Alaska Water Level Watch

Collaborative Working Group
2020-2025 Guidance Plan

2020 Steering Committee:

6/25/21

Jacquelyn Overbeck, State of Alaska Department of Natural Resources
Division of Geological & Geophysical Surveys, Chair — Date

Carol D. Janzen — 6/25/21

Carol Janzen, Alaska Ocean Observing System — Date

Becki Heim — 6/28/21
Becki Heim (Jun 28, 2021 11:22 AKDT)

Becki Heim, National Oceanic and Atmospheric Administration
National Weather Service, Alaska Region — Date

10/20/21
Laura Rear McLaughlin (Oct 20, 2021 17:31 EDT)

Laura Rear McLaughlin, National Oceanic and Atmospheric Administration
Center for Operational Oceanographic Products and Services — Date

10/28/2021

Nathan Wardwell,
Management Association of Private Photogrammetric Surveyors — Date

Executive Summary

Alaska Water Level Watch (AWLW) is a collaborative group working to improve the quality, coverage, and accessibility to water level observations in Alaska's coastal zone. This guidance plan was developed to establish a formal framework for AWLW members and to form the AWLW Steering Committee.

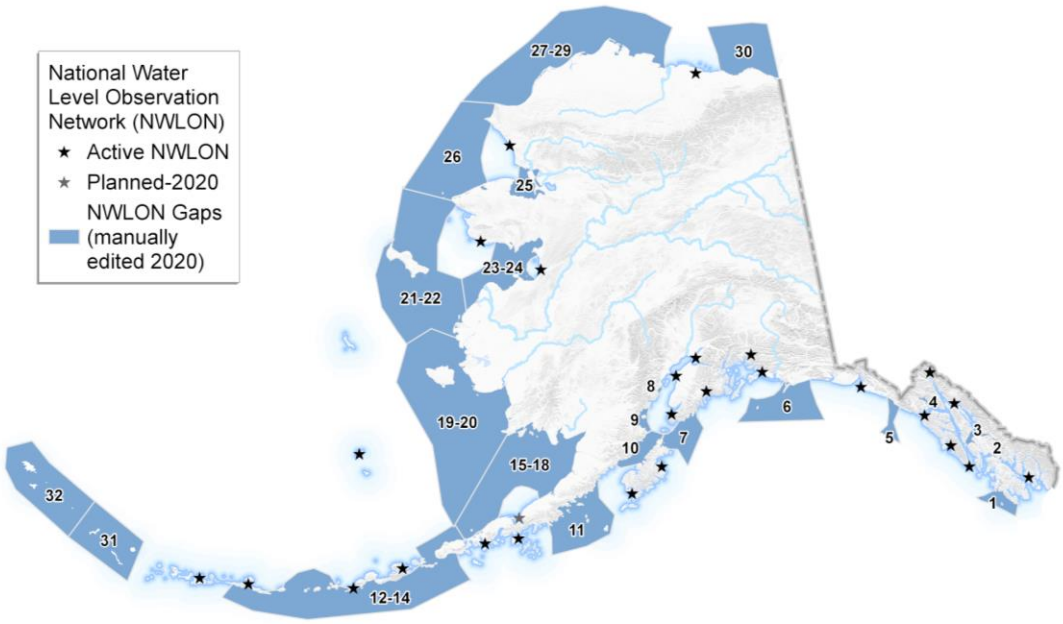
Photo of AWLW partner water level sensor at Tununak, Alaska, August 2019. Xavier James (Native Village of Tununak), Richard Buzard, Katie Miller, and Jacquelyn Overbeck (Alaska Division of Geological & Geophysical Surveys). Photo taken by unmanned aerial vehicle piloted by Richard Buzard.

The AWLW vision is to increase public access to water level data and products, through innovative technologies and collaborative partnerships, and to expand the coastal water level observation capacity across Alaska's coastline. This vision will be carried out by addressing goals to improve data access to real-time sensors, tidal datums, high water marks and other water level observations through an online data portal and increased geographic coverage of water level data.

Background

The coast of Alaska is populated with over 100 rural communities, navigated by national and international mariners, utilized for subsistence, sport, and commercial fishing, and much more. The coast, however, lacks critical water level data to support community, mapping, or economic activities in the nearshore. The National Oceanic and Atmospheric Administration (NOAA) is the authority on water level observing systems through operation of the National Water Level Observation Network (NWLON). In 2014, NOAA conducted a gap analysis of coastal waters for the U.S. which identified 32 water level monitoring gaps in Alaska waters, covering thousands of miles of coastline (NOAA, 2014). Alaska's water level gaps are extensive because of the many challenges in operating real-time water level sensing equipment in such a vast, remote, and cold environment. In 2015, NOAA released a tiered data policy, recognizing that data external to the organization would be of value where it is fiscally infeasible for NOAA to expand operations (Edwing, 2015). Within the policy, NOAA provides standards by which data can be tiered (i.e. A, B, and C) based on data quality, which allows for alternative options for water level sensing. Alaskan's have self-organized in coordination with NOAA to build out an expanded water level network that utilizes the NWLON as the authoritative backbone, using alternative sensors that are operated by a variety of organizations and collaborative partners that make up Alaska Water Level Watch (AWLW).

Coastal storm, Utqiagvik, Alaska, August 2019, taken by Jacquelyn Overbeck (Alaska Division of Geological & Geophysical Surveys).



National Water Level Observing Network gaps (blue). Since this map was created, a permanent station has been planned for redeployment at Port Moller. Map revised in 2020 from NOAA (2014).

Collaborations to improve coastal water level data for Alaska originated during a 2012 Coastal Hazards Workshop, where workshop participants identified huge geographic gaps in data necessary to provide forecasts of erosion and flooding to Alaska's rural coastal communities. The following year (2013) another Coastal Hazards Workshop was held, then in 2015 an official Water Level (specific) Workshop was held. A document was written to summarize the 2015 meeting (AOOS, 2016) which covered:

- water level instrumentation options,
- challenges, including:
    - technology gaps,
    - barriers to operation, and
    - data sharing,
- existing assets,
- known gaps, and
- next steps.

Since the written document formalized gaps, meetings have been held annually to provide updates on gaps being filled based on systems operated by partners, with data made available in an online and interactive web map preceding the 2019 annual meeting.

Meeting notes and agendas are available for each of the meetings that have taken place:

Alaska Water Level Meeting April 29,2020
The 2020 Alaska Water Level Meeting was a half day session for updates on water level monitoring activities and sensor testing for real-time water levels, tidal datum computations, and other water level activities including high water marks.

Alaska Water Level Meeting, April 24, 2019
The 2019 Alaska Water Level Meeting took place in a 1-day session to present the Alaska Water Level Watch (AWLW) Build-Out plan, receive updates from AWLW partners, and see examples of other state's observing systems. Participants of this meeting determined it would be beneficial to establish a AWLW steering committee and guidance plan to formalize the AWLW efforts..

Alaska Water Level Meeting, May 22-23, 2018
The Alaska Water Level Meeting, Making Progress: Integrated Water Level Observation Network in Alaska was held in two sessions, Day 1. water level sensing technologies and Day 2. stakeholder and partner engagement.

https://aoos.org/alaska-water-level-watch/meetings/

Water Level Workshop, May 27-28, 2015
See "*Coastal & Nearshore Water Level Observations in Alaska: Challenges, Assets, Gaps, and Next Steps",* (AOOS, 2016).

Coastal Hazards Workshop, December 18, 2013
This meeting updated partners on progress since joint AOOS/Western Alaska LCC (WALCC) Coastal Hazards workshop held in May 2012.

Coastal Hazards Workshop, May 2012
Western Alaska Landscape Conservation Cooperative, Alaska Ocean Observing System, and U.S. Geological Survey held a two-day workshop focused on coastal hazards that covered new information and collaboration opportunities. Participants then developed initial marine and coastal models of processes that affect coastal processes and identified key information needs to improve coastal hazard predictive capabilities.

https://aoos.org/workshops-and-reports/

Guiding Principles

AWLW is a collaborative group working to improve the quality, coverage, and access to water level observations in Alaska's coastal zone.

Vision Statement

Increase public access to water level data and products through innovative technologies and collaborative partnerships and to expand the coastal water level observation capacity across Alaska's coastline

Mission Statement

The AWLW steering committee will establish a framework for a sustained collaborative team consisting of state and federal agencies, local governing entities, non-profits, private businesses, and communities to:

- Enable the effective and efficient sharing of information.
- Foster leveraging of available resources.
- Provide improved services to mutual customers.
- Provide assistance in identifying and prioritizing actions to fill water level monitoring gaps.
- Promote advancement of water level sensing technologies for use in Alaska's coastal waters.

Online access to AWLW activities and annual plans are publicly available at the AWLW website and mapped build-out plan, respectively.

Steering Committee Participants (subject to annual changes):

- Alaska Division of Geological & Geophysical Surveys (State Agency - Committee Lead)
- Alaska Ocean Observing System (Federally Funded Non-Profit)
- NOAA Center for Operational Oceanographic Products and Services (Federal Agency)
- NOAA National Weather Service (Federal Agency)
- Management Association of Private Photogrammetric Surveyors (Private Sector Consortium)

Member Participants

Alaska Division of Community & Regional Affairs
Alaska Division of Homeland Security & Emergency Management
Alaska Division of Geological & Geophysical Surveys
Alaska Department of Transportation & Public Facilities
Alaska Geospatial Council
Alaska Sea Grant
Alaska Ocean Observing Systems
ASTRA
Axiom Data Science
CRW Engineering Group
JOA Surveys, LLC
Management Association of Private Photogrammetric Surveyors
National Oceanic and Atmospheric Administration, Office of Coastal Management
National Oceanic and Atmospheric Administration, Center for Operational Oceanographic Products
National Oceanic and Atmospheric Administration, Office of Coast Survey

National Oceanic and Atmospheric Administration, National Geodetic Survey
National Oceanic and Atmospheric Administration, National Weather Service
Oregon State University
University of Alaska Fairbanks
University of Notre Name
U.S. Geological Survey
Western Alaska Sustainable Partnership

Strategic Alignment

Steering Committee

Development of Alaska water level sensing objectives and strategies for filling gaps will be completed by the AWLW steering committee. Member organizations of the steering committee were selected from participants of the Alaska Water Level meetings who represent particular sectors of AWLW goals. The steering committee will meet remotely as necessary, but at least twice per federal fiscal year to present updates and ensure progress towards milestones set for 2025 in the AWLW online build-out plan, as well as priorities in other known plans such as the 2021-25 AOOS Strategic Plan and the 2019-2023 NOAA CO-OPS Strategic Plan. Annually, the AWLW steering committee will organize a meeting open to the public and AWLW members that will cover progress on milestones set for 2025 and encourage feedback.

Membership

AWLW depends on the voluntary cooperation of its members who represent state and federal agencies, local governing entities, non-profits, universities, and private businesses. AWLW requires that:

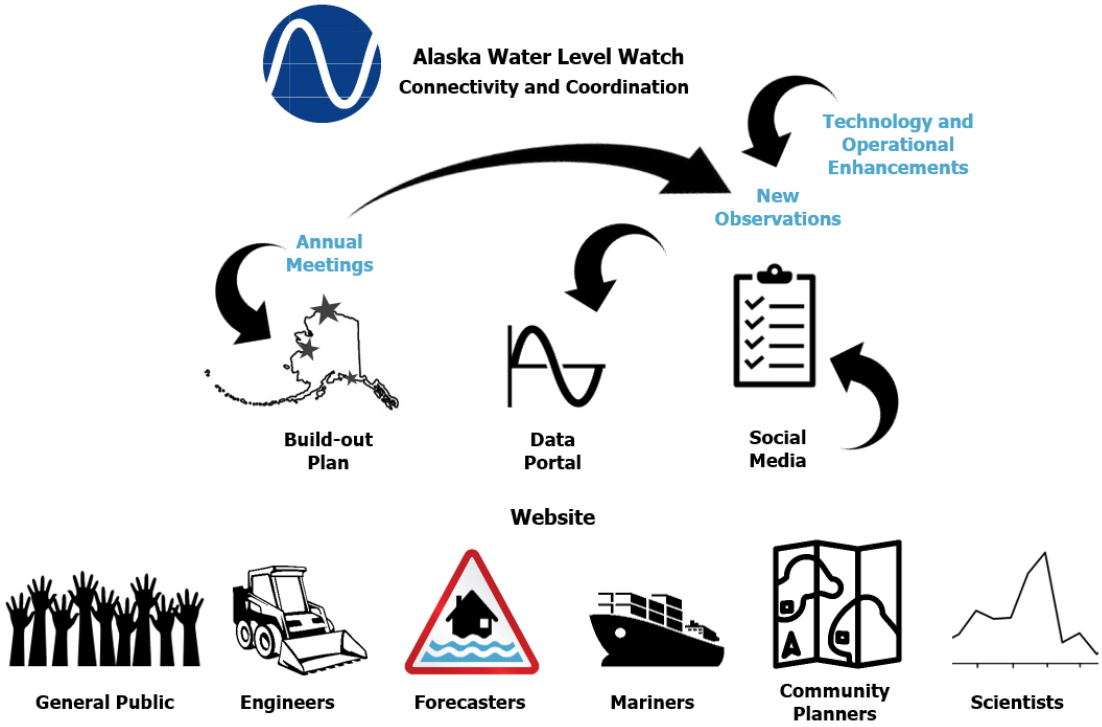
- All members will support the mission of AWLW, acknowledging that nothing in this guidance document can be construed to limit or modify their existing authorities or responsibilities.
- All members will contribute experience and information to team efforts.
- All members agree to participate in assessments of the team’s effectiveness and to develop action items designed to address key objectives and to meet milestones set for 2025.

2020-2025 Objectives and Evaluation

Water level data needs consist of these three categories:

1. **Tidal Datums**-which provide a vertical reference to measure coastal water level heights, connecting the land to the sea and supporting relative sea level trends;
2. **Real-time sensors**-which provide basic water level information for decision support to maritime activities, forecasting, and emergency response; and
3. **High water marks and other water level observations**-which provide water level data for specific storm events or local needs.

Improved access to these data will be created through the AWLW Data Portal. Each type of water level data and ways of accessing data will require training for the broad range of anticipated users (i.e., the general public, engineers, weather forecasters, mariners, community planners, and scientists; see below).



Information graphic showing the connections of AWLW to potential users and how new observations, gaps, and priorities are coordinated, enhanced, and distributed through AWLW web content.

Specific gaps, objectives, and milestones are detailed below. The Steering Committee's success in meeting objectives will be tracked through the percent completion of new observations over current data gaps (2020 status), success in maintenance of existing sites, and number of partners reached through training and web interfaces, which will be reported annually. Any changes to anticipated milestones will be discussed by the full AWLW

membership at annual meetings. Milestones for real-time water level sensors are mapped and tracked in table form at http://aoos.org/alaska-water-level-watch/ which are updated annually.

	Objective	2020 Status	2025 Milestone
Online Data Portal	Access to NWLON and alternative real-time water level data in Alaska in one location and standard format.	The AWLW Data Portal was created in 2019 to mirror functionalities of NOAA CO-OPS for lower tiered data.	Maintain the AWLW Data Portal by ingesting new observations. Also: see tidal datums below.
	Access to non-real-time water level data (e.g. high water marks and short-term) in Alaska in one location and standard format.	Non-real-time data for Alaska are stored in a variety of locations with very different standards for formatting.	Develop a standard format on the AWLW Data Portal for non-real-time data.
	Standardized format for alternative water level metadata.	In 2019, a consistent metadata format for alternative water levels was developed to support hosting data on the AWLW Data Portal.	Ensure that all sensors on the AWLW Data Portal have appropriate metadata and that easy access to instructions on metadata creation is made to AWLW partners.
	Objective	**2020 Status**	**2025 Milestone**
Tidal Datums	NOAA authoritative tidal datums linked to land (geodetically tied) in every populated coastal area.	64 communities in Alaska have a superseded or no tidal datum. Between 2019-2020, tidal datums were planned for collection at 20 communities. Of the remaining communities, 16 are a priority for collection due to vulnerabilities to coastal flooding and the lack of coastal storm forecasting that necessitates the collection of authoritative tidal datums.	Establish tidal datums at priority communities that meet NOAA authoritative standards.
	Sufficient tidal datum sites to support an Alaska VDATUM.	Southeast Alaska is the only region that currently has access to VDATUM. NOAA has developed an assessment of data gaps needed to support building VDATUM for all of Alaska.	Establish water level sensors at gap locations that meet NOAA specifications to support building a statewide Alaska VDATUM.
	Increased public access to unofficial tidal datums where authoritative datums are not available.	Some water level monitoring activities result in data that may contribute to better understanding local tidal datums, yet do not meet NOAA standards for an authoritative datum.	Develop web format in the AWLW Data Portal for distribution and metadata of tidal datum data which clearly communicates data accuracy.

	Objective	2020 Status	2025 Milestone
Real-Time Sensors	Maintain current real-time water level observing systems.	Currently Alaska has 25 operating NWLON and one NWLON planned for re-installation along with 8 partner water level sensors.	Maintain existing sites for as near continuous operation as is possible.
	Build out new real-time NWLON and/or partner water level sensor sites.	Currently Alaska has 32 NWLON gaps and 48 communities threatened by flooding or tsunami that lack water level sensors or the ability to document flooding. 38 of those communities are good candidates for improved real-time water level observations.	Identify opportunities to develop new NWLON and/or partner stations at Alaska communities.
	Develop processing format for partner-used water level sensing technologies to report in real-time or near real-time.	GNSS-Reflectometry is a promising new technology for monitoring water levels; however, the data cannot currently be processed in real-time for water level data distribution.	Develop operational processing workflow for GNSS-R data to provide converted water level parameters to the public in near-real-time.
Other Water Level Observations	Partner with community members to collect high water marks after coastal storms.	Approximately 16 communities remain in northern and western Alaska which are vulnerable to flooding that are good candidates for other types of water level observation than real-time sensors.	Establish high water mark benchmarks at Alaska communities and measure existing U.S. Army Corps of Engineers high water marks to connect observations to the National Spatial Reference System.
	Where financially infeasible to deploy real-time sensors, install short-term delayed sensors to monitor certain seasons or individual storm events, and calculate tidal datums.	Between 2016-2020, AOOS piloted multiple rapid response water level monitoring activities. Some projects were successful, while others failed.	Identify an AWLW member to use lessons learned from AOOS pilot projects to conduct coastal storm water level monitoring.
	Capture complex coastal flood and wave dynamics in the Arctic.	Models of coastal dynamics have primarily been developed for regions outside of Alaska and the Arctic. Additional research is necessary to accurately model sea ice and wave/water level interactions, wave runup on frozen and gravel beaches, and the effects of inundation on coastal permafrost.	Develop new technologies that assist in water level monitoring specific to Arctic coastal processes (e.g. beach monitoring cameras, etc.) and install new monitoring equipment at Alaska community sites.
Training	Integration of water level data into operational procedures for a broad range of water level data users.	Most users and potential users of water level data have not previously had public access to data to conduct their work. Training may be needed to improve accessibility to water level data and products.	Establish an AWLW partner to be the technical lead and primary contact for each data type, including using the Data Portal. The technical lead will provide guidance to the public on each data type listed above.

References

Alaska Ocean Observing System (AOOS), 2016, Coastal and nearshore water level observations in Alaska: challenges, assets, gaps, and next steps, version 1.0, found at: http://www.aoos.org/wp-content/uploads/2011/05/2016_Alaska_Water_Level_Observations_v1-0.pdf

Edwing, Richard, December 2015, Approval of Revised Policy for Management and Dissemination of External Source Water: National Oceanic & Atmospheric Administration. http://www.ioosassociation.org/sites/nfra/files/documents/boardmaterials/meetingmaterials/springmeeting2016/External_Source_Policy_22December2015.pdf

National Oceanic and Atmospheric Administration (NOAA), 2014, A network gaps analysis for the national water level observation network: updated edition, found at: https://tidesandcurrents.noaa.gov/publications/Technical_Memorandum_NOS_COOPS_0048_Updt.pdf

Overbeck, J.R., ed., 2018, Alaska coastal mapping gaps & priorities: Alaska Division of Geological & Geophysical Surveys Information Circular 72, 34 p. http://doi.org/10.14509/30096

Links

AWLW website, https://aoos.org/alaska-water-level-watch/
AWLW build-out plan, http://arcg.is/0qqjDm
AWLW data portal, https://water-level-watch.portal.aoos.org/

AWLW_GuidancePlan2020_2025_Final

Final Audit Report 2021-10-28

Created:	2021-06-24
By:	Carol Janzen (janzen@aoos.org)
Status:	Signed
Transaction ID:	CBJCHBCAABAAD-M4_JkWopa9FCM_5Zn2Jn3RO7L9694N

"AWLW_GuidancePlan2020_2025_Final" History

Document created by Carol Janzen (janzen@aoos.org)
2021-06-24 - 8:15:40 PM GMT- IP address: 206.174.29.188

Document emailed to Jacquelyn Overbeck (jacquelyn.overbeck@alaska.gov) for signature
2021-06-24 - 8:18:23 PM GMT

Email viewed by Jacquelyn Overbeck (jacquelyn.overbeck@alaska.gov)
2021-06-25 - 4:31:13 PM GMT- IP address: 158.145.14.21

Document e-signed by Jacquelyn Overbeck (jacquelyn.overbeck@alaska.gov)
Signature Date: 2021-06-25 - 4:32:31 PM GMT - Time Source: server- IP address: 158.145.14.21

Document emailed to Carol Janzen (janzen@aoos.org) for signature
2021-06-25 - 4:32:33 PM GMT

Email viewed by Carol Janzen (janzen@aoos.org)
2021-06-25 - 4:32:35 PM GMT- IP address: 72.14.199.25

Document e-signed by Carol Janzen (janzen@aoos.org)
Signature Date: 2021-06-25 - 6:34:34 PM GMT - Time Source: server- IP address: 206.174.29.188

Document emailed to Becki Heim (rebecca.heim@noaa.gov) for signature
2021-06-25 - 6:34:36 PM GMT

Email viewed by Becki Heim (rebecca.heim@noaa.gov)
2021-06-25 - 6:47:09 PM GMT- IP address: 66.249.84.66

Document e-signed by Becki Heim (rebecca.heim@noaa.gov)
Signature Date: 2021-06-28 - 7:22:16 PM GMT - Time Source: server- IP address: 216.137.215.169

Document emailed to Laura Rear McLaughlin (laura.rear.mclaughlin@noaa.gov) for signature
2021-06-28 - 7:22:19 PM GMT

Email viewed by Laura Rear McLaughlin (laura.rear.mclaughlin@noaa.gov)
2021-06-28 - 7:22:26 PM GMT- IP address: 72.14.199.21

Document e-signed by Laura Rear McLaughlin (laura.rear.mclaughlin@noaa.gov)
Signature Date: 2021-10-20 - 9:31:21 PM GMT - Time Source: server- IP address: 172.58.189.107

Document emailed to Nathan Wardwell (nathan@joasurveys.com) for signature
2021-10-20 - 9:31:24 PM GMT

Email viewed by Nathan Wardwell (nathan@joasurveys.com)
2021-10-20 - 9:34:59 PM GMT- IP address: 206.174.44.43

Document e-signed by Nathan Wardwell (nathan@joasurveys.com)
Signature Date: 2021-10-28 - 7:23:12 PM GMT - Time Source: server- IP address: 24.237.47.46

Agreement completed.
2021-10-28 - 7:23:12 PM GMT