Bathymetric and Sediment Assessment in the Bishopville Prong of St. Martin River

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Objectives

- To document stream geometry of Bishopville Prong prior to construction phase of the Dam removal project.
- To document the bottom sediment characteristics prior to construction.

Field work conducted in June 13-16, 2011
Bathymetric Surveys

- Conducted hydrographic surveys
  - Shore to shore transects collected on 50 meter grid
  - Axial transects
  - Perimeters (shoreline) transects
- Collected water level data
  - Two WLR installed
- Soundings used to develop bathymetric (elevation) model of the Prong
  - Shoreline digitized from 2009 Orthophotography
**Additional Tasks**

- **Sub-Bottom seismic reflection surveys** were conducted concurrent with the hydrographic surveys
  - Used to identify shallow and thin deposits
  - Used to identify and verify the general type of bottom sediment (i.e.- soft or hard bottom)
Water Level Data

Bishopville Prong tides

- Bishopville Dam
- Sansom Dock
- Isle of Wight, NOAA Sta. 857-0283

Date Time (UTC)

Level (ft), NAVD88

6/14/11 18:00  6/15/11 00:00  6/15/11 06:00  6/15/11 12:00  6/15/11 18:00  6/16/11 00:00  6/16/11 06:00  6/16/11 12:00  6/16/11 18:00
Bishopville Prong Study

Resource Assessment Service/Maryland Geological Survey

**Shoreline Videos**
- Collected concurrent with the perimeter hydrographic surveys
- GPS-tagged videos
- Provide visual conditions of the shoreline at the time of the hydrographic surveys

Screen capture of GPS tagged video
Sediment Assessment

- Collected surficial sediment samples
  - 7 samples in Bishopville Pond
  - 20 samples in Bishopville Prong
    - mid-channel and at the mouth of the Prong
- Sample analyzed for:
  - Textural/bulk properties
    - Water content/bulk density
  - Gravel, Sand, Silt and Clay components
  - Nutrient elements:
    - Total nitrogen, carbon, sulfur and phosphorus
  - Elemental analyses:
    - 47 elements, including TAL metals
Supplemental data from NPS

- NPS collected sediment samples in multiple tidal tributaries to Coastal Bays
  - Samples collected in Winter, 2011
  - Including three samples in Bishopville Prong

- Samples analyzed by MGS using same methods as Bishopville Study
Bathymetry

- The deepest portion, 4.7 m (15.3 ft) is a large pool just downstream (approximately 150 meters) of the dam and the Rt. 367 bridge.
- Prong divided into three sections, defined by geomorphology and hydrodynamic regime (maximum energy levels); useful in explaining the bathymetry and sediment data:
  - Upper 1500 m segment, narrow, meandering, and deepest, scouring;
  - Middle 2000 m, wider, less meandering, with defined channel, sediment accumulating in point bars;
  - Mouth of Prong
Sediment Types and Distribution

- Sediments range from coarse sand to fine grained silty clay, the latter being the most often collected.
  - Clay content in sediment is very important because nutrients and many metals are often associated with the clay fraction.

- Distribution of the sediment types is controlled by stream hydraulic regime
  - Within segments, sediments grade from coarser to finer downstream direction.
  - In Pond, coarser sediment at headwater and become finer toward dam.
Summary

- Results of chemical analyses of the Pond sediments are similar to those reported by Gascoyne Labs, Inc. (KCI, 2002) for those chemical constituents measured in both studies.
- C, N and P contents in Pond and Prong were some of the highest observed in the coastal bays watershed.
- N contents measured in the rest of the Prong samples are comparable to contents measured in sediments from other coastal bays tributaries. Pond sediments contain slightly higher N contents.
Conclusions

• Based on mass ratio C to N, a significant portion of the total C and N in the Pond and upstream area of the Prong may be attributed to algae blooms, and the Pond is a significant source of C and N to the Prong.

• Bishopville Prong sediment contain the highest sulfur contents observed in the coastal bays watershed. Pond sediments also contain S at levels higher than what would be expected in a fresh water environment.

• Historic spills from Processing Plant is thought to be a significant source of the S.