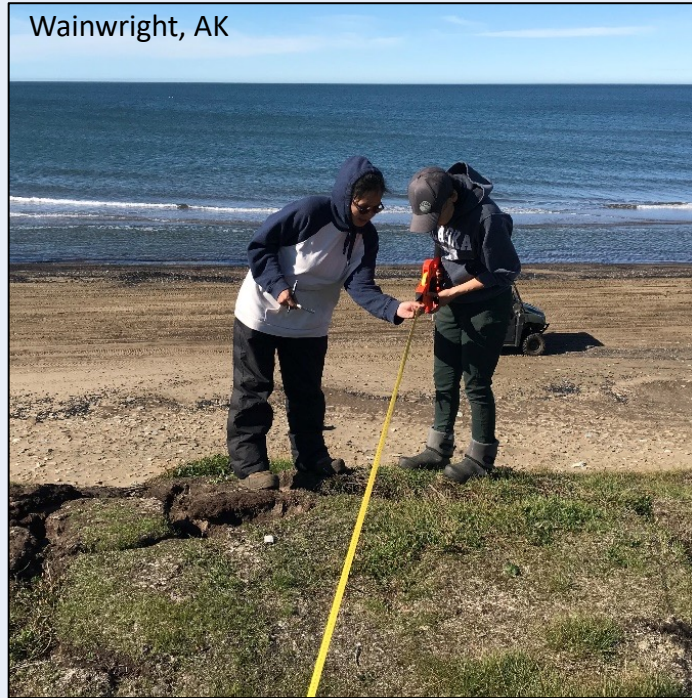


Community-Driven Data Collection

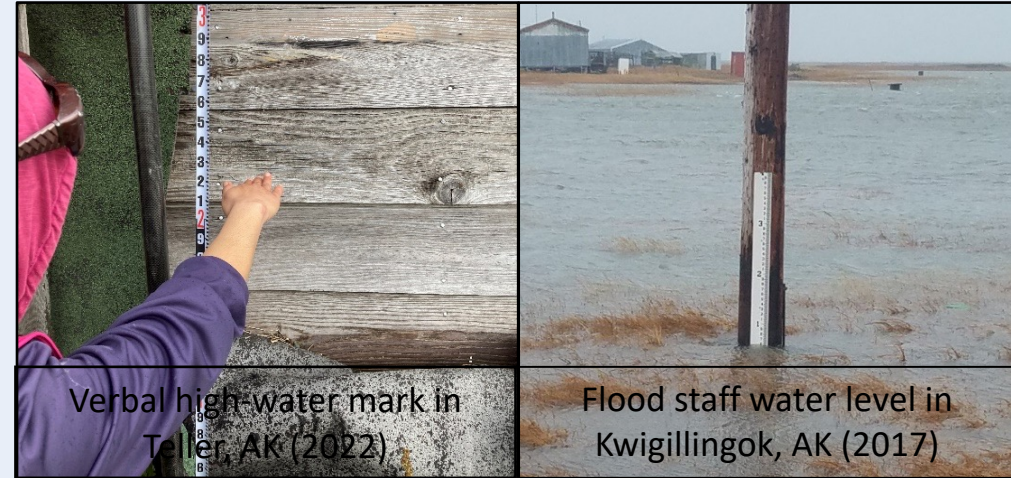


Helping Alaskans collect and connect to the vital data, methods, and tools they need to make informed decisions and better prepare for, respond to, and recover from geological hazards.



Local knowledge is critical knowledge

- Community members are the first to observe and experience changes to the coastline, rivers, and infrastructure.
- Existing datasets are improving, but without local context this information is incomplete.
- Important details can be missed by agencies and researchers because they are not able to observe the land in the same way as community members.
- We hope to bridge this gap by providing tools for communities to contribute knowledge and improve safety for all Alaskans.



ALASKA HIGH-WATER MARK OBSERVATIONS



<https://arcg.is/15T54W2>

Alaska High-Water Mark Observations

Flooding can happen anywhere in Alaska

Collecting high-water marks helps communities document flooding to assist with emergency management and future planning. Building a reliable record of high-water marks also helps improve the accuracy of flood models and predictions.

The Alaska Division of Geological & Geophysical Surveys (DGGs) developed this tool for community members like you to submit your own high-water mark observations and help improve flood forecasting, planning, and safety throughout Alaska.

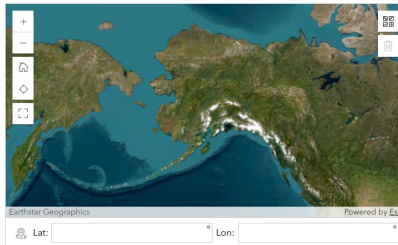
For more information about flooding in Alaska, including additional tools that are available, please visit DGGs' [Coastal Hazards Program](#).

THANK YOU!

How To Collect High-Water Marks

High-Water Mark Location*

Please provide the physical location of your observation using your device's location, by selecting the location from the map, or by providing the latitude and longitude coordinates.




Measurement

Please do not attempt to take a measurement unless it is safe to do so.

Using a tape measure, ruler, or yard stick, measure up from the ground to the height of the high-water mark.


High-Water Mark Photograph*

Please upload or take a photograph of the high-water mark that clearly shows what the mark is. If possible, please include a measurement in the photograph.

Drop image here or select image 

Area Photograph*

Please upload or take a photograph of the high-water mark that clearly shows the area of flooding. If possible, please include identifiable landmarks in the photograph.

Drop image here or select image 

How To Collect High-Water Marks

What is a high-water mark?

Please do not place yourself or others in harm's way while collecting high-water mark observations; your safety is always more important.

High-water marks are evidence left behind by floods that indicate the maximum height water reached during the event. Many high-water marks are only temporary, so identifying and documenting them quickly after an event is very important. For help identifying high-water marks, expand the high-water Mark Examples section below.


Flooding may leave behind a variety of different types of high-water marks that can represent dynamic or still water heights depending on the location and type of mark. Below is a list of the most common types of evidence you are likely to encounter and examples of each.

High-Water Mark Examples


Measuring High-Water Marks

Please do not attempt to take a measurement unless it is safe to do so.

Using a tape measure, ruler, or yard stick, measure up from the ground to the high-water mark. It is important that you measure up as close to vertically as possible.



Taking a photograph that includes your measurement can be helpful, but it is important not to take the photograph at too much of an angle. If possible, try to align the lens of your camera so that it is at the same height as the high-water mark and the measurement is readable.



If you do not have a measurement tool, you can include a person or object in the photograph whose height you know. Adding this information in the description of the high-water mark makes it possible to estimate the height of the mark by comparison.

A publicly available survey for residents to identify high-water marks in their communities after a flood.



What is a high-water mark?

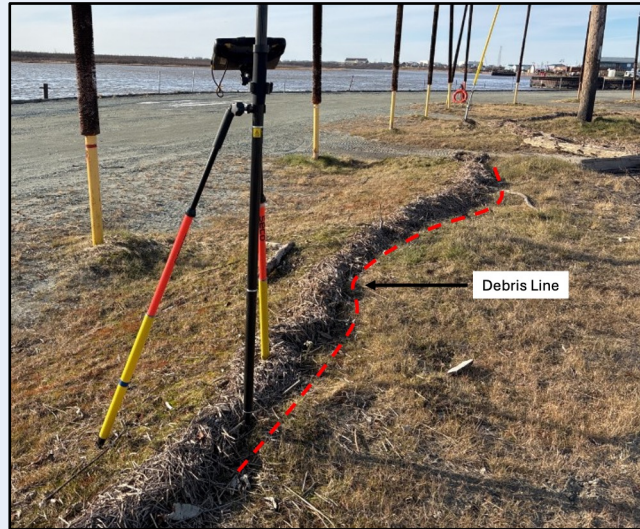
High-water marks are evidence left behind by flooding that indicate the maximum height water reached during the event.

Many high-water marks are only temporary, so identifying and documenting them quickly after an event is very important.



Ex-Typhoon Merbok debris line high-water mark in Hooper Bay, AK, on September 20, 2022

High-water mark examples

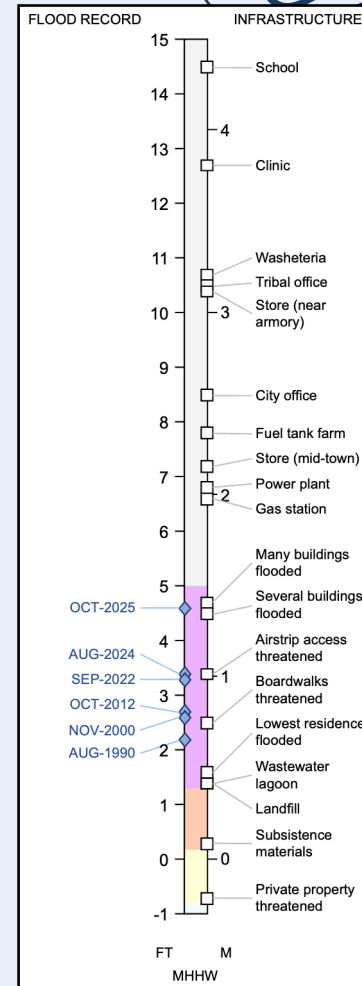
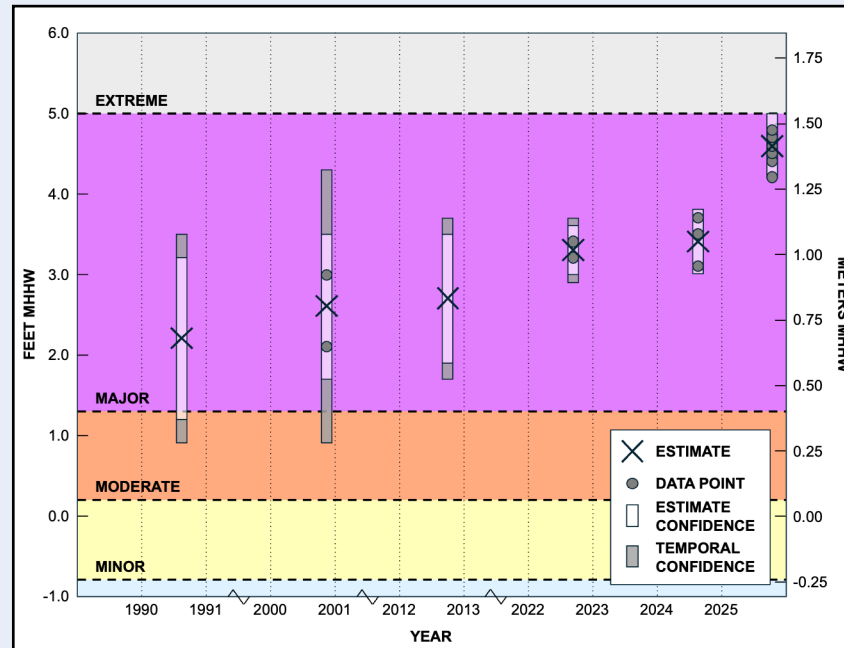


What are high-water marks used for?

High-water marks are not just data points and numbers; they are vital records that help communities prepare for, respond to, and recover from floods.

Collecting high-water marks helps:

- Build a reliable flood record
- Validate and correct flood models
- Support better forecasting and emergency response
- Improve hazard assessments and mitigation planning
- Document impacts and facilitate recovery



Flood Records

Long-term flood records are sparse and incomplete throughout rural Alaska.

Building an accurate and reliable history of flooding helps communities:

- Preserve local knowledge
- Identify areas of persistent flooding
- Support planning for housing, transportation, and community infrastructure
- Improve flood models

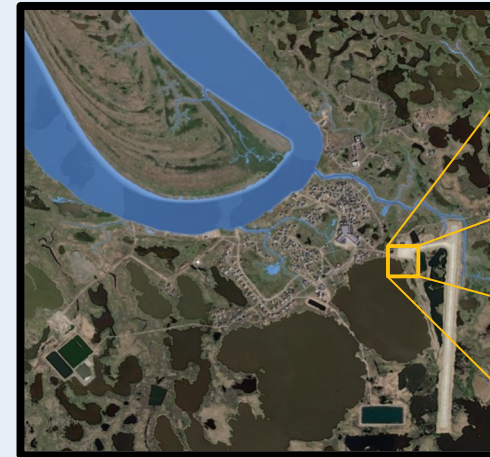
Estimated Floods								
	Flood Date	Type	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)
Major	2013-NOV-10	Storm Surge	12.2	± 0.8	± 0.5	3.71	± 0.25	± 0.16
	1960-OCT-03	Storm Surge	11.2	± 0.3	± 1.0*	3.40	± 0.08	± 0.30
	2019-AUG-03	Storm Surge	11.1	± 0.2	± 0.2	3.37	± 0.06	± 0.05
	2022-SEP-17	Storm Surge	10.7	± 0.9	± 0.0	3.27	± 0.28	± 0.00
	2003-NOV-09	Storm Surge	10.4	± 0.4	± 1.0	3.18	± 0.11	± 0.30
	1974-NOV-11	Storm Surge	10.0	± 0.3	± 0.7	3.04	± 0.08	± 0.21
	1964-SEP-22	Storm Surge	9.3	± 0.3	± 1.0*	2.82	± 0.08	± 0.30*
	1965-NOV-14	Storm Surge	9.3	± 0.3	± 1.0*	2.82	± 0.08	± 0.30*
Moderate	1986	Storm Surge	8.3	± 0.3	± 0.1	2.52	± 0.08	± 0.02

Validated Flood Models

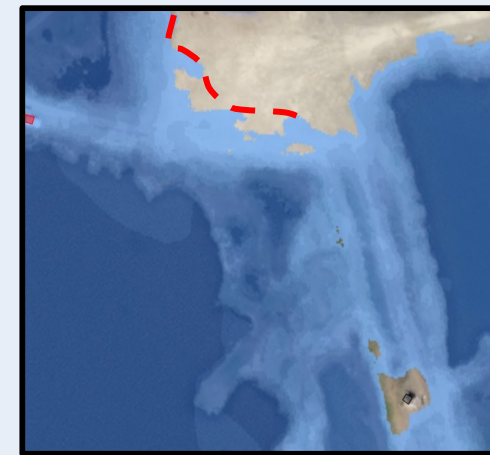
Flood models are only as good as the data they are built upon. High-water marks provide **real** measurements of flood heights and extents to test against modeled simulations.

Accurate flood models help communities:

- Identify areas of persistent flooding
- Support planning for housing, transportation, and community infrastructure
- Improve forecasting and emergency response



Kipnuk, AK



Modeled still water flood extent
at 8 ft MHHW



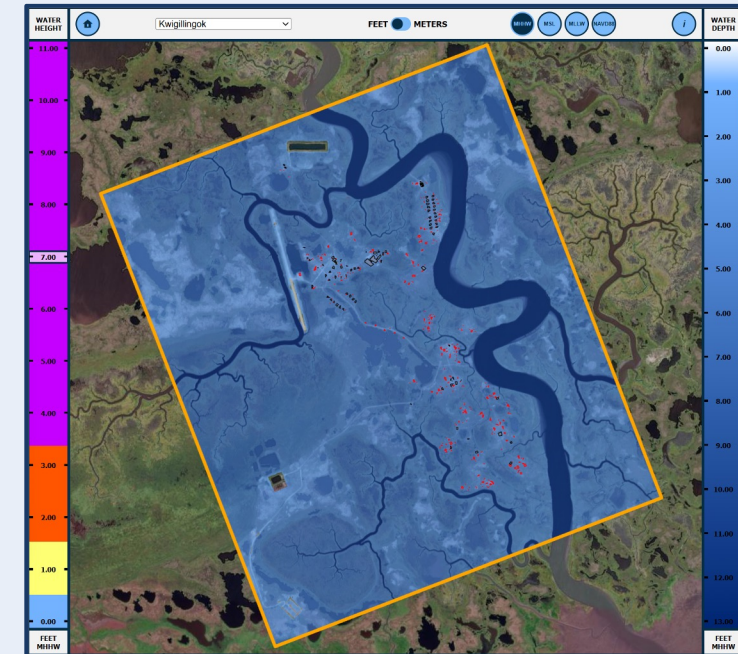
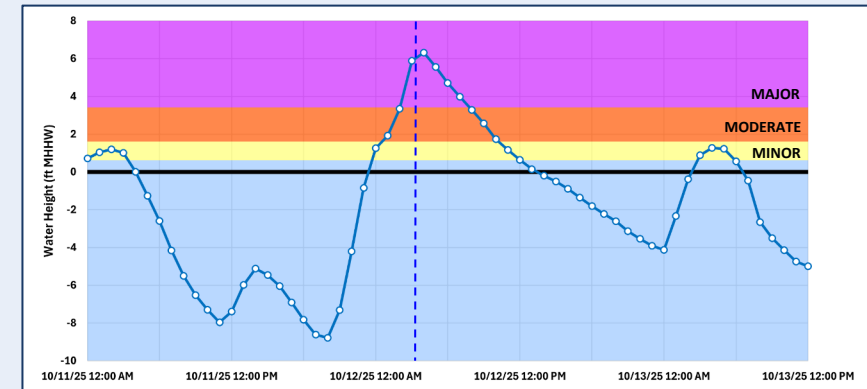
Drone imagery collected after
Ex-Typhoon Halong (AKDOT)

Improved Forecasting

Accurate flood histories and models allow forecasters to provide more than just a predicted flood height.

Accurate flood models help agencies:

- Better communicate potential flood extents and infrastructure impacts
- Provide more reliable and timely flood warnings
- Facilitate emergency planning and response before, during, and after a flood event

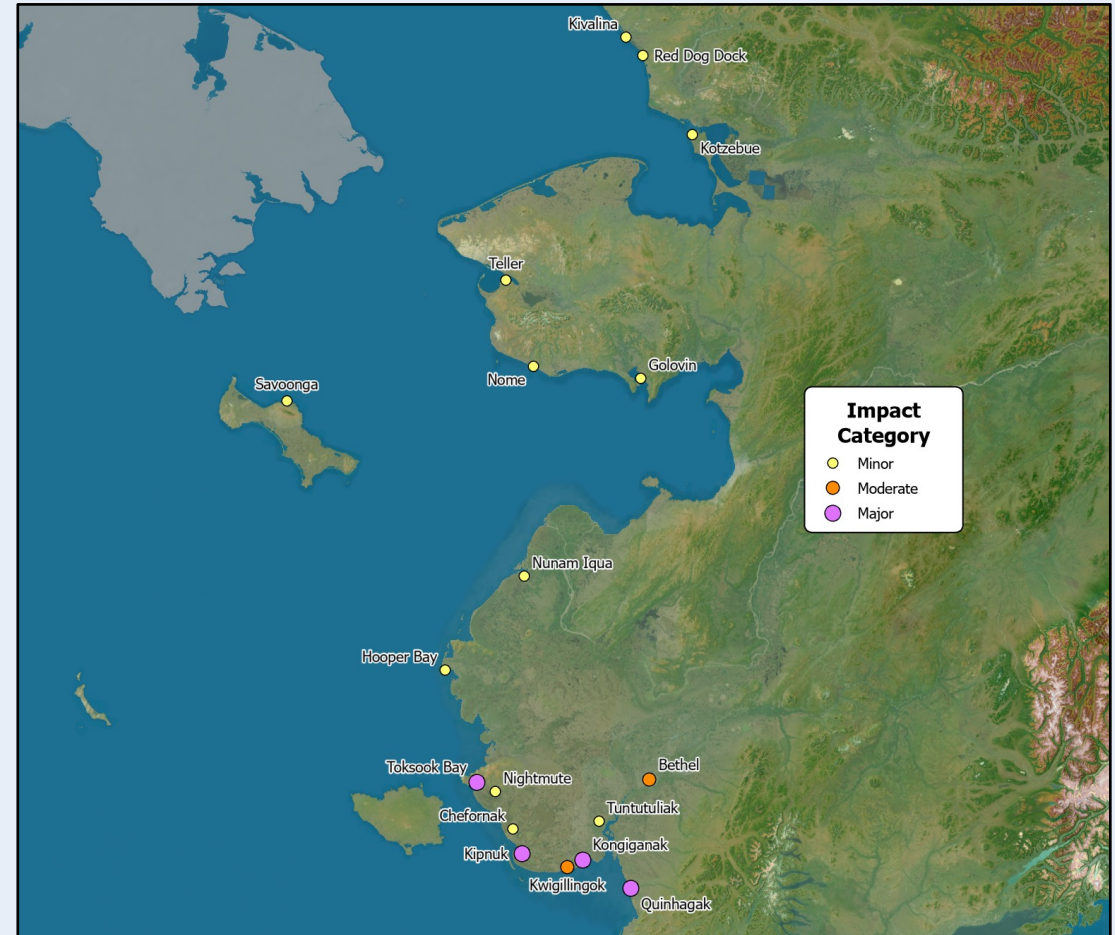


Improved Emergency Response

Accurate, timely forecasts are one of the most important tools for emergency management at every level.

More accurate forecasts help:

- Communities make informed decisions about how prepare for and safely endure major events
- Emergency managers identify threatened communities and pre-position assets
- Agencies assist impacted communities document and recover from damages



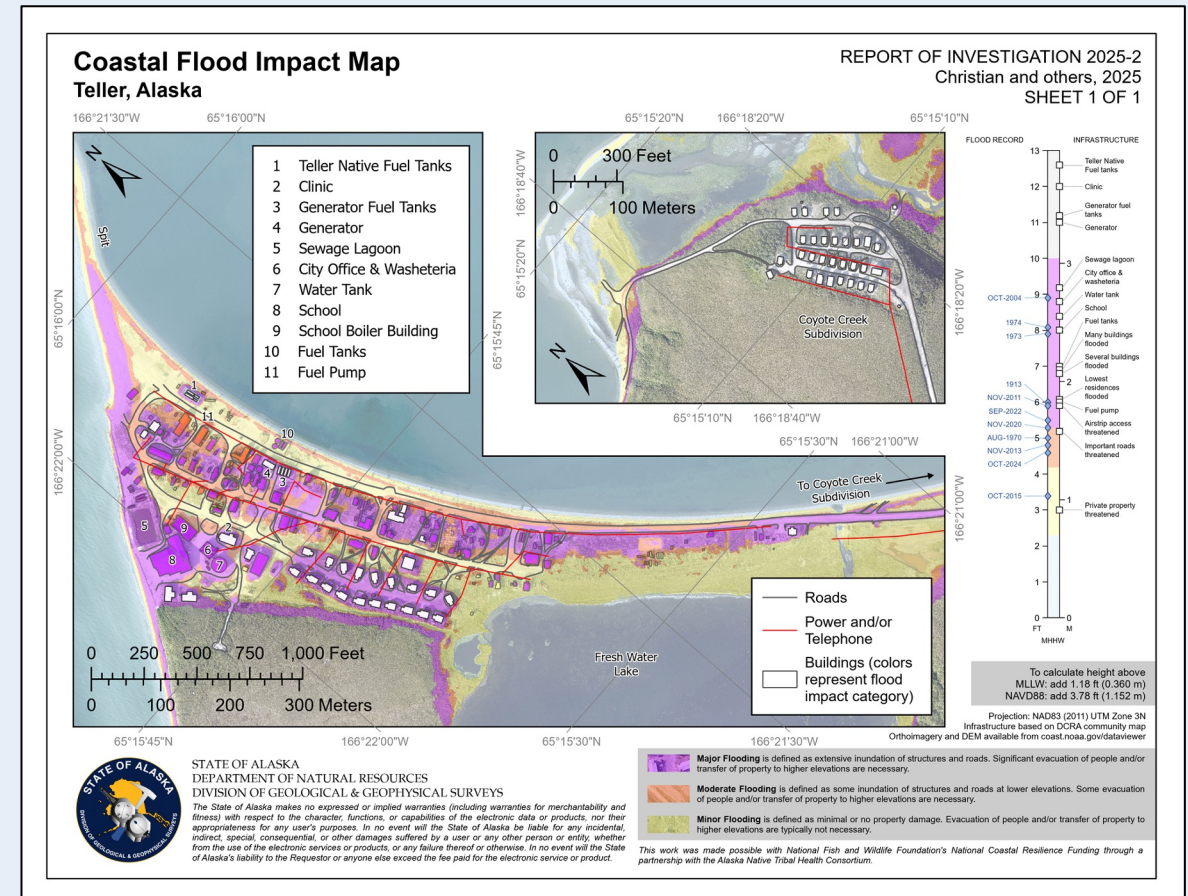
An example forecast map for a hypothetical storm event

Improving Hazard Assessments

Reliable, long-term flood histories and accurate, verifiable flood models are critical for high-quality hazard assessments.

These products help communities:

- Identify local hazards and develop resiliency and mitigation plans
- Prioritize and address concerns before disasters occur
- Create grant and funding proposals backed by scientific studies informed by local knowledge



Documenting Impacts

Well documented high-water marks provide tangible evidence of how severe a flood event was and the areas it impacted.

This information helps communities:

- Convey their immediate needs to emergency responders
- Provide clear evidence when submitting for post-event disaster assistance
- Build a shared understanding of how flooding affects the community and changes over time



Ex-Typhoon Merbok flood documentation in Tuntutliak, AK, on September 18, 2022
(photo credit: Paul Jimmie)


CULVERT INVENTORY SURVEY



AK DGGS Culvert Inventory

Please help the Alaska Division of Geological & Geophysical Surveys (DGGS) verify culverts in your community. Culverts are structures that allow water to pass through or under obstructions like roads and berms. Knowing where these structures are can help refine flood models in your location. Your on-the-ground knowledge and input are critical to enhancing the understanding of flood risks in your community and throughout the State. **Please do not place yourself or others in harms way while verifying these data; safety is always more important.** Thank you so much for your assistance!

Figure 1. Culvert examples.



Please direct questions or comments to the [Coastal Hazards Program](mailto:dnr.dggs.coastal.hazards@alaska.gov) via email: dnr.dggs.coastal.hazards@alaska.gov

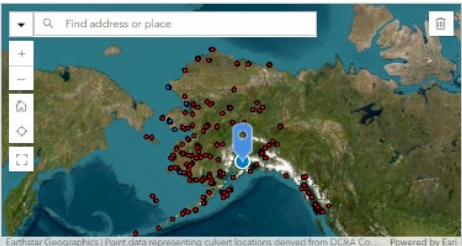
Date*
Date of verification

3/11/2026

Culvert Location*
RED points are **UNVERIFIED** culverts in the inventory, **GREEN** points are **VERIFIED** culverts in the inventory, and **BLUE** points are citizen scientist submissions awaiting approval.

If you are adding a **NEW** culvert not already in the inventory, click on its location on the map. If you are verifying whether a culvert that is already in the inventory **IS** or **IS NOT** present, click on its corresponding point on the map.

If a culvert already in the inventory is in the wrong location, mark it as **NOT** present and create a **NEW** culvert in the correct location.



Find address or place

Lat: 61.215996 Lon: -149.812627

Verification*

Culvert IS Present Culvert IS NOT Present NEW Culvert

Diameter
(Optional) What is the diameter of the culvert in inches? For a culvert that is not round, please describe its dimensions in the Conditions field below. **Please do not put yourself or others in harms way to collect measurements; safety is always more important.**

12

Material
(Optional) What material is the culvert made of?

Corrugated pipe
 Steel pipe
 Concrete
 PVC
 Other (please describe in Conditions field below)

Condition
(Optional) What is the physical condition of the culvert? Examples: good condition, obstructed, damaged, etc.

1000

Photograph
(Optional) Provide a photograph of both ends of the culvert if possible. **Please do not place yourself or others in harms way while taking photographs; safety is always more important.**

1 Drop image here or select image (number of files allowed: 1 - 2)

<https://akdggs.com/culverts>

A publicly available web application for citizen scientists to verify hydrological connections in their communities.

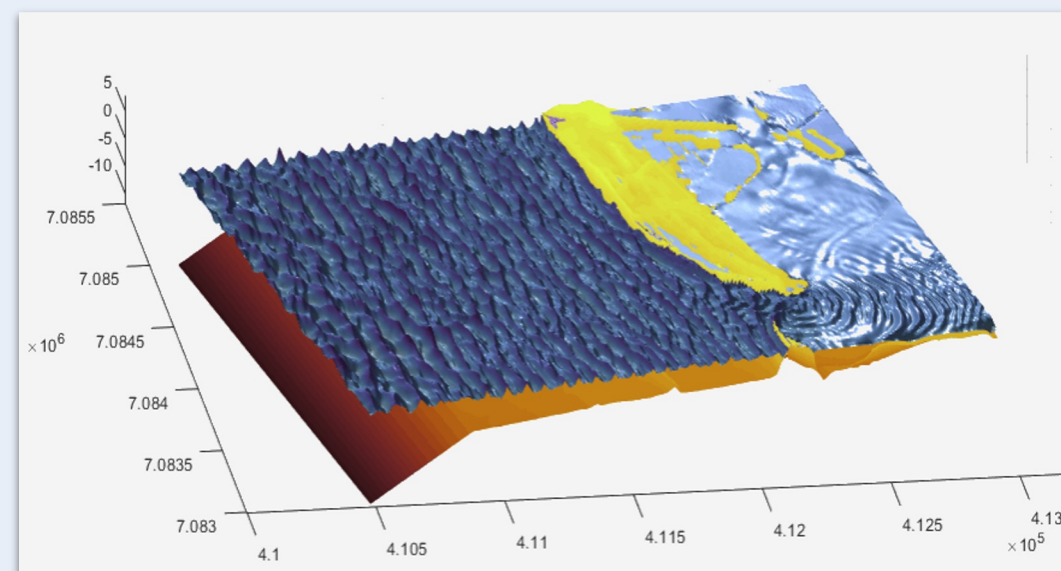


Why is it important to know where culverts are?

Culverts are physical connections that allow water to not only flow within a community but also in flood models.

Understanding where these connections are and what condition they are in helps:

- Identify areas that are vulnerable to flooding
- Verify and correct flood models
- Improve hazard assessments
- Support planning for community infrastructure



USGS hydro-dynamic flood model tailored to local bathymetry, topography, and hydrological connectivity, Unalakleet, AK

Identifying Vulnerable Areas

Without local knowledge, agencies and researchers may miss important details.

Providing critical information about hydrological connectivity not only improves flood models but also helps communities address local areas of concern.

Culvert Included



Still water inundation model (SWIM) for Teller, AK, at 2.75 m (NAVD88)

Identifying Vulnerable Areas

Without local knowledge, agencies and researchers may miss important details.

Providing critical information about hydrological connectivity not only improves flood models but also helps communities address local areas of concern.

Culvert Missing



Still water inundation model (SWIM) for Teller, AK, at 2.75 m (NAVD88)

Verifying and Correcting Flood Models

Simply knowing a culvert exists might not always be enough; only community members can verify the condition of these connections.

Culvert Assumed Clear



Culvert Blocked

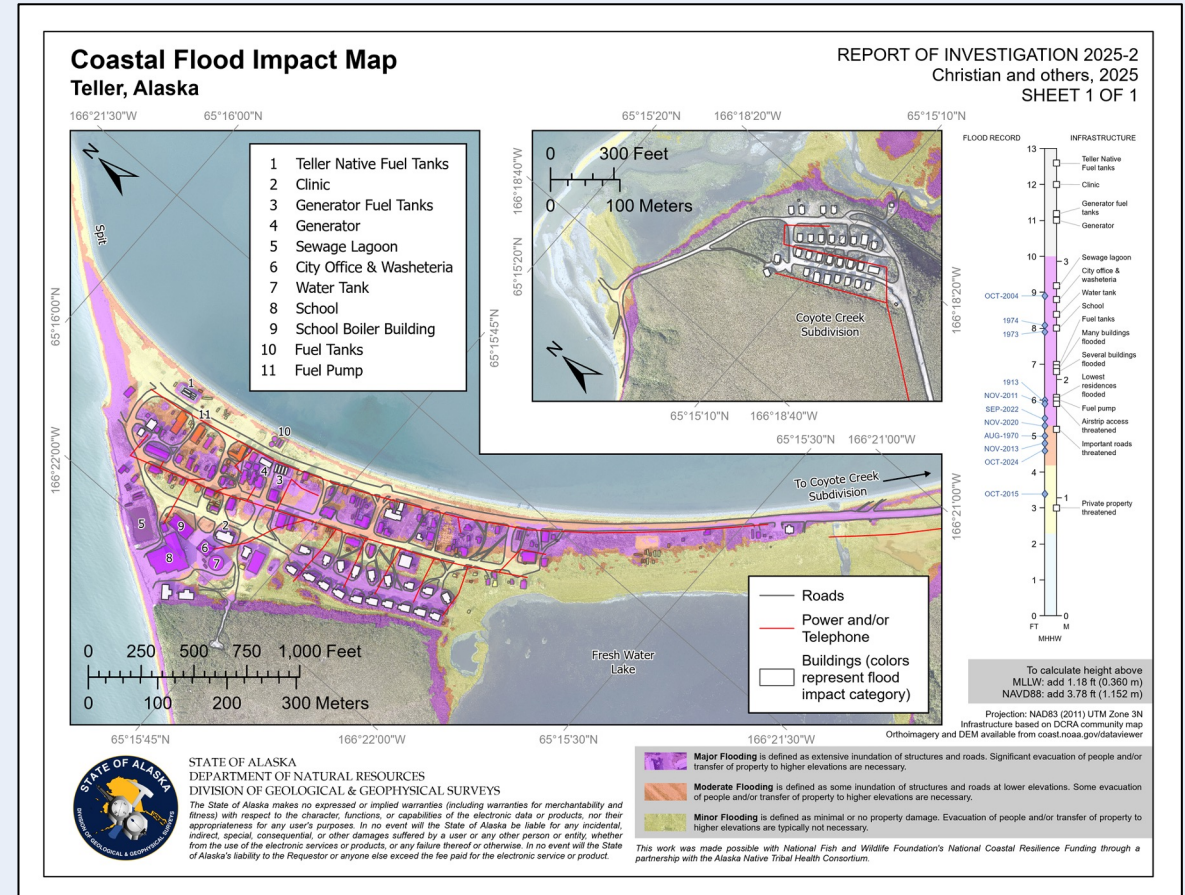


Improving Hazard Assessments

Like high-water marks, understanding the hydrological connections in communities is also critical for high-quality hazard assessments.

These products can also help communities:

- Identify local hazards and develop resiliency and mitigation plans
- Prioritize and address concerns before they become disasters
- Create grant and funding proposals backed by verified infrastructure data



Supporting Infrastructure Planning

Verifying the location and condition of culverts can also provide a starting point for improving drainage plans in communities.

Identifying and documenting existing infrastructure, how well it is functioning, and areas where it is lacking are the first steps in addressing problems and vulnerabilities.



High-Water Mark Observations



<https://arcg.is/15T54W2>

Culvert Inventory Survey



<https://akdggs.com/culverts>

With these tools we hope to bridge the gap between local knowledge and researchers by providing ways for communities to contribute vital information and improve safety for all Alaskans.

THANK YOU!



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Keith Horen

GIS Analyst
keith.horen@alaska.gov

Coastal Hazards Program Website:
<https://dggs.alaska.gov/hazards/coastal/>

