

# Assessing Endocrine-Disrupting Chemical Exposure in Indigenous Aquatic Populations in the Ohio River

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## Statement of the problem:

Traditional assessment endpoints largely focus on changes at the population and community levels. Endpoints on these biological levels are response to a variety of stressors and therefore offer limited information as to causative agent. Recently, EPA has focused research on developing molecular indicators of exposure to environmental contaminants in hopes that they may be used to supplement traditional ecological endpoints. Recently, an emerging class of toxicants, endocrine disrupting compounds (EDCs) and specifically estrogenic compounds, has gained much media attention. EDCs are increasingly being found in waterways in the United States and Europe from sewage effluents and animal facilities at biologically active levels toxicological effects. Their presence has been linked to a wide variety of developmental, morphological and reproductive abnormalities in aquatic wildlife and has been loosely linked to human health issues such as increased incidences of ovarian and breast cancer. For this reason, efforts in molecular indicator development have focused largely on these emerging threats.

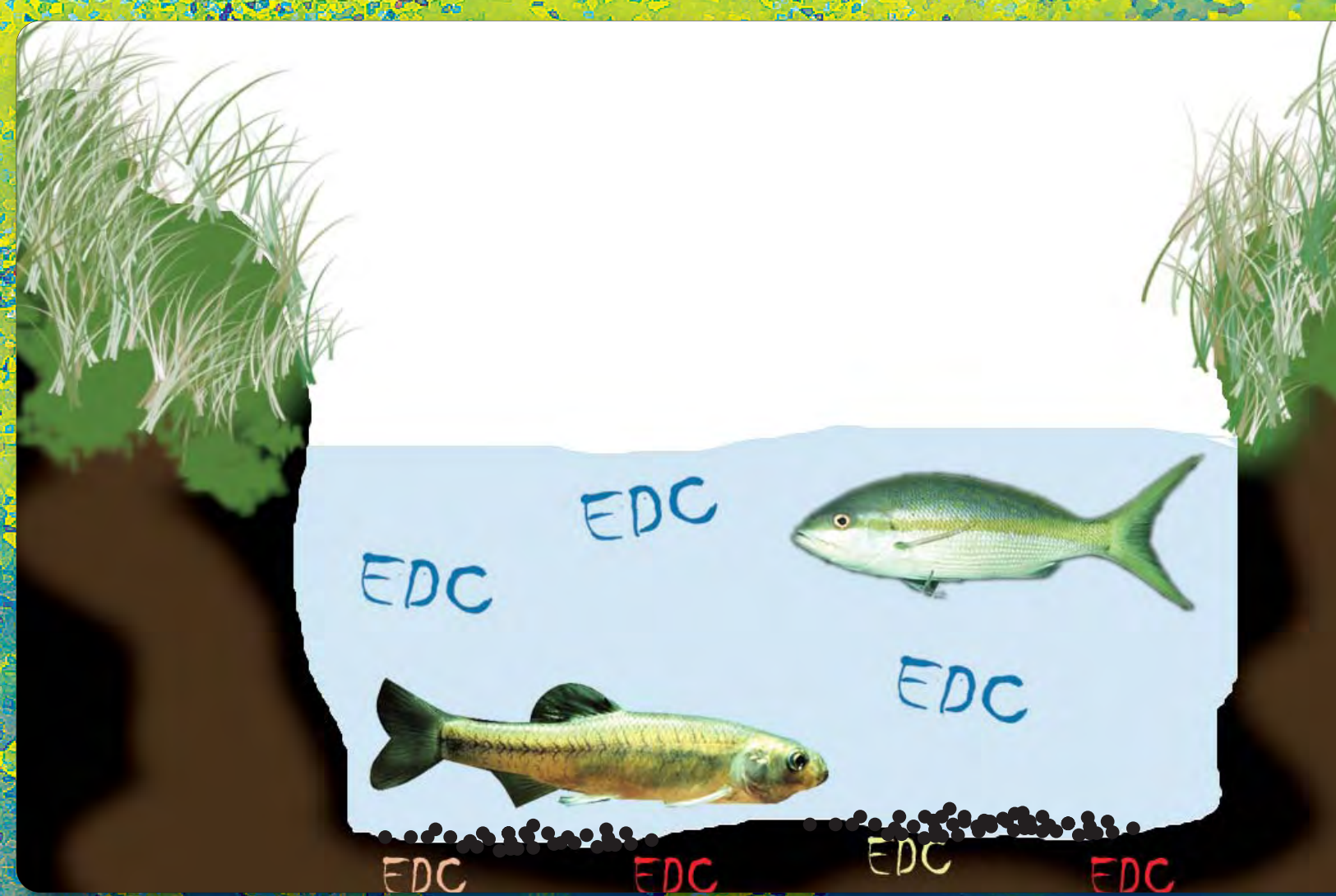


## The Exposure-Effect Hierarchy

Biological Level	Biological Effect
Community	Bio-assessment + Community Assessment
Population	Population Decline, Adaptation Population DNA Analyses
Organism	Toxicity Testing
Tissue/Organ	Histopathology
Cellular	Cell death/Mitosis/Activation
Subcellular	Molecular/RNA/Protein Changes

## Objectives

- To determine the extent of EDC exposure in the New Cumberland Pool of the Ohio River
- To strengthen the linkage relationships between molecular and population changes
- To demonstrate the utility of integrating ecological endpoints focused on multiple biological levels
- To determine if fish found in different ecological regions of the water column can indicate route of exposure to estrogenic compounds.

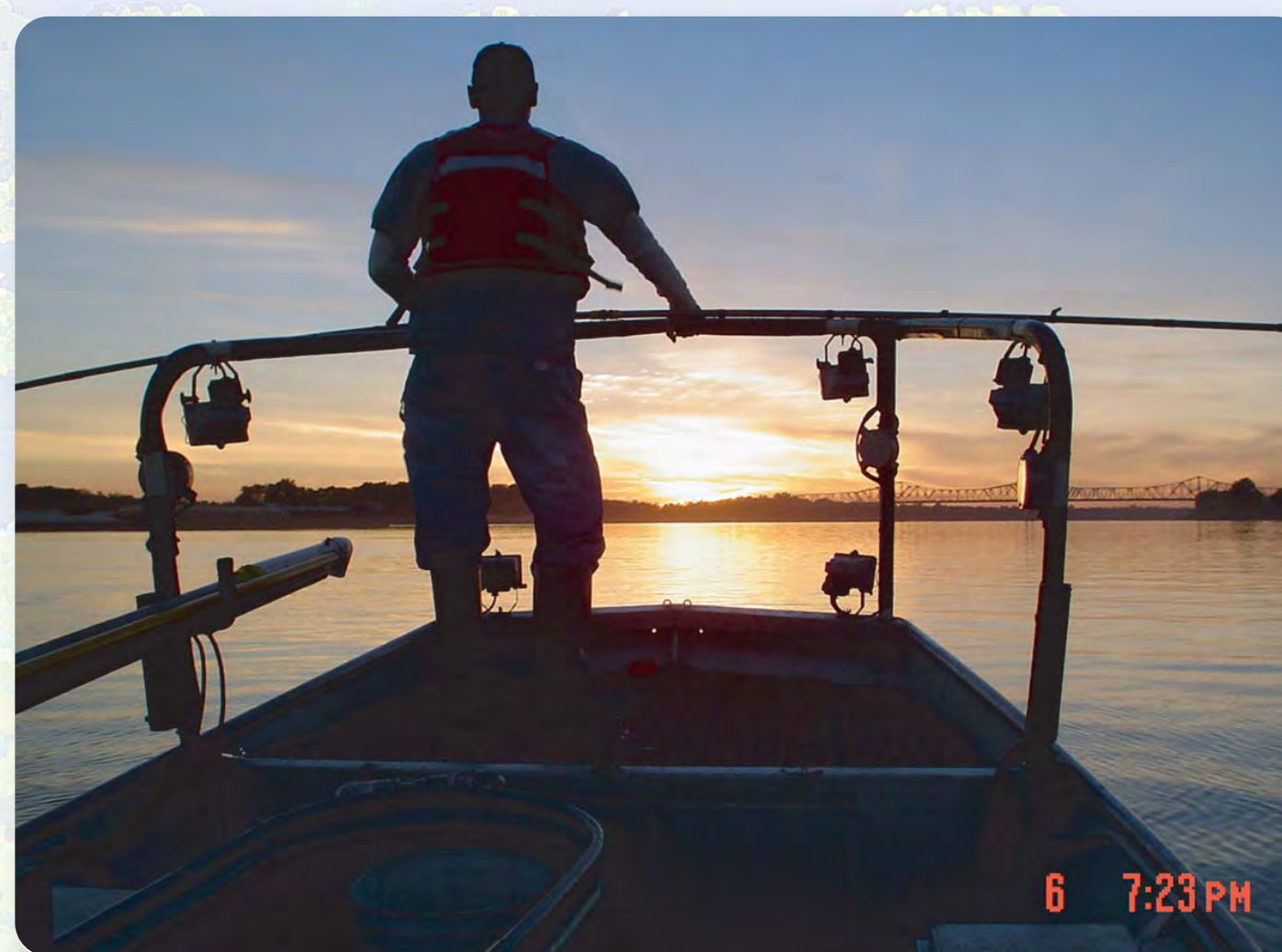


## Outcomes

- Validate a useful diagnostic tool for ecological assessment
- Demonstrate the impact of EDC exposure in natural aquatic systems
- Demonstrate the relative sensitivity of different species of aquatic organisms.
- Establish important linkages of exposure and effect

## Methods

- Target indigenous fish at sites surrounding effluents from 3 Waste Water Treatment Plants (WWTP) in the Ohio River
- Measure gross morphological and molecular changes and sex ratios in a number of fish species representing different ecological niches.
- Target indigenous fish in 15 probabilistic sites in the severely impaired New Cumberland Pool
- Measure gross morphological and molecular changes and sex ratios in a number of fish species representing different ecological niches.



Although this work was reviewed by EPA and approved for publication, it may not necessarily reflect official Agency policy.



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