STUDY PERFORMANCE REPORT

State: Michigan **Project No.:** F-81-R-3

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

Period Covered: October 1, 2001 - September 30, 2002

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 three streams in 2002. Stream temperature loggers have not been retrieved from streams selected for temperature monitoring in 2002. Additional stream temperature data are being collected by management units. Watershed scale data are being assembled in a format compatible with GIS analysis; and hydrologic, stream temperature; and fish community modeling is ongoing.

Findings: Jobs 2, 3, 4, and 5 were scheduled for 2001-02, 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 and stream temperature have been developed, and modeling is continuing.

Mesohabitat variables were measured at three 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, or run habitat. Historical discharge data have also been compiled from United States Geological Survey (USGS) gaging 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 three streams during 2002 (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. 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 I have collected and data from management unit files through 2002 (total N=82) 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 or moderate temperature variations (Table 2). No clear relationship has been found between stream temperature regimes and watershed characteristics.

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. Michigan Department of Natural Resources, Fisheries Research Report 2038, 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.

Prepared by: Edward A. Baker
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Table 1.–Streams, dates, and locations (township, range, section) sampled for mesohabitat and fish communities in 2002.

Stream	Date Sampled	Township, Range, Section	Number of Fish Species
South Branch Stutts Creek	9/11/02	44N, 17W, 10	7
Creighton Creek	9/13/02	45N, 16W, 14	10
Mead Creek	9/17/02	44N, 13W, 30	14

Table 2.–Summary of the number of streams classified by temperature regime for 82 Upper Peninsula streams based on system developed for Lower Peninsula (Wehrly et al. 1998). Weekly mean temperature and weekly temperature range (difference between weekly maximum and minimum temperature) were calculated from continuous data for the period 24 June to 21 July, 1996-2002.

Weekly Mean Temperature C^o	Weekly Temperature Flux C^o			Total
	Stable (<6^o)	Moderate (6-9^0)	Variable (>9^o)	
Cold (<19^o)	16	26	4	46
Cool (19-22^o)	3	22	4	29
Warm (>22^o)	0	5	2	7
Total	19	53	10	82