



# CoastWise

## Achieving Ecological Resilience and Climate-Ready Road Crossings in Tidal Environments

**Maine Sustainability & Water Conference**

March 30, 2023

**Jacob Aman**

Ellen Bartow-Gillies

Jeremy Bell

William Bennett

Robert Blunt

**Michael Burke**

Jamie Carter

Matthew Craig

Claire Enterline

Jeremy Gabrielson

Robert Hamilton

Slade Moore

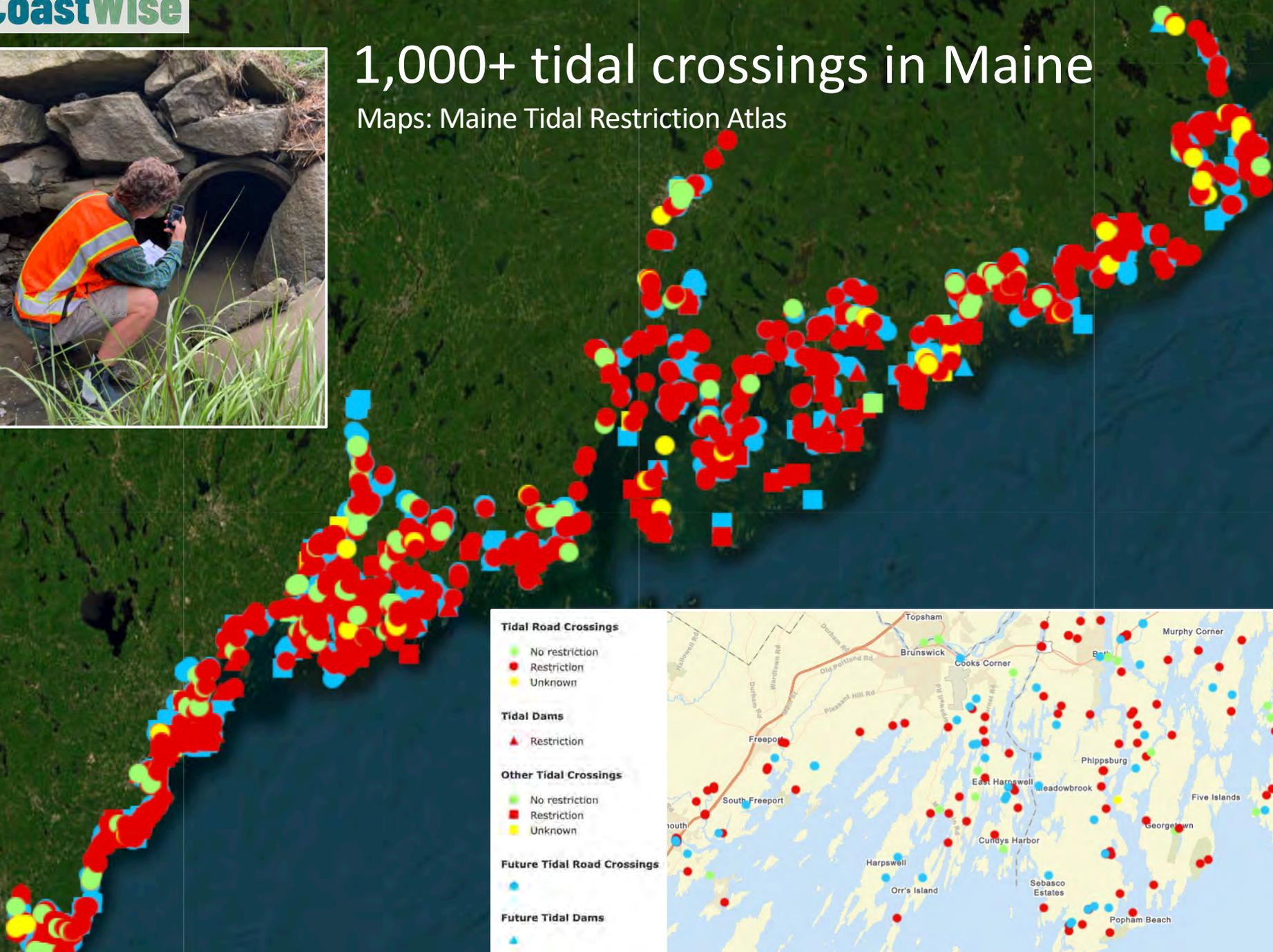
Matthew Schultz

Peter Taylor

Sarah Widing

# 1,000+ tidal crossings in Maine

Maps: Maine Tidal Restriction Atlas



**Tidal Road Crossings**

- No restriction
- Restriction
- Unknown

**Tidal Dams**

- ▲ Restriction

**Other Tidal Crossings**

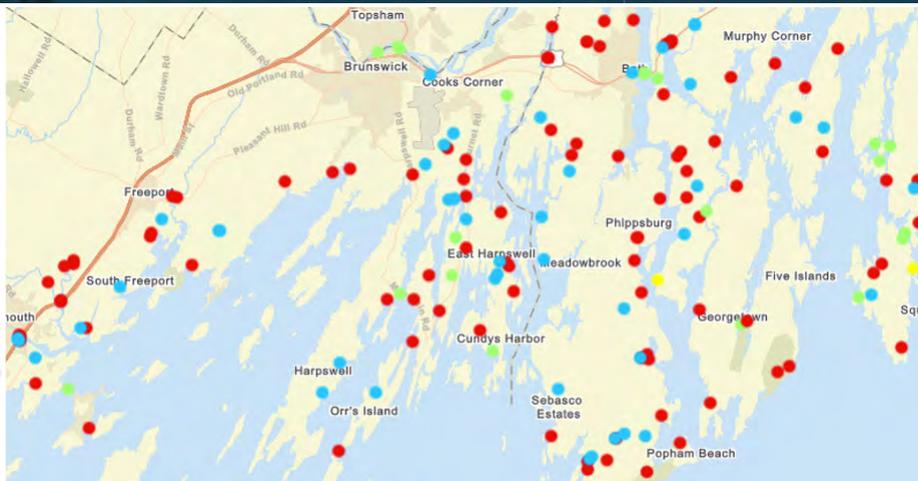
- No restriction
- Restriction
- Unknown

**Future Tidal Road Crossings**

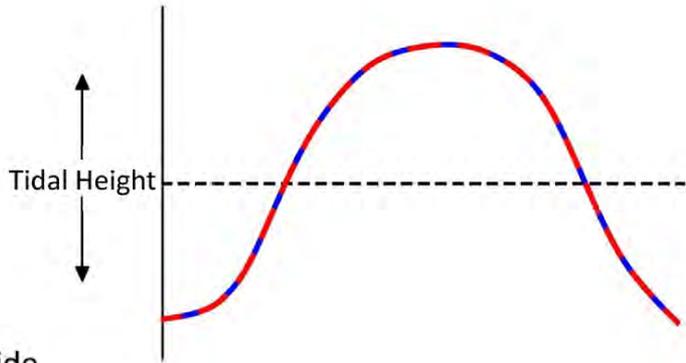
- 

**Future Tidal Dams**

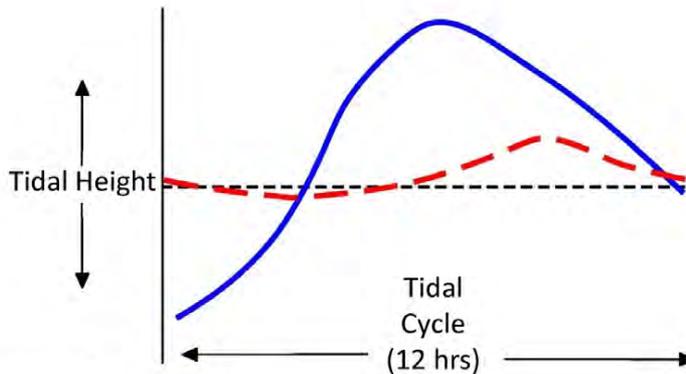
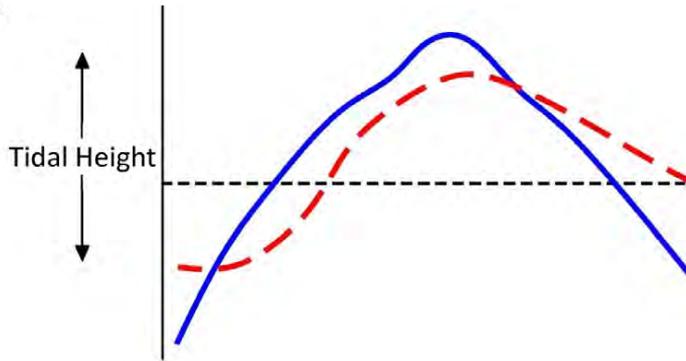
- ▲



# Many crossings block or restrict tidal flow

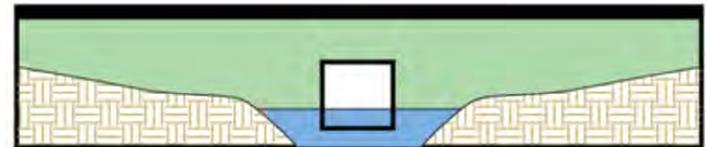


— Seaward side  
— Inland side  
- - - Mean Tide



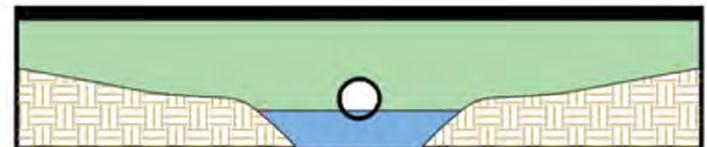
**UNRESTRICTIVE CROSSING**

This crossing features a bridge span that exceeds the wetland width. As a result, the graph indicates little to no difference between the magnitude and timing of seaward and inland tidal water levels. It's unlikely to restrict flow except during the highest tides of the year, and then only marginally.



**RESTRICTIVE CROSSING**

At this site, the incoming tide must attain the perched crossing's outlet height before flowing upstream. Inland water levels drain slower than the seaward side because the culvert is undersized and the perch prevents full drainage. The differences between seaward and inland conditions are likely to increase during spring tides.



**SEVERELY RESTRICTIVE CROSSING**

This culvert is even smaller and perched higher than the example above. That causes a major lag in the timing of high and low tide and greatly suppressed upstream tide heights. It also allows less drainage of the inland side. These differences would be even more pronounced during spring tides and major precipitation events.

Tidal restrictions impact:

- ❖ Road infrastructure
- ❖ Public safety
- ❖ Ecosystem



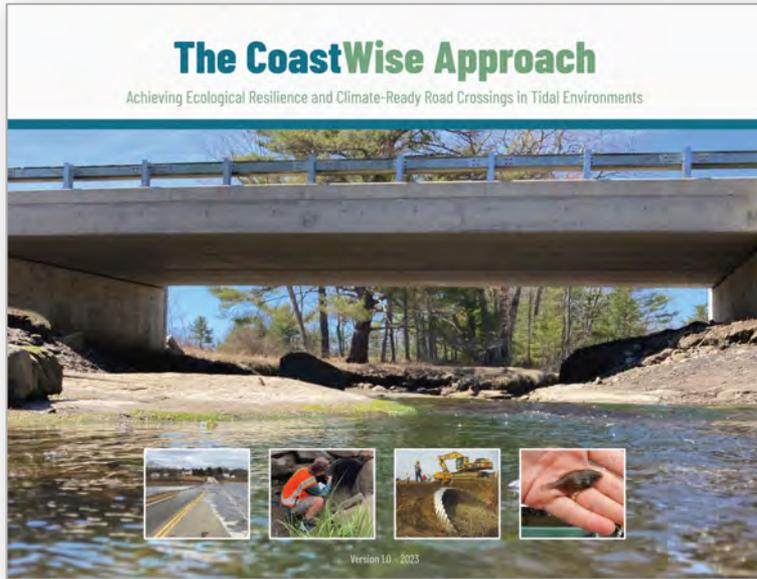
CoastWise provides a new framework for voluntarily addressing impacts of tidal crossings:

- ❖ Best practices
- ❖ Decision-making tools
- ❖ Path for designing safe, cost-effective, ecologically supportive, and climate-resilient tidal crossings

Similar to Stream Smart, but tailored for the added complexity of tidal environments

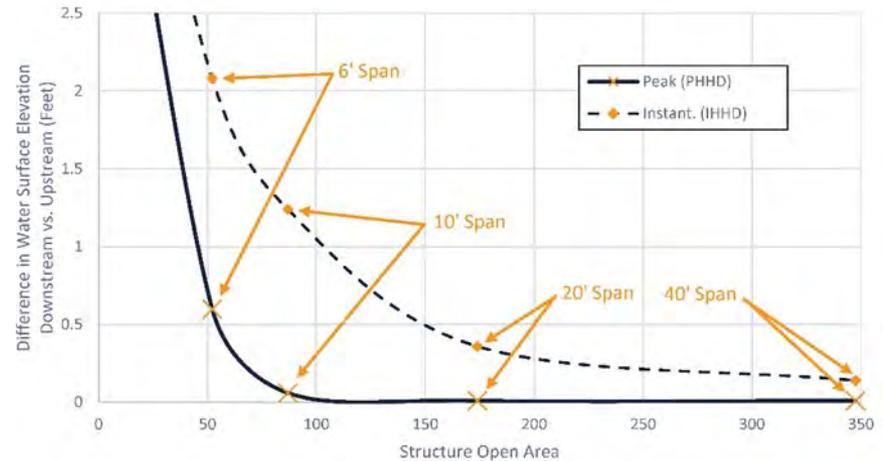


# COASTWISE MANUAL



- ❖ Developed over 3 years by multi-state working group, steering committee, engineering team, and media expert
- ❖ To be released April 2023

# ANALYSIS OF DESIGN CRITERIA

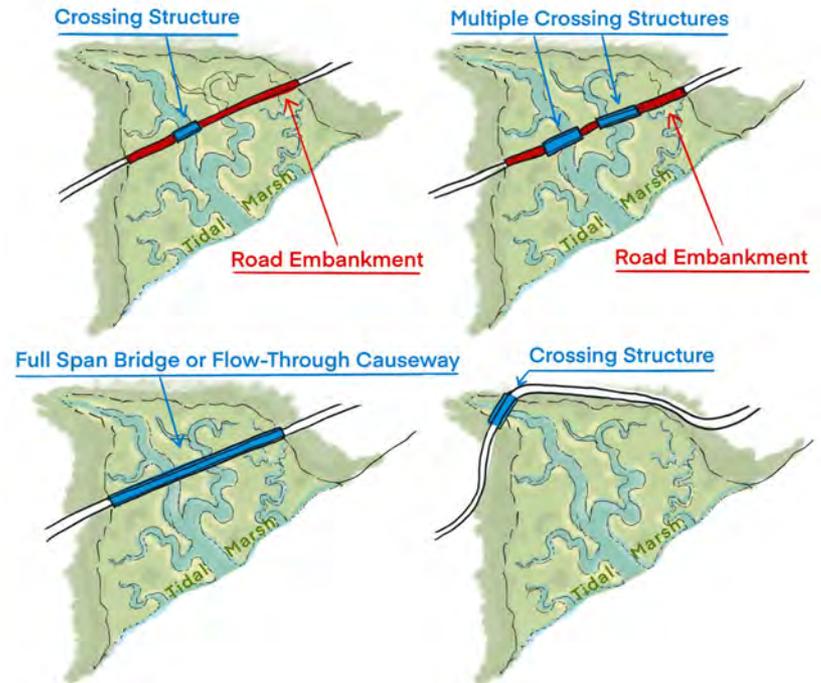


- ❖ Ongoing supplemental study to be completed 2023
- ❖ Based on analysis of modeling approaches and results at existing project sites for future conditions

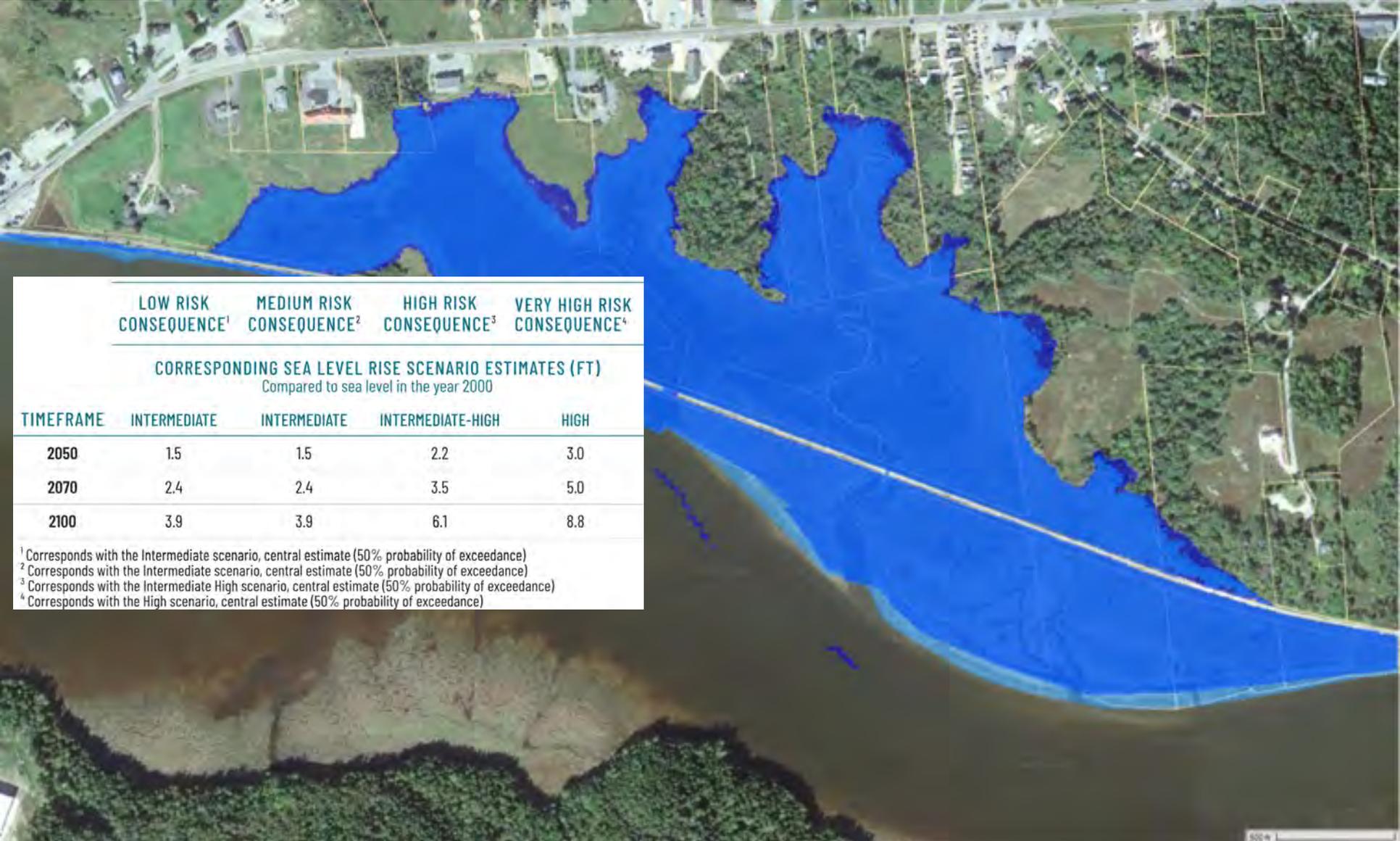
# COASTWISE PRINCIPLES

High-level guidance about the CW approach

- ❖ Know your tidal crossing
- ❖ Start early
- ❖ Ask for advice
- ❖ Engage qualified engineers
- ❖ Involve local participants
- ❖ Identify risk factors
- ❖ Plan for coastal change
- ❖ Establish objectives
- ❖ Size crossing for resilience



## Selection of sea level rise (SLR) scenarios for CW projects based on risk consequence



LOW RISK CONSEQUENCE<sup>1</sup>    MEDIUM RISK CONSEQUENCE<sup>2</sup>    HIGH RISK CONSEQUENCE<sup>3</sup>    VERY HIGH RISK CONSEQUENCE<sup>4</sup>

**CORRESPONDING SEA LEVEL RISE SCENARIO ESTIMATES (FT)**  
Compared to sea level in the year 2000

TIMEFRAME	INTERMEDIATE	INTERMEDIATE	INTERMEDIATE-HIGH	HIGH
2050	1.5	1.5	2.2	3.0
2070	2.4	2.4	3.5	5.0
2100	3.9	3.9	6.1	8.8

<sup>1</sup> Corresponds with the Intermediate scenario, central estimate (50% probability of exceedance)  
<sup>2</sup> Corresponds with the Intermediate scenario, central estimate (50% probability of exceedance)  
<sup>3</sup> Corresponds with the Intermediate High scenario, central estimate (50% probability of exceedance)  
<sup>4</sup> Corresponds with the High scenario, central estimate (50% probability of exceedance)

# PROJECT PHASES

1. Preliminary Site Assessment
2. Detailed Field Investigation
3. Performance Objectives & Design Criteria
4. Development & Evaluation of Conceptual Design Alternatives
5. Design & Permitting
6. Construction
7. Monitoring for Success

# NEXT STEPS

- ❖ April 2023: CoastWise Manual release
- ❖ Summer 2023: Conclusion of sizing criteria analysis & updates to manual
- ❖ 2023-24: Workshops & trainings

**For more information:**

Bill Bennett, USFWS  
Jacob Aman, WNERR  
Matt Craig, CBEP  
Jeremy Gabrielson, MCHT

[william\\_bennett@fws.gov](mailto:william_bennett@fws.gov)  
[jaman@wellsnerr.org](mailto:jaman@wellsnerr.org)  
[matthew.craig@maine.edu](mailto:matthew.craig@maine.edu)  
[jgabrielson@mcht.org](mailto:jgabrielson@mcht.org)

