

Evaluation of an electric barrier to reduce walleye escapement

Principal Investigator: Michael J Weber
Student Investigator: None
Collaborators: Mark Flammang, George Scholten, IDNR
Duration: April 1, 2013 – July 31, 2013
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

Evaluate the potential effectiveness of an electric barrier at reducing walleye escapement from reservoirs. Laboratory experiments were used to compare walleye behavior, escapement, and mortality using four pulse (0, 0.3, 0.5, and 0.8 ms) and three voltage (0, 60, and 80 V) settings.

Introduction

Fish entrainment through dams, hydroelectric projects, or into cooling water intakes has been shown to have negative impacts on fish populations. In Iowa, walleye escapement from Rathbun Lake can approach 30% annually with an associated large economic cost. Section 316(b) of the Clean Water Act has required that “best technology available” be used to minimize adverse environmental impacts resulting from operation of cooling water intake structures. Thus, evaluations of barriers to reduce walleye escapement are needed. Several different types of nonphysical barriers have been employed, such as constant light, strobe lights, underwater sound, bubble curtains, electrical current, or a combination of the above. A recent barrier evaluation found that a sound-air-light barrier was minimally effective at reducing walleye escapement. The use of electric barriers has been successful at reducing movement of fishes for over 60 years. However, few formal evaluations currently exist that assess their ability to successfully deter fish movements.

Progress

All trials have been completed at Rathbun Fish Hatchery, data has been analyzed, and the final report has been completed. Our results demonstrate that a pulsed DC electric barrier was successful at reducing approaches and increasing deflections of walleyes when it was activated, suggesting that fish avoided the barrier. Altered behavior resulted in a 70% reduction in escapement. However, pulse width and voltage did not influence escapement rates. No walleyes died during control trials whereas mortality ranged from 0.5-5.7% when the barrier was activated and was highest at the highest barrier setting (80 V, 0.8 ms).

Future Plans:

Additional work is needed to evaluate the effect of flow rate on escapement rates using these barriers and the utility of electrical barriers in field settings under a wider range of conditions and on additional species.