M.L. 2013 Minnesota Aquatic Invasive Species Research Center Subproject Abstract
For the Period Ending June 30, 2019

SUBPROJECT TITLE: MAISRC Subproject 19: Decision-making tool for optimal management of AIS
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SUBPROJECT BUDGET AMOUNT: $172,465
AMOUNT SPENT: $80,469
AMOUNT REMAINING: $91,996

Sound bite of Subproject Outcomes and Results
We optimized network models for water connectivity and boater movement in Minnesota to predict zebra mussel and Eurasian watermilfoil invasion patterns. We then developed county-based recommendations to prioritize the optimal location of watercraft inspectors. The approach was piloted with Crow Wing, Ramsey, and Stearns Counties, and the results broadly disseminated.

Overall Subproject Outcome and Results
Understanding the patterns of historic AIS invasion can provide the framework for forecasting future invasions. To that end, we used a big data approach to combine hydrologic connectivity and boat movement to create a multiplex metacommunity model for both zebra mussel and Eurasian watermilfoil. We found that the hydrological corridors are important pathways of spread, even more so that previous research has suggested. While overland dispersal of AIS via boater movement is still a significant factor, additional management strategies should be developed to include intervention of hydrological pathways.

Using connectivity networks of boater movement, we developed county-based AIS management optimization models that prioritize inspection locations that will intercept the highest number of 'risky boats' (e.g. moving from infested to uninfested lakes). We piloted the models in Crow Wing, Ramsey, and Stearns Counties and had a very productive collaboration with county managers and citizen advisory boards during the development and evaluation for each. Ultimately, the application of this approach was well received and helped inform allocation of their inspection hours at the county level (for example: https://www.crowwing.us/1004/Aquatic-Invasive-Species-AIS).

Dissemination and usability of the models was a priority of this project. We created online tools to 1) visualize the spread risk for zebra mussels and Eurasian watermilfoil based on model predictions made in Activity 1, and 2) visualize and modify the decision optimization model at the county level based on management thresholds or funding availability. These tools and more detailed descriptions of the project has been disseminated through in-person stakeholder meetings and presentations to diverse audiences, including managers, researchers and the public.

Subproject Results Use and Dissemination
Efforts were made throughout the project to engage end-users, share findings and make deliverables broadly available. We used a combination of formal and informal dissemination strategies for this project given the

direct application to AIS managers and broad interest among other stakeholders. We held in-person meetings with County representatives and citizen advisor boards from Crow Wing, Ramsey and Stearns Counties to present results and update our models according to their input. These meetings were highly valuable to the project team and the outcomes of the project. In addition, we provided scientific and/or outreach presentations at the International Conference on Aquatic Invasive Species, the Aquatic Invaders Summit, the Cass County Watercraft Inspectors annual training, the annual AIS Roundtable, and MAISRC's Research and Management Showcase. Several publications are currently in late-stage drafts and will be submitted for peer-review in the coming months.