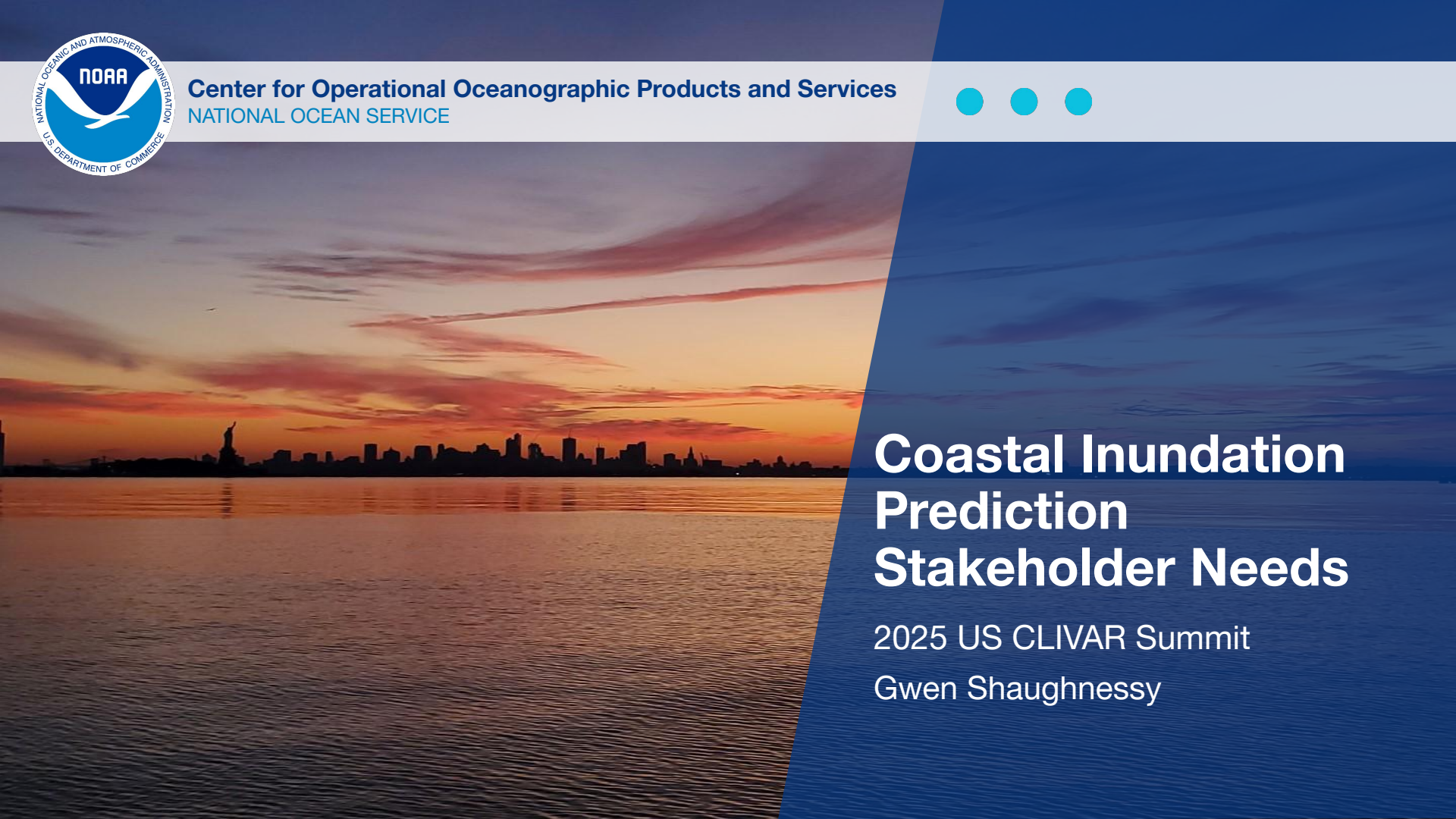


Center for Operational Oceanographic Products and Services
NATIONAL OCEAN SERVICE

Coastal Inundation Prediction Stakeholder Needs

2025 US CLIVAR Summit

Gwen Shaughnessy

Outline

- Part 1: Background and context
- Part 2: How are users currently using coastal/ocean predictions to inform decision-making and/or management strategies?
- Part 3: What are the major challenges in coastal data use, and what are the specific prediction data and information needs?

PART 1.

Background and Context

Bipartisan Infrastructure Law Provision 3: Flood and Inundation Mapping and Forecasting, Water Modeling, and Precipitation Studies

- Real-time Coastal and Inland Forecast Flood Inundation Mapping (CIFIM)
- Improve Overall Forecasting Skill and Services through the Next-Generation of NOAA's National Water Model (NG)
- Update and Revise Precipitation Frequency Atlases for the U.S. including Probable Maximum Precipitation (PF/PMP)
- Build out Subseasonal to Annual Integrated Water Capabilities (SA)
- Apply NOAA's Service Delivery Framework (SD)

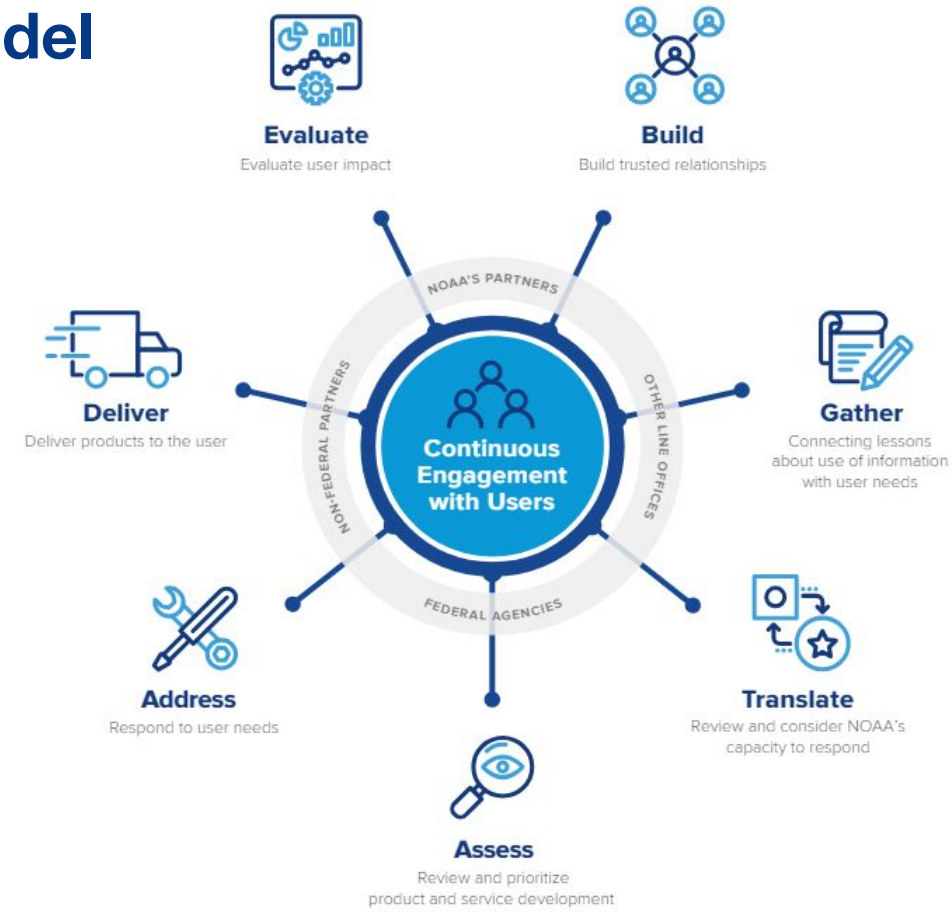
Bipartisan Infrastructure Law Provision 3:

Coastal and Inland Flood Inundation Mapping and Forecasting Subseasonal to Annual Flood Prediction

- Develop the capability to predict the location and timing of flooding events, and document how this risk varies from month to month and year to year.
- Understand user requirements for inundation products at subseasonal to annual and longer-term timescales through needs assessment and partner network analysis.

NOAA Service Delivery Model

A service-oriented approach focused on understanding challenges users face in order to guide and improve decision support products and services in their delivery

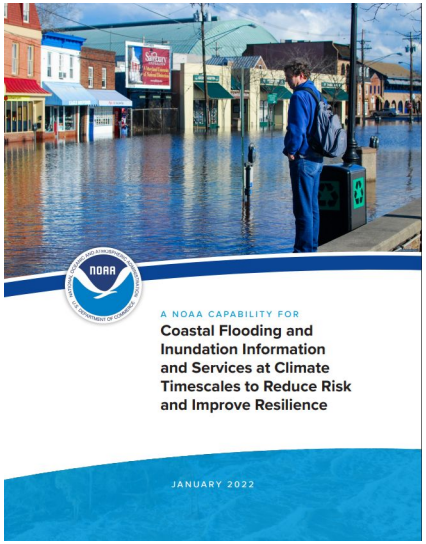


Documented Application & User Needs

Coastal Flooding in the Face of Climate Change: Understanding Constituent Needs

A Needs Assessment Funded by the NOAA Water Initiative

August 2022



A NOAA CAPABILITY FOR

Coastal Flooding and Inundation Information and Services at Climate Timescales to Reduce Risk and Improve Resilience

JANUARY 2022

A Synthesis of Coastal Inundation Needs for NOAA Product and Service Development

December 2023

USGS science for a changing world

Coastal and Marine Hazards and Resources Program

User Engagement to Improve Coastal Data Access and Delivery

Scientific Investigations Report 2023–5081

U.S. Department of the Interior
U.S. Geological Survey

Primary User Groups

- **Coastal Decision Makers**
  - Community Planners
  - Coastal Management Programs
  - Floodplain managers
  - Natural Resource Managers
- **Government**
  - Tribal Governments
  - Local, State, Federal Agencies
- **Private Partners**
  - NGO's
  - Consultants
  - Researchers

PART 2.

How are users currently using coastal/ocean predictions to inform decision-making and management strategies?

Sea Level Trends & Projections

- **Structural engineer:** calculate freeboard heights for infrastructure projects
- **Public works:** demonstrate when critical thresholds will be crossed to justify planning and budget forecasts

Changes in Flood Frequency

- **Public works:** plan drainage improvements such as adding backflow preventers, installing pumps, or creating new bioswales
- **City planner:** combine historical flooding data and future projections to recommend zoning changes
- **Floodplain manager:** use seasonal information to plan maintenance schedule to address recurring flood issues

Extreme Water Levels

- **Civil engineer:** design stormwater systems to mitigate the effects of increased floodwater
- **City planner:** combine historical flooding data and future projections to recommend zoning changes
- **Emergency manager:** plan emergency services and determine proper evacuation routes

PART 3.

What are the major challenges in coastal data use, and what are the specific prediction data and information needs?

Themes: Challenges to Coastal Data Use

Too many tools

Difficulties finding data they need

Lack of capacity

Difficulties understanding and applying data to decision making

Too Many Tools

- Overwhelmed with too many web tools and applications, needing to spend extra time sorting out the differences
- Difficulties differentiating and keeping track of similar tools from different agencies
- Technical assistance is often needed but not provided

Difficulty Finding Data

- Overwhelmed by navigating among numerous data sources
    - Determining which is optimal for their needs
    - Determining if dataset, model or tool is the most up-to-date
- Struggle navigating agency sites
- Access to underlying data

Lack of Capacity

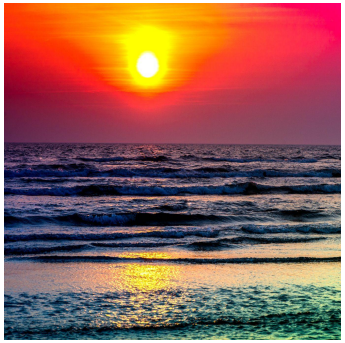
- Insufficient staffing with certain skill sets and expertise
- Insufficient time hinders ability to digest and discover relevant scientific information

Difficulty Understanding and Applying Data

- Reconciling discrepancies among different datasets, models, or tools
- Difficulty understanding limitations of the data
- Observation vs. prediction vs. model forecasting vs. projection - which are being used for what product and what are their limitations
- Integration of observed data with projections helpful in comparing historical data with future sea level baselines

Themes: Prediction Data and Information Needs

Data needs across every temporal scale



Need both technical and more simplified web tools

Persistent data gaps

Data interpretation for internal application and external communication

Data Needs Across All Temporal Scales

- Historical information: understand changes through time and calibrate models
- Real-time data: understand near-term flood risks
- Time-series data: understand trends, demonstrate changes through time, and predict coastal hazards
- Seasonal forecasts: short-term decision making such as resource allocation
- Projected data: infrastructure development, shoreline and coastal habitat change through time

Need Technical and Simplified Tools

- No one-size-fits-all tool solution, but common traits of successful tools include intuitive user interfaces, usability, trustworthiness, and access to underlying data
- More technical audiences want to acquire data for their own analysis
- Less data savvy audiences need more simplified tools to answer questions and communicate with stakeholders

Persistent Data Gaps

- Total water level / compound flooding information
- Data poor regions - Alaska and Great Lakes, more rural areas
- High resolution data - certain NOAA data are valuable at regional or national applications, but locally-relevant products are of greater value to certain user groups
- More real-time tide stations and water level observations
- Products with wave / storm scenarios
- Better measurements of vertical land motion and relative sea level rise information

Data Interpretation

- Simplified and synthesized information to support messaging on coastal flood risk
- Science translation to make the data easy to use
  - What does the data mean for on the ground issues and impacts
  - How can it be useful in decision making
- Need more education and outreach materials in easily understandable, conversational language

Thank you!

gwen.shaughnessy@noaa.gov