M.L. 2013 Project Abstract
For the Period Ending June 30, 2018

SUBPROJECT TITLE: MAISRC Subproject 13: Eco-epidemiological Model to Assess Aquatic Invasive Species Management
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LEGAL CITATION: M.L. 2013, Chp. 52, Sec. 2, Subd. 06a

SUBPROJECT BUDGET AMOUNT: $195,249
AMOUNT SPENT: $195,249
AMOUNT REMAINING: $0

Overall Subproject Outcome and Results

Aquatic invasive species (AIS) are spreading at an alarming rate in Minnesota, putting the urgent need for prevention at odds with limited budgets and capacity. To inform decision making, we have developed a series of integrated models that provide the cumulative risk of introduction and establishment of zebra mussels and starry stonewort in all Minnesota lakes. We first answered the question of 'can the species get there?' using network models to describe lake connections. The watercraft network was built with 1.6M MN DNR watercraft inspections from 2014-2017, with gaps and biases accounted for with a variety of statistical approaches. The water connectivity network was created at a finer resolution and larger geographic area than currently available using multiple sources of GIS data and satellite imagery. Next, we answered the question of 'will the species survive?' using advanced methods of ecological niche modeling. With current species distribution of the invaded and native ranges, paired with local environmental data, we projected suitability at the lake level. These three massive data sources fed into the development of an integrated model that quantified the risk of AIS invasion for each waterbody from 2018-2025. Not surprisingly the results suggest the number of infested waterbodies will increase in the years to come. However, with the integration of hypothetical management scenarios developed and incorporated during two project workshops, we demonstrated the value of this approach to assess management effectiveness by determining the number of new infestations averted. While the model is not perfect (no models are), the results are robust and provide useful information from which to make decisions. When considered across a watershed, county or state, the ability to rank waterbodies based on actual, not perceived, risk is a game changer for the prioritization of intervention strategies.

Subproject Results Use and Dissemination

The outcomes of this projects received considerable attention from AIS managers, lake associations and other researchers. We took full advantage of this opportunity and far exceed expectations to disseminate the results. We communicated to the scientific community with the publication of seven related manuscripts and have three more in preparation, and presentations at three scientific conferences. The project was presented to stakeholder audiences 11 times in formal settings and many informal settings. We worked closely with MAISRC to disseminate project updates through MAISRC's

newsletter and social media. We have helped develop a project page on the MAISRC website (https://www.maisrc.umn.edu/modeling-ais) that has links to finalized risk ranking for each lake in Minnesota, project reports, and communications. In addition, all raw data and products generated as part of this project will be stored in the MAISRC-DRUM (Data Repository at UMN) for indefinite public access (web addressed TBD).