What does the future hold for Casco Bay's fringing marshes?

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Casco Bay Estuary Partnership

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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

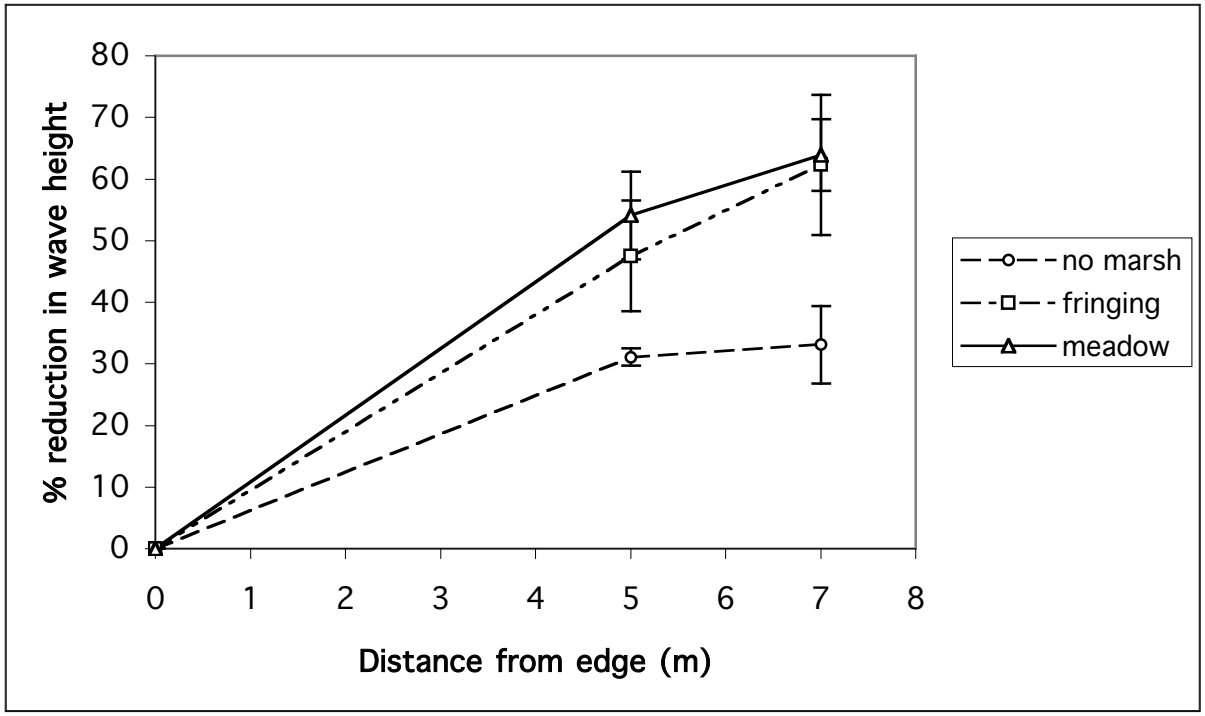
Improve water quality

Base of the food web

Nursery for young fish

Habitat for birds

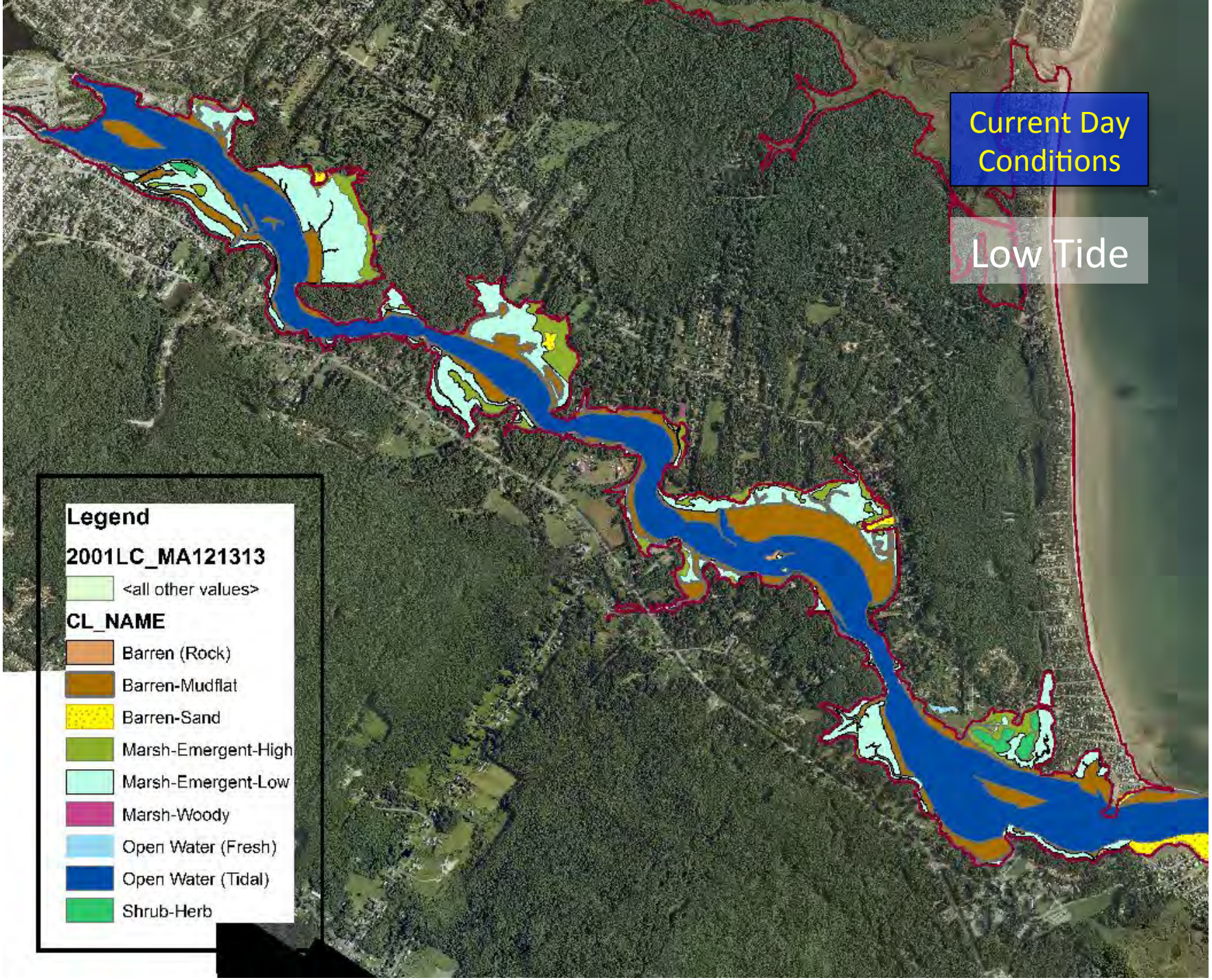
Fringing marshes absorb wave energy, protecting shoreline

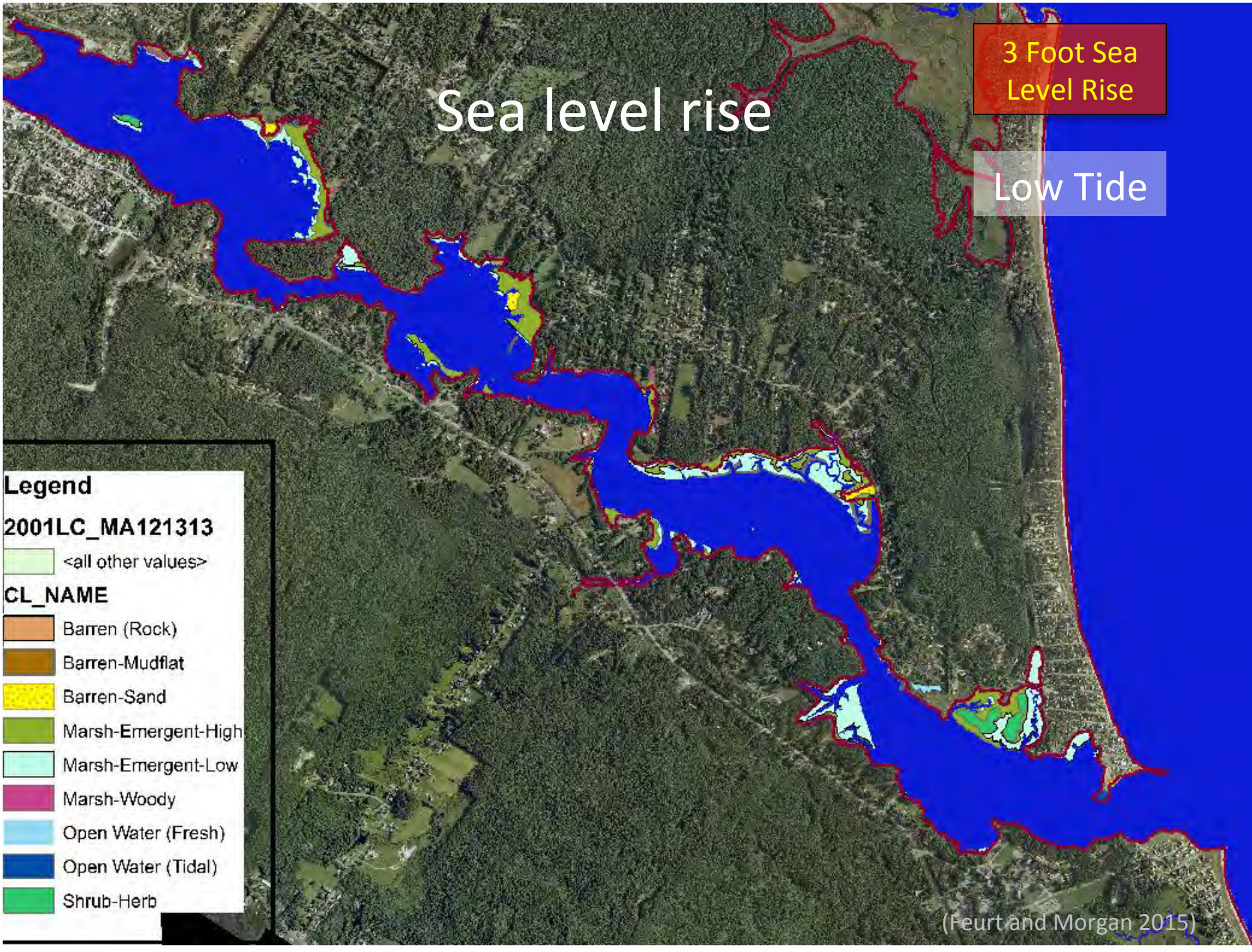


(Morgan et al. 2009)

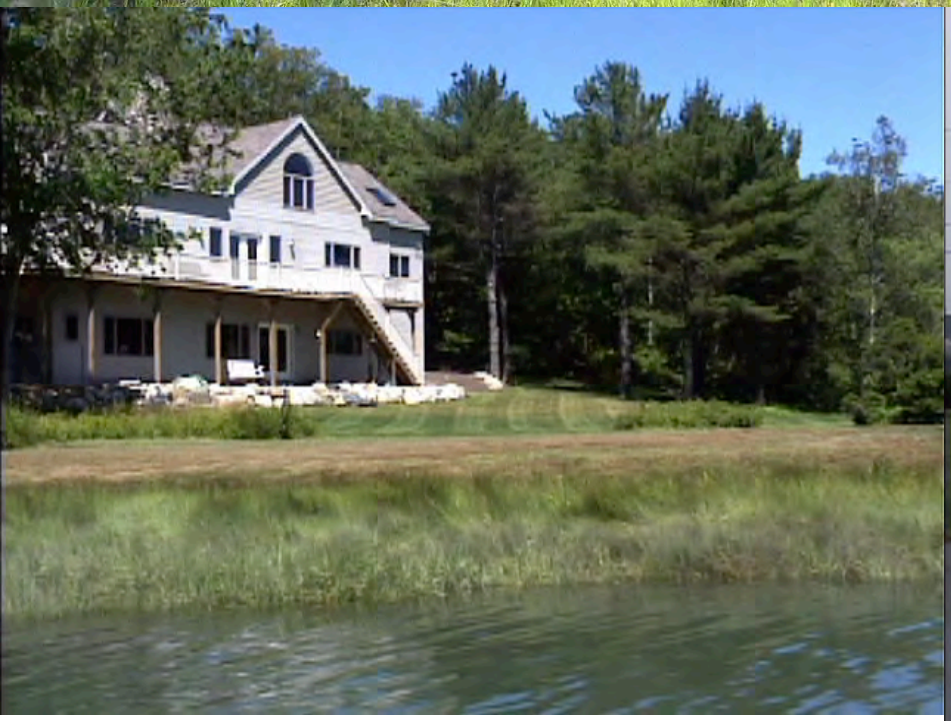
What are the threats to fringing marshes? What do we need to look out for?

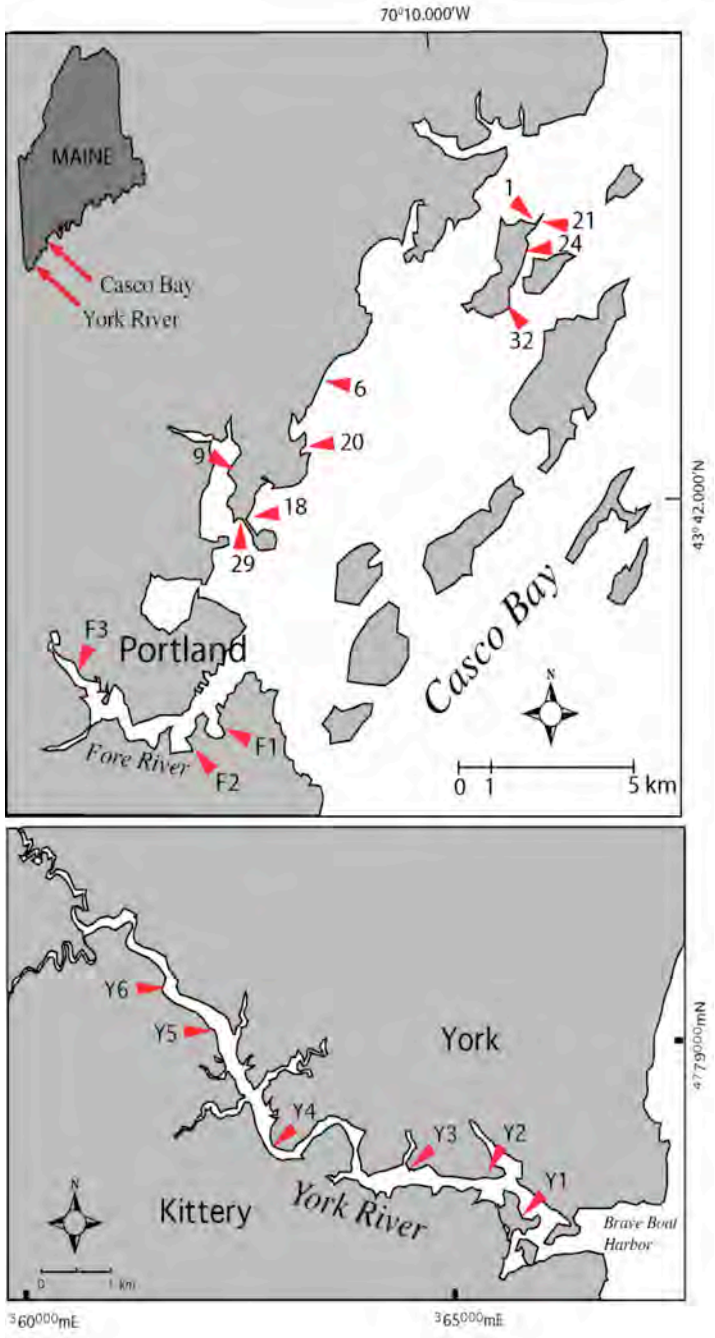

Invasive species


Current Day Conditions
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

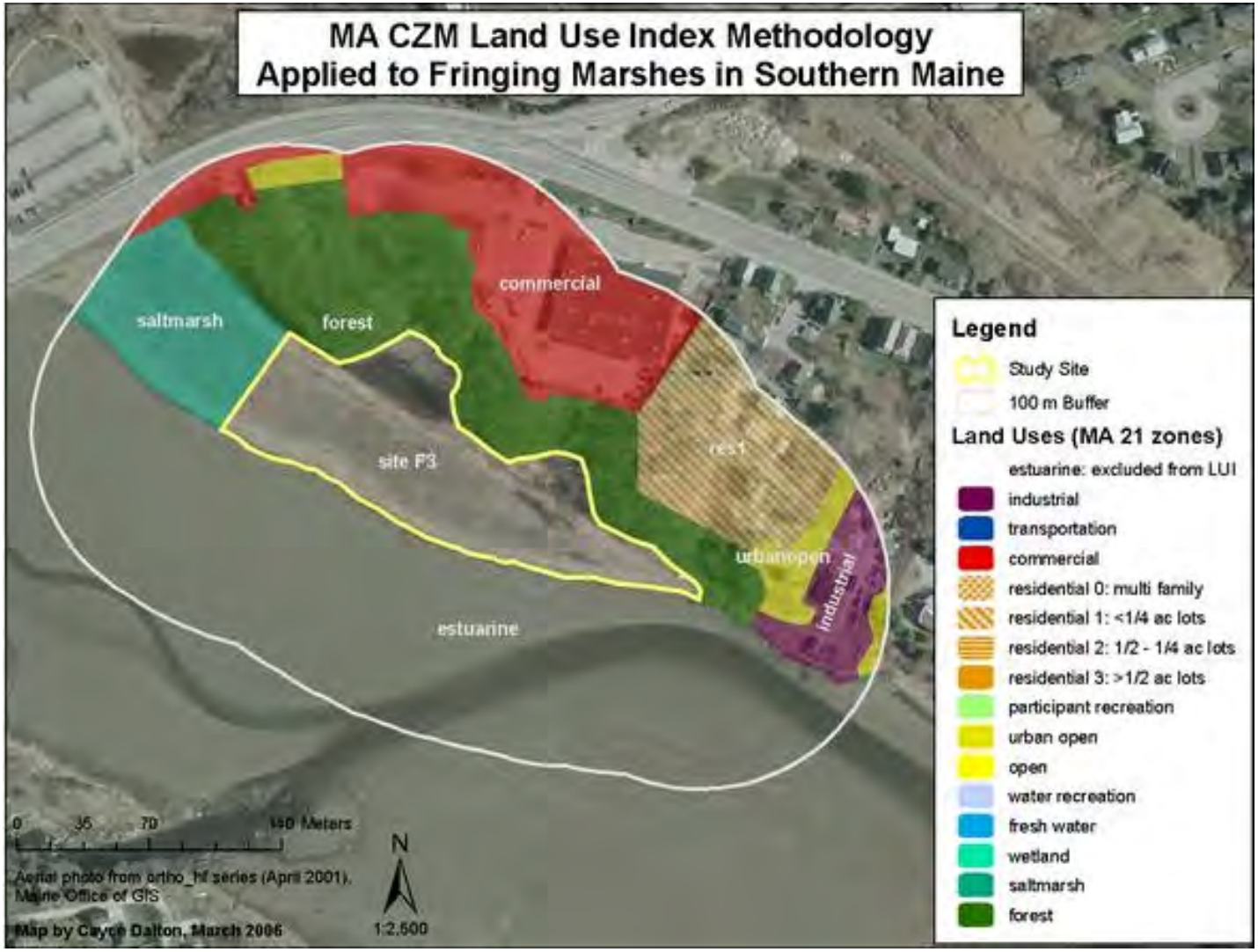

Sea level rise
3 Foot Sea Level Rise
Low Tide
Legend
2001LC_MA121313
<all other values>
CL_NAME
Barren (Rock)
Barren-Mudflat
Barren-Sand
Marsh-Emergent-High
Marsh-Emergent-Low
Marsh-Woody
Open Water (Fresh)
Open Water (Tidal)
Shrub-Herb
(Feurt and Morgan 2015)

Shoreline development and pollutant runoff

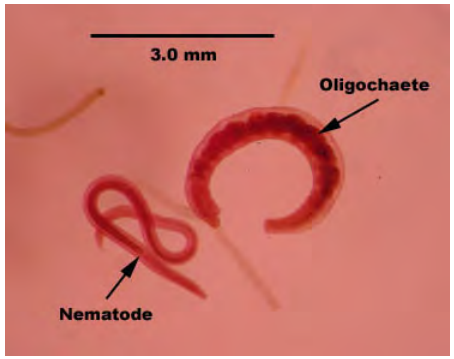




(Morgan et al. 2015)


MA CZM Land Use Index Methodology
Applied to Fringing Marshes in Southern Maine
saltmarsh
forest
commercial
site F3
res1
urbanopen
industrial
estuarine
0 35 70 140 Meters
N
1:2,500
Aerial photo from ortho_hf series (April 2001), Maine Office of GIS
Map by Cayce Dalton, March 2006
Legend
Study Site
100 m Buffer
Land Uses (MA 21 zones)
estuarine: excluded from LUI
industrial
transportation
commercial
residential 0: multi family
residential 1: <1/4 ac lots
residential 2: 1/2 - 1/4 ac lots
residential 3: >1/2 ac lots
participant recreation
urban open
open
water recreation
fresh water
wetland
saltmarsh
forest

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

13 fish and 4 crustacean species used the marshes

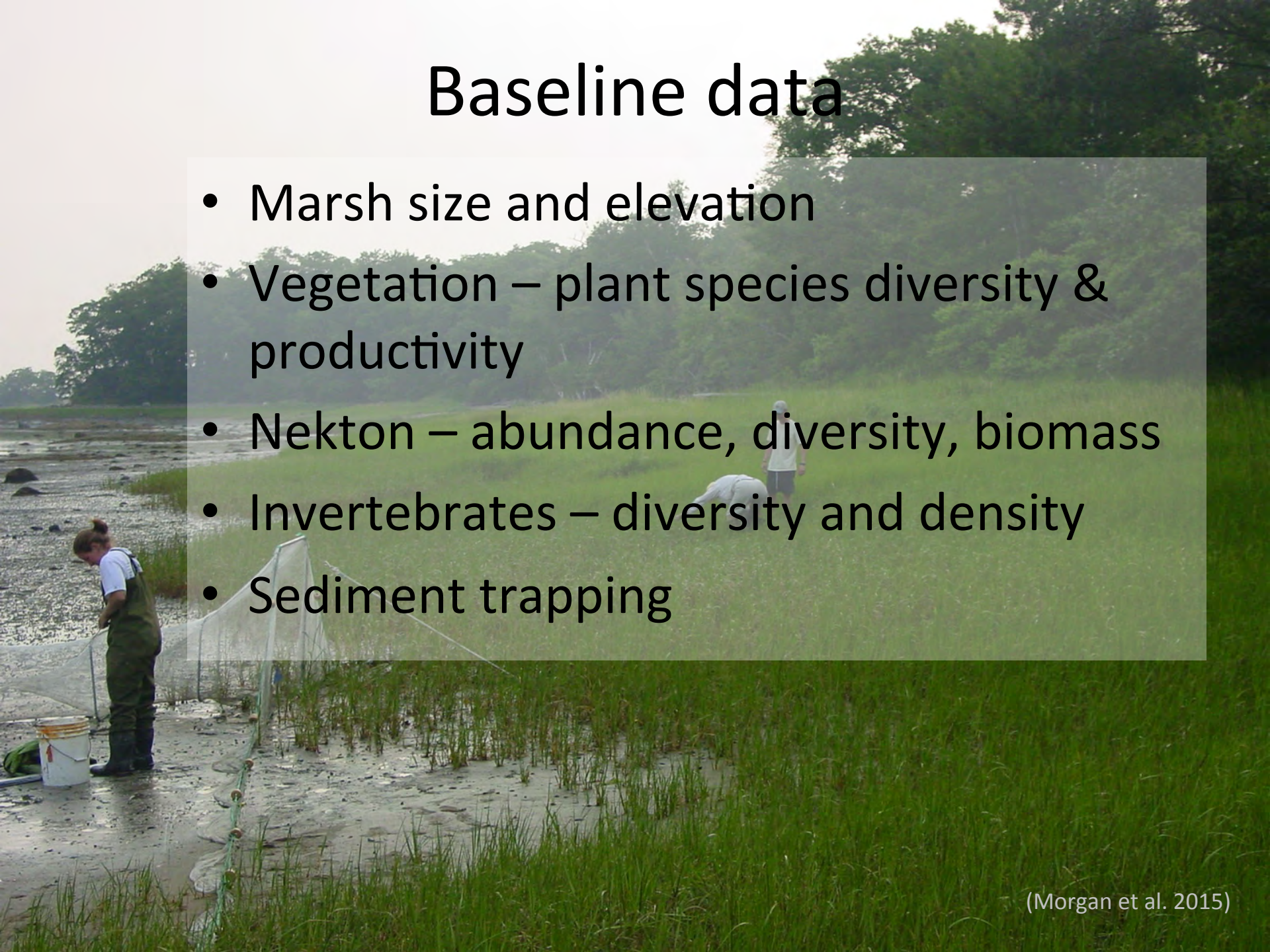
Mummichog biomass was less in marshes adjacent to undeveloped shorelines, where green crabs were more numerous.

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

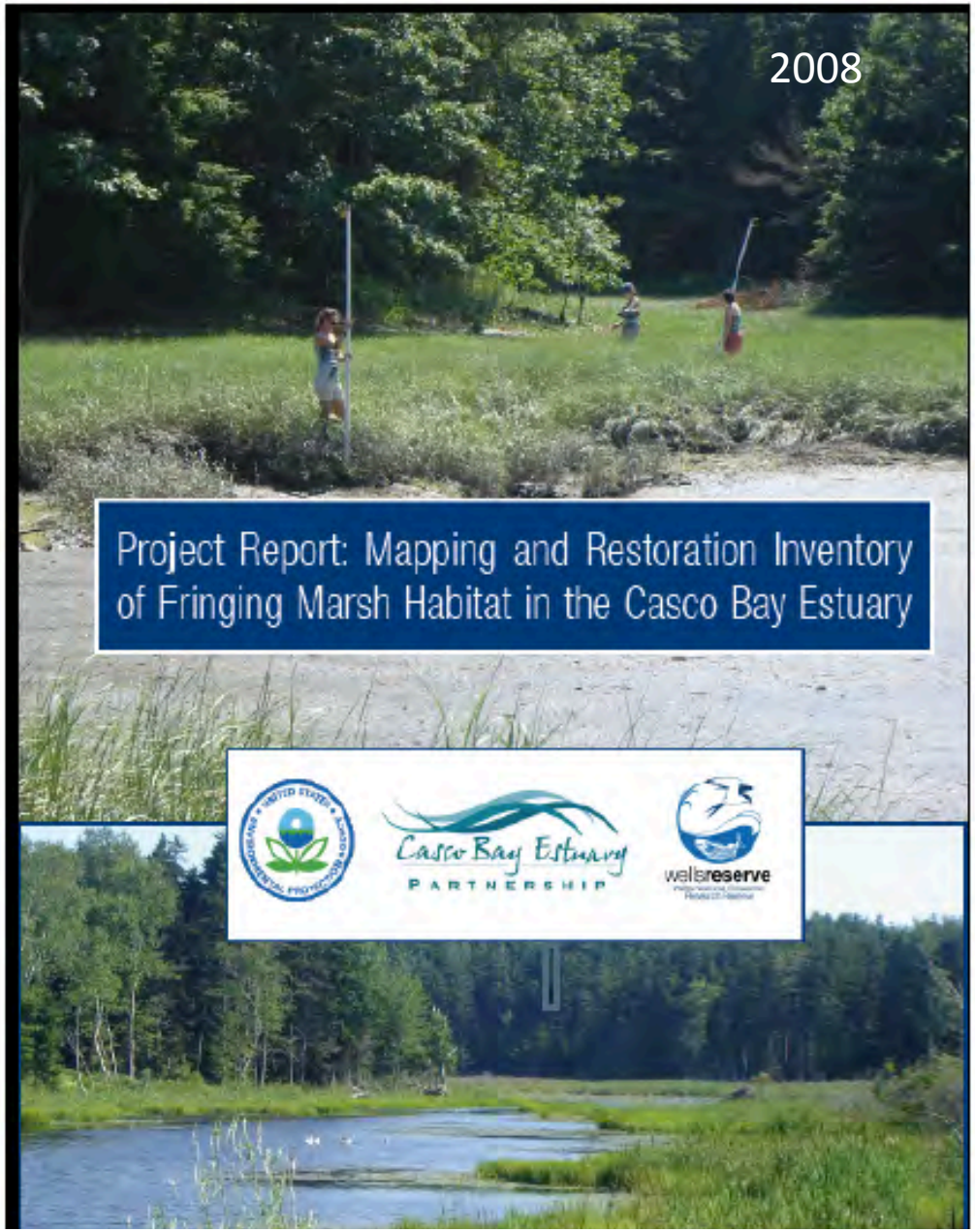
(Morgan et al. 2015)

Baseline data

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



(Morgan et al. 2015)



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

(Hayes et al. 2008)

(Hayes et al. 2008)

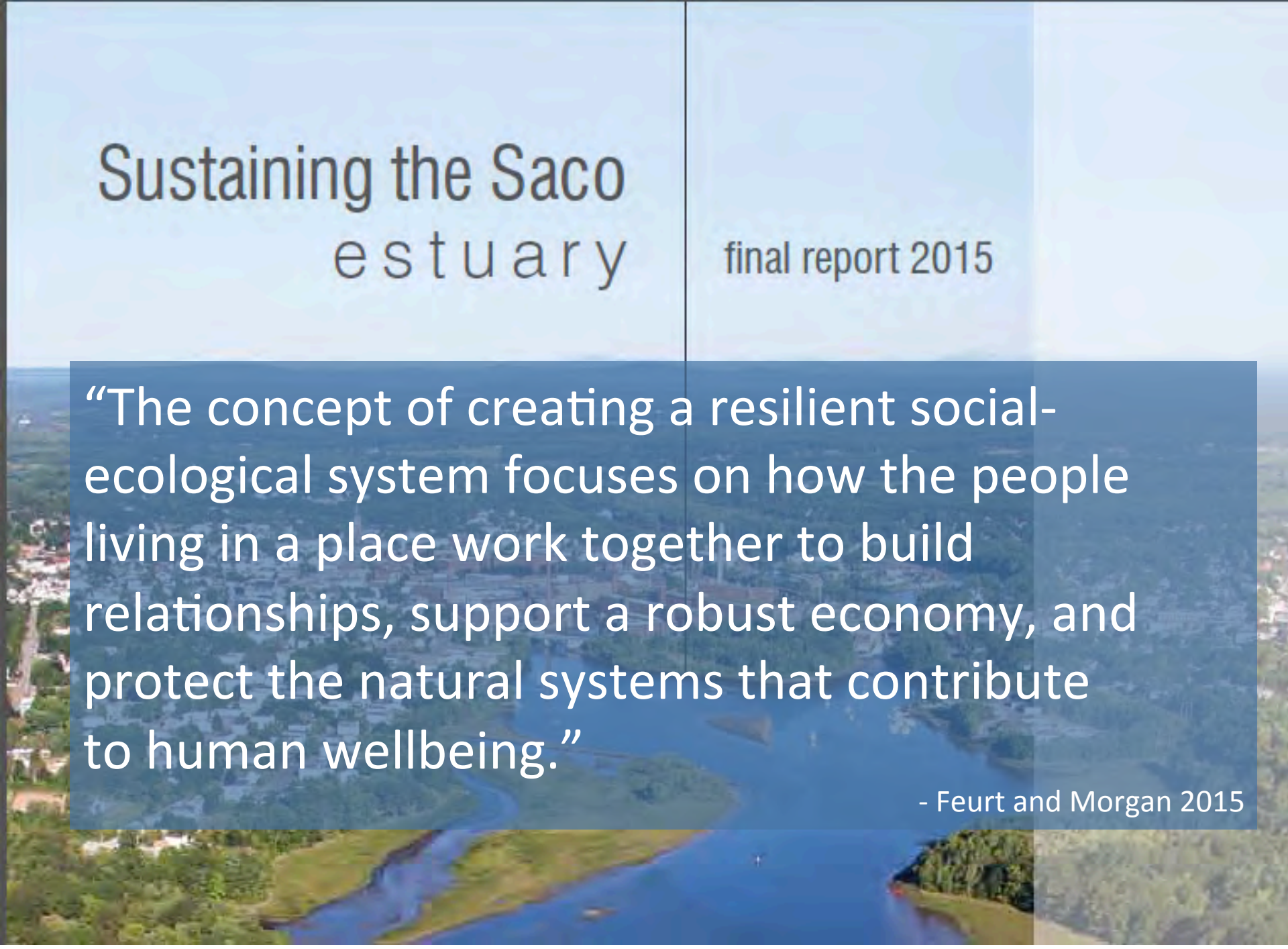
Field survey results

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

(Hayes et al. 2008)

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



"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

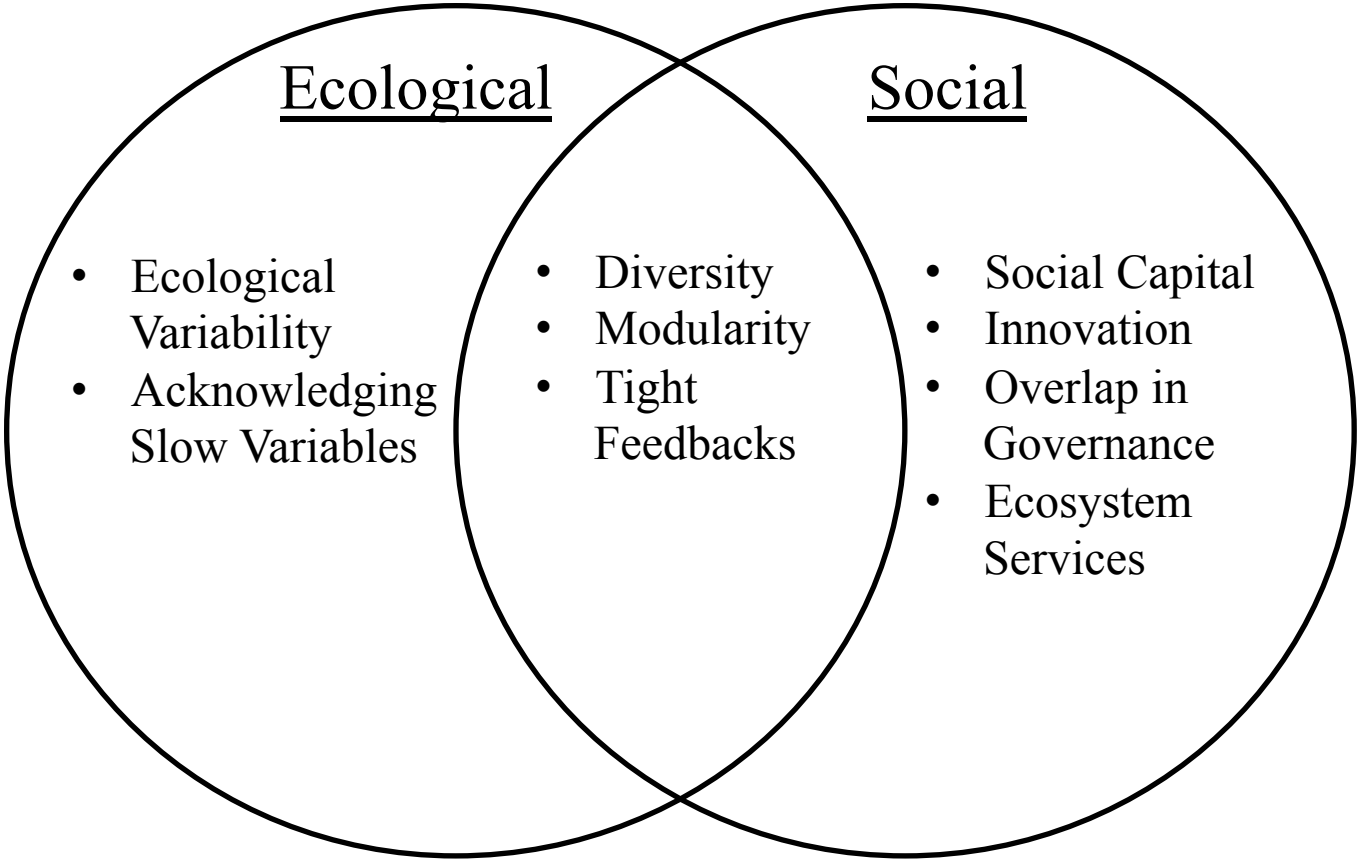
Members of the Stewardship Network bring diverse expertise, knowledge and skills to the work they do that contributes to sustaining the ecosystem services of the Saco Estuary.

The Saco Estuary Stewardship Network (2009–2014)

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

(Feurt and Morgan 2015)

A resilient social-ecological system



Jed Wright, U.S.F.W.S.

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**

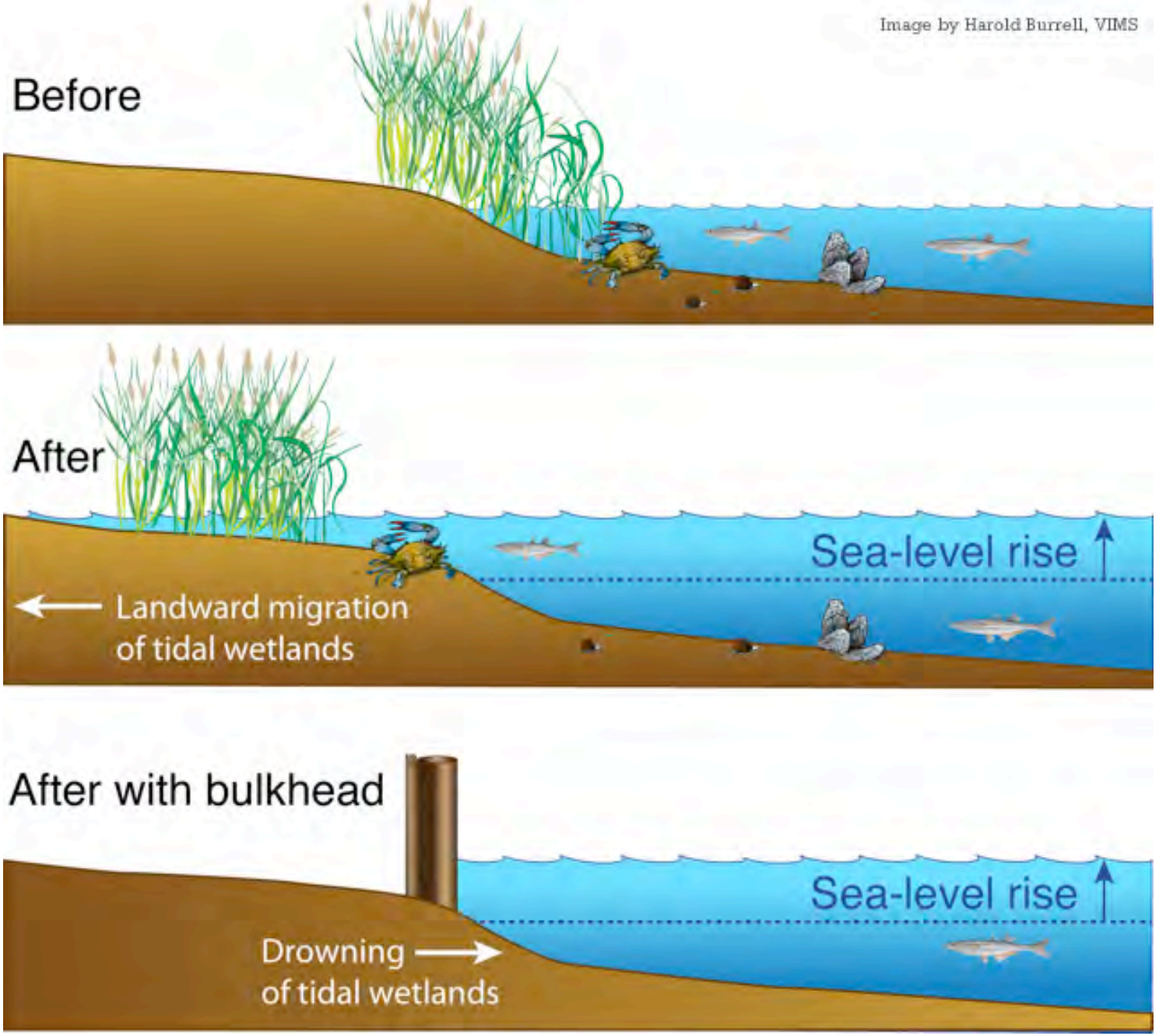
   CBEP seeks to increase public engagement with Casco Bay and to support collaborative initiatives that illuminate the region's ecological and economic interconnections, celebrate the Bay's importance, and help citizens and leaders increase the region's resilience in the face of climate disruptions.

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



http://www.vims.edu/newsandevents/topstories/_images/sea_level_plan_art.jpg

Living shorelines

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

Acknowledgements
Maine Department of Environmental Protection
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