

2015

## What does the future hold for Casco Bay's fringing marshes? (2015 State of the Bay Presentation)

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### Recommended Citation

Morgan, Pam, "What does the future hold for Casco Bay's fringing marshes? (2015 State of the Bay Presentation)" (2015). *Presentations*. 18.  
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# What does the future hold for Casco Bay's fringing marshes?

Dr. Pamela Morgan

Department of Environmental Studies



State of the Bay Conference  
Tuesday October 13, 2015

In Maine, nearly half of the coastal salt marsh area is comprised of marshes 0.2 ha (0.49 acres) or smaller.



(Jacobson et al. 1987)





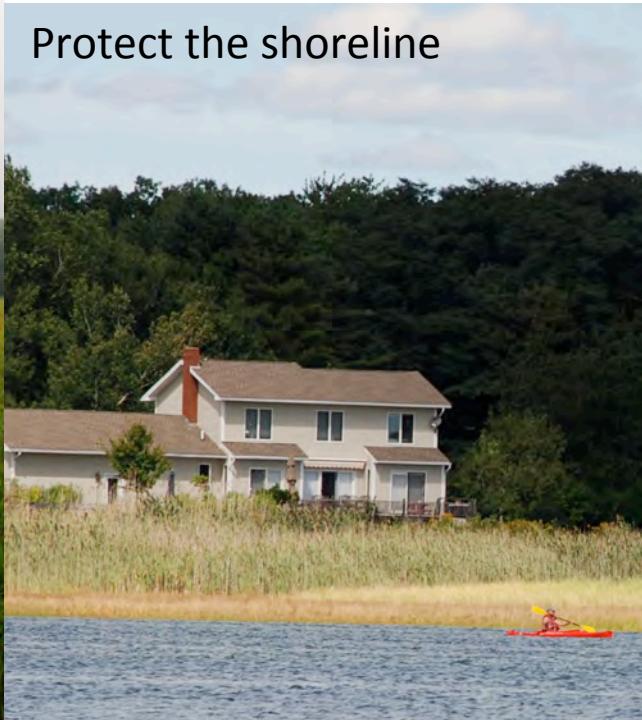
Why should we care about fringing  
marshes?



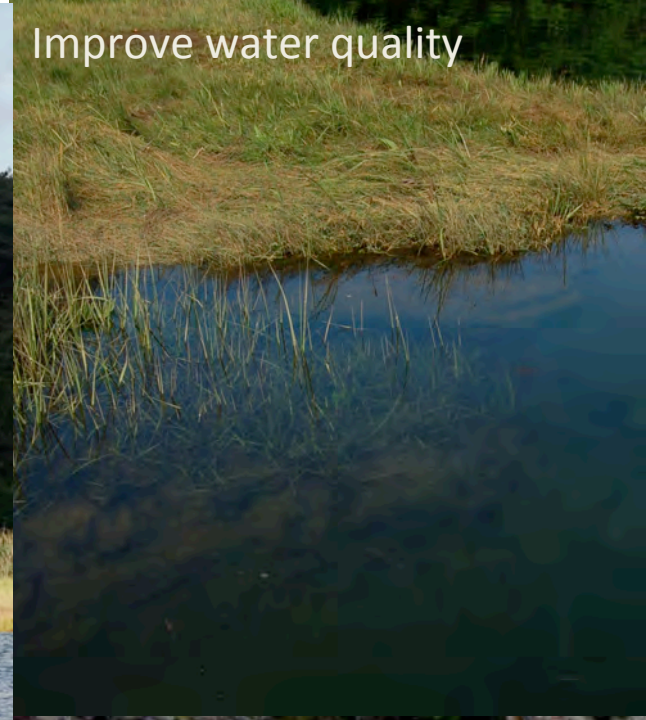
Provide beauty



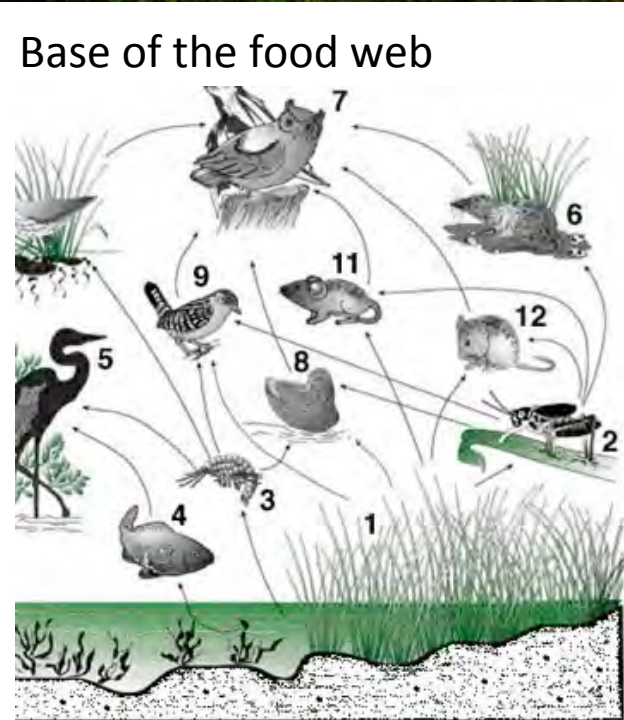
Protect the shoreline



Improve water quality



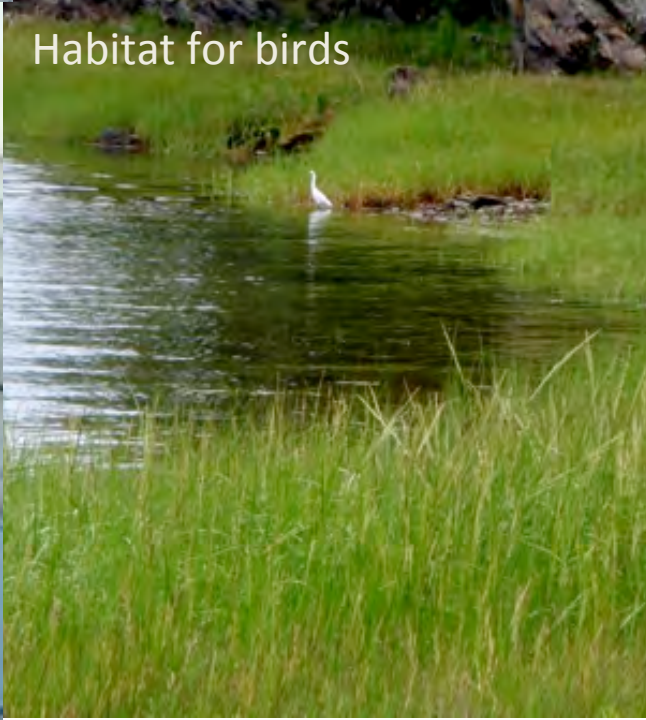
Base of the food web



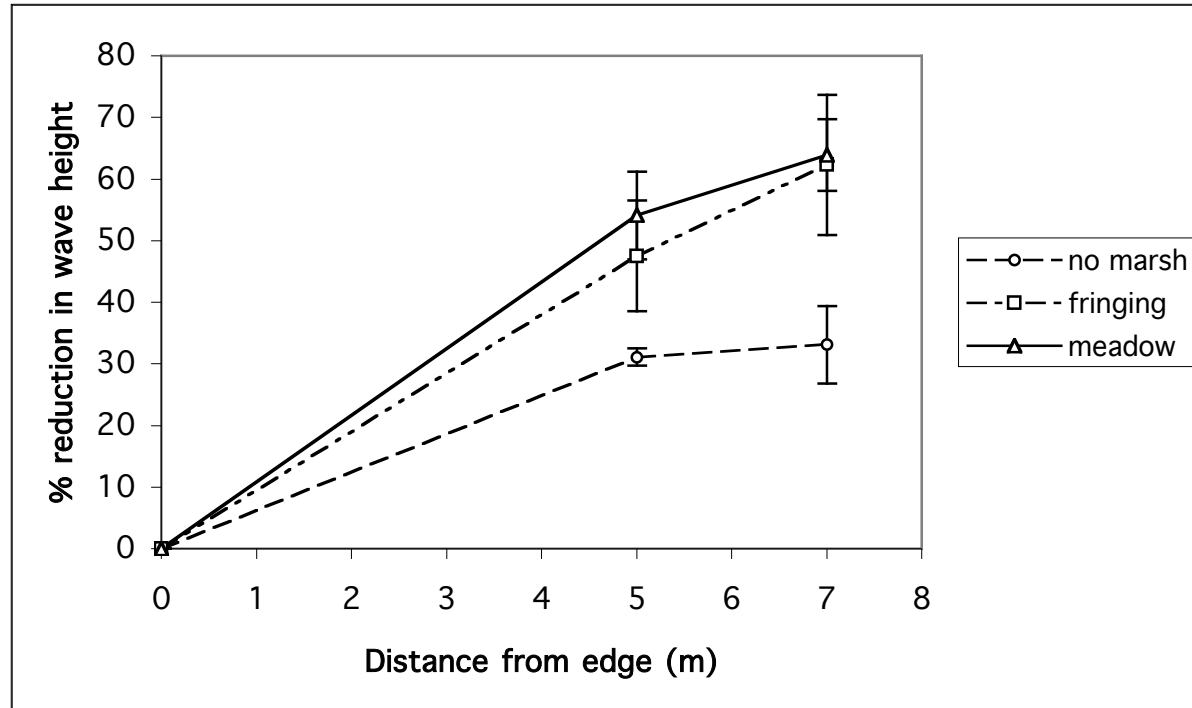
Nursery for young fish



Habitat for birds



# Fringing marshes absorb wave energy, protecting shoreline



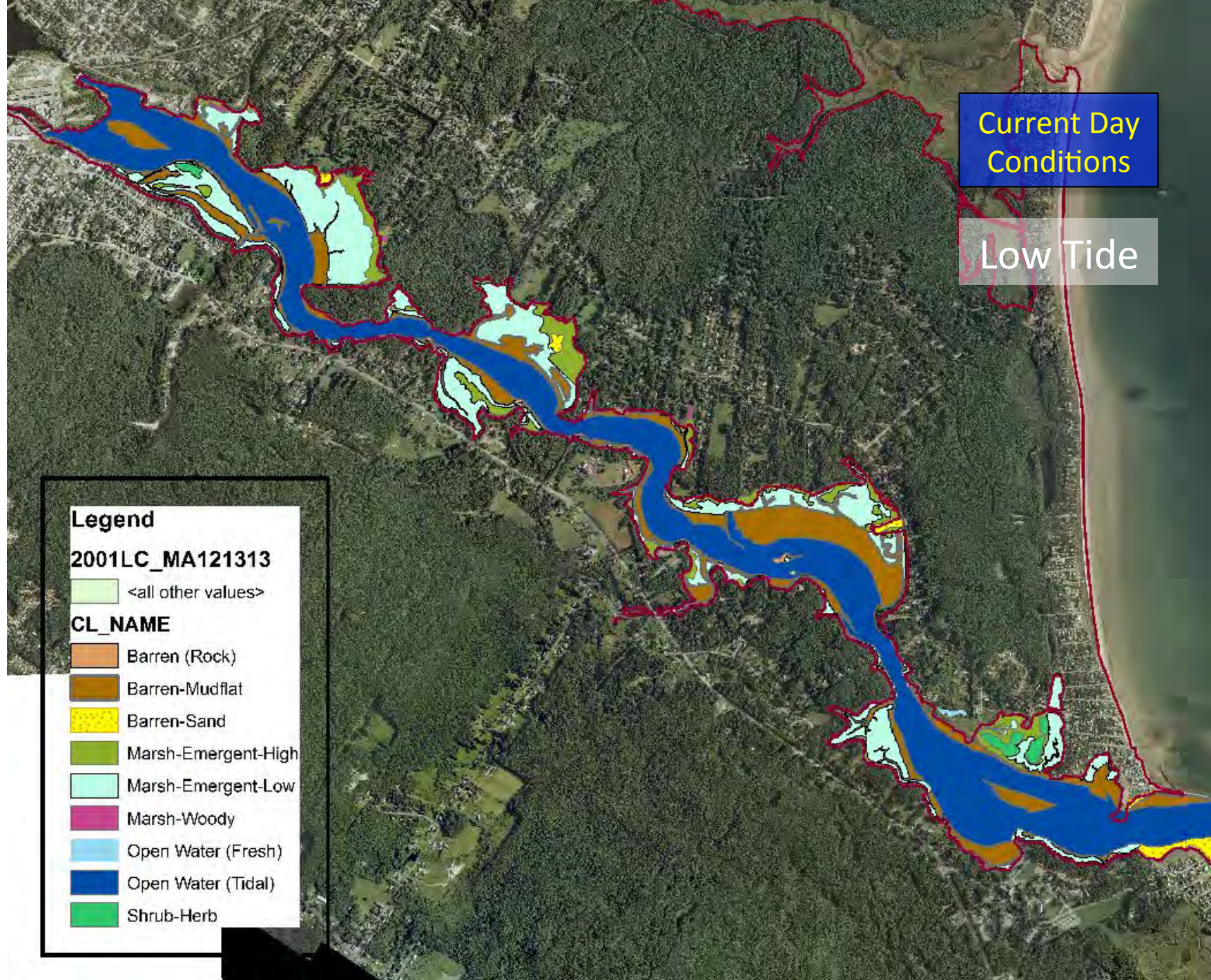
What are the threats to fringing marshes?  
What do we need to look out for?



# Invasive species









# Sea level rise

3 Foot Sea  
Level Rise

Low Tide

## Legend

2001LC\_MA121313

<all other values>

## CL\_NAME

- Barren (Rock)
- Barren-Mudflat
- Barren-Sand
- Marsh-Emergent-High
- Marsh-Emergent-Low
- Marsh-Woody
- Open Water (Fresh)
- Open Water (Tidal)
- Shrub-Herb

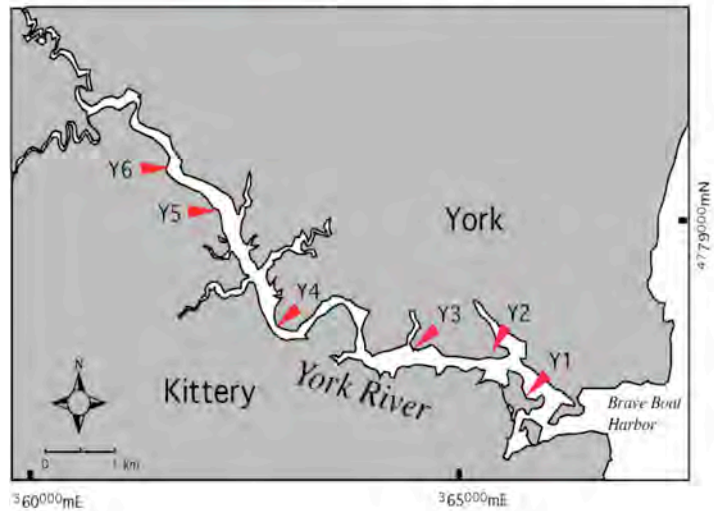
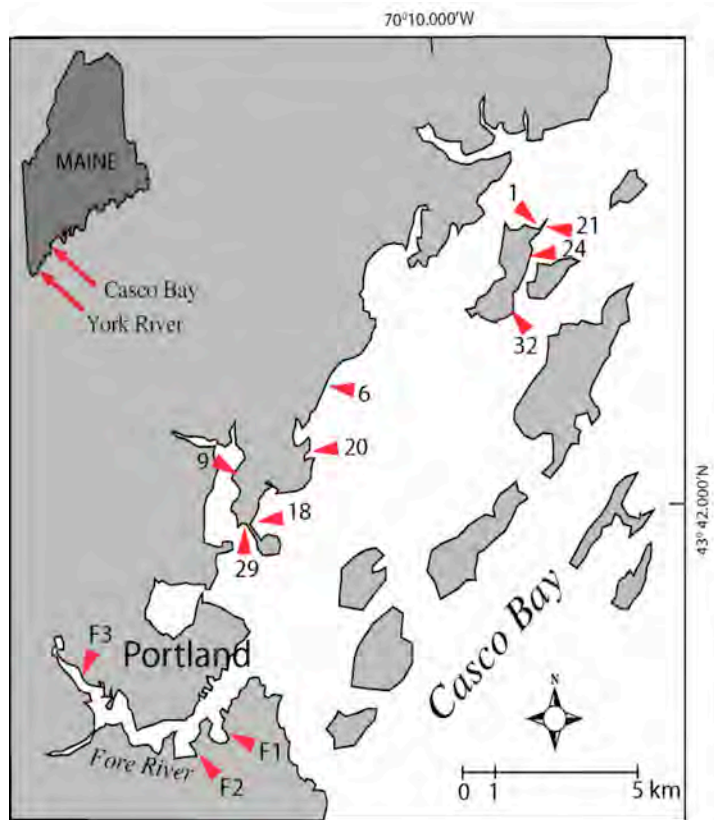
(Feurt and Morgan 2015)



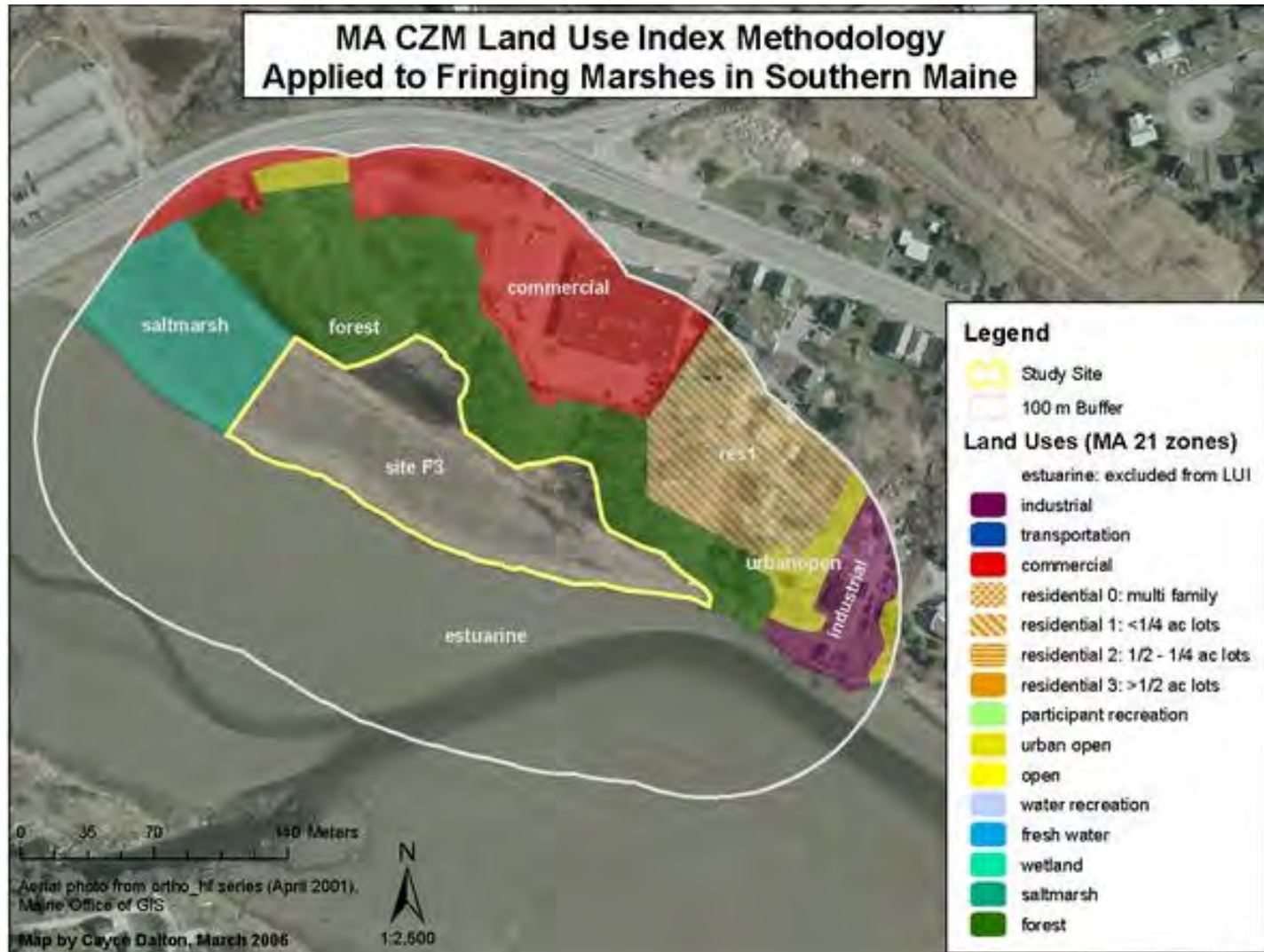
# Shoreline development and pollutant runoff







# MA CZM Land Use Index Methodology Applied to Fringing Marshes in Southern Maine







**Less plant diversity in marshes adjacent to more developed shorelines.**



**Fewer dipteran larvae and nematodes in the high marsh at sites where shoreline development was greater.**

Median densities of nematodes:

Casco Bay = 429 individuals  $\text{m}^{-2}$

York River = 12,956 individuals  $\text{m}^{-2}$



**13 fish and 4 crustacean species used the marshes**

Mummichog biomass was less in marshes adjacent to undeveloped shorelines, where green crabs were more numerous.



**Green crabs comprised 30-97% of the nekton biomass collected at the 18 sites**

# Baseline data

- Marsh size and elevation
- Vegetation – plant species diversity & productivity
- Nekton – abundance, diversity, biomass
- Invertebrates – diversity and density
- Sediment trapping



2008

Project Report: Mapping and Restoration Inventory  
of Fringing Marsh Habitat in the Casco Bay Estuary



Funded through grants from the Casco Bay Estuary Partnership and the U.S.  
Environmental Protection Agency Region 1

(Hayes et al. 2008)



1,160 marshes

100 acres of marsh covering 90 miles of the mainland coastline of Casco Bay



# Field survey results

*Moderately to heavily impacted marshes suffered from:*

- Insufficient buffers
- Physical use and damage to the marsh from activities such as dock movement, boat storage, boat wakes, and foot traffic
- *Phragmites australis* and, to a far smaller extent, purple loosestrife (*Lythrum salicaria*) in a small number of locations



# Sustaining Quality of Place in the Saco River Estuary through Community-Based Ecosystem Management









# Sustaining the Saco estuary

final report 2015

“The concept of creating a resilient social-ecological system focuses on how the people living in a place work together to build relationships, support a robust economy, and protect the natural systems that contribute to human wellbeing.”

- Feurt and Morgan 2015



# The Saco Estuary Stewardship Network

Members of the Stewardship Network bring diverse expertise, knowledge and skills to the work they do that contributes to sustaining the ecosystem services of the Saco Estuary.

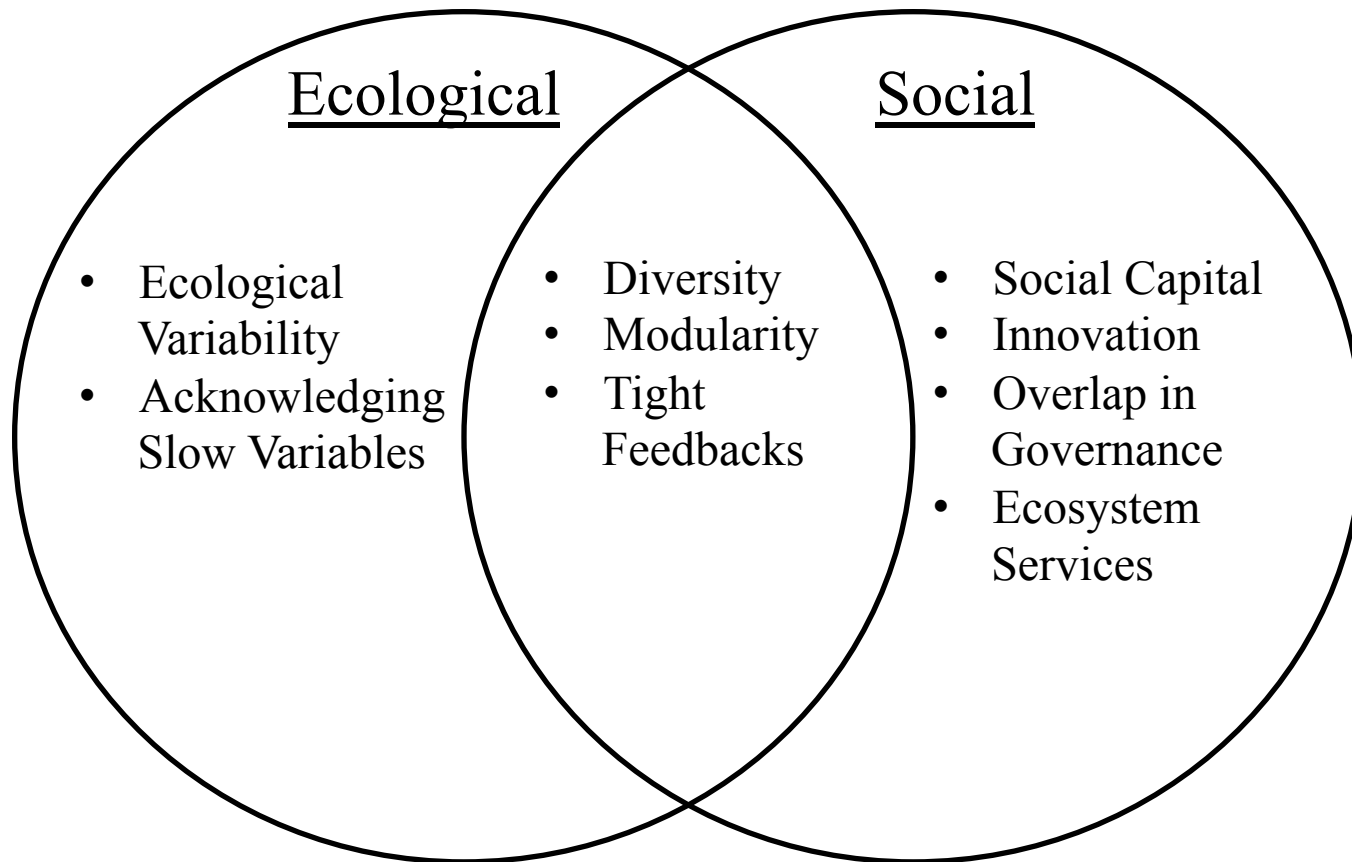
## The Saco Estuary Stewardship Network (2009–2014)

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Biddeford Pool Land Trust	Maine Department of Inland Fisheries and Wildlife
Biddeford-Saco Chamber of Commerce and Industry	Maine Department of Marine Resources
Biddeford Saco Water (Maine Water)	Maine Department of Transportation
Blanding's Park Wildlife Sanctuary	Maine Drinking Water Program
City Of Biddeford	Maine Geological Survey
Biddeford Code Enforcement	Maine Natural Areas Program
Biddeford Conservation Commission	Marston's Marina
Biddeford Engineering, Stormwater Management and Public Works	Rumery's Boat Yard
Biddeford Open Space Committee	Saco Bay Trails
Biddeford Planning Department and Planning Board	Saco Farmer's Market
Biddeford Shellfish Commission	Saco Valley Land Trust
Biddeford Wastewater Treatment Facility	Saco Bay Tackle Company
City of Saco	Saco River Corridor Commission
Saco Code Enforcement	Saco River Salmon Club
Saco Conservation Commission	Southern Maine Planning and Development Commission
Saco Engineering and Public Works	The Nature Conservancy of Maine
Saco Planning Department and Planning Board	Thornton Academy
Saco Wastewater Treatment Facility	University of New England
Coastal Waters Commission	USDA Natural Resource Conservation Service
Cumberland County Soil and Water Conservation District	US Fish and Wildlife Service, Gulf of Maine Office
Friends of Wood Island Lighthouse	US Fish and Wildlife Service, Rachel Carson National Wildlife Refuge
Heart of Biddeford	US Environmental Protection Agency Boston Office
Maine Coastal Program	Wells National Estuarine Research Reserve
Maine Department of Environmental Protection	

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# A resilient social-ecological system







# Looking Ahead: Goals of the Casco Bay Estuary Partnership

## **1. Protect, restore and enhance key habitats that sustain ecological health**

*CBEP commits to conserving priority undeveloped shorelines, protecting and restoring vital habitats such as eelgrass beds and tidal mudflats, enhancing connectivity among aquatic habitats, and strengthening the capacity of Casco Bay ecosystems to accommodate change.*

## **2. Improve Casco Bay's water quality by reducing nutrient pollution and its impacts, including coastal acidification**

*CBEP promotes practices that reduce nutrient pollution, support public funding for improved stormwater management, and assess the dynamics of how nutrients enter and move within Casco Bay.*

## **3. Foster resilient communities and their connections to Casco Bay**

*CBEP seeks to increase public engagement with Casco Bay and to support collaborative initiatives that illuminate the region's ecological and economic interconnections, celebrate the Bay's importance, and help citizens and leaders increase the region's resilience in the face of climate disruptions.*

## **4. Mobilize collective knowledge and resources to support Casco Bay**

*CBEP serves as a convener and catalyst, mobilizing scientific, financial and human resources to help residents throughout the watershed effectively address the complex and evolving challenges facing Casco Bay.*

# Planning for the future of Casco Bay's fringing marshes

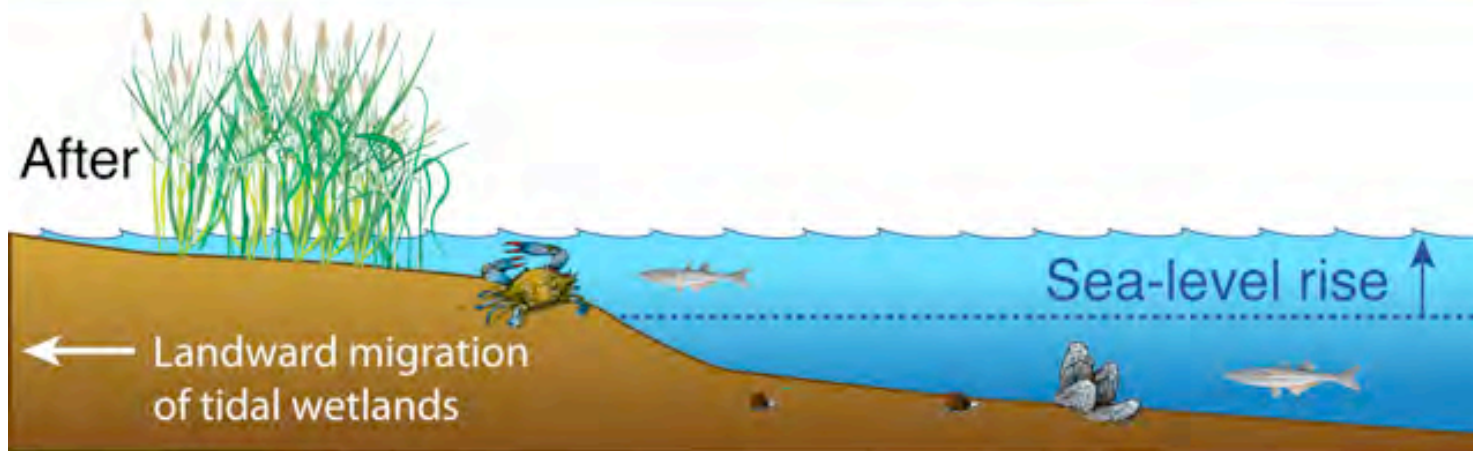
- Protect and restore marsh habitat within the context of the watershed and the bay
  - Habitat connectivity
  - Shoreline development
- Monitor and manage invasive species
- Plan for climate change and sea level rise
  - Marsh migration
  - Living shorelines



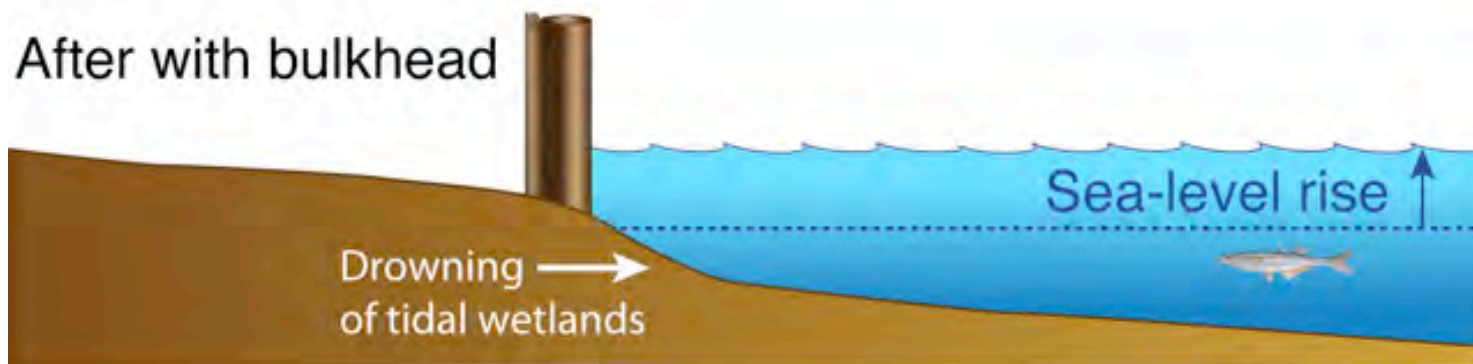
Before



After



After with bulkhead



# Living shorelines



<http://publicradioeast.org/post/living-shorelines>





### Acknowledgements

Maine Department of Environmental Protection  
Maine Oil Spill Advisory Committee  
Environmental Protection Agency New England  
University of New England  
Wells National Estuarine Research Reserve  
National Science Foundation award #EPS-0904155 to Maine  
EPSCoR at the University of Maine

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