

**Title: Bluff Creek Hydrological and Fish Community Improvements**

Michigan AUID Number: 040201020108-02

GRTS Number: Section 319 funds were used for the monitoring described below, which in 2004 was Grant 975474040, Project 01.

Opening Paragraph: Bluff Creek is a designated coldwater stream draining to the Ontonagon River in Ontonagon County, in Michigan's Upper Peninsula. The creek is an important local resource for both trout fishing and power generation, and receives large quantities of water from the Bond Falls Basin reservoir as a result of discharges from the Upper Peninsula Power Company (UPPCO) Copper District Flume. Water releases in the 1990s varied greatly in flow and duration because the Federal Energy Regulatory Commission (FERC) license did not establish minimum or maximum flows, and the stream flow was quite turbulent even at baseflow (Figure 1). A 1995 biosurvey conducted by the Michigan Department of Environmental Quality (MDEQ) found low numbers and diversity of fish, presumably due to the hydrologic variability of the creek, and the creek was on Michigan's 303(d) list through 2004. A new FERC license issued in 2003 established minimum and maximum flow and ramping rate restrictions, to protect aquatic resources. A follow-up biosurvey in 2004 found a substantial increase in fish numbers and diversity, and the stream was removed from the 303(d) list in 2006.

Problem: Unstable stream flows in Bluff Creek due to highly variable discharges from a power generation reservoir lowered fish populations and diversity.

Results: The 1995 biosurvey found relatively low numbers of fish, approximately one-fifth as many as would be expected in a comparable unimpacted stream in this part of the state. The 2004 biosurvey found that the number of fish captured in the first electrofishing "pass" (comparable to the sampling technique used in 1995) had increased by 126 percent, and the number of fish species increased by 50 percent (Table 1). The two fish species whose numbers increased the most were the longnose dace (*Rhinichthys cataractae*) and the mottled sculpin (*Cottus bairdi*). Both species prefer clean, swift, sand- or gravel-bottomed streams and are negatively impacted by unnaturally variable flows.

Partners and Funding: The Michigan nonpoint source program partially supported the biosurveys in 1995 and 2004, which were performed by MDEQ Water Bureau Staff and Michigan Department of Natural Resources fisheries staff. UPPCO modified discharges from Copper District Flume to accommodate the biosurveys, which were conducted on private property with the permission of the owner, Mr. Jack Lamar.

Photographs:

**Figure 1. Bluff Creek downstream of the Copper District Plume prior to the new FERC license, at baseflow. Note the turbulent flows.**



Data:

**Table 1. Pre and Post Fish Data.**

<b>Metric</b>	<b>1995, prior to the new FERC license</b>	<b>2004, the year after the new FERC license</b>
No. fish collected in first eletroshock pass	74	167
No. fish species	10	15
No. longnose dace collected in first eletroshock pass	18	79
No. mottled sculpin collected in first eletroshock pass	19	52

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