



The role of stakeholder feedback in glacial lake outburst flood monitoring tools: Mendenhall and Snow Glaciers

Dina Abdel-Fattah
Natural Resources & Sustainability PhD Candidate
University of Alaska Fairbanks



First off, what do I do?

I study decision making and risk assessment under uncertainty

I am interested in how people make decisions and assess risk re: ice hazards

- Glacial lake outburst floods (GLOFs)
- Sea ice hazards



So what does that actually look like?

I look at the role of scientific uncertainty, stakeholder needs, and perceived risk in how different informational products are used by a diverse group of stakeholders regarding:

GLOFs on the Kenai



GLOFs in Juneau



Sea ice hazards off Utqiaġvik



Research objectives

To understand a few effective ways to relay GLOF information to different stakeholder groups via:

1. how current informational products are used by different stakeholders
2. what challenges exist for stakeholders regarding their use of these products
3. whether different stakeholder have different informational needs
4. what are the best formats to communicate scientific information

Research objectives (cont.)

Follow-up surveys and assessments to understand:

whether stakeholders who are involved in this research experience any changes over time: in 1) their perception of the utility of informational products and 2) their use of informational products

Importantly, this research aims to foster and promote **co-production of knowledge**, with both information providers and stakeholders involved in this research

Research questions

Data use:

To what extent does format affect the ability of a stakeholder to use a data product for decision-making?

Risk analysis:

What are some of the fundamental information stakeholders need to assess risk?

Communicating uncertainty:

What are some effective methods, from a stakeholder perspective, to relay uncertainty in a data product?

Background - Juneau

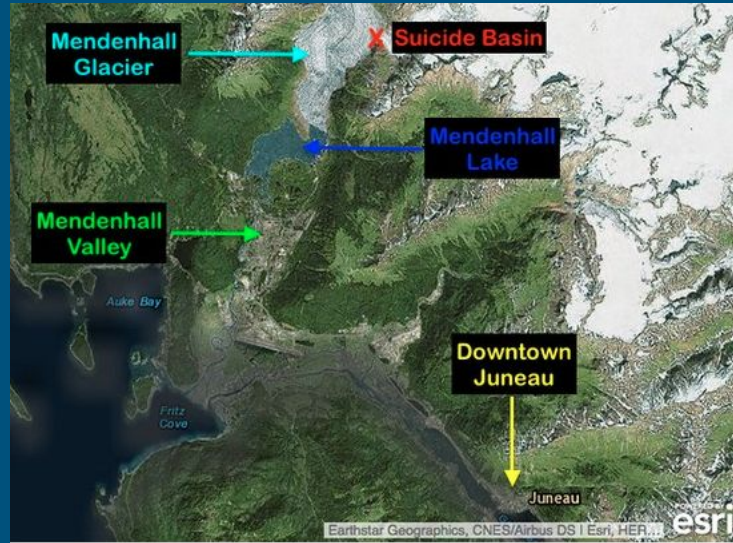


Juneau presents a unique opportunity to analyze and understand societal and economic impacts of GLOF events on a downstream community, given the close proximity of Suicide Basin to the city of Juneau

Strong interest in community, beyond researchers, to capture and understand the impacts of GLOF events

- Preliminary assessment and outreach conducted in March 2018

Where is Suicide Basin?



About Suicide Basin



Suicide Basin is directly adjacent to Mendenhall Glacier

Since 2011, Suicide Basin releases (at least once annually) into Mendenhall Lake via Mendenhall Glacier, raising water levels in both Mendenhall Lake and River to varying degrees

Several homes, tour operations, and public infrastructure are in the floodplain of Mendenhall River and have been affected in GLOF events

Largest GLOF recorded thus far was in 2016; 2018, 2nd largest on record

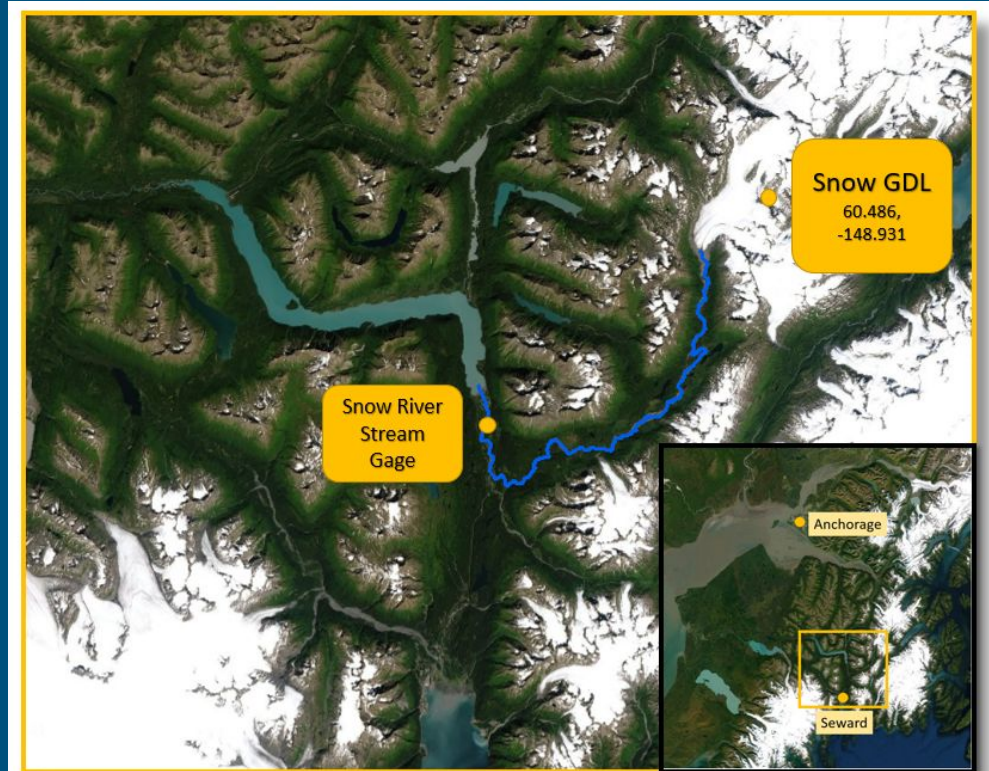
Background - Kenai Peninsula



The Kenai Peninsula provides an opportunity to analyze and understand the comparative societal and economic impacts of GLOF events on another downstream community (Seward, Cooper Landing, Kenai Keys)

Stakeholder interest to capture and understand the impacts of GLOF events, particularly given that Snow Glacier is not as intensely monitored as Suicide Basin

Where is Snow Glacier?



About Snow Glacier



Images Courtesy of the USGS Alaska Science Center

Snow Glacier in the Kenai Peninsula releases ~every 2 - 3 years into the Snow River. The earliest reported GLOF was in 1949.

Recent GLOF events have resulted in nuisance flooding, damage to various transportation-related infrastructure, as well as impact on the local economy, due to the cancellation of tour operations.

Typical release events can raise river water levels several feet at communities like Cooper Landing and Kenai Keys.

Collaborators

- University of Alaska Southeast
- National Weather Service (NWS) Alaska-Pacific River Forecast Center
- NWS Weather Forecast Office - Juneau
- NWS Weather Forecast Office - Anchorage
- US Geological Survey
- City and Borough of Juneau
- Kenai Peninsula Borough

Funding

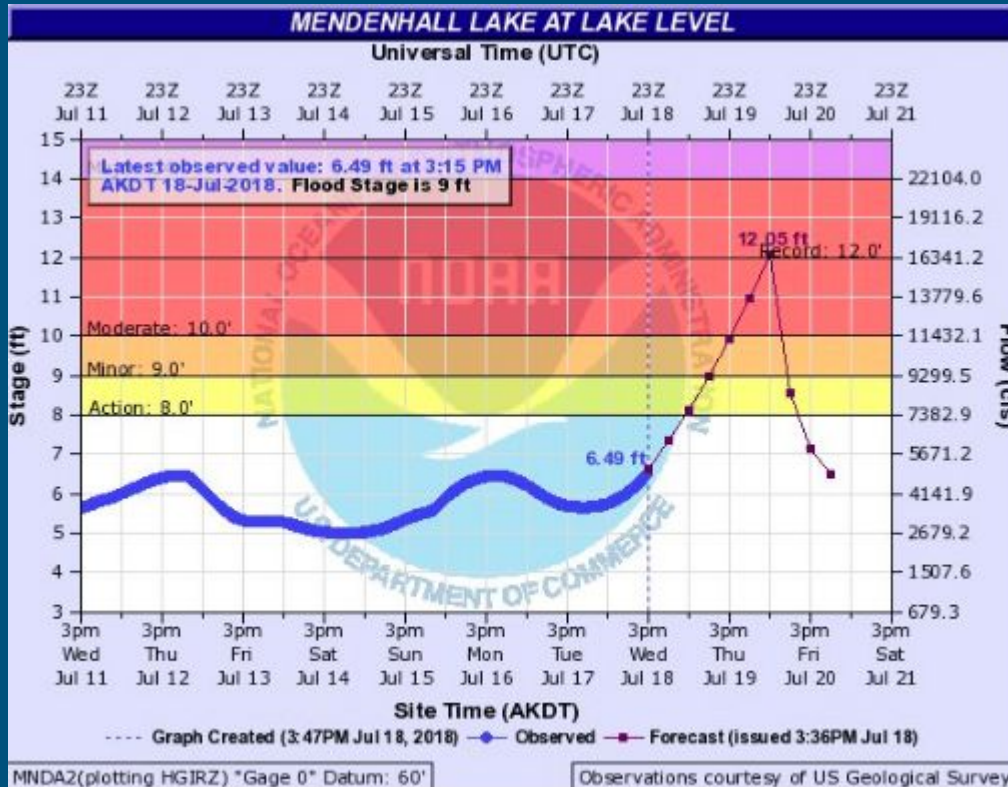
- Arctic Domain Awareness Center
- Alaska Center for Climate Assessment & Policy
- NWS Alaska-Pacific River Forecast Center (in-kind field visit support)



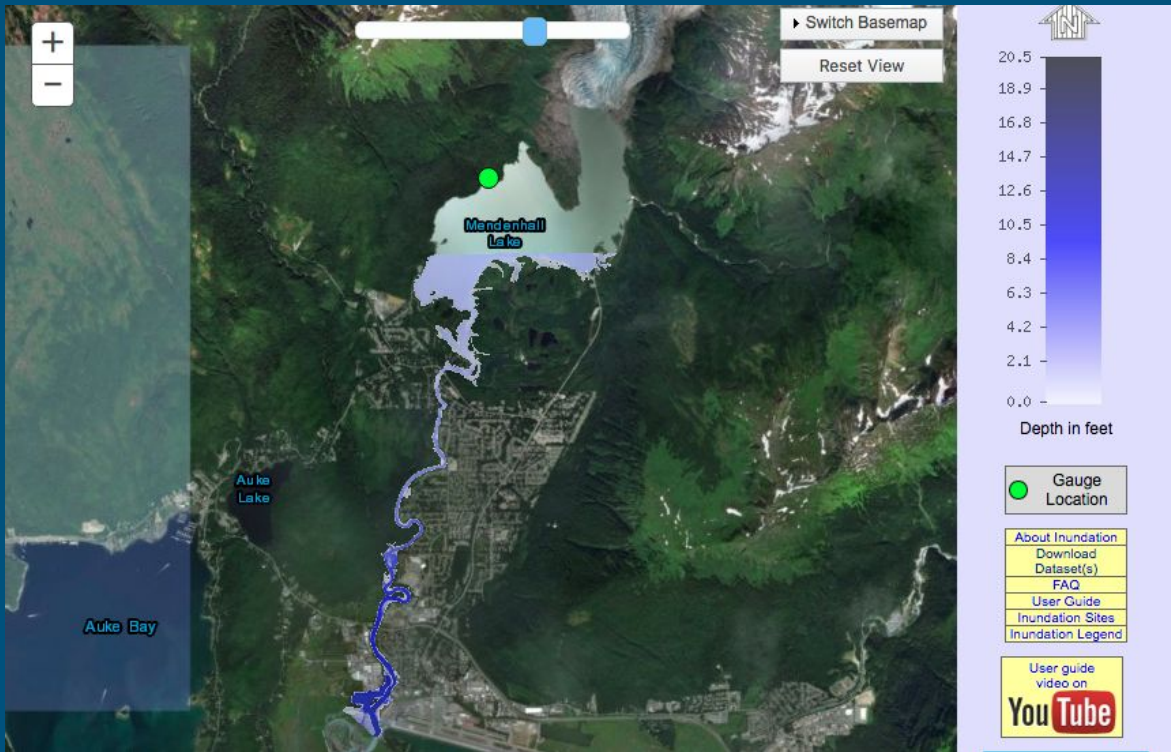
Methodology

- Baseline survey of 5 different information products with identified stakeholders (Juneau, Summer 2018)
- Sharing baseline survey results with information providers
 - Information providers to incorporate feedback into existing products or create new products based on feedback
- Round 2 interviews to showcase improved / new products to stakeholders (Juneau, Summer 2019)
- Comparative survey to assess any changes in information product use across a different context (Kenai, Summer 2019)

National Weather Service Hydrograph



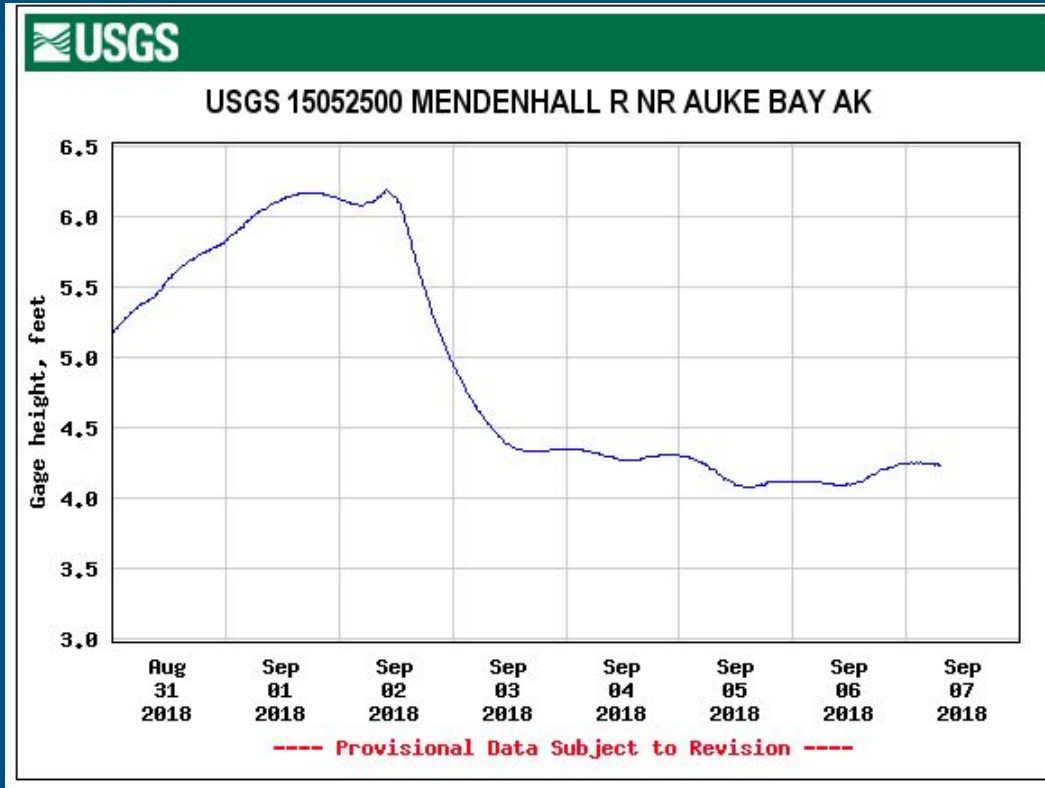
National Weather Service Inundation Map



US Geological Survey Webcam



US Geological Survey Water Gage



National Weather Service Flood Statement

Flood Watch

Flood Watch
National Weather Service Juneau AK
848 AM AKDT Wed Jul 18 2018

AKZ025-191400-
/O.NEW.FAJK.FA.A.0002.180720T0000Z-180721T0000Z/
/00000.O.GO.000000T0000Z.000000T0000Z.000000T0000Z.OO/
Juneau Borough and Northern Admiralty Island-
Including the city of Juneau
848 AM AKDT Wed Jul 18 2018

...FLOOD WATCH IN EFFECT FROM THURSDAY AFTERNOON THROUGH FRIDAY
AFTERNOON...

The National Weather Service in Juneau has issued a

- * Flood Watch for Central Inner Channels...Including the following
AREA...Juneau.
- * From Thursday afternoon through Friday afternoon
- * Suicide Basin is now draining into Mendenhall Lake. Water levels
are rising and there is potential for flooding to begin by late
Thursday afternoon. Latest stage on Mendenhall Lake was 5.9 feet
as of 7:15 AM. Flood stage is 9.0 feet. It is expected to reach a
near record peak stage of around 12 feet by midnight Thursday
night. Water levels should fall rapidly after it peaks. However,
there is inherent uncertainty in initial glacial lake volume
which will result in varying crest height and timing.
- * Once the lake stage reaches 9.1 feet, water will cover West
Glacier Spur Road between Skaters Cabin and the West Glacier
Trailhead. Also, water will flow into the Mendenhall Lake
campground. Once the lake stage reaches 10.9 feet, View Drive
will be flooded and impassable with significant flooding to some
homes in the area.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A watch means conditions are favorable for the development of
flooding in and close to the watch area.

Persons living along streams should stay alert and be prepared to
take action if a warning or advisory is issued, or flooding is
observed.

This statement will be updated by 6 AM AKDT Thursday or sooner if
conditions warrant.

Stakeholders interviewed

- 33 unique individuals in Juneau and/or involved with Suicide Basin
- 13 unique individuals on the Kenai and/or involved with Snow Glacier
- Stakeholders fall into at least 1 of the 5 main stakeholder groups:
 - Federal agency
 - State agency
 - Local agency
 - Homeowner
 - Local business
- Stakeholders also grouped as either: information provider or affected party

Analysis

- Quantitative:
 - Google Web Analytics analysis & survey data
- Qualitative:
 - Ethnographic notes & changes in narrative and perceptions analysis

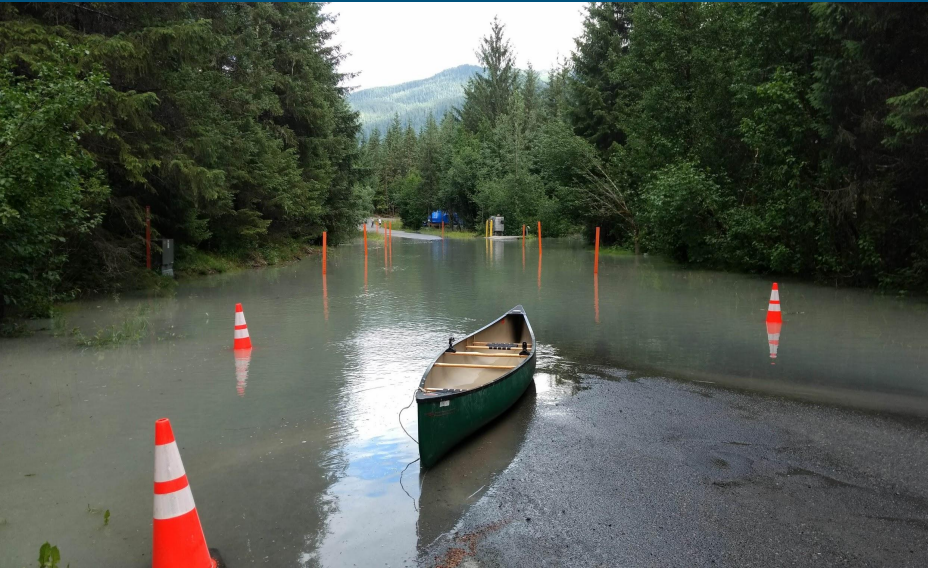
Preliminary findings

- In general, all 5 products are generally well understood
- Actual use of data products varied widely among different stakeholder groups
 - Largely dependent on whether there was an information “middleman”
- Several stakeholders independently expressed a desire for:
 - To have all GLOF information products in one place
 - To have more context on what trends exist with GLOF events, for future planning

Co-production success stories

- The NWS Juneau Forecast Office in collaboration with University of Alaska Southeast, the NWS Alaska-Pacific River Forecast Center, and the USGS developed a one-stop-shop webpage in June 2019 to display all Suicide Basin informational products on one page
 - All stakeholders found this new webpage extremely useful
- The NWS Alaska-Pacific River Forecast Center, in collaboration with USGS, developed a similar one-stop-shop webpage in August 2019 to display all Snow Glacier informational products on one page

Discussion



- There is room for improvement in how uncertainty is expressed in information products
- Much of the understanding on the risk associated with GLOF events in Juneau and on the Kenai revolves around people's previous experiences
 - "We know this flood wouldn't be worse than 2016"
 - How do you communicate risk to people with *no previous knowledge*?

A person wearing a blue jacket and a red hat stands on a glacier, looking out over a vast field of icebergs. The scene is a wide expanse of broken ice, with some large, flat icebergs in the foreground and a sea of smaller, jagged icebergs in the background. The sky is overcast, and the overall tone is cool and desolate.

Questions?

dabdelfattah@alaska.edu