

Development of Delaware Estuary Hydrodynamic and Eutrophication Model

Water Quality Advisory Committee Meeting
with the Model Expert Panel

West Trenton, NJ
December 12, 2012

Goal

- Hydrodynamic model:
 - Water surface elevation, current velocity, water temperature, and salinity.
 - linked with water quality model
- Water quality model
 - Short-term use: Dissolved Oxygen (DO) related
 - CBOD re-allocation (if necessary)
 - NBOD allocation (if necessary)
 - Long-term use: nutrient criteria and/or nutrient-related criteria
 - Algal community composition
 - Harmful Algal Blooms (HABs)
 - Ecological End Point (e.g., freshwater mussels)



Discussion Topics



Model Domain

- Inclusion of major tributaries
- Inclusion of Chesapeake and Delaware (C&D) Canal
- Downstream boundary
- Upstream boundary at the head of tide at Trenton, NJ
- Tidal marshes



Model Dimension

- One dimensional
- Two dimensional
- Three dimensional
- Combination of 1, 2, 3-D

Additional Model Components/Inputs

- Sediment transport
- Atmospheric deposition
- Watershed models



Available Data and Data Needs

- Parameters
- Spatial
- Temporal

Modeling Efforts in Delaware Estuary

Hydro-dynamic Model	Water Quality Model	Year developed	Users	Purpose	Model Domain
ECOM	RCA	1998	DRBC	DO / Eutrophication	Head of tide to head of Bay
DYNHYD	TOXI	2003	DRBC	PCBs	Head of tide to mouth of Bay
CH3DZ		1998	USCOE / DRBC	Channel Deepening / Salinity modeling	Head of tide to Atlantic Ocean inclusion of upper Chesapeake
ROMS		Late 2000s	NOAA / Rutgers	Tide prediction/ oyster larvae	Head of tide to Atlantic Ocean
EFDC	WASP	Under development	PWD	DO / Eutrophication	Head of tide to Delaware City
FVCOM	RCA	Under development	U. MD.	DO	Head of tide to Atlantic Ocean
RMA2		Late 1990s	PSE&G	Heated discharge	Head of tide to Atlantic Ocean (?)

Eutrophication Model

- Possible State Variables:
 - Total Phosphorus (TP)
 - Total Nitrogen (TN)
 - ammonia
 - nitrite-nitrate
 - CBOD
 - NBOD
 - Chlorophyll_a
 - DO
- SAV, Algal Species, etc.