

ALASKA FLOOD INUNDATION TOOL (AK-FIT)

INNOVATION THROUGH SIMPLIFICATION

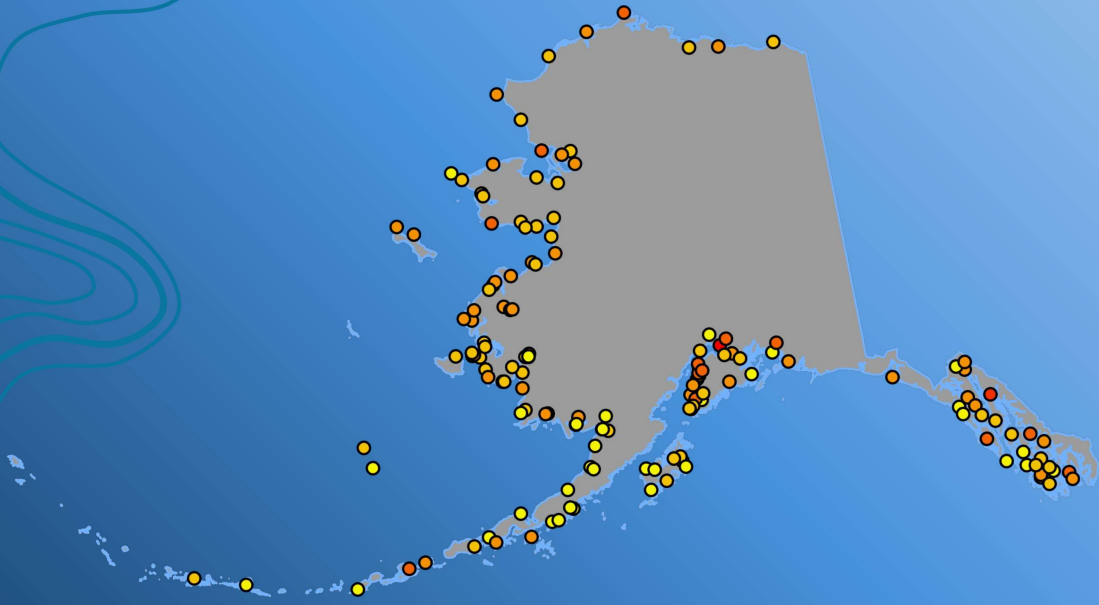
KC Horen, Nora Nieminski, & Jessie Christian



Alaska Division of Geological & Geophysical Surveys | Coastal Hazards Program



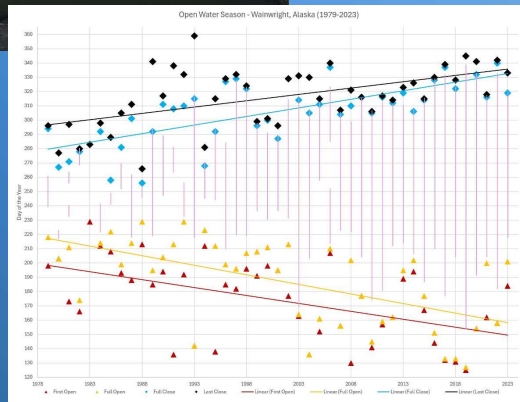
MOTIVATIONS



- ▶ Alaska's tidal shoreline is longer than the combined total of the lower 48 states (NOAA ORR, 2024).
- ▶ 64% of Alaskans live in coastal or tidally-influenced riverine communities.
- ▶ 144 Alaska Native Communities are threatened by flooding, erosion, and/or permafrost degradation (Denali Commission, 2019).



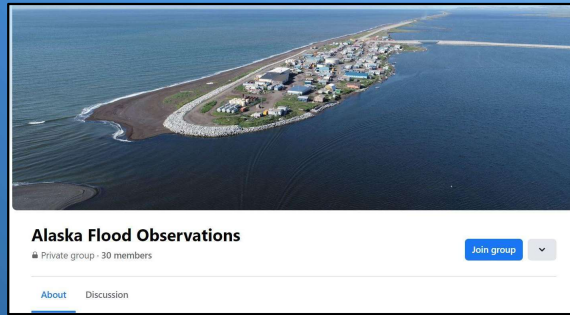
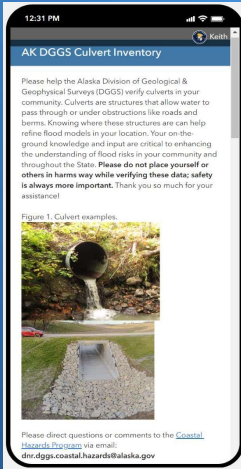
CHALLENGES



- ▶ Many communities are extremely remote & difficult to access.
- ▶ Instrumentation & communication infrastructure is limited in many locations.
- ▶ Much of the State lacks both current & historical data.
- ▶ Data collection windows are short, & weather conditions can deteriorate quickly.
- ▶ CHP is a small program (3-4 individuals).



INITIATIVES



- ▶ Community-based monitoring & engagement
- ▶ Alaska Flood Observations Group
- ▶ Culvert Inventory Survey
- ▶ Flood impact criteria & assessment methods publications
- ▶ Tribal, local, State, and Federal agency partnerships; collaborations with universities and NGOs

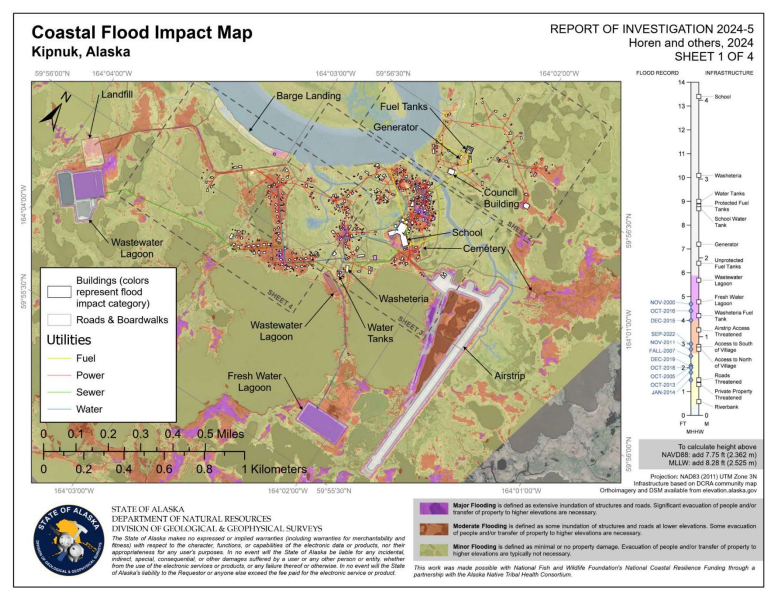


RESULTS

FLOOD ASSESSMENTS

Table 1. Summary of infrastructure elevations and flood categories. Gray = Extreme, purple = Major, red = Moderate, and yellow = Minor. The Extreme category represents infrastructure situated at elevations above the highest estimated flood height with uncertainty included. Categories are based on current infrastructure conditions.

Elevation Feature	Elevation (ft MHHW)	Vertical Uncertainty (ft)	Elevation (m MHHW)	Vertical Uncertainty (m)
School	13.4	0.1	4.07	0.04
Airstrip inundated	11.6	0.2	3.53	0.06
Washeteria	10.1	0.1	3.08	0.04
Water tanks	9.0	0.1	2.73	0.04
Fuel tank containment wall	8.8	0.1	2.68	0.04
School water tank	8.7	0.1	2.64	0.04
Generator	7.2	0.1	2.20	0.04
Fuel tanks	6.4	0.1	1.96	0.04
Many buildings flooded	6.2	0.1	1.90	0.04
Extreme	5.8		1.78	
Several buildings flooded	5.7	0.1	1.74	0.04
Wastewater lagoon	5.7	0.2	1.72	0.06
Freshwater lagoon	4.8	0.2	1.48	0.06
Lowest residences flooded	4.6	0.1	1.40	0.04
Washeteria fuel tank	4.2	0.1	1.27	0.04
Major	4.1		1.25	
Airstrip access	3.6	0.2	1.09	0.06
Access to large portions of village	2.8	0.2	0.84	0.06
Moderate	2.6		0.79	
Low-lying roads threatened	1.5	0.2	0.46	0.06
Private property threatened	1.3	0.2	0.38	0.06
Riverbank	0.6	0.2	0.17	0.06
Minor	0.4		0.11	



Example Flood Impact Categorization for Kipnuk, AK



RESULTS

SWIM METHOD

Traditional "Bathtub" Model



Still Water Inundation Model

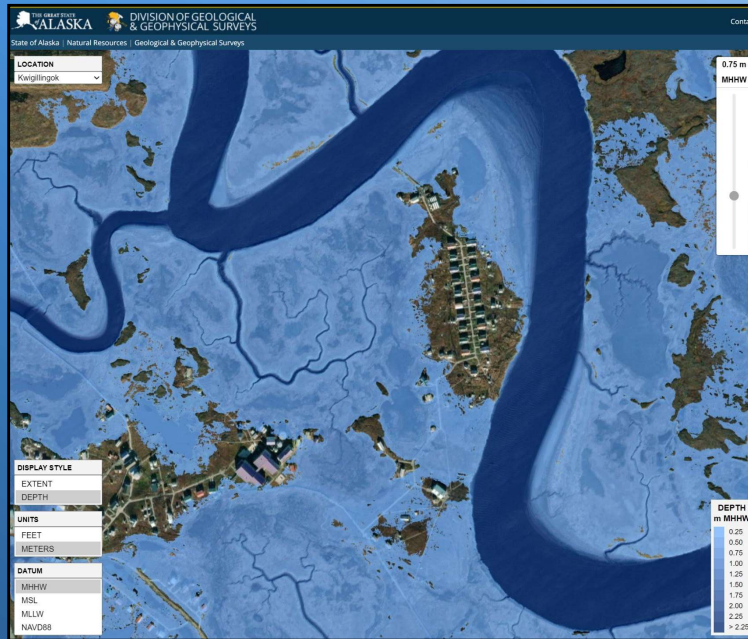


Modeled flood inundation from Ex-Typhoon Merbok on October 17, 2022, in Hooper Bay, AK



RESULTS

AK-FIT



- ▶ Web-based modeling application
- ▶ Browser, tablet, & mobile compatible
- ▶ 24/7 availability
- ▶ Multiple display, datum, & unit options
- ▶ Minimal data storage requirements (128KB - 5MB per layer)
- ▶ Fast loading imagery without on-the-fly tiling



REACH OUT

Coastal Hazards Program Website:
dggs.alaska.gov/hazards/coastal/

Coastal Hazards Program email:
dnr.dggs.coastal.hazards@alaska.gov

KC Horen keith.horen@alaska.gov

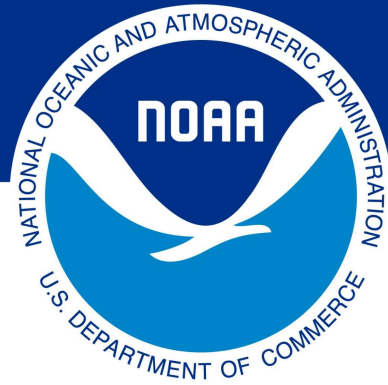
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NOAA DIGITAL COAST

Maravilla Clemens & Bret Folger

November 13, 2024

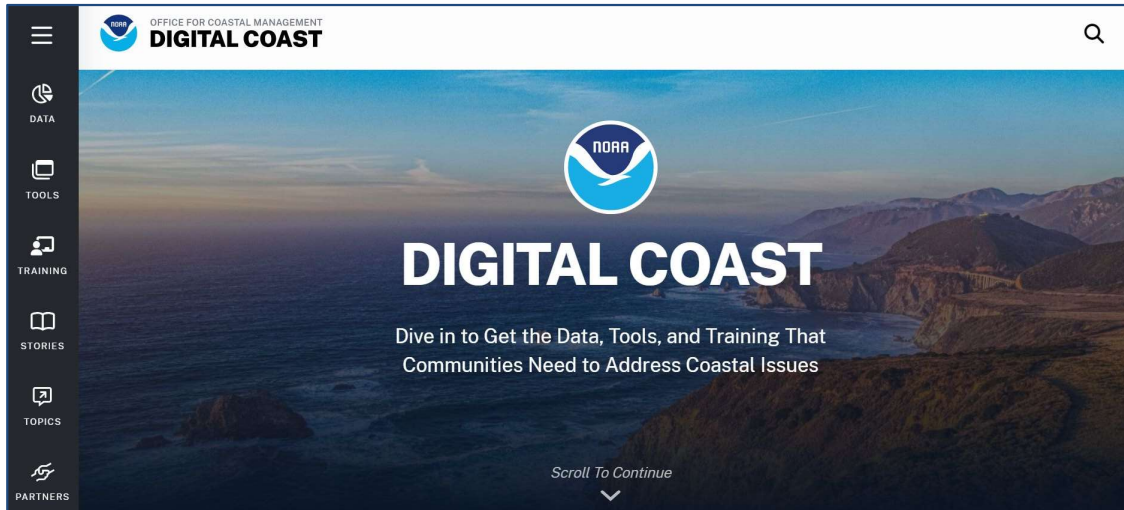
Objective

- Highlight Digital Coast data, tools, and training resources that can support inundation risk assessment and adaptation planning
- Familiarize you with Digital Coast's structure and organization



Digital Coast

coast.noaa.gov/digitalcoast



NOAA Office for Coastal Management | American Planning Association
Association of State Floodplain Managers | Coastal States Organization
National Association of Counties | National Estuarine Research Reserve Association
National States Geographic Information Council | The Nature Conservancy | Urban Land Institute

Digital Coast

coast.noaa.gov/digitalcoast

The screenshot shows the NOAA Digital Coast website homepage. At the top left, there is a hamburger menu icon. To its right is the NOAA logo and the text "OFFICE FOR COASTAL MANAGEMENT" and "DIGITAL COAST". A search icon is in the top right corner. The main content area features a large background image of a coastal landscape. In the center, there is a circular NOAA logo, the text "DIGITAL COAST", and the tagline "Dive in to Get the Data, Tools, and Training That Communities Need to Address Coastal Issues". Below the tagline, it says "Scroll To Continue" with a downward arrow. On the left side, there is a vertical navigation menu with icons and labels: "DATA", "TOOLS", "TRAINING", "STORIES", "TOPICS", and "PARTNERS". Three green arrows point to the "DATA", "TOOLS", and "TRAINING" menu items.



Tools & Data

- Data Access Viewer
- Sea Level Rise Viewer
- Coastal Flood Exposure Mapper
- High-Resolution C-CAP Land Cover Data
- Coastal County Snapshots



Data Access Viewer



coast.noaa.gov/dataviewer/#/

Sea Level Rise Viewer



[Home](#) / [Tools](#) / [Catalog](#) / [Sea Level Rise Viewer](#)

Sea Level Rise Viewer

NOAA Office for Coastal Management

[Launch](#)

[Download Data](#)

[Access Map Services](#)

GEOGRAPHY

Coastal contiguous U.S. (excludes Great Lakes), HI, and territories

PLATFORM

Web-based

LEVEL OF EFFORT

Low

Overview

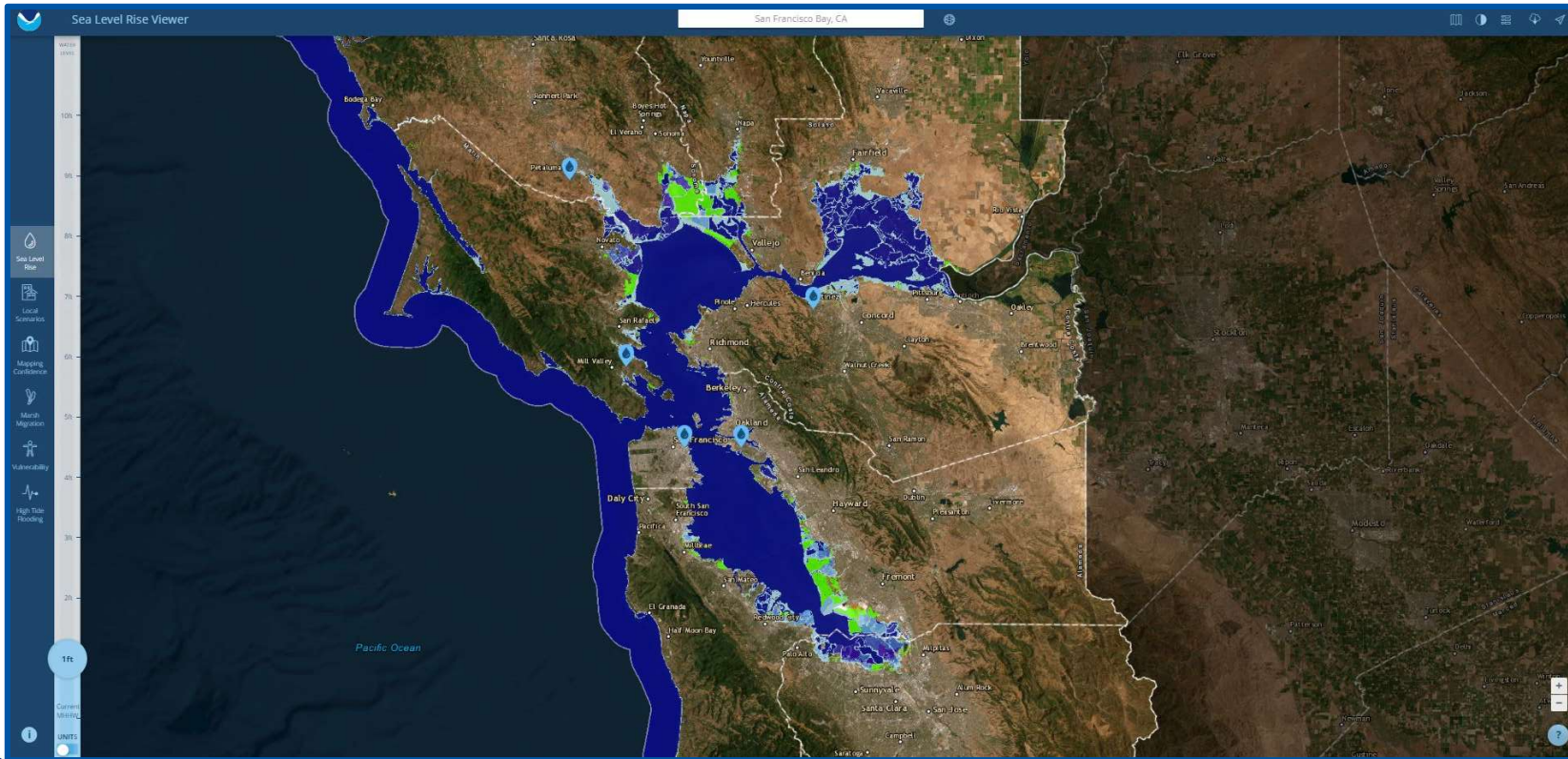
Use this web mapping tool to visualize community-level impacts from coastal flooding or sea level rise (up to 10 feet above average high tides). Photo simulations of how future flooding might impact local landmarks are also provided, as well as data related to water depth, connectivity, flood frequency, socio-economic vulnerability, wetland loss and migration, and mapping confidence.

Features

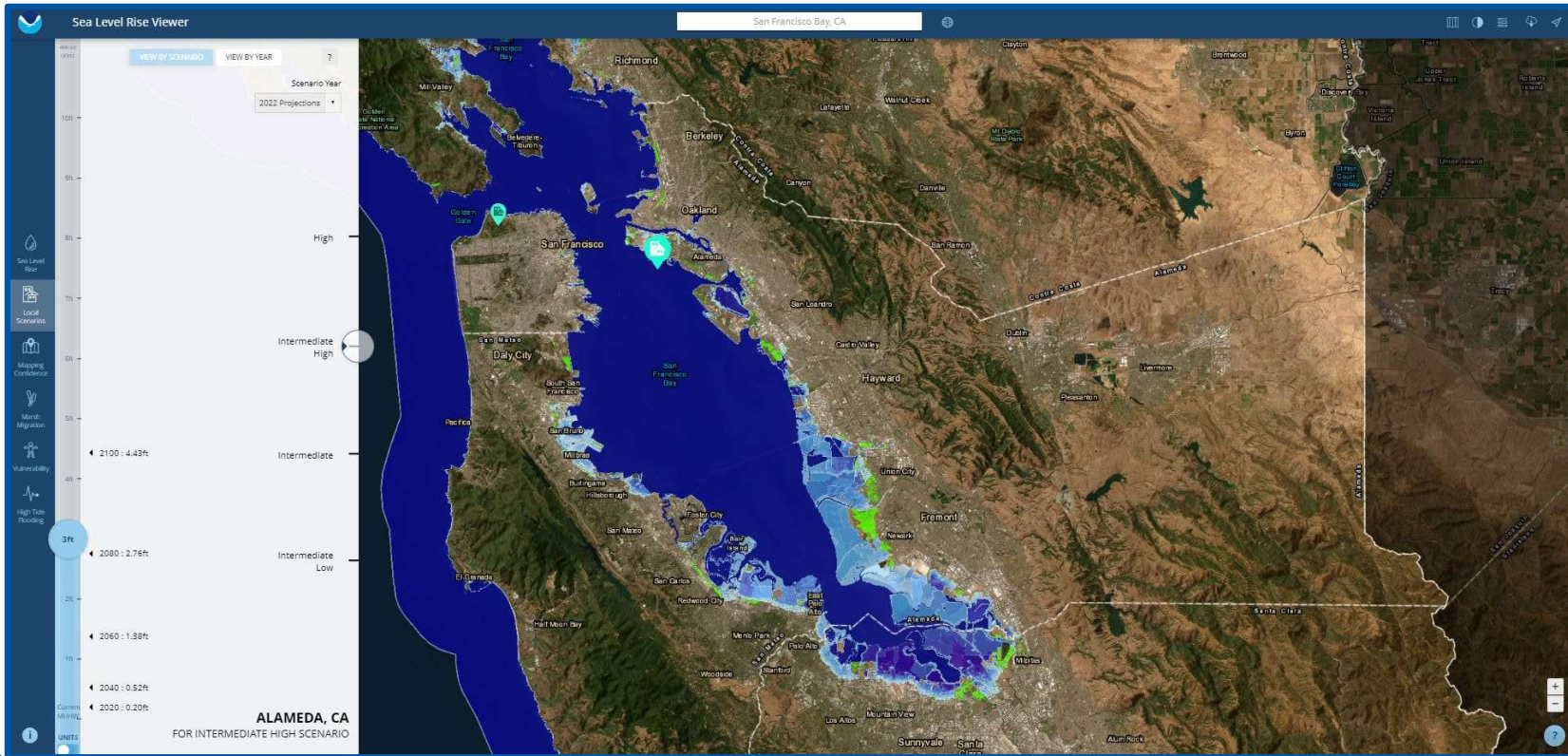


NOAA DIGITAL COAST

Sea Level Rise Viewer

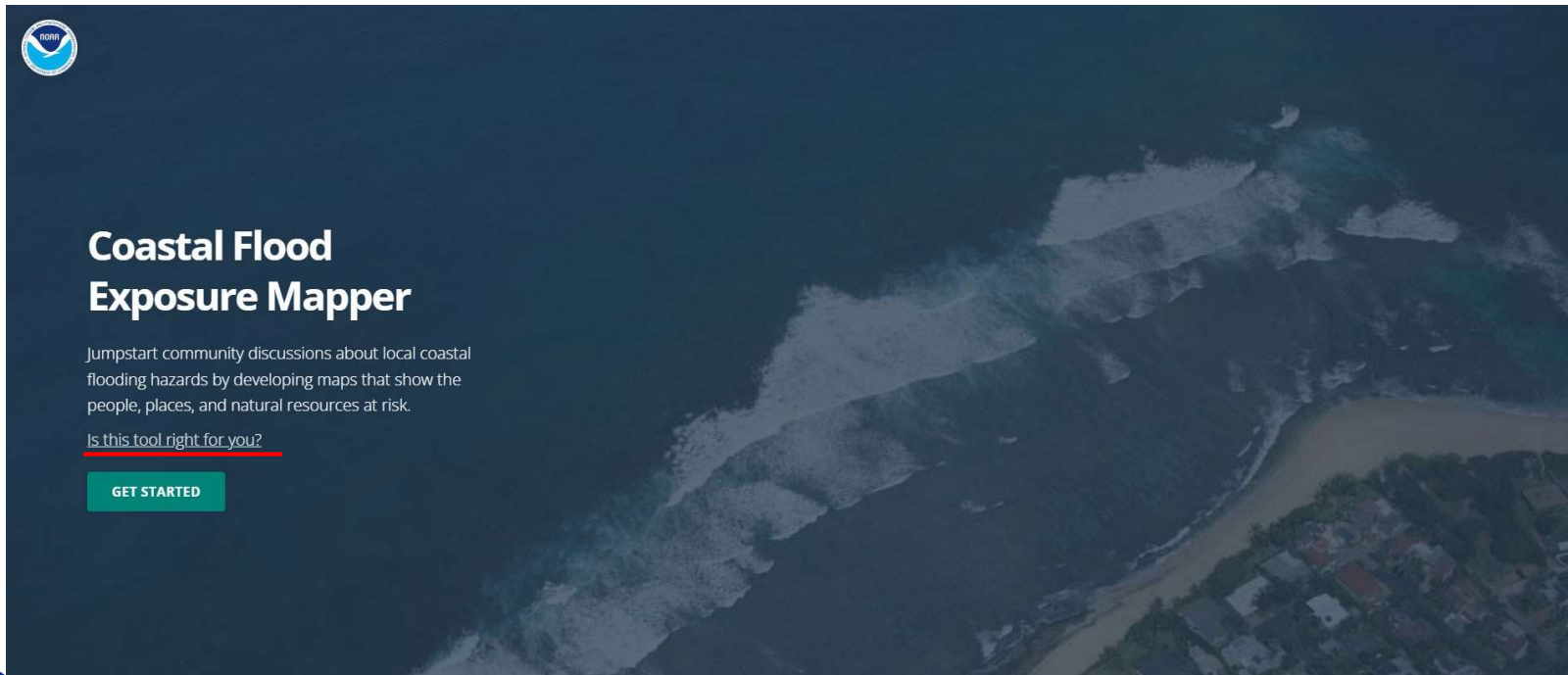


Local Sea Level Rise Scenarios

















Coastal Flood Exposure Mapper

coast.noaa.gov/digitalcoast/tools/flood-exposure.html

The screenshot shows the web application interface for the Coastal Flood Exposure Mapper. It features a dark blue background with a faint aerial map of a coastal area. In the top left corner, there is a small NOAA logo. The main heading is "Coastal Flood Exposure Mapper" in white text. Below the heading, there is a paragraph of text: "Jumpstart community discussions about local coastal flooding hazards by developing maps that show the people, places, and natural resources at risk." Underneath this paragraph is a link that says "Is this tool right for you?" with a red underline. At the bottom left of the interface is a green button with the text "GET STARTED" in white capital letters.

The Coastal Flood Exposure Mapper can help you

(Select each of the actions you're interested in. Select the ? to learn more.)

 Start a community conversation.	<input checked="" type="checkbox"/>	
 Show community areas at risk to flooding hazards.	<input type="checkbox"/>	
 Conduct a local flood hazard exposure analysis.	<input type="checkbox"/>	
 Inform the hazard exposure information in a grant proposal.	<input checked="" type="checkbox"/>	
 Prioritize areas for resilience efforts.	<input type="checkbox"/>	
 Prepare to engage a contractor for the technical work.	<input type="checkbox"/>	
 Incorporate GIS map layers into local tools and models.	<input type="checkbox"/>	

Your choices will be reflected in your PDF Companion Guide.



Your Selected Tasks: Using Maps To ...

Inform the Hazard Exposure Information in a Grant Proposal

Mapper Tips

Combine hazard maps with other data layers applicable to specific grant categories, such as natural infrastructure or projects that benefit impoverished communities.

Create your maps with this tool, share them via links with your team, then export the images to include in your proposal.

Maps to Consider

- **Layers:** Hazard layers, ecosystem layers, societal layers.
- **Coastal Flood Hazard Composite:** Provides a comprehensive overview of multiple flood hazard factors, allowing you to highlight the specific risks faced by your community.
- **FEMA Flood Zones:** Demonstrates the designated high-risk and moderate-risk flood zones, providing evidence of the community's exposure to flood hazards.
- **Sea Level Rise:** Helps showcase the long-term impacts of rising sea levels, emphasizing the need for adaptation measures.

Your Selected Tasks: Additional Considerations

Inform the Hazard Exposure Information in a Grant Proposal

Why Do This?

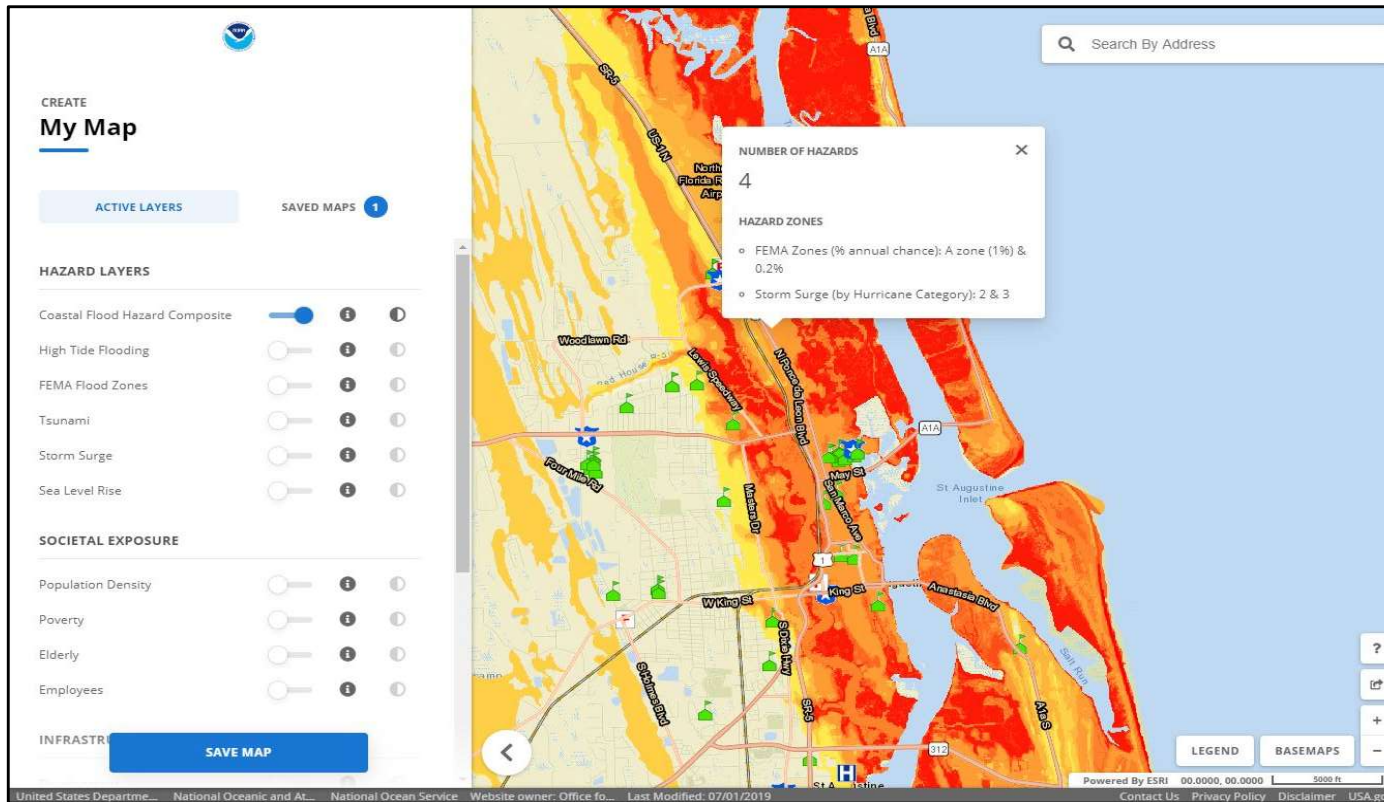
- For your grant proposal for enhancing coastal resilience, disaster preparedness, or environmental conservation, consider using maps displaying data layers showing areas at high risk from flooding to lend credibility to and strengthen your proposal;
- Showcase your understanding of local conditions;
- Demonstrate potential impacts and add urgency to your proposal;
- Present evidence-based information on coastal flood hazards and climate vulnerabilities;
- Show how your project plans are rooted in robust analysis;
- Make clear the specific risks and vulnerabilities being confronted; and
- Increase the likelihood of your proposal being accepted.

Strengths

- This tool gives you the ability to export maps as images that can easily be incorporated into proposals.
- Maps made with the Coastal Flood Exposure Mapper can enhance the clarity and effectiveness of your proposal with visual representations of flood-prone areas.

Limitations

Coastal Flood Exposure Mapper



C-CAP High Resolution Land Cover

The screenshot shows the NOAA Digital Coast website for C-CAP High-Resolution Land Cover data. The page features a header with the NOAA logo and 'DIGITAL COAST' text, a breadcrumb trail 'Home / Data / Catalog / C-CAP High-Resolution ...', and a search icon. The main content area has a dark background with a colorful satellite-style map. The title 'C-CAP High-Resolution Land Cover' is prominently displayed, followed by the NOAA Office for Coastal Management logo. Three buttons are visible: 'Download Data by State', 'Seamless Download', and 'Map Services'. Below these are three columns of information: 'AREA OF COVERAGE' (Most coastal areas nationwide), 'CLASSIFICATION' (Up to 25 categories), and 'RESOLUTION' (1 to 2.4 meter). A white box at the bottom left highlights 'Now Available: 1-meter Resolution Data' with links for 'Press Release', 'Video Message', and 'Explore the Data in this Storymap'. A 'View 208 Datasets' button is located on the right side of the white box.

NOAA OFFICE FOR COASTAL MANAGEMENT
DIGITAL COAST

Home / Data / Catalog / C-CAP High-Resolution ...

C-CAP High-Resolution Land Cover

NOAA Office for Coastal Management

[Download Data by State](#) [Seamless Download](#) [Map Services](#)

AREA OF COVERAGE Most coastal areas nationwide	CLASSIFICATION Up to 25 categories	RESOLUTION 1 to 2.4 meter
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Now Available: 1-meter Resolution Data

[Press Release](#) [Video Message](#) [Explore the Data in this Storymap](#)

[View 208 Datasets](#)



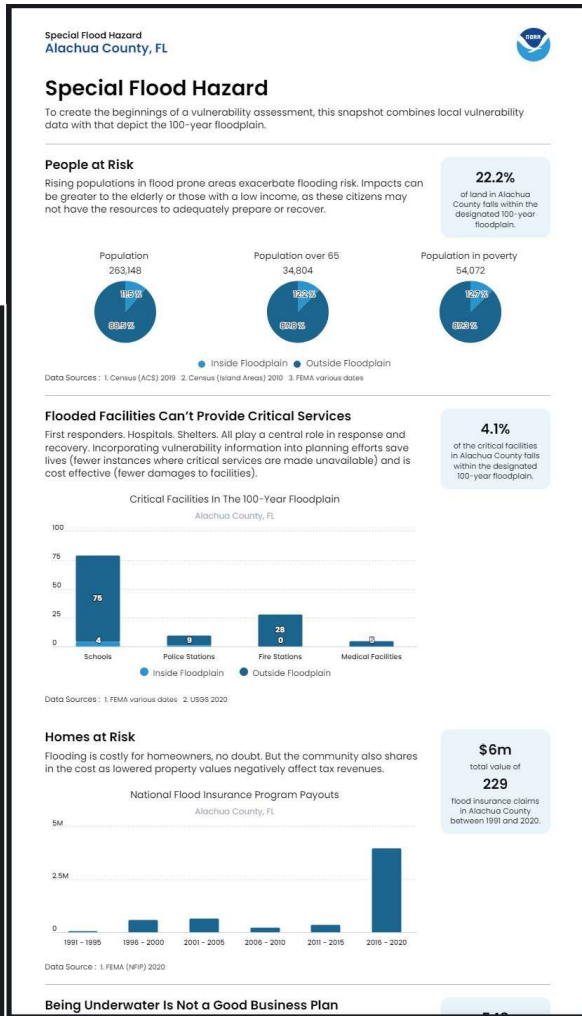
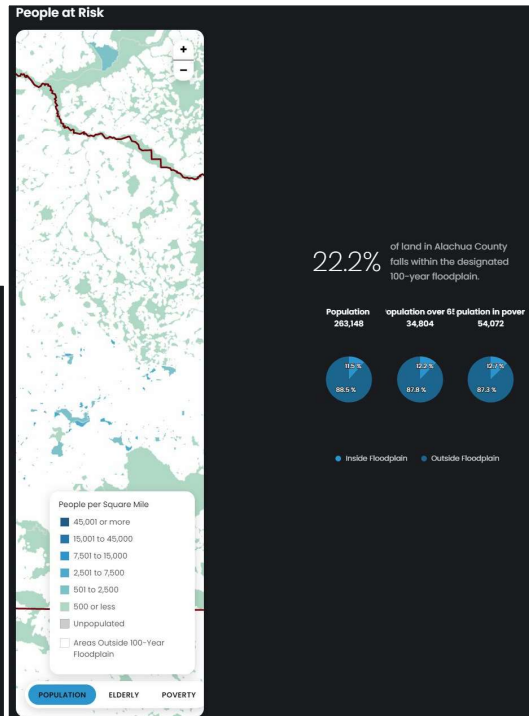
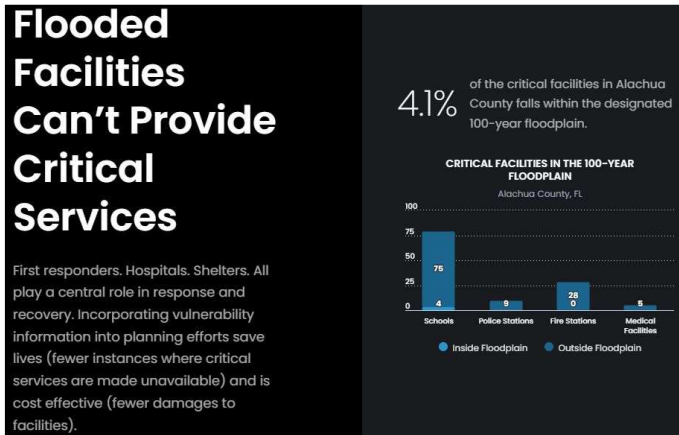
C-CAP High Resolution Land Cover

The screenshot displays the NOAA Digital Coast website interface. At the top left, the NOAA logo and 'OFFICE FOR COASTAL MANAGEMENT DIGITAL COAST' are visible. A search icon is in the top right. The main content area features a large circular inset on the left labeled 'LOCAL (1-METER)' containing a detailed land cover map of an urban area. To the right, the heading 'High-Resolution Land Cover' is followed by 'NOAA Office for Coastal Management'. Below this are three buttons: 'by State', 'Seamless Download', and 'Map Services'. A table-like section lists 'CLASSIFICATION' as 'Up to 25 categories' and 'RESOLUTION' as '1 to 2.4 meter'. A 'View 208 Datasets' button is positioned to the right. At the bottom left, there is a section for 'Lower Resolution Data' with the text 'Explore the Data in this Storymap'.

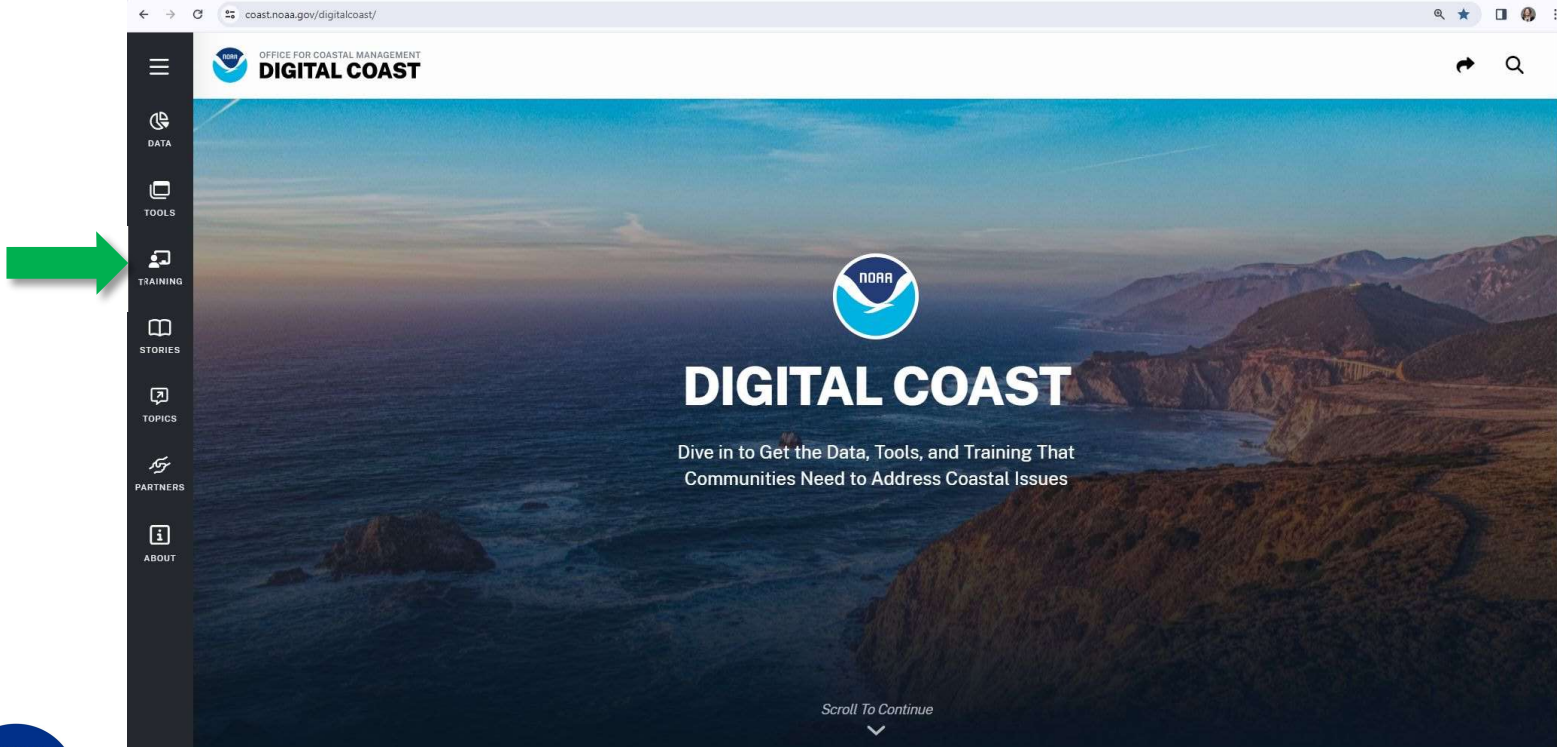


Coastal County Snapshots

- Complex data in easy-to-understand charts and graphs
- Educational tool for governing bodies and citizen groups
- Flood exposure, ocean jobs, wetland benefits



Training



Training

coast.noaa.gov/digitalcoast/training/home.html

Home / Training

Training

The Digital Coast Academy is the go-to site for coastal management training.

Find
Search By Keyword

ON-DEMAND RESOURCES (149)

SCHEDULED TRAINING (25)

COURSE CALENDAR



INTERACTIVE MODULES

Climate 101: Science, Impacts, and Society

1.5 hours

PUBLICATIONS

Coastal Adaptation Planning Guide: Five Steps for Beginners

46 pages

GUIDES

Coastal and Waterfront Smart Growth Guide

Self-paced

QUICK REFERENCES

Coastal Change Analysis Program (C-CAP) Land Cover Classifications

4 pages

GUIDES

Coastal Community Resilience Indicators and Rating Systems

63 pages

GUIDES

Coastal Ecosystem Services Management Guide

Self-Paced

INTERACTIVE MODULES

Coastal Zone Management Act 101

Self-paced | Professional Credit

QUICK REFERENCES

Common Data Collection Methods for Evaluation

2 pages



Training

coast.noaa.gov/digitalcoast/training/home.html

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Trainings

- **Coastal Adaptation Planning Essentials**
- Adaptation Planning for Coastal Communities
- Building Risk Communication Skills
- Nature-Based Solutions for Coastal Hazards



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