Report as of FY2006 for 2006DE77B: "Measuring Groundwater Discharge to the Inland Bays"

Publications

- Water Resources Research Institute Reports:
  - Peters, G., and W. Ullman, 2007, Measuring Groundwater Discharge to the Inland Bays, Delaware Water Resources Center, University of Delaware, Newark, Delaware, 15 pages.
- Other Publications:
  - Boyd, A., ed., 2006, Delaware Water Resources Center WATER NEWS Vol. 6 Issue 2 Nine DWRC Internship Winners for 2006 2007, http://ag.udel.edu/dwrc/newsletters/Summer2006.pdf, p. 6-7.

Report Follows

Undergraduate Internship Project #8 of 9 for FY06

Intern ***Garrett Peters*** worked with advisors Dr. William Ullman and Dr. Douglas Miller of the ***University of Delaware (UD) College of Marine and Earth Studies (CMES)*** on his ***DWRC / CMES*** co-sponsored internship project, *"Measuring Groundwater Discharge to the Inland Bays."* Garrett investigated the patterns and rates of groundwater seepage and any related ecological and environmental impacts to the coastal zone. He used new methods, such as water temperature, as an indicator of the rate of groundwater flow as well as more traditional methods that use salinity as an indicator of flow. The region of study included the northern edge of the Indian River, locations in the Inland Bays, and marshy areas.

"*I found the internship extremely valuable because I was able to see first hand how research is conducted and it allowed me to develop skills necessary for my future - both as a student and an engineer****." - Garrett Peters***

Abstract

The focus of this research was to study the patterns of flow in an intertidal groundwater seepage zone, where discharges may impact the rates of nutrient loading. A range of complementary methods were compared and used together to interpret flow patterns, tidal control of discharge rates, and to determine directly discharge rates. The methods used were horizontal hydraulic head and gradient measurements which are proportional in any setting to horizontal flow, seepage meters that collect discharging waters over a set area of collection, and subsurface temperature logging, which monitors flow directions based on the temperature difference between fresh groundwater and surface seawater. Our results showed that the hydraulic head and temperature logging methods were consistent with each other, both showing maximum horizontal flow at low tide, while the seepage meters showed a maximum vertical flow at high tide. These observations suggest that saline tidal waters act to focus groundwater discharge to a narrowing intertidal zone during rising tide, although the total discharge over the whole intertidal zone may in fact decrease during this period. The results of this work suggest that multiple survey techniques are needed to properly quantify groundwater discharge to intertidal zones and to properly identify the processes controlling discharge at such sites.