VIMS Industry Partnership Meeting Notes – October 5, 2007
Director's Conference Room, Watermen's Hall, VIMS, 10 a.m. until noon

Present

VIMS: John Wells (Dean and Director), Iris Anderson (Graduate Dean), John Brubaker (Physical Sciences), David Forrest (Physical Sciences), Carl Friedrichs (Physical Sciences), Steve Kaattari (Environment and Aquatic Animal Health), Jane Lopez (Sponsored Programs), Ann Marshall (Development), Mike Unger (Environment and Aquatic Animal Health), Lyle Varnell (Advisory Services). W&M Main Campus: Bill Bean (Technology and Business Center), Tina Bunai (Applied Research Center), Jim Golden (Economic Development), Dennis Manos (Vice Provost), John van Rosendale (Computational Science). Industry: Jay Diedzic (Blackrock Energy), Eric Weisel (Werner Anderson), Dave Marsell (Pressure Systems), Chris Gullickson (HREDA), Jim Schultz (HRRP)

Discussion

1. **The Bay Clean-up Initiative** (Iris Anderson)
    a. VIMS and DEQ have agreed on a fixed-price contract of approximately $1.44 million for 2006-2008. VIMS is providing spatially and temporally intensive monitoring of attainment of EPA criteria for designated uses in Virginia tributaries. DEQ did not fund the dynamic mapping VIMS proposed.
    b. The state is investing in reducing nutrient inputs into Virginia rivers. The biennium state budget includes more than $200 million to clean up the Bay in an effort to reach the 2010 standards to get off the EPA "impaired waters" list. Evaluating the impact of those nutrient reductions on the quality of water in the bay is complicated, because nutrients also flow into the rivers from the Bay. The data VIMS is providing are important to make sure that the large state investments are based on valid data.
    c. The monitoring includes DataFlow monthly cruises (for large area assessments of shallow water areas), fixed station datasondes (for single-depth, continuous assessment), the ACROBAT towed undulating vehicle for dissolved oxygen and chlorophyll 3D assessment in deep water, and a vertical profiler (for continuous, multiple depth, fixed station observations). All of those instruments will be used on the York River, and some of them will be used on the Potomac, Rappahannock, and James Rivers.
    d. Daily monitoring results vary widely, so it is important to gather data over time. Dynamic mapping is required to scale point measurements up to descriptions of conditions in each river. This permits adjustments for time of day and tidal phases. The dynamic mapping was not funded by DEQ.,
    e. Iris presented monthly charts showing data results for dissolved oxygen and chlorophyll a in the York River. The data highlighted the appearance of red tide in the second week of September 2007.
    f. General Discussion:

  i. Funding for 2008 and beyond is at risk because of state budget issues. Preliminary budget cuts are disproportionately large in the area of water quality.

  ii. Funding now comes to VIMS through DEQ. It would be more efficient if the funding came directly to VIMS.

  iii. A reduction in funding would mean that the large state investments in water quality improvement would be based on limited data.

  iv. The group was impressed with the dramatic increase in available data over the past year of the program.

  v. VIMS has graduate students looking at the impact of temperature changes on marine life community composition, including a study on jellyfish.

  vi. The group speculated about the likely EPA response if standards are not met by 2010. The response could include total maximum daily (TMDL) load restrictions for the Virginia tributaries.

2. **Antibody-based sensor development** (Steve Kaattari, Mike Unger – 20 min)

 a. VIMS continues to make substantial progress in antibody-based sensor development. The goal is to create remote, rapid, reliable assessments of environmental samples. The probes in development are superior to current alternatives in portability, sensitivity, time, and cost. VIMS is developing compound-specific monoclonal antibodies for various toxic chemicals and hydrocarbons. Sensors are then used to measure the reaction to the monoclonal antibodies. The extent of the reaction indicates whether or not a substance is present. The antibodies are used in equipment developed by Sapidyne to detect the extent of binding with chemicals in field samples.

 b. The team reported progress in development of a real-time biosensor for the detection of TNT in a paper published in the May 2007 issue of <u>Biosensors and Bioelectronics</u>. Successful testing of the biosensor will be reported in an upcoming issue of <u>Environmental Science and Technology</u>.

 c. Work is complete in the development of an antibody to dibenzothiophene (a three ringed aromatic heterocyclic compound consisting of two benzene rings with a central five-membered ring containing a sulfur atom).

 d. The team received $400,000 in NOAA funds for 2007-2009 through CICEET (The Cooperative Institute for Coastal and Estuarine Environmental Technology) to develop and validate sensors in collaboration with the Elizabeth River Project. The work will be done in collaboration with Erin Bromage at the University of Massachusetts Dartmouth.

 e. Steve discussed the details of developing monoclonal antibodies and recent refinements using "subtractive immunization" to induce mice to react only to the desired antigens. The new processes are more efficient in producing only the desired monoclonal antibodies.

 f. The work has been well received elsewhere and it seems to have strong commercial applications.

 g. Discussion

       i. W&M is doing work with the City of Portsmouth and some funding may be available for the work with the Elizabeth River Project through that collaboration.

     ii. The monoclonal antibodies have enormous commercial potential. The next steps are to demonstrate applications of the technology to convince potential users that the sensors are in fact superior to current alternatives in portability, sensitivity, time and cost.

3. **Jamestown Flood Hazard Emergency Management Project** (John Boon, John Brubaker)

    a. John Boon discussed the value of monitoring water levels to (1) provide near-real time storm surge and storm tide information, (2) aid community planning, and (3) verify storm surge models. He noted that a storm tide is the high water level produced locally from a storm surge in combination with the astronomical tide.

    b. He cited an example of a community planning issue. High storm tides and high waves during hurricane Isabel caused a barrier spit to be breached at the entrance to the Back River in Hampton, a bay tributary heavily populated with waterfront homes. Although the barrier has covered little more than half of the Back River entrance, local citizens firmly believe their homes were flooded then and during later storms because of the breaching of the barrier (akin to flooding in New Orleans during Katrina due to a failed levee). However, water level records from nearby Sewells Point show that the recent Back River flooding is most likely the result of a series of storm tides higher than any experienced since 1962. Water level records inside Back River would show whether the barrier spit has had any effect on flood reduction but none are available. Hampton unfortunately may react to the problem by repairing the spit at considerable expense only to see that it has no effect. Strategic planning including storm tide modeling is needed in lieu of ad-hoc solutions.

    c. He showed data for Sewell's Point indicating that water levels were rising at a rate of about 1.4 feet per century. This increase is higher than for some other areas, in part because the land level is dropping. Coastal community planning cannot afford to ignore this trend going forward.

    d. The proposed project has installed a state-of-the-art water level gauge with data transmission by satellite at six-minute intervals on the North Ferry Pier at Jamestown. The data will be used to guide emergency management planning for the area.

4. **General Discussion**

    a. Tina Bunai outlined her interests in using thermo orbitrap protein analysis to determine variations in oil content across different algae species. That information could be very useful in photobioreactor production. This could link to VCERC biodiesel research.

    b. We hope to integrate that idea into a broader discussion at our next meeting about VCERC funding and related programs at VIMS.

     c. Jane Lopez noted that VCERC funding for this year had not yet arrived, pending the ongoing state budget review.

5. John Wells adjourned the meeting at noon.

Next Meeting: Friday, December 14, 10-noon

Potential Agenda Topics:

     Campus Broadband and Data Management Connectivity -- John Van Rosendale (who graciously deferred this presentation at the last two meetings)
     Virginia Coastal Energy Research Consortium (VCERC): Biodiesel and wind energy initiatives – Neil Rondorf, SAIC, John Wells, Others
     Economic Development Initiatives Related to VIMS – Chesapeake Bay, Sensors, Modeling and Simulation, Portsmouth – Jim Golden, Bill Bean
     Others to be announced – Please send ideas to Jim Golden