important for healthy people.



Photo by Mike Brubaker

Climate change is occurring in Alaska as evident from the change in mean annual temperature.

Total Change in Mean Annual Temperature (°F), 1949 - 2009



Climate change is also causing major changes in the environment, permafrost is a good example. Thawing on the North Slope is causing coastal erosion.



Photo by Ben Jones

**Thawing in communities is causing damage to infrastructure.
Here an arctic pipe in the village of Selawik.**



Photo M. Brubaker

Climate change is also resulting in health benefits.



Noatak River, by Ryan Brubaker

Center for Climate and Health

To assist the tribal health system in understanding effect, raise awareness and encourage strategies and responses that protect public health.

How can we minimize risk and maximize benefit?

The health effects of climate change (positive and negative)



Disease



Mental Health



Food Security



Injury



Water Security

So in 2009 we started three activities to describe potential impacts: the first was scanning northern news media for evidence of climate change.

The screenshot shows a CBC News article from May 2012. The page features the CBC News logo and navigation tabs for various news categories. The main headline is "Troublesome beetles spotted close to Yukon border", with a sub-headline "Mountain Pine Beetle has been ravaging B.C. forests for years". A photograph shows a person's hands holding a piece of wood with a small beetle on it. To the right of the photo are social media sharing options and a list of "Latest North News Headlines".

CBCnews | North

Live: Yellowknife
CBC News Iglaag
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Troublesome beetles spotted close to Yukon border

Mountain Pine Beetle has been ravaging B.C. forests for years

CBC News | Posted: May 22, 2012 2:04 PM CT | Last Updated: May 22, 2012 2:27 PM CT

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Latest North News Headlines

- Northern food costs remain sky high
- Yellowknife teachers ratify 3-year agreement
- Yukon might be undiscovered polar bear hybrid, scientist says
- Norway returns Inuit artifacts to Gjoa Haven
- Hay River teen sentenced to 5 months

© Mountain Pine beetle or bark beetle is seen on the tip of forester Cal Wetzstein's knife during the examination of trees in the White River National Forest near Vail, Colo., in this July 5, 2002 file photo. The beetle has also ravaged forests in B.C., and has been spotted close to the Yukon border. (Ed Andriasek/UP Photo)



We post these articles on publically available Google maps.

Google

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Circumpolar Climate Events Map - January 2014

This map provides an overview of climate-related or potentially climate-related events occurring in the circumpolar north. The map is hosted by the Alaska Native Tribal Health Consortium (ANTHC), Center for Climate and Health and is based on published reports, articles in the press, and local observations. To receive updates or to be included in our weekly Climate and Health E-News, visit our website. You can Google us at "Center for Climate and Health".

Public · 2 Collaborators · 4,046 views
Created on Dec 19, 2013 · By mbrubaker · Updated 2 days ago
Rate this map · Write a comment · KML

- Link: LEO Network**
Click here to see this month's Local Environmental Observer Network Observation map. Monitoring the environment is imp for understanding the risks and benefits adn for adaptation. T LEO'...
- Mild weather helps with Aleutian bird count (USA)**
Unalaska, Alaska. January 1, 2014 (birds, weather) The bird in the Aleutians was also aided by mild weather. Winter is rure late in Unalaska this year – and that was good news for those
- Power shutdown forced by high demand (Canada)**
Prince Edward Island, New Brunswick, January 3, 2014 (wea An emergency power outage was initiated on Prince Edward cutting electricity to some business customers in order to pre bla...
- Deep freeze challenges Thunder Bay farmers (Cana)**
Thunder Bay Ontario, January 3, 2014 (extreme cold, farming recent stretch of frigid weather has made life difficult for farmi

1000 mi
2000 km

ALASKA NATIVE TRIBAL HEALTH CONSORTIUM

Secondly, we began to visit communities and document the kinds of climate sensitive changes they are experiencing.



Photo Mike Brubaker

The result has been over a dozen community scale reports about climate change and health effects.



Climate Change in **Nondalton**, Alaska

Strategies for Community Health



ANTHC Center for Climate and Health



The third was training and working with local environmental managers to describe the kind of environmental change they are experiencing, and to connect them with experts who can provide technical assistance.



The Eyes, Ears & Voice
LEO AK
of Environmental Change

**Our communities are changing
due to environmental impacts,
climate change and development.**

LEO is a free network of environmental and natural resource professionals. There are over 200 members from more than 100 communities.



**LEO is focused on observation not structured monitoring.
Participants post observations about environmental change that
is unique or unusual.**



Google LEO is public. All information is accessible via Google maps.

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LEO Network - January 2014

This map provides observations posted by the Local Environmental Observers (LEO) Network. For more information visit our website at the Alaska Native Tribal Health Consortium, Center for Climate and Health. Google us at "LEO Network".

Public · 2 Collaborators · 35,973 views
Created on Dec 19, 2013 · By [mbrubaker](#) · Updated Feb 24
[Rate this map](#) · [Write a comment](#) · [KML](#)

Link: Circumpolar Climate Events Map

Click here to view this months Circumpolar Climate Events Map including web links to news articles from across the circumpole north. See also Center for Climate and Health website.

No snow: roads open and harvesting time change

Solomon, Alaska, January 3, 2014 (weather) The Solomon-C Road is usually closed by end of October. Last year we were camping down in Solomon until end of November. This year r Snow and the Road...

Lack of sea ice observed in the Bristol Bay Region

Port Heiden, Alaska, January 7, 2014 (ice, weather) We've or sea ice once this year and I think that was on only for one or 1 days and then it all melted away. The sea ice usually shows t aro...

Coastal erosion disrupts bulk fuel farm

Port Heiden, Alaska, January 7, 2014 (erosion, sea ice) Durin observation for erosion and weather condition, we came acro yellow fuel headers pipes for our bulk fuel farm. The city has l

What a warm winter season - climate change

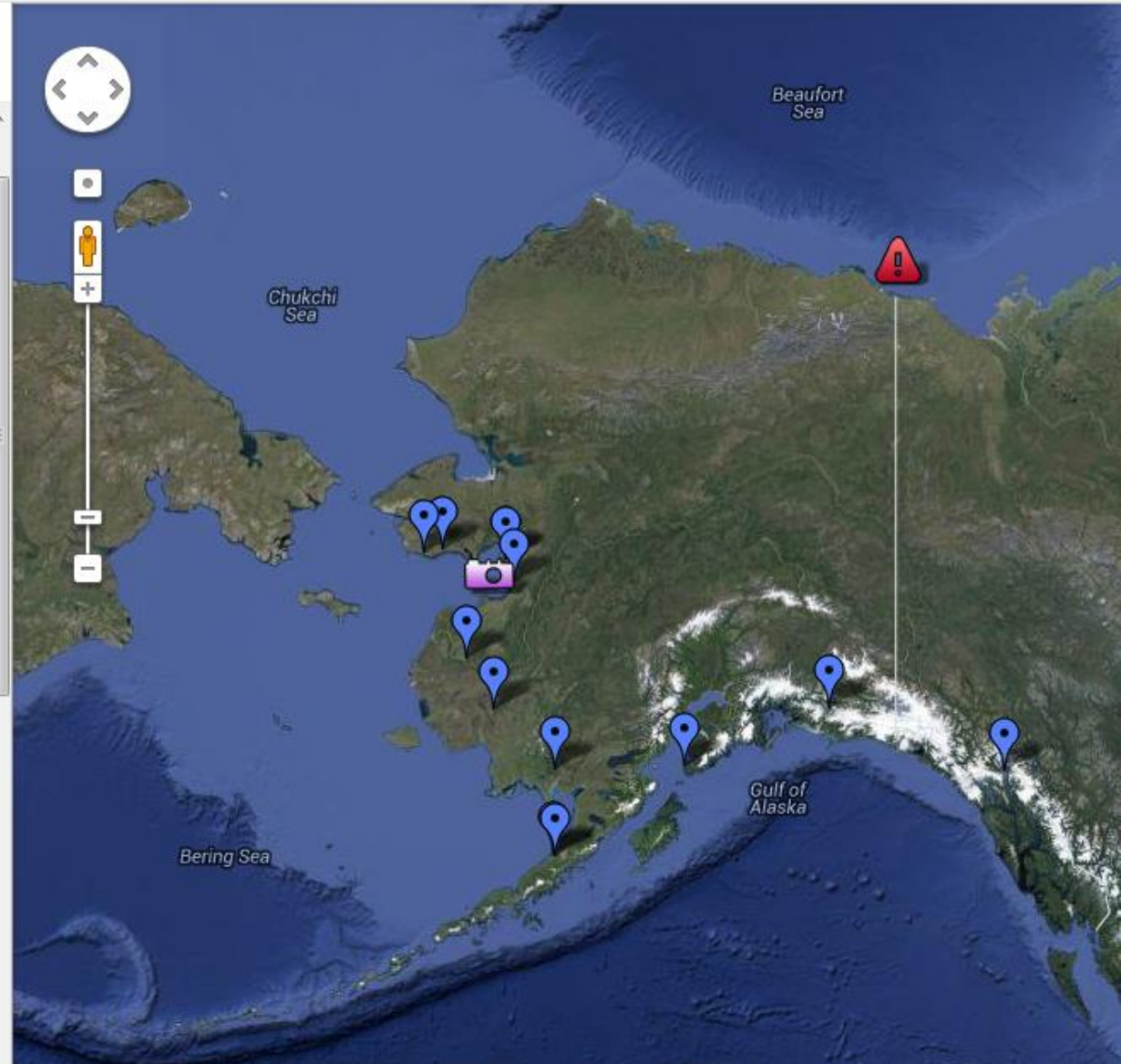
Shaktoolik, Alaska, January 20, 2014 (weather) Last week we received a huge amount of snow during our snow storm. Unfortunately, it rained yesterday! Making the road conditions ice. It fe...

Coyote near Norton Sound Community

Shaktoolik, Alaska, January 23, 2014 (land animal) My son w check his traps and ran across a coyote, at first he though it v fox. I haven't heard of anyone here or around our neighboring

The plants are blooming early - the ice is melting

Bethel, Alaska, January 24, 2014 (weather) I noticed that the are budding here in Bethel. I looked out my office window anc trees in bud. Also water on the Kuskokwim River and thin ice.



LEO had 192,725 Google map site visits in 2013.

LEO is community driven. Members decide within their own organizations what is important and appropriate to share.



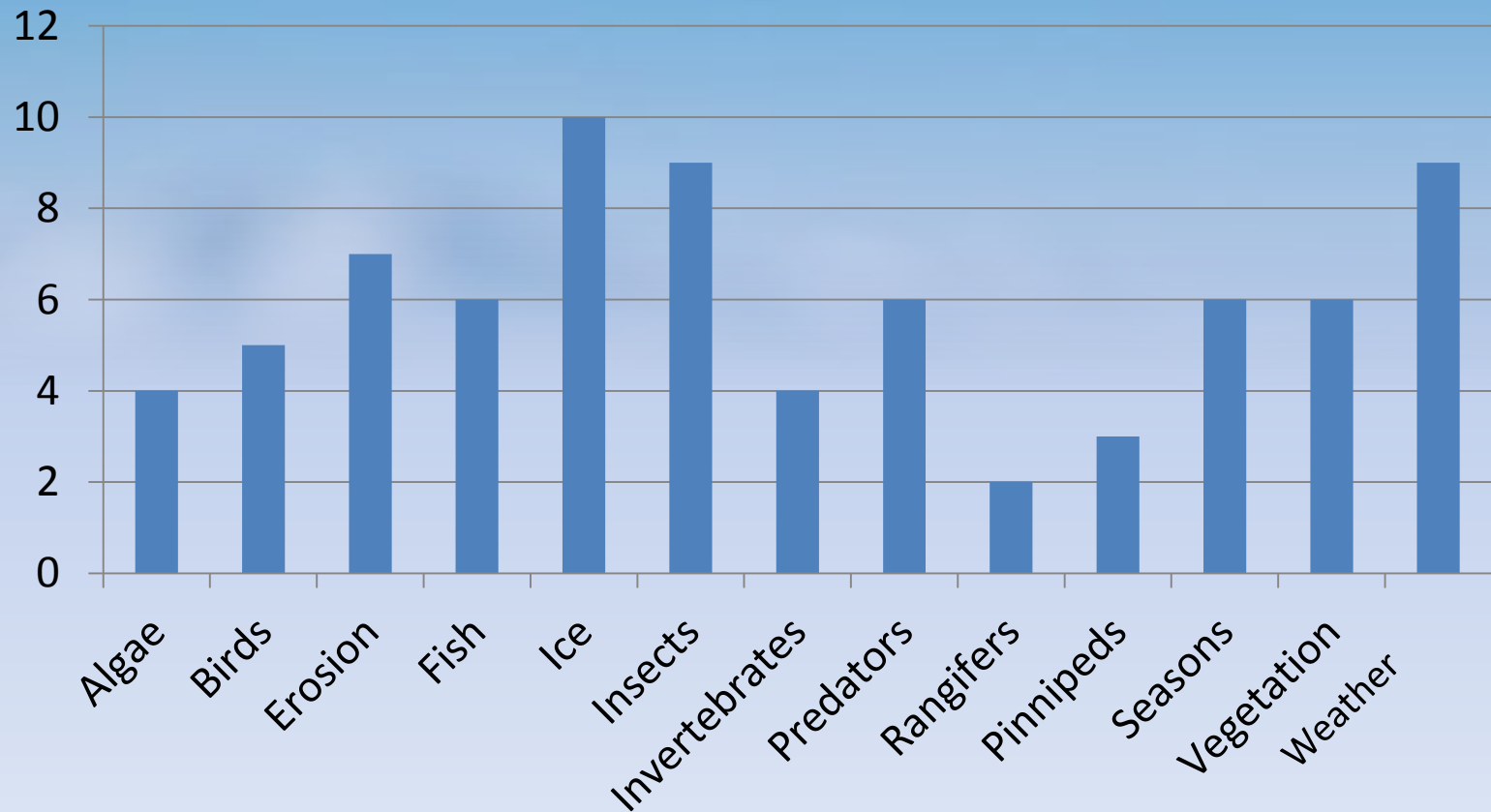
Nikki Shanigan reviews an observation with tribal council members in Pilot Point. Photo Mike Brubaker

LEO looks at broad environmental effects. Members post observations on changes to wildlife, plants, weather, landscape and many other topics.



Barrow Ice - Photo courtesy of Quinugan Roddy, LEO

This graph shows of observations by category during 2013.



LEO is inclusive. Anyone can share observations, however the local LEO is the go to person who reviews observations before posting.

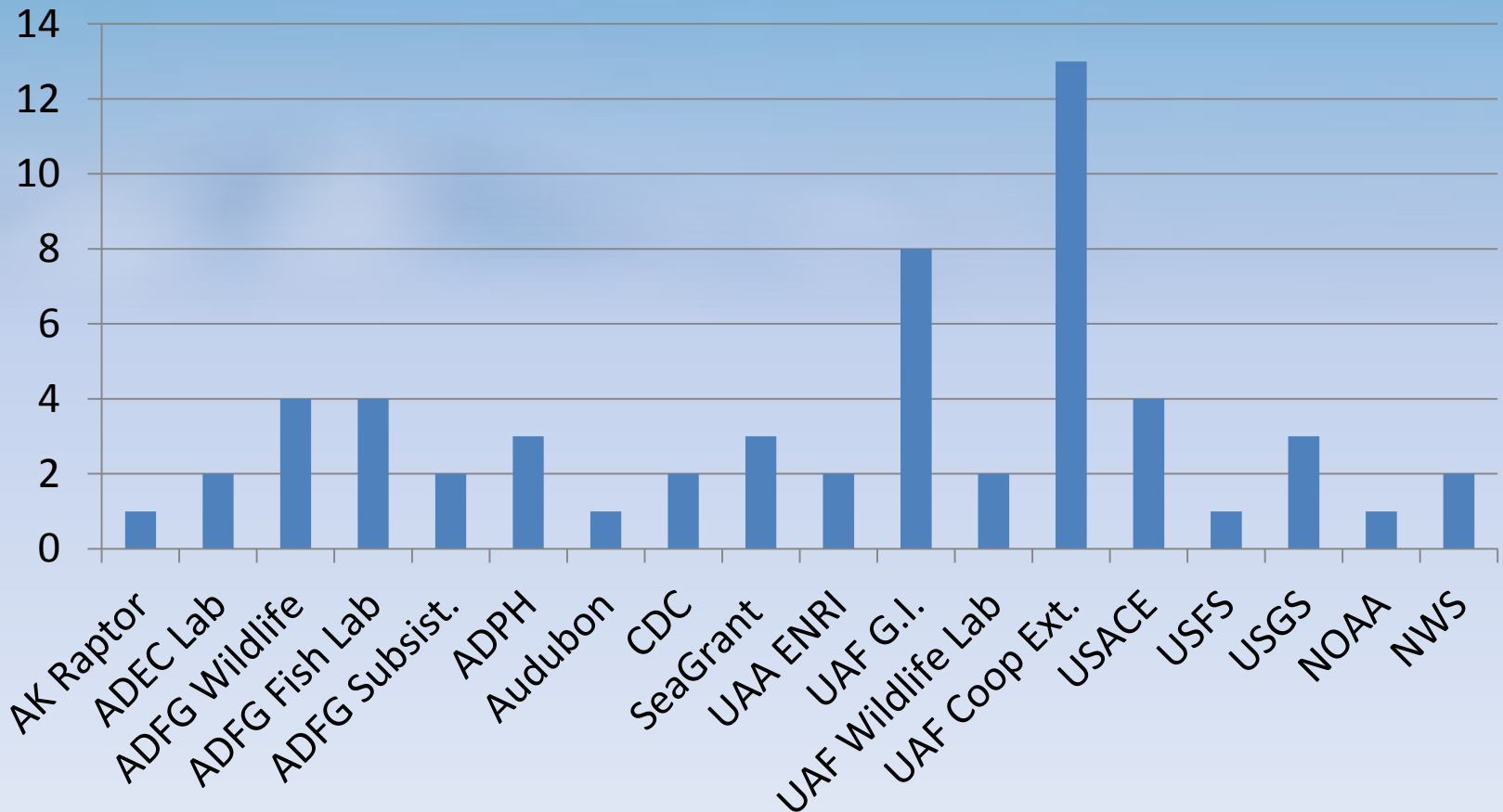


Photo Mike Brubaker

LEO connects communities with technical experts. Dr. Hajo Eicken is a regular collaborator on sea ice observations.



This graph shows technical referrals by organization during 2013.



NO provides surveillance for emerging environmental issues.

October 13, 2014. Skin illness in white fish “In all the years I've been fishing I never caught any fish like this” Sam Kunaknana, Nuiqsut



Diagnosis of illness caused by the mold *Saprolegnia* was made by the Alaska Fish Pathology Lab.

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Explore making custom maps in an [interactive tutorial](#).

Local Environmental Observer (LEO) Map, May 2012

Local Environmental Observer (LEO), May 2012
 This map provides a monthly record of unusual or noteworthy events that have occurred across Alaska. The purpose is to increase communication and understanding about our changing environment and to encourage healthy ways to adapt. Reports are provided through the network of Local Environmental Observers (LEO); environmental professionals located in local or regional tribal organizations across Alaska.

For more information visit our site at the [Alaska Native Tribal Health Consortium](#), Center for Climate and Health:

<http://www.anthc.org/chs/ces/climate/leo/>
 Email: anthcleo@anthc.org

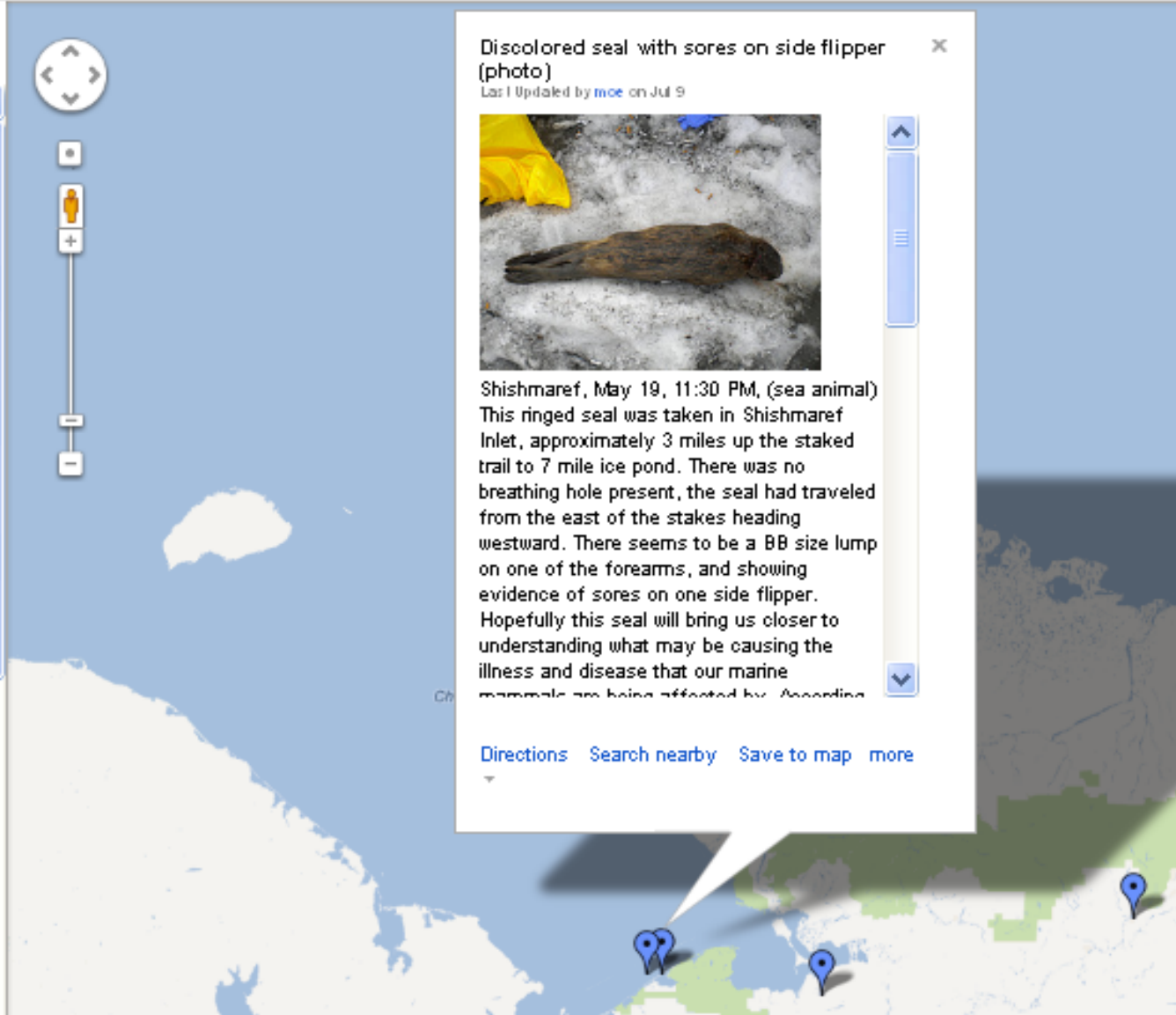
Funded by the Environmental Protection Agency

Public · 2 Collaborators · 8,470 views
 Created on May 3 · By [mbrubaker](#) · Updated Jul 9

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Deer with fur loss in Southeast

Hollis, Alaska, May 1, 2012 (land mammals) We have been seeing like Black-tailed deer with large patches of fur hanging from their bodies and bald spots the size of place mats. Some deer also have mu...



Discolored seal with sores on side flipper (photo)

Last Updated by [moe](#) on Jul 9



Shishmaref, May 19, 11:30 PM, (sea animal)
 This ringed seal was taken in Shishmaref Inlet, approximately 3 miles up the staked trail to 7 mile ice pond. There was no breathing hole present, the seal had traveled from the east of the stakes heading westward. There seems to be a BB size lump on one of the forearms, and showing evidence of sores on one side flipper. Hopefully this seal will bring us closer to understanding what may be causing the illness and disease that our marine mammals are being affected by. According

[Directions](#) · [Search nearby](#) · [Save to map](#) · [more](#)

LEO maps include rich content about type of event, local knowledge, implications, adaptation, resources, photos and video.



Collaborate

Explore making custom maps in an [interactive tutorial](#).

LEO Network Participants (Please Do Not Distribute)

This is a private map for LEO Network Participants. It shows the locations of all LEOs and has contact information to encourage collaboration within the network. This map is for LEO participants only, so please do not distribute. You can click on the individual icons to look at LEO information and their photos. If you have comments or would like to add information, or be removed from the map, you can contact the map hosts at: anthcleo@anthc.org

Unlisted · 3 Collaborators · 2,548 views
 Created on Jan 24 · By [mbrubaker](#) · Updated Jun 25
[Rate this map](#) · [1 comment](#) · [HTML](#) ·

Moses Tcheripanoff, LEO 01 (photo)

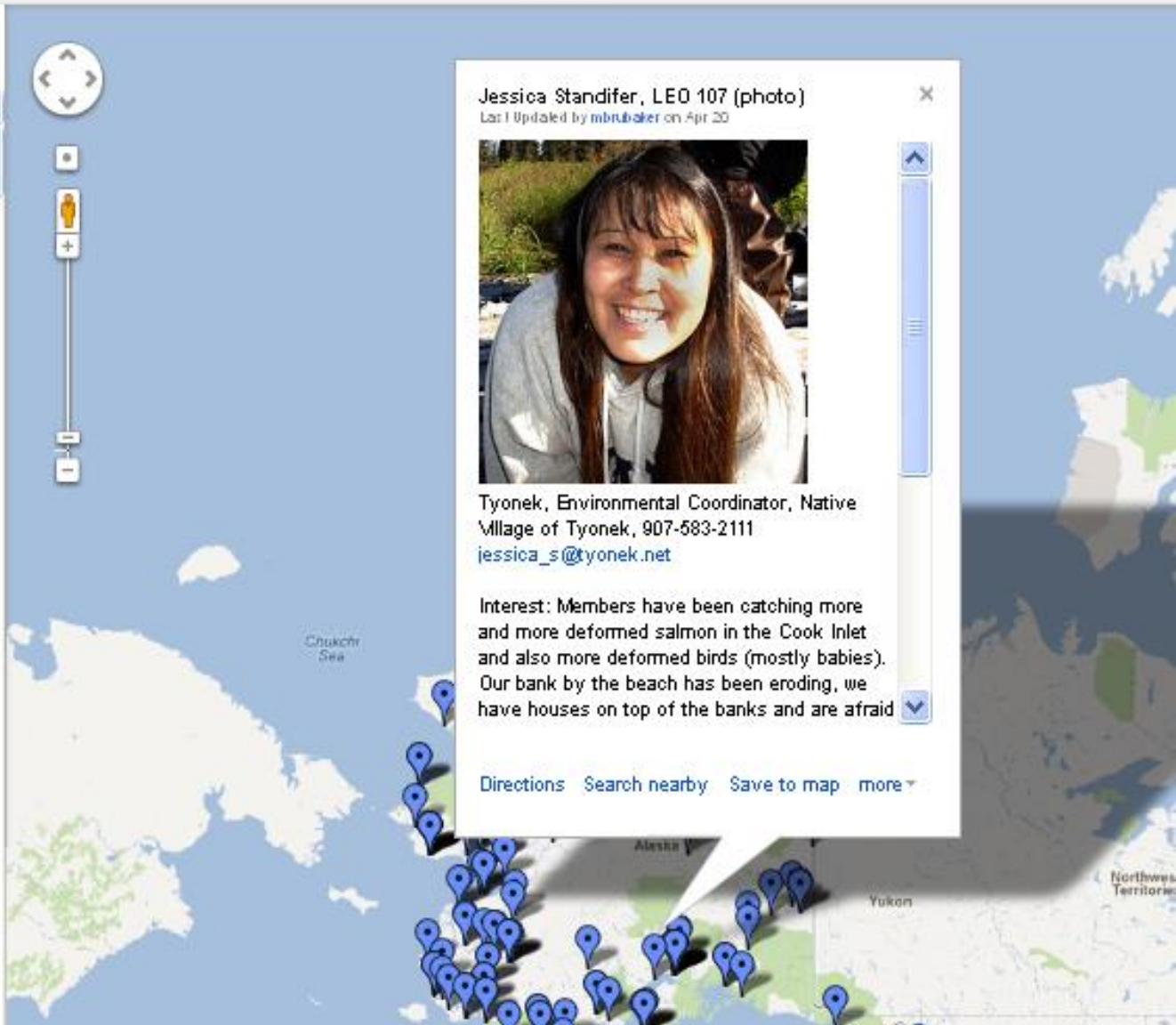
Wasilla LEO Manager and Web Guru, Alaska Native Tribal Health Consortium, 907-729-2496, mp.tcheripanoff@anthc.org Interest: I believe that this program is essential for keeping our communities connected...

Mike Brubaker, LEO 02 (photo)

Anchorage / McDonald Spit LEO Manager, Director Community Environment and Safety, Alaska Native Tribal Health Consortium, 907-729-2464, mbrubaker@anthc.org Interest: community change related to c...

Hanna Eklund, LEO 03 (photo)

Chugach / Anchorage, Researcher, Chugach Regional Resource Commission, 907-562-6647, hanna@crcalaska.org Interest: ... LEO since January 2012.



Jessica Standifer, LEO 107 (photo)

Last Updated by [mbrubaker](#) on Apr 20



Tyonek, Environmental Coordinator, Native Village of Tyonek, 907-583-2111
jessica_s@tyonek.net

Interest: Members have been catching more and more deformed salmon in the Cook Inlet and also more deformed birds (mostly babies). Our bank by the beach has been eroding, we have houses on top of the banks and are afraid

[Directions](#) [Search nearby](#) [Save to map](#) [more](#)

LEO is also a social network and members correspond with each other directly to discuss local concerns and to exchange information.

LEO is built on open and available web programs and uses social media. You can find links to our Facebook, flickr and YouTube pages on our website.

LEO Home



Local Environmental Observer (LEO) Network

Northern communities are changing due to environmental impacts, climate change and development. Monitoring the environment is important for understanding the risks and benefits and for adaptation. The LEOs are the eyes, ears and voice of environmental change in our communities.



We are tribal professionals who apply traditional knowledge, western science and technology to document unusual plants and wildlife, extreme weather, erosion, flooding, droughts, wildfire and other events that can threaten food security, water security and community health. Checkout our LEO Public Maps, and resource links to learn more. You can view our observation data on our [2012](#) and [2013](#) spreadsheets.



LEO May 2014



View LARGE: [click here](#)

Monthly Maps

October 2013

Category Maps


Air Quality

Alaska Region Maps

Aleutian & Pribilof Isl

Canada Region Maps

British Columbia

LEO communities at a glance, click icon: 

Related Pages

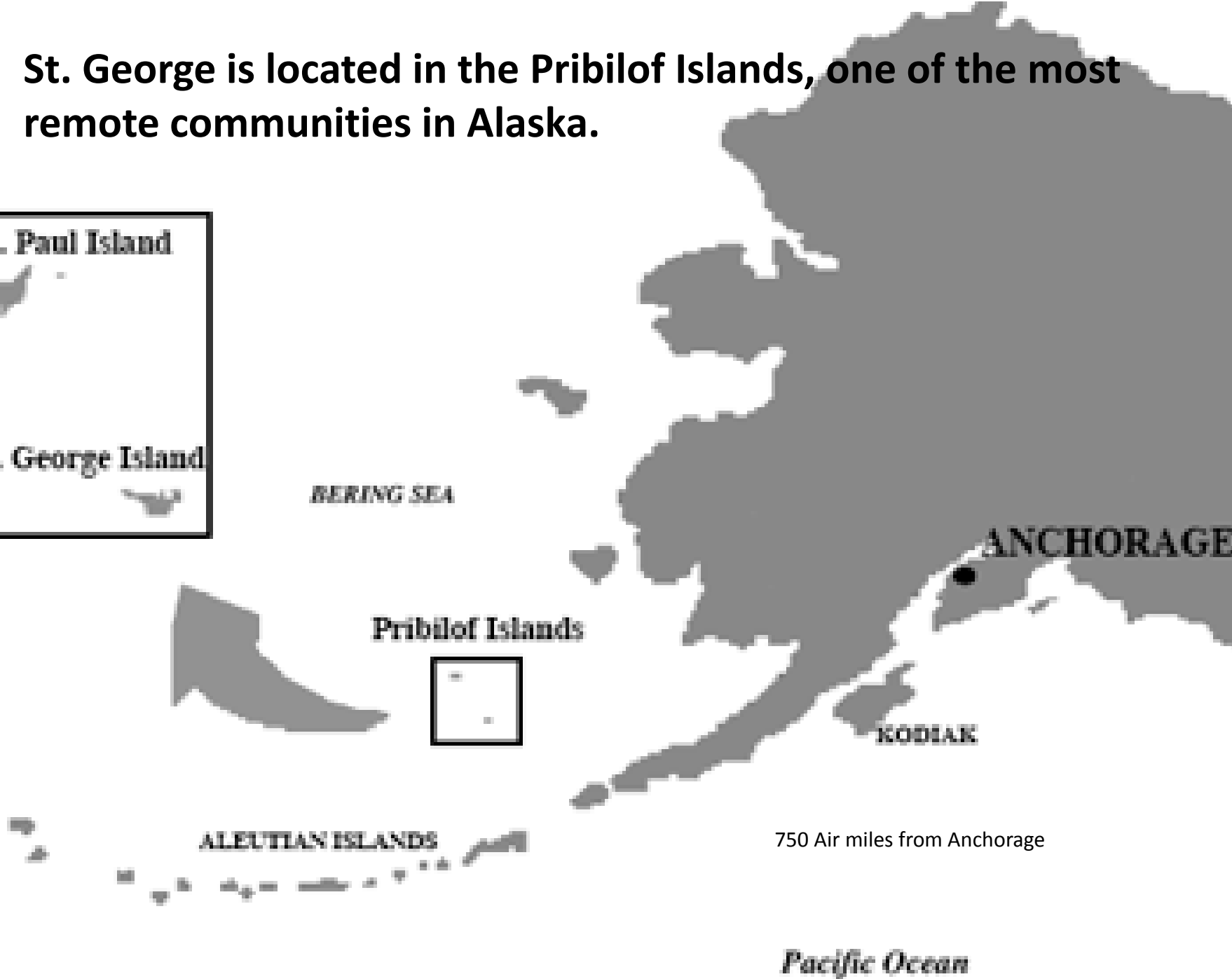
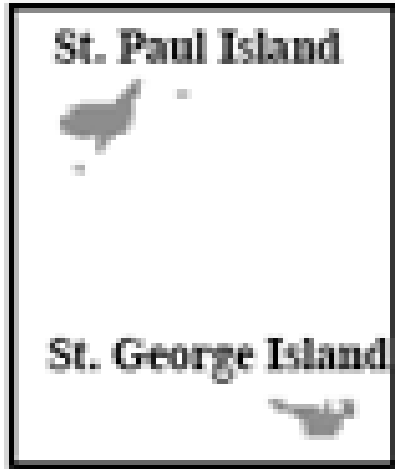
- [About LEO](#)
- [Contact Info](#)
- [Faces of LEO](#)

A LEO Case Study – St. George Alaska, September 2012




Photo Mike Brubaker

St. George is located in the Pribilof Islands, one of the most remote communities in Alaska.



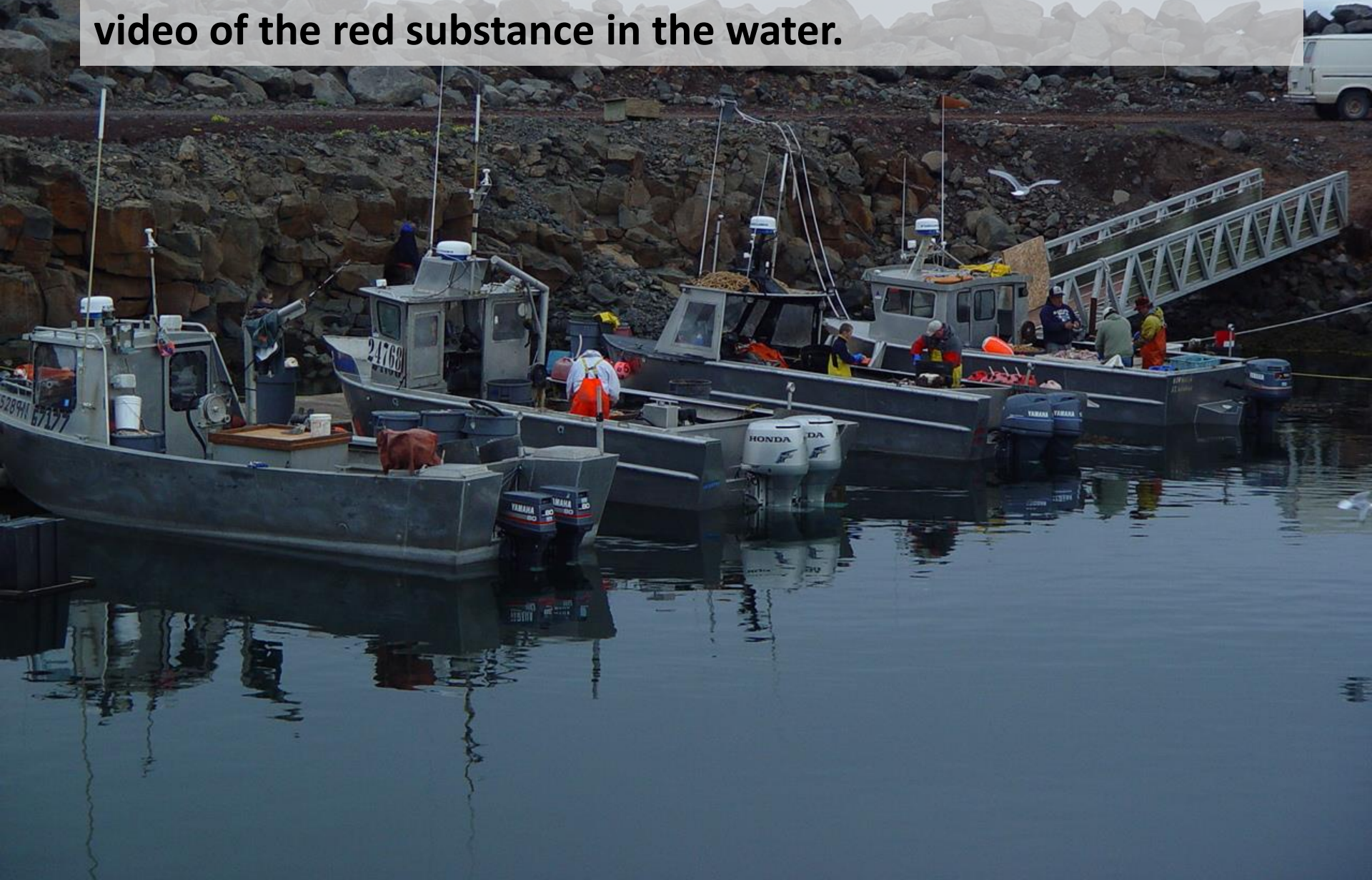
750 Air miles from Anchorage

Pacific Ocean

A portrait of Aaron Merculief, a man with short dark hair, glasses, and a goatee, wearing a dark jacket. The background is a textured, light-colored wall.

In September 2012, Aaron Merculief Environmental Manager and LEO, was presented with an environmental mystery: why had the harbor turned red? Was the source living or non living, organic or inorganic? Most importantly as environmental manager, was the substance harmful?

Aaron went to the St. George harbor and using a point and shoot camera on a broom stick, took underwater photos and video of the red substance in the water.



Aaron went to the LEO website and posted this observation:

Saint George, Harbor, September 14, 2012 The community members who work around the harbor noticed the redness in the harbor as the water doesn't get disturbed too much from the weather like the waters around the island. The community members who brought this to my attention said they haven't seen anything like this. It appears the red goo was only on the surface of the water and no more than 1 to 1.5 feet deep. This raises concern about food safety on St. George. Aaron Mercurief, LEO

This is the way the observation post appeared on the LEO – September 2012 Google Map.

Google

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LEO - September 2012

This map provides a monthly record of extreme, unusual or noteworthy events. The purpose is to increase communication and understanding about our changing environment and to encourage healthy ways to adapt in Northern communities. Reports are provided through the network of Local Environmental Observers (LEO) located in tribal organizations across Alaska. For more information visit our site at the Alaska Native Tribal Health Consortium, Center for Climate and Health.

Public · 2 Collaborators · 5,684 views
Created on Sep 4, 2012 · By mbrubaker · Updated 5 hours ago
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- Heat lightning observed in far western Aleutians**
Near Kiska Island, September 1, 2012 (weather) Heat lightning reported by an experienced fisheries observer, who had never seen heat lightning in the Aleutians region before. New weather phenomena will...
- Windfall devastation in Anchorage**
Ryan and Carter Brubaker survey windfall. Anchorage, East of Cheney Lake, September 5, 2012 (trees) The windstorm that hit Anchorage on Tuesday night brought down a lot of trees and branches. These a...
- Windfall creates flood hazard**
Photos by Mike Brubaker Anchorage, Chester Creek culvert at Bader Road, September 5, 2012 (river) The wind storm that hit Anchorage on Tuesday night brought down a lot of trees and branches. These a...
- Spruce bark beetle infestation (Video)**
Fort Yukon area, September 7, 2012 (Insects) Some of the trees in the area of Fort Yukon are infested with spruce bark beetles. They have been increasing in the last few years. Spruce trees are an important...
- Unusual fish found on Arctic beach**
Photo by Clara Kilous, Barrow area, September 13, 2012 (reptile) Unusual fish 'sting ray' found along the beach of Barrow didn't know we got sting rays this far north. Glnugan Roddy, LEO ...
- Red colored water observed in harbor (Video)**
Photos by Aaron Mercurieff Saint George, Harbor, September 14, 2012 (environmental/food security/marine) The community members who work around the harbor noticed the redness in the harbor water d...
- Unusual polar bear sighting**

Red colored water observed in harbor (video)

Last Updated by Moses on Oct 8

Saint George, Harbor, September 14, 2012 (environmental/food security/marine) The community members who work around the harbor noticed the redness in the harbor as the water doesn't get disturbed to much from the weather like the waters around the Island (St. George). The community members who brought this to my attention said they haven't seen anything like this. It appears the red goo was only on the surface of the water and no more that 1 to 1.5 feet deep. The raises concern about food safety on St. George. Aaron Mercurieff, LEO

Directions Search nearby Save to map more-

Bering Sea Gulf of Alaska

Aaron collected water samples from the harbor and then used the only microscope available on island for analysis ... It was a microscope he found in his closet that belonged to his daughter.



Using the microscope and his digital camera, he collected pictures and video that showed the movement of living organisms, rather than some kind of dust.

ANTHC LEO Managers sent the map post in and email to Dr. Dean Stockwell with the University of Alaska Fairbanks who consulted on the LEO post. He forwarded the post onto an expert on marine plankton in Massachusetts.



The map post and video were reviewed by Dr. Matthew Johnson, a Marine Biologist at the Woods Hole Oceanographic Institute. We consulted with LEO informing that the organism was not a harmful algae, but rather a marine ciliate called *Mesodinium rubrum*.





Mystery solved: the red color was not a food safety risk. Aaron collaborated with Matt to then collect water samples for genetic analysis in Woodshole.

Through these three activities we are beginning to describe climate and health relationships in Alaska.

Health Effects of Climate Change in Alaska

The map of Alaska is divided into several regions, each associated with a specific health effect of climate change. The regions and their associated health effects are:

- North Slope:** Dangerous travel (Image: People in a small boat on choppy water)
- Northwest Arctic:** Allergic reactio (Image: A wasp on a branch)
- Nome:** Food Spoilage (Image: A person in a kitchen sink)
- Denali:** Infrastructure damage (Image: People in a boat on rough water)
- Matanuska-Susitna:** Food security (Image: A person holding a large fish)
- Valdez-Cordova:** Poor Water Quality (Image: A green, multi-legged microorganism)
- Wade Hampton:** Wildlife disease (Image: A close-up of a raccoon's face)
- Berthel:** Respirator Illness (Image: A forest fire)
- Dillingham:** Ice zard injury (Image: A person carrying a sled on a snowy slope)
- Ketchikan:** Drought and Infestation (Image: A forest of brown, dead trees)
- Wrangell-Petersburg:** Unsafe food (Image: A pile of dark, possibly moldy food)
- Prince of Wales:** Snow hazards (Image: A snow-covered roof)
- Outer Ketchikan:** Allergies (Image: A close-up of a yellow flower)
- Alutians West:** Dangerous seas (Image: A red fishing boat on a rough sea)

Understanding about local impacts has helped the health system develop targeted advisories that can help in adaptation.



Source Drinking Water Challenges Changes to an Arctic Tundra Lake

Center for Climate and Health

Michael Brubaker, Alicia Rolin, Jacob Bell, John Warren
CCH Bulletin No. 2, October 19, 2009

This paper reports on a special health concern identified in Point Hope, Alaska during a recent Climate and Health Assessment: disruption of drinking water treatment influenced by temperature driven increases in organic material in an Arctic tundra lake. Blooms of organic material have been observed in the past in the source water lake in Point Hope, but conditions have been extreme over the last two years. If warm temperatures continue, organic blooms will become a reoccurring problem for Point Hope and other communities that depend on tundra lakes for their water supply. Analysis of source water chemistry and biology is recommended, as is an analysis of possible adaptive operational procedures or design modifications that could improve water system efficiency.

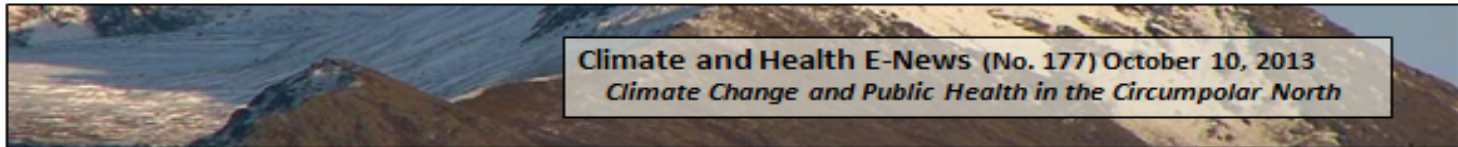
Introduction

In May of 2009, the Alaska Native Tribal Health Consortium (ANTHC) performed a Climate and Health Assessment in Point Hope, Alaska. It was performed by ANTHC's Center for Climate and Health in partnership with Maniilaq Association, the regional tribal health consortium for Northwest Alaska, and the North Slope Borough. The purpose of the assessment was to record local observations related to climate change and to explore adaptive strategies for community health. The purpose of this paper is to identify vulnerabilities and raise awareness about an emerging environmental health issue, and to identify potential adaptation strategies.

Background

Point Hope is an Inupiat community of about 700 residents. It is located on a gravel spit extending out into the Chukchi Sea. It is the furthest point west in the Northwest Arctic, roughly half way between Kotzebue and Barrow on the Northwest Arctic Coast. The climate is arctic and annual temperature ranges from -49°F to 78°F. Precipitation is light, 10 inches annually, with a cumulative annual snowfall of about 36 inches. The Chukchi Sea is ice-free from late June until mid September (AK Division of Community Advocacy, 2009).

LEO maps are shared publically with readership of the weekly Climate and Health E-News. They are also reviewed quarterly by agency officials who participate in the *Alaska One Health Group*.



Local Environmental Observer (LEO) Network Map – LEO welcomes our new network members from the [Inuvialuit Settlement Region](#) of Canada. You can see our new [Inuvialuit Regional map](#) as well as regional maps from Alaska at our [website](#). Visit our [archives](#) and follow us on [Facebook](#)

Climate Events in the Circumpolar North – *In Alaska*: thousands of walrus come ashore in Point Lay, a mysterious algal bloom in Homer, and the Forty Mile caribou herd crosses the Yukon River for the first time in memory. *In Canada*: game managers close caribou hunt to prevent unmanaged harvest of Forty Mile herd, starfish continue to die near Vancouver, north bound grizzlies settling at Cambridge Bay, and polar bears attacking dogs in Arviat. *In Sweden*: jelly fish have caused shut down of one of the world's largest nuclear power plants. [ANTHC](#)

What's that brown algae floating in Kachemak Bay? October 6, 2013. A brown sludgy plankton bloom is raising concerns on how it may impact the delicate filtration systems of shellfish and other marine life. The plankton from the group *Gymnodinium* is described as four or five feet deep in its most concentrated areas. Though NOAA, as part of the federal government shutdown, is banned for the moment from continuing the plankton inquiry, the Kachemak Bay Research Reserve is on the job conducting phytoplankton sampling with residents all around the Bay. [Homer Tribune](#)

Deadly trio may cause mass extinction of marine species October 9, 2013. Marine scientists warn that a deadly combination of warmer temperatures, acidification and decreasing oxygen levels are a looming threat to the survival of the world's oceans. "We are entering an unknown territory of marine ecosystem change, and exposing organisms to intolerable evolutionary pressure," scientists with the International Programme on the State of the Ocean (IPSO), wrote in the most recent report. [Arctic Journal](#)

Arctic coastlines threatened by melting permafrost October 5, 2013. Approximately 34 percent of the world's coastlines are covered permafrost, which absorbs the impact of ocean waves and protects against coastal erosion. Sea ice helps too, by blocking waves from the shore. That buffer zone is disappearing, however, and without it coastal erosion could accelerate and threaten critical infrastructure including oil and gas pipelines – in the Arctic and elsewhere. [Barents Observer](#)

Eat locally for sustainability globally — Alaska family lives a year off only local foods September 25, 2013. "There is a misconception Alaska can't support its own food needs," said Saskia Esslinger, of Anchorage, who with her family transformed a few hundred square feet in an urban neighborhood into their garden and grew rhubarb, cabbage, cucumbers, kale and other greens, zucchini and other gourds, and c

The take home

The northern environment is changing very quickly.

Communities seek assistance responding to impacts.

LEO member select, qualify and post their own observations.

They can apply traditional as well as western science.

LEOs engage directly with technical experts.

LEOs help their communities and the region to adapt to change.

For more information contact mbrubaker@anthc.org

