1.a. Program Description – A Brief Overview of the Ohio Tributary Monitoring Program

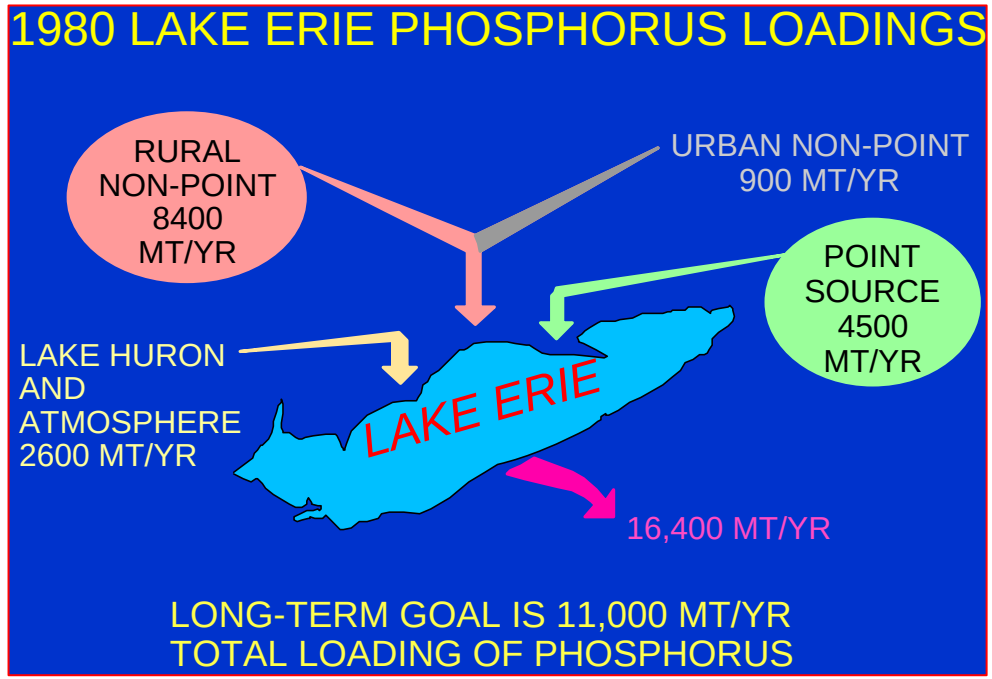
The tributary monitoring program operated by the Heidelberg College Water Quality Laboratory (WQL) is the largest program of its type in the United States. It supports nonpoint source pollution control programs within the Lake Erie Basin and Ohio. Nonpoint sources currently dominate pollutant loading in the United States.

Program Purpose: Quantifying Nonpoint Source Pollution

Tributary loading programs are designed to measure how many tons of various kinds of pollutants move from watersheds through rivers to receiving waters, such as Lake Erie or the Ohio River. This program was launched in the mid-1970s to measure the total amounts of phosphorus entering Lake Erie from Ohio watersheds.

Within watersheds, pollutants are derived from two types of sources -- point sources, such as municipal and industrial discharges, and nonpoint sources, such as runoff from agricultural and urban landscapes. Point source dischargers are required to report the tons of pollutants that they discharge to streams and rivers.

Pollutants derived from nonpoint sources are quantified by measuring the total pollutant export from the watershed and subtracting the upstream point source inputs. For example, if the total export of phosphorus from a watershed in a particular year was 100 tons, and upstream point sources contributed 20 tons, then various nonpoint sources would have contributed 80 tons of phosphorus.



The WQL's tributary loading program provided major data inputs into the determination of an accurate phosphorus mass balance for Lake Erie. The mass balance led to the development of agricultural phosphorus reduction programs throughout the Lake Erie Basin.

Sampling Program Design

Calculation of pollutant export from watersheds requires information on both streamflow and pollutant concentrations. Thus, sampling stations are typically located at or near U.S. Geological Survey stream gaging stations.

Since most pollutant export occurs during storm runoff events, and, during runoff events, pollutant concentrations change rapidly, frequent sampling is required for accurate loading calculations. We use refrigerated automatic samplers that collect three samples per day at most of our sampling stations. Samples are returned weekly to our analytical laboratories. During storm runoff events, three samples per day are analyzed while during non-runoff periods, one sample per day is analyzed.

Analytical Program

Initially, the tributary monitoring program focused on nutrient and sediment transport in rivers. In the early 1980s, herbicide monitoring was added to the analytical program. The current analytical program covers the following major pollutants:

Suspended solids
Total phosphorus
Soluble reactive phosphorus
Nitrate+ nitrite nitrogen
Ammonia-nitrogen
Total Kjeldahl Nitrogen
Chloride
Conductivity
Sulfate
Silica
Fluoride
major herbicides, selected metals

Uses of the Data from the Ohio Tributary Monitoring Program

Planning Nonpoint Control Programs

Provided data for the Lake Erie phosphorus control programs -- 1980a/90s.
Provided data for the Lake Erie sediment control programs --1990s/2000s.
Data used for Total Maximum Daily Load Plans for the Cuyahoga and Sandusky basins.

Public Education for Nonpoint Programs

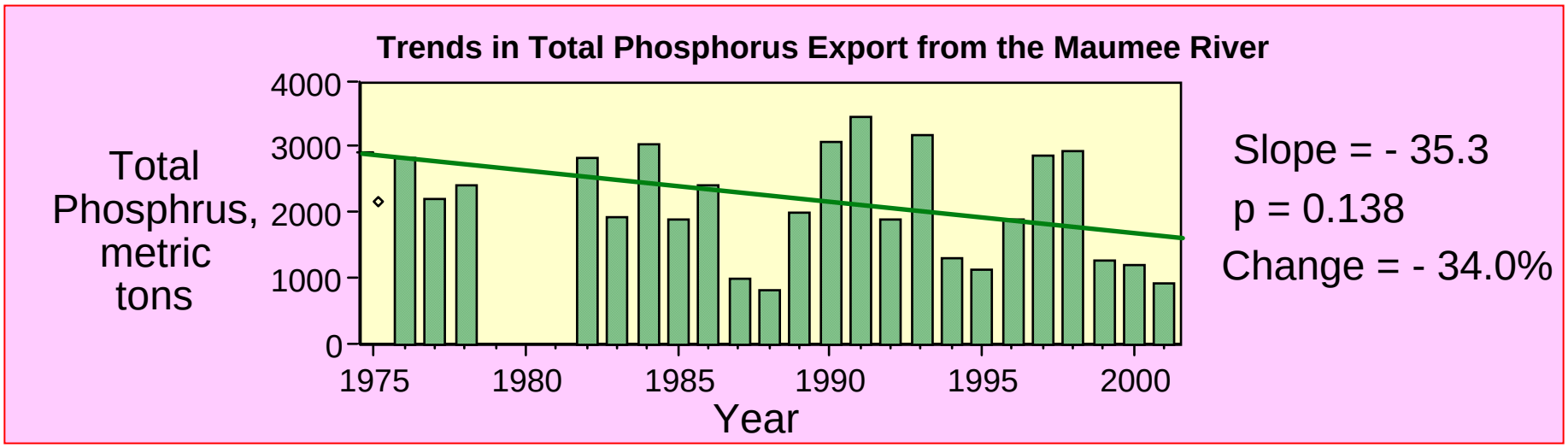
Provided data for public education programs to garner farmer support for phosphorus and sediment reduction programs.
Provided data for atrazine risk assessment in Ohio's public water supplies.
Supported an active environmental extension program, whereby WQL staff carried the results of their studies directly to the public.

Evaluating Program Effectiveness

Data used to document the effectiveness of agricultural phosphorus control programs.
Data used to track progress in nonpoint load reduction programs for Lake Erie (See State of the Lake Report, 2004, Lake Erie Quality Index, Ohio Lake Erie Commission).

Advancing Monitoring Science

Data used to develop, calibrate and evaluate nonpoint pollution models.
Data used to design more efficient monitoring programs for nutrients and pesticides.



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For a more complete list of publications by WQL staff, including papers and reports related to our pesticide monitoring program and our private well testing program, see:

http://www.heidelberg.edu/wql/publish.html.