**PROJECT TITLE: Mississippi River Dams: blocking invasive fish, helping natives.**

**I. PROJECT STATEMENT**

a) *Overall goals of the project*—Our first goal is to prevent ≥94% of Bigheaded Carps in Iowa’s Pool 16 from reaching Minnesota’s Pool 8 (Fig. 1). Our second goal is to increase the passage of native fish species from Pool 5 to Pool 1 within Minnesota, which will contribute to the restoration of the Mississippi River ecosystem and improve its resistance to invasion by Bigheaded Carps.

*b) How the project will achieve those goals—*To achieve the first goal, we will recommend gate adjustments that can prevent ≥50% of the Bigheaded Carps from passing through each dam below Pools (LDs) 15, 14, and 11. With the adjustments that already have been implemented at LD8, the overall rate of passage from Pool 16 to Pool 8 will be reduced to ≤6% (= ≥94% prevention). We will use a previously developed and proven computational model that uses dam hydrodynamics, gate positioning, river discharge, fish swimming abilities, and navigational requirements to arrive at the recommended adjustments. The process for achieving the second goal at LD5, 4, and 2 will be similar, except we will look for increasing instead of decreasing passage, and we will be using swimming ability data for Lake Sturgeon, Paddlefish, Channel Catfish, and Walleye. These species exhibit a wide array of swimming abilities that will apply to many other native species. The dams we selected offer the greatest potential for changing passage rates because their gates spend the least amount of time out of the water.

*c) Why this project needs to be done*—Because the invasion fronts of Bigheaded Carps currently are downstream of Pool 16, we have the opportunity to greatly slow the advance of those fronts into Minnesota. The state has implemented several mechanisms to keep Bigheaded Carps below LD8. If we use the cumulative effect of four blockage dams, we greatly reduce the chances of Bigheaded Carps becoming established in Minnesota. If we can improve native fish movement in the reach above LD5, we can increase biological connectivity and potentially improve natural resistance to invasion by Bigheaded Carps. The proposed project directly contributes to action item 2.9 in *Minnesota’s Invasive Carp Action Plan*. It also offers an alternative upstream deterrence strategy that is based on enhancing native fish movement and helps to offset the negative impacts of blockage strategies, an item identified in section 2 of the Action Plan.

**II. PROJECT ACTIVITIES AND OUTCOMES**

**Activity 1:** Determination of gate operations at LD15, 14, and 11. **(July 2020–December 2021).**

**Description:** We obtain structural and operational data, and historic river discharges for each dam from USACE (Rock Island District). We use a supercomputer to run thousands of simulations for each dam and analyze for optimal gate adjustments. We conduct multiple interagency meetings to secure data and implementation agreements among the states and USACE.

**ENRTF BUDGET: $162,141**

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| **Outcomes** | **Completion Date** |
| *1. Optimal gate adjustments for ≥50% Bigheaded Carps blockage for LD 15.* | *December 2020* |
| *2. Optimal gate adjustments for ≥50% Bigheaded Carps blockage for LD 14.* | *June 2021* |
| *3. Optimal gate adjustments for ≥50% Bigheaded Carps blockage for LD 11.* | *December 2021* |
| *4. Interagency (state and federal) agreement on implementation* | *December 2021* |

**Activity 2:** Determination of gate operations at LD5, 4, and 2. **(January 2022-June 2023).**

**Description:** We already have structural and operational data, and historic river discharges for each dam from USACE (St. Paul District). We use a supercomputer to run thousands of simulations for each dam and each species and then analyze for optimal gate adjustments across all target species. We conduct meetings to negotiate implementation agreements among Minnesota, Wisconsin, and USACE.

**ENRTF BUDGET: $162,141**

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| **Outcome** | **Completion Date** |
| *1. Optimal gate adjustments to improve native fish passage for LD 5.* | *June 2022* |
| *2. Optimal gate adjustments to improve native fish passage for LD 4.* | *December 2022* |
| *3. Optimal gate adjustments to improve native fish passage for LD 2.* | *June 2023* |
| *4. Interagency (state and federal) agreement on implementation* | *June 2023* |

**III. PROJECT PARTNERS AND COLLABORATORS:**

**U of MN:** Dr. Jay Hatch (Associate Professor): Project management, invasive and native fish behavior; Dr. Anvar Gilmanov (Research Associate): modeling, fish passage analysis, numerical simulations.

**Project Partners:** Minnesota Aquatic Invasive Species Research Center, Minnesota Department of Natural Resources (in negotiations with U. S. Army Corps of Engineers, Upper Mississippi River Conservation Committee, U. S. Fish and Wildlife Service, U. S. Geological Survey, and Wisconsin Department of Natural Resources)

**IV. LONG-TERM IMPLEMENTATION AND FUNDING:**

Implementation of gate adjustments is dependent upon agreement among the states and USACE’s willingness to use them, which makes the negotiation portion of the project important. Once agreements are established, implementation can continue as long it is needed. Slowing the advance of Bigheaded Carps into Minnesota’s reach of the Mississippi River also aids in the efforts to deter their advance into the St. Croix and Minnesota River systems. Similarly, improving connectivity in the upper reaches should increase invasion resistance in these other stream systems. Should monitoring indicate large increases in Bigheaded Carps at any navigation pool above LD8, gate adjustments to block advancement will have to be made at more upstream dams as suggested in Minnesota’s Action Plan. Gate adjustment recommendations for blockage already have been made for LD5 and 4.

**V. SEE ADDITIONAL PROPOSAL COMPONENTS:**

**A. Project Budget Spreadsheet**

**F. Project Manager Qualifications and Organization Description**