Alaska Coastal Mapping Strategic Plan

Update for the Alaska Ocean Observing System December Board Meeting
December 16, 2019

Jacquelyn Overbeck and Marta Kumle

Photo taken by U.S. Army Corps of Engineers National Coastal Mapping Program at Sitka, Alaska

Coastal Mapping Strategic Plan

Why does Alaska need a coastal mapping strategic plan?

Alaska contains over **35%** of the U.S. coastline

Most of Alaska is **under-mapped**.

Presidential Memo calling out nearshore coastal mapping for Alaska.

Mapping contributes to:

- Predicting and mitigating flooding and erosion,
- Enabling safe vessel navigation,
- Promoting responsible exploration, and more.

Flooding at Hooper Bay, Alaska November, 2019. Photo taken by Emma Smith.

Coastal Mapping Strategic Plan

Progress to-date:

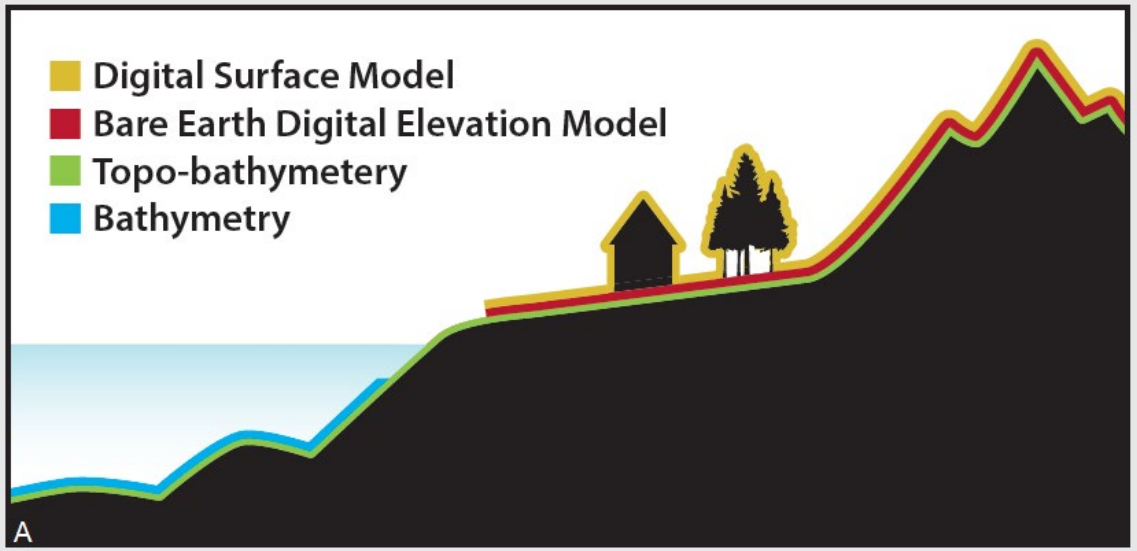
- **Jan-May 2019 –** Carry out geospatial prioritization survey.
- **May-Jul 2019 –** Analyze results of survey.
- **Jul-present –** develop and write strategic plan.
- Depending on reviews – complete by **Jan-Feb 2020**.

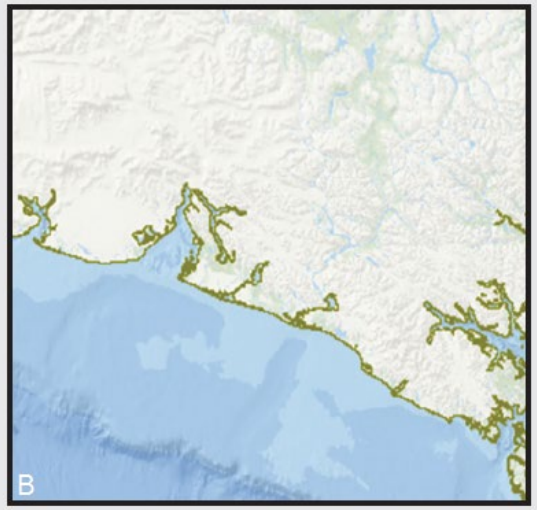
40 participants from state, federal, and local agency liaisons, native corporations and associations, non-profit and professional organizations, and academia

Preliminary results available online in an interactive ArcGIS story map.

http://arcg.is/qOf19

Coastal Mapping Data





Shoreline vector

Orthoimagery

Digital Surface Model (DSM) – a three-dimensional surface that follows the tops of buildings, trees, and other vegetation.

Bare Earth Digital Elevation Model (DEM) – a three-dimensional surface that follows the ground surface, excluding buildings, treetops, and vegetation.

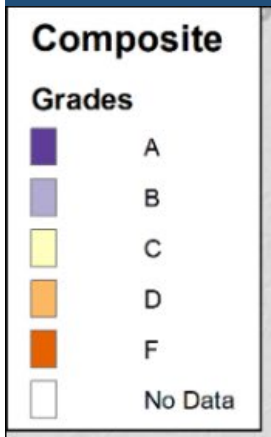
Seamless Topobathymetry – a three-dimensional surface that includes both under water bathymetry and onshore topography without any data gap at the land/water interface or tidal zone.

Bathymetry – the measurement of water depth in oceans, sea, or other bodies of water. Often represented as a three-dimensional surface of the seafloor.

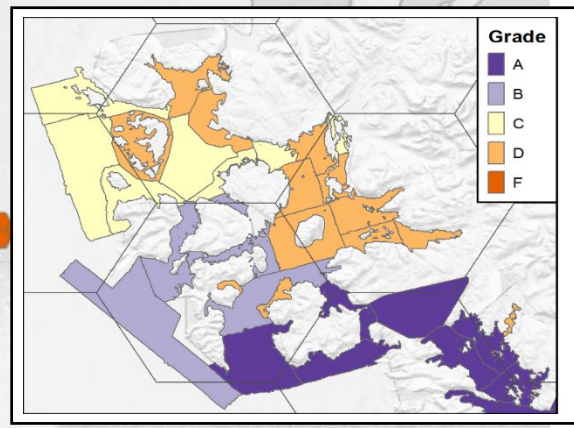
Orthoimagery – aerial photographs or satellite images that have been geometrically corrected ("orthorectified") to fit the earth's irregular surfaces such that the scale is uniform and the image has the same lack of distortion as a map.

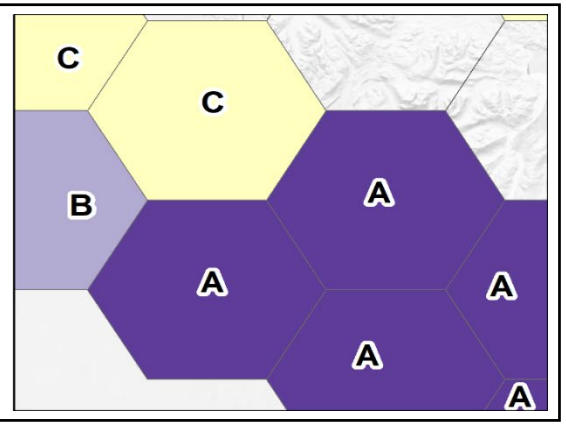
Shoreline Vector – a derived line separating offshore from onshore areas. Most commonly aligned with the official or estimated mean high water position.

Grading System for Existing Data



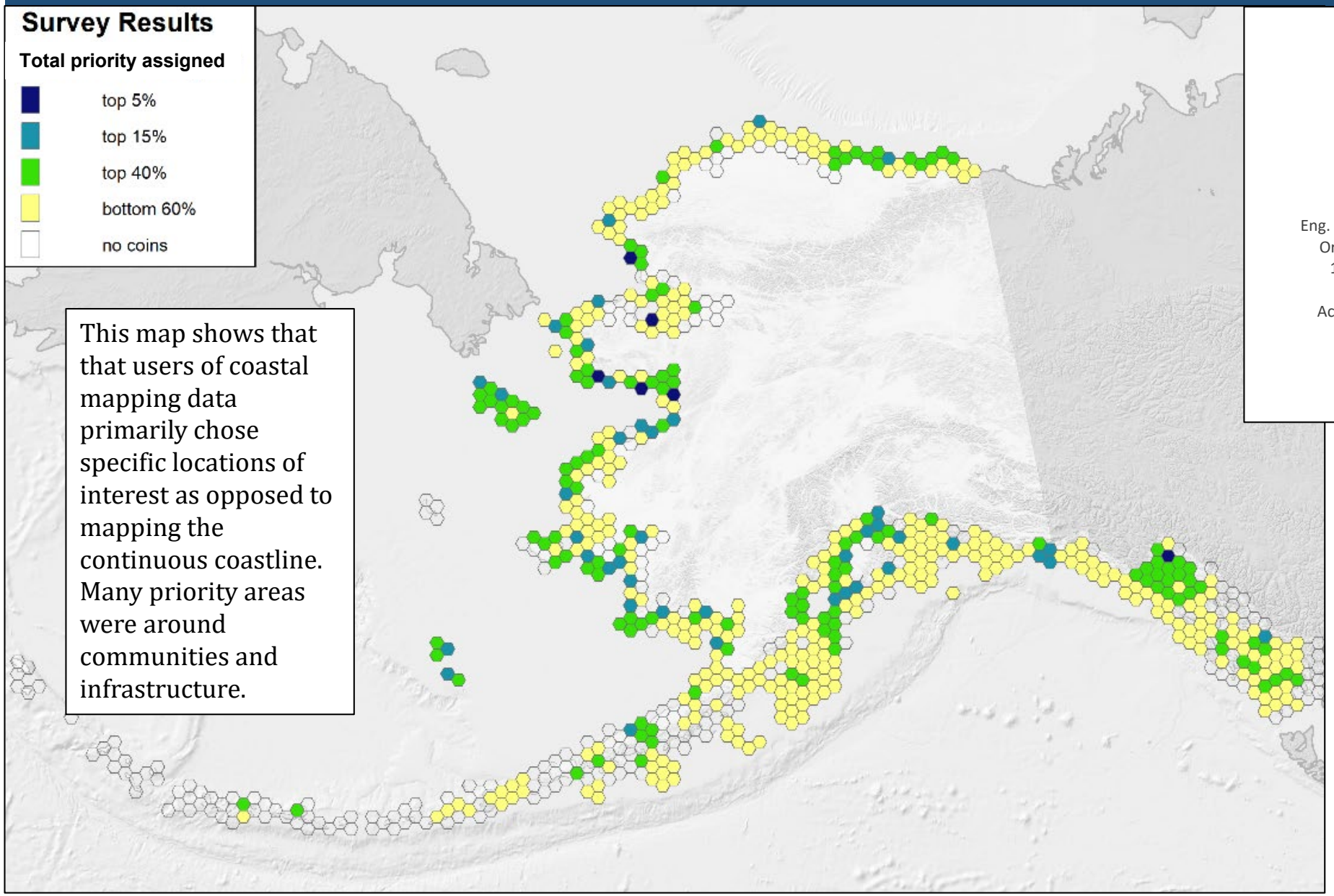
This map shows that much of Alaska is graded at C or lower, meaning that data are not high enough in resolution, were collected too long ago, or do not exist.



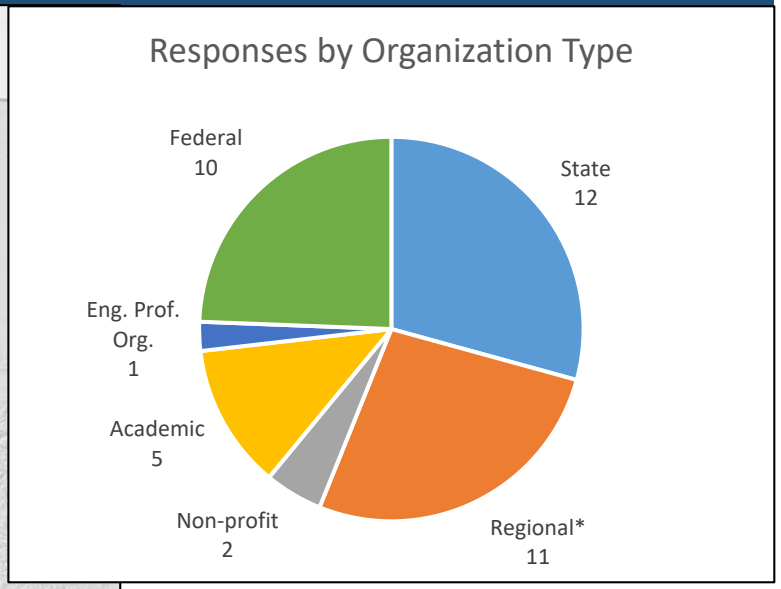


Map of the composite grade of coastal mapping data on left (individual grades for each data type were also computed). In the box, on the left pane shows the actual extent of bathymetric surveys in a region of Southeast Alaska (near the community of Craig) which are colored by grades. On the right, the cells are colored to show the realized grade, which is the highest grade of data in each cell. Notice that a cell with a particular grades does not mean data of that caliber is available throughout the entire cell.

Prioritization Survey Results



This map shows that that users of coastal mapping data primarily chose specific locations of interest as opposed to mapping the continuous coastline. Many priority areas were around communities and infrastructure.



Map of the composite survey priority areas with a pie chart of representation from organization types.

Coastal Mapping Strategy

Survey results guiding recommendations for the Alaska Mapping Executive Committee over next five years:

Over the next month, we will convert these results into recommendations with budgeted amounts for tasked completion.

- Priority areas did not extend along the entire coast continuously, however, were primarily selected around communities and infrastructure (69% of the coast).
- Priorities of bathymetry and topobathymetry had the most unmet needs from existing datasets.
- Priorities for most digital elevation models, digital surface models, and orthoimagery already had quality data, however, these data were several years old and will degrade to C and D quality within a few years.
- Most priority locations were selected by more than one organization type including a response from state, federal, and other (54% of the response).
- Most priority locations were selected by more than one of the three user categories including engineering, hazards & emergency response, land and resource management, and/or vessel navigation (65% of the response).
- Survey respondents prioritized the best quality of data with the option for the most spatial coverage by selecting topobathymetric data for 80% of the priority locations as compared to DSMs for only 2% of the priority locations.

Cumulative Percent of Total Coins Spent	Rank by Coin Totals	Rank by Selection Frequency	Region	Communities	Most Rigorous Type of Dataset Requested	Current Grade	Unmet Need Priority	Data Users				Org. Type		
								Eng. / Haz.	Mgmt.	Vessel Nav.	Regional	State	Fed	Other
1.0%	1	2	Northwest Arctic	Kivalina	DEM	B	lowest	•	•	•	•	•	•	•
					Topobathymetry	N/A	highest							
					Ortho	A	-							
					Shoreline Vector	A	-							
1.9%	2	6	Bering Straits	Shaktoolik	DEM	B	lowest	•		•	•	•	•	•
					Topobathymetry	N/A	highest							
					Ortho Not Prioritized	A	-							
					Shoreline Vector	F	highest							

Additional details for individual agency planning efforts that will be made available in the plan. Survey respondents did not use the data grade to inform their prioritization, for this reason, we have highlighted the “unmet need”, which shows where there is priority and quality data are not available.

Coastal Mapping Strategic Plan

More information at:
http://agc.dnr.alaska.gov/coastal.html

Marta Kumle
AOOS and Alaska DNR
Marta.kumle@Alaska.gov

Jacquelyn Overbeck
Alaska DNR DGGS
Jacquelyn.Overbeck@Alaska.gov

Corri A. Feige
Commissioner

Department of Natural Resources

www.DNR.Alaska.Gov

Anchorage, Alaska

STATE OF ALASKA

PRESS RELEASE

For Immediate Release: December 3, 2019

Presidential directive will boost DGGS' Alaska coastal mapping

(Anchorage, AK) – President Donald J. Trump's recent decision to prioritize mapping of Arctic and nearshore coastal areas will advance ongoing state efforts to survey and document Alaska's coastal conditions, resources and hazards, the director of the Division of Geological and Geophysical Surveys (DGGS) said today.

Press release for Presidential Memo:
http://dnr.alaska.gov/commis/pic/publicnote.cfm

Alaska Water Level Watch

December 2019 Board Meeting Alaska Ocean Observing Systems

Jacquelyn Overbeck

Photo taken by Lewis Amik at Kwigillingok, Alaska September 2019

Development or deployment of **diversified observing systems** including iRadar, iGage, Facebook, flood staffs, wave cameras.

~$1.1M in NOAA-OCM investment. Coordination with USACE and NOAA CO-OPS. Overall resulting in **13 new tidal datums, ~9 topo-bathy** lidar collections, and orthoimagery/DSMs for Bristol Bay and North Slope.

Development of the Alaska Water Level Watch **Build Out Plan** ArcGIS Story Map

17 Color-indexed elevation maps for flood communication with development of an online interactive format (**Digital Coast Fellow**).

Ongoing Activities

- Coordination on water level data collection and viewing
- Water Level Observations
- Coastal Flood Maps and Services
- Coordination on coastal flood forecasts and preparation

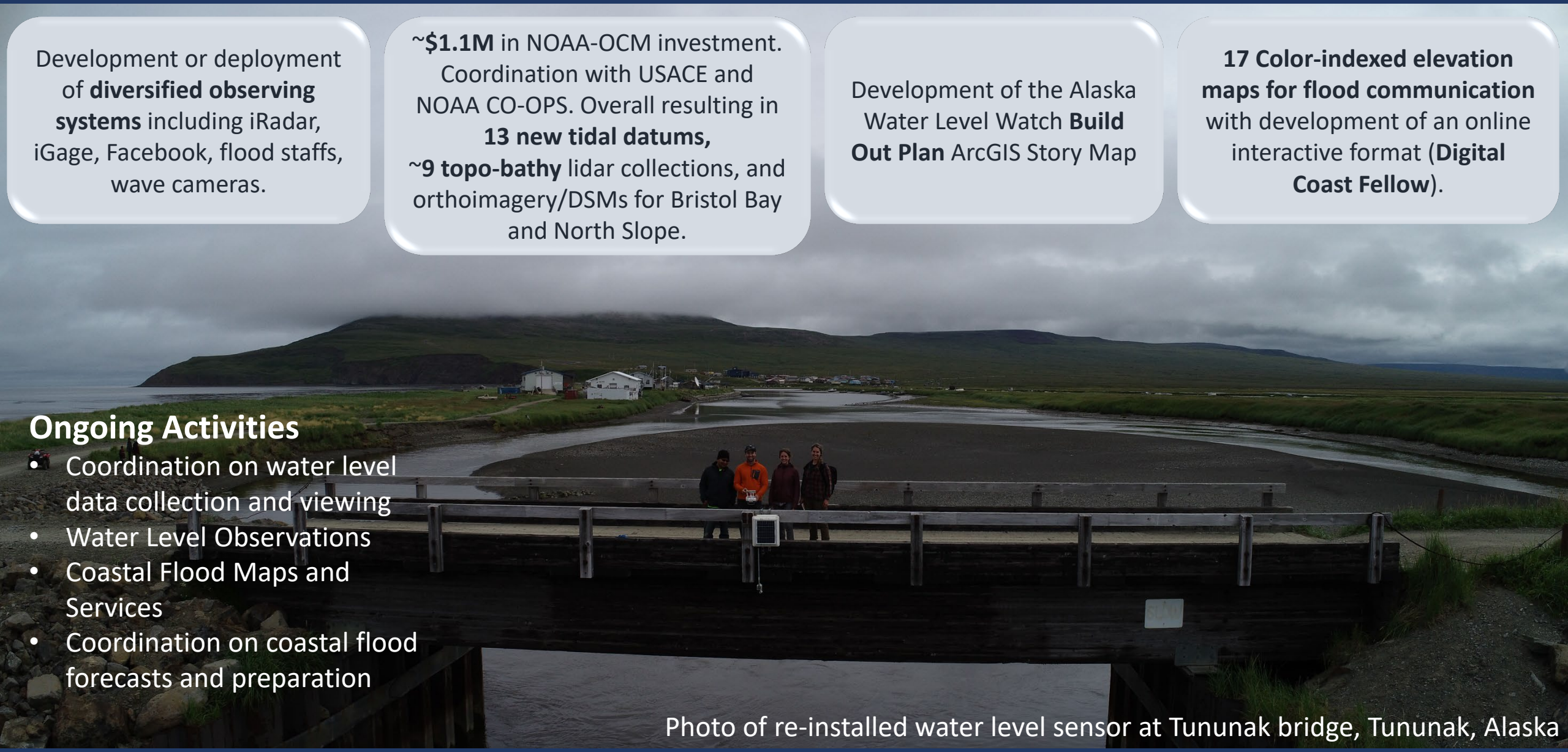
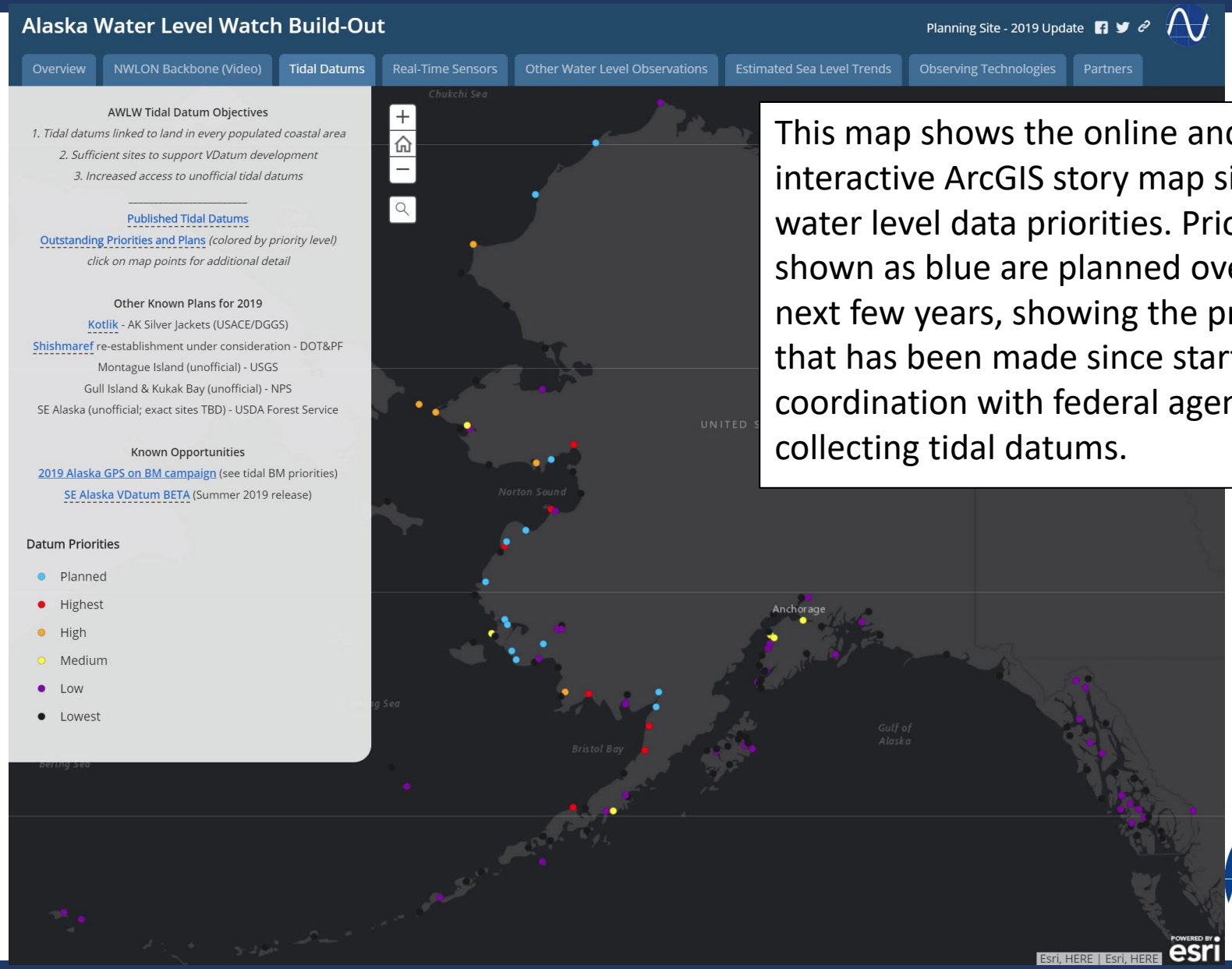


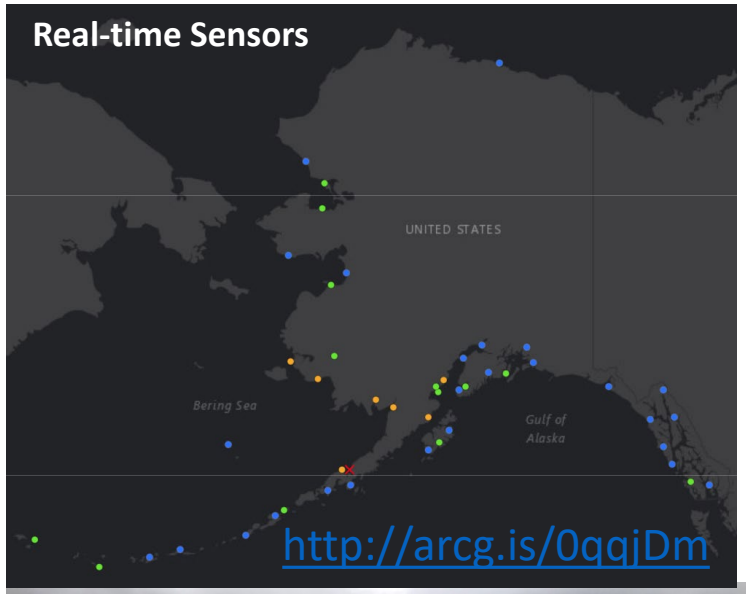
Photo of re-installed water level sensor at Tununak bridge, Tununak, Alaska

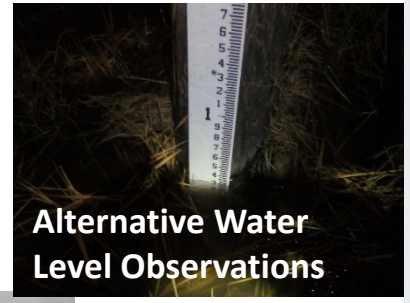
- Alaska Water Level Watch Website updates to content.
- Water Level Data Portal development assistance to Axiom.
- Annual Alaska Water Level Watch Meetings, Apr or May each year. Working on developing a steering committee and guiding documents to formalize working group at present.
- Attendance at meetings requested by the NWS to develop their forecast language, American Geophysical Union (2019) and others.
- Coastal Mapping Strategic Plan Development.

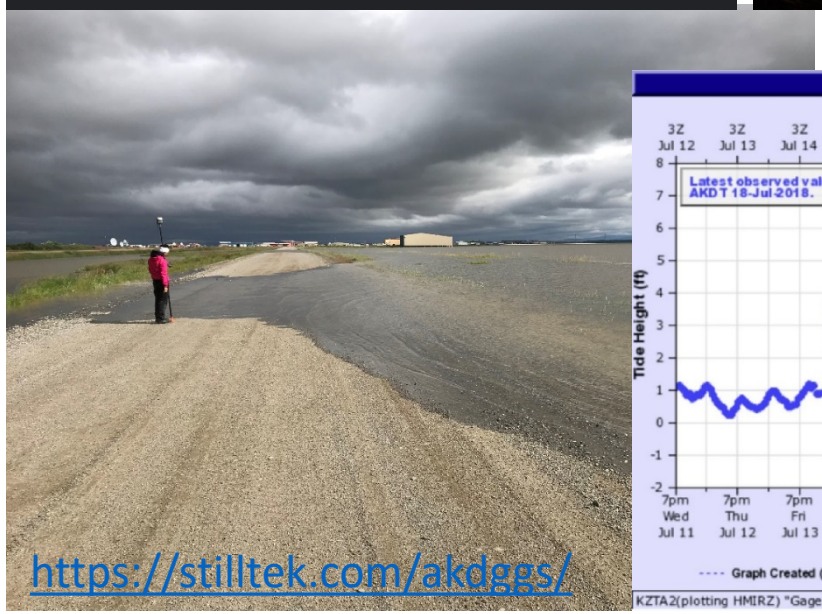


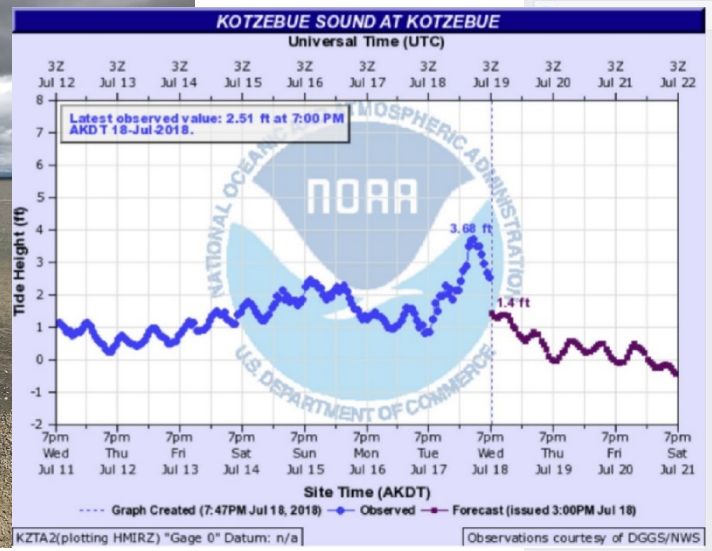
This map shows the online and interactive ArcGIS story map site for water level data priorities. Priorities shown as blue are planned over the next few years, showing the progress that has been made since starting coordination with federal agencies on collecting tidal datums.

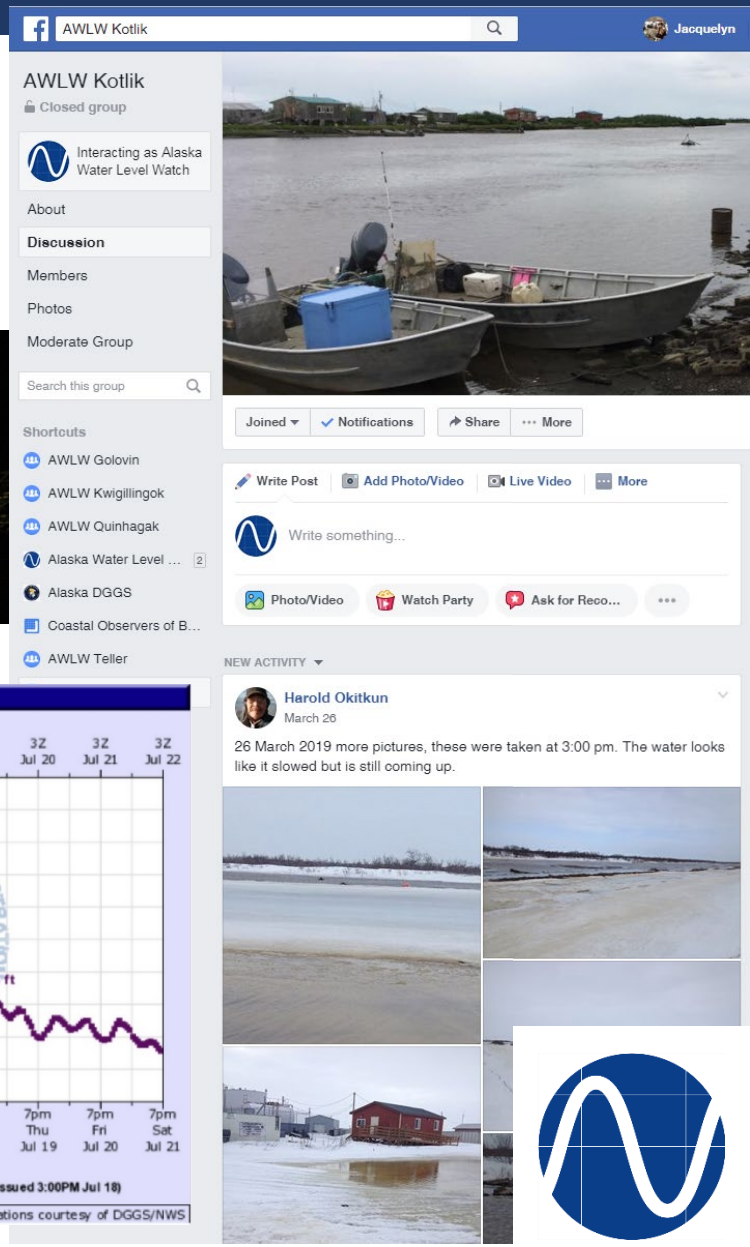
- Currently 4 real-time stations in operation: Kotzebue, Tununak, Naknek, and Nelson Lagoon.
- Planned repair on Dillingham, Kwigillingok, and Deering.
- Adding 3 webcams (locations TBD).
- Continuously receiving storm photos from Facebook and email (9 coastal storms in 2019 so far).





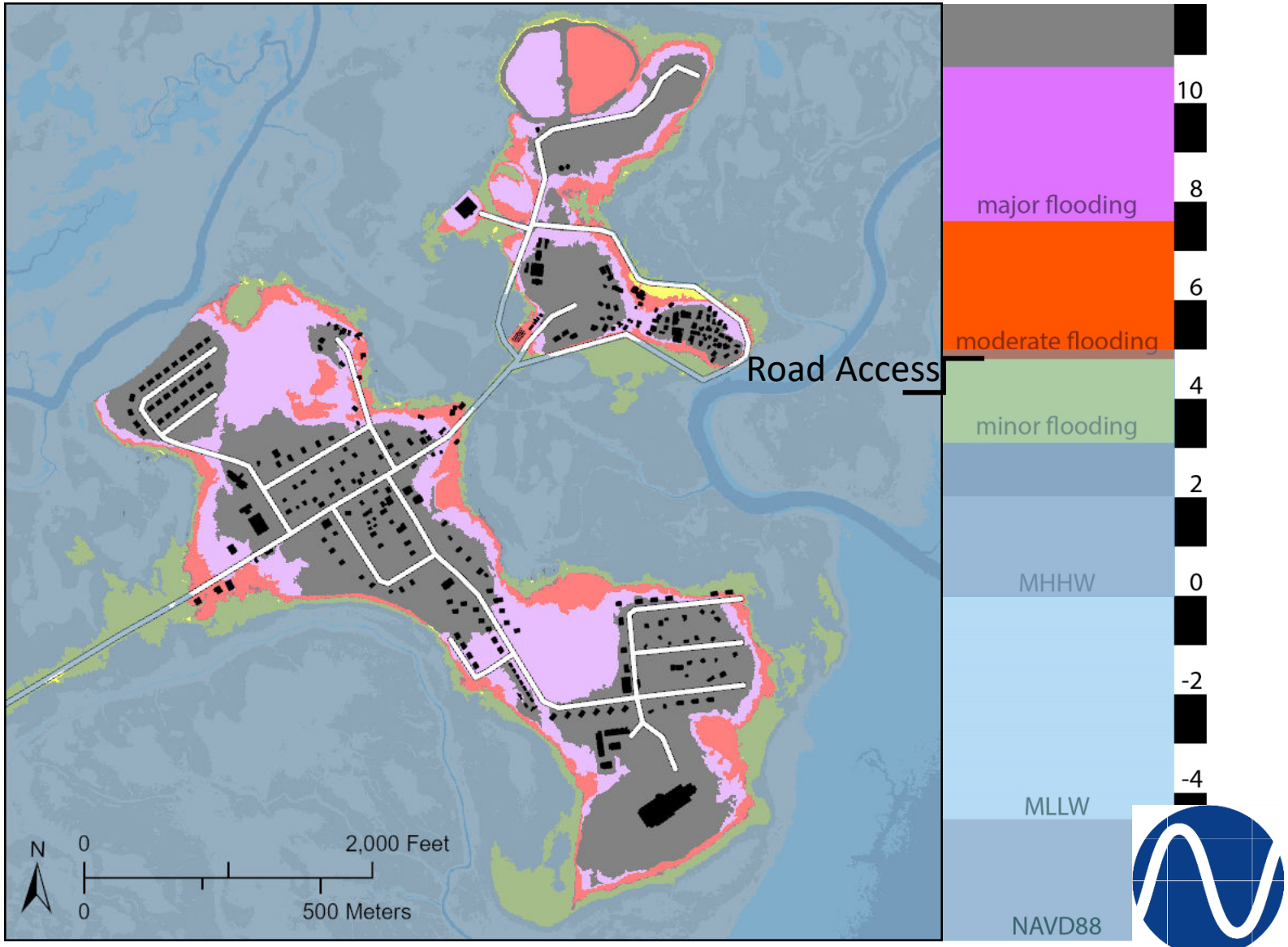






- With additional tidal datums, DGGS will be enabled to create next generation coastal flood impact mapping at more communities.

- Digital Coast Fellow completing report on historical storms and interactive online tool for visualizing flooding for Alaska communities. (see Hooper Bay on the right, where elevation layers can be turned on incrementally to show potential for flooding near community infrastructure.)



- Provide on-the-fly guidance to Fairbanks and Anchorage weather forecasting offices when technical guidance is requested.

- Gave preparation presentation to State Emergency Operations Center at 2019 coastal storm preparation meeting.

Eroded berm at Shaktoolik, Alaska. DGGS traveled on-site to measure the erosion in August 2019.

Jacquelyn Overbeck
Alaska DNR DGGS
Jacquelyn.overbeck.@Alaska.gov
https://aoos.org/alaska-water-level-watch/
http://dggs.alaska.gov/hazards/coastal/