

## ***Piscirickettsia* Infection in the Muskellunge Population of Lake St. Clair**

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**Abstract.**—For decades, Lake St. Clair has supported an economically important sport fishery for muskellunge. The muskellunge population has been completely self-sustaining, thus any threat to the continued successful recruitment of muskellunge in the lake is a serious concern for fisheries managers. In 2002, muskellunge exhibiting external lesions were collected by the Michigan Department of Natural Resources (MDNR) from the Anchor Bay area of Lake St. Clair. The lesions were in the form of raised, reddish granulomatous-like sores that varied in diameter from 3 mm to 2 cm. An intracellular bacterium was found in affected tissues. Based on its morphological characteristics, cultural criteria, and gene sequencing, the bacterium found in abundance in muskellunge skin lesions and internal organs was determined to be a *Piscirickettsia* species. This two-year study was funded with the goal of addressing some concerns and questions regarding this emerging infection. The objectives of this study were: (1) to identify the *Piscirickettsia*-like bacterium that was the causative agent of the lesions; (2) to determine the *Piscirickettsia* infection rate in Lake St. Clair muskellunge and whether the rate varies spatially or temporally; (3) to determine if other fish species in the St. Clair System are infected by the bacteria; (4) to identify the impacts of the bacterium on the health of individual muskellunge; and (5) to determine if the disease can be vertically transmitted. This study found a high proportion of muskellunge caught in Anchor Bay were infected, but found no evidence of the infection in other fish species, except for yellow perch. Molecular analyses confirmed that muskellunge and yellow perch isolates were identical to each other but not identical to *Piscirickettsia salmonis* that devastates cultured salmonids, suggesting the causative agent was likely a new species of *Piscirickettsia*. Histopathology demonstrated the presence of severe skin edema and severe degeneration of the kidney glomeruli in infected muskellunge. In laboratory trials, mortality was high for fingerling muskellunge experimentally infected with *Piscirickettsia* bacteria, but mortality was low for rainbow trout and largemouth bass. No *Piscirickettsia* bacteria were retrieved from muskellunge ovarian fluids, eggs, or milt samples, suggesting likelihood of vertical transmission was minimal. Trap net survey and angler diary catch rates suggested that no major change in adult muskellunge abundance occurred from 2002 to 2007. However, the effects of a decline in fingerling survival, if it occurred in the lake, would not be apparent for several years. Subsequent to the identification of the *Piscirickettsia* infection, viral hemorrhagic septicemia virus was identified from muskellunge in Lake St. Clair. The impact of the combination of these two infectious agents on the muskellunge population of the lake remains unknown.