STUDY PERFORMANCE REPORT

State: Michigan **Project No.:** F-81-R-4

Study No.: 662 **Title:** Inventory and classification of Michigan rivers and river fish communities.

Period Covered: October 1, 2002 to September 30, 2003

Study Objective: (1) Extend and modify as necessary models under development for Lower Peninsula rivers that describe site-specific fish habitat variables using watershed-scale variables to rivers of the Upper Peninsula; (2) Using variables defined in (1), classify Michigan river habitats into distinct types; (3) Determine composition of Upper Peninsula river fish communities from historic data and electrofishing surveys; (4) Extend and modify as necessary models predicting fish populations and community characteristics from site-specific and watershed-scale habitat variables that are being developed for Lower Peninsula rivers to include Upper Peninsula rivers; (5) Classify Michigan river fish communities into distinct types based on habitat classification; (6) Evaluate interactions between water temperature and fish community dynamics, including distribution and abundance for Michigan river fish communities.

Summary: Geographic information systems (GIS) analysis is ongoing. Stream fish communities were sampled at four streams in 2003. Stream temperature loggers deployed in 2002 were retrieved and additional loggers were deployed. Additional stream temperature data are being collected by management units. Watershed scale data are being assembled in a format compatible with GIS analysis. Hydrologic, stream temperature, and fish community modeling are ongoing.

Findings: Jobs 2 through 5 were scheduled for 2002-03, and progress is reported below.

Job 2. Title: Compile watershed- and site-scale habitat data.–Geographic information systems (GIS) data layers have been assembled and analysis is ongoing. Preliminary models for hydrology, stream temperature, and fish communities have been developed and modeling is continuing.

Mesohabitat variables were measured at four stream sites that were sampled for fish community composition (Job 3). Mesohabitat variables were collected at equally spaced transects in the sampled reach and included mean channel width, thalweg depth (deepest point in a cross section of the channel) and water velocity, substrate composition, riparian habitat, streambank stability, and percent of the sampled reach that is pool, riffle, and run habitat. Historical discharge data have also been compiled from United States Geological Survey (USGS) gauging stations for all currently operating and defunct stations.

Job 3. Title: Survey fish communities at selected additional sites.–We conducted stream fish community surveys at four streams during 2003 (Table 1). Sites were selected based on the geological characteristics of the watershed. Stream fish communities were sampled with DC electrofishing gear and the length of stream sampled was at least 100 m, except only 53 m of the AuTrain River were sampled. Sites were sampled by three consecutive electrofishing passes and all fish captured during each pass were removed. Fish species abundance was then estimated using the Zippin removal method (Zippin 1956; 1958), total biomass by species was estimated from the abundance data and the average individual fish weight for each species was calculated from the gross weight of all individuals of the same species.

Job 4. Title: Monitor stream temperatures.–Continuous temperature recorders have not been retrieved as of this date. Stream temperature data analysis and modeling are ongoing. Stream temperature data have been collected and data from management unit files through 2003 (total N=98) have been analyzed using the same techniques used for Lower Peninsula streams (Wehrly et al. 1998). Results indicated that most of the streams sampled to date are cold- or cool-water streams that have stable temperature variations (Table 2). Modeling results showed that several watershed-scale variables were important determinants of stream temperature regime. Significant watershed variables included watershed area, percent of glacial outwash in catchment, percent surface water in catchment, percent lacustrine sand and gravel in catchment, and percent of coarse end moraine in catchment.

Job 5. Title: Analyze data.–Data analysis is ongoing and incomplete. This progress report was prepared on schedule.

References:

Wehrly, K. E., M. J. Wiley, and P. W. Seelbach. 1998. A thermal habitat classification for lower Michigan Rivers. Fisheries Research Report No. 2038, Michigan Department of Natural Resources, Ann Arbor.

Zippin, C. 1956. An evaluation of the removal method of estimating animal populations. Biometrics 12:163-189.

Zippin, C. 1958. The removal method of population estimation. Journal of Wildlife Management 22:82-90.

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Table 1.–Streams, dates, and locations (township, range, and section) sampled for mesohabitat and fish communities in 2003.

Stream	Date sampled	Township, Range, Section	Number of species
Rapid River	7/17/03	42N, 21W, 29	17
Yellow Dog River	7/18/03	50N, 27W, 03	9
Ford River	9/15/03	39N, 24W, 02	21
Ford River	9/16/03	46N, 20W, 17	8

Table 2.–Summary of the number of streams classified by temperature regime for 98 Upper Peninsula streams based on system developed for Lower Peninsula (Wehrly et al. 1998). Weekly mean temperature and weekly temperature flux (difference between weekly maximum and minimum temperature) were calculated from continuous data for the period 24 June to 21 July, 1996-2003.

Weekly Mean Temperature C° (6/24-7/21)	Weekly Temperature Flux C°			Total
	Stable (<6°)	Moderate (6-9°)	Variable (>9°)	
Cold (<19°)	30	0	0	30
Cool (19-22°)	43	0	0	43
Warm (>22°)	21	2	2	25
Total	94	2	2	98