An Overview of CO-OPS Coastal Resilience & Inundation Products & Services

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Center for Oceanographic Products and Services (CO-OPS)

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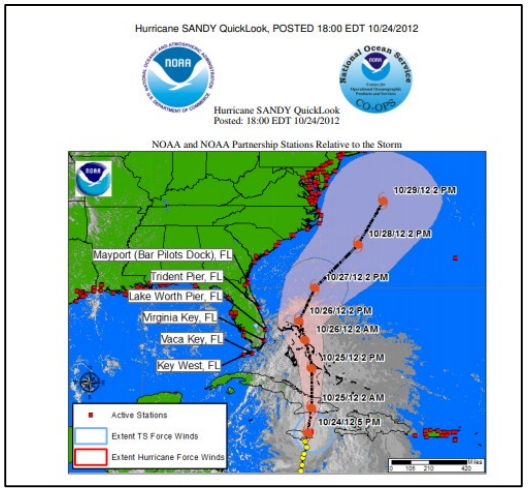
Past Resilience & Inundation Products

Where We Started

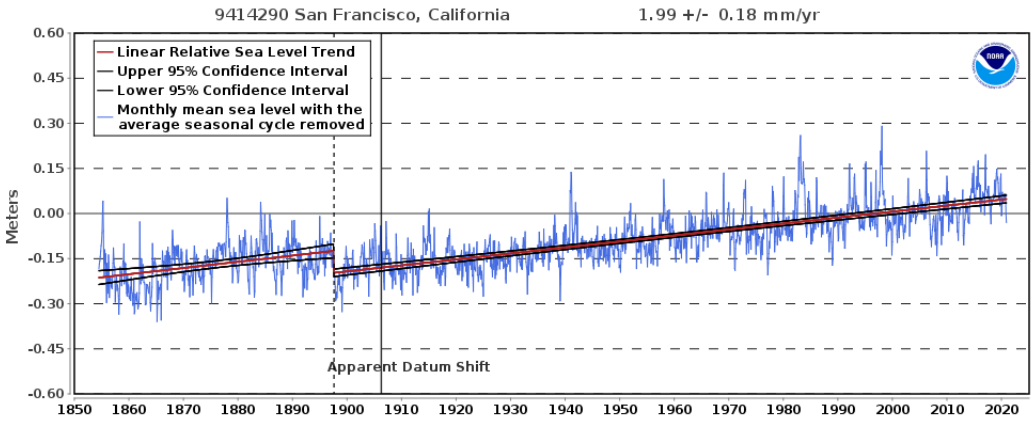
Monitoring sea level trends intrinsic to maintaining tidal datums. Static products and data available for each individual gauge:

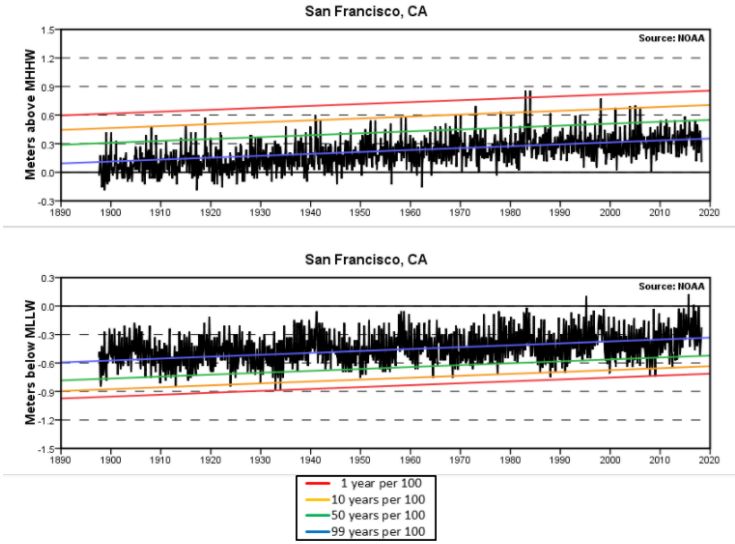
- Sea Level Trends & Extremes
- Storm Quicklooks



Extreme Water Levels

9414290 San Francisco, CA

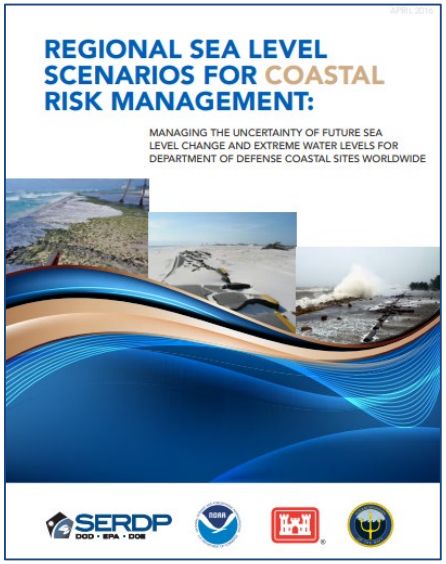


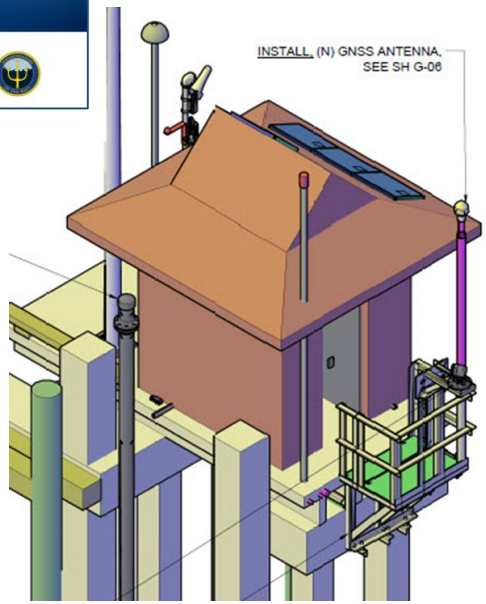


Current Resilience & Inundation Products

Where We Started

- Technical consultation with federal partners to understand the SLR risks that guides coastal infrastructure projects and vulnerability assessments.
  - USACE Technical Letters on sea level rise.
  - DOD SERDP Report "*Regional Sea Level Scenarios for Coastal Risk Management*"
- US Contribution to the UN IOC Global Sea Level Observing System (GLOSS)



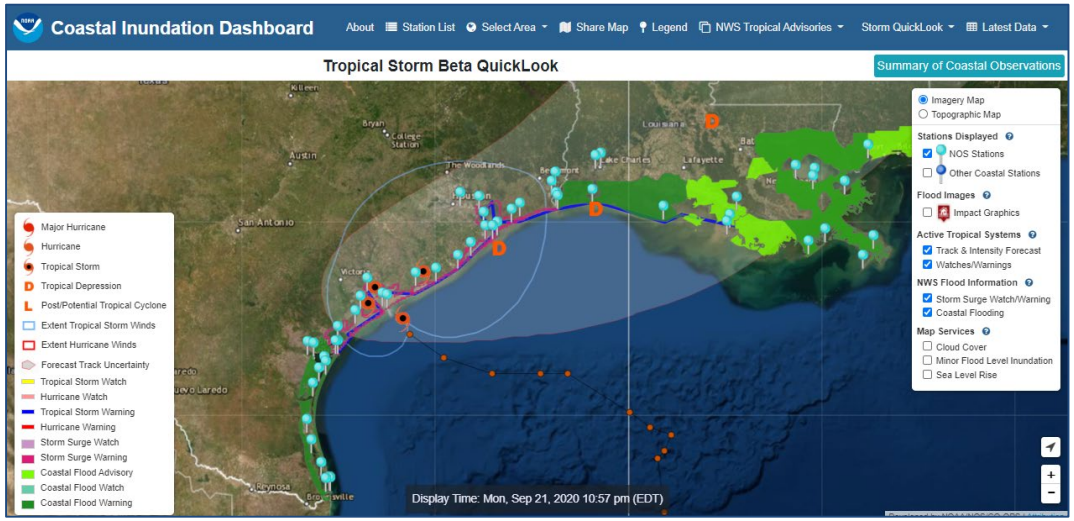


GLOSS/NWLON station with cGNSS co-location

Current Resilience & Inundation Products

Where We are Going: Coastal Inundation Dashboard (CID)

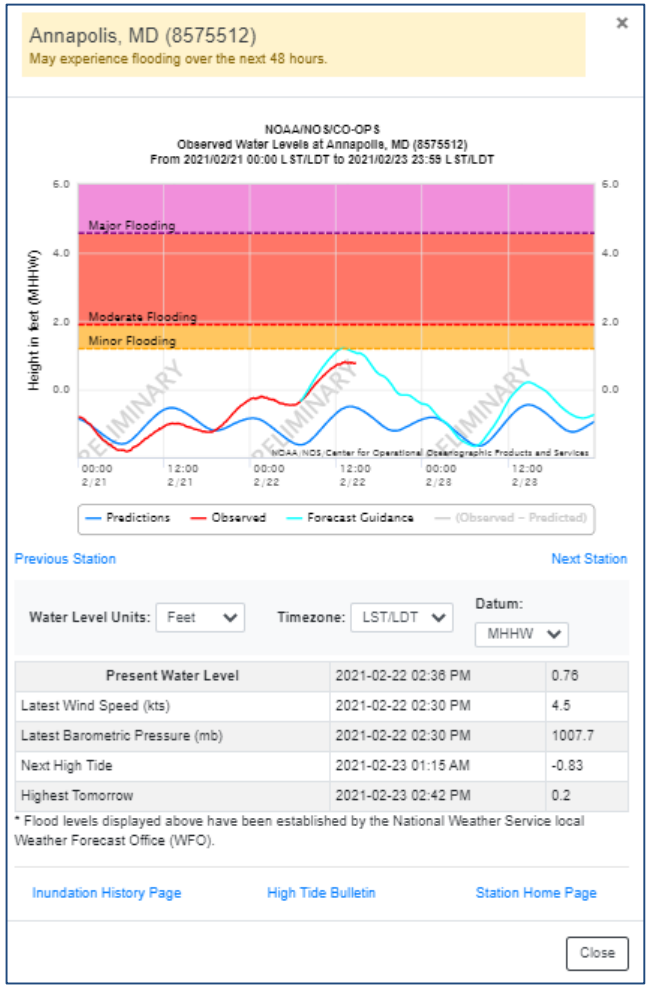
- Moved to a dynamic spatial product integrating inundation data
- Use flood thresholds for real-time inundation alerts and tracking of changing high tide flooding due to SLR.
- Integrated historical products like SLR trends, Extreme Water Level and Top 10 information.
- Platform for the Next Generation Storm Quicklooks
- Expanding service to the Great Lakes in FY21-22.



Current Resilience & Inundation Products

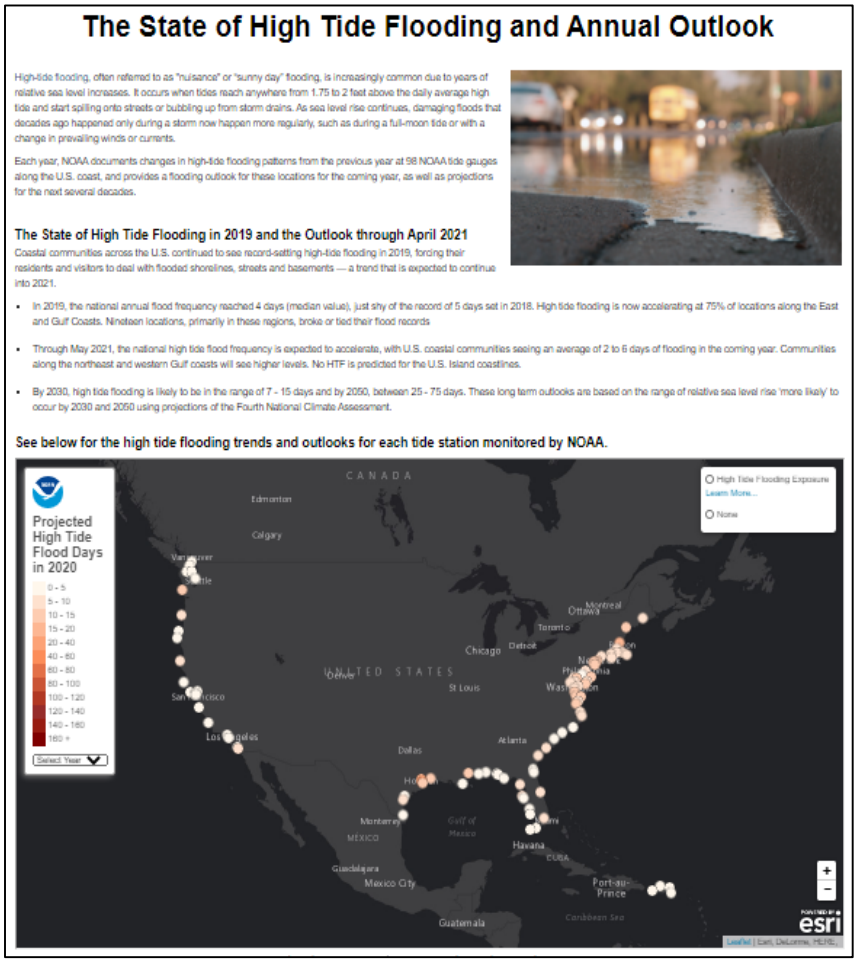
Where We are Going: Coastal Inundation Dashboard (CID)

- Use of NWS thresholds to understand inundation at weather and climate timescales. Use thresholds to:
  - trigger real-time water level alerts (weather)
  - monitoring and tracking annual exceedances (climate)
- Working to standardizing thresholds to support national product consistency
- 5-year plan for build out of the CID to include more climate timescaled oriented information



Current Resilience & Inundation Products

- Over the past 5 years, began communicating about the impact of SLR on tides.
  - Quarterly High Tide Bulletin
  - High Tide Flooding Annual Outlook
- Significant media attention as communities experience more frequent flooding
- Integrating High Tide Outlook capabilities into Coastal Inundation Dashboard in FY22.



The State of High Tide Flooding and Annual Outlook

High-tide flooding, often referred to as "nuisance" or "sunny day" flooding, is increasingly common due to years of relative sea level increases. It occurs when tides reach anywhere from 1.75 to 2 feet above the daily average high tide and start spilling onto streets or bubbling up from storm drains. As sea level rise continues, damaging floods that decades ago happened only during a storm now happen more regularly, such as during a full-moon tide or with a change in prevailing winds or currents.

Each year, NOAA documents changes in high-tide flooding patterns from the previous year at 98 NOAA tide gauges along the U.S. coast, and provides a flooding outlook for these locations for the coming year, as well as projections for the next several decades.

The State of High Tide Flooding in 2019 and the Outlook through April 2021

Coastal communities across the U.S. continued to see record-setting high-tide flooding in 2019, forcing their residents and visitors to deal with flooded shorelines, streets and basements — a trend that is expected to continue into 2021.

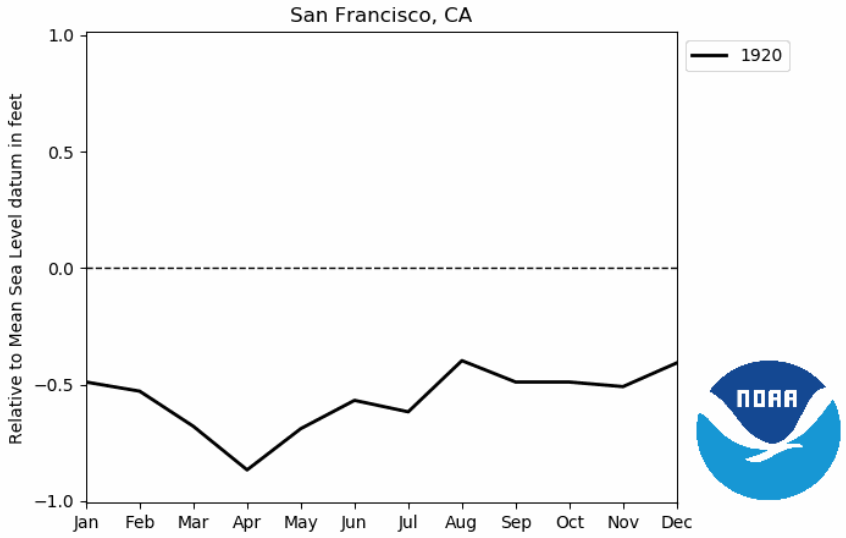
- In 2019, the national annual flood frequency reached 4 days (median value), just shy of the record of 5 days set in 2018. High tide flooding is now accelerating at 75% of locations along the East and Gulf Coasts. Nineteen locations, primarily in these regions, broke or tied their flood records
- Through May 2021, the national high tide flood frequency is expected to accelerate, with U.S. coastal communities seeing an average of 2 to 6 days of flooding in the coming year. Communities along the northeast and western Gulf coasts will see higher levels. No HTF is predicted for the U.S. Island coastlines.
- By 2030, high tide flooding is likely to be in the range of 7 - 15 days and by 2050, between 25 - 75 days. These long term outlooks are based on the range of relative sea level rise 'more likely' to occur by 2030 and 2050 using projections of the Fourth National Climate Assessment.

See below for the high tide flooding trends and outlooks for each tide station monitored by NOAA.

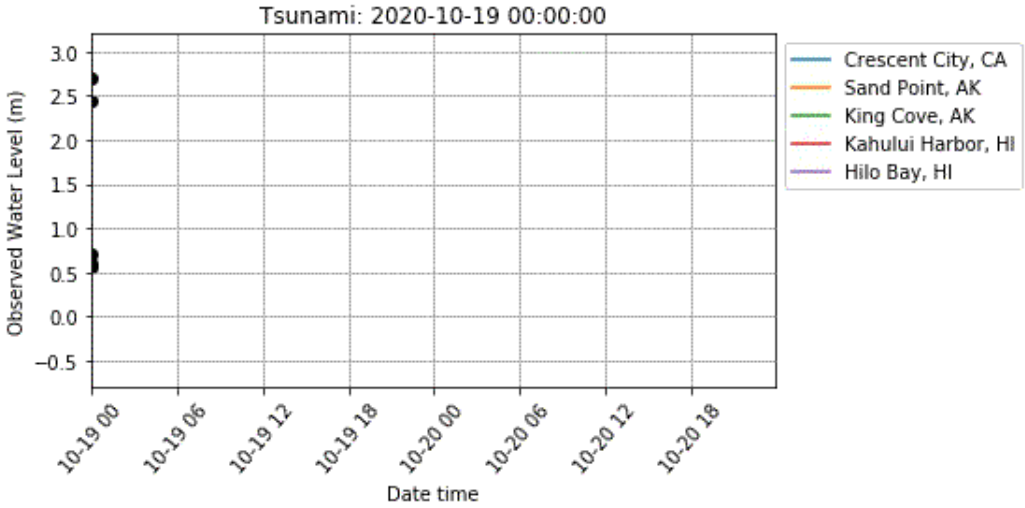
Current Resilience & Inundation Products

- Exploring improved data visualization capabilities by leveraging improvements in coding, data automation, and cloud migration.
- Partnering with NOAA's Climate.gov to produce actionable information for communities through the Resilience Tool Kit.

Mean Sea Level Visualization

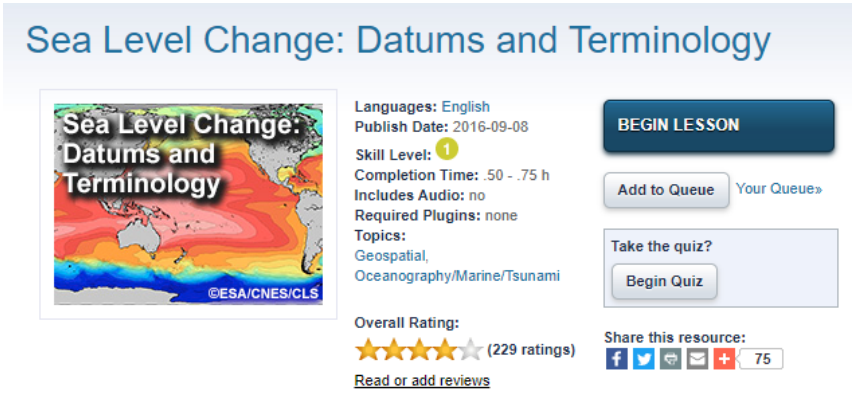


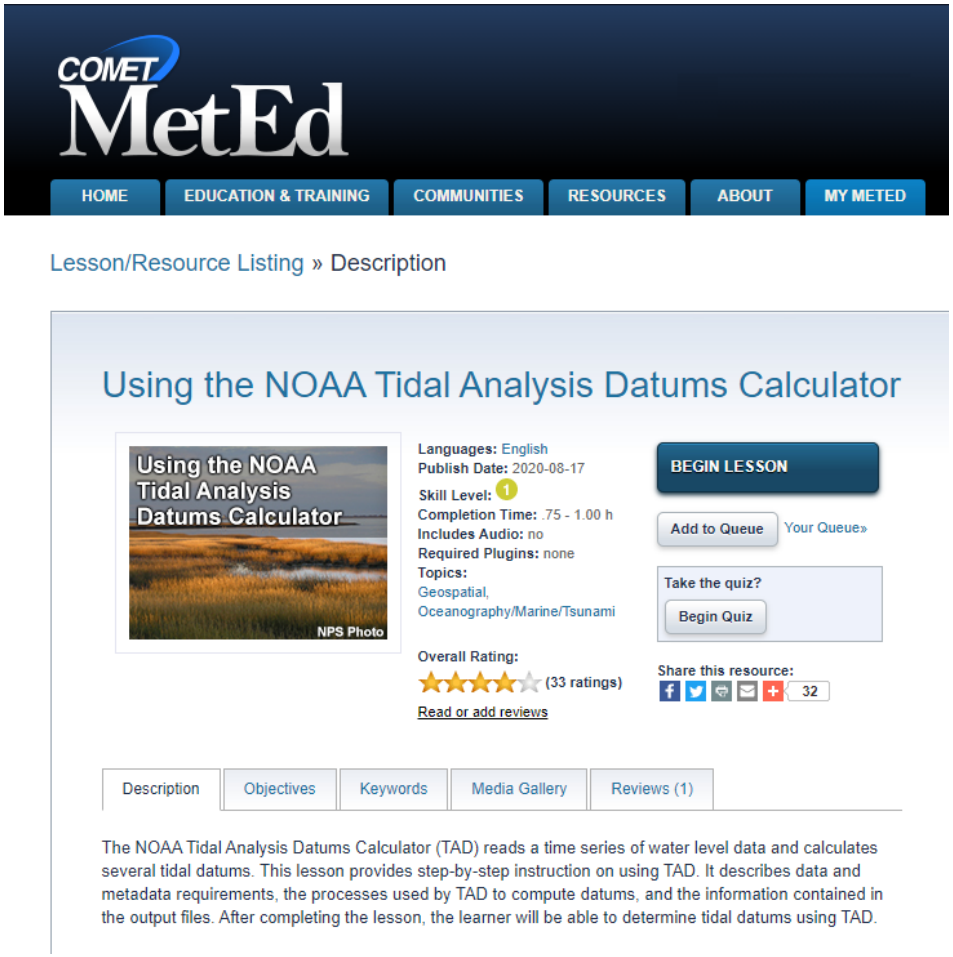
Tsunami Visualization



Supporting Stakeholders on Coastal Resilience

- Improving support to stakeholders working on coastal resilience
- Technical Assistance Tools and Training
  - Tidal Datums Calculator
  - COMET Virtual Training Course

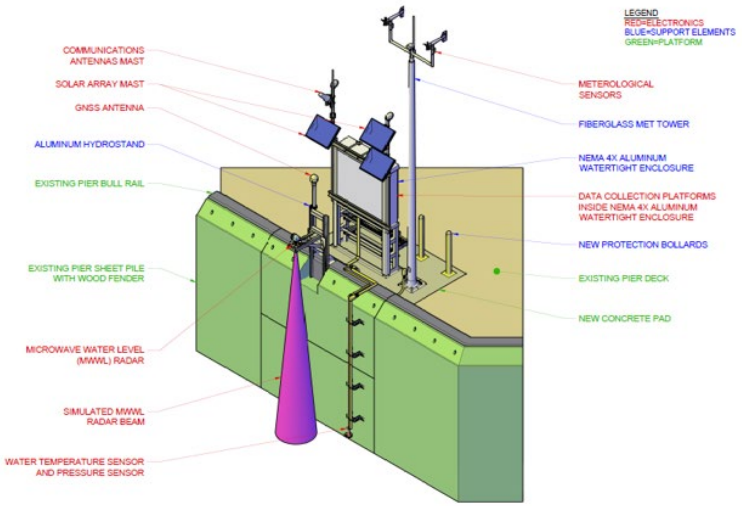


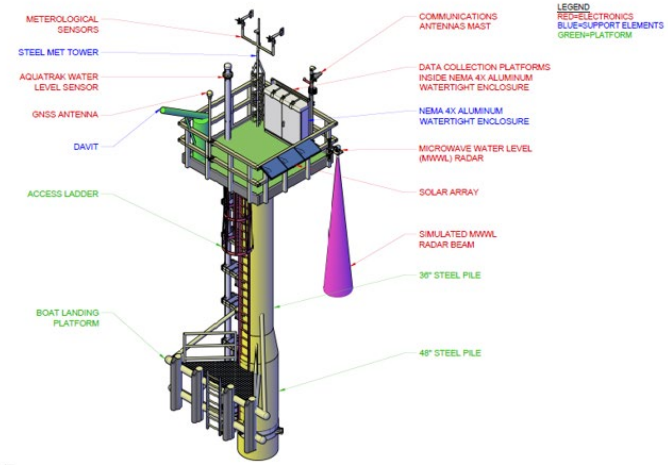


Observing Systems Improvements to Support Resilience

Where We're Going

- Storm-resilient infrastructure
  - SPIPs and station hardening
  - NWLON Recap Plan
- Co-location of cGNSS with NWLON to improve foundational data on Vertical Land Motion.
- cGNSS Tide Buoy (OCS & NGS) to support improve charting and mapping of coastal inundation.
- User needs assessment to support Wave Observation Measurement Requirements

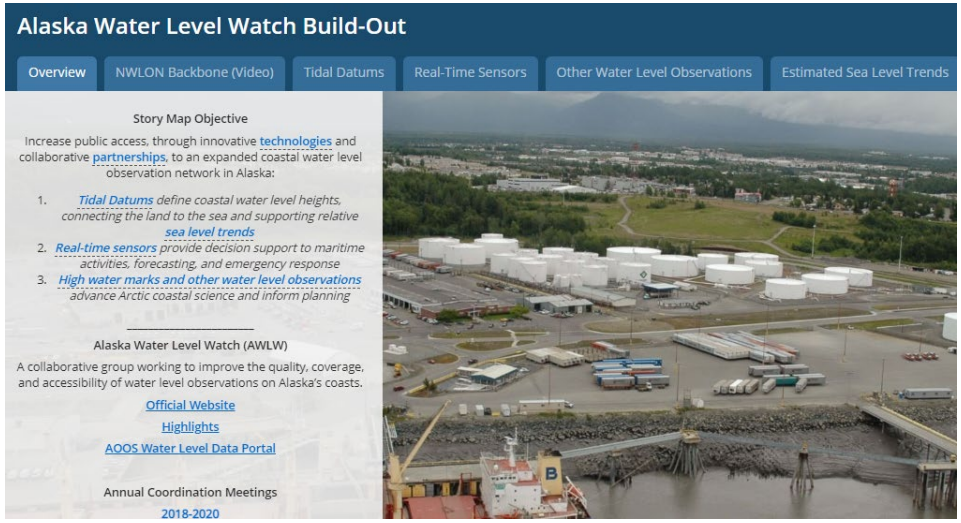




Observing System Integration & Partnerships

Where We're Going

- Integrating Federal, State, & local networks to increase the density of available information, and coastal inundation products & services



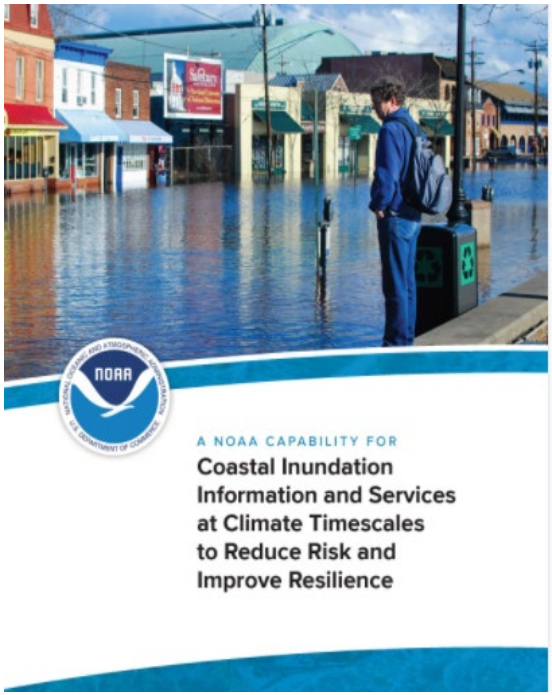
- AOOS Water Level Database and use of web-services for display of water level information in tools like Coastal Inundation Dashboard
- Water level partnerships to fill tidal datum gaps with USGS, NERRS, NPS, TCOON, IOOS, NWS

Future Inundation Products &Services Priorities

Where We're Going

Through a cross-NOS/NOAA effort visioning of a NOAA Capability for Coastal Inundation at Climate Timescales to provide a full range of information and services beyond weather time scales.

- Responding to Congressional requests for a National Coastal Flood Information System.
- Moving from observation based inundation information to 2-D gridded hydrodynamic data for downscaled coastal flood risk information.
- Improved modeling and reanalysis of historical water level data to support the generation of probabilistic subseasonal -to-seasonal inundation outlooks.



Questions?


NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE