

TECHNICAL PROGRESS REPORT

Reporting Period: December 10, 2007 to March 9, 2008

EPA Agreement: EM-83329801-0 US EPA

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Project Title: Wilma H. Schiermeier Olentangy River Wetland Research Park: Teaching, research, and outreach initiative 2006

PROJECT OBJECTIVE:

This project has 3 objectives:

1. Conduct a two-year hydrologic pulsing wetland experiment related to wetland biogeochemical and water quality functions;
2. Estimate carbon sequestration of created wetlands and compare these accumulation rates with natural wetlands; and
3. Extrapolate findings at the Olentangy River hydrologic experiment on nitrogen, carbon, and other nutrients to rivers of different hydrologic pulsing and water quality in Ohio with an Ohio-wide water quality network.

SUMMARY OF ACTIVITIES:

1. PULSING STUDY

a. hydrology

Average inflow was 313 ± 12 gpm and 324 ± 13 gpm for wetland 1 and wetland 2, respectively. There were 23 days of pulsing, with daily inflows ranging from 650 gpm to 400 gpm for each wetland. The pulsing events matched the Olentangy River floods, and most pulse events occurred in December 2007, January and February, 2008. Due to a blocked intake, the pump did not operate for one day, on December 19, 2007.

b. water quality

Water quality samples were collected from the inflow of wetland 1 and both outflows on a daily basis for turbidity and general water quality. Weekly samples were also collected from the inflow and two outflows in each of the wetlands and in the Olentangy River - upstream and

downstream of the wetlands - for nutrients. A new Shimadzu Total Organic Carbon analyzer was installed in the laboratory in late December, and technicians and graduate students attended an in-house training course. Technicians are running current and backlogged (frozen) samples.

c. denitrification

Measurement of denitrification rates from each wetland began during this quarter using the acetylene blocking method on a monthly basis. Samples were analyzed on a Shimadzu GC-14A gas chromatograph for nitrous oxide.

d. pathogens

Weekly samples were collected and analyzed for pathogen indicator species (*E. coli*) throughout this entire time period.

e. methane

Methane samples were successfully collected in March in both the Olentangy River Wetland Research Park wetlands and Old Woman Creek. Samples have been analyzed for methane concentrations on the Shimadzu GC-14A in the analytical laboratory.

f. methane oxidation

We developed wetland sampling methods and initiated monitoring methane oxidation of wetland and associated pulsing zone and upland sites. A Ph.D. student joined the project and began working on developing ^{13}C probing of methanotrophs.

g. macroinvertebrates

There was no research in experimental wetlands due to cold temperatures and subsequent lack of active macroinvertebrates.

3. CARBON SEQUESTRATION

Samples from Old Woman Creek wetland were analyzed for Cs^{137} and Pb^{210} . We began analyzing soil samples from each of the core slices for total organic and inorganic carbon content using the loss-on-ignition technique and the Shimadzu TOC analyzer.

4. WATER QUALITY NETWORK

a. Shawnee State University

To this point, efforts for data reception have been successful.

b. Central State University

Data collection was continued through this period.

c. Kenyon College

Water samples were collected periodically by undergraduate research students, preserved and stored for analysis at the lab at the ORWRP for analysis of nutrients (NO_3 , NH_4 , TKN, SRP, TP). S. Fennessy provided instrument maintenance including periodic retrieval of the station and calibration of the sensors. The water quality sensor for turbidity failed twice during the year, requiring it to be sent for repairs.

d. Wright State University

No data reported.

5. ANTICIPATED ACTIVITIES:

Preparations were made for SWS conference in Washington DC to be held in May 2008 and the American Ecological Engineering Society meeting in June 2008 in Blacksburg, Virginia. We anticipate several presentations at the meeting related to pulsing and carbon.