

AN AUTOMATIC FISH TRACKING SYSTEM FOR THE U.S. E.P.A.'s  
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An automatic tracking system controlled by an RCA 1802 microprocessor was developed to locate fish in a 400 m outdoor experimental stream channel at the U.S. EPA Monticello Ecological Research Station. The monitoring network consisted of 12 horizontally polarized antennas spaced at 30 m intervals. The antennas were sequentially switched into a receiver and the signal strength at each antenna was measured. The microprocessor controlled all timing, switching and measurement functions. Each fish tracked by the system was tagged with an implanted radio transmitter which had a unique frequency in the 53 MHz band. Selecting a particular fish for tracking was equivalent to requesting a particular frequency entered into the memory of the receiver. The microprocessor determined which antenna had the maximum signal level and printed this information along with fish number and time of day. Also, to give an estimate of data quality, a signal to noise index was calculated by subtracting an estimate of the background noise from the signal level obtained from the antenna closest to the fish.

During May, 1979, a comprehensive tracking system performance test was made generating 36,000 locations on 10 walleyes, 4 open noise channels, and 2 primary reference transmitters. Each fish was located at 15 min. intervals. Results indicated that the tracking system located radio-transmitters to the nearest antenna with a reliability of 98.7%. Correlations of walleye resting and movement behavior and social organization to environmental variables such as light intensity and food introduction were possible from data produced by the system.

A M.S. thesis by Kathleen C. Zinnel has resulted from the project. A final technical report detailing the engineering and software development is currently in review with the EPA. We anticipate a publication on the walleye behavior in the near future.

Potential applications of this system include experimental observations on fish behavior, relative to environmental alterations such as sublethal toxicant concentrations, changes in habitat and manipulation of population densities.