ORSANCO Research Initiatives

SRBC Water Quality Advisory Committee

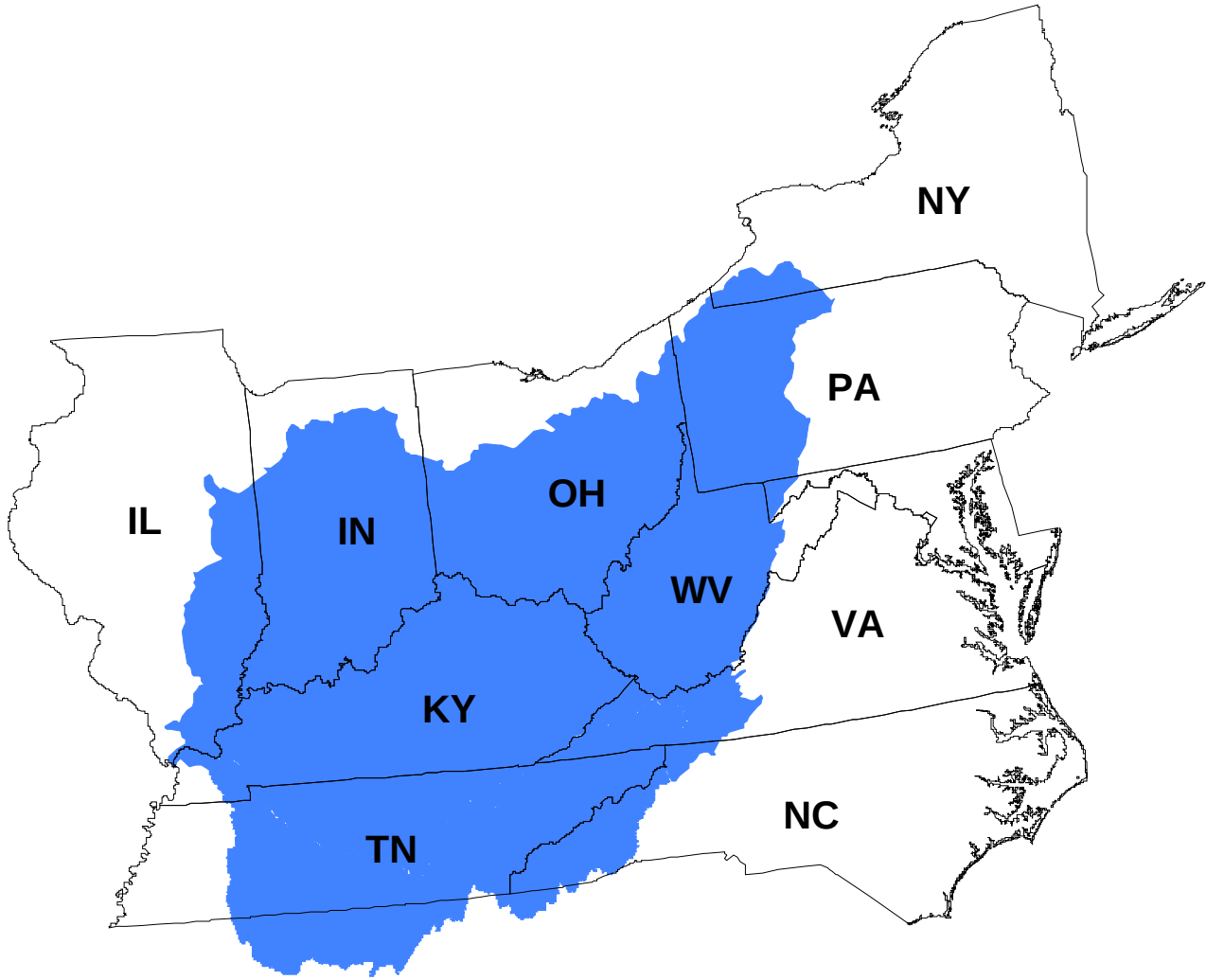
May 25, 2011

Who/What is ORSANCO

- Ohio River Valley Water Sanitation Commission
- Interstate water pollution control agency
- Powers derived by 1948 Compact signed by state governors and approved by Congress
- Consists of representatives from eight states (6 main stem states, NY and VA) and the federal government

Mission of ORSANCO

- Implement the Compact through direct action and coordination of state activities
- Wastes discharged in one state shall not "injuriously affect" the waters of another state
- Compact authorizes Commission to adopt rules, regulations and standards



Commission

27 Commissioners
- 3 per state
- 3 federal

25 employees

State funding based on formula incorporating land area and population

Federal funding via 106 grant

Programs

- Water Quality Monitoring and Assessment
- Biological Studies
- Pollution Control Standards
- Spill Detection and Notification
- Organics Detection System
- Public Information and Education
- **Water Resources**

Research Committee

- Identify research needs in the Ohio River Basin and provide guidance in research initiatives
- 9 member panel
  - 3 Commissioners
  - US EPA
  - USGS
  - Water Environment Research Foundation
  - Environmental consulting firms
  - University researchers

Current Areas of Interest

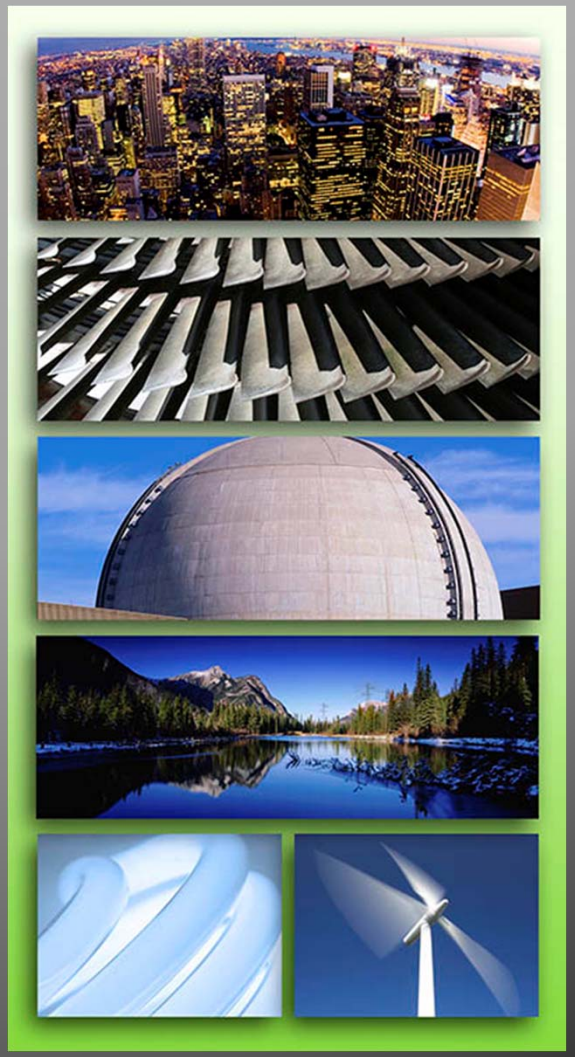
- Nutrients
- Emerging Contaminants
- Microbial Source Tracking
- Mercury
- Total Dissolved Solids
- Biological Programs

Gulf of Mexico Hypoxia

- Hypoxic Zone averages 15,000 km^2.
- Goal is to reduce the zone to 5,000 km^2.
- Task Force includes 5 Federal Agencies and 12 States.
- Task Force website: http://water.epa.gov/type/watersheds/named/msbasin/index.cfm

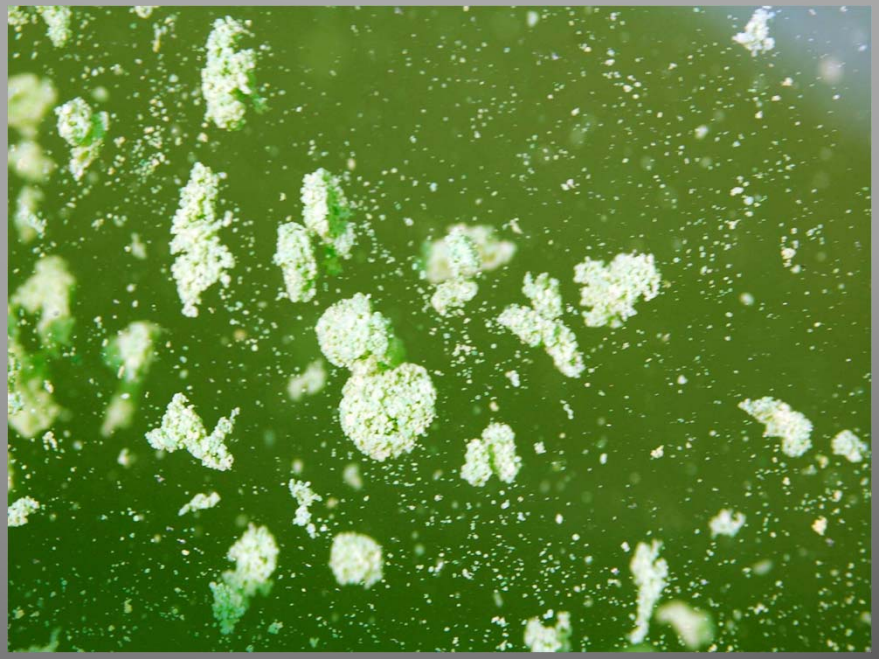
EPRI Nutrient Trading Project

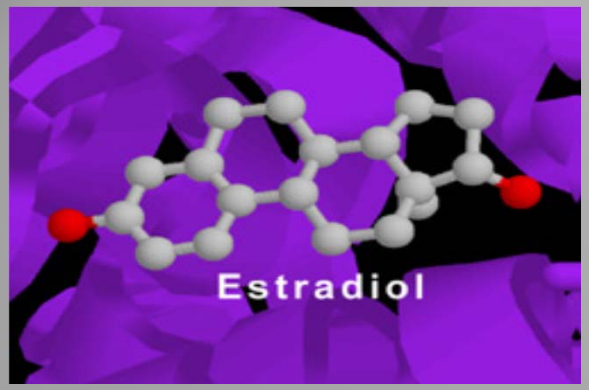
- Led by Electric Power Research Institute. Project partners include Industry, Government, Agriculture
- Current funding: $1 million Targeted Watershed Grant
- Largest trading project ever attempted
- Project website: www.epri.com/ohiorivertrading



Nutrient Criteria Development

- Data collection for nutrient criteria began in 1999.
- Attempts at correlating nutrients to biological effects unsuccessful to date.
- Current approach is a weight of evidence method using multiple lines of evidence.
- Draft numbers from this approach expected in 2012





Emerging Contaminants

- Pharmaceuticals & Personal Care Products (PPCPs)
- Hormones and Sterols
- Perfluorinated Compounds

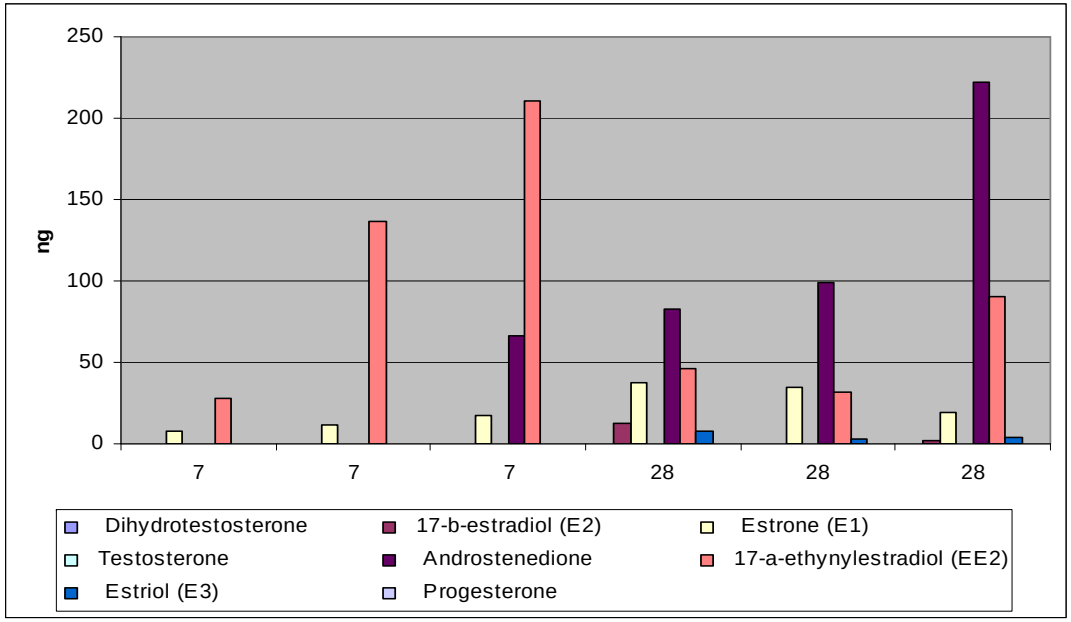
Research Strategy

- Do we find ECs in the Ohio River?
- Are fish and other aquatic organisms showing effects possibly caused by exposure to ECs?

- If YES…
  - Develop a strategy for testing fish health indicators and develop a routine monitoring strategy.

Phase 1 – Results

- Hormones found
  - In effluent mixing zones
  - At upstream reference locations
- Fish showed possible signs of health effects
  - No Intersex found!!



Phase 2 – Ongoing

- A more comprehensive look at the occurrence of Emerging Contaminants within the mainstem Ohio River
  - 22 Locations
    - Longitudinal spread
    - Range of potential for occurrence
      - POTW mixing zones
      - Tributaries
      - 'Background' areas
  - 121 Pharmaceutical and Personal Care Compounds
  - Hormones & Sterols
  - Nonylphenol (+)
  - Perfluorinated Compounds (PFCs)
  - Optical Brighteners

Phase 2 – Objectives

- Document occurrence of ECs within the mainstem Ohio River
- Identify areas of the river with a greater risk potential (to aquatic organisms)
  - Number of contaminants present
  - Levels observed
  - Single chemical 'WERF ranking' (ongoing project)
    - Prioritizing Trace Organic Compounds

Phase 2 – "Partners"

- USEPA NERL – Cincinnati
  - APEOs – NPEOs – Optical Brighteners – PFCs
  - Researchers are national/international experts in the EC field
- AXYS Analytical
  - Developed PPCP methods for EPA (1694; 1698)
- Waters
  - Demonstrating new analytical capabilities

Phase 3 – Overview

- Use Phase 2 results to identify a 'gradient of (EC) condition'
  - Areas with differing potential for showing biological response
    - Occurrence of ECs
      - Type
      - Concentration
      - *Risk Potential* – ongoing WERF Research Project
- Test various candidate measures of *Fish Health* along the gradient identified

Microbial Source Tracking

- Understanding sources is critical in developing effective pollution control strategies
- Partnered with USGS and Ohio State University
- Resulted in improved lab methods
- Confirmed human-specific genetic markers can be used in complex system to identify sources

Methylmecury Investigation Goals

Primary Goals

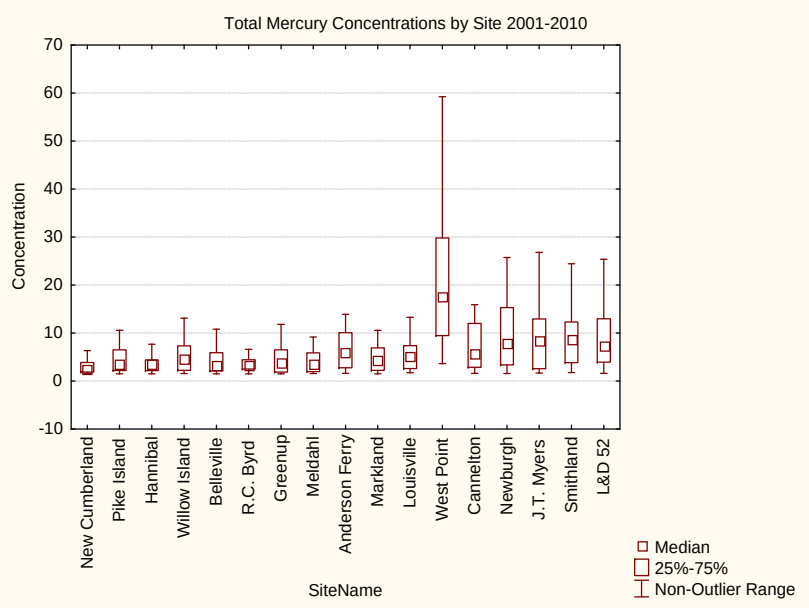
- Characterization of bioavailable methylmercury versus total mercury in water
- Look at relationships between MeHg in water vs. fish tissue
- Evaluate ORSANCO Clean Metals methods/locations for future methylmercury studies

Secondary Goals

- Provide information to assist with potential future variance requests.
- Transfer of knowledge: ORSANCO learns USGS Equal Discharge Increment (EDI) sampling methods

Monitoring Plan

- Six Ohio River Locations
  - Ohio River Mile 118 (AEP Mitchell Plant/PPG Natrium)
  - Mile 126 Hannibal L&D
  - Mile 606 McAlpine L&D
  - Mile 720 Cannelton L&D
  - Mile 840 J.T. Myers L&D
  - Mile 918 Smithland L&D



- 3 Events per site: May, July, and September 2010

Analytical Parameters

Mercury

- Dissolved total Hg
- Particulate total Hg

- Dissolved methyl Hg
- Particulate methyl Hg

Supplemental Constituents

- Dissolved sulfate
- Total particulate nitrogen
- Chlorophyll-a
- Suspended sediment

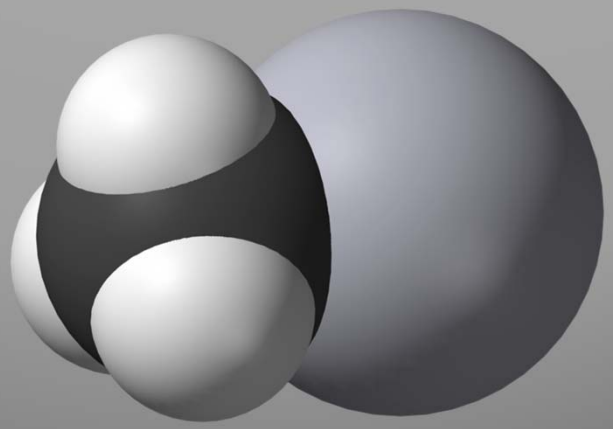
- Dissolved organic carbon
- Total particulate carbon
- Particulate organic carbon
- Particulate inorganic carbon

Sampling Methods

- USGS Equal Discharge Increment (EDI)
  Isokinetic Sampling

Mercury in Power Plant Effluent

- Number of Hg violations in Ohio River increasing
- Implementation of air regulations shifting Hg releases to water
- Proposed study to evaluate impact of FGD scrubbers on mercury levels in power plant effluents



H_3C-Hg^+

Total Dissolved Solids

- See increasing trends of some TDS constituents (bromide, sulfate)
- Variety of sources
  - Mining, power plants, road salt, gas extraction, agriculture
- Proposed TDS standard
- Increasing bromide levels causing drinking water treatment plants problems in meeting disinfection byproduct standards
- Need to evaluate effectiveness of treatment techniques to minimize byproduct formation

Biological Programs

- Develop mussel monitoring techniques; develop mussel bio-criteria
- Determine effects of invasive submerged aquatic vegetation on fish populations
- Determine current distribution of Asian carp and predict future dispersals
- Quantify isolation effects of dams on Ohio River fish populations

Questions?

Sam Dinkins

513-231-7719

sdinkins@orsanco.org