Sediment Quality Indicators for the Delaware Estuary
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Presented at the 2006 National Monitoring Conference May 7-11, 2006 San Jose California

ABSTACT

Sediment characterization is an important component of the assessment of estuarine environmental health. The goal of ecological indicators is the integration of environmental response to multiple stressors. Indicators are useful in assessing trends or as first tier screening tools prior to more rigorous and costly sampling efforts. We synthesized and compared data for the Delaware Estuary from the National Coastal Assessment Program, the National Status and Trends Program, Delaware River Basin Commission program studies, and NPDES permit monitoring activities. Sediment chemistry, acute and chronic sediment toxicity and benthic infauna assemblage studies were compared to sediment quality guidelines, published benchmarks and bioassessment guidance in an integrated approach to sediment quality characterization.

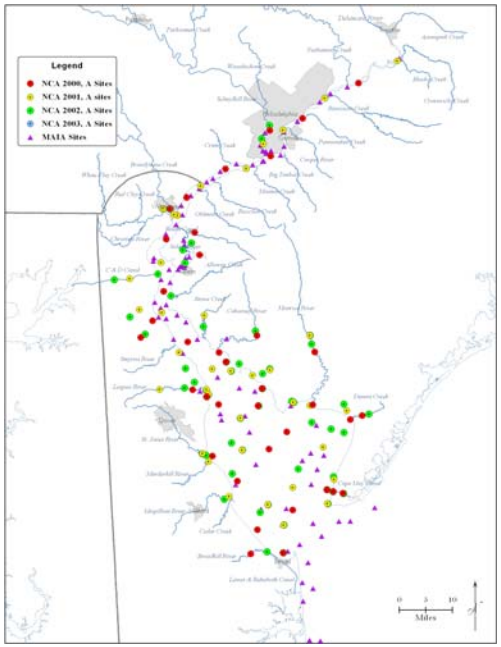


Figure 1: NCA 2000-2003 and MAIA 1997 sample sites

Table 1. A comparison of the respective sediment collection programs over the period 1990 to 2003

	Survey Area	Number of sample sites	Acute Toxicity Tests *Ampelisca abdita* (amphipod)	Acute Toxicity Tests *Arbacia puntulata* (sea urchin)	Chronic Toxicity Tests *Hyalella azteca* and *Leptocheirus plumulosus* (amphipods)	Non-standard toxicity Tests P450 and Microtox	Chemical Contaminant Analysis	Benthic Community Assessment
ADL 93	tidal river	16	*	NA	NA	NA	*	NA
EMAP 90-92	estuary	33	*	NA	NA	NA	*	*
MAIA 97	estuary	92	*	*	NA	*	*	*
NCA 00-03	estuary	163	*	NA	NA	NA	*	*
Hall 01-02	site specific	15	NA	NA	*	NA	*	*

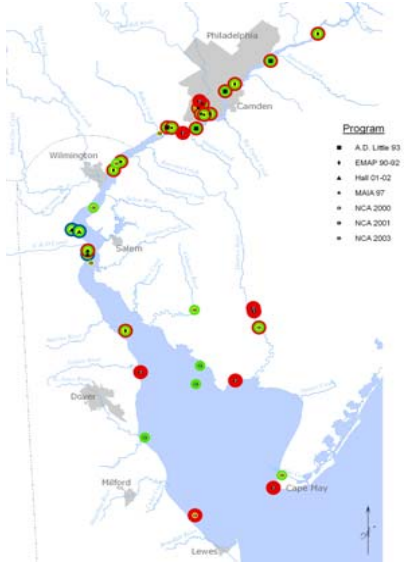
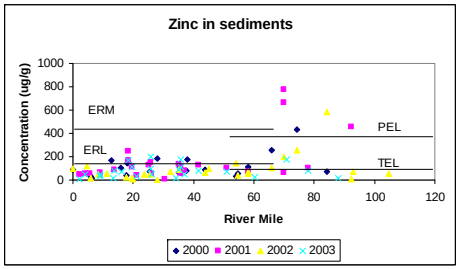
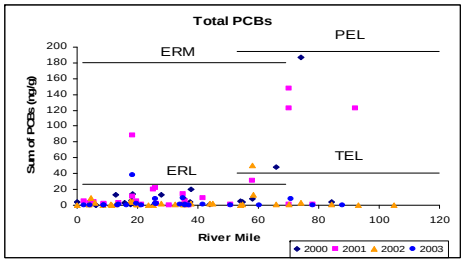


Figure 2. Delaware Estuary sites with acute sediment toxicity (red band), chronic sediment toxicity (blue band), sediment contamination (green band) and/or benthic community degradation (yellow band).

CONCLUSIONS

The 2001-2003 sediment toxicity are preliminary and do not include sediment contamination and benthic community assessment. For the most part, sediments in the Delaware Bay are not acutely toxic (9 toxic sites of approximately 125 sites sampled). Throughout the tidal Delaware River (C&D canal to head of tide at Trenton, NJ) sediment toxicity, degraded benthic communities and exceedance of sediment guidelines by various contaminants are observed. Any sediment-quality assessment of the Delaware Estuary should incorporate physical parameters such as salinity and grain size. To better assess bioavailability, simultaneously extracted metals /acid-volatile sulfide (SEM/AVS) values should also be reported. Furthermore, increasing knowledge of the sedimentation and geophysical conditions in the Delaware estuary should be used to inform future monitoring strategies.





Figures 3 and 4: Representative metal and organic contaminants (NCA data) compared to sediment quality guidelines: Effects Range-Low (ERL), Effects Range-Medium (ERM), Threshold Effect Levels (TEL) and Probable Effects Levels (PEL).

REFERENCES

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