



Facilitating Climate Adaptation Strategies for Marblehead and its Harbor

Funded by MA Coastal Zone Management Coastal Resiliency Grant

Barbara Warren, Salem Sound Coastwatch Executive Director

Photo credit: Salem Sound Coastwatch

Project Goal

The Town and residents will better understand its climate vulnerabilities and future impacts and the importance of public/private partnerships in order to evaluate different climate resilient adaptive options, make better informed decisions and set priorities for the Harbor.



Photo credit: Salem Sound Coastwatch

Project Objectives

1. Identify vulnerable areas at risk of coastal flooding under present day and projected future climate change conditions
2. Prioritize public infrastructure at risk under current, 2030, 2050 and 2070 scenarios
3. Develop preliminary strategies to protect the most vulnerable areas from storm surge flooding, sea level rise and more intense storms
4. Communicate climate change impacts and Marblehead's vulnerabilities to the community
5. Explore public/private partnerships



February 3, 2020 - 1st presentation 282 people attended
Available for viewing at <https://vimeo.com/393491717>

The Future of Marblehead Harbor:

Probabilistic Modeling of Flooding and how it can
Help Communities Adapt to the Changing Climate

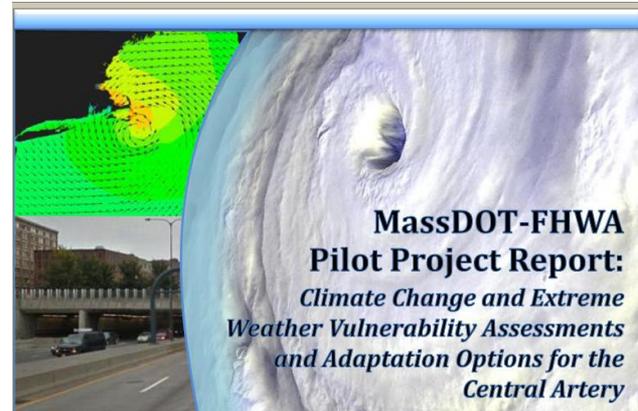
Town of Marblehead, MA

Kirk F. Bosma, P.E.
kbosma@woodsholegroup.com



Summary

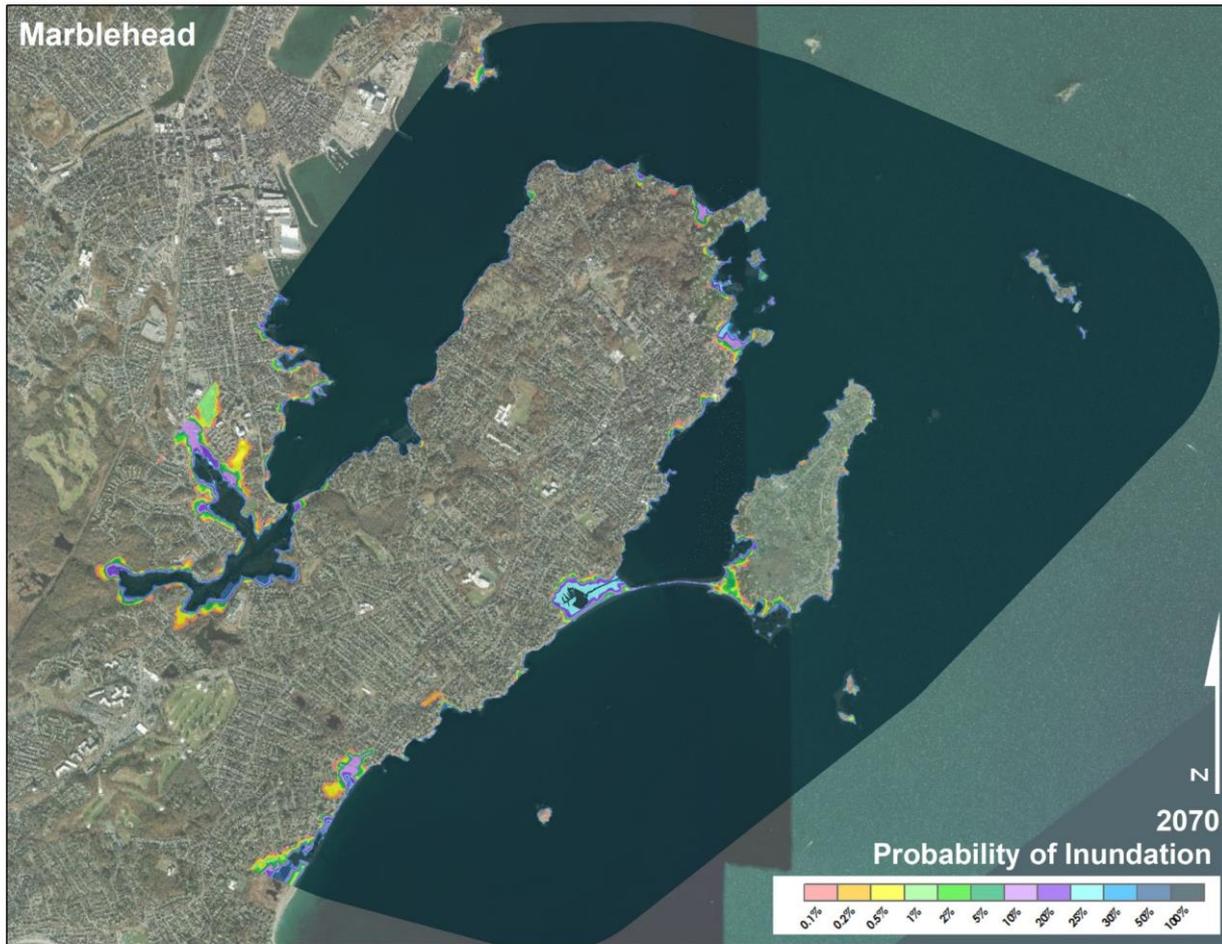
1. Woods Hole Group worked for MassDOT to develop high-resolution flooding results based on projected climate change scenarios.
2. The modelling was peer-reviewed by Technical Advisory Committee - WHOI, USGS, NOAA, USACE, and USEPA
3. Probability based results can be effectively used to assess vulnerabilities and prioritize planning.

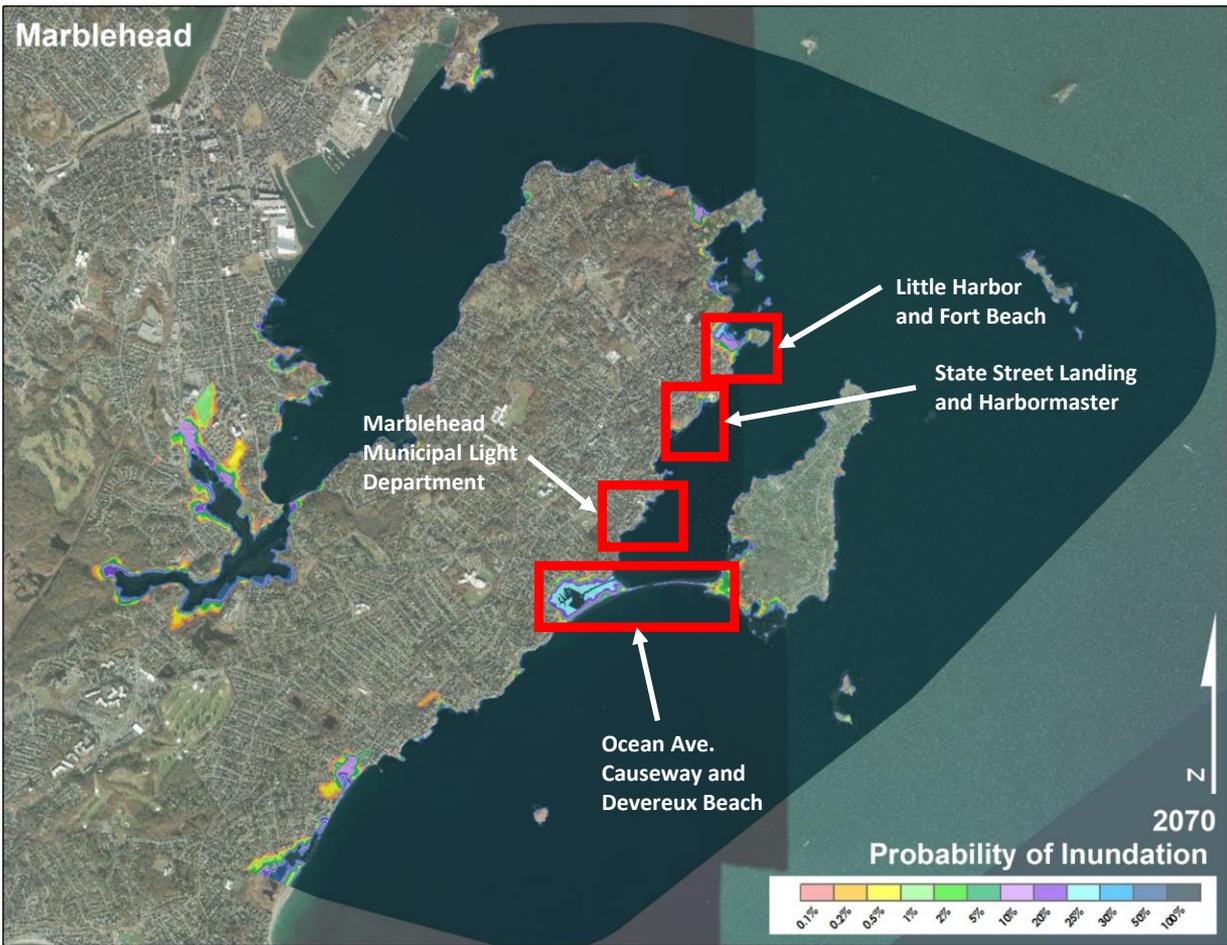


1. What is the probability of assets flooding?
2. What assets are vulnerable?
3. What should be a priority?
4. What interventions are available?



Marblehead





Town selected four Focus Areas:

- Little Harbor and Fort Beach
- State Street Landing and Harbormaster
- Marblehead Municipal Light Dept.
- Ocean Ave. - Causeway, Riverhead and Devereux Beaches



August 17th 2020 - 2nd presentation online > 85 people attended
Available for viewing at <https://vimeo.com/450127541>

The Future of Marblehead Harbor:

Climate Adaptation: Themes and Concepts

Town of Marblehead, MA

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Adaptations based on Three SCENARIO THEMES

near, mid and long-term strategies
to increase coastal resiliency for at risk area around the Harbor

NATURAL RESOURCES

Emphasize ecosystem health and resilience



PROTECTION

Emphasize protection and maintenance of infrastructure and current use



TRANSFORM

Emphasize a balance of uses now with a vision of potential transformation of future flood prone areas.



Conceptual Adaptations for Marblehead Harbor

What they are...

- Identification of critical assets and locations at risk
- Conceptual options and ideas for planning purposes
- Flexible and adaptive possibilities
- Individual elements that can be assembled in different ways
- Guidance on timing of actions – when they may be needed
- Dialogue starters & expand thinking about possibilities

What they are NOT...

- Final recommendations on how to proceed
- Design plans

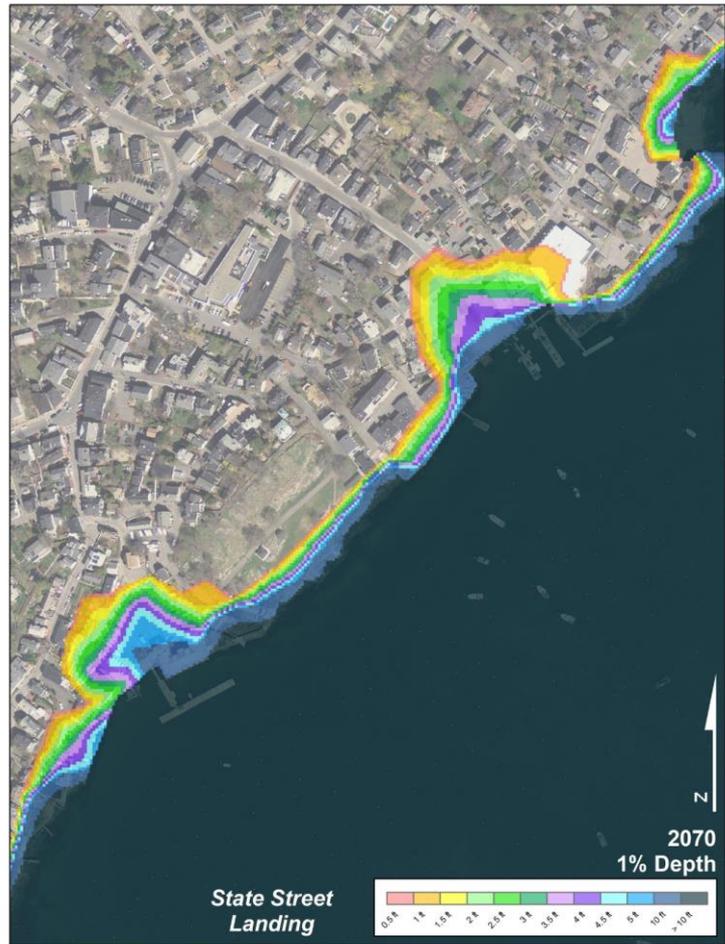
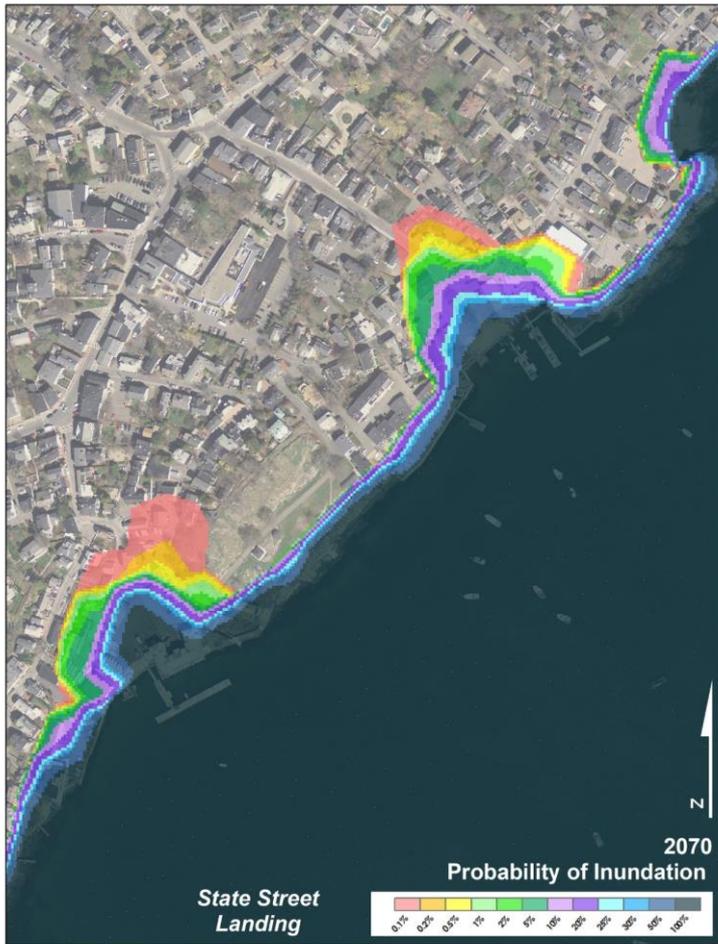
What they Ignore...

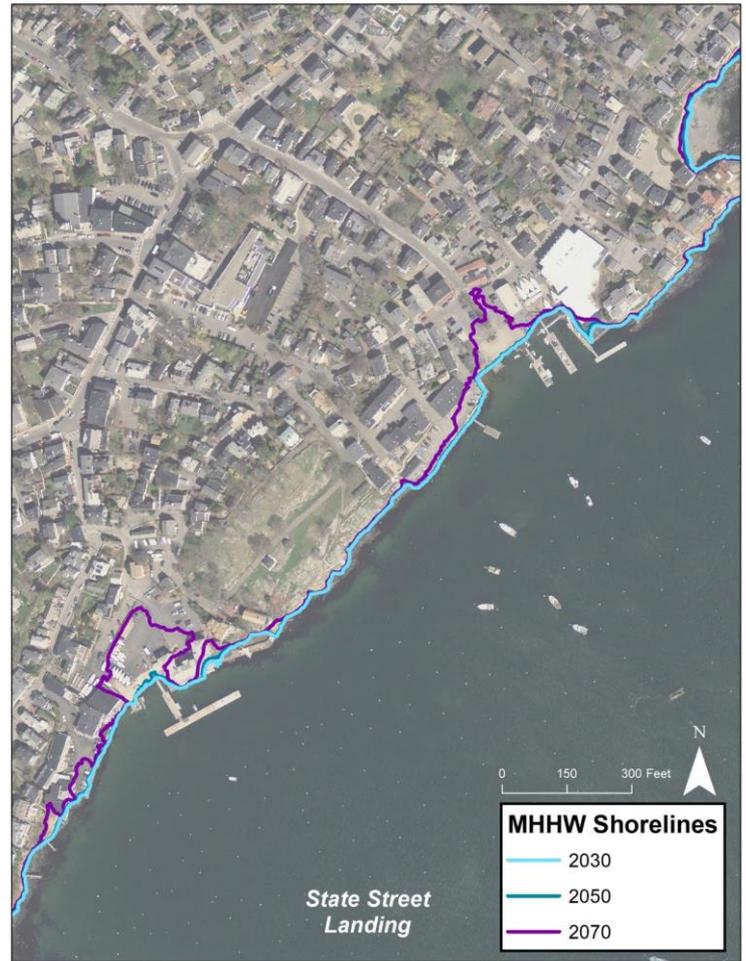
- Permitting regulations
- Public and private property restrictions

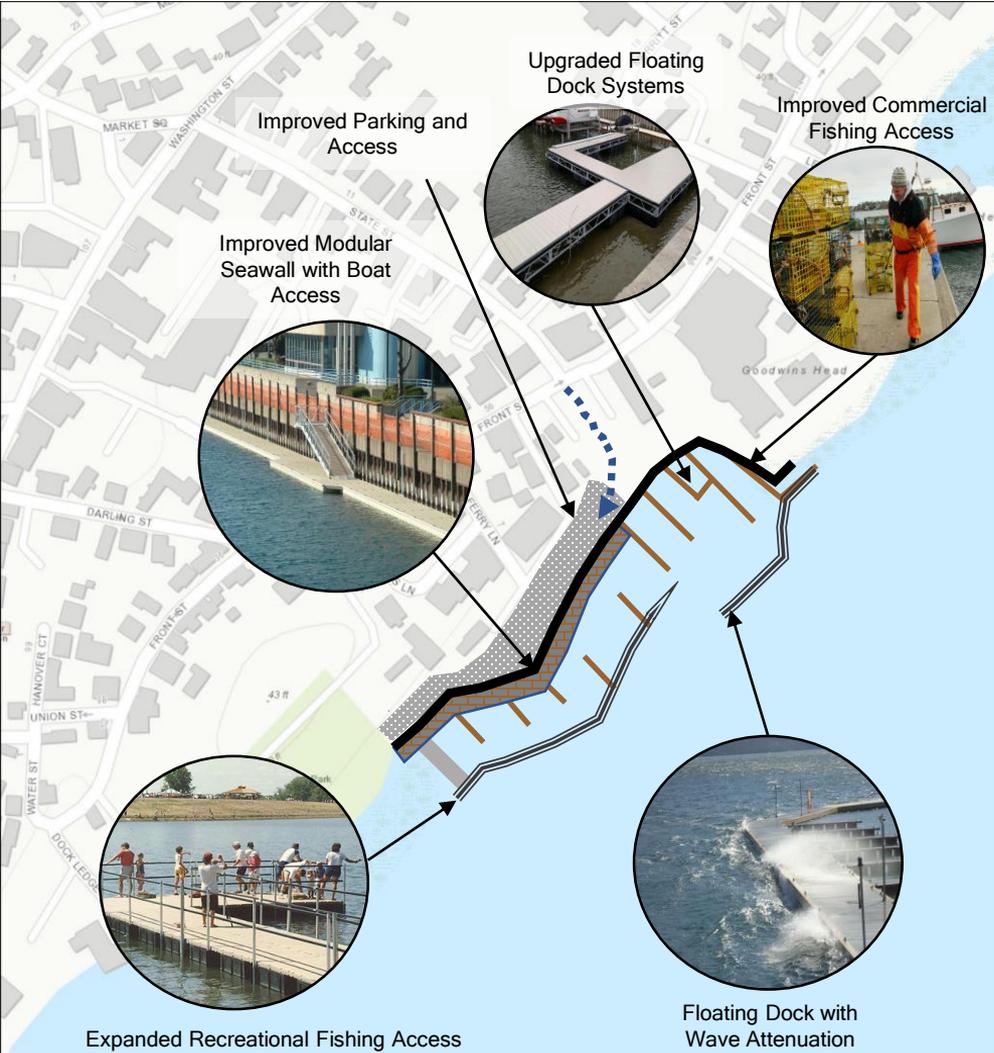


State Street Landing & Harbormaster's









PROTECTION

Emphasize protection and maintenance of infrastructure and current use

Flexible, Phased Adaptation and Implementation Plan

Time Horizon	Adaptation Measures
Near-Term (Now - 2030)	<ul style="list-style-type: none"> Evaluate geotechnical and sub-surface conditions at seawall and bulkheads Planning for seawall/bulkhead improvement and repairs Construction of new concrete floating dock system with wave attenuation Improve Fishing Access
Mid-Term (2030 - 2070)	<ul style="list-style-type: none"> Repair subsurface conditions under parking and State St. Landing areas. Design and construct new modular industrial seawall and floating dock systems
Long-Term (2070 +)	<ul style="list-style-type: none"> Add modular sections to seawall and bulkhead systems to provide added protection under climate change conditions



NATURAL RESOURCES

Emphasize ecosystem health and resilience

Flexible, Phased Adaptation and Implementation Plan

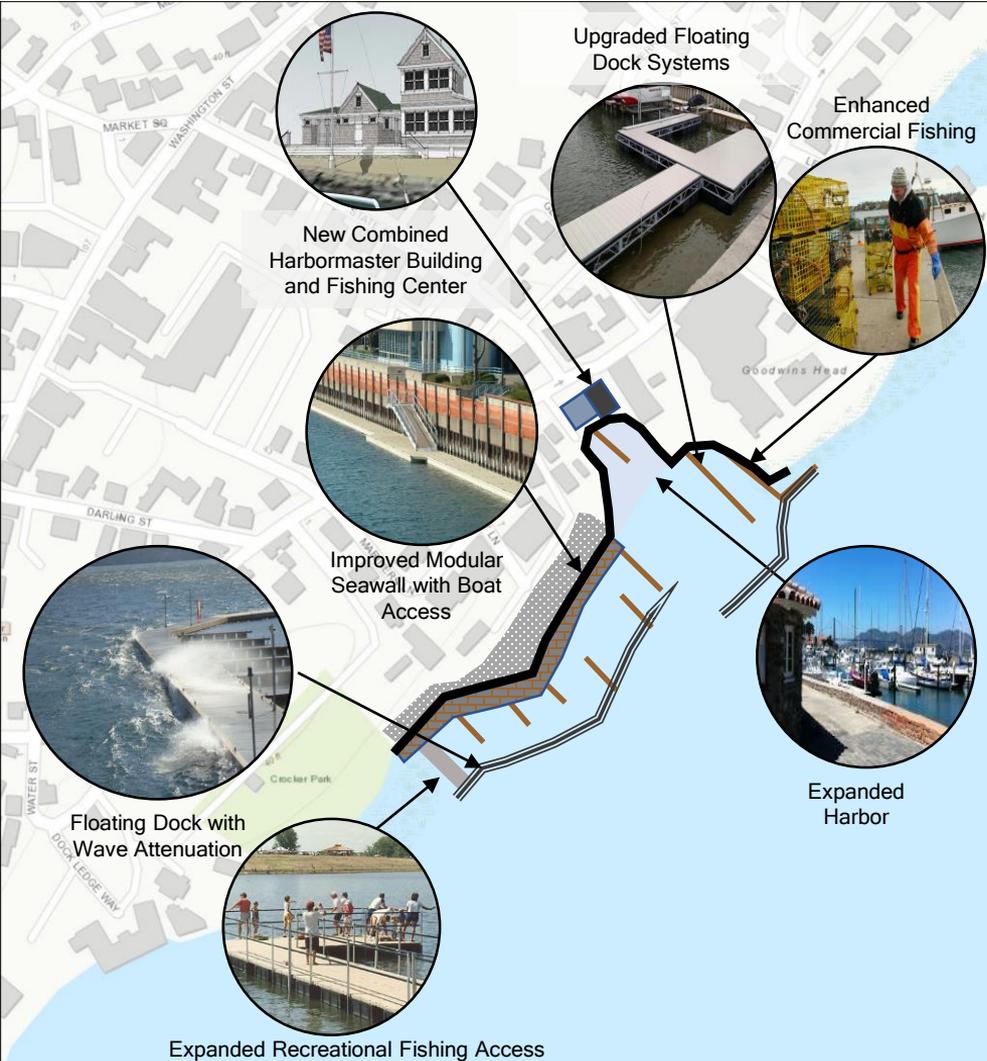
Time Horizon	Adaptation Measures
Near-Term (Now - 2030)	<ul style="list-style-type: none">▪ Evaluate geotechnical and sub-surface conditions at seawall and bulkheads▪ Planning for seawall/bulkhead improvement and repairs and integration of open space▪ Construction of new concrete floating dock system with wave attenuation▪ Improve Fishing Access
Mid-Term (2030 - 2070)	<ul style="list-style-type: none">▪ Repair subsurface conditions under parking and State St. Landing areas.▪ Design and construct new modular industrial seawall and floating dock systems▪ Construction of open space and observation dock area▪ Design of berm around edge of park / open space
Long-Term (2070 +)	<ul style="list-style-type: none">▪ Add modular sections to seawall and bulkhead systems to provide added protection under climate change conditions▪ Integration of berm to reduce elevated seawall in areas



Emphasize a balance of uses now with a vision of potential transformation of future flood prone areas.

Flexible, Phased Adaptation and Implementation Plan

Time Horizon	Adaptation Measures
Near-Term (Now - 2030)	<ul style="list-style-type: none"> Evaluate geotechnical and sub-surface conditions at seawall and bulkheads Planning for seawall/bulkhead improvement and repairs and integration of expanded harbor Construction of new concrete floating dock system with wave attenuation Improve Fishing Access
Mid-Term (2030 - 2070)	<ul style="list-style-type: none"> Repair subsurface conditions under parking and State St. Landing areas. Design and construct new modular industrial seawall and floating dock systems Construction of new expanded harbor area
Long-Term (2070 +)	<ul style="list-style-type: none"> Add modular sections to seawall and bulkhead systems to provide added protection under climate change conditions





Little Harbor and Fort Beach

Protection

Natural Resources

Transform

near, mid and long-term



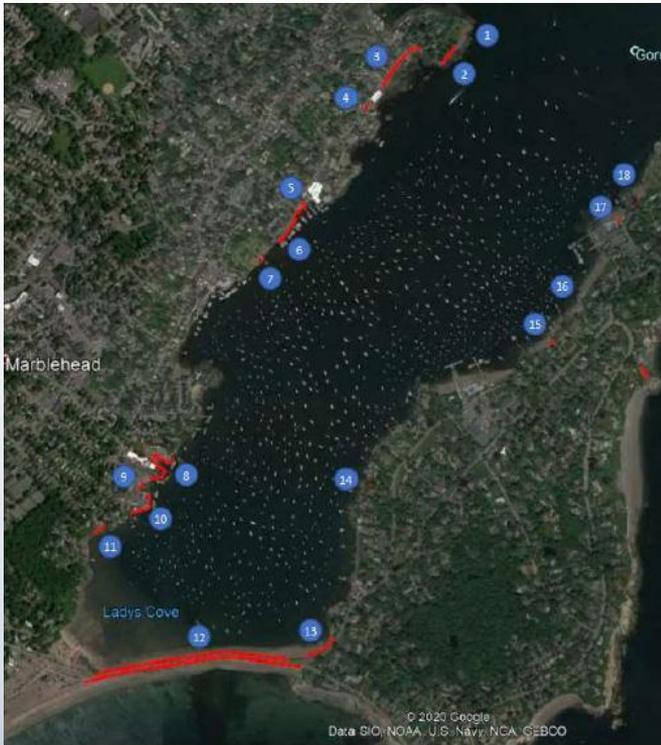
Ocean Ave. and Causeway
Riverhead and Devereux Beaches
Goldthwait Marsh



MMLD

Marblehead Municipal Light Department

Marblehead Harbor Municipal Structures Visual Assessment Report



Location map of 18 municipal structure locations around Marblehead Harbor

Evaluated current condition of
Marblehead Harbor municipal seawalls
- 24 structures at 18 locations

Provided potential future resiliency
options for each structure

Stakeholder Engagement Throughout the Project

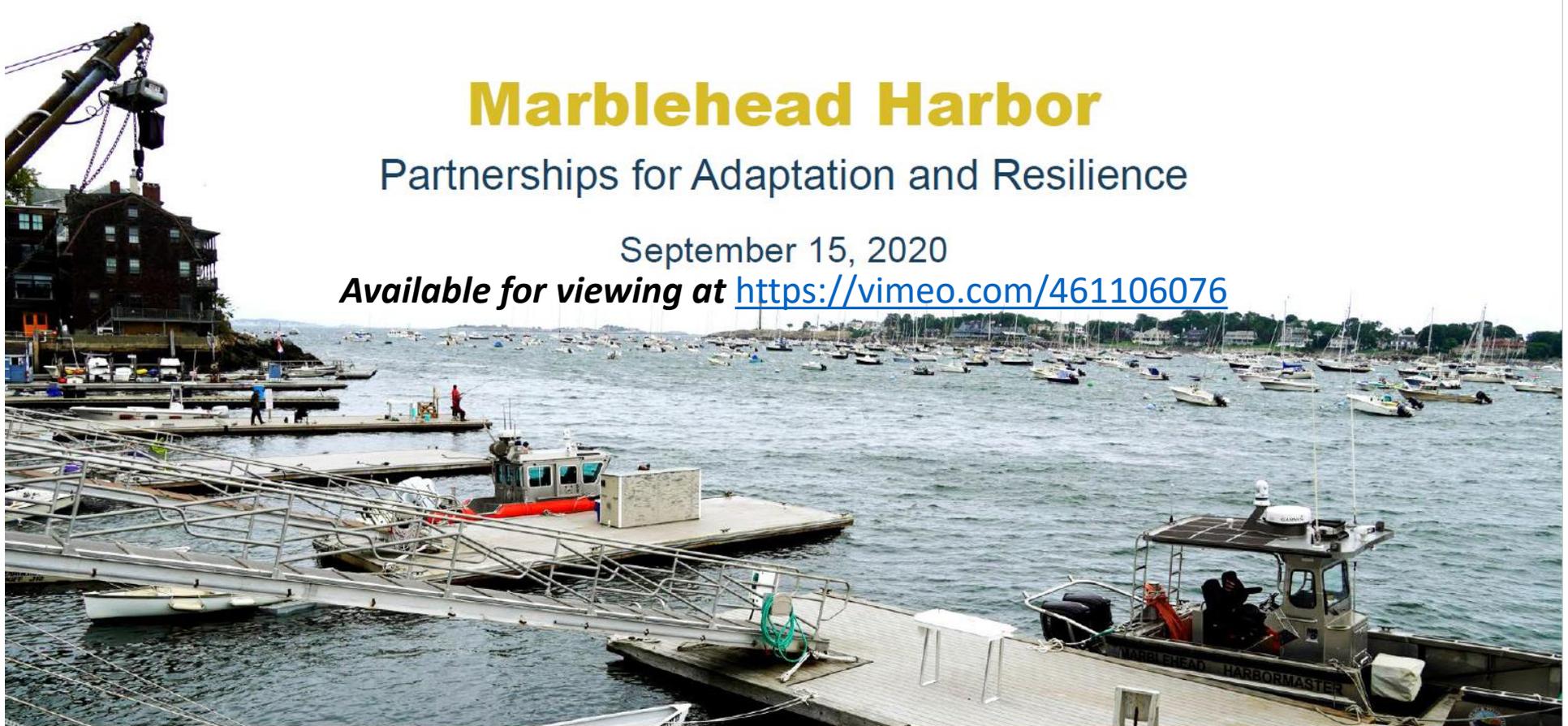
- Spoke with individual and groups in person and online to hear their stories of past storm experiences and present day concerns
- Followed up after presentations to answer questions and again hear people's reactions and thoughts
- Finally, in an effort to reach more people, conducted an online Community Survey
 - another opportunity to be hear from more people.

Marblehead Harbor

Partnerships for Adaptation and Resilience

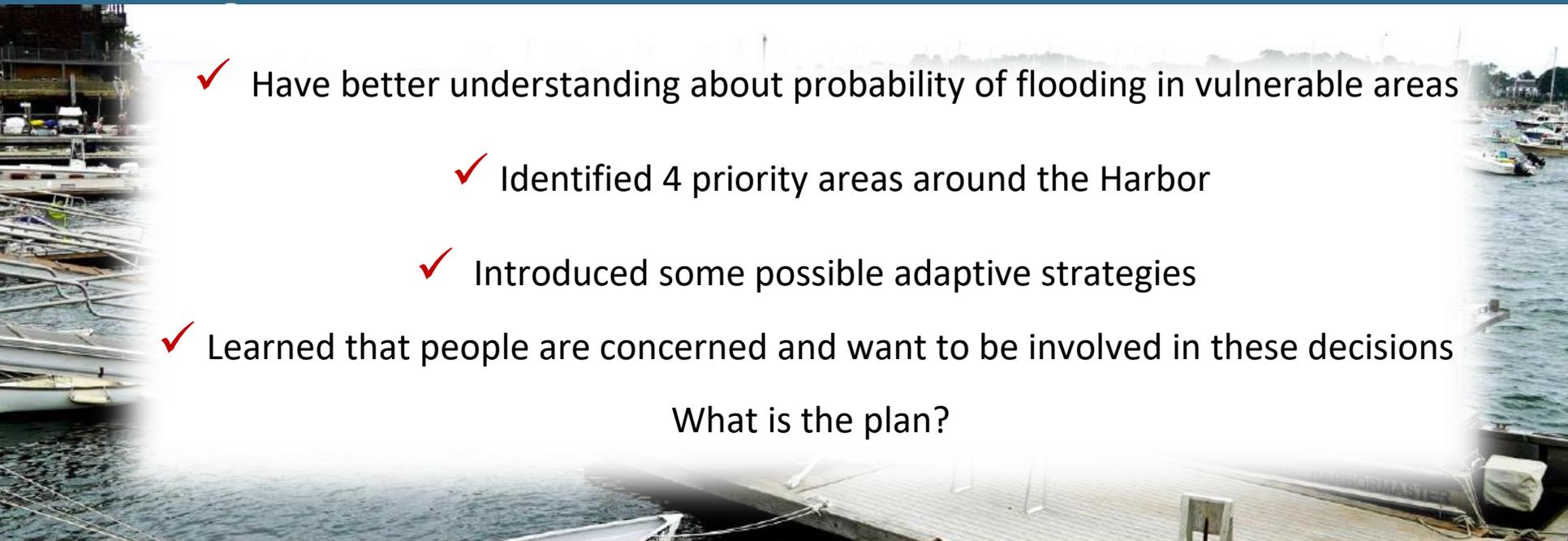
September 15, 2020

Available for viewing at <https://vimeo.com/461106076>



Sarah Slaughter, Built Environment Coalition
Jim Newman, Linnean Solutions

“The benefits of strong and early action far outweigh the economic costs of not acting.” - The Stern Review, in reference to climate adaptation

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- ✓ Have better understanding about probability of flooding in vulnerable areas
 - ✓ Identified 4 priority areas around the Harbor
 - ✓ Introduced some possible adaptive strategies
 - ✓ Learned that people are concerned and want to be involved in these decisions

What is the plan?

Marblehead is Well Positioned for Next Steps

Marblehead Harbor Plan (update 2009)

Marblehead Hazard Mitigation Plan (update 2015)

Using Lessons Learned and Community Survey Results to be ready for the next coastal resiliency grants:

MA CZM (Coastal Zone Management)

MVP Action (Municipal Vulnerability Preparedness)



Next Steps will continue the Community Resilience Building Process with Climate Change as a DRIVER

Marblehead is now better prepared to take on this challenge
because of this coastal resiliency project!



Thank You

*Still time until October 10 to take
the Community Survey at
marblehead.org
salemsound.org*



Photo credit: Salem Sound Coastwatch