THE CASCO BAY NUTRIENT COUNCIL

It takes a lot of different perspectives to make good policy

Curtis C. Bohlen
Director, Casco Bay Estuary Partnership

Casco Bay Estuary Partnership

- One of 28 National Estuary Programs
  - Watershed focused
  - Science based
  - Non-regulatory
  - Collaborative
- Four person staff
- Locally led by a 23 member advisory board
- The Casco Bay Plan

Casco Bay

- A Complex Bay
  - ~ 160 square miles of water
  - 575 miles of shoreline
  - About 785 islands, islets and ledges
  - 13 coastal municipalities
- Watershed
  - 985 Square miles
  - Touches 48 municipalities

2016 Plan Highlighted Nutrients

- Casco Bay showing signs of stress – but few catastrophic impacts
- Population growth and development will increase loads
- Climate change likely to increase vulnerability
  - Warmer waters
  - More intense storms

Too Much of a Good Thing?

- Nutrients are essential building blocks of life
  - Principally N and P
- But too many can lead to problems…
- In Casco Bay:
  - Few dramatic problems like fish kills
  - Subtle effects (acidification)
  - Episodic events (algal overgrowth of tidal flats)

Major Costs to Communities

- East End WWTP Upgrade to "Best Available Technology"
  - ~ $40 million
- Long Creek Watershed Management District
  - $14 million
    - ~ 2.3 square miles
    - Just in the first decade
- Portland's CSO Plan
  - $170 million

Casco Bay Nutrient (Pollution) Council

- Seek cost-effective solutions to nutrient pollution of Casco Bay
- Two year, facilitated discussion

- Membership includes:
  - Wastewater Treatment Facilities
  - Municipal staff
  - Environmental advocates
  - Academics
  - Engineers and scientists

The Council's Work

- Unflinching review of the science
- Review of existing programs and efforts
- Review of costs and cost effectiveness

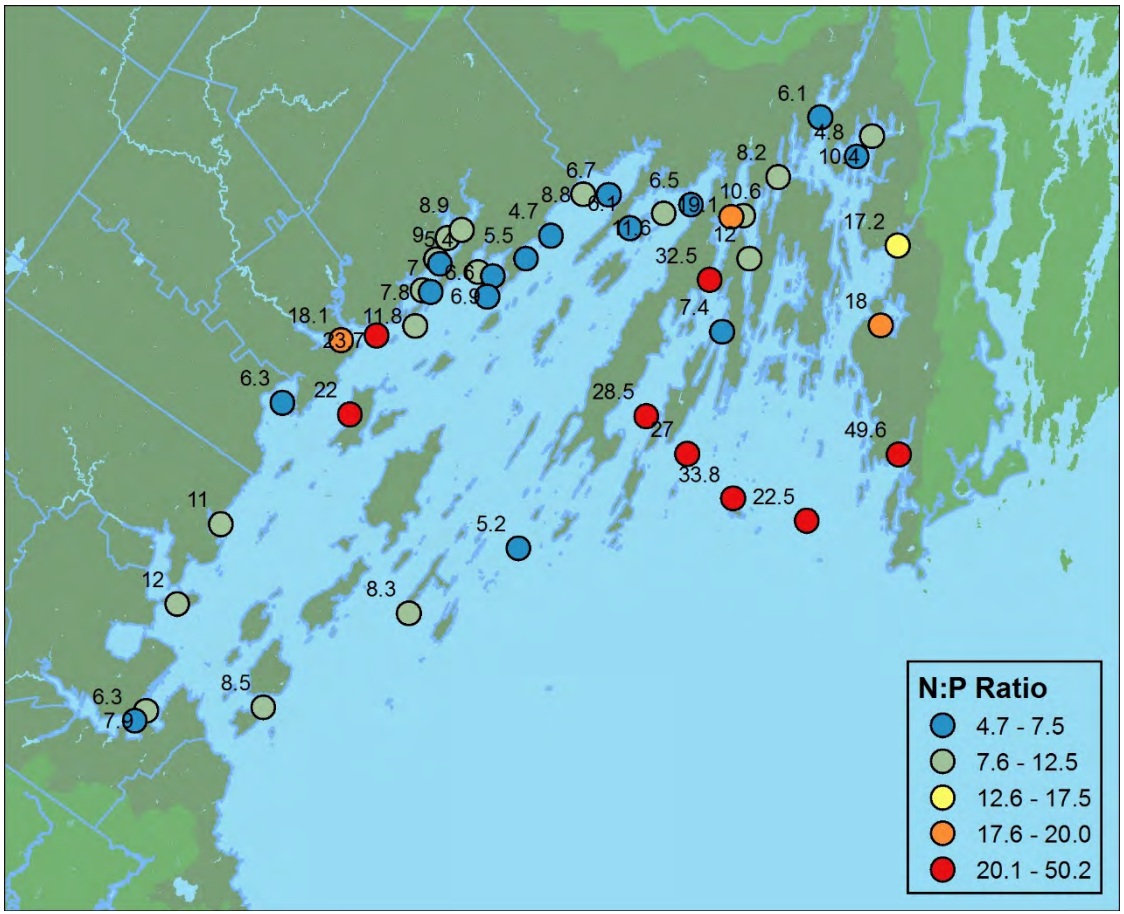
Thinking Outside the CWA Box

- "Investing in Clean Water"
- Resources are the challenge
  - Taxes, fees
- Regulatory solutions impose costs on regulated entities
  - Often municipalities
- Reduce costs
  - Cost-effectiveness analysis
  - Policy harmonization
    - Across permits
    - Across jurisdictions
    - Across levels of government

What's Casco Bay's "limiting nutrient"?

7
N
14.01

- "Limiting nutrient" plays a dominant role in affecting growth of marine phytoplankton
- Nitrogen or phosphorus?
- Almost certainly nitrogen, most of the time
  - Most common limiting nutrient in inshore marine waters
  - Low ratios of N:P in the Bay



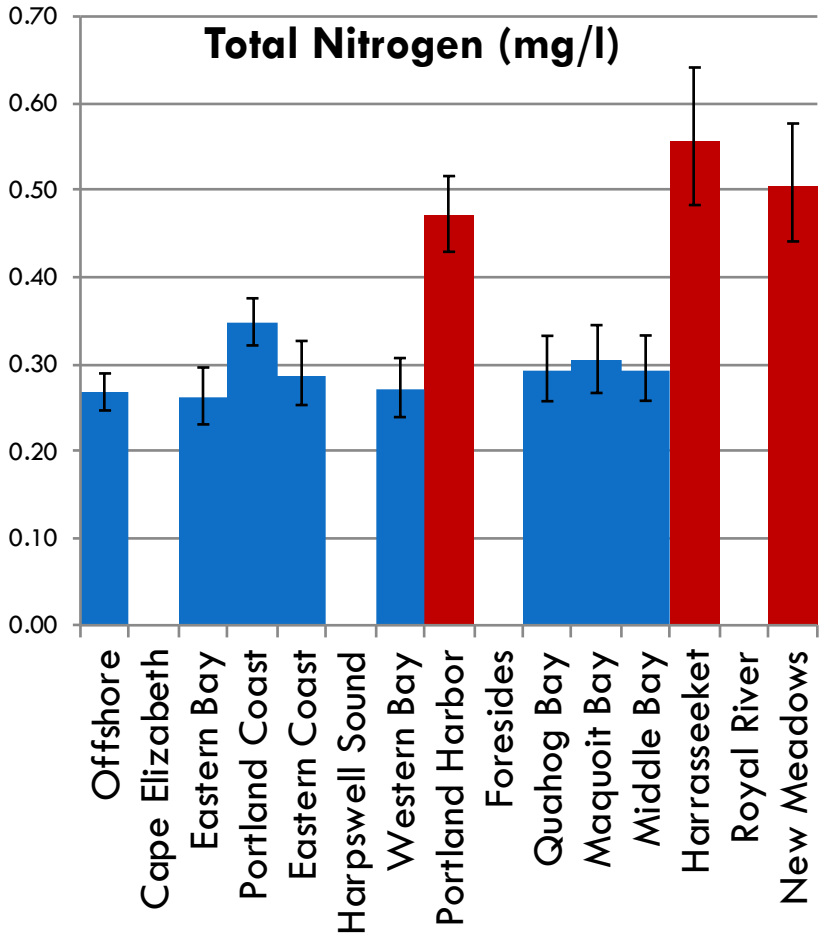
Source: CBEP "Red Tide" Study data 2007-2008

How close to a "Tipping Point"?

- Hard to tell…
- Nitrogen in parts of Casco Bay exceed levels with negative effects elsewhere
  - Impacts to eelgrass
    - TN > 0.32 mg/l
  - Low dissolved oxygen
    - TN > 0.45 mg/l

Nutrient Status

- Nitrogen levels in parts of Casco Bay are among the highest observed in Maine marine waters
- Exceed levels of concern applicable to other Northeastern coastal waters
- Maine has no applicable numerical standards



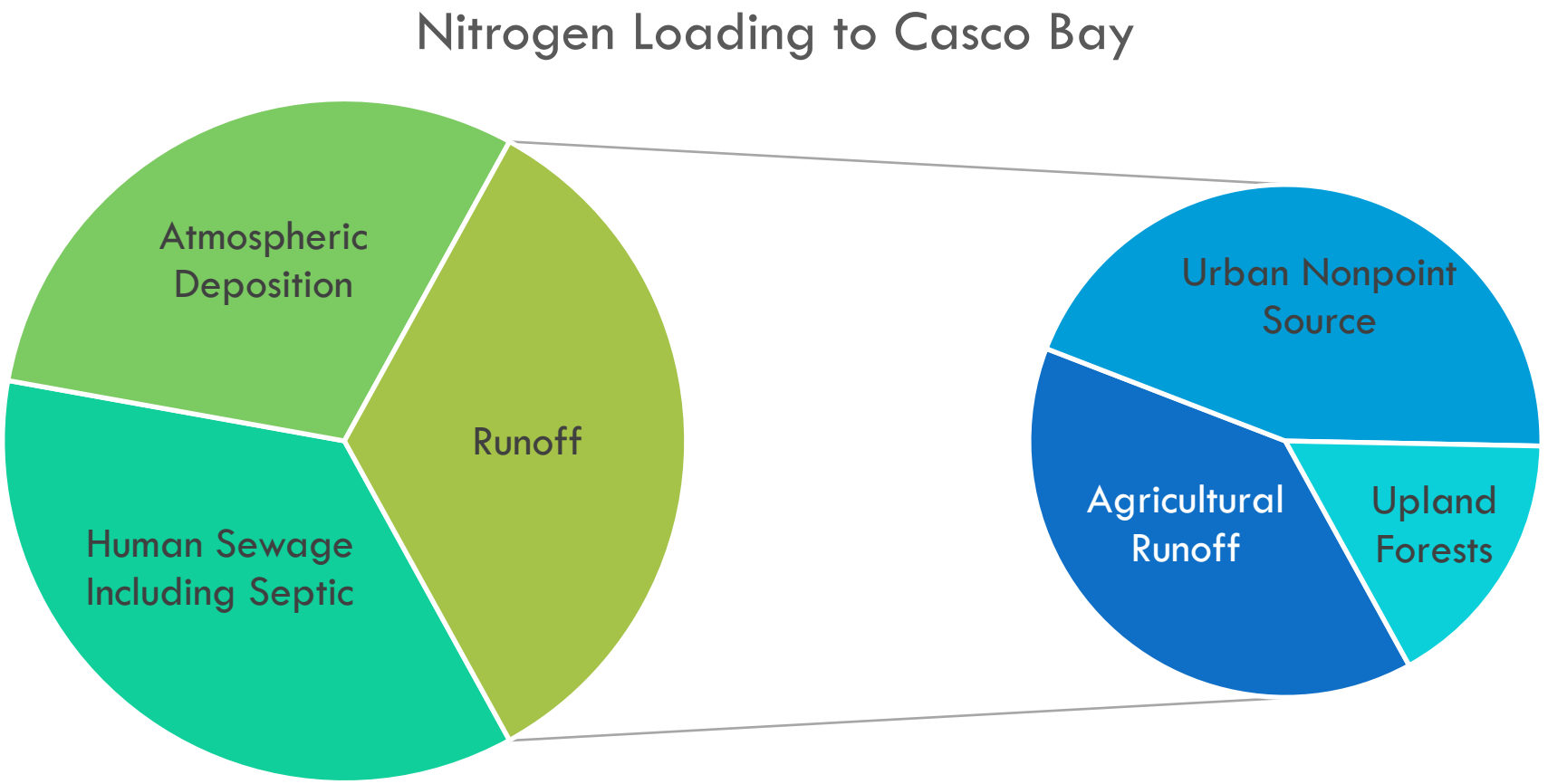
Source: CBEP State of the Bay 2015
Based on FOCB Data
Geometric Mean TN. Sample Size Varies

Algal Blooms

- Three major blooms in 2017
  - Red Tide (May)
  - Karenia (September)
    - including first observed hypoxia since 1980s
  - Pseudo-nitzschia (December)

Karenia mikimotoi bloom, September 2017

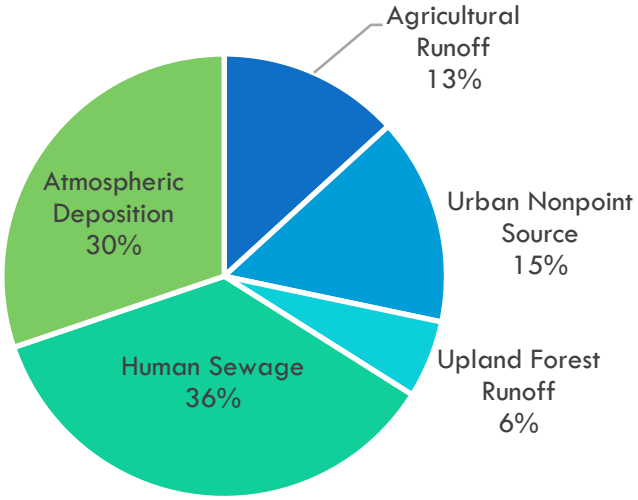
Where's it all coming from?



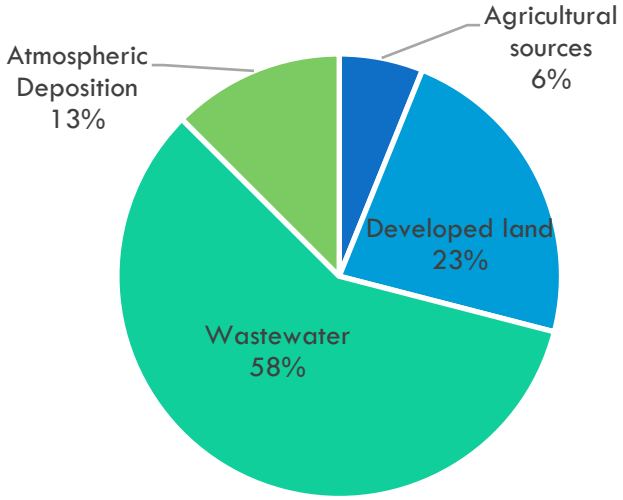
Source: Castro et al. 2003

Too Many Models, Not Enough Data

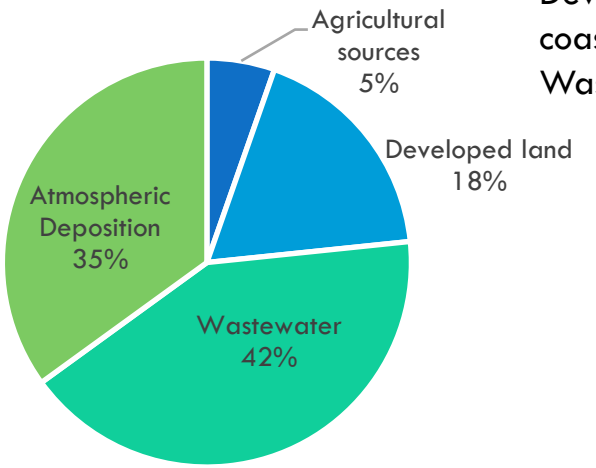
Castro et al. 2003



Liebman et al. 2012



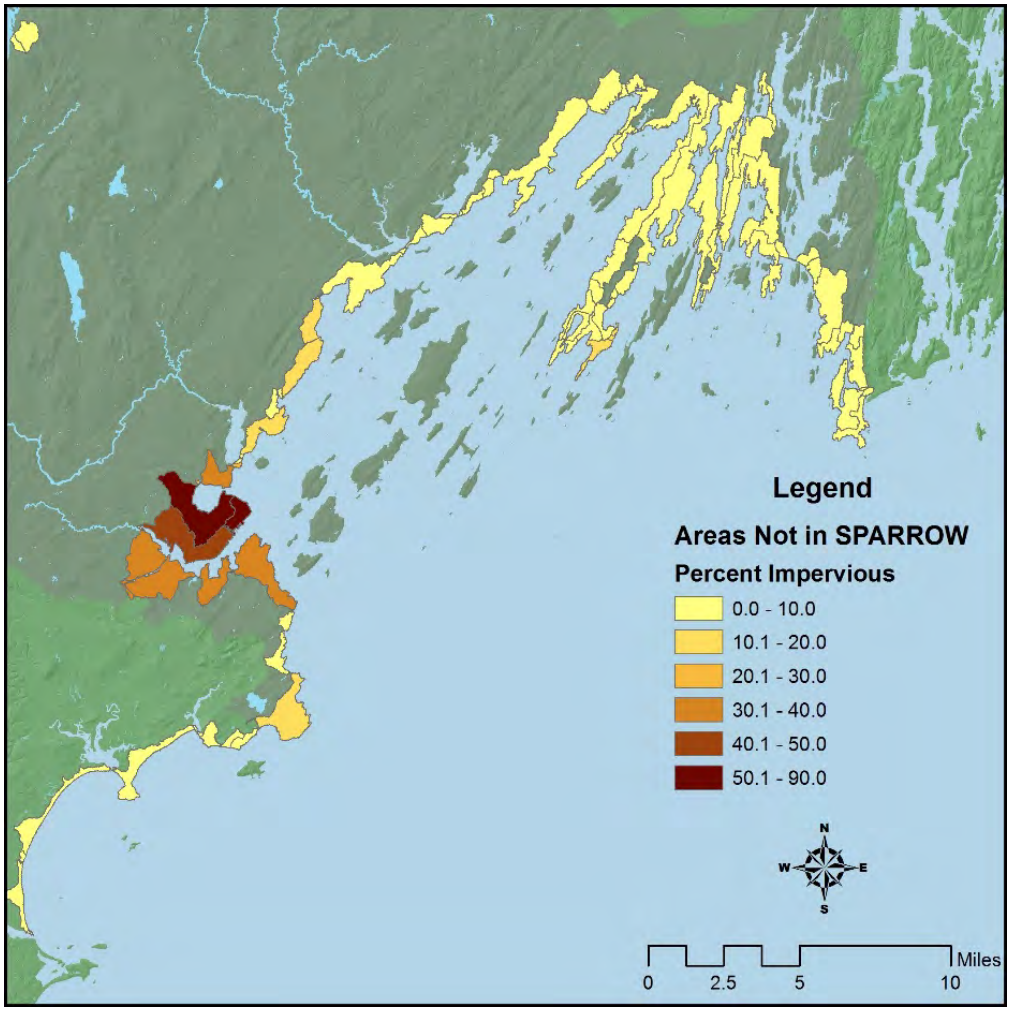
Bricker et al 2006
As Cited in Liebman et al. 2012



- 1 million Kg N per Year
- (+/- about 40%)

Developed Land does not include direct coastal drainage, but includes septic. Wastewater assumes design flows.

"SPARROW" Model



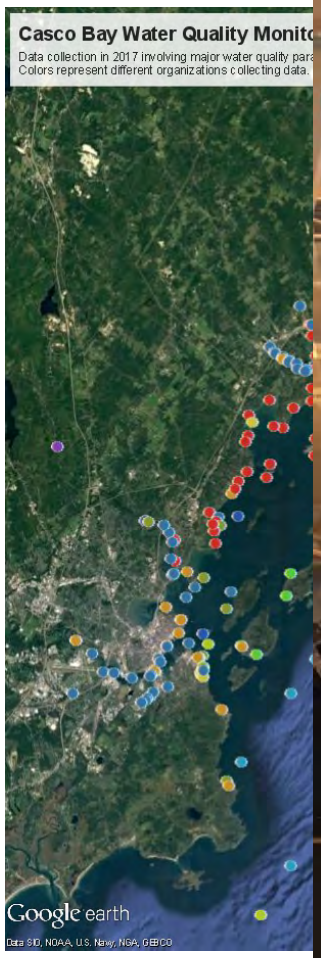
- Most recent model
- Most sophisticated
- Widely applied to similar questions
- Produced lowest estimates of the importance of nutrients from stormwater
- Because leaves out ~ 14% of the impervious area in the entire Casco Bay watershed

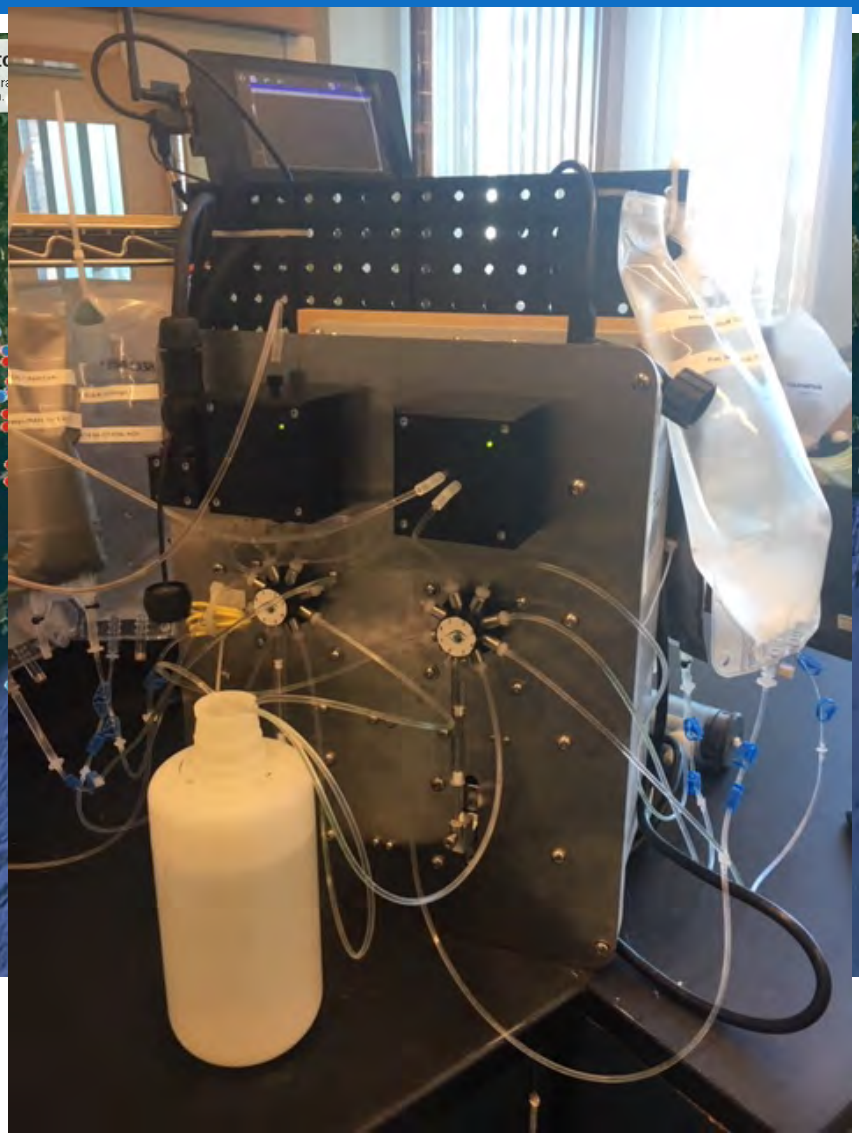
Council Outcomes

- Nutrient Council Report
- Eighteen recommendations
  - From better monitoring to working across jurisdictional silos
- Strengthening collaborations
  - Monitoring
  - Modeling
- Portland integrated planning

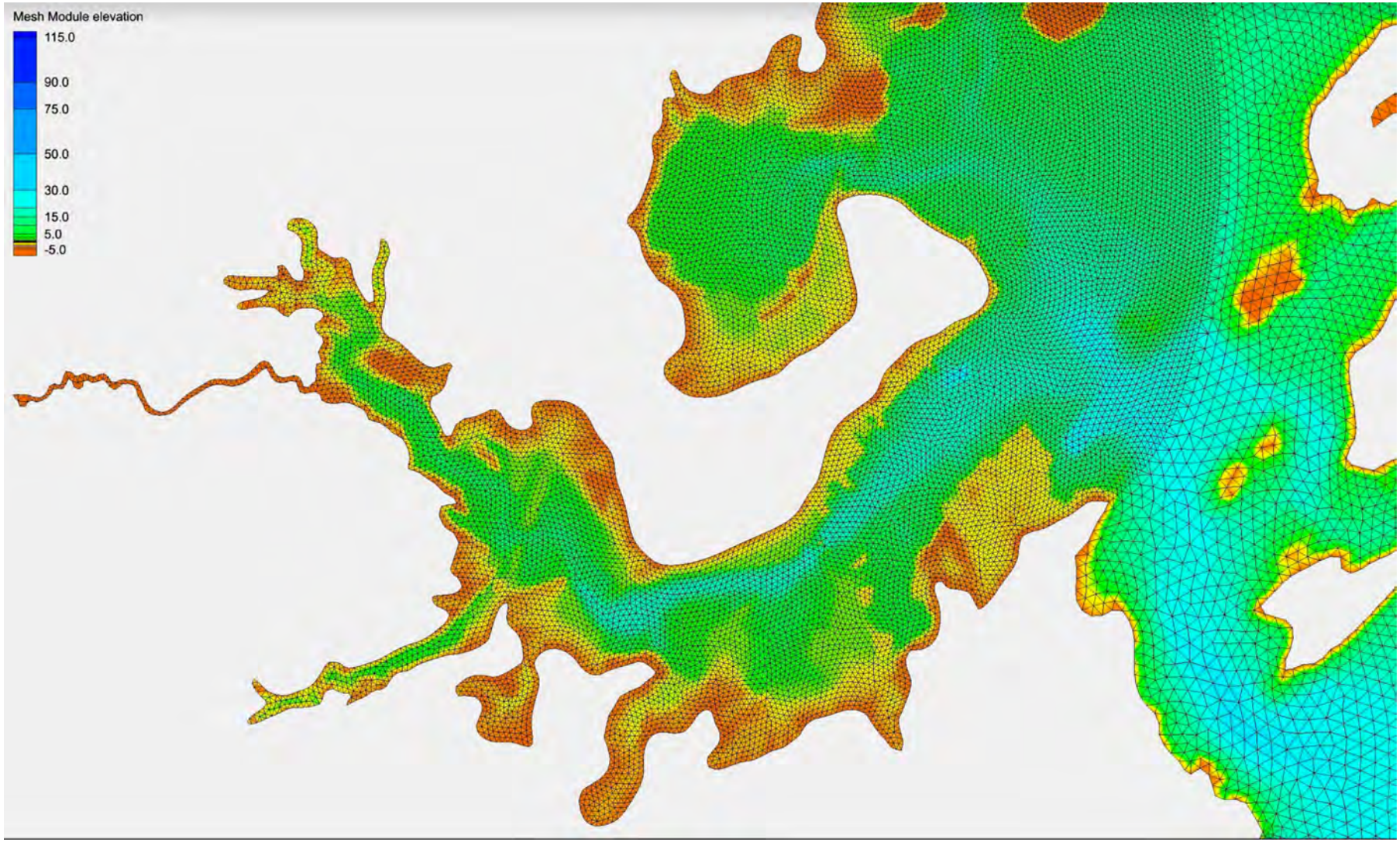
Black duck nest in tidal marsh

What did we learn?





Hydrodynamics matters….



Cost Effectiveness

- Multiple permits, multiple jurisdictions hinder ability to identify or implement cost-effective strategies
  - Regional conversations integrating policy, permitting and implementation across municipalities
  - Facilitate policy coordination between state and local government
  - "Integrated Planning" to look across permits, goals

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Setting Clear Nutrient Goals

- Better science on impacts of nutrients on Casco Bay
- Establish nutrient criteria….
  - But what's the right balance between predictability and flexibility?

The best “Best “Bang for the Buck”?

- Policies should favor technologies and actions that reduce loads or remove nitrogen
  - Planning as though watersheds matter
  - Green Infrastructure
- Need to examine a portfolio of projects to compare costs
- Policy flexibility may be needed to allow cost optimization

Thank You

Long Reach Lane Culvert Replacement

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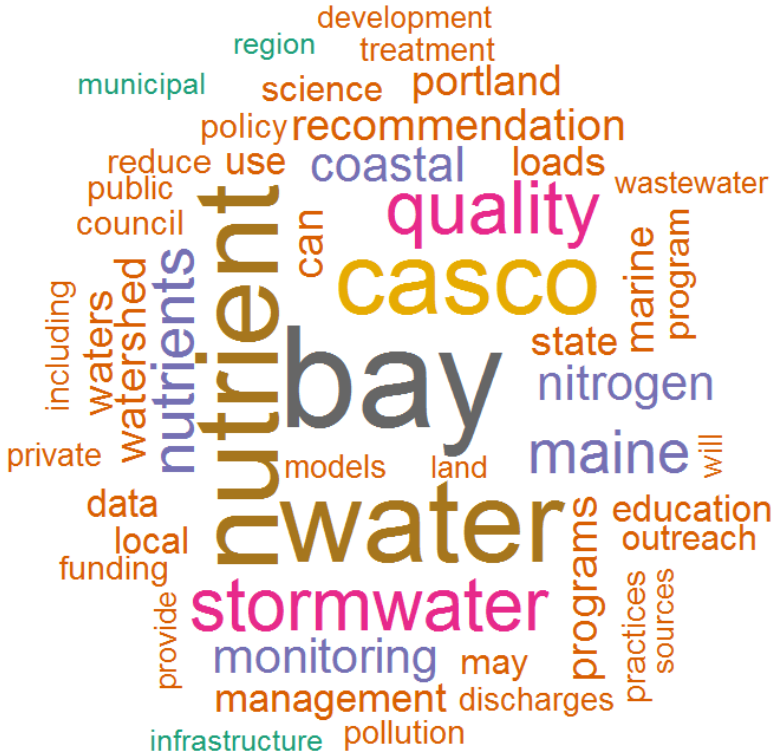

Nutrient Council Report Wordcloud