

2013 Project Abstract

For the Period Ending June 30, 2016

PROJECT TITLE: Developing eradication tools for invasive carp species. Phase I: Understanding the virome of carp species in the Upper Midwest

PROJECT MANAGER: Dr. Nicholas Phelps

AFFILIATION: Minnesota Aquatic Invasive Species Research Center

MAILING ADDRESS: 2003 Upper Bufford Circle, 135 Skok Hall

CITY/STATE/ZIP: St. Paul, MN 55108

PHONE: 612-624-7450

E-MAIL: phelp083@umn.edu

WEBSITE: www.maisrc.umn.edu

FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: M.L. 2013, Chp. 52, Sec. 2, Subd. 06a

APPROPRIATION AMOUNT: \$206,754

Overall Project Outcome and Results

Although ambitious, eradication of aquatic invasive species is an ultimate goal of the MAISRC. One possible method would be through the introduction or promotion of species-specific pathogens. This high-risk, high-reward approach must be carefully assessed with thorough investigation and scientifically justified risk assessment. As a first step in Phase I of a multi-phase project, invasive carp species were surveyed to identify viruses circulating in these populations. Nearly 700 common carp were collected from Minnesota lakes, 120 silver carp from the Fox and Illinois Rivers, and a variety of carp species from eight mortality events. All fish were negative for cyprinid herpes viruses 1, 2, and 3, carp edema virus, and spring viremia of carp virus. However, advanced molecular approaches and virus isolation detected several known and unknown viruses of significance. This included novel viruses from at least seven RNA virus families: picornavirus, reovirus, hepatovirus, astrovirus, hepatitis virus, betanodavirus, and paramyxovirus. The novel carp paramyxovirus was associated with a mortality event and shows particular promise for further evaluation as a biocontrol agent. The standard operating procedures developed during Phase I will be essential to advance future work on this and related pathogen discovery research. Unfortunately, Phase I was met with several unforeseen challenges that hindered completion of all proposed activities, including laboratory renovation progress, service provider availability and delays, and access to mortality events. In spite of these setbacks, this project has significantly advanced our understanding of invasive carp viruses and positioned us well to for future research efforts. Phase I of this project provided researchers and managers with baseline data on viruses circulating in invasive carp populations in the region. These data have been broadly disseminated at scientific conferences, peer-reviewed and lay publications, and through MAISRC communications. Continued efforts to build upon this line of research will commence in Phase II of this long-term effort.

Project Results Use and Dissemination

The data generated from this study was presented five times in different scientific and stakeholder conferences. The research data from this study will generate three or more publications, which are currently in preparation. These are tentatively titled (i) Prevalence of RNA viruses in invasive carp populations in Minnesota; (ii) Genomic-based characterization of novel RNA viruses present in invasive carp population in Minnesota; (iii) Molecular characterization of novel RNA viruses associated with fish mortality events in different lakes in

Minnesota; (iv) Next generation sequencing as a tool for diagnosis and discovery of novel pathogens.