

The Delaware Estuary Benthic Inventory: Soft-Bottom Sampling Design and 2008 Field Work

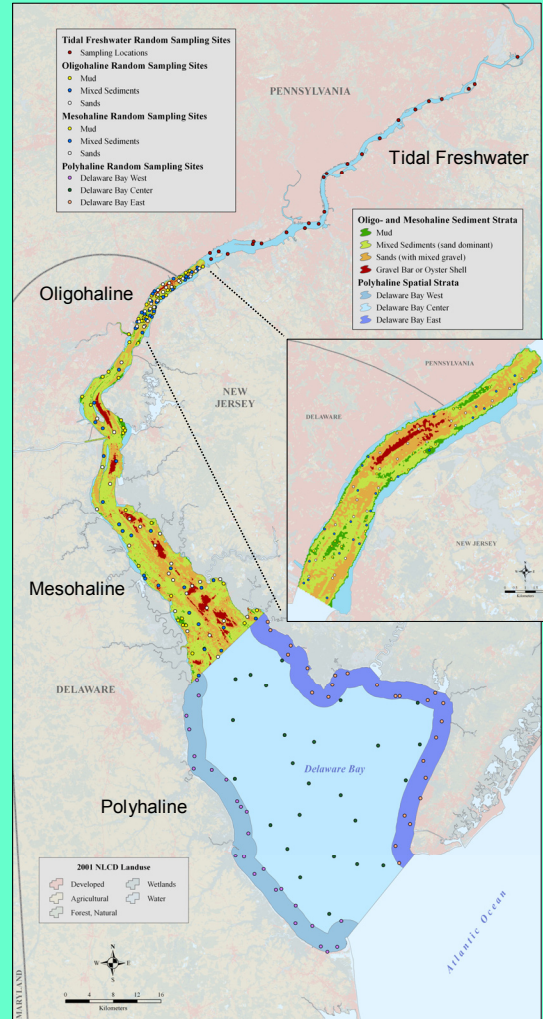
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Introduction

- The most comprehensive benthic survey ever undertaken of the Delaware Estuary was planned and initiated in 2008 by a workgroup established by the Science and Technical Advisory Committee of the Partnership for the Delaware Estuary (PDE), the National Estuary Program.
- The workgroup is comprised of representatives from PDE, the states of Delaware and New Jersey, EPA Regions II and III, EPA's Office of Research and Development (Atlantic Ecology Division), the Delaware River Basin Commission, the University of Delaware, and Rutgers University.
- The project is ongoing and is funded by two EPA RARE (Regionally Applied Research Effort) grants from EPA Regions II and III to the PDE. Invaluable technical support has been provided by EPA's Office of Research and Development, Atlantic Ecology Division in Narragansett, Rhode Island.
- The survey, also known as the Delaware Estuary Benthic Inventory (DEBI), supports **multiple goals**:
 - ✓ A comprehensive inventory of benthic communities for use in protection and restoration efforts.
 - ✓ An assessment of the health of benthic communities providing a baseline for future monitoring and assessment.
 - ✓ Spatial integration of biology with the on-going bathymetric and sediment distribution mapping of the Delaware Bay Benthic Mapping Project, Delaware DNREC, Delaware Coastal Programs (see maps at left with legend).
- This poster describes that portion of the survey focused on **soft-bottom** benthic communities. For the purpose of this project, "soft-bottom" habitat was defined as benthic habitat in which the Young grab could, once on the bottom, completely close and recover an acceptable (as defined by specific criteria) sample.

Sampling Design

- Stratified random** (probabilistic) scheme:
 - **Three salinity strata:** Oligohaline, Mesohaline, Polyhaline (based on *expected* salinity with plan to assess site salinity classification at time of sampling).
 - **Three sediment strata:** Mud (Silt & Clay), Mixed Sediments, and Sand.
 - **Probabilistic sampling** in which **25 sampling sites** were randomly located within each of the three salinity strata (with one exception), a process that made substantial use of the sediment-type distribution mapping of the Delaware Bay Benthic Mapping Project, Delaware DNREC (see maps at left with legend).
 - **Exception:** The polyhaline stratum lacked sufficient sediment-type mapping, and consequently, was stratified spatially, using two shore zones and a mid-bay zone, and randomly locating 25 sampling sites within each. (Twenty-five sampling sites were also randomly located in the tidal freshwater portion of the estuary, but not stratified according to sediment type.)
- Total sampling sites planned:** 250
- Post-sampling verification:** The accuracy of the pre-sampling allocation of sampling sites into salinity and sediment strata will be assessed using Summer 2008 field data.
- Real-time images** of bottom surface captured using video camera attached to frame of Young benthic grab.



2008 Field Work

- Over **30 volunteers** participated in day of training at the College of Marine and Earth Studies, University of Delaware, Lewes.
 - From July to September, field crews spent 36 days on the estuary, **sampling 230 sites**, covering 91 river miles.
- | Salinity Stratum | Number of Random Sites Sampled |
|------------------|--------------------------------|
| Tidal Freshwater | 5 |
| Oligohaline | 75 |
| Mesohaline | 75 |
| Polyhaline | 75 |
- Over **460 benthic grabs** (Young grab) collected: two grabs at each site—one for benthic community and sediment grain-size (% silt-clay) analysis, and a second for metals chemistry and total organic carbon. At many sites sediment for PCB analysis was also collected.
 - Water quality data** (T°C, salinity, pH, turbidity, DO, depth) collected at each sampling site, using a YSI Sonde (Model 6600 V2) calibrated daily. Overall, approximately **1,500 data points** collected. In addition, Secchi disk depths were collected at most sites.
 - Digital video** recorded of bottom (when visibility allowed) using camera attached to frame of Young grab.

Next Steps

- Sample Analysis:
 - Benthic Invertebrate Community – PDE Contract Laboratory
 - Sediment Grain Size (% silt-clay), metals, and total organic carbon – USEPA Region III Laboratory, Ft. Meade, MD
 - Sediment PCBs – DRBC Contract Laboratory
- Use data generated to develop and apply Benthic Index of Biotic Integrity (B-IBI)
- Using 2008 salinity and sediment grain size data, assess the accuracy of the pre-sampling allocation of sites into salinity and sediment strata. Some post-sampling re-classification of sites may be necessary.

Acknowledgments

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Volunteers: Lauren Carter, Stephanie Chin, Robert Chominski, Priscilla Cole, Erika Farris, George Gibson, Matt Gray, Cathleen Kennedy, Katie Lamb, Kevin Mager, Christine Mazzarella, Susan Mudry-McDaniel, Bill Muir, Carol Petrow, David Rider

