VIMS, Portsmouth and the Elizabeth River: a long term relationship.

Roger Mann, John Boon, Karen Duhring, Rom Lipcius, Walter Priest, Rochelle Seitz, Mac Sisson, Mike Unger, Lyle Varnell, and Harry Wang - alphabetical but all equal.

Virginia Institute of Marine Science
Gloucester Point.
VIMS presence in Portsmouth

- Elizabeth River Project, Board of Directors 16 years.
- Technical assistance, Portsmouth Wetlands Board
- Designs for wetlands at 4 Norfolk Naval Shipyards superfund sites.
- PAH toxicity and clean up, new technology.
- Port expansion at Craney Island - modeling and mitigation.
- Continuing tide sensing for circulation and storm surge modeling.
Paradise Creek

Restoration of a superfund site
Creosote—another source for PAH coal-tar distillation fraction, approximately 90% PAH

In the Elizabeth River old abandoned wood-treatment facilities are a source for PAH via contaminated sediments
PAH induced liver lesions and cancer in *Fundulus heteroclitus*

Where PAH are high Tumors are high
Antibody-based Chemical Sensor Development at VIMS

Current technology focuses on physical conditions and inorganic chemicals. What about PAH? Can we make an oil spill detector?

There is a need for “real-time” analysis of toxic chemicals in the environment.
The Elizabeth River Project
- 16 years of river restoration -

**Mission:** Restore the Elizabeth River to the highest practical level of environmental quality with government, business, & community partnerships.
June 9, 2009 Dredging begins!

VIMS uses the biosensor to monitor dissolved PAH
Data reported to shore by cell phone
Money Pt during dredging

3-5 ring dissolved PAH

Correlation between Biosensor and Chemistry-determined PAH concentrations

\[ y = 1.1109x + 0.1206 \]

\[ R^2 = 0.9977 \]
Money Point sampling (after dredging) – 24 June 09

Concentration

3-5 ring dissolved PAH
Craney Island Expansion - modeling

The full Craney Island Eastward Expansion project.

The south cell expansion (shown in upper right panel) and the full expansion (lower right panel).
Proposed Craney Island Eastward Expansion

APM Dredged Channel and Terminal

Proposed Norfolk Harbor Dredging by Navy
Particle Tracking Capability of Numerical Model
Craney Island Expansion Option 7

Port Facility

539 acres
Compensatory Mitigation Plan for Port Expansion at Craney Island

- **Environmental Impacts**
  - Filling 522 acres open water and submerged bottom habitat
  - Loss of fisheries habitat
  - Loss of benthic habitat

- **Compensatory actions.**
  - Toxic Sediment Remediation: Dredging to remove highest concentrations and sand caps to isolate remaining contaminants
  - Wetland Restoration with fisheries habitat benefits: Excavate disturbed upland areas to create salt marsh habitat
  - Restore previously disturbed tidal wetlands
  - Oyster Reef/Clam Ground Restoration
VIMS Roles in Compensatory Mitigation Plan

Biological surveys of impact and restoration areas

Shoreline Erosion and Tidal Wetland Restoration Technical Guidance

Inter-agency coordination and advice for Local Wetlands Boards