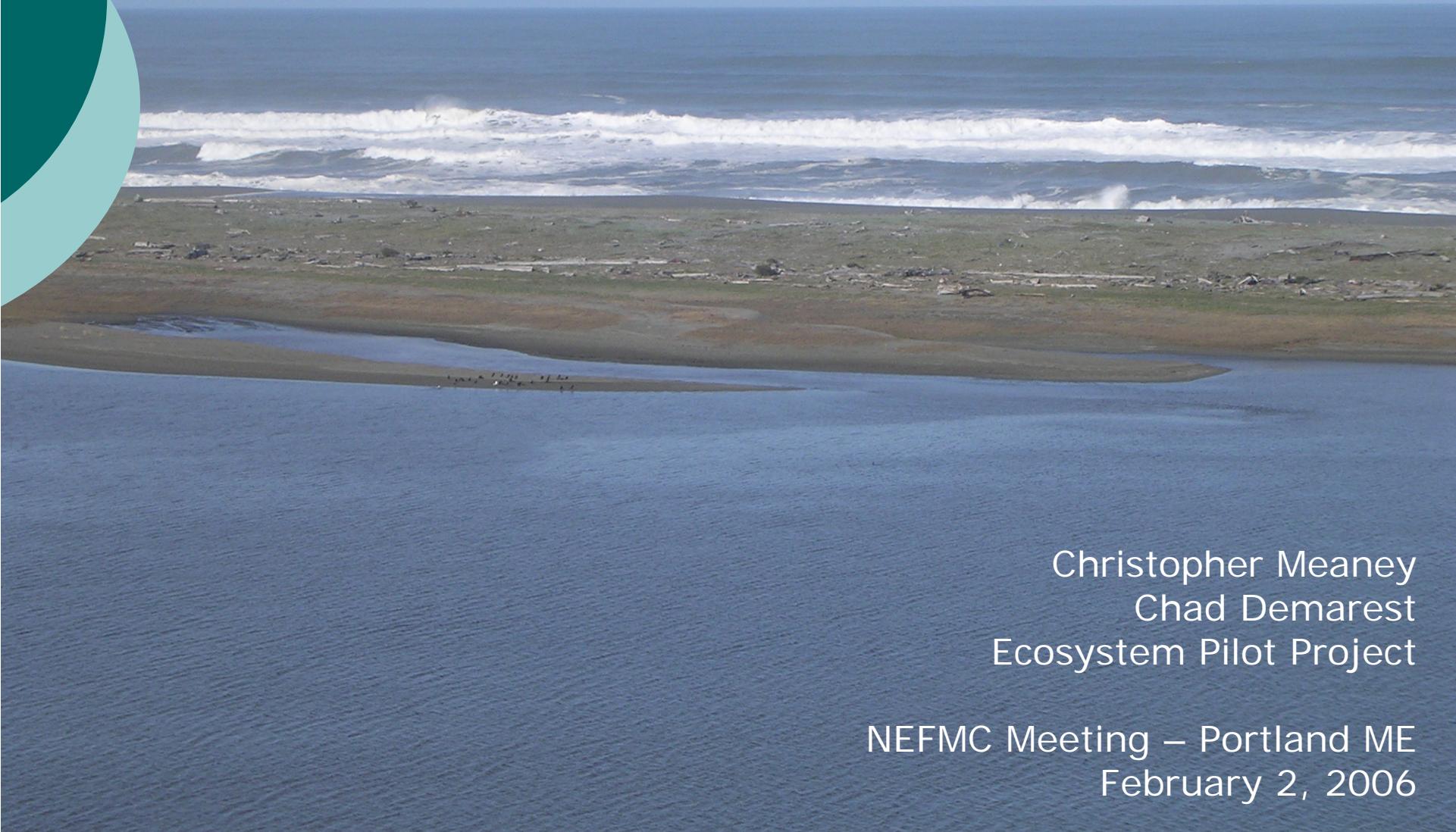


# Coastal Pollution and New England Fisheries

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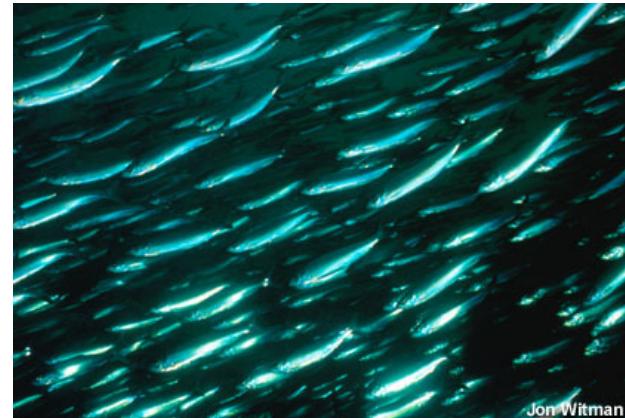


Christopher Meaney  
Chad Demarest  
Ecosystem Pilot Project

NEFMC Meeting – Portland ME  
February 2, 2006

# Objective

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To better understand the relationship  
between coastal pollution and  
fisheries in New England



## Desired Outcome

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To further an ecosystems approach to management by providing information that will help managers ask appropriate questions regarding the link between marine fisheries and coastal pollution

# Definition

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Pollution:

*"The presence in the environment, or the introduction into it, of products of human activity which have harmful or objectionable effects"*

Oxford English  
Dictionary, Second Edition





## Two-Step Approach

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- Step 1:
  - Identify coastal pollution sites of concern, their pollutants, and the species they may impact
  
- Step 2:
  - Investigate the potential impacts of this pollution on species integral to New England marine fisheries

# Step 1: Coastal Pollution Sites

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Identify coastal pollution sites with a focus on:

- Pollutants emitted
- Marine species associated with areas and pollutants





# Brief list of toxic contaminants of concern

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Metals	Ag, As, Be, Cd, Cu, Ni, Pb, Sb, Se, Ti, Zn
Polychlorinated biphenyls (PCBs)	all congeners
Pesticides	aldrin, chlordane, DDT, DDE, DDD, dieldrin
Polycyclic aromatic hydrocarbons (PAHs)	anthracene, fluoranthene, dibenz (a,h)anthracene
Others	benzene, toluene, xylene



# Coastal Pollution Sites

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## Regional Perspective

- Watersheds containing areas of probable concern for sediment contamination (2004 EPA NSQS)  
*Lower Connecticut, Charles, Narragansett, Quinnipiac, Housatonic, Southern Long Island*
- Waterbodies with the greatest amount of sediment contamination 2004 (EPA NSQS)  
*Massachusetts Bay and Long Island Sound*
- Estuaries with high eutrophic condition (NOAA NEEA 1999)  
*Casco Bay Me; Boston Harbor, MA; Long Island Sound, CT*

# Coastal Pollution Sites

## State and Local Perspective - NPL

- 13 past/present coastal sites
- New Bedford Harbor, Portsmouth Naval Shipyard
- Atlantic cod, flounders, Atlantic herring, and others



PCB Contamination Distribution  
[www.darp.noaa.gov/northeast/new\\_bedford/](http://www.darp.noaa.gov/northeast/new_bedford/)



# Coastal Pollution Sites

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## State and Local Perspective

- Combined Sewer Systems (CSSs)
  - Convey domestic, commercial and industrial wastewaters and storm runoff
  - 421 CSSs in New England with potential impacts to the coast
- TMDLs, within-state lists of contaminated properties
  - <http://www.dep.state.ct.us/wst/remediation/sites/sites/htm>



## Summary - Coastal Pollution Sites

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- Significant level of detail is associated with NPL sites and potentially affected marine species
- Most New England states provide site locations, however they are not easily distinguishable as coastal sites and rarely identify species of concern



# Summary - Coastal Pollution Sites

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- Working through state databases and municipal data incorporating suspected affected organisms, will provide the layer of detail necessary to understand the complexity of a coastal sites inventory
- Fishery managers will likely require lists and databases that are comprehensive, updated frequently, and are coordinated with the efforts of other New England States and associated organizations
- Visually depicting available data may be a first step in conveying the potential scope of the problem to managers, scientists and the public



## Step 2: Impacts of Pollution

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Investigate the potential impacts of this pollution on species integral to New England marine fisheries

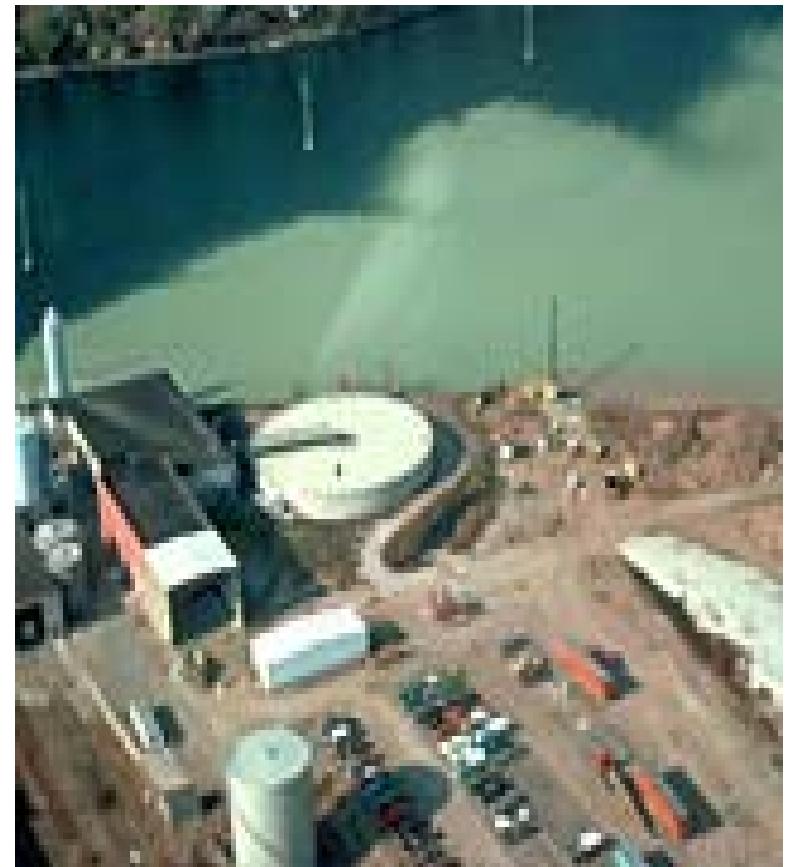
*Literature review  
focusing on:*

- Chemical contaminants
- Nutrient overenrichment

# Chemical contaminants

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- Larval mortality
- Reproduction and development impairments
- Disease, lesions and parasites

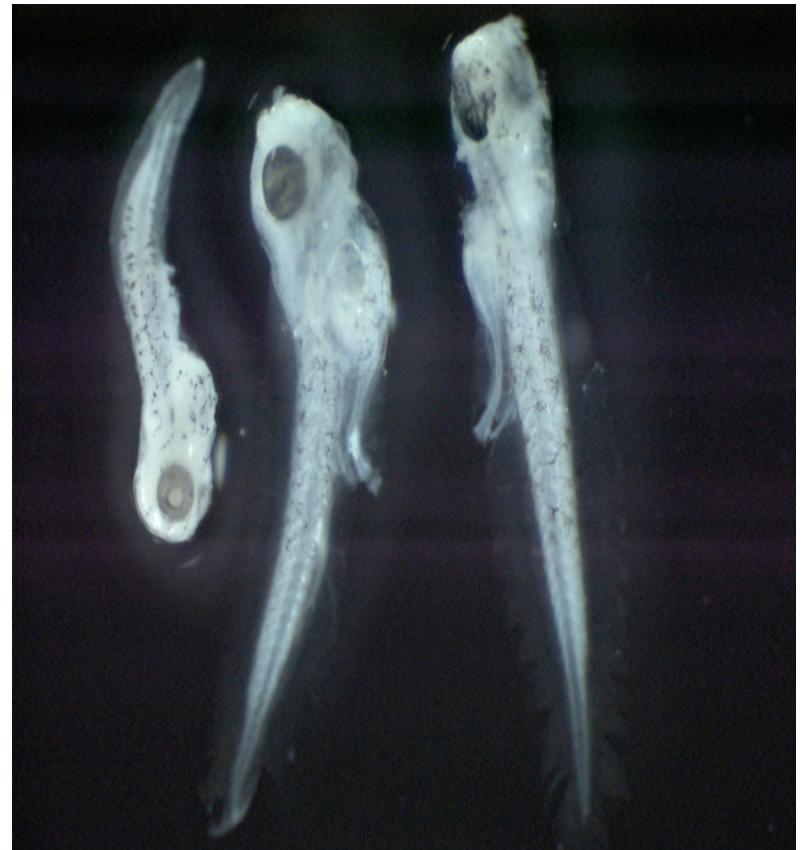


# Chemical contaminants

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## Larval mortality

- Winter flounder, cod, sea scallops, crabs
- Malformed and dead embryos and larva, reproductive failure, and more dead larvae
- --Synergistic impacts noted--



# Chemical contaminants

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## Reproduction and Development Impairments

- Cod, marine & freshwater fish, winter flounder, atlantic salmon
- Failure to reproduce, stunted development, smaller size-at-hatch and smaller larvae, sterility, disturbed sexual differentiation, migratory pattern impairment, and a multitude of sexual function impairments



# Chemical contaminants

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## Disease, lesions, parasites

- Winter flounder, estuarine fish, windowpane flounder, yellowtail flounder, cod
- Hepatic disease, early-life lesions, exacerbation of winter stress syndrome, red blood cell inclusions, lymphocytosis, histopathological liver lesions



Burkholder

# Nutrient overenrichment

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- Fish mortality and community change
- Reproduction and development

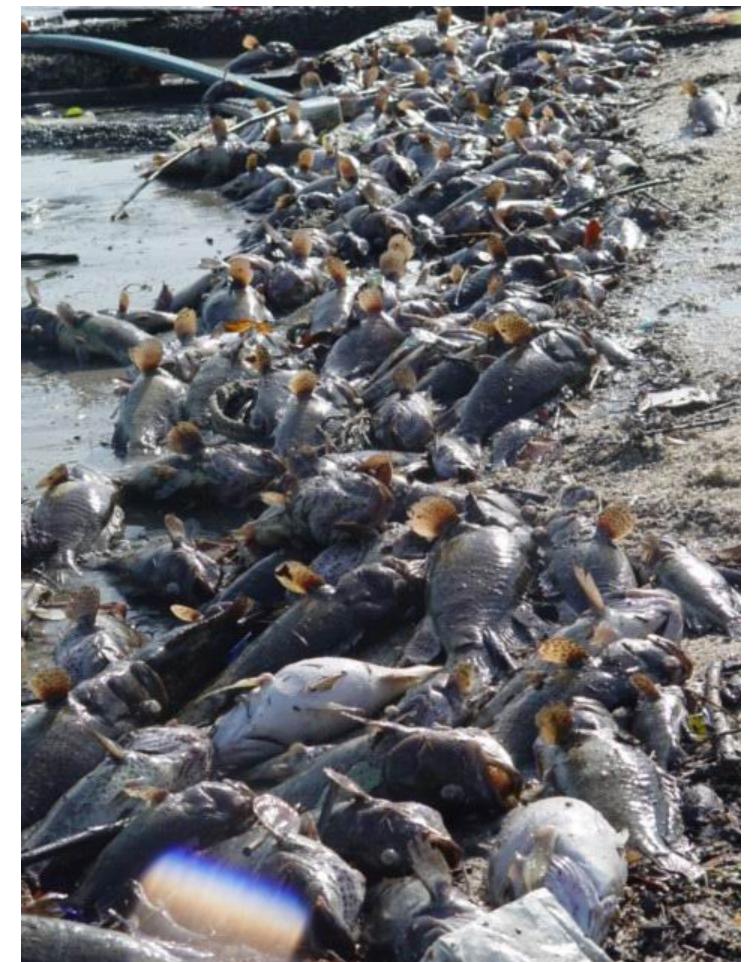


# Nutrient overenrichment

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## Fish mortality and community change

- Degraded marine food web
- Fish kills
- Community shifts, lower productivity
- Reduced growth and recruitment



# Nutrient overenrichment

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## Reproduction and development

- Endocrine disruption, teratogenic effects
- Reduced larval survival
- Retarded growth
- Early embryonic development



U.S. Geological Survey—Woods Hole, MA



## Summary - Impacts of Pollution

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- Lack of comprehensive studies on ways in which coastal pollution affect species integral to New England fisheries, especially synergistic/cumulative affects
- Information on how pollution affects fish is based on extrapolation/speculation
- Growing attention to nutrient overenrichment within the literature



## Summary - Impacts of Pollution

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- More information is needed
  - Area is ripe for exploration
  - Some comprehensive studies underway
  
- Communication is essential
  - Pathways between fisheries research divisions, academic scientists, and managers may be fragmented
  - Must improve coordination



# Conclusion

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- Sufficient evidence to warrant more work
  - Role for cooperative research?
  - More emphasis at the federal, state and academic levels?
- Efforts to address vital issues are not reaching full potential



# Recommendations

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- Encourage establishment of a data repository
  - Catalog analytical, geographic, and other data
  - Identify trends in both pollution levels and incidences of observed harms to fish
- Vocalize support for increased research and funding
  - Targeting especially population-level and synergistic effects
  - Cooperative research?
- Establish a forum for discussing these issues at the Council level and beyond
  - Involve members and/or staff in related events