Ottawa County's Pigeon River: A Qualified Success Story

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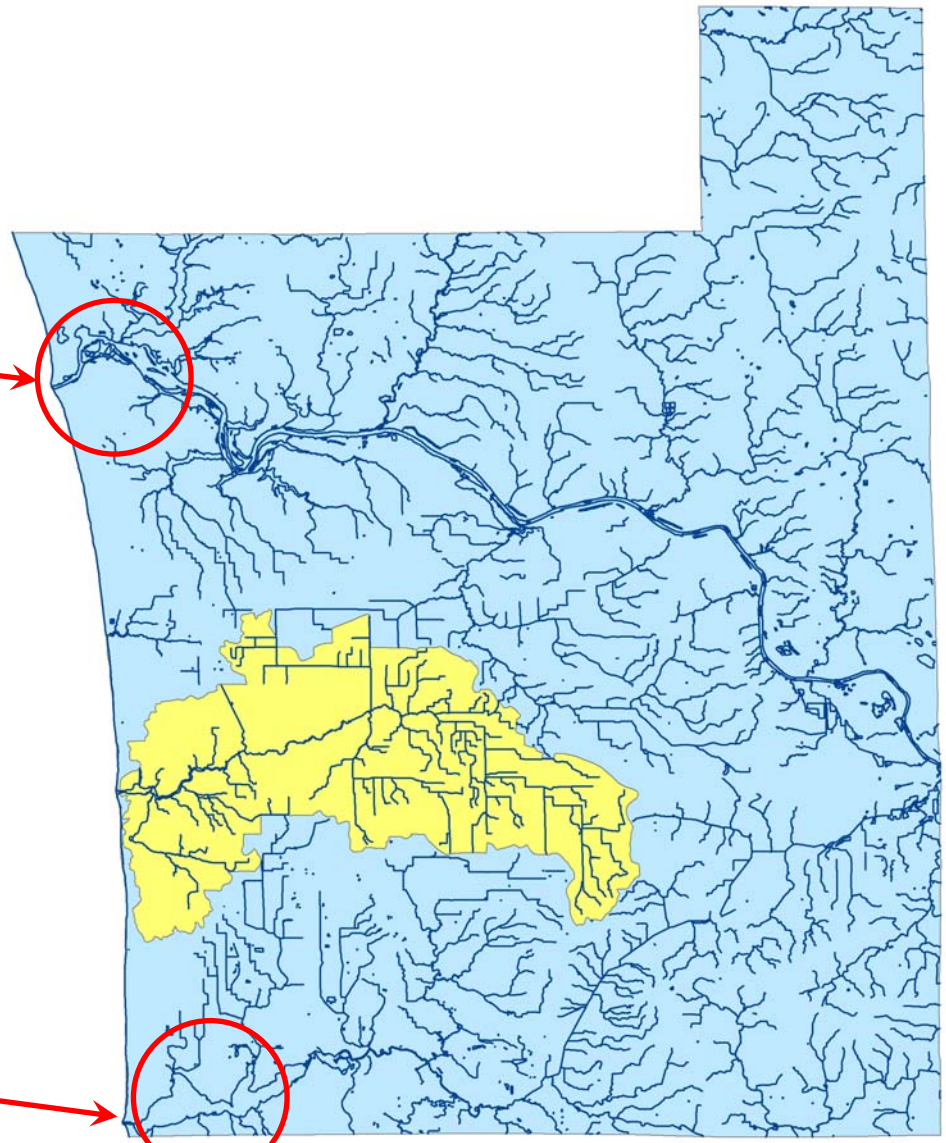
Location of Pigeon River Watershed
in Ottawa County, Michigan



Source: Michigan Geographic Data Library

Background

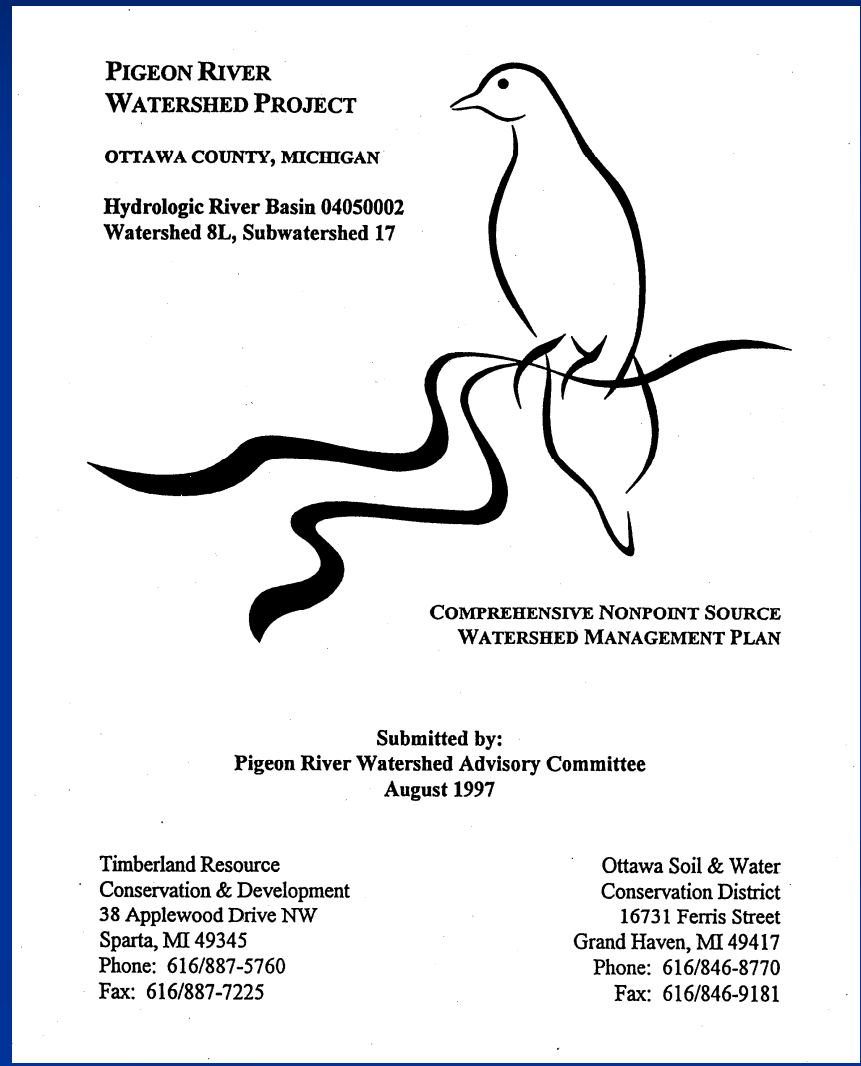
- 41,300-acre watershed, originally covered by forests and wetlands.
- Most of watershed cleared and drained for agriculture by the 1920s.
- Large areas reforested in 1940s to control wind erosion.
- Lower mainstream stocked with trout by MDNR through late 1960s, when trout population was considered self-sustaining.
- By 1989, however, water quality had become impaired by both point and non-point source pollution. Stream surveys found a degraded biotic community and no trout.
- In mid-1990s, state regulatory action taken and Pigeon River Watershed Project initiated to address water quality problems.

Regulatory Action

- Large food-processing plant in central part of watershed was routinely exceeding permitted discharges of pollutants.
- MDEQ took action in mid 1990s. Company upgraded its water treatment plant and has complied with permitted point-source discharges since then.

Pigeon River Watershed Project

- Community-based project initiated in 1995 as combined effort of interested public agencies, non-profit organizations, and private landowners.



PIGEON RIVER
WATERSHED PROJECT

OTTAWA COUNTY, MICHIGAN

Hydrologic River Basin 04050002
Watershed 8L, Subwatershed 17

COMPREHENSIVE NONPOINT SOURCE
WATERSHED MANAGEMENT PLAN

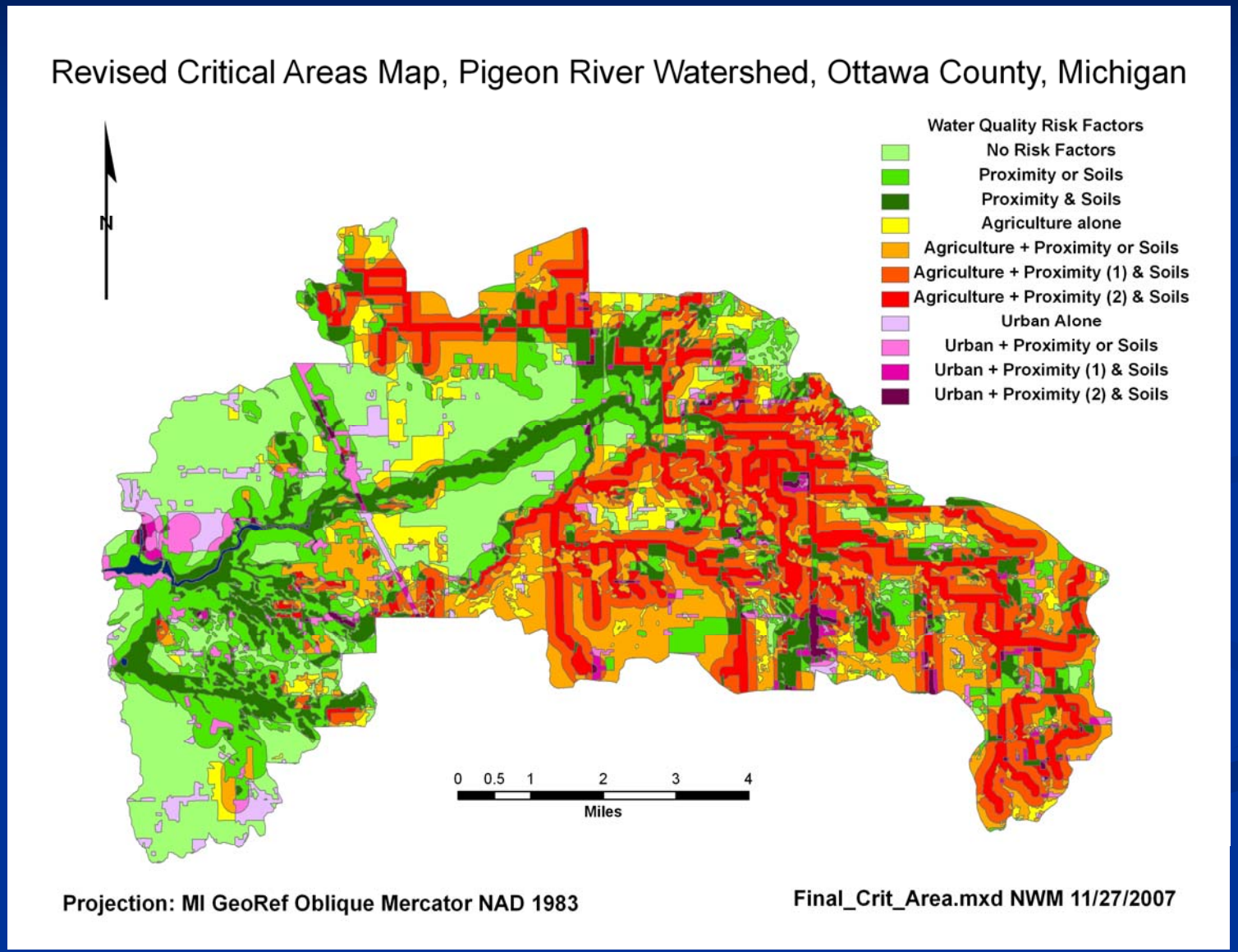
Submitted by:
Pigeon River Watershed Advisory Committee
August 1997

Timberland Resource
Conservation & Development
38 Applewood Drive NW
Sparta, MI 49345
Phone: 616/887-5760
Fax: 616/887-7225

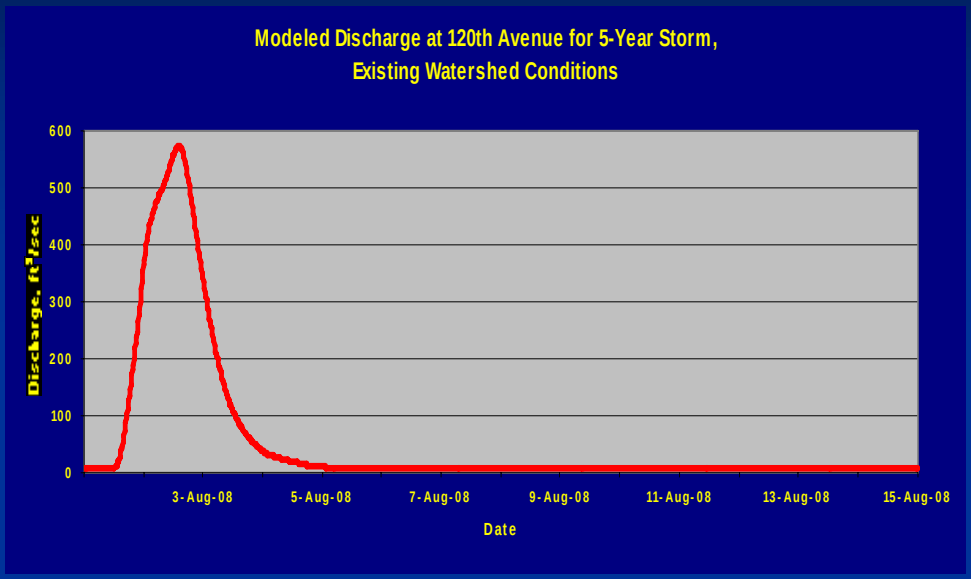
Ottawa Soil & Water
Conservation District
16731 Ferris Street
Grand Haven, MI 49417
Phone: 616/846-8770
Fax: 616/846-9181

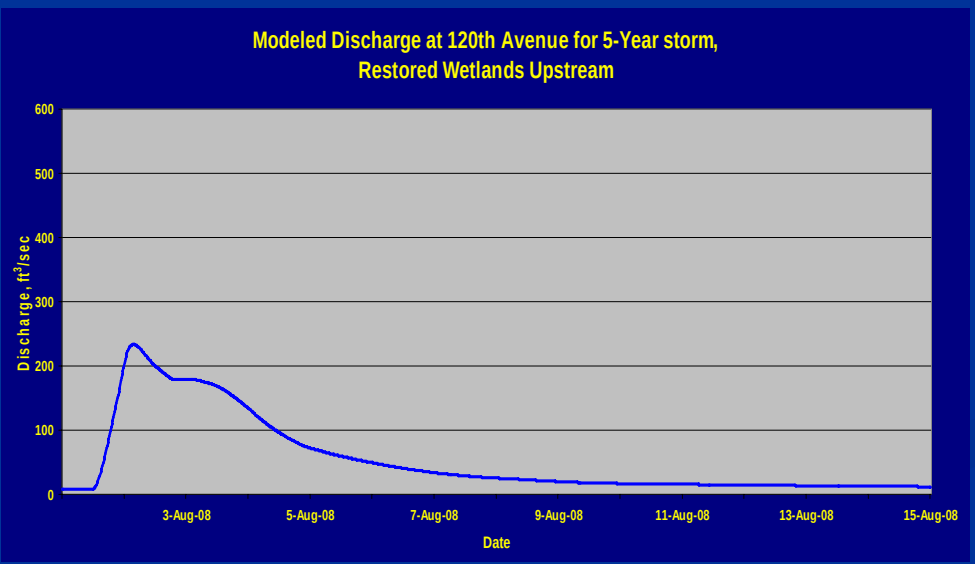
Examples of Project Activities

Critical Areas Map Development



Watershed Model Development





- HEC-HMS Model developed by Dave Fongers of MDEQ to assist watershed planning efforts.
- Model predictions indicate restoration of strategically located areas of upstream wetlands would help regain hydrologic stability.

Water Quality Monitoring

MICHIGAN ACADEMICIAN XXXII (2001), 155–73

Hydrologic Events and Water Quality in the Pigeon River, Ottawa County, Michigan

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Ottawa Soil and Water
Conservation District

Researchers conducting water quality tests in the lower Pigeon River

ABSTRACT

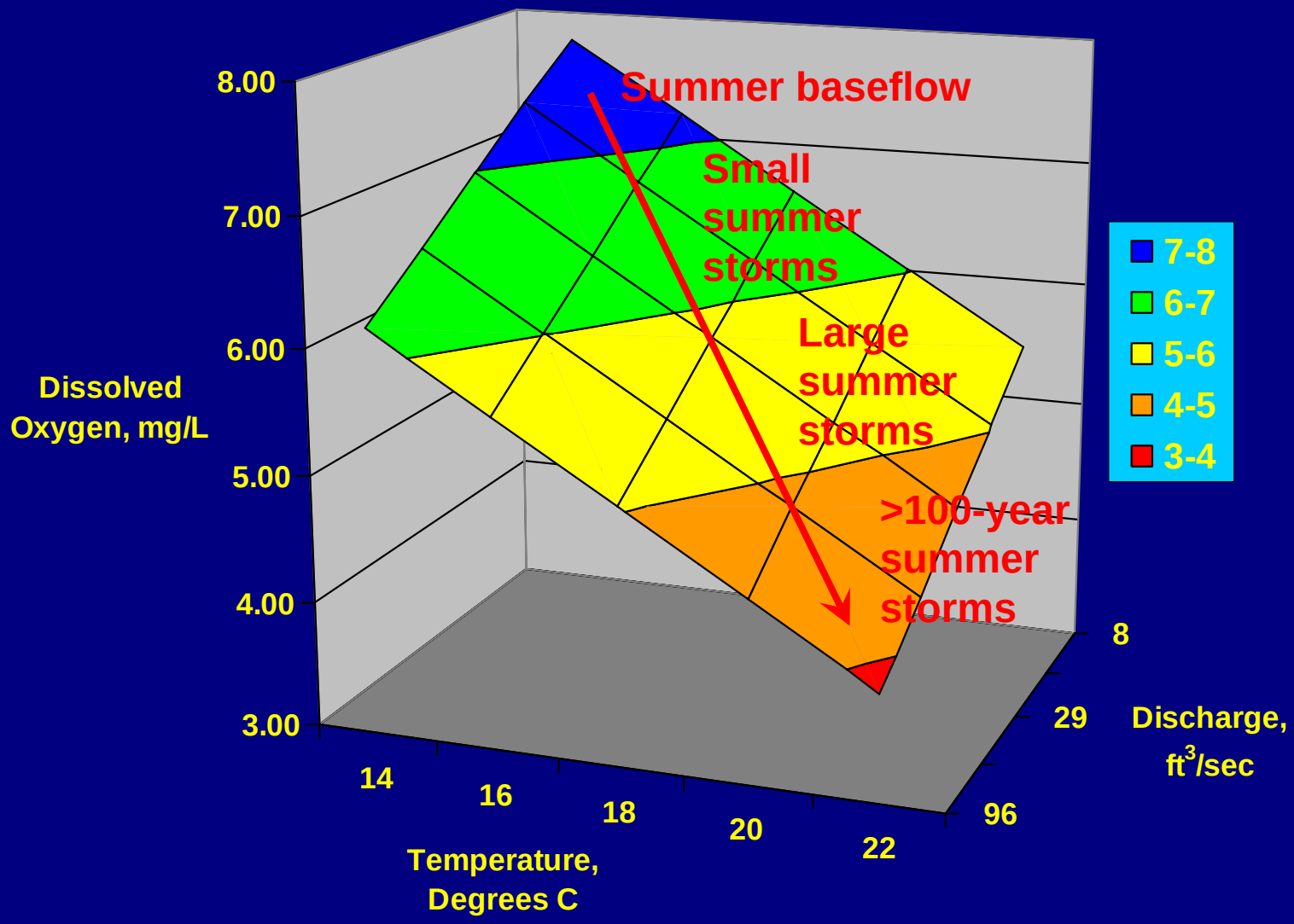
The Pigeon River drains a 16,765-ha agricultural watershed in western Ottawa County, Michigan and discharges into south-central Lake Michigan. Extensive areas of wetlands in the upper watershed were drained in the 1920s, causing significantly altered hydrology characterized by flashy discharges during storms and periods of snowmelt. We studied stream chemistry and hydrology for a four-year period between September, 1996, and October, 2000, to determine water quality status, to estimate annual nutrient exports, and to evaluate the effects of different seasonal flow types. Results of our study confirmed that the upper reaches of the Pigeon River experience chronically degraded water quality, with contributions from both nonpoint and point sources. As a result, the watershed has high annual rates of nutrient export (approximately 10.8 kg ha^{-1} inorganic N and 0.25 kg ha^{-1} PO_4-P). With the influx of groundwater, change in land use to forest, and development of natural stream channel characteristics in the lower mainstream, water quality at baseflow in this section of the Pigeon River improves to the point where coldwater fish populations should persist. Inputs of degraded water during high flows, however, produce periods of environmental stress and the fish population in the lower Pigeon includes only a low number of pollution-tolerant, warmwater species. Large summer storms are biologically stressful because of increased temperatures and reduced dissolved oxygen levels, while spring storms and snowmelt contribute substantially to total nutrient and suspended solids exports. Efforts to improve water quality in this and similar agricultural watersheds need to emphasize major reductions in nonpoint source inputs through substantial improvements in land and water management practices. Wetland restoration and implementation of other stormwater retention practices in such watersheds also are required to reverse the acute impacts of high stormwater discharges caused by past drainage and stream channelization.

- Four-year water quality study of the Pigeon River funded through AWRI Faculty Research grants (1996-2000).
- Results published in Michigan Academician (2001).

Conclusions of Initial Phase of Study

- The Pigeon River contained high levels of inorganic pollutants from both point and nonpoint sources.
- Inputs of degraded water during high flows created episodes of environmental stress in the lower mainstream, especially during the summer.
- Temperatures and dissolved oxygen concentrations in lower mainstream typically remained in range suitable for trout despite these existing pollution problems.

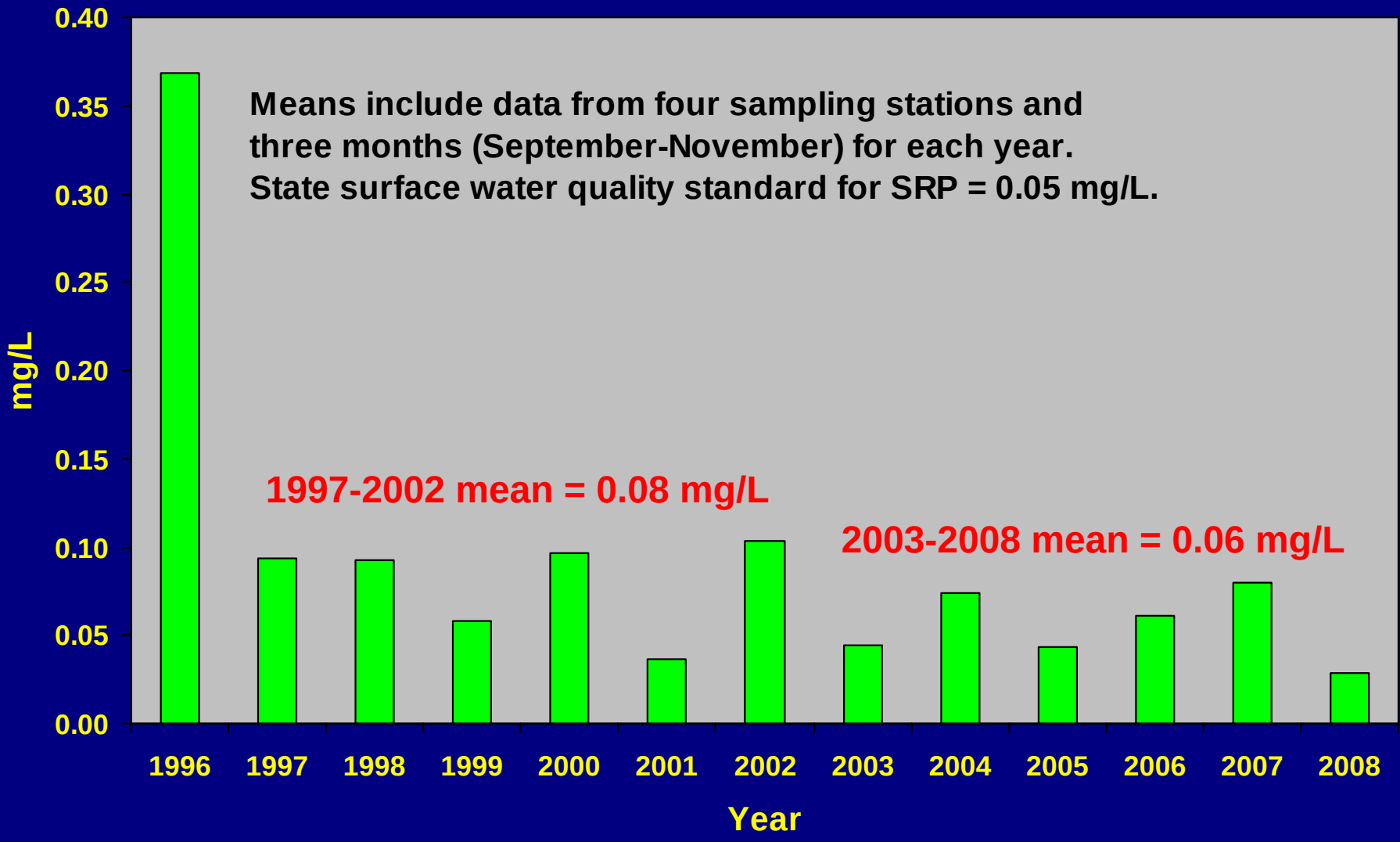
Temperature, Discharge, and Dissolved Oxygen Concentration at Pigeon Creek Park



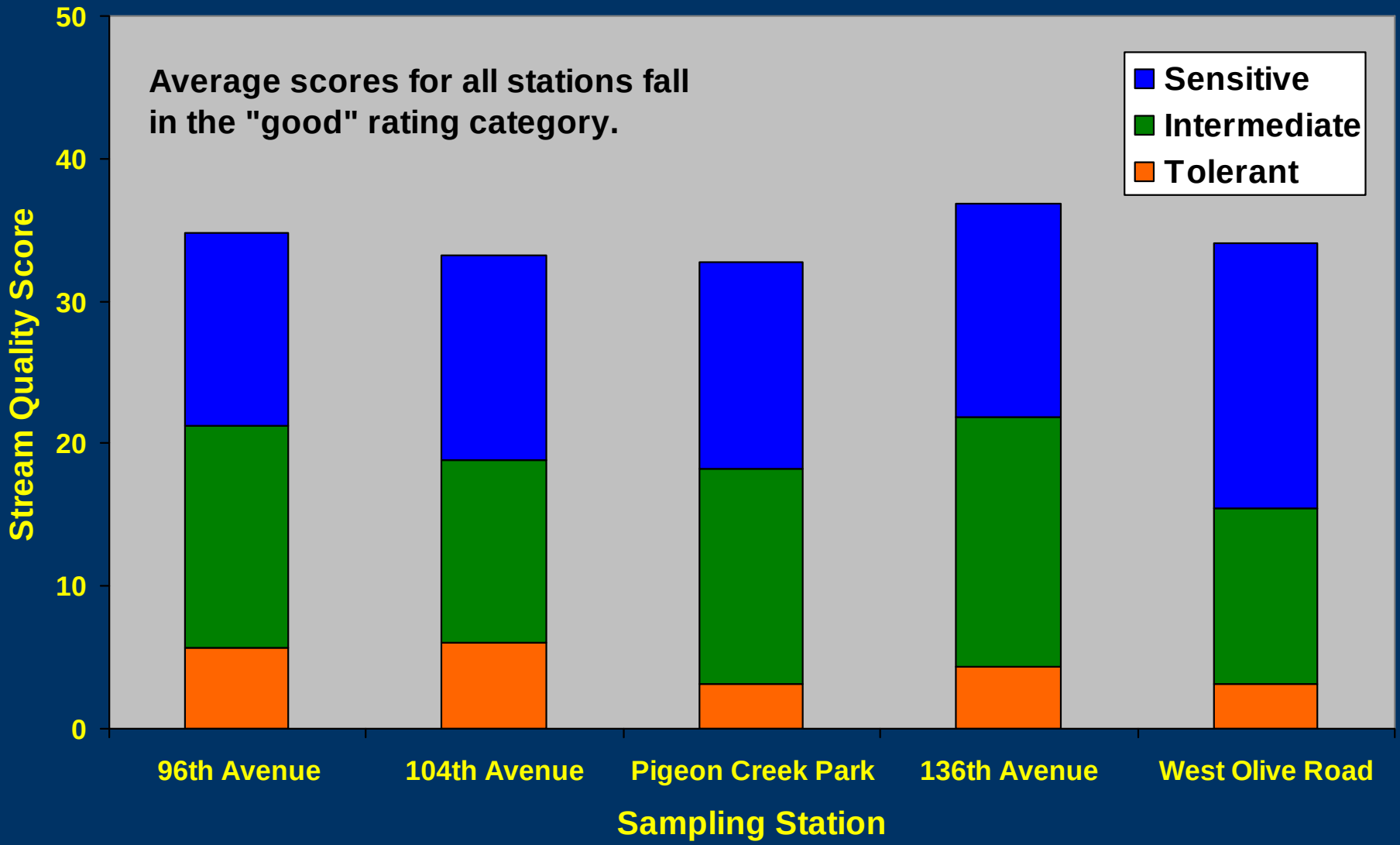
Ongoing GVSU Course Project

- Water quality study continued each fall as part of NRM 452, Watershed and Wetland Management.
- Thirteen years of data have been collected and are available to local and state agencies.

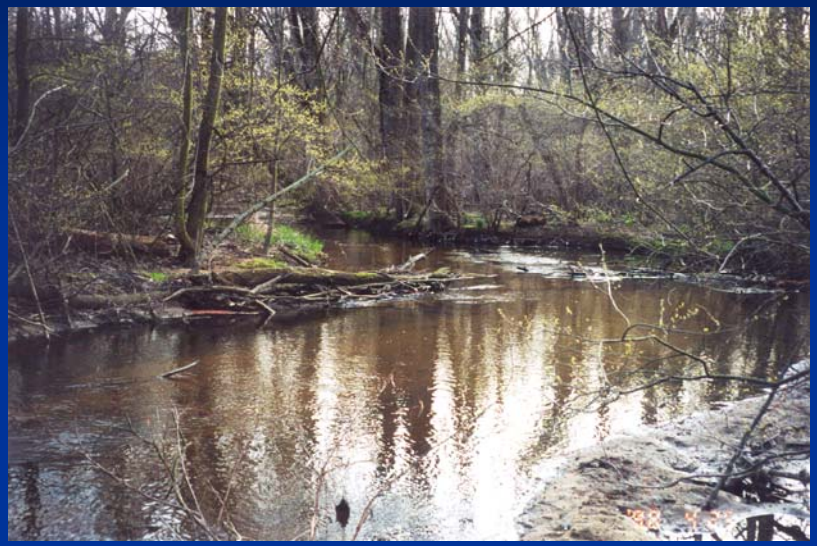
Fall Concentrations of Soluble Reactive Phosphorus in the Pigeon River, Ottawa County, Michigan, 1996-2008



Macroinvertebrate-Based Stream Quality Scores at Five Stations on the Pigeon River, Ottawa County, Michigan, 2005-2008

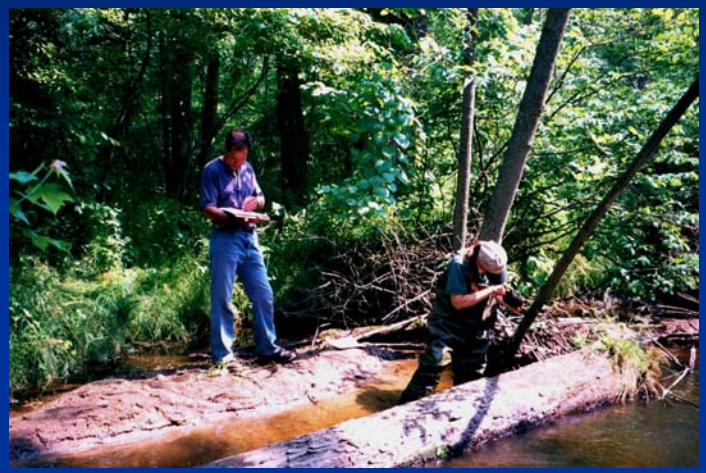


Pigeon River Greenway



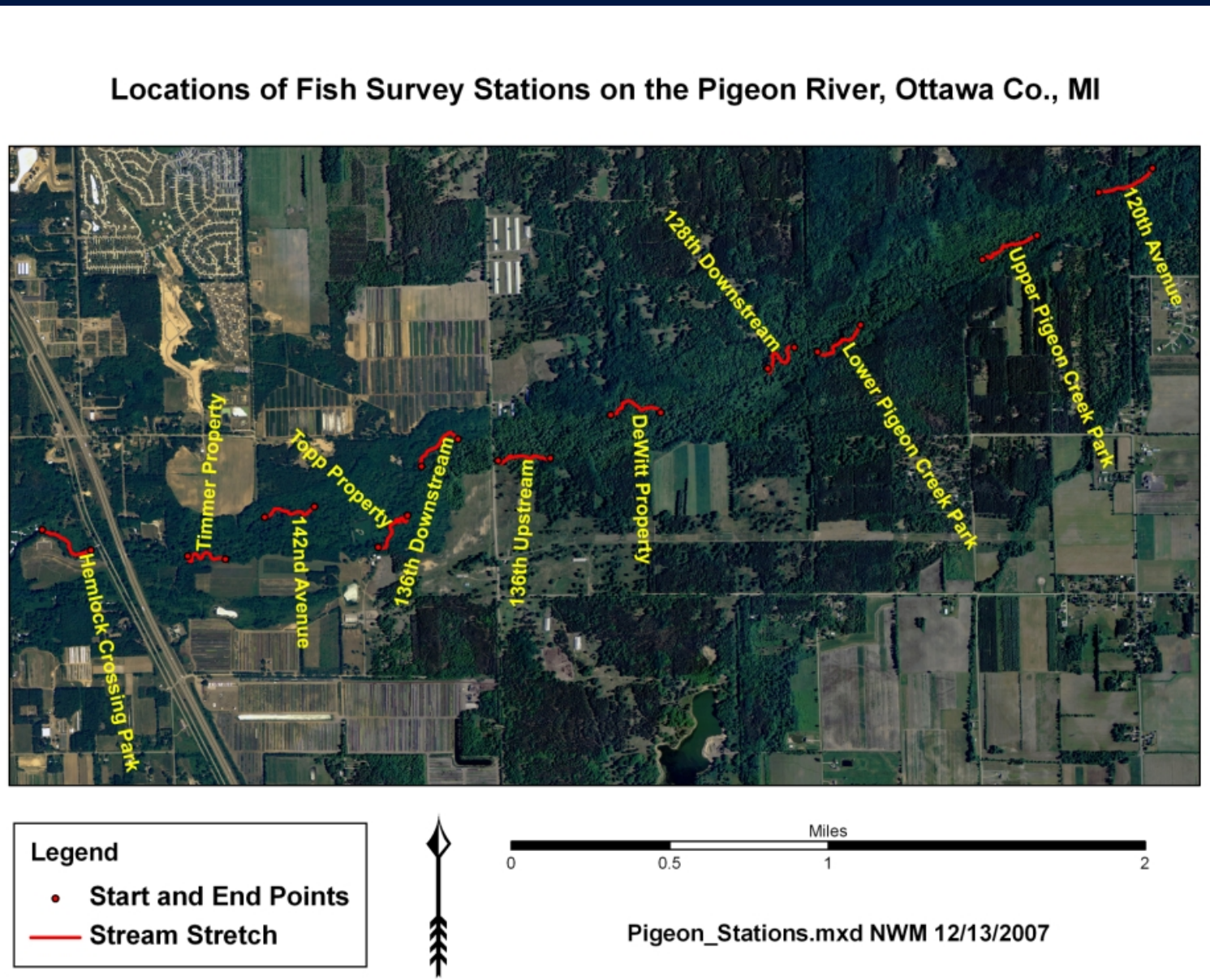
- Pigeon Creek Park and Hemlock Crossing Park provide watershed protection and public access to the mainstream of the Pigeon River.
- Private landowners between these two parks have maintained the natural features of the intact, forested floodplain.

Fish Population Study



- Based on results of water quality studies, MDNR resumed brown trout stocking on experimental basis in 2003.
- GVSU evaluated stocking success with follow-up studies in 2006 and 2007 by Dan Mays, MS student.

Pigeon River Fish Survey Stations



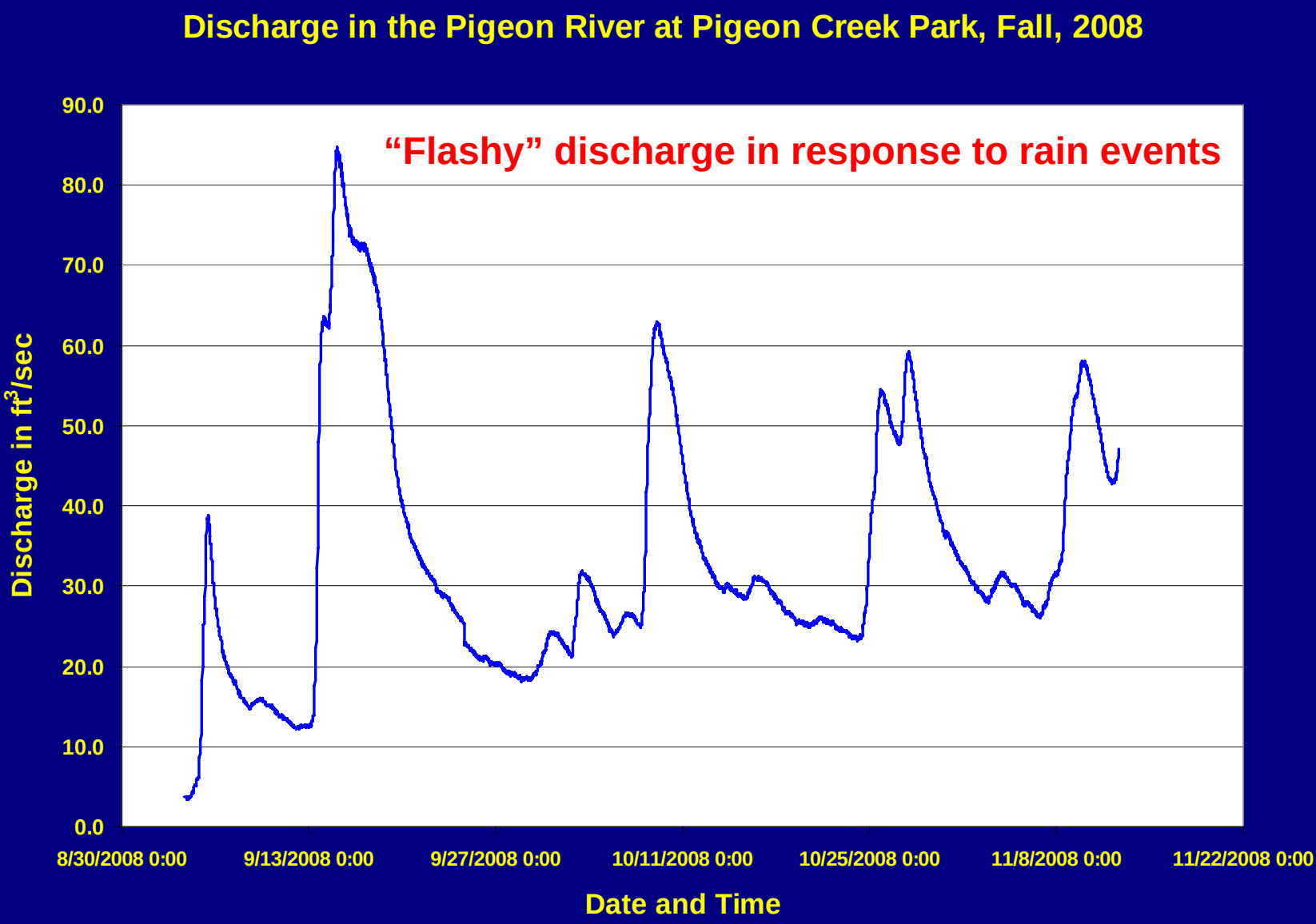
Multiple Size Classes of Trout

Continuing Concerns

Water Quality

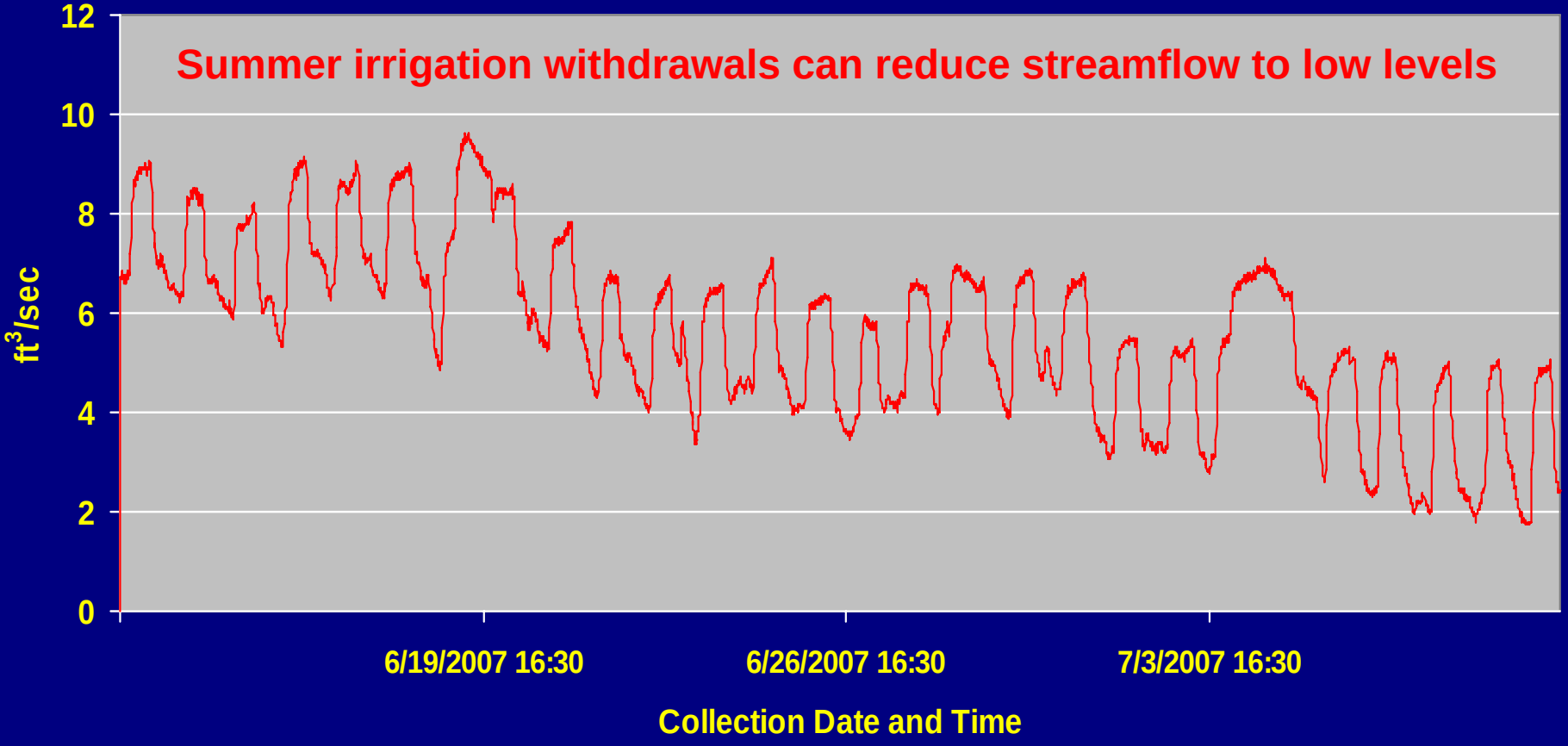
- Water quality generally good, but further improvement needed, especially during stormflows.
- Fish population still dominated by pollution-tolerant species, indicative of episodic periods of environmental stress.

Hydrologic Instability

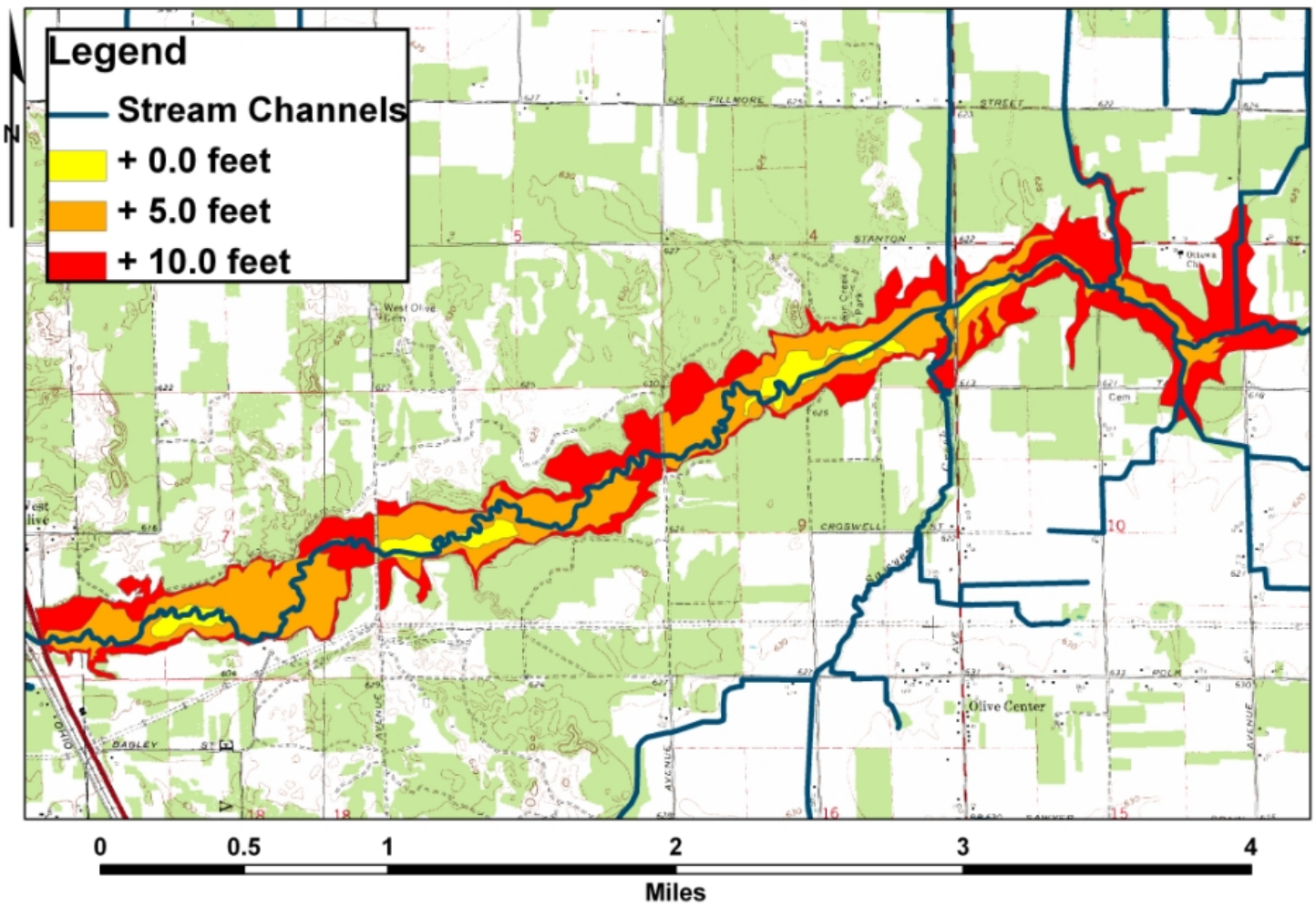


Irrigation Withdrawals During Low Flows

Daily Variation in Discharge in the Pigeon River Below 136th Avenue, Mid June-Early July, 2007



Continuing Need to Protect the Intact Floodplain of the Lower Mainstream



Conclusions

- The Pigeon River is a valuable public resource that benefits the citizens of Ottawa County.
- Regulatory action, watershed project efforts, public land acquisition, protection by private landowners, and active fishery management have helped to maintain and improve the river.
- Continued vigilance and management are needed to further protect and preserve the stream for future generations.

Questions?