

## **Session K2: Using the National Aquatic Resource Surveys to Support Regional/State/Tribal Information and Decision Needs**

Room A106  
3:30 – 5:00 pm

**0177**  
**K2-1**

### **An Example of Using National, State and Local Surveys to Support an Integrated Basin Water Quality Assessment: The Willamette Basin (Oregon) Rivers and Streams Assessment**

Michael Mulvey, Aaron Borisenko and Robin Leferink

*Oregon Dept. of Environmental Quality, Hillsboro, Oreg., USA*

Oregon's Willamette basin is the hub of the state's population and economy with 70% of the state's population and 75% of the state's employment in only 12% of the state's land area. The basin contains some of the state's most challenging water quality issues.

Over a 15 year period more than a dozen stream and river surveys have monitored approximately 650 randomly selected sites and least-impaired reference sites on streams and rivers in the Willamette basin using common sampling approach and data collection methods. Monitoring was conducted by municipal, state and federal governments; university researchers, and local watershed councils using US EPA's Environmental Monitoring and Assessment Program protocols. Careful calculation of site weighting factors was critical to integrating data from many different surveys with wide ranges of sampling densities.

The Oregon Department of Environmental Quality aggregated these various compatible data sets to evaluate stream and river status for the entire Willamette basin; for urban, agricultural and forested land use types; and for major subbasins using biological, water quality and physical habitat condition indicators. Randomly selected sites are compared with least-human-impaired reference sites to evaluate the role of natural conditions and human activity to the current stream and river status. Relative risk assessment was used to examine which water quality and habitat stressors were most likely responsible for detrimental effects to the biological quality of the basin's rivers and streams.

The biological health of 46% of the streams and river miles in the Willamette basin are in most disturbed condition as measured by the stream insect community and other macroinvertebrates. Agricultural land use is the largest source of most disturbed streams accounting for 62% of the most impaired stream miles while representing only about 30% of the total stream miles.

Nearly 70% of the stream and river extent in the basin violates the temperature criteria for protecting sensitive cold water fish like salmon and trout. Streams with temperature violations were nearly twice as likely to have impaired macroinvertebrate biological condition and 14 times more likely to have impaired fish and amphibian biological condition.

**0189**  
**K2-2**

### **California's Successful Transition from Western Pilot EMAP to a State Funded Wadeable Streams Assessment Program and Biocriteria**

James Harrington

*California Dept. Fish and Game, Rancho Cordova, Calif., USA*

Since 1993, the California Department of Fish and Game (DFG) has been working with the State Water Resources Control Board (California's water quality agency) and the US Environmental Protection Agency (EPA) to develop techniques and tools to assess the biotic integrity of wadeable streams throughout the State. In 2000, California accelerated its efforts in developing a bioassessment program by participating in the EPA Western Pilot Environmental Monitoring and Assessment Program (EMAP-West). The sampling effort in California was intense since besides the state-wide assessment unit, California had three additional assessment units and conducted a special study to calibrate its historic invertebrate sampling protocol to EMAP standards. DFG staff gained considerable experience with EMAP-West protocols since they conducted all the field work and processed all the invertebrate samples.

With the experience with EMAP-West, California has taken advantage of the research and development products provided by the EPA. Bioassessment techniques and reporting framework used in California today are based on those used in the National Aquatic Resources Assessment (NARS). As a result of our involvement with the EPA, biotic and physical condition assessments are used in many water quality programs in California and soon there will be state-wide numeric criteria for wadeable streams and rivers.

0357  
K2-3

### **Increasing State Biological Monitoring Capabilities Using Probabilistic Monitoring Strategies**

Jason Hill and Larry Willis

*Virginia Dept. of Environmental Quality, Roanoke, Va., USA*

Virginia Department of Environmental Quality (VDEQ) has completed its second five year freshwater probabilistic monitoring cycle. When the probabilistic program began in 2001, VDEQ's only biological monitoring tool was a family level (100 count) macroinvertebrate tool whose reference sites were not ecoregionally calibrated and only applicable in wadeable streams. VDEQ has used its state-level freshwater probability and the National Stream and River Assessment (NSRA) programs data to pilot multiple biological monitoring tools for wadeable and non-wadeable streams. VDEQ has found the probability monitoring strategy an efficient way to identify reference sites necessary to validate biological indices. Future biomonitoring tools include a periphyton Index of Biotic Integrity (IBI) for wadeable streams, fish IBI for wadeable streams, and a wadeable streams genus level macroinvertebrate index calibrated for each major ecoregion in Virginia.

In 2008, VDEQ adopted a modified NSRA protocol for non-wadeable streams in its state-level probability survey. Biological data collections at these large river sites will allow VDEQ to characterize the conditions of these important freshwater resources. This improvement in state monitoring capabilities will improve VDEQ's ability to communicate regional stream and river conditions to the public, help biological TMDL development, and identify the major stressors to several biological communities in the aquatic environment.

0382  
K2-4

### **Virginia's 2010 Near-Shore Oceanic Survey: Characterizing the Commonwealth's 6th Order Near- Shore Oceanic Watersheds**

Donald Smith and Roger Stewart

*Virginia Dept. of Environmental Quality, Richmond, Va., USA*

In 2010, VA-DEQ conducted a probabilistic survey aboard EPA's Ocean Survey Vessel Bold, in conjunction with the NARS/NCCA, to characterize its newly delineated near-shore oceanic watersheds. Fifty random sites were selected and sampled between Virginia's continental barrier beaches and its three-nautical-mile territorial limit. Near-surface waters were characterized for bacteria, nutrients, chlorophyll, dissolved and total trace metals, and 19 petroleum-related PAHs. Hydrographic profiles permitted near-surface and near-bottom characterizations of water temperature, dissolved oxygen, pH, salinity, and turbidity. Sediment was characterized for chemical contaminants, particle size and TOC, and ten-day static acute sediment toxicity tests were performed with *Leptocheirus plumulosus*. Analysis of benthic communities completed the third leg of the sediment quality triad.

Sites varied from 8.5 to 25.8 m in depth. There was little evidence of well defined stratification, although temperature differentials of 7.2-7.6 °C were observed at several of the deepest sites. Near-surface bacteria, nutrients, and chlorophyll were within seasonal ranges previously reported by EPA and NOAA for the Mid-Atlantic Bight. With the exception of copper, all metals concentrations were relatively low. Even at low concentrations, a well defined north to south gradient of metal prevalence was noted. The tidal discharge flume from Chesapeake Bay induced a sharp break in salinity and in dissolved metals gradients. Dissolved arsenic, vanadium, antimony and zinc were more prevalent south of the Bay's mouth. All petroleum-related PAHs analyzed were below detection limits at all sites. Substrate was predominantly sandy; only five sites exhibited muddy sediment and most were in moderately deep waters near inlets along Virginia's northern Delmarva coastline. A single site (muddy) had sediment TOC >1.0 %. No chronic water quality standards or sediment screening values (ERM or ERL) were exceeded at any site. Highly significant *L. plumulosus* mortality was observed in toxicity tests from two northern Delmarva sites, but overall variations in toxicity were not clearly related to substrate type or to sediment TOC or contamination. Simple benthic abundance and diversity metrics were not clearly correlated with sediment characteristics, although these data should contribute to future development of multimetric indices of benthic biotic integrity.