STATEMENT OF WORK

Subproject Proposal: Relation of Diurnal Dissolved Oxygen Fluctuation with Nutrients, Chlorophyll *a*, and Biological Communities

IAG: DW14922577-01-0

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INTRODUCTION

This subproject proposal investigates relations between nutrients (i.e., nitrogen and phosphorus) and biological communities, specifically fish assemblages in a nutrient rich landscape. Land use in U.S. Environmental Protection Agency (U.S. EPA) Region V, including in many parts of Indiana, is dominated by row-crop agriculture, primarily corn and soybeans, and some of the highest nutrient concentrations in the U.S are found in streams associated with these agricultural activities.

The biotic community of streams are directly affected by the water chemistry and flow in the stream and the riparian and in-stream habitat, and indirectly affected by environmental conditions in the watershed (for example, land use and soil types). Anthropogenic factors in the watershed indirectly affect conditions in the stream by affecting what reaches the streams. Excessive nutrient (phosphorus and nitrogen) loss from point and nonpoint sources in the watershed is frequently associated with degraded stream habitat and reduced water quality. Point source discharges of nutrients are fairly constant and are controlled by U.S. EPA's National Pollutant Discharge Elimination System. To improve water-resource conditions, agricultural performance standards and regulations for croplands and livestock operations are being proposed by various States. In addition, the U.S. EPA is working with States and Tribes in U.S. EPA Region 5 to establish nutrient water quality criteria in each State and Tribe to determine whether actions are needed to improve a stream's physical habitat, water quality, or biological conditions.

This subproject would allow USGS and the Indiana Department of Environmental Management (IDEM) to conduct sampling of fish assemblages in streams of the Busseron Creek watershed. This sampling will provide information that U.S. EPA needs in fulfilling its role under the Clean Water Act (CWA) of developing TMDLs for impaired

waters submitted by States and Tribes. The Busseron Creek watershed was listed in 1998 by Indiana as impaired with possible causes due to heavy metals, sulfates, total dissolved solids (TDS), and nutrients. Sampling to determine the fish assemblages in the Busseron Creek watershed will assist U.S. EPA and IDEM clarify the main causes of impairment in the Busseron Creek watershed.

Water chemistry sampling of heavy metals, sulfates, and TDS last year in the upper watershed indicated that these parameters are no longer above water quality standards. However, while conducting the chemistry sampling, IDEM noted that there was a lack of aquatic life in the streams, suggesting that the streams are still impaired but due to causes other than heavy metals, sulfates and dissolved solids. Sampling of the fish community will help IDEM and U.S. EPA determine if the streams are still impaired and if so, what the causes are. Likely potential causes at this point include excessive sediment and/or nutrients.

Streams in the lower Busseron Creek Watershed are listed under CWA 303(d) primarily due to nutrients. Biological sampling will allow U.S. EPA and IDEM determine whether fish communities have been impacted. The biological samples will be compared to nutrient data collected by IDEM last year as well as to more intensive nutrient data that IDEM will be collecting over the next year (under separate funding). Finally, the sampling of biological information throughout the watershed will help U.S. EPA and IDEM determine how differences in land use, including land use patterns associated with nutrients application, affect the level of impairments on fish communities.

PROJECT OBJECTIVES

1. Sample fish communities at 40 sites in Busseron Creek watershed.

APPROACH

USGS will sample the sites for which IDEM has existing data chemistry and or biological community data (24 sites) for verification of original and determination of temporal trends. USGS will sample an additional 16 sites to spatially cover the watershed more thoroughly. All samples will utilize a one-pass sampling strategy and

will be based on existing IDEM protocols for fish collection, which among other aspects, require that sites be located on a reach which is at least 15 times greater than the stream width. USGS will collect vouchers, and where appropriate, photos, for quality assurance. USGS will provide the data to IDEM in an excel spreadsheet that will be transferable to IDEM's Assessment Information Management System (AIMS) database.

FIELD SAMPLING METHODS

1) Fish assemblages will be collected by the USGS using the "Standard Operating Procedures for Fish Collections, Use of Seines, Electrofishers, and Sample Processing" (IDEM/OWM/WQSSB/BSS-SOP, December 1992, revision number 1. 33p.) employed by Indiana.

RESPONSIBILITIES

Jeff Frey and Brian Caskey (USGS) are responsible for collecting and assembling the biological community (fish assemblage) data and providing it to IDEM in an excel spreadsheet format that is compatible with IDEM's AIMS database.

Schedule:

September to October 2007	Sample in Busseron Creek watershed
October to November 2007	Assemble and provide data to IDEM

BUDGET