

# Climate Change and Health Effects in the Bristol Bay Region of Alaska

**ACES 2014**

**December 9, 2014**

**Susan Flensburg  
Bristol Bay Native Association**

Storm surge in Pilot Point. Photo courtesy of Sue Evanoff



## **Three key questions were identified:**

- 1. What are the impacts of climate change?**
- 2. How do they effect community health?**
- 3. How can communities adapt in ways that encourage wellness?**



# Health Effects of Climate Change in Alaska

**Allergic  
reaction**



**Dangerous  
travel**



**Poor Water  
Quality**



**Food  
Security**



**Respirator  
Illness**



**Storm  
damage**



**Ice  
hazards**



**Wildlife  
disease**



**Infestation**



**Food Safety**



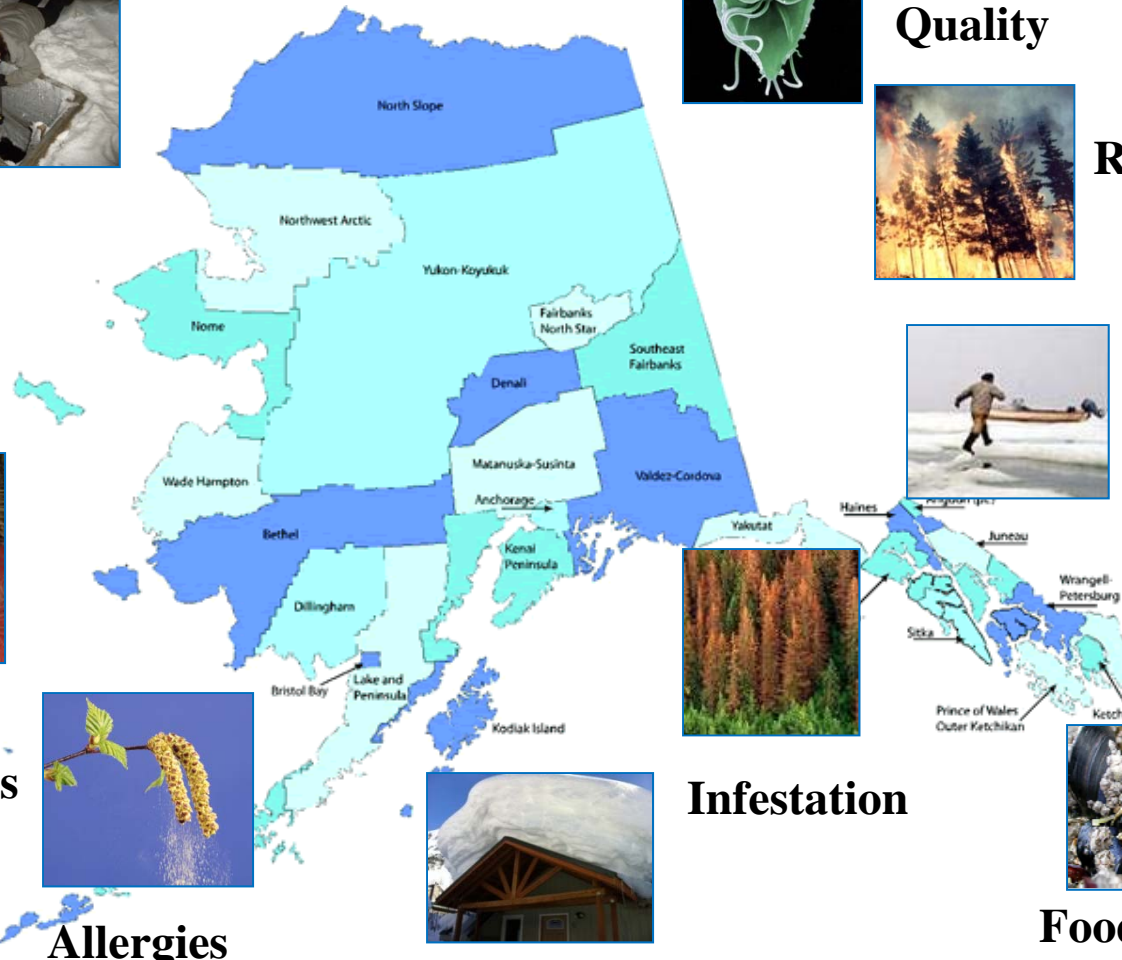
**Snow hazards**



**Dangerous  
seas**

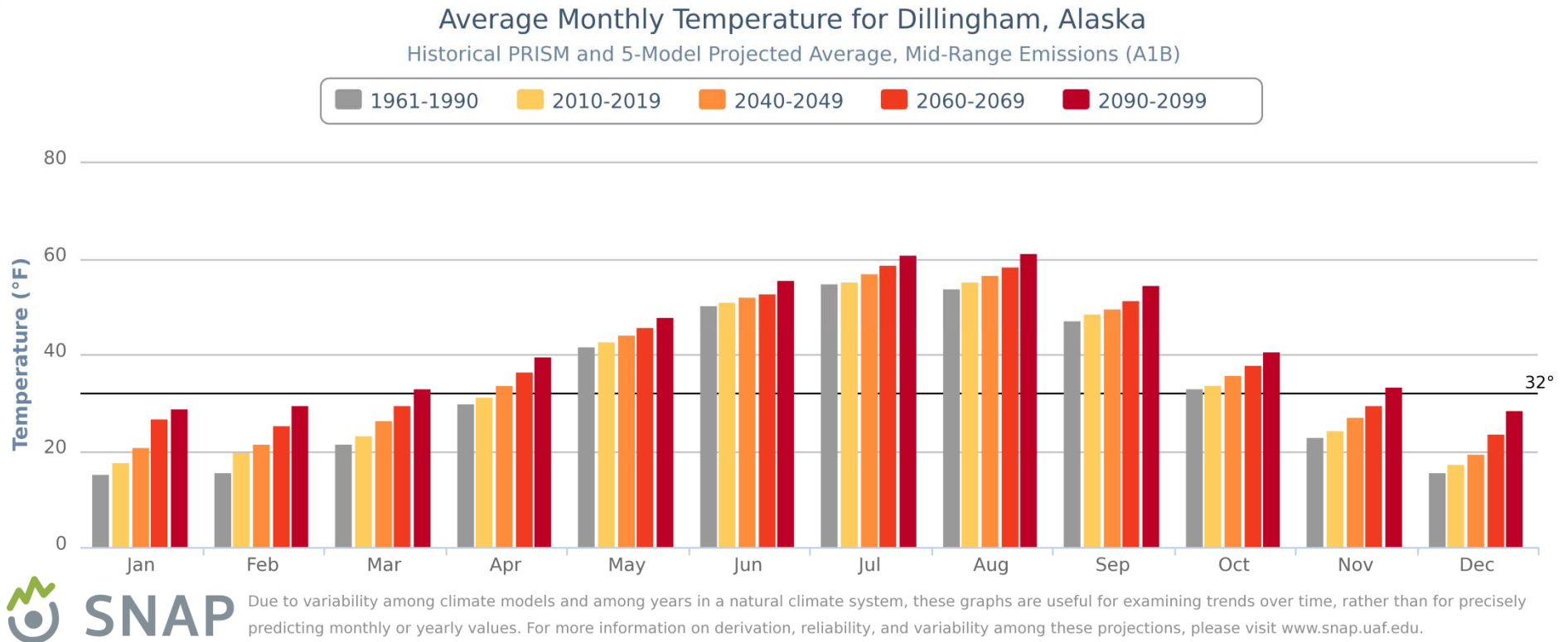


**Allergies**



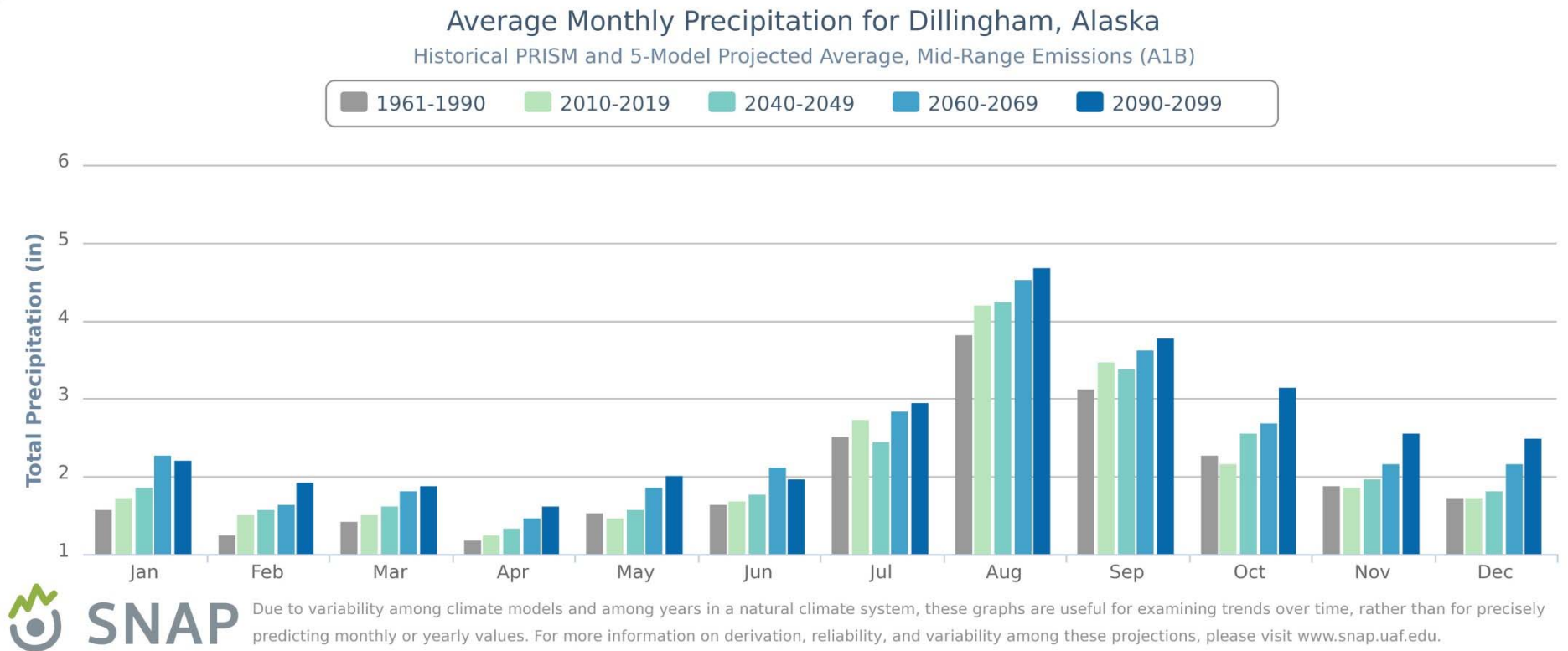


**The region is becoming warmer.**



Comparing these two periods, 1961 – 1990 (grey) , and 2010 – 2019 (yellow), the temperature in Dillingham has increased in every month.

## The region is becoming wetter.



Comparing these two periods, 1961 – 1990 (grey), and 2010 – 2019 (green), precipitation has increased in eight months, decreased in three and remained relatively stable in only one - December. The type of precipitation is also changing, with increases in winter rain events and generally a shorter snow season.

Of special importance for community wellness are food and water security.





Three focus communities were selected for this project with the purpose of describing local and regional climate change impacts



## **Community Assessments:**

- **Review of regional data (e.g. flood history)**
- **Climate Change in My Community Survey**
- **Community knowledge and local observations**
- **Site visits to areas identified by communities**
- **Installation of time-lapse cameras**





**There were also interviews and community meetings, such as here in Nondalton at fish camp.**



A review of available data was performed and communities were scored based on existing data about economic health, water and sanitation system vulnerability, flood history, and erosion conditions.

BRISTOL BAY REGION CLIMATE CHANGE VULNERABILITY INDEX (CVI)  
Alaska Native Tribal Health Consortium, Center for Climate and Health, December, 2011

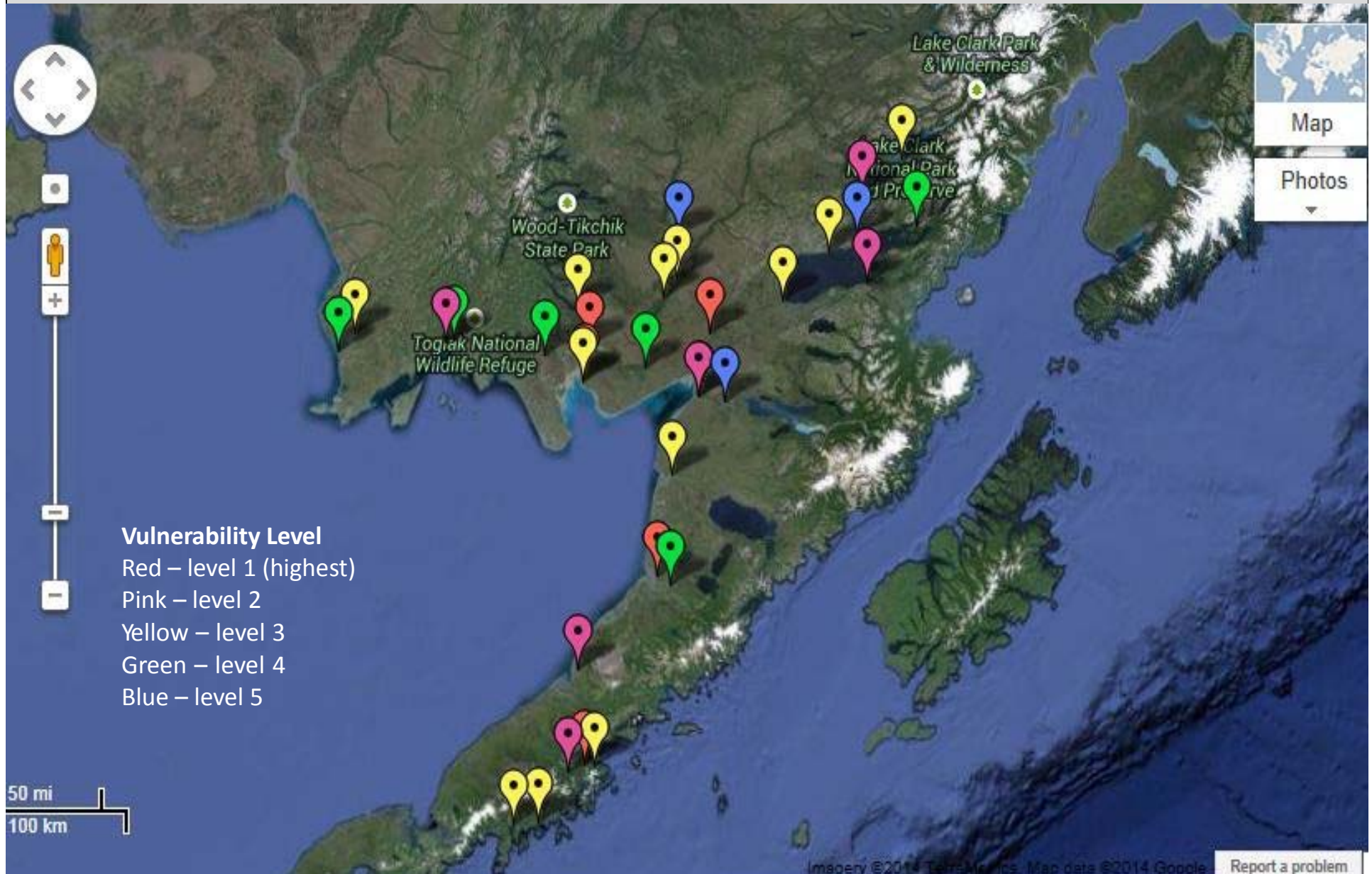
BACKGROUND DATA

VULNERABILITY SCORING DATA

	Community	CONTACT	POP	BIOME	WATERSHED	FOOD	WATER	ECONOMIC	WATER	FLOOD	EROSION	Total	Ranking
			<a href="#">DCCED</a>	Lake/Coast/ River	Major Rivers Lakes, Bays	<a href="#">Harvest</a> Survey	<a href="#">Source</a> R / L / GW	<a href="#">Distressed</a> + 1	<a href="#">Imperiled</a> +1	<a href="#">Historical</a> +1	<a href="#">Baseline</a> +1 to +3		1-5
	Reference	S. Flensburg		S. Flensburg	S. Flensburg	ADF&G	B. Reed	Denali C.	ADEC/BBAHC	T. Boothby	C. Borash		
1	<i>Aleknagik</i>	Dan Chythlook Tina Tinker	219	L	Aleknagik Lake at head of Wood River	84	GW	0	0	0	2	2	3
2	<i>Chignik Bay*</i>	Jeanette Carlson	91	C	South Shore of Alaska Peninsula	84,89,91,03	L	0	0	1	1	2	3
3	<i>Chignik Lagoon*</i>	Carol Grunert Angela Gregorio	78	C	South Shore of Alaska Peninsula	84,89,03	GW	0	1	1	2	4	1
4	<i>Chignik Lake*</i>	Della Takak Inez O'Domin	73	C	South Shore of Alaska Peninsula	84,89,91,03	GW	1	0	1	1	3	2
5	<i>Clarks Point</i>	Susie Wassillie	62	C	Nushagak Bay	84	GW	1	0	-	3	4	1
6	<i>Dillingham*</i>	Billy Maines	2329	C	Nushagak Bay	84	GW	0	0	1	3	4	1
7	<i>Egegik*</i>	Jessica Chernikoff	109	R	Egegik River	84	GW	0	0	0	2	2	3
8	<i>Ekuk</i>	Jennifer Robinette		C	Nushagak Bay	-	GW	0	0	1	1	2	3
9	<i>Ekwok</i>	Lorraine King	115	R	Nushagak River	87	GW	1	0	0	1	2	3
10	<i>Goodnews Bay</i>	Alice Julius	246	R	Goodnews River	-	GW	1	0	1	0	2	3
11	<i>Igiugig*</i>	Christina Salmon Sheryl Wassillie	50	R	Kvichak River	83,92,05	GW	0	0	0	2	2	3
12	<i>Iliamna*</i>	Sue Andrew	109	L	Iliamna Lake	83,91,04	GW	0	0	0	2	2	3
13	<i>Ivanof Bay*</i>	George Anderson Nicole Cabrera	7	C	Kupreanof Peninsula	84,89	R (creek)	0	0	0	1	1	3
14	<i>King Salmon**</i>	Ralph Angasan, Jr.	374	R	Naknek River	83,07	GW	0	0	0	0	0	5
15	<i>Kokhanak*</i>	Roy Andrew	170	L	Iliamna Lake	83,92,05	L	1	0	1	1	3	2



**Climate Vulnerability Index (CVI)** – the map below is based on economic, water and sanitation, flood, and erosion data from state and federal surveys.





## Responses: community health conditions that are “Very Affected” by climate change

Town	Water	Air	Housing	Food	Injuries	Travel
Aleknagik	x	x		x	x	x
Chignik Bay		x				x
Clarks Point						
Dillingham						
Egegik				x		
Ekuk						
Kokhanok	x	x		x	x	
Koliganek						
Levelock						
Manokotak	x			x		
Naknek						
Perryville						
Port Heiden						
Togiak		x		x		x
Twin Hills	x			x		
Ugashik						

**Time lapse cameras were installed in each community.**





## Greg Andrew in Levelock





# Pilot Point- Coastal Community



Photo by Mike. Brubaker



## Key Topics – Pilot Point

- Food harvest – caribou (-)
- Storm surge and flooding
- Erosion
- Winter warming
- Sea change
- Vegetation expansion
- Aggressive wildlife – bears, wolves

Report available at [ANTHC website](#).





"In low snow years, there is not enough spring flood to bring the salmon carcasses back into the system." Dan Kingsley (Pilot Point)



**Impact – less sea ice resulting in damaging storms, erosion and flooding**

**Negative Effects – risk of injury and loss of critical infrastructure**

**Vulnerability – port, roads, fish camps, and other vulnerable infrastructure**

**Pilot Point road threatened by erosion.**

Photo by Mike Brubaker





# Nondalton-Lake Community



Photo by Mike. Brubaker





Climate Change in **Nondalton**, Alaska  
Strategies for Community Health



ANTHC Center for Climate and Health

## Key Topics – Nondalton

- Lake change
- Seasonal change
- Community source water
- Community sanitation
- Harvest change (caribou)
- Glacier change

Report available at [ANTHC website](https://www.anthc.org/our-work/center-for-climate-and-health/).

**Impact – warming stream, lake and air temperatures**

**Negative Effects – food harvest, drying fish, nutrition, mental health**



**“We hang our fall fish to dry in the cold air, but last year it did not do well. It was too warm.” Charlotte Balluta, Nondalton 2012**



**Injury - Positive effect**  
**Increased flight safety**

"We used to worry about getting high enough to fly through the passes. We don't worry about that anymore. The glaciers have really receded."  
June Tracy (Nondalton)

Flying through Lake Clark Pass. Photo by Mike Brubaker



# Levelock - River Community



Photo by Mike. Brubaker





## Climate Change in **Levelock**, Alaska

Strategies for Community Health



ANTHC Center for Climate and Health

## Key Topics – Levelock

- Erosion - river, tundra
- Air quality (dust)
- Harvest change – caribou(-), beluga (+)
- Food preservation
- River change
- Vegetation expansion
- Aggressive wildlife (bears, wolves)

Report available at [ANTHC website](#).



## Impact- river bank erosion

Negative Effects - loss of critical infrastructure, river navigation



Photo by Mike. Brubaker

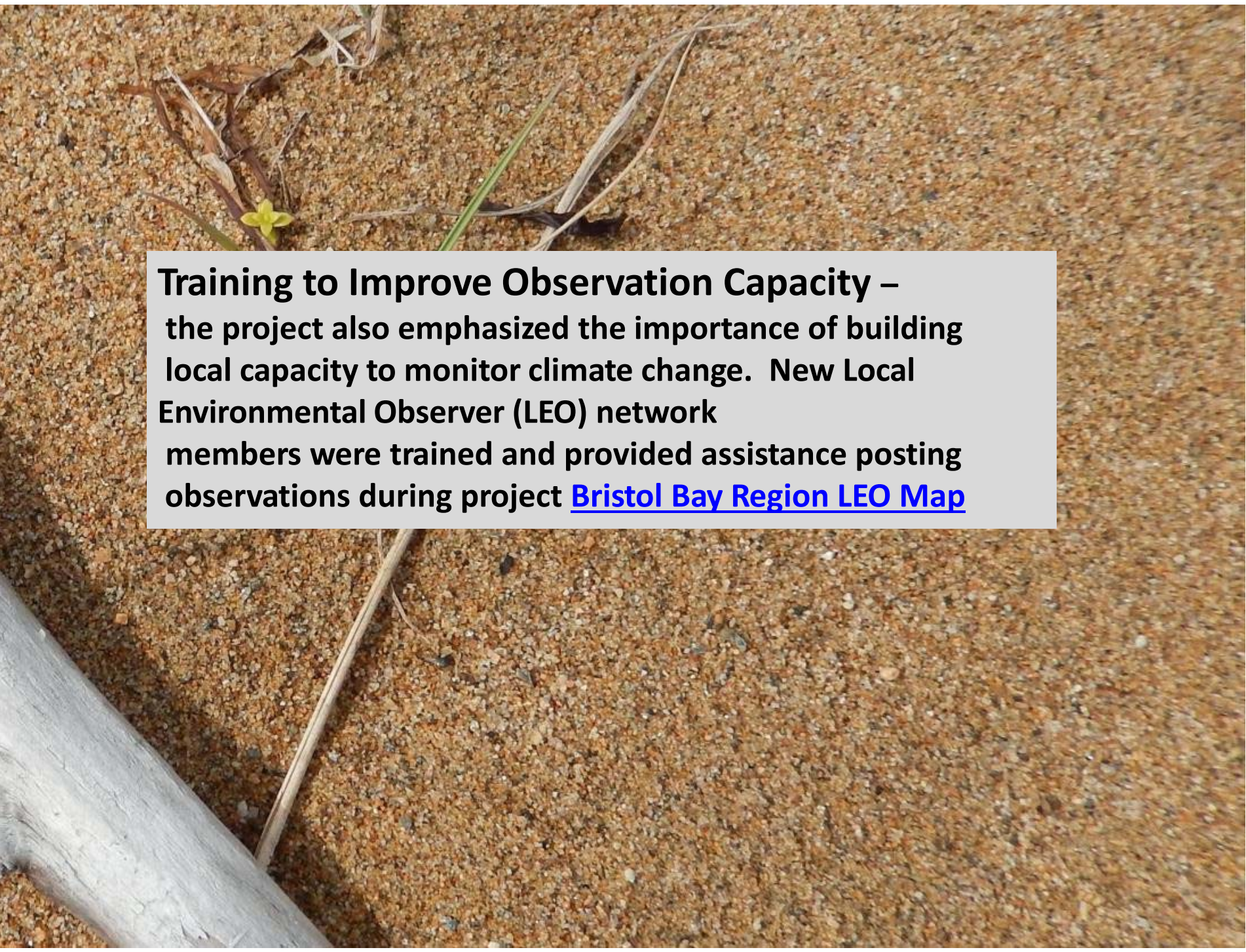


**Impact – increases in sea mammals (beluga, seal) in river**  
**Positive Effects – improved food harvest, food security**

**"The belugas are increasing more then ever. Also we have seal."  
Ella Charley (Levelock)**

Photo by AK Dept of Fish and Game



A close-up photograph of a sandy beach. The sand is light brown and textured. In the upper left, there is a small yellow flower with five petals, surrounded by some dried, brown plant matter. A piece of light-colored driftwood is visible in the bottom left corner. A semi-transparent grey box with black text is overlaid on the right side of the image.

**Training to Improve Observation Capacity –**  
the project also emphasized the importance of building  
local capacity to monitor climate change. New Local  
Environmental Observer (LEO) network  
members were trained and provided assistance posting  
observations during project [Bristol Bay Region LEO Map](#)





**Fish kill - thousands of sticklebacks near Igiugig** - Grants Lagoon, shore of Lake Iliamna, near Igiugig Alaska, September 14, 2013 (fish) "Several hundred thousand (didn't actually count them) dead nine-spine stickle backs along with many more live ones in a small dead-end tributary from the lagoon to Iliamna Lake. A dozen or more dead sucker fish as well as some live ones in the same stretch. The lagoons are an important subsistence resource to our community as we often fish pike in the lagoons. We assume that the stickle backs and sucker fish are important food sources for the resident pike." Christina Salmon, LEO



## Warm weather and open water on Lake Aleknagik

Aleknagik, Alaska, January 28, 2014 (lakes, weather) "This is a video of people coming across Aleknagik Lake to town. We have never traveled by boat across the lake in January. Usually it is frozen even at the mouth and we are traveling by snow machine over the ice. Never in history have we fished in January for smelt. But the water is open on the lake and we have been catching smelts right by Daniel Chythlook's house. It is a good thing in some ways. We sent a boxes of smelt to Manokotak because their subsistence area was contaminated by the sinking of the Lonestar barge last summer. They were really glad to receive the smelt. This weather has been really something. Hardly any snow and the mountains are all bare. I saw a caddis fly hatch on January 8th. We are wondering if the bears have been flooded out and will start to roam around. All the dogs have been barking at night." Tina Tinker, LEO



Video by Tina Tinker,  
[LEO YouTube Channel](#)



The background of the slide is a photograph of a coastal scene. On the left, there is a calm body of water under a clear blue sky. In the foreground, a wide, sandy beach stretches across the bottom. To the right, a line of green trees and shrubs borders the beach. A small, light-colored building is partially visible through the foliage on the right side.

## Other Outcomes:

- Assessments for Pilot Point, Nondalton and Levelock will be integral to community hazard mitigation planning (e.g. FEMA grant recently awarded to BBNA).
- Nondalton will be involved in a NIH funded project to address indigenous health indicators.
- The project has contributed to an evolving partnership with UAF SNAP and the Alaska Native Science Commission to collaborate on community-led adaptation planning.



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**Mount Chiginagak Volcano, near Pilot Point. Photo courtesy of Sue Evanoff**