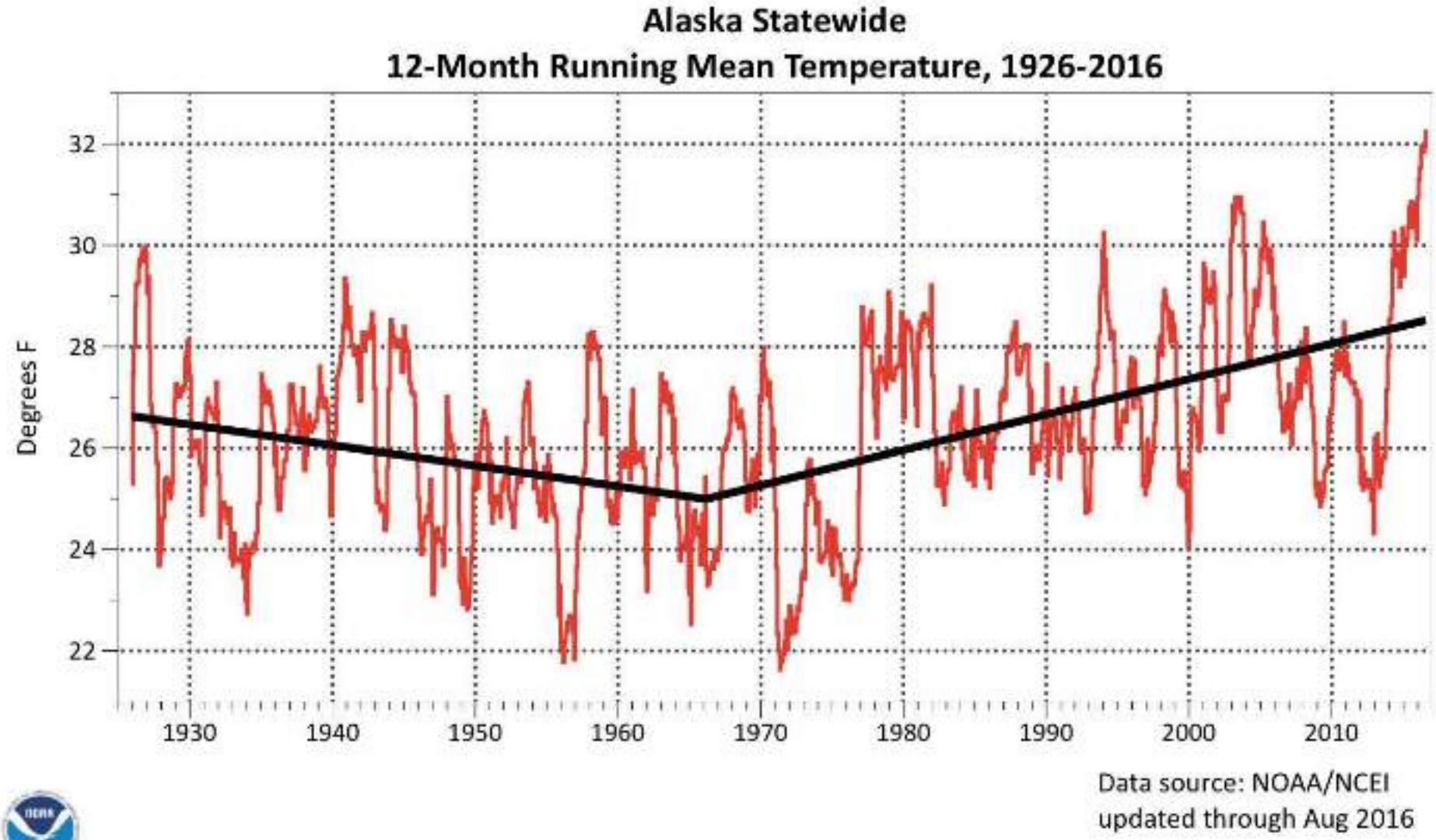
Climate Change and Community Water Security
Emerging Challenges and Strategies

WIHAH – September 19 & 20 2016

Mike Brubaker

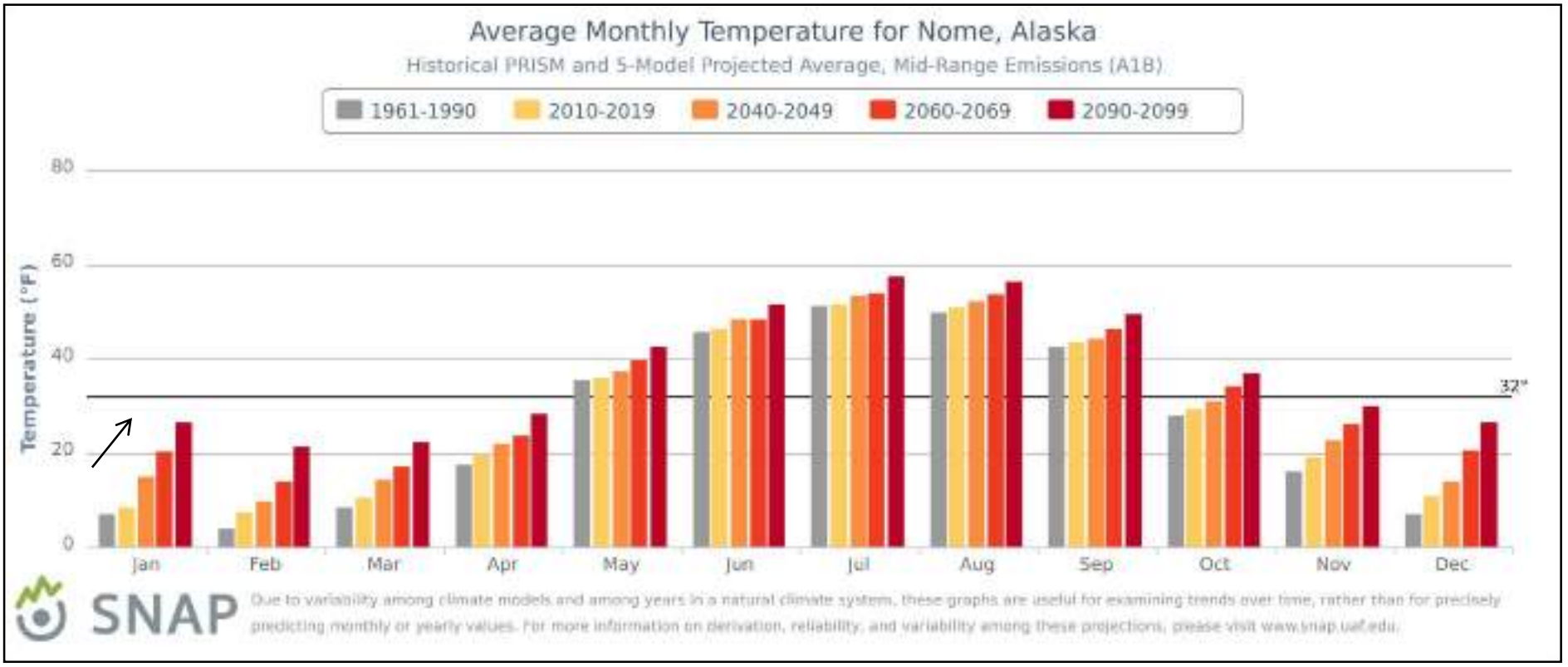
Alaska Native Tribal Health Consortium

ALASKA NATIVE TRIBAL HEALTH CONSORTIUM



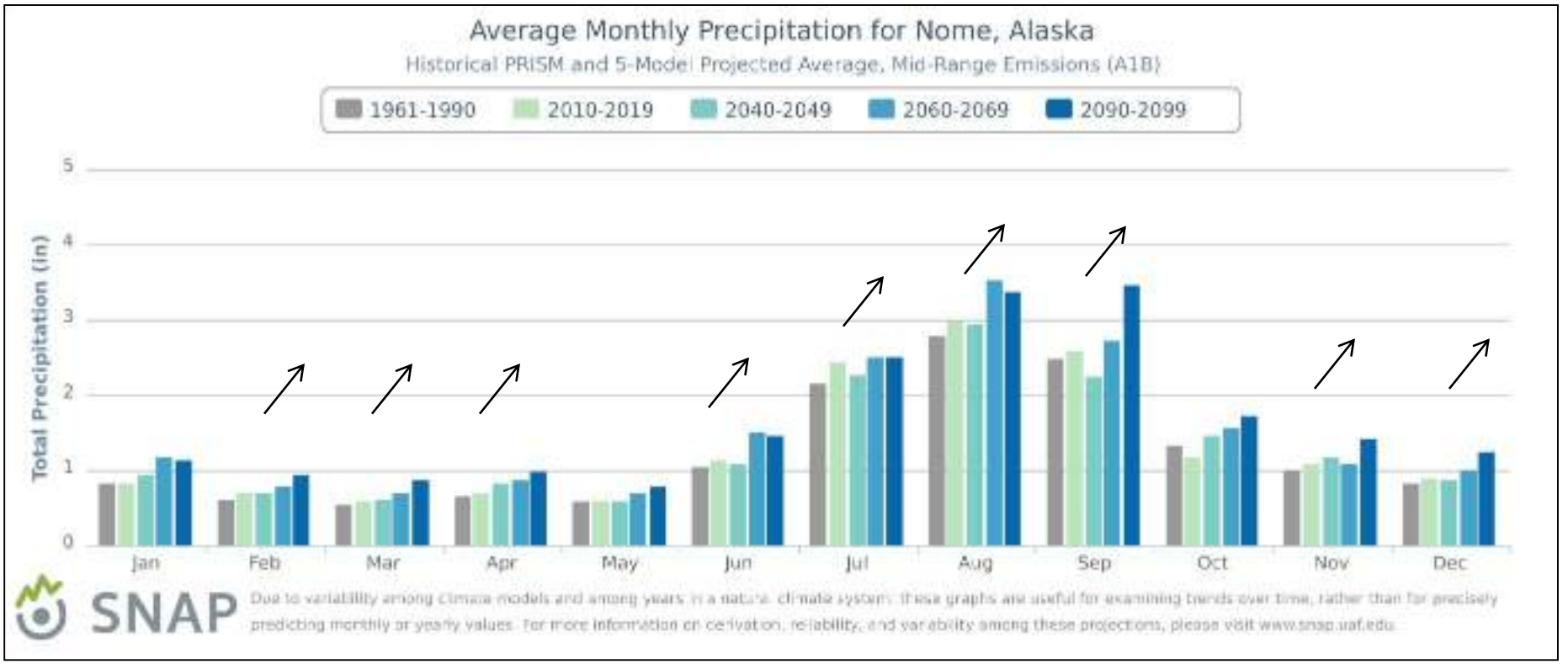
Courtesy Rick Thoman

What do we know about climate change trends? Warmer.



Comparing these two periods, 1961 – 1990, and 2010 – 2012, temperature has increased in every month. Biggest changes occurring in winter.

What do we know about climate change trends? Wetter.



Comparing these two periods, 1961 – 1990, and 2010 – 2012, precipitation has increased in nine of twelve months. Biggest change occurring in summer and fall.

How does climate change affect human health?

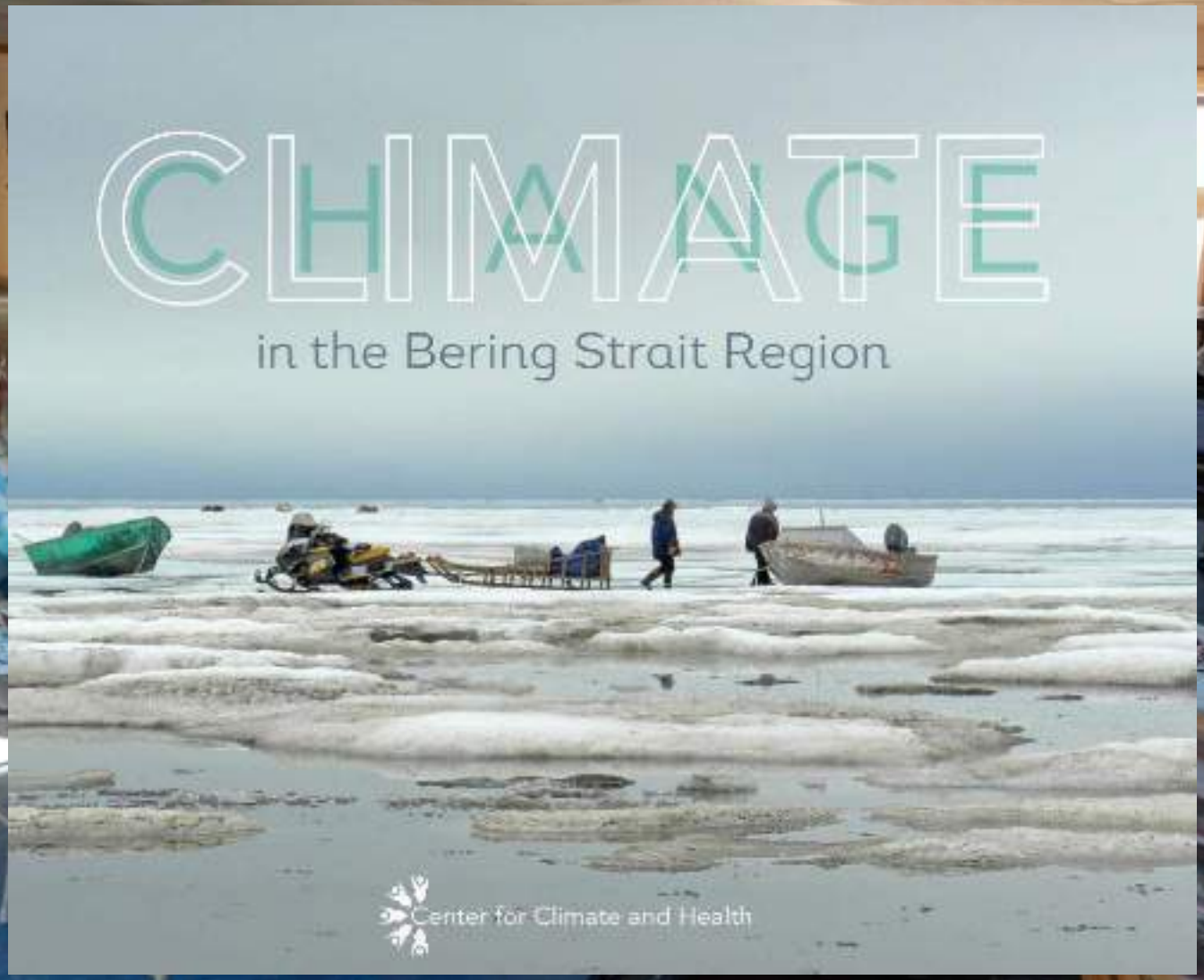
Disease

Behavioral Health

Food Security

Injury

Water Security

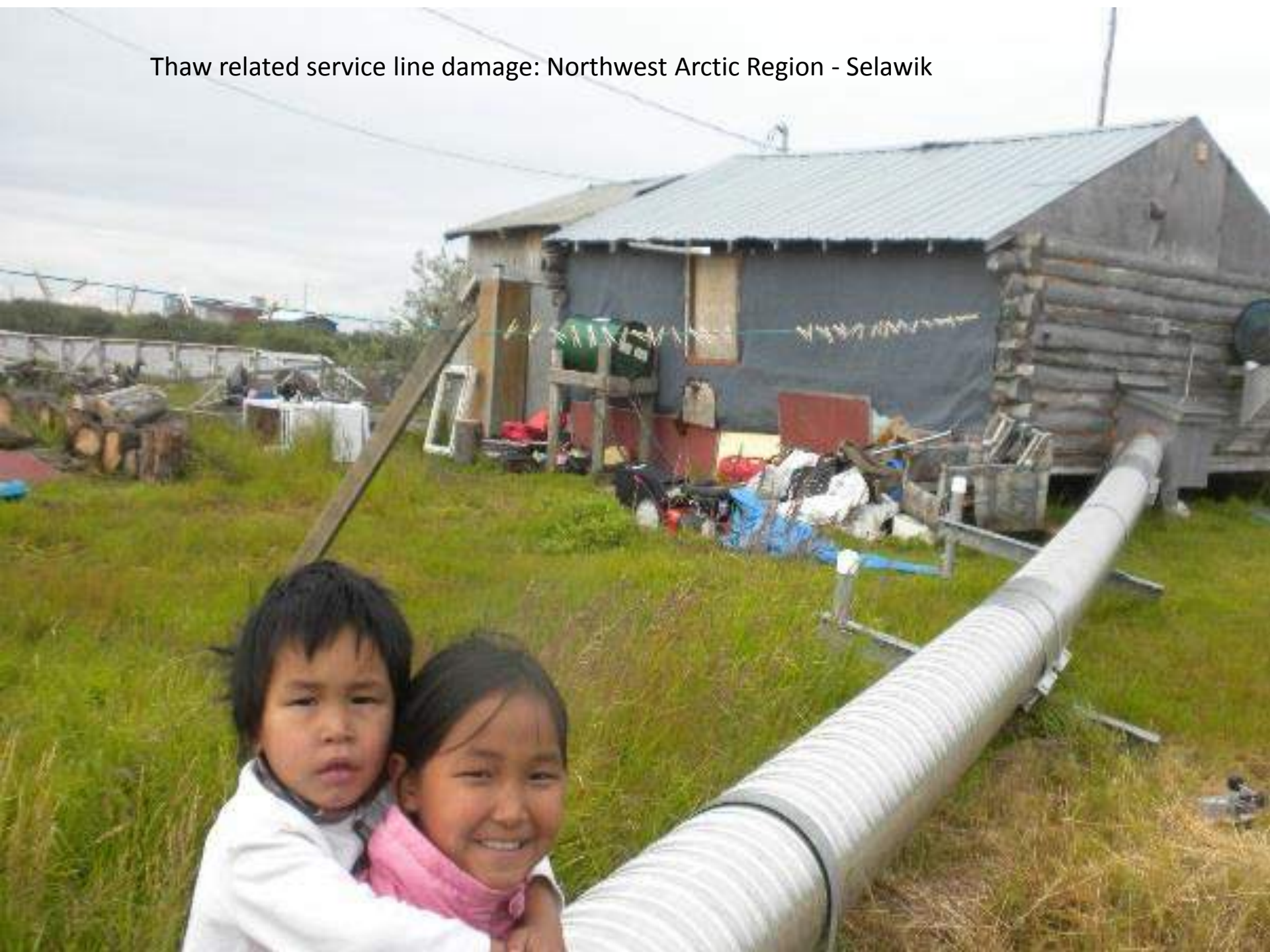

CHANGE
in the Bering Strait Region
Center for Climate and Health

How does climate change affect water security?

Damage or disruption to water infrastructure.

Changes to water source quality or availability.

Thaw related service line damage: Northwest Arctic Region - Selawik



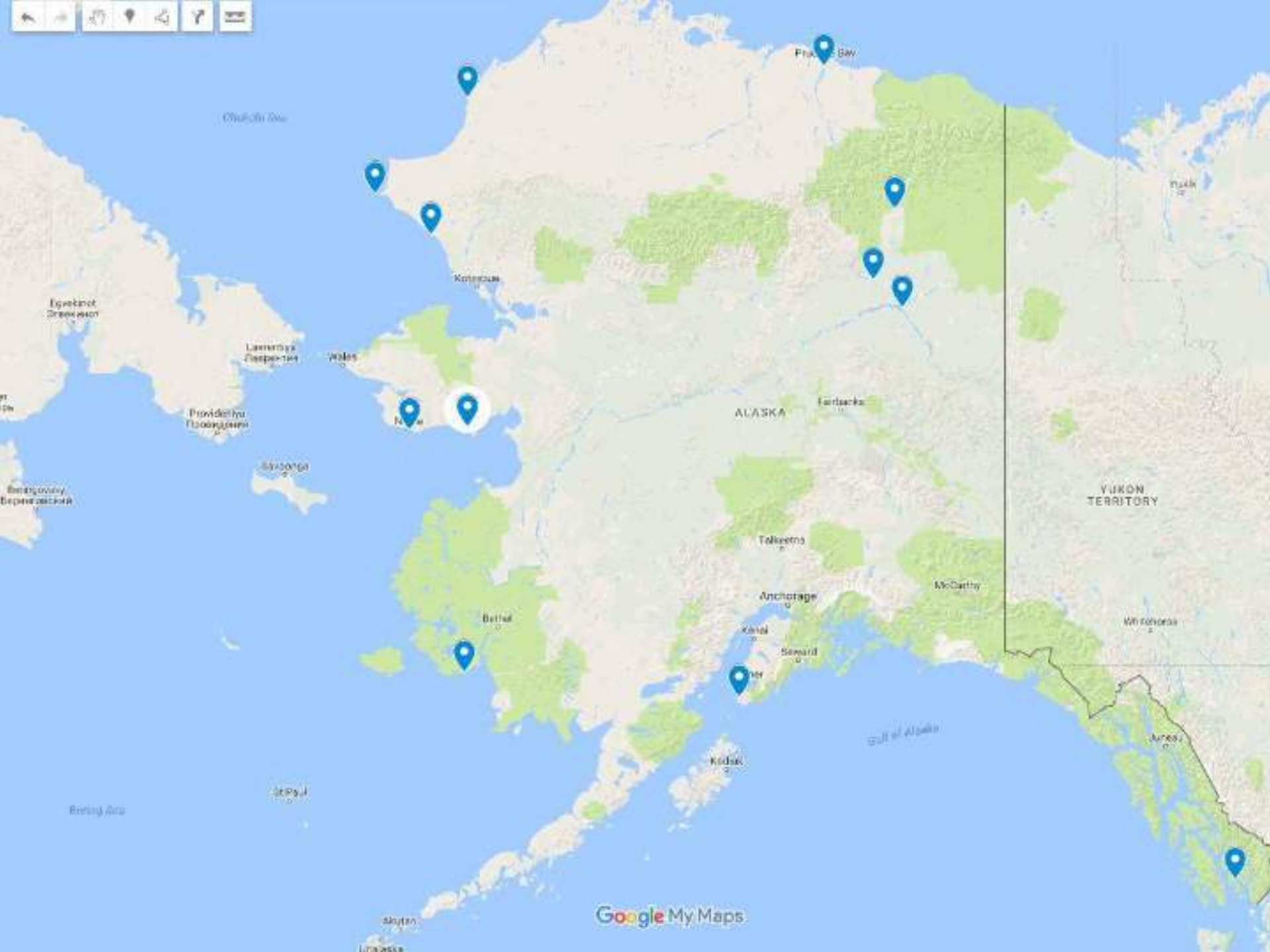
Thaw related septic system damage: Northwest Arctic Region - Selawik

Center for Climate and Health ©2011

Yukon-Kuskokwim Health Corporation

Community Water Source Type

lake water river water ground water


ALASKA
YUKON TERRITORY
Anchorage
Fairbanks
Barrow
Kotzebue
Nome
Wales
Bethel
Kodiak
Juneau
Talkeetna
McCarthy
Seward
Kenai
Whitehorse
Gulf of Alaska
Bering Sea
St Paul
Skagway
Provideniya
Lavrentiya
Egvekinot
Beringovskiy
Google My Maps

What are some drivers of lake change?

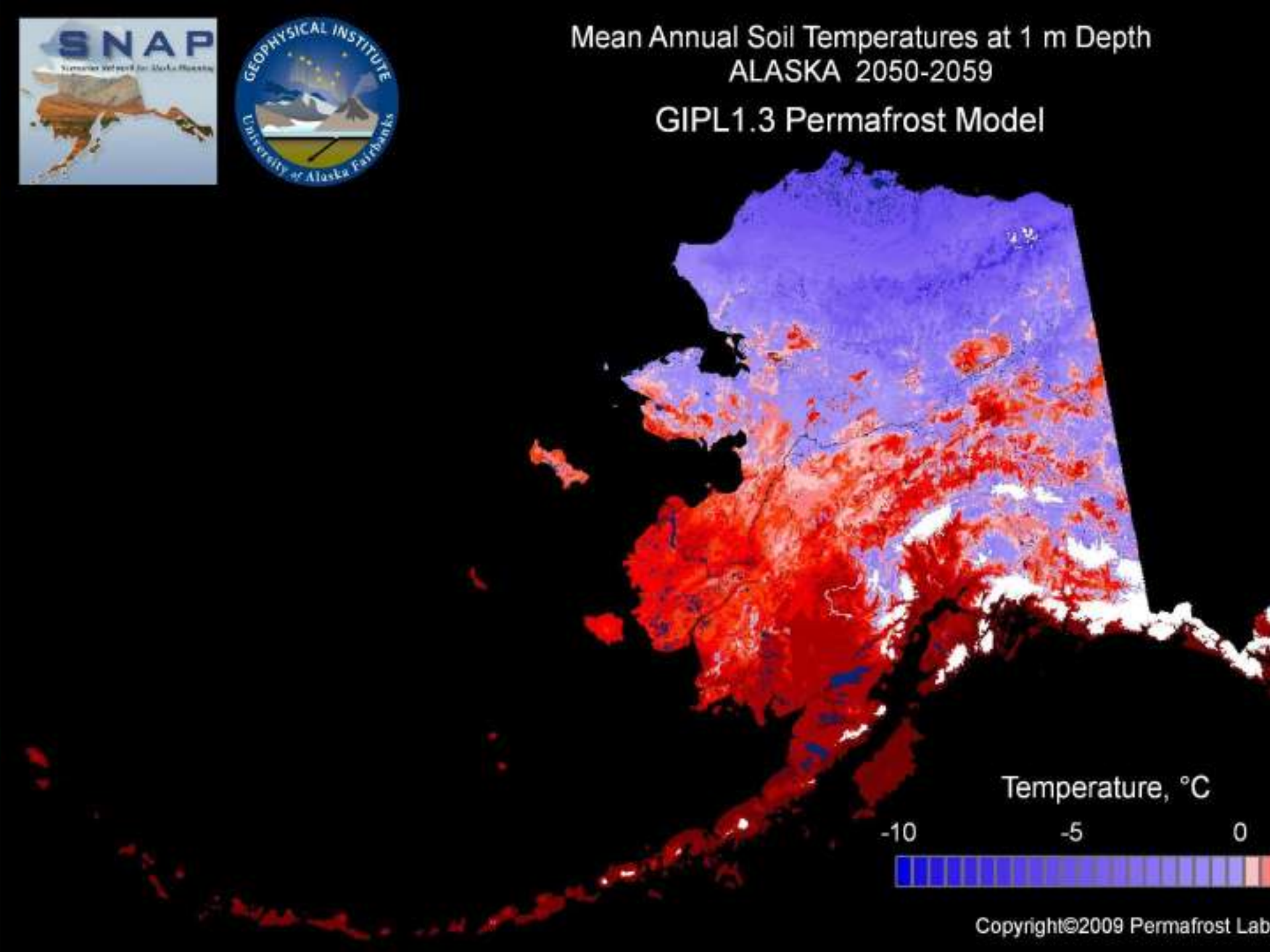
Decrease in snow pack.

Decrease in rainfall.

High summer temperatures.

Erosion

Thawing permafrost


SNAP
GEOPHYSICAL INSTITUTE
University of Alaska Fairbanks
Mean Annual Soil Temperatures at 1 m Depth
ALASKA 2050-2059
GIPL1.3 Permafrost Model
Temperature, °C
-10
-5
0
Copyright©2009 Permafrost Lab

Lake Drying: North Slope Region – Deadhorse
(Cause - permafrost thaw)

Photo Courtesy of Vladimir Romanovsky


Lake Drying: Norton Sound Region – Nome
Cause - permafrost thaw, drought
Source: LEO Network. Photo by Mike Sloan


Lake Drying: Interior Region - Fort Yukon
Cause - permafrost thaw(?) and drought

Lake Draining: Yukon / Kuskokwim Region – Kwigillingok

Cause - permafrost thaw (?) and erosion

Photo – Anchorage Daily News

Lake Draining: North Slope Region – Point Lay

Cause: permafrost thaw and erosion

Source: KTBA/GoogleEarth

Source: LEO Network. Photo by Nancy Yeaton


River Drying. Southcentral Region - Seldovia
September 2015

Reservoir Drying. Southeast Region Saxman

Cause – low rainfall and high temperatures

Over 141 inches annually.

July 2015

Saxman tapping creek

KETCHIKAN (KDN) – The City of Saxman is using a $9,500 grant of emergency funds to add to its water supply.

Heavy rainfall usually has Saxman's water reservoir overflowing, but water levels fell far enough during the island's dry May to stop runoff, prompting the city to look for another source of potable water.

City Administrator Leona Haffner said Tuesday that she requested emergency funding from the Alaska Native Tribal Health

See 'Saxman water,' page 2

Sunday, May 11, 2014

City warns of water shortage

By **CHARLES L. WESTMORELAND**

JUNEAU EMPIRE

The City and Borough of Juneau posted a notice on its website Friday asking residents to begin conserving water due to lower-than-usual supplies for this time of year. Reservoir levels are standing at about 30 percent of usual capacity due to a string of high temperatures and low precipitation.

With reservoir low, Kodiak asks citizens to conserve water

By **Kayla Desroches, KMXT - Kodiak** - September 28, 2015

It's been a dry summer for Kodiak, which has lowered the Monashka reservoir. According to Rick Thoman, the climate science and services manager for the Alaska region of the National Weather Service, it's one of the driest seasons in Kodiak history. "Kodiak since June 1 has received just over ten inches of rain. That's just about half of normal for that time and is the second lowest of record…

What are some of the indirect effects of low water?

Increase in temperature.

Decrease in available.

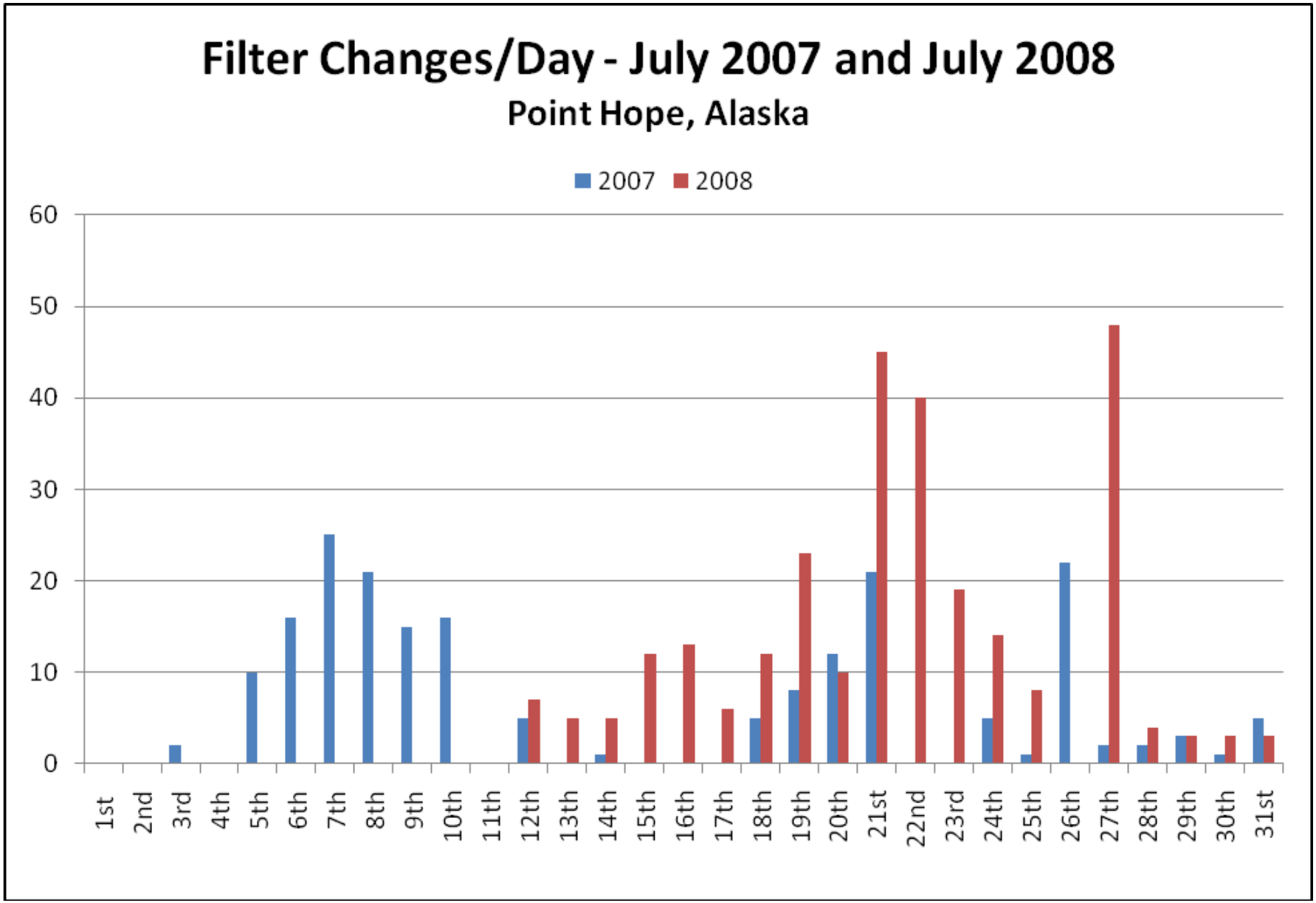
Increased growth of algae and other aquatic plants.

Lower water quality.

Increased cost of treatment.

Reservoir algae growth. Bering Strait Region - Shishmaref

Photo Courtesy Mike Black


Filter Changes/Day - July 2007 and July 2008
Point Hope, Alaska
2007
2008
60
50
40
30
20
10
0
1st
2nd
3rd
4th
5th
6th
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21st
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25th
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28th
29th
30th
31st

What are some drivers of river change?

Decrease in snow pack.

High summer air temperatures.

Thawing permafrost

Erosion

Extreme rain or drought

Rapid plant growth

Emergence of new wildlife

Disruption of Barge Service Northwest Region

Cause: Low water level.

Fuel delivery - Noatak.

River freeze up - Arctic Village, Alaska

Cause – low water Chandlar River

River thaw feature and erosion, Interior – Chandlar River

August 2016.


River thaw feature and erosion, Northwest Arctic - Selawik River


Community water well relocation Interior Region - Venetie
Cause: Erosion


High turbidity: Norton Sound Region - Golovin.
Cause - permafrost thaw and erosion

River bank thaw and erosion: Northwest Arctic - Kivalina, Alaska

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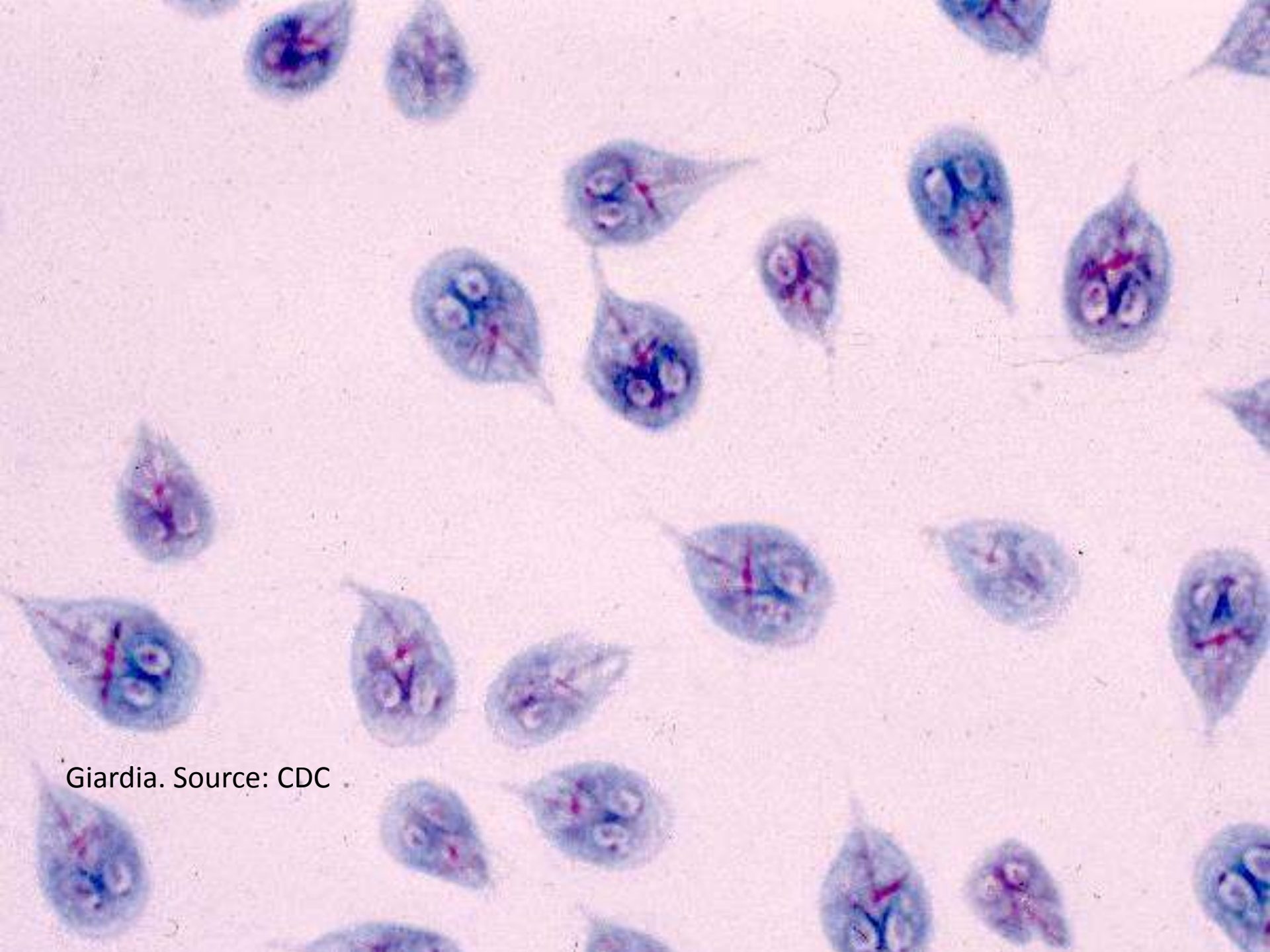
Source: ADFG

First evidence of beaver in Wulik River: Northwest Region - Kivalina



Giardia. Source: CDC

Water (Source) Security – Take Home

Alaska - less frozen and resilient and more thawing and fragile.

Surface water sources are climate vulnerable.

Lakes are changing and in some cases drying.

Rivers are becoming wider, shallower, and dirtier.

Both engineered and traditional sources are impacted.

The effects are statewide and have a variety of drivers.

Water source security can no longer be taken for granted.

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