

STUDY FINAL REPORT

State: Michigan

Project No.: F-35-R-23

Study No.: 670

Title: Development of decision tools for river management

Period Covered: April 1, 1996 to March 31, 1998

Study Objective: Using the results of F-35-R, Study 631, develop management decision tools for application to the rivers of Michigan's Lower Peninsula, specifically:

1. Classify all segments of Lower Peninsula rivers as either coldwater or not, using the VSEC system. More stringent water quality regulations are applied to coldwater streams.
2. Classify all segments of Lower Peninsula rivers as to their current potential for gamefish production. Develop decision processes for stocking hatchery fishes.
3. Develop ecological targets for rehabilitation of the Rouge River, Detroit, MI (discontinued through amendment 1997).
4. For each Lower Peninsula river segment, develop predicted values for various metrics of ecological integrity representing both current and "best case" scenarios.

Abstract: Work initially proposed in this study has expanded through cooperative arrangements, essentially developing into 2 distinct Sport Fish Restoration studies. Therefore, we are ending this study and continuing the proposed work through 2 new studies (678 and 679) to be funded under F-35-R-24. Objectives 1 and 2 will be covered by Study 679--*Ecological river classification as a basis for management of coldwater streams*. Work under this study will be done in cooperation with Michigan Department of Environmental Quality, Surface Water Quality Division (MDEQ, SWQD), but only work done by Michigan Department of Natural Resources, Fisheries Division (MDNR, FD) will be charged to F-35-R. Objective 4 will be continued as new Study 678--*Development of location-specific reference conditions for stream biocriteria*. Work done on this study will be done in cooperation with a university student funded by the United States Environmental Protection Agency (USEPA), Region V, but only work done by MDNR, FD will be charged to F-35-R. Objective 3 was discontinued in 1997 but completed through separate funding from the Rouge Project Office.

Background: Agencies responsible for management of Michigan rivers and their fisheries need science-based tools (such as modelling predictions or classifications) to help with decision-making in regulating water quality and storm water flows, for protecting and rehabilitating aquatic communities, and for enhancing gamefish populations. This development of decision tools addresses

several needs highlighted in the Michigan Fisheries Division Strategic Plan, Fishery Resources Program; specifically: (1) To work with regulatory agencies in developing goals, objectives, and guidelines for aquatic habitat protection and rehabilitation; and (2) To evaluate stocking programs.

Seelbach and Wiley (1997) developed a regional synthesis of information and ideas on many aspects of habitats and fishes in the rivers of Michigan's Lower Peninsula. This included an ecological classification of river segments (Seelbach et al. 1997) and models that predict habitat (Kleiman 1995; Wehrly et al. 1998) and fish community characteristics (Zorn et al. 1998).

We proposed to use these initial syntheses to develop predicted habitat and fish community conditions for each river segment in the Lower Peninsula, based on its unique local and catchment landscape attributes. These predictions would serve as a scientific basis for identifying streams as "trout streams" (of various types) for fishery management purposes (stocking, habitat enhancement, regulations), and as "coldwater streams" for application of state water quality standards by the MDEQ, SWQD. Similarly, development of models that predict biocriteria would provide segment-specific baseline conditions for statewide assessment of stream health by MDEQ, SWQD.

Procedures: We proposed to complete the Seelbach et al. (1997) ecological classification of Lower Peninsula river segments. This involved classification of some additional stream systems and validation of assigned attributes. Decision rules would then be developed for designation of coldwater stream segments; likewise a decision process would be developed to aid fishery managers in determining whether to stock hatchery trout.

We proposed to illustrate the use of segment-specific modelling for developing baseline conditions for biocriteria, through development of landscape-based predictive models for biocriteria and the development of baseline conditions for several representative river segments.

Complete development of both of these objectives required the cooperation of state and federal agencies responsible for river management decisions. Recognizing this, we explored possibilities for expanding this initial research program through collaborative arrangements and outside funding sources.

Recapitulation:

Job 1. Title: Classify segments and ID coldwater segments. We developed a research partnership with The Nature Conservancy (Chicago Regional Office), who are working in Michigan as a pilot towards development of a national stream classification (Lammert et al. 1997). The Nature Conservancy (Chicago Regional Office) has completed (as of 1997) a simplified, initial classification of the smaller tributaries and coastal streams that were missed by Seelbach et al. (1997). We have not yet completed the review and expansion of this work to include all VSEC attributes; thus completing the initial VSEC classification of Lower Peninsula streams. We have also not developed, nor applied, a decision rule for designation of coldwater streams. These tasks will now be completed within Study 679 .

Job 2. Title: Classify segments for trout production and develop decision process for stocking. We have not completed work on this job. However, members of the MDNR, FD, Trout Management Committee, have agreed to participate in reviewing the classification of segments for trout production

and in evaluating the use of segment units for coldwater fishery management. This work will be continued within Study 679.

Job 3. Title: Develop flow scenarios and recommendations for Rouge River. This job was discontinued in 1997 but the proposed work was done through separate funding obtained by the Rouge Project Office (see Wiley et al. 1998).

Job 4. Title: Develop models for ecological metrics. Work on this job was not completed. However, a MS student at the University of Michigan, School of Natural Resources and Environment, has begun work on this job. He is funded by a cooperative USEPA grant. We have obtained the statewide stream biological survey database from MDEQ and have begun 1) quality assurance for site locations and 2) development of a GIS system. This work will be continued within Study 678.

Job 5. Title: Develop site-specific reference expectations and evaluate procedure. Work on this job was not completed. This work will be continued within Study 678

Job 6. Title: Write reports. Reports were completed as scheduled.

References cited:

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- Lammert, M., J. Higgins, D. Grossman, and M. Bryer. 1997. A classification framework for freshwater communities: proceedings of The Nature Conservancy's Aquatic Community Classification workshop, New Haven, Missouri, April 9-11, 1996. The Nature Conservancy, Arlington, VA.
- Seelbach, P.W., and M.J. Wiley. 1997. Overview of the Michigan Rivers Inventory (MRI) Project. Michigan Department of Natural Resources, Technical Report 97-3, Ann Arbor.
- Seelbach, P.W., M.J. Wiley, J.C. Kotanchik, and M.E. Baker. 1997. A landscape-based ecological classification system for river valley segments in Lower Michigan (MI-VSEC Version 1.0). Michigan Department of Natural Resources, Fisheries Research Report 2036, Ann Arbor.
- Wehrly, K.E., M.J. Wiley, and P.W. Seelbach. 1997. Landscape-based models that predict July thermal characteristics of lower Michigan rivers. Michigan Department of Natural Resources, Research Report 2037, Ann Arbor.
- Wiley, M.J., P.W. Seelbach, and S. Bowler. 1998. Ecological targets for rehabilitation of the Rouge River. Rouge Project Office Report, Wayne County, MI.
- Zorn, T.G., P.W. Seelbach, and M.J. Wiley. 1997. Patterns in the fish communities of Lower Michigan streams. Michigan Department of Natural Resources, Fisheries Research Report 2035, Ann Arbor.

Findings: Jobs 1, 2, 4 and 5 were not completed as scheduled. However, jobs 1 and 2 will be continued through Study 678 (F-35-R-24). Job 3, though discontinued in 1997, was completed through an independent funding source. Jobs 4 and 5 will be continued through Study 679 (F-35-R-24).

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