

# DOCUMENTING COASTAL FLOODING & EROSION IN WESTERN ALASKA



Presentation for the Local Environmental  
Observer Network Monthly Webinar  
October 2017

Jacquelyn (Jaci) Overbeck  
State of Alaska, Dept. of Natural Resources  
Division of Geological & Geophysical Surveys  
Coastal Hazards Program Manager

Photo collected by Gay Sheffield Alaska Sea Grant  
Nome MAP Agent, Nome, October 2016

# Many Observer Networks and Names, Which to Choose!?!

Division of Geological & Geophysical Surveys  
Bering Watch  
Active Layer Network  
DGGS  
Water Watch  
Local Observers  
Ocean Acidification Network  
Community-Based Monitoring  
Stakes For Stakeholders  
Coastal Hazards Program  
Alaska Water Level Watch  
Environmental


*DGGS tries to contribute to all of them!*



# Many Observer Networks and Names, Which to Choose!?!

Observations ▾About ▾?LEO NETWORKJacquelyn Overbeck ▾English ▾Q

EXPLOREMEMBERSJACQUELYN OVERBECK




**Jacquelyn Overbeck**  
Fairbanks Alaska, United States  
Division of Geological & Geophysical Surveys (DGGS)  
Coastal Hazards  
[Send a Message to Jacquelyn Overbeck](#)


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Contributions📍 View on Map


Consultant




Beach Sand - Coastal Erosion  
Hooper Bay, Alaska,...  
JUL 20, 2017




Consultant




Coastal Shore Erosion Near Cape Blossom  
Cape Blossom, NW ...  
JUN 30, 2017



Consultant

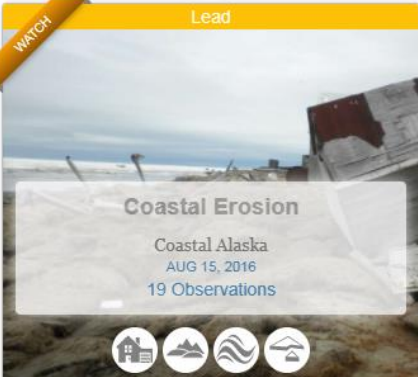


Erosion Could Drain Lake at Anytime  
Port Heiden, Alaska...  
MAY 29, 2017




WATCH

Lead




Coastal Erosion  
Coastal Alaska  
AUG 15, 2016  
19 Observations




WATCH

Consultant



River and Lake Erosion  
AUG 15, 2016  
10 Observations




## Collaborators



**Richard Buzard**  
Fairbanks Alaska, Unit...  
UAF, Geosciences



**Chris Maio**  
Fairbanks Alaska, Unit...  
Assistant Professor  
Coastal Geography  
UAF, Geosciences



**Susan Flensburg**  
Manokotak Alaska, Uni...  
Environmental  
Planner  
Bristol Bay Native  
Association

# Many Observer Networks, Which to Choose!?!

## Observations

- ✓ Report what you see that is happening
- ✓ Comparable to what you've seen in the past
- ✓ Consistent with past communication methods
- ❑ Difficult to use as legal proof
- ❑ Difficult to communicate to anyone outside of your community

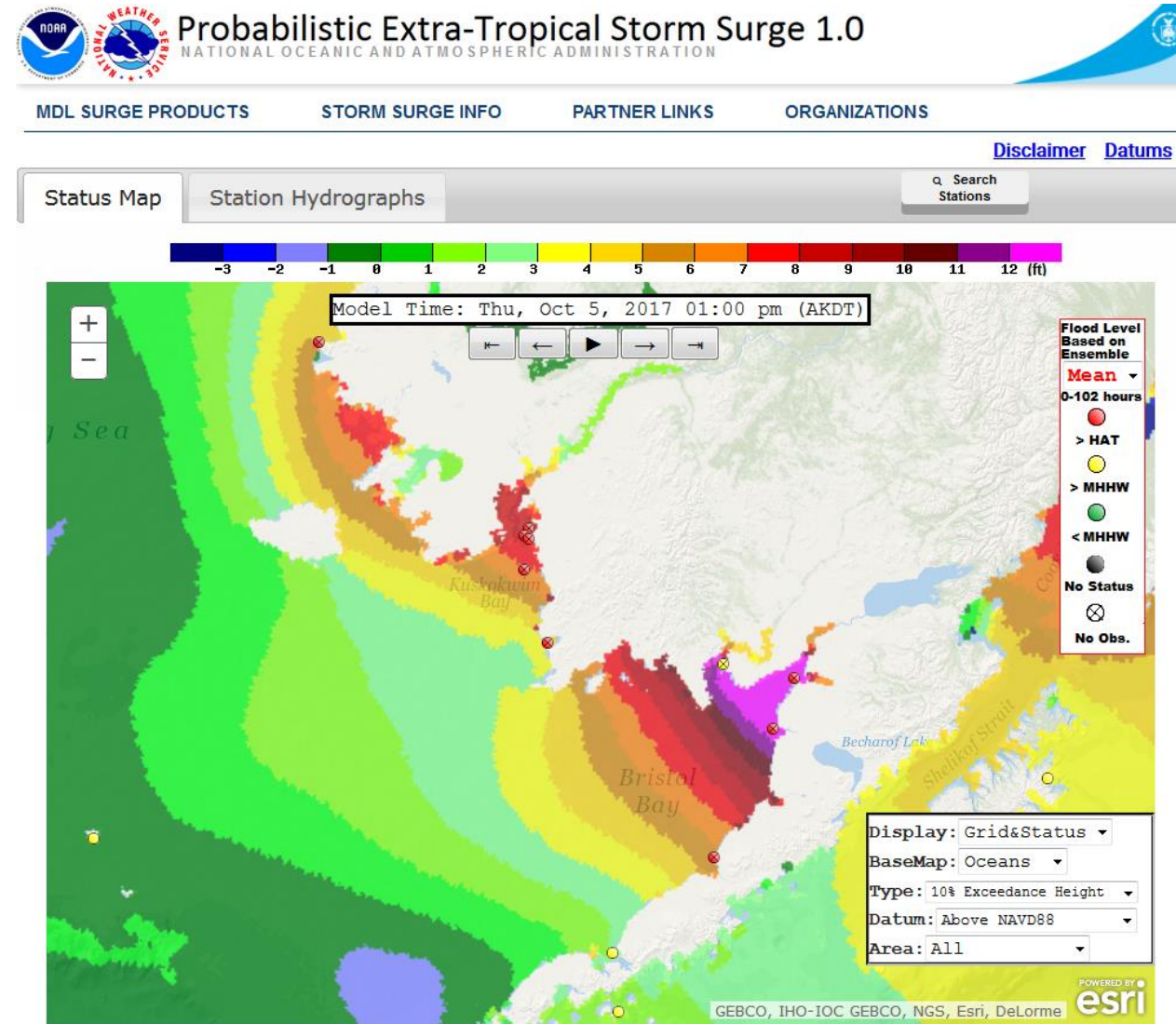
## Measurements

- ✓ Follow science methods
- ✓ Report numbers or converted to numbers
- ✓ Comparable to other datasets
- ❑ Requires working with scientists to install
- ❑ Requires regular maintenance
- ❑ Equipment can break or get lost and must be replaced

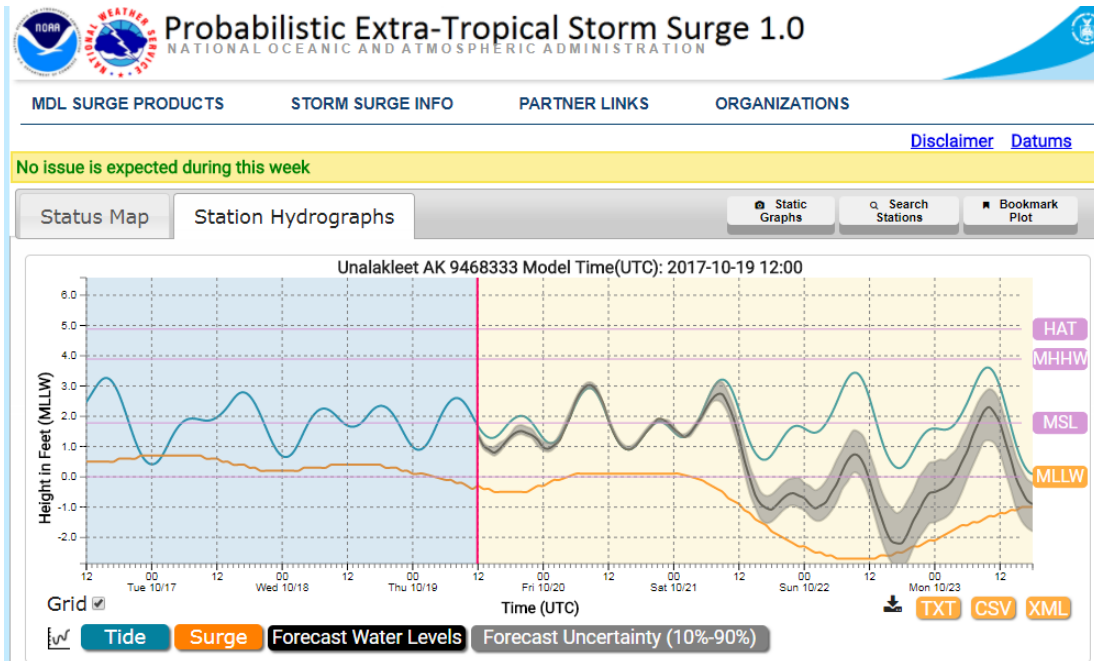
**Observations + Measurements = Full Story**



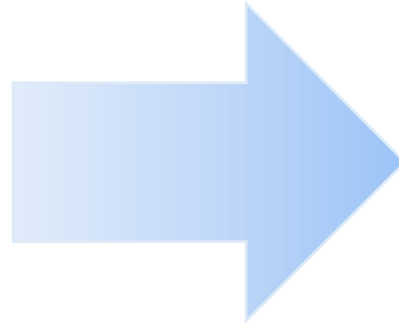
# Extra-tropical Cyclones



[http://slosh.nws.noaa.gov/etss/station/petss1.0esri/index.php?glat=All&display=0&type=e10&base=Ocean\\_Basemap&datum=datum&src=mean](http://slosh.nws.noaa.gov/etss/station/petss1.0esri/index.php?glat=All&display=0&type=e10&base=Ocean_Basemap&datum=datum&src=mean)



# Conditions



# Impacts

- Wind Speed
- Wind Direction
- Storm Surge Height
- Wave Height
- Local topography and bathymetry

- Flooding
- Erosion
- Other Damages

# DGGS Measurements



## Community-Based Methods for Monitoring Coastal Erosion

A STEP-BY-STEP GUIDE FOR DOCUMENTING SHORELINE CHANGE IN YOUR COMMUNITY

\*Will be presenting at AFE and ATCEM

## Erosion

- Community-based erosion monitoring
  - Site installation
  - Training
  - Follow-up
  - Continued measurements

## Flooding

- Sensors
- Tide Staffs
- Photographs



Tide Staff

Tununak Igage  
re-install



Photo from the 2011 Bering Sea Storm  
taken by Steve Ivanoff at Unalakleet



# Sensors

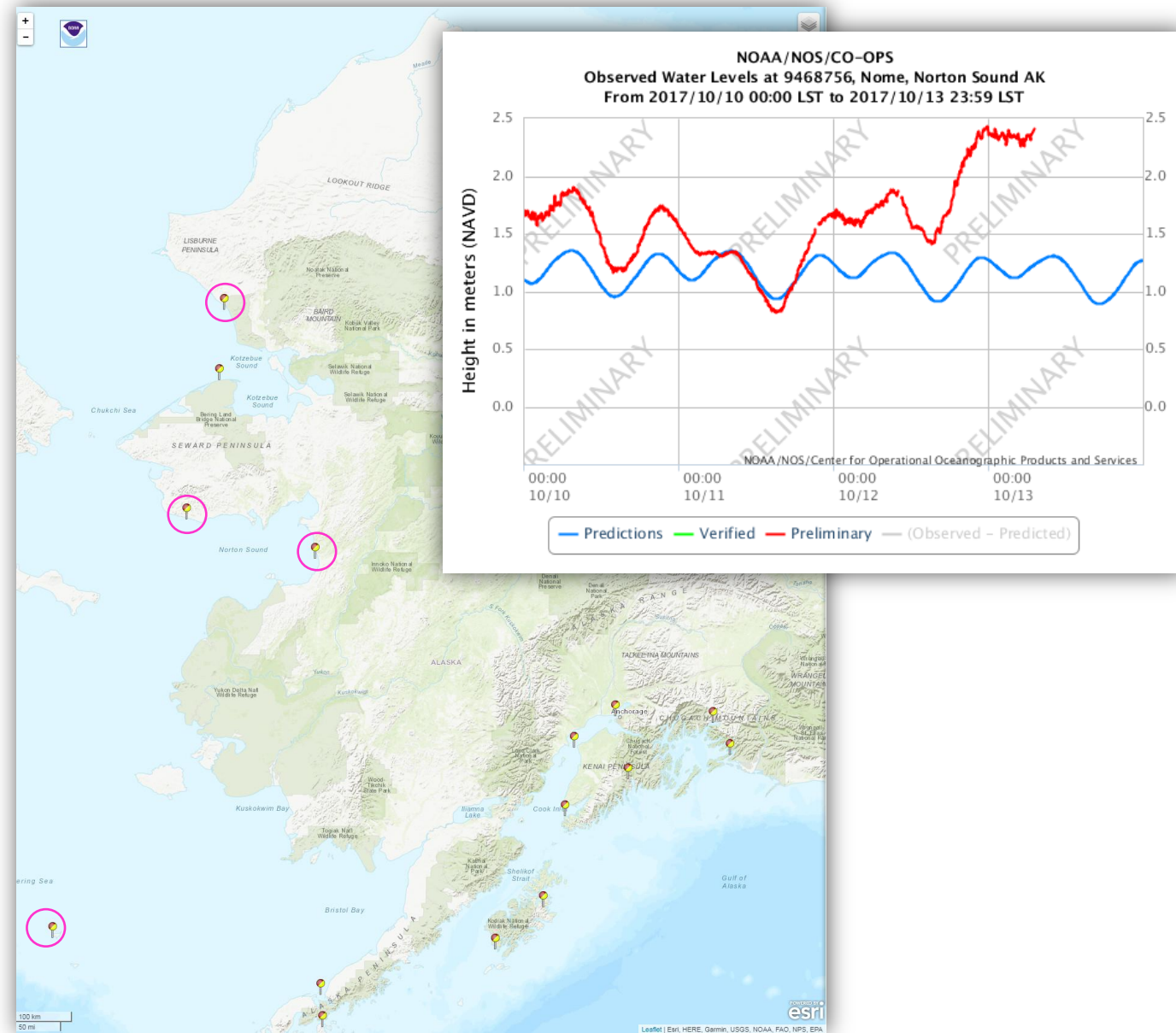
NOAA operated  
tide gauges

Red Dog

Nome

Unalakleet

St. Paul Island



<https://tidesandcurrents.noaa.gov/map/index.shtml?region=Alaska>



# Sensors

DGGS and  
Alaska Pacific  
River Forecast  
Center Gauges

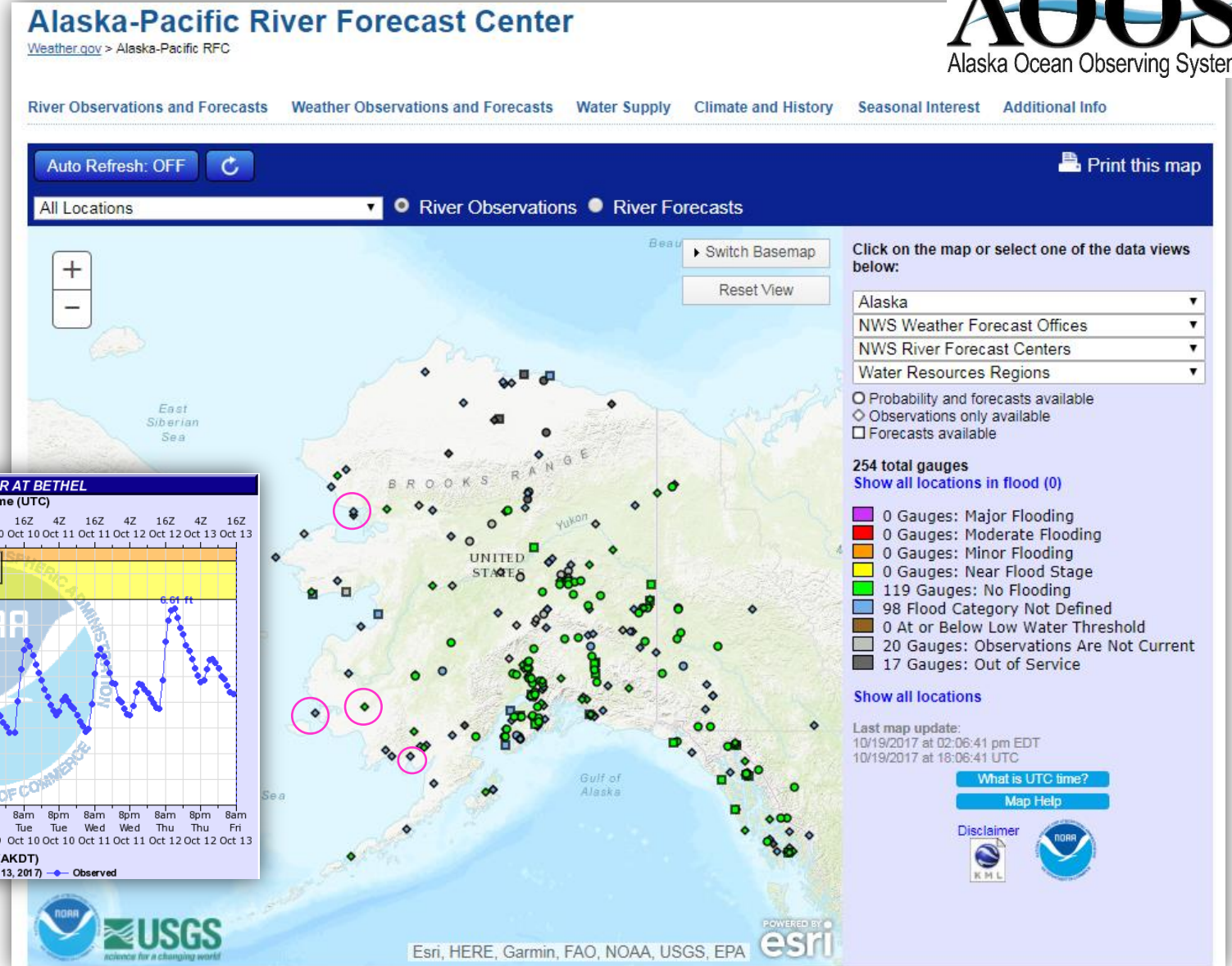
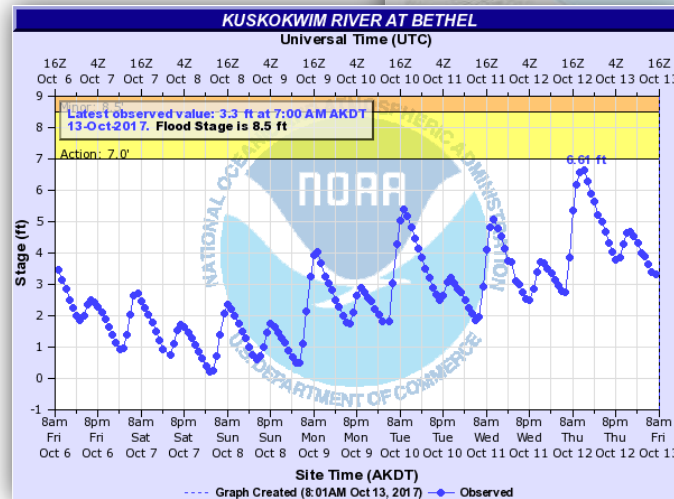
Kotzebue

Tununak

Bethel

Dillingham—

coming back online



<https://tidesandcurrents.noaa.gov/map/index.shtml?region=Alaska>

# Sensors

Rapid Response  
Storm Sensors

Shishmaref

UAF

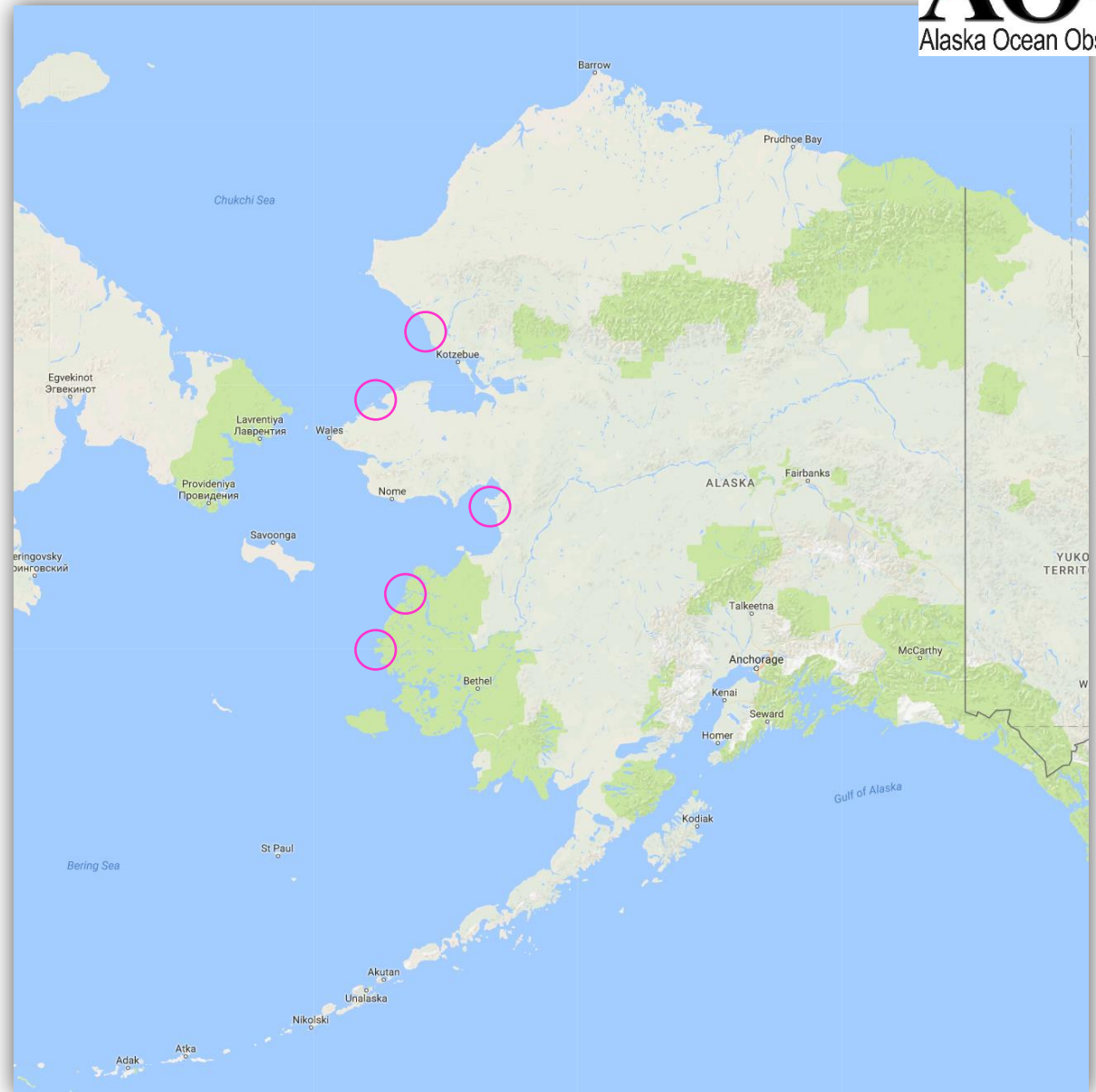
Kivalina

Shaktoolik

DGGS

Nunam Iqua

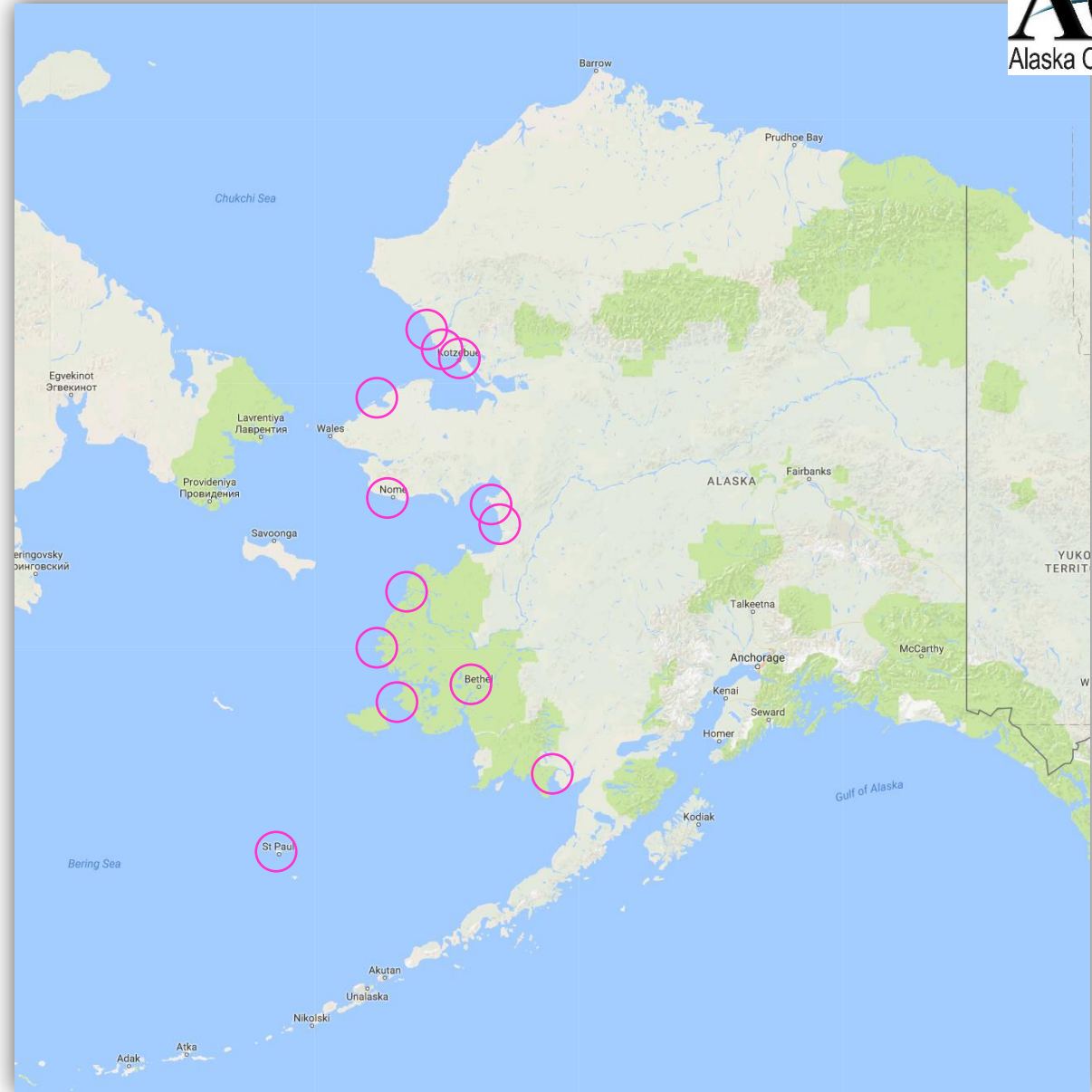
Hooper Bay



# Sensors

All Sensors  
Operating for  
Portions of 2017

Data will be  
made available at  
[www.aoops.org](http://www.aoops.org)





# Tide Staffs

DGGS Placed  
Staffs for  
Community  
Observations

Shishmaref

Golovin

Kotlik

Chevak

Kwigillingok

Chignik Lake

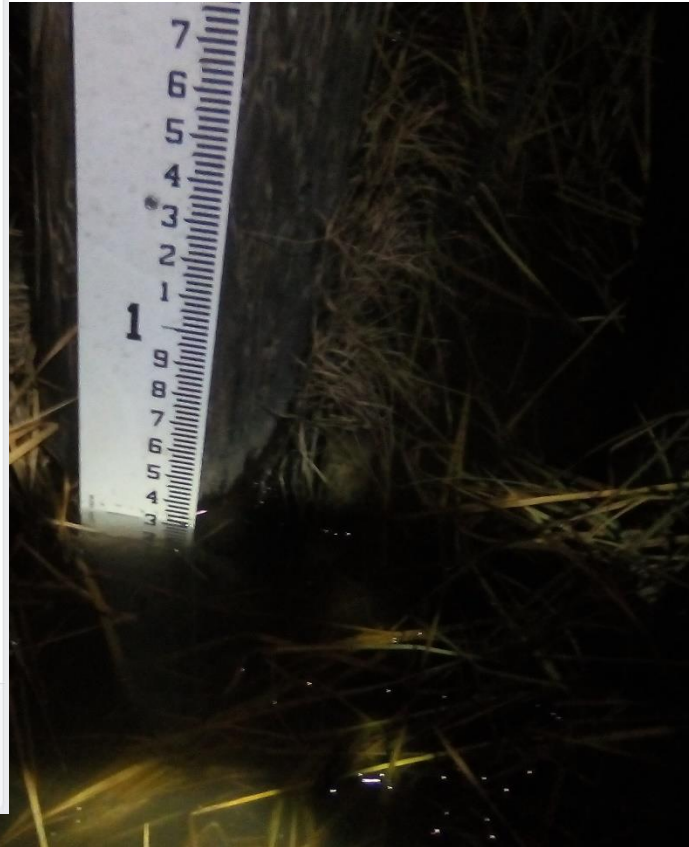


**AOOS**  
Alaska Ocean Observing System

Tide staff installation at Kwigillingok, with Denise Pollock,  
Lewis Amik III, and Jacquelyn Overbeck



# Tide Staffs



Close up photo of the tide staff and a photo showing boardwalk damage at Kotlik on October 13, 2017, taken by Harold Okitkun



# Tide Staffs

Observations ▾About ▾?

LEO NETWORK

Jacquelyn Overbeck ▾English ▾

Q

EXPLOREOBSERVATIONSUNUSUAL FAST FLOODING

OCTOBER 13, 2016

Nome

Unusual Fast Flooding

Chignik Lake, Alaska, United States

WEATHER

WATERS

TRANSPORTATION

500 km

300 mi


Mapbox

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Contributors


Observer



Oxenia O'Domin  
Anchorage Alaska, Uni...

Tribal Program Associate  
ANTHC

Consultant



Edward "Ted" Smith  
Eagle River Alaska, Un...

Emergency Preparedness  
ANTHC

**Observation:** Flooding occurred unusually fast beginning on October 9th - similar to what occurred in December 2007 with heavy rain and bad weather conditions that resulted in infrastructure damage to homes and damage and washout of the road culvert that provides access for part of the community to the airport. Water levels are currently still rising on October 13th. Shared post by Oxenia O'Domin (ANTHC-LEO), and Shalene O'Domin, local resident.

**Resources:**

(2009-03-10) *Erosion Information Paper* - Chignik Lake, Alaska. "Heavy rains in November and December, 2007 caused flooding." Alaska Baseline Erosion Assessment. (*U.S. Army Corps of Engineers Alaska District*)

(2007-12) *Flooding Conditions in Chignik* - "Heavy rains, strong onshore winds, high tide and storm surge, and potentially frozen ground contributed to flooding between Chignik Lake and Port Heiden on the Alaska Peninsula December 1-3, 2007." (*Alaska Center for Climate Assessment & Policy*)

Staff installed May 2017

Photo by Shalene O'Domin - Chignik Lake Resident

Photo by Shalene O'Domin - Chignik Lake Resident

Photo by Shalene O'Domin - Chignik Lake Resident

STATE OF ALASKA

DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

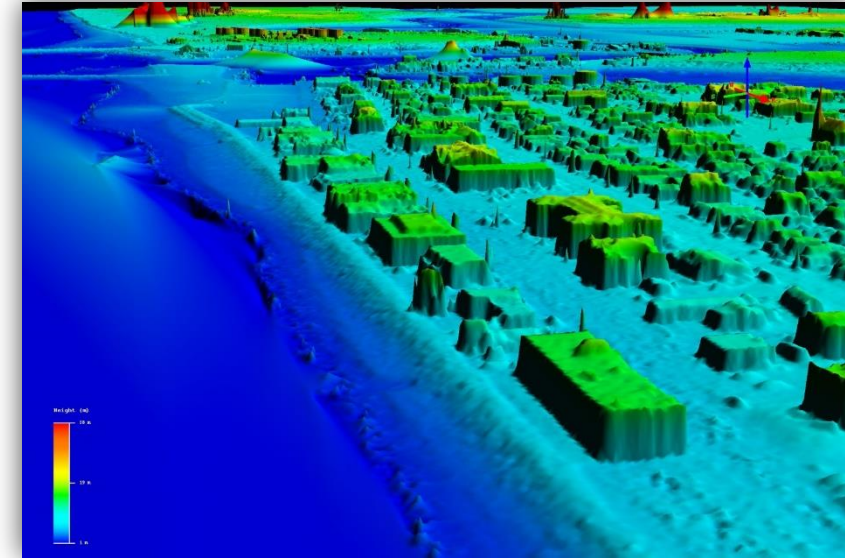


# Photographs

Aerial  
Photos



Elevation  
Model



Identify flood  
locations and  
extract elevation  
values

On-the-  
Ground  
Photos



# Photographs



A series of photos from a high point at Golovin, taken by Toby Anungazuk Jr. on October 13.



# Photographs



October 13, 2017



October 29, 2016



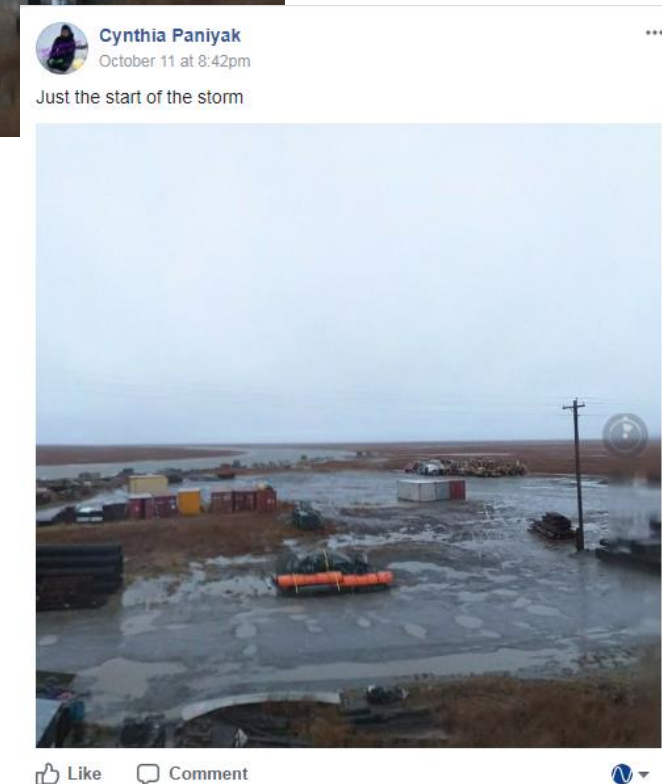
Photos taken at Golovin,  
October 29, 2016 by  
Jack Fagerstrom.



# Photographs



Panoramic photo taken by Cynthia Paniyak and posted to Alaska Water Level Watch Facebook page during the start of a storm on October 11 at Chevak.



# Photographs

October 29, 2016

16:13

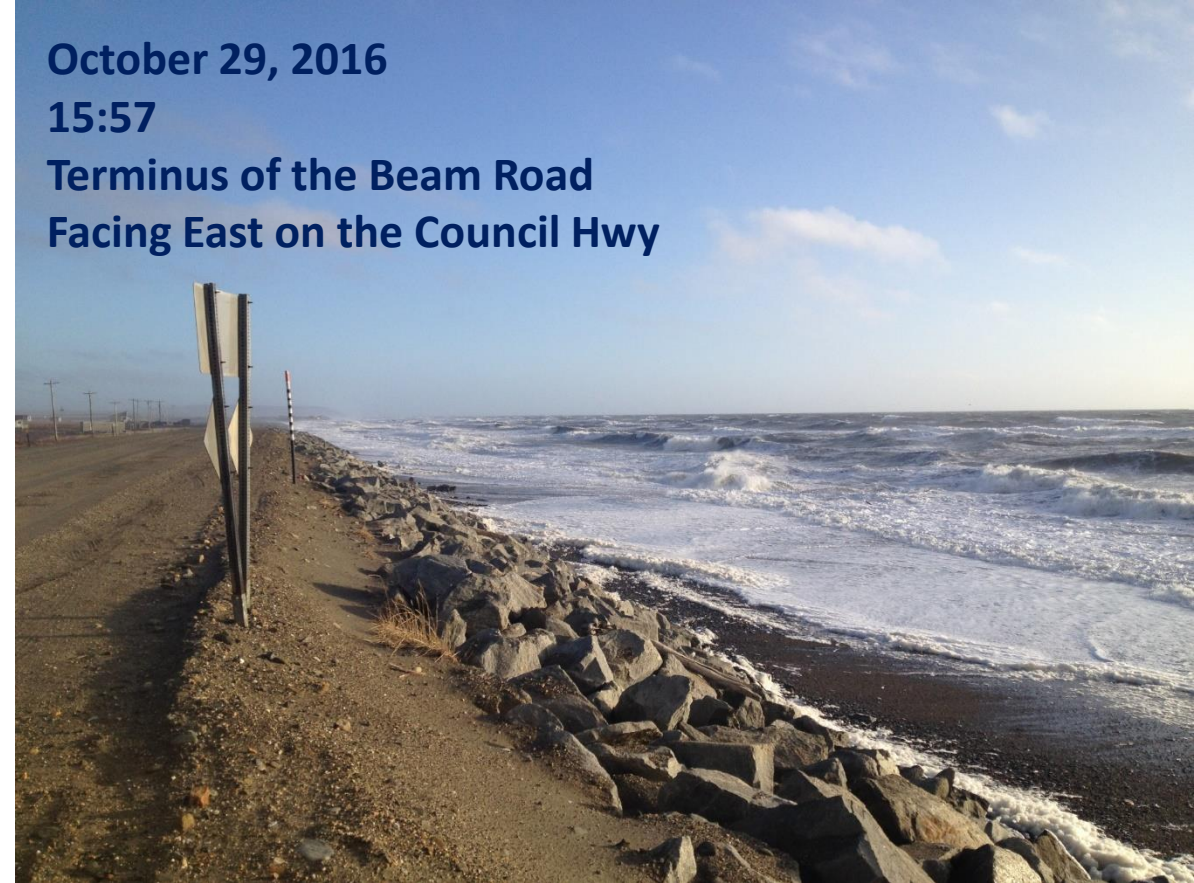
Looking west at the flooded  
inner harbor from the corner of  
West F St. and West 2<sup>nd</sup> Ave.



October 29, 2016

15:57

Terminus of the Beam Road  
Facing East on the Council Hwy



Selection of photos and descriptions provided by Gay Sheffield in Nome, during  
October storm 2016.

# Photographs



Method requires high resolution elevation and orthoimagery data, **available over the areas in the map.**

Take photos:

1. At the intersection of aerial photo-identifiable features,
2. Low-slope ground surfaces,
3. Even surfaces, and
4. Multiple exposed and sheltered coastal locations.



# Photographs

Photo from after storm posted on AWLW facebook page

Photos from Harold Okitkun's post



Photo from field installation of erosion monitoring equipment



In the photo: Harold Okitkun, Emmitt Matthias, and Denise Pollock, taken by Jacquelyn Overbeck

# Observations

Other information and a description to go with the data

Were infrastructure or cultural resources damaged?

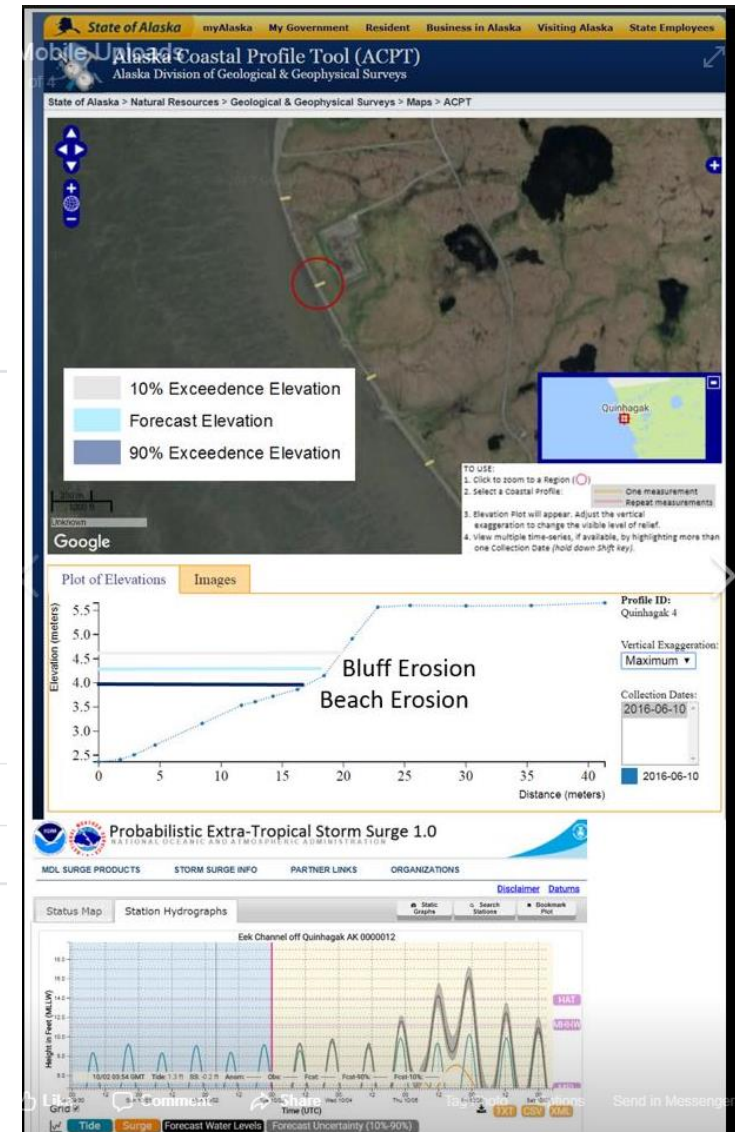
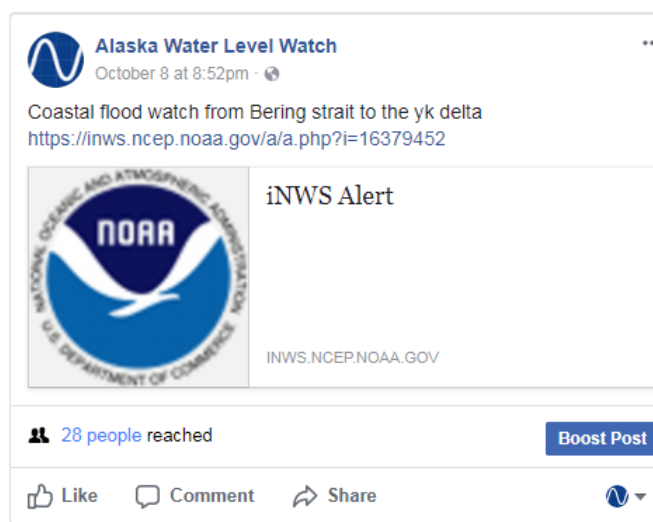
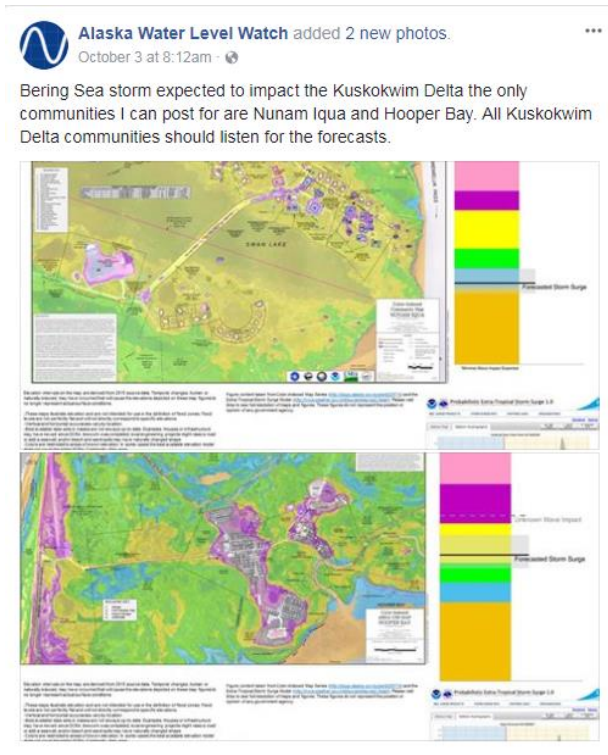
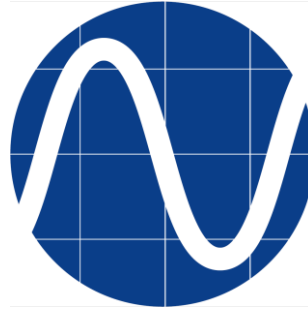
Did anyone have to evacuate to a different building, such as the school or community center?

Did anyone have to move equipment or vehicles to avoid getting flooded?

Was this a normal event?

# Submitting Photographs

- Facebook—[Alaska Water Level Watch](#)
- Email—[Jacquelyn.Overbeck@Alaska.gov](mailto:Jacquelyn.Overbeck@Alaska.gov)





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### COASTAL HAZARDS

Alaska's extensive shorelines are incompletely mapped and under-instrumented for the evaluation of coastal dynamics. The Coastal Hazards Program at DGGS is engaged in ongoing investigations that will expand our understanding of how the coastline has evolved and how it will respond to hazardous events and long-term changes. This program is dedicated to fostering scientific partnerships that will improve the quality and quantity of the critical baseline data that are necessary to fuel informed decision-making throughout the state.

We routinely respond to information requests by agencies and the general public. If we can assist you in any way [please contact our program directly](#)

Follow DGGS on Twitter @akdggs

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<https://www.facebook.com/AlaskaWaterLevelWatch/>



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Alaska Sea Grant

Bureau of Indian Affairs

Coastal Impact Assistance Program

Generous contributions of time from local tribe and city staff