

## STUDY PERFORMANCE REPORT

State: Michigan

Project No.: T-10-T-5

Study No.: 237025

Title: Protecting instream habitat by development and support of a water withdrawal decision-support tool in Michigan

Period Covered: October 1, 2014 to September 30, 2015

**Study Objectives:** This study is designed to provide ongoing support for development and refinement of the Michigan ecological river segment GIS and development and implementation of the Water Withdrawal Assessment Tool (WWAT). Accordingly, the project has the following objectives:

1. Critically review the Michigan Ecological River Segment GIS (MI-VSEC 2.0) and strengthen the underlying database by integrating additional hydro-geomorphic habitat attributes and improving biological attributes.
2. Expand data collection to support improvements to the Michigan Ecological River Segment GIS and the WWAT, including collection of temperature, flow, and fish assemblage data in under-represented stream types.
3. Develop review tools to facilitate participation of biologists statewide in environmental review of site-specific requests for groundwater withdrawals.
4. Support participation in the internal (Fisheries Division) groundwater task group, Southwestern Michigan Groundwater Advisory Council, and the statewide Water Resources Conservation Advisory Council. Specially, this objective will provide technical expertise in development of groundwater models as they relate to effects on stream habitat and ensures the consideration of species of greatest conservation need (SGCN) in these products.

**Summary:** In summer 2015, we installed 30 electronic water pressure-temperature sensors in 15 streams throughout Michigan, five of which were in the southwest (SW), four in the northern Lower Peninsula (NLP), and six in the Upper Peninsula (UP). Three discharge measurements were taken at the location of each electronic sensor throughout July, August, and September for calibration (Table 1). Staff also participated in internal and external task group to review study plans for the development a regional aquifer model for southwest Michigan.

**Findings:** Jobs 1 through 6 were scheduled for 2014-15, and progress is reported below.

**Job 1. Review MI-VSEC 2.0 fish assemblage / thermal classes per segment.**—No progress to report.

**Job 2. Field data collection to support improvements to the Michigan Ecological River Segment GIS and WWAT.**—Michigan State University and Michigan DNR Fisheries Division began field data collection to support improvements to the Michigan Ecological River Segment GIS and WWAT. This summer, emphasis was placed on installation of water pressure-temperature loggers and discharge calibration in streams of varying temperature classes throughout Michigan. Throughout the state, loggers were placed at an upstream and downstream location in 15 streams. Locations were selected to represent four thermal classes represented within the WWAT: cold (C), cold-transitional (CT), warm-transitional (WT), and warm (W). At least one of each thermal class was selected in each of three regions: SW, NLP, and UP.

Installation of loggers began in early July, as funding support was not finalized until early summer. Electronic water pressure-temperature loggers (HOBO Water Level Logger) were housed in stilling wells constructed with PVC piping which was then attached to a metal fencepost driven into the stream bottom. The top of the PVC piping was covered with a well cap and contact information (i.e., business card of Daniel Hayes) was attached. Installation locations of loggers were chosen to represent uniform stream bottom and during periods of low flow to ensure that loggers remained submerged throughout stages of low flow.

Discharge calibrations were necessary to relate pressure readings from electronic sensors to discharge measurements. Calibration dates were chosen on a practical basis to represent a range of discharge levels. Discharge was measured at both upstream and downstream locations of streams on the same date. To date, three discharge measurements have been collected at each site with a fourth planned for when gauges are removed in late fall. Velocity and depth measurements were taken at systematic intervals across the stream width at the location of the temperature-pressure sensor. Intervals were designed so that 20 velocity and depth measurements were taken across the stream width.

**Job 3. Convene regular meetings of the Fisheries Division groundwater working group.**—DNR staff met internally and with representatives from the Michigan Department of Agriculture and Rural Development, Michigan State University, and United States Geological Survey to discuss refinements and implementation of the Michigan Water Withdrawal Assessment Tool and development of a regional aquifer model for southwest Michigan.

**Job 4. Conduct site-specific reviews, and develop improved review tools and protocols.**—DNR project biologist conducted site-specific reviews to evaluate the potential for water withdrawals to result in adverse resource impacts. Site-specific reviews were conducted in Branch, Allegan, Ottawa, and Berrien counties.

**Job 5. Participate on the state Water Resources Conservation Advisory Council, the Southwestern Michigan Groundwater Advisory Council, and associated committees and subcommittees.**—DNR staff participated and provided technical support in meetings of the Southwest Michigan Water Resources Council, Water Resources Conservation Advisory Council and associated subcommittees.

**Job 6. Write annual performance report.**—This report was completed as scheduled.

Table 1.—Streams selected for temperature-discharge monitoring in 2015. The first entry in the table represents the date each station was established, and in most cases, when the first discharge calibration measurement was collected. Later dates in the table list when additional discharge calibration measurements were collected. The Fish Creek gauge was installed on June 29, but no discharge measurement was taken that day.

Name	Temperature class	July	Aug	Sep
Pigeon River	CT	21	20	17
Pokagon Creek	C	20	20	17
Prairie River	W	20	21	17
Nottawa Creek	WT	20	21	22
Fish Creek	C		20	10, 17
Cedar River	C	9, 28		15
Butterfield Creek	CT	9, 28		15
N. Br. Thunder Bay River	W	9, 28		15
King Creek	WT	8, 28		15
Slapneck Creek	CT	21	5, 25	
E. Br. Waiska River	W	20	4, 25	
M. Br. Escanaba River	WT	21	4, 25	
Morgan Creek	C	21	4, 25	
Spring Creek	CT	22	3, 24	
Carp River	CT	21	4, 25	