

Annual Meeting of the Wisconsin Chapter of American Fisheries Society

Stevens Point Wisconsin
January 31 - February 2, 2011

Response of a diminutive coldwater fish to warming in the world's largest lake

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Lake Superior's 2.5 °C increase in mean summer surface water temperatures over the past 30 years is one of the greatest documented temperature increases of any habitat worldwide. We took advantage of a long-term record (1978-2010) of water temperature profiles and fish collections in Lake Superior to evaluate bottom temperatures and the depth distribution of pygmy whitefish (*Prosopium coulterii*), a small demersal prey fish in Lake Superior. Preliminary analyses suggest that spring bottom temperatures increased about 0.8 C over this period. Pygmy whitefish abundance-weighted mean depth of collection increased from about 72 m in 1978 to about 96 m in recent years; a ~7 m per decade rate of deepening. In warm years, fish were generally collected in deeper waters than in years when spring water temperatures were colder. In 2010, summer surface water temperatures were the warmest on record in Lake Superior and the mean abundance-weighted depth of collection of pygmy whitefish was 105 m, the deepest on record. This rate of deepening is similar to that observed in many North Sea demersal fishes that have deepened up to 14 m per decade (1980-2004) in response to a winter bottom temperature increase of 1.6°C.