Stakeholder Presentation

Resiliency Study Project Overview

January 2024

Jaime Wallace, PE – Wright-Pierce
Dennis Dunbar – Westport Island Conservation Commission (WICC)
Ruth Indrick – Kennebec Estuary Land Trust (KELT)

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Presentation Overview

Who We Are
Project Overview
Grant Scope and Objectives
Sea Level Rise and Storm Surge Projected Impacts
Design Study Discussion
Restoration and Marsh Migration Opportunities
Thank You

Who We Are – Meet Our Team

Jaime Wallace, PE
Project Manager, Wright-Pierce

Dennis Dunbar
Westport Island Conservation Commission (WICC)

Ruth Indrick
Kennebec Estuary Land Trust (KELT)

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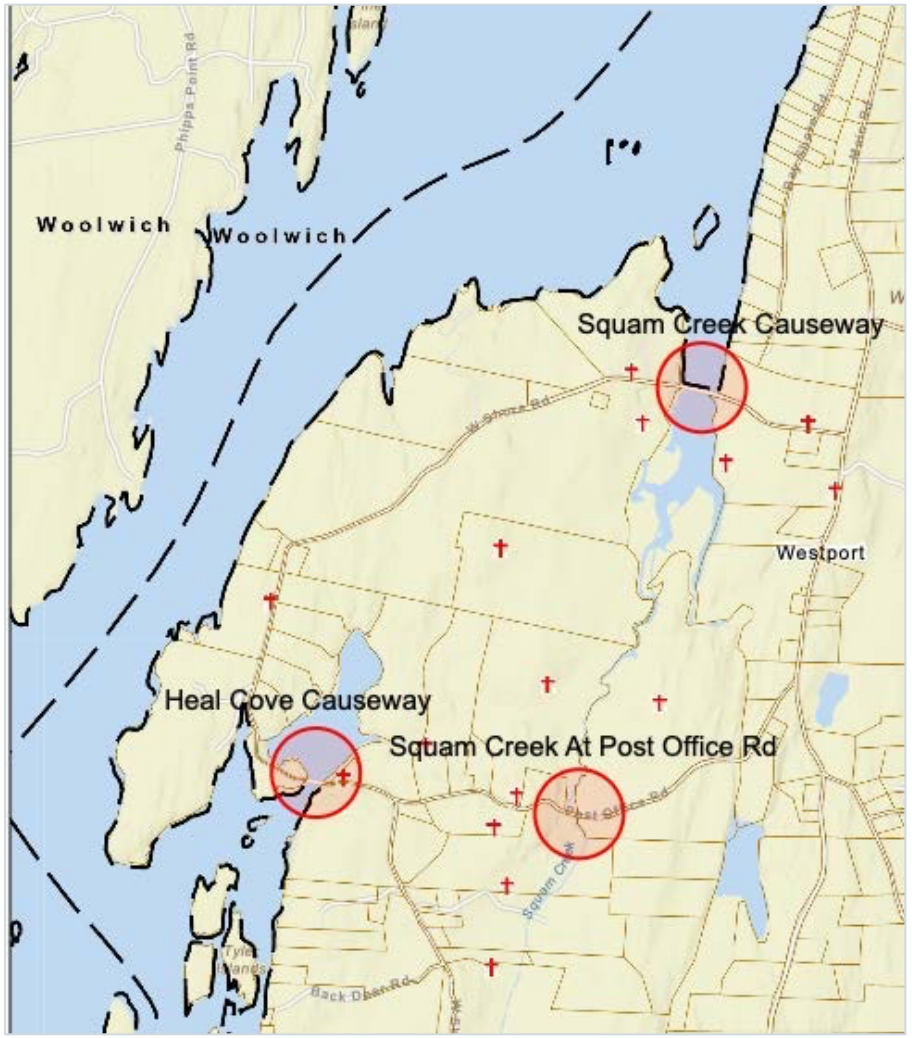
Project Overview



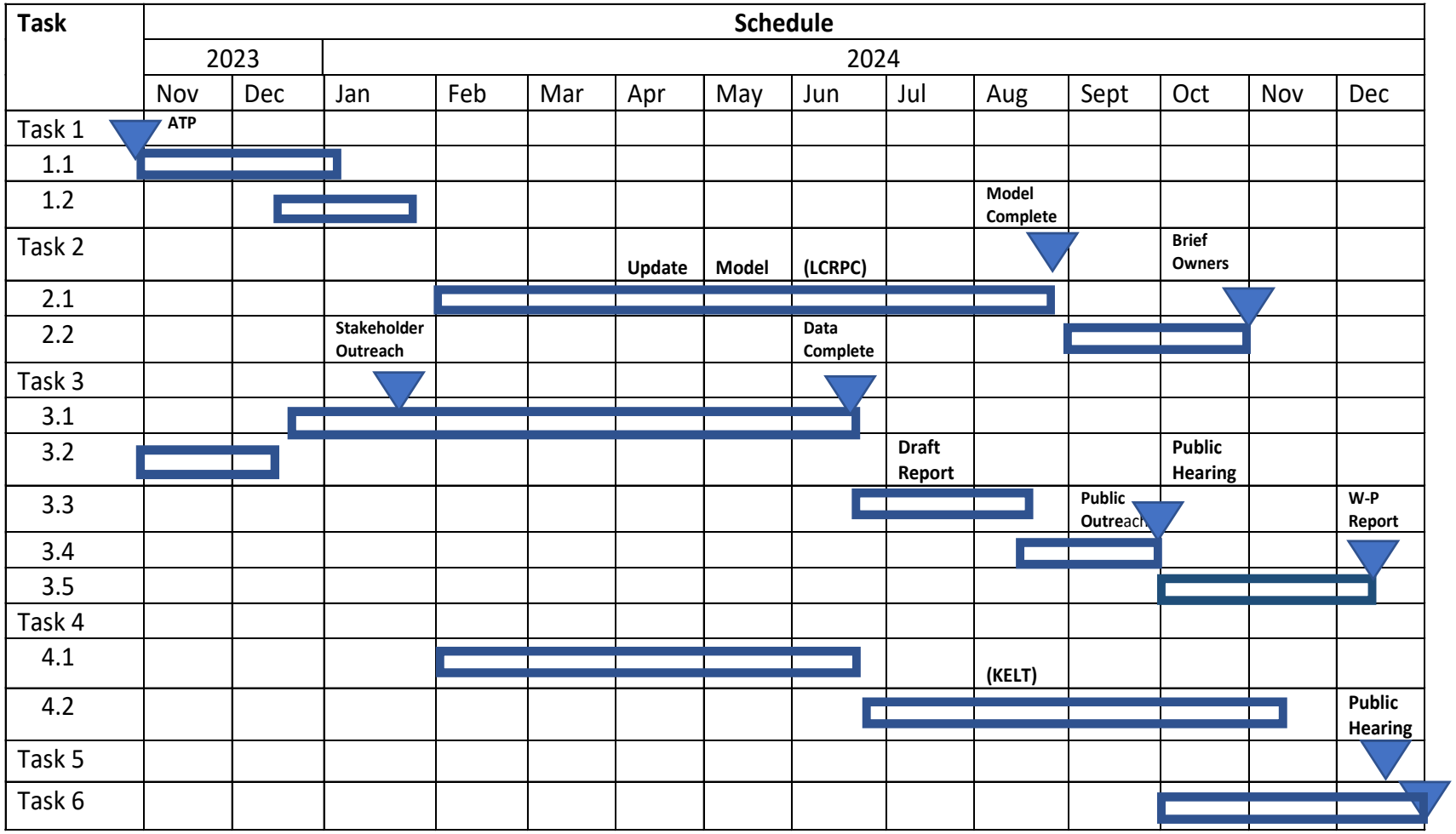
- Westport Island received a $50K grant to evaluate our vulnerabilities to sea level rise and increased storms in the decades ahead, and how to adapt to them
- Workshop in September 2022 identified tidal crossings as a high priority for the town
- Most vulnerable sites identified are:
  - Squam Creek Causeway at West Shore Road
  - Squam Creek crossing at Post Office Road
  - Heal Cove Causeway at West Shore Road
- Wright-Pierce joined our effort for environmental engineering and KELT for marsh restoration and migration study

Grant Scope & Objectives

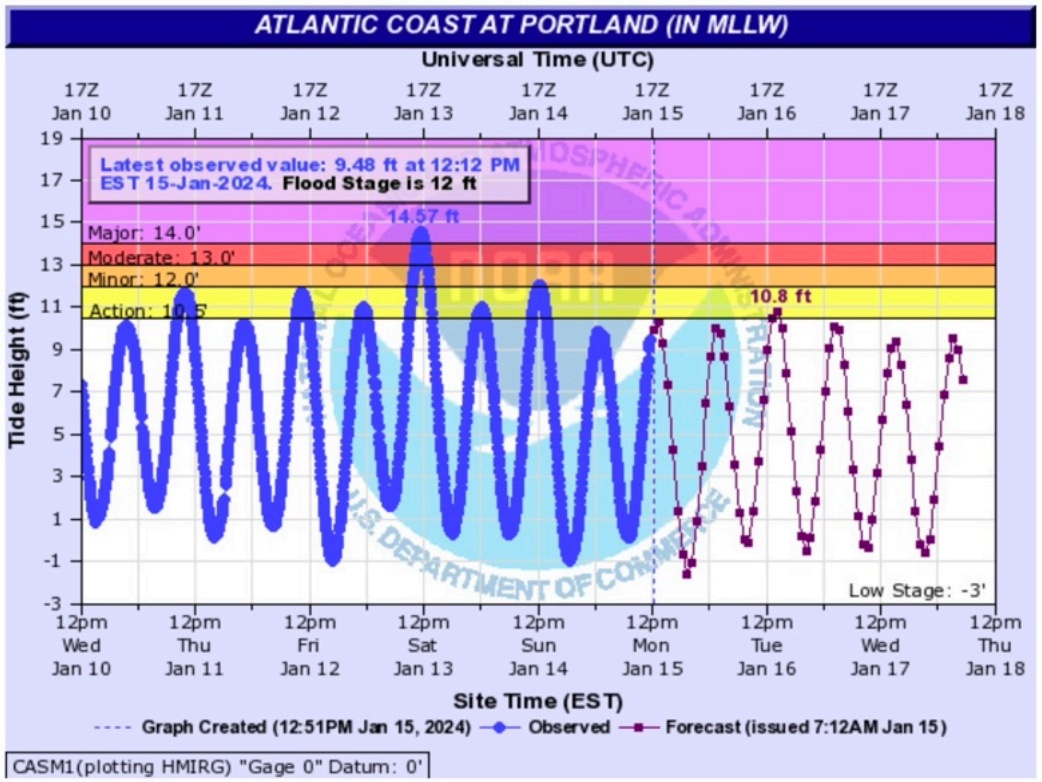
Tasks

1. Establish SLR and Storm Surge Projections
2. Identify Susceptible Roads and Buildings
3. Conduct Causeway Adaptation Pre-design
4. Evaluate Marsh Restoration Options
5. Conduct Public Hearing
6. Prepare Final Report

Master Schedule



Sea Level Rise & Storm Surge Projected Impacts



Record water level of 14.57' (11.3' high tide + 3.27' storm surge)[1]. overtopped Squam Creek and Heal Cove causeways on January 13, 2024

1. As measured at Portland tide gage

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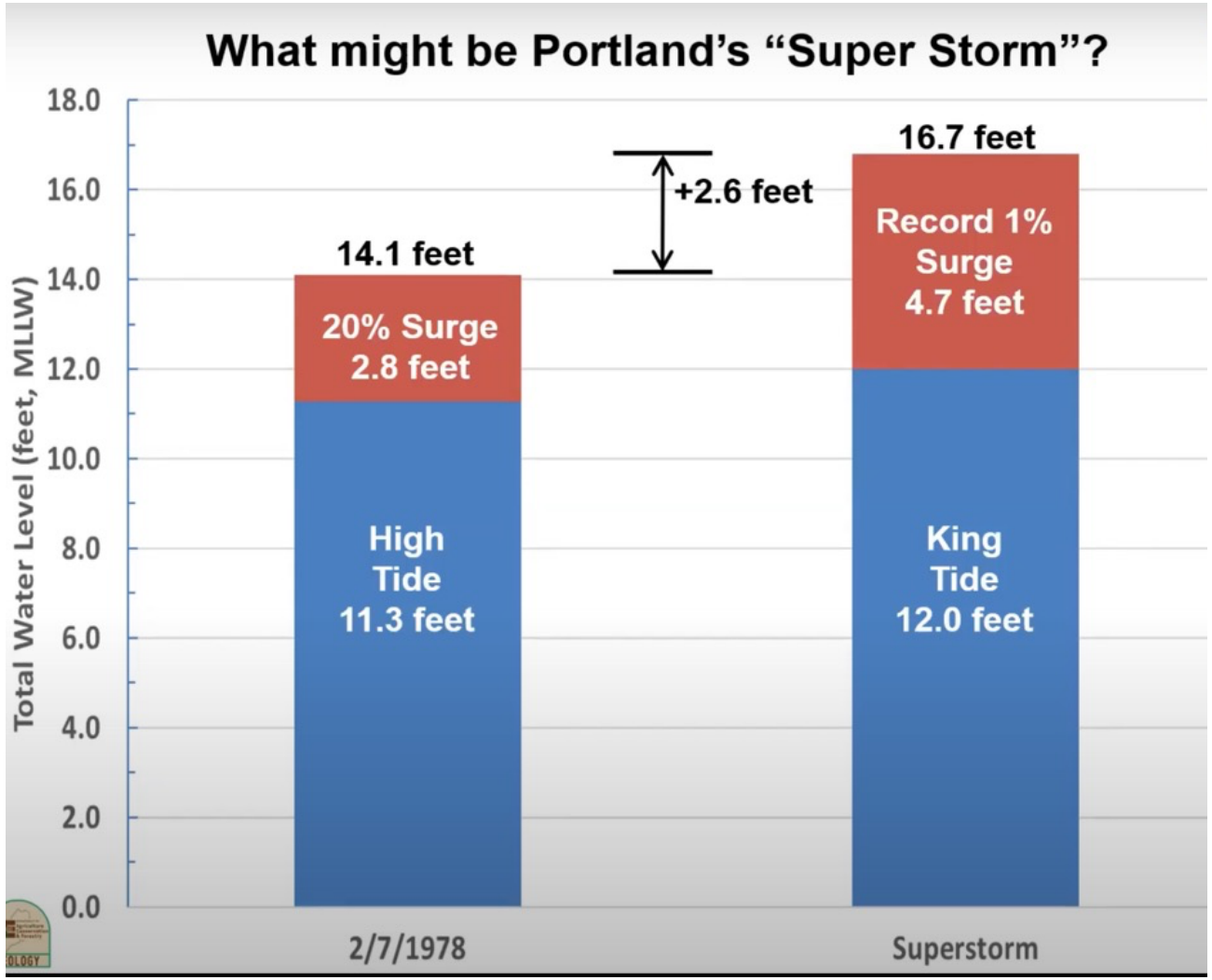
Higher Storm Surges and Higher Tides Can Increase Damage



- Highest recorded storm surge was 4.7' measured in Portland
- Highest Annual King Tide is 12.0'
- This Low Probability Occurrence would exceed 1978 Storm by 2.6' and the January 13, 2024 Storm by 2.1'

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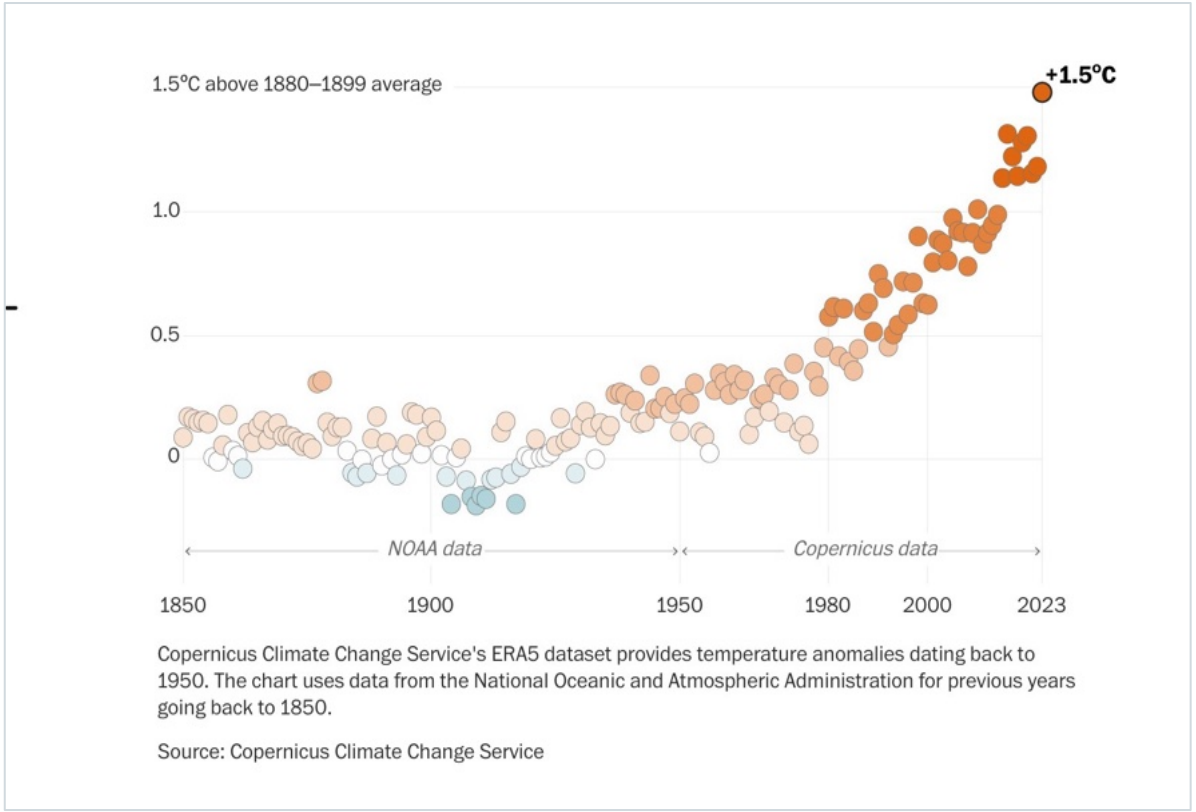
Earth's Temperature Increase Leads to Sea Level Rise

2023 Average Temperature 1.5 C Above 1880 – 1899 Average (Goal for Upper Limit)



- Global average temperatures are increasing since entering the industrial age
- Rate of increase has been accelerating
- Transition to renewable energy sources expected to slow rate of increase
- Sea level rise expected to continue until global temperatures decline

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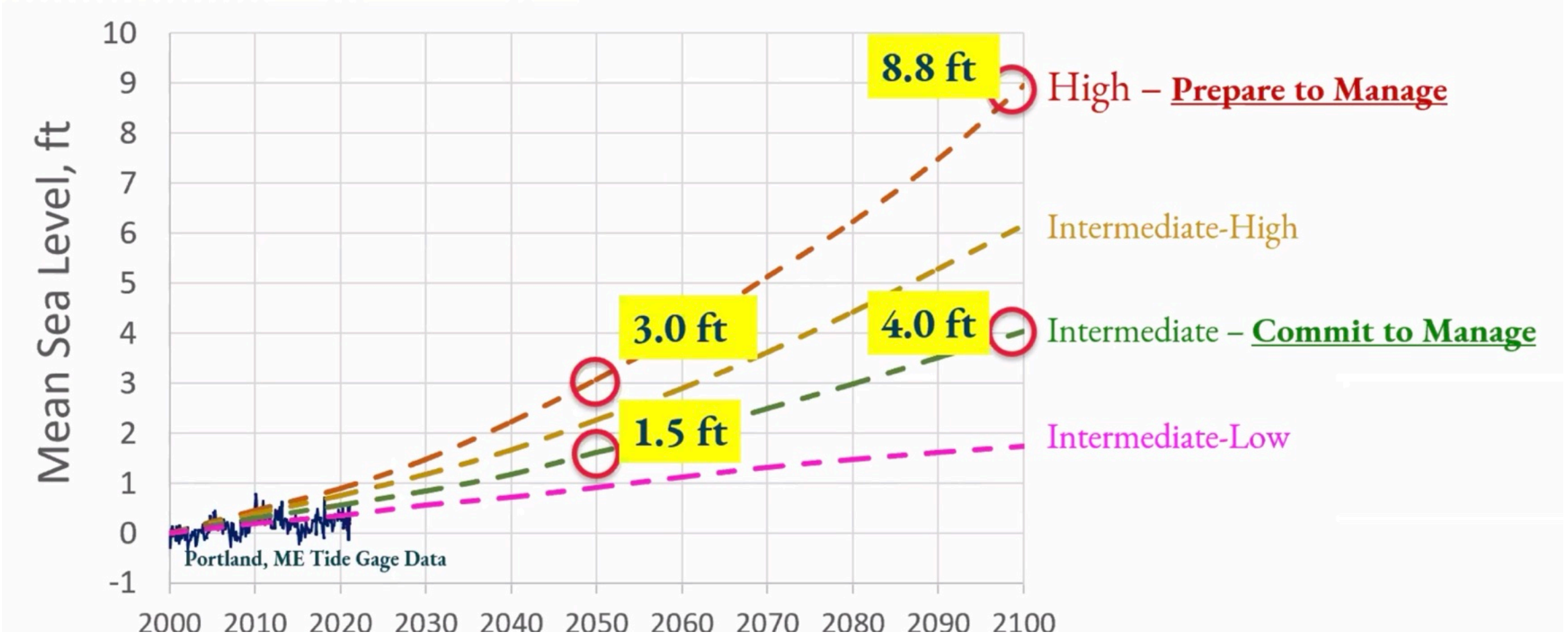
NOAA Sea Level Rise Scenarios and Maine Planning Guidance

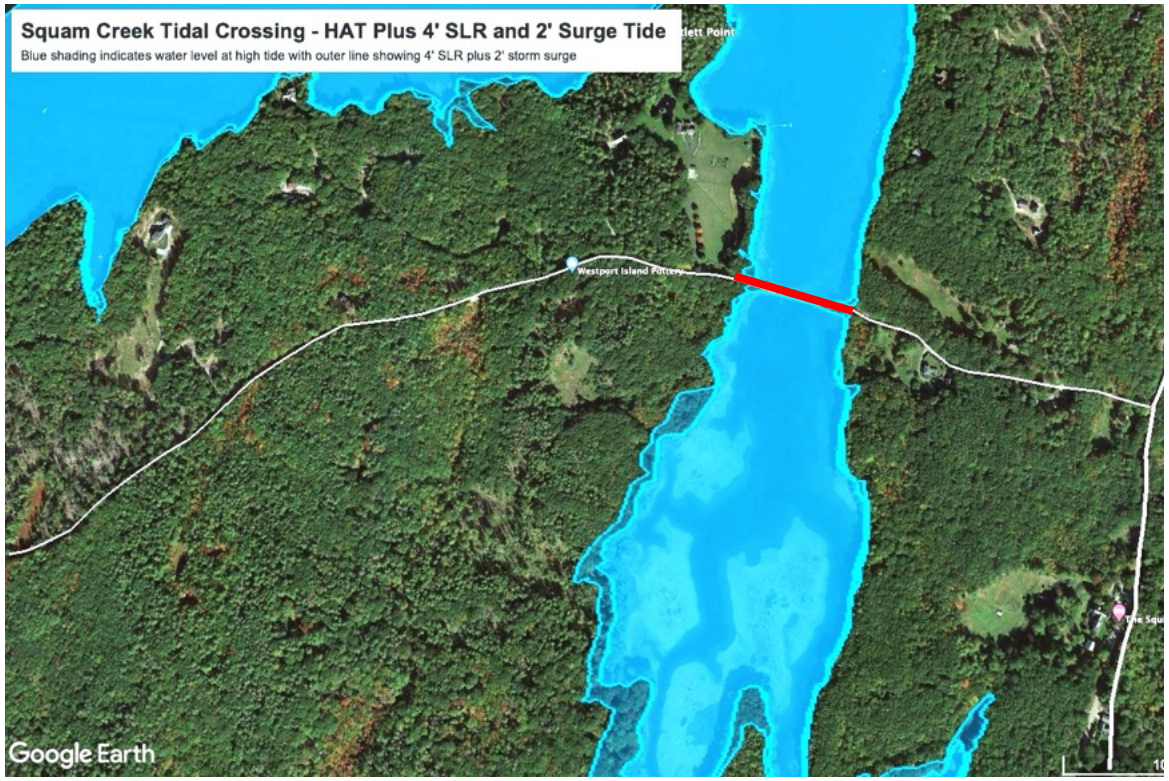


Sea Level Rise and Storm Surge Study Groundrules

- 4-feet of sea level rise by 2100 ("Commit to Manage" guidance for High risk tolerance areas)
- 4.7' of storm surge based on "100-year storm" history
- 1' minimum "freeboard" for overtopping
- Drainage to accommodate 100-year rain intense event

Squam Creek Causeway

"Dike" Causeway at Squam Creek



Causeway Overtopped with 4' sea level rise and 2' storm surge in prior modeling

Squam Creek Causeway – January 10, 2024, 10’ High Tide

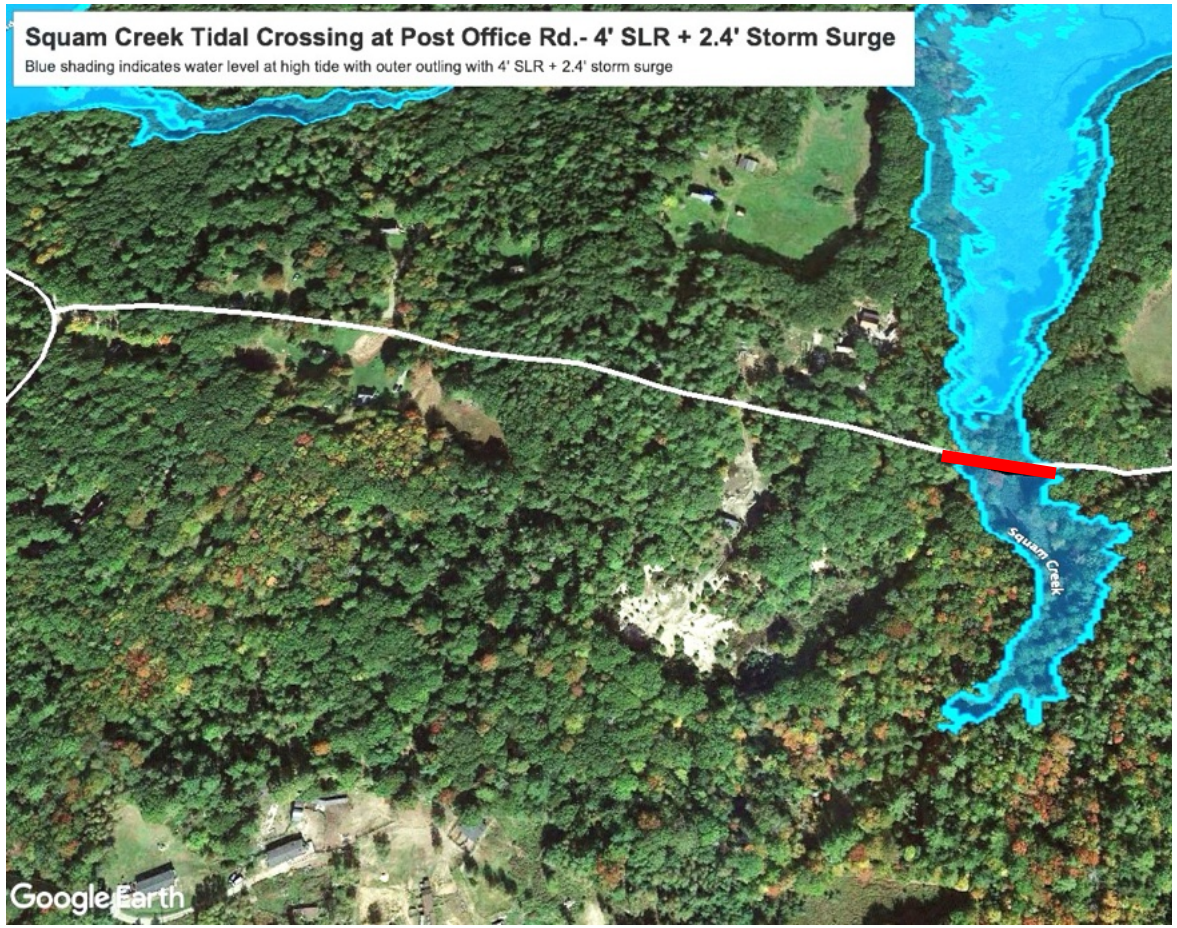
- January 13th storm resulted in serious damage
- 11.30’ King Tide
- 3.27’ Storm Surge
- 14.57’ Water Level (Record height in Portland)

Squam Creek Crossing – Prior to the Causeway

Bridge Crossing prior to Causeway (c.1953)

Bridge crossing collapse resulted in gravel filled causeway and concrete culvert (c. 1955)

Squam Creek at Post Office Road



Squam Creek at Post Office Road

Tidal water approaching crossing today – culvert failing

Runoff flow during January 10, 2024 Storm

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Heal Cove Causeway

Heal Cove tidal crossing

Causeway overtopped with 4' sea level rise and 2' storm surge in prior modeling

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Heal Cove Causeway

January 13th storm resulted in serious damage

11.30' King Tide

3.27' Storm Surge

14.57' Water Level (Record height in Portland)

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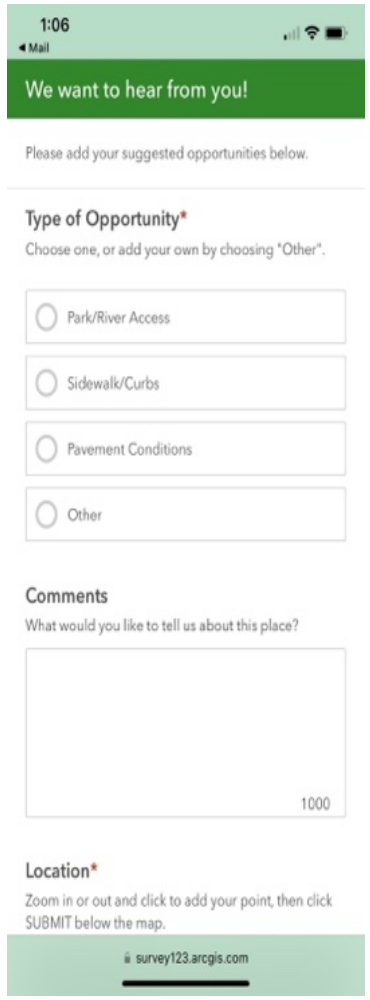
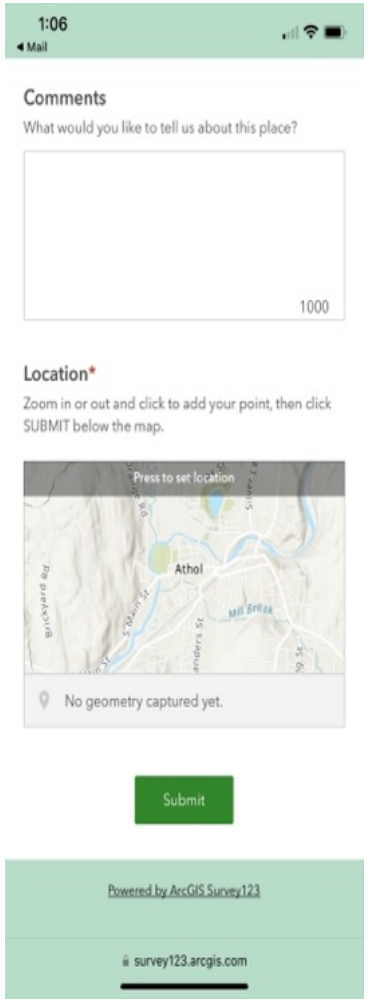
Design Study – Data Collection Phase

- Site topography collected on December 5, 2023.
- Four data loggers deployed. Two at each tidally influenced crossing.
  - KELT deployed data loggers at Post Office Road crossing
- Base mapping using survey data. Supplemented with LiDAR data.
- Hydrologic and Hydraulic modelling of existing conditions and up to three alternatives for each crossing (12 total), for SLR scenario selected.

Design Study – Community & Stakeholder Outreach





- Solicit comments from Town and regulatory stakeholders.
  - Ecological considerations.
  - Social considerations.
- Public outreach through virtual survey.
- Draft report issued to Town for public comment.

Scan the QR code for an example of a story mapping webpage created by Wright-Pierce.

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Design Study – Draft & Final Resiliency Study

- Public input is very important
- Recommended alternatives to consider for each crossing
- Cost opinions prepared for alternatives
  - Discussion on potential funding opportunities to support alternatives
- Presentation of findings to Town

Coastal Resilience Projects: Benefitting Habitats & People

Improving road structures while also increasing the health and resilience of habitats

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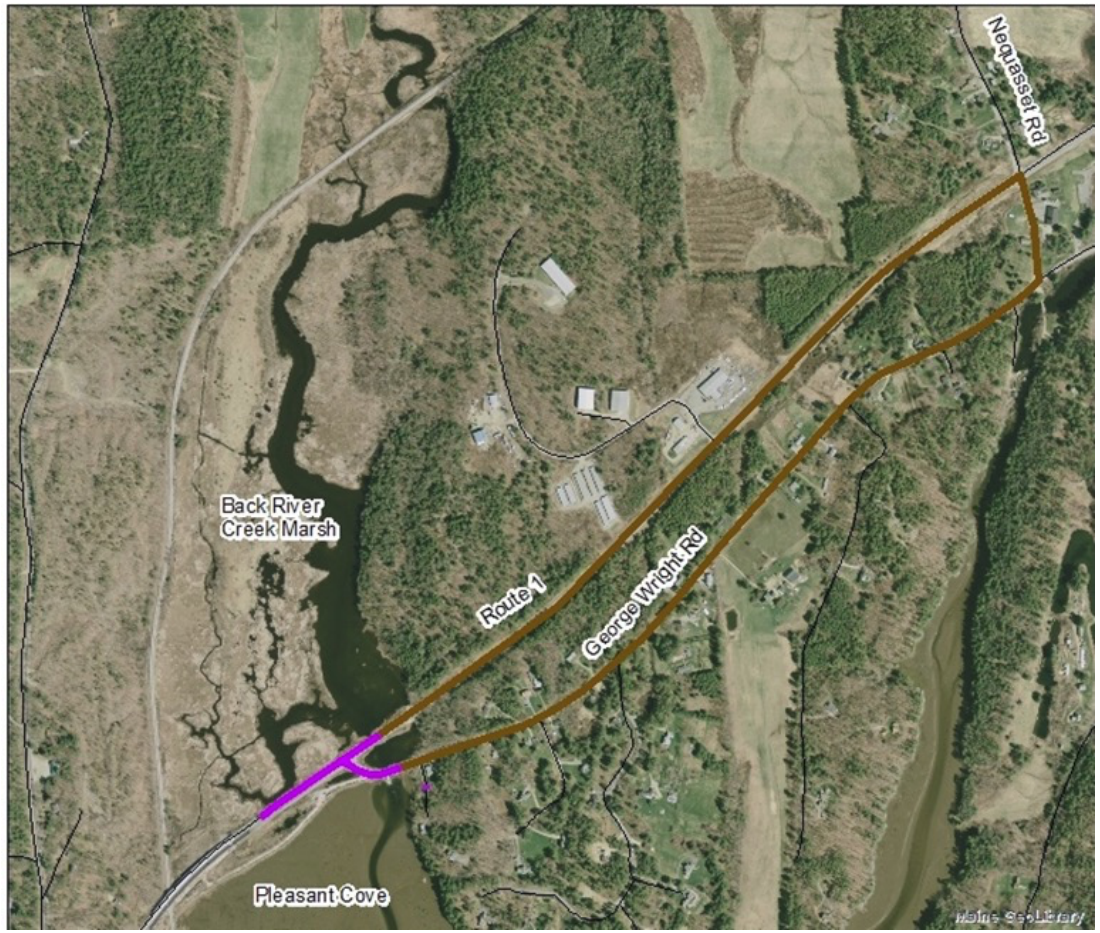
Example of Blending Habitat and Community Needs: Woolwich



Community Goals – Identified by the Town of Woolwich

- Safe road connection to Route 1
- Minimize road maintenance costs
- Good access for emergency services to Route 1
- Ability for tractor trailers to access roads to the south of Route 1
- Less flooding on the town road
- Maintain a boat launch in Pleasant Cove

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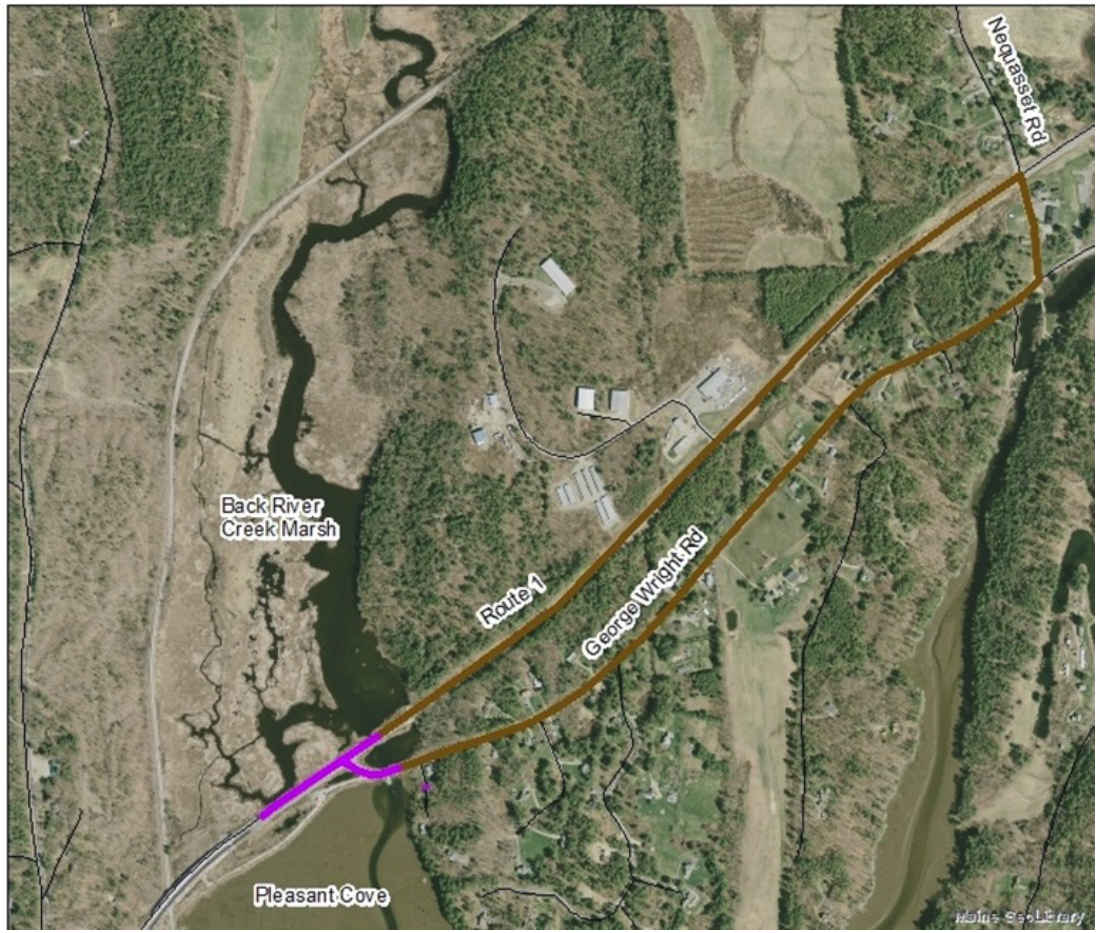

Goals for the Habitat

- Better fish passage
- Connected natural tidal flow in marsh
- Salt water levels are the same upstream and downstream from the road
- More diverse plants
- Fewer invasive plants
- More diverse birds

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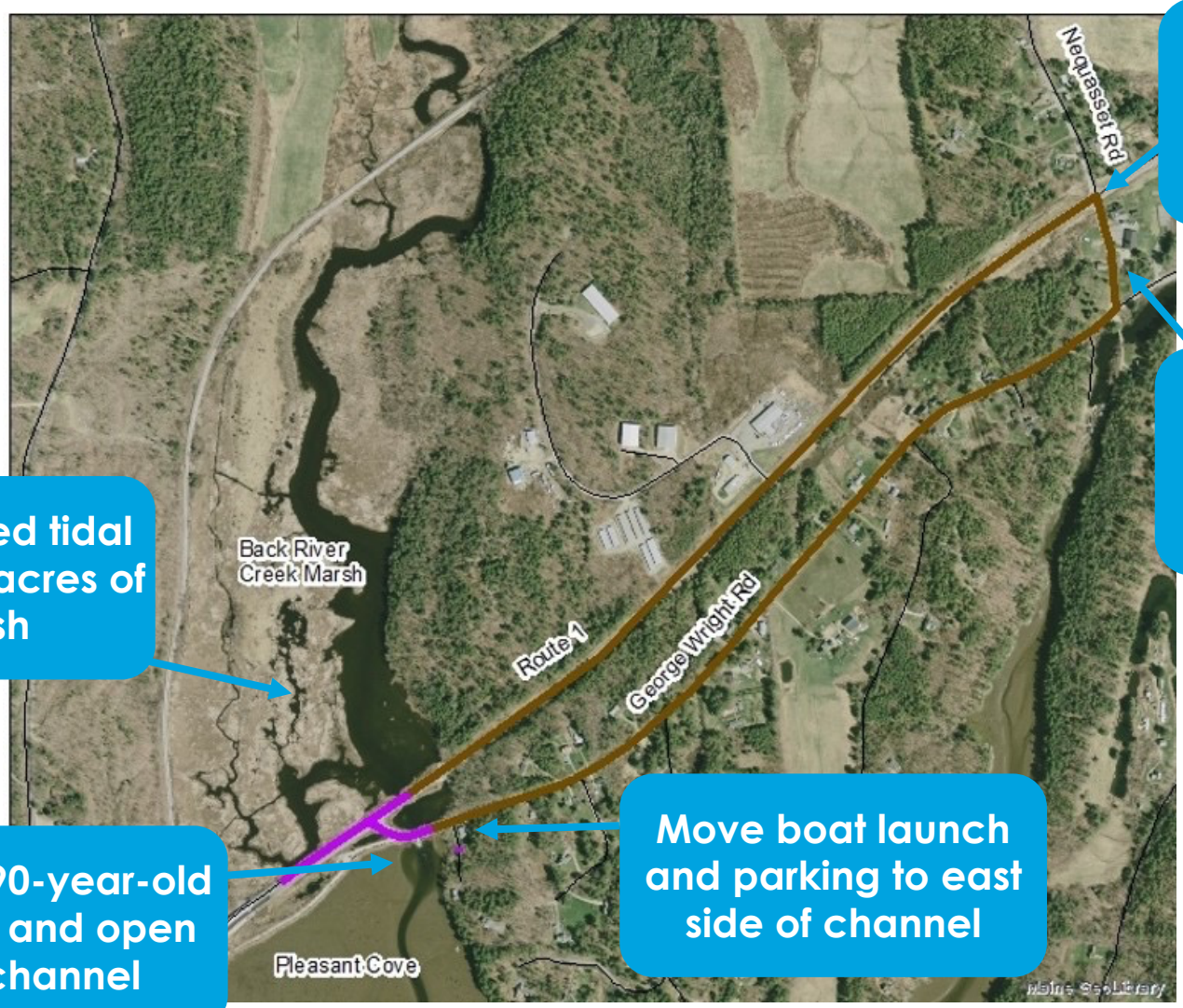

Permanent stop light & improved lanes at Rt 1 / Nequasset Rd intersection

Reconstructed intersection at Nequasset Rd / George Wright Rd

Unrestricted tidal flow to 99 acres of marsh

Move boat launch and parking to east side of channel

Remove 90-year-old structure and open tidal channel

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Identifying Needs and Goals for Westport Island

People
Transportation
Marine resources
Recreation
Buildings

Habitat
Fish passage
Tidal marshes

People: Identifying Community Goals

Transportation

- Safety
- Access to homes
- Construction and maintenance costs
- Other?

8	Occupied Residences Cut off with Flooded Road

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People: Identifying Community Goals

Marine Resource Use

- Clam digging
- Oyster growing
- Fishing

People: Identifying Community Goals

Recreation

- Water available for boats at all tides
- Boats able to safely travel from Squam Creek to the Back River
- Swimming

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People: Identifying Community Goals

Buildings

- **Buildings vulnerable to flooding that may become more or less vulnerable with changes**

0	Buildings that could flood near Squam Creek crossings
2	Buildings that could flood near Heal Pond crossing

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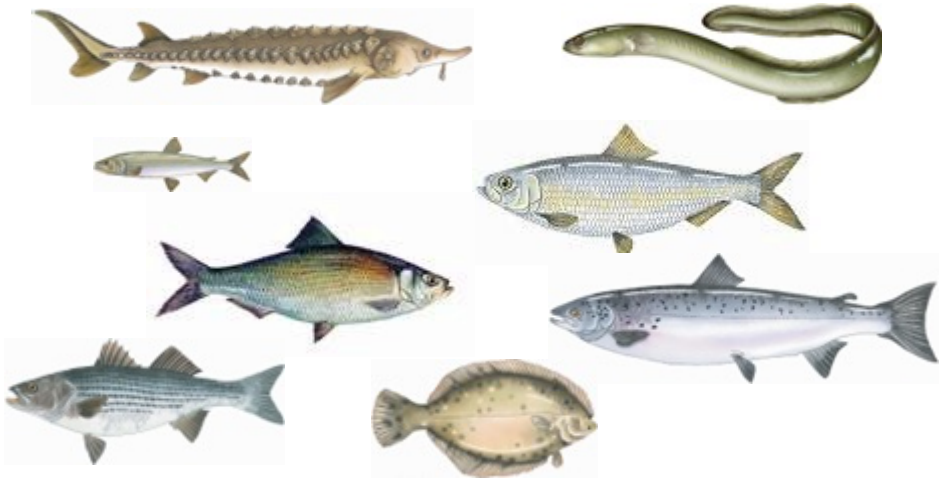
Nature: Identifying Habitat Goals

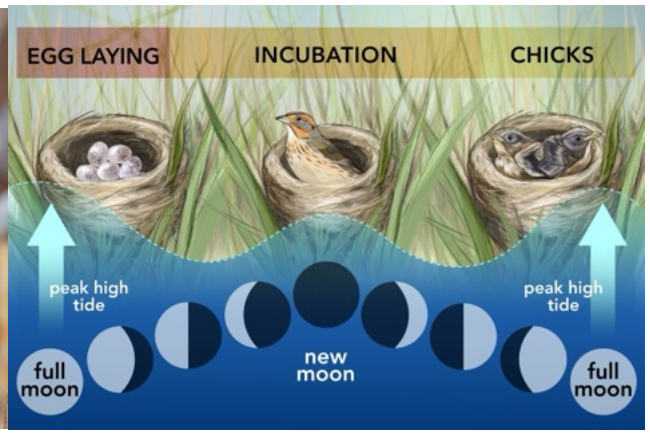
Salt Marsh & Stream Values

- **Commercial Value: "In the Gulf of Maine, estuaries and coastal wetlands are used by two-thirds of commercially valuable fish, shellfish, baitworms and other forage organisms at some point in their life cycles"**



Drawings provided courtesy of the Maine Department of Marine Resources Recreational Fisheries program and the Maine Outdoor Heritage Fund.
Dionne, M., Bonebakker, E., & Grant, K. (2003). Maine's Salt Marshes: Their Functions, Values, and Restoration.

- **Millennium Ecosystem Assessment: "Coastal ecosystems are among the most productive yet highly threatened systems in the world. These ecosystems produce disproportionately more services relating to human well-being than most other systems, even those covering larger total areas, but are experiencing some of the most rapid degradation and loss"**



https://www.allaboutbirds.org/news/sea-change-as-sea-levels-rise-can-saltmarshes-be-saved/
https://www.allaboutbirds.org/guide/Nelsons_Sparrow/photo-gallery/311384101

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Nature: Identifying Habitat Goals

WHAT'S AT RISK? THE VALUE OF TIDAL MARSHES

Tidal marshes provide important services for nature and people. Making way for marsh migration as the sea rises can help reduce the loss of these benefits:

Fish Nurseries	Food and shelter for the young of many species of commercially and recreationally important fishes
Wildlife Habitat	Feeding and breeding areas for dozens of bird and mammal species, including rare species
Flood Protection	Reduction of storm surge and wave damage
Clean Water	Natural filtering that removes waterborne sediment and excess nutrients
Erosion Reduction	Stabilization of shorelines and reduction of erosion
Food Supply	Rich plant growth that builds marsh peat and supports the food web locally and regionally
Carbon Storage	Long-term removal of carbon from the atmosphere
Aesthetics and Recreation	Scenic vistas for recreation, relaxation, and tourism
Education	Living laboratories for teaching science at all grade levels
Self Sustaining	Natural capacity to continue providing ecosystem services despite many environmental changes

Source: *Make Way for Marshes* (Northeast Regional Ocean Council)

Nature: Identifying Habitat Goals

Slide from presentation by Jack Witham, 2023. Illustration © Barbara Harmon. Salt Marshes in the Gulf of Maine, Gulf of Maine Council on the Marine Environment. 2008. p. 14-15.

- The salt marsh is one of the most productive ecosystems in nature with primary productivity rates in some areas comparable to coral reefs and tropical forests

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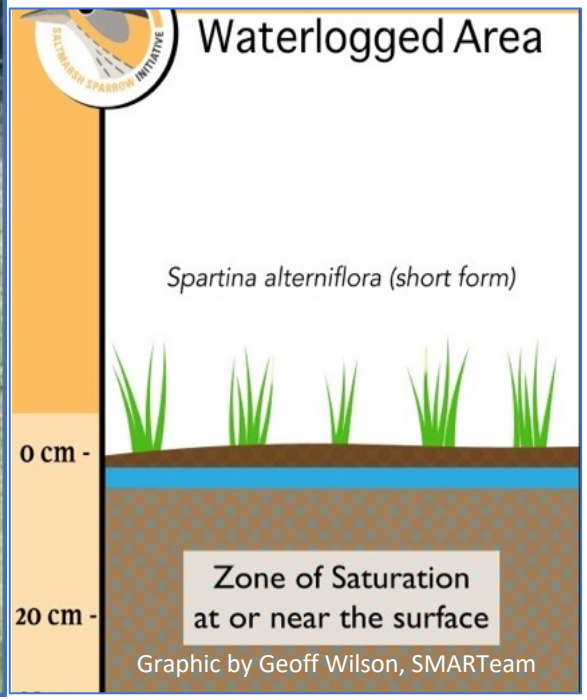
Nature: Identifying Habitat Goals

Salt marshes: Supporting a vulnerable habitat

Squam Creek	Heal Pond	Water Levels
18.6	0	Acres now
47.6	0	Acres +6ft



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Nature: Identifying Habitat Goals

Connected streams and safe fish passage

Squam Creek	Heal Pond	
3.39	0.34	Miles of streams above crossing

Funding

Great grant opportunities available for projects that blend habitat and community needs

Funding is available now from the Bipartisan Infrastructure Law, the Inflation Reduction Act, and other sources:

- National Oceanic and Atmospheric Administration's Transformational Habitat Restoration and Coastal Community Resilience Grant (federal)
- National Fish and Wildlife Foundation's Coastal Resilience Fund (federal)
- FEMA Building Resilience Infrastructure and Communities Grant (federal)
- Maine Infrastructure Adaptation Grant (state)

THANK YOU