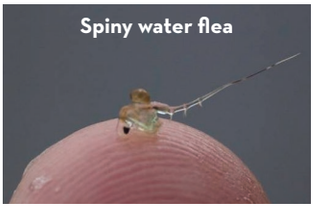
MAISRC

AIS Explorer

10,000+ lakes. 800,000+ boats. One big problem.

How can we best protect Minnesota's waters from aquatic invasive species with limited resources?



Researchers at the Minnesota Aquatic Invasive Species Research Center have developed an online dashboard—AIS Explorer—that both forecasts the introduction risk of aquatic invasive species (AIS) to individual waterbodies and provides decision-making support for optimizing watercraft inspection efficacy.

After five years of development, the project team established a robust lake-connectivity network. With over 1.6 million data points of reported boater movements and a complex array of river connections, thousands of simulations were done to test the accuracy of the model and create the AIS Explorer.

AIS Explorer provides guidance on two key prevention methods:

- **Surveillance:** modeling the likelihood of new infestations
- **Watercraft inspections:** prioritization of physical intervention at the riskiest lakes

The AIS Explorer dashboard is free and open to the public. Users can focus on any lake in Minnesota, or view model results on a county level. To stay current, the underlying models update weekly to account for new infestations and changing risk dynamics.

Data Sources

Infested waters list

A list of all Minnesota waters infested with aquatic invasive species, maintained and updated by the Minnesota Department of Natural Resources.

Boater movement

A predicted network of boater movement was created using more than 1.6 million reported lake-to-lake connections from inspection surveys. The connections between pairs of lakes were directional and weighted based on the estimated number of boats moving between them.

Water connectivity

Natural water connections that allow for downstream drift/migration of aquatic invasive species. The water connectivity network included directionality and is weighted based on the length of the river connecting each pair of lakes.

"Risky" boats

Using the predicted network of boater movement, boats moving from an infested waterbody to an uninfested waterbody.

Minnesota Aquatic Invasive Species Research Center
University of Minnesota
Driven to Discover℠

AISexplorer.umn.edu

Environment and Natural Resources Trust Fund

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Toggle between the two models in AIS Explorer at the top of the dashboard.

Introduction Risk for Surveillance | **Prioritization for Watercraft Inspections**

Surveillance

Data sources for the AIS Explorer surveillance and early detection model:

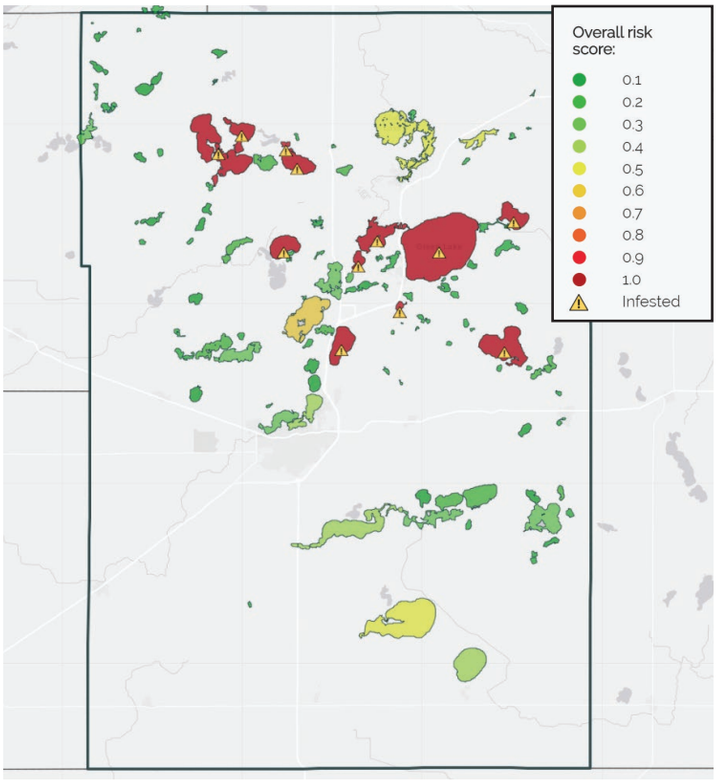
Infested waters list

Boater movement

Water connectivity

Using the Bayesian modeling approach—which incorporates prior and current information—AIS Explorer integrates the data sources to calibrate a model and verify the accuracy with known data. The model predicts the likelihood a lake will be infested with zebra mussels or starry stonewort within the next eight years.

The model outputs provide a risk score estimating the likelihood of infestation ranging from 0 to 1 and are color-coded green to red, respectively. For example, an overall risk score of 0.25 means there is a 25% chance that zebra mussels/starry stonewort will be introduced to a specific lake.



Watercraft inspections

Data sources for the AIS Explorer watercraft inspections model:

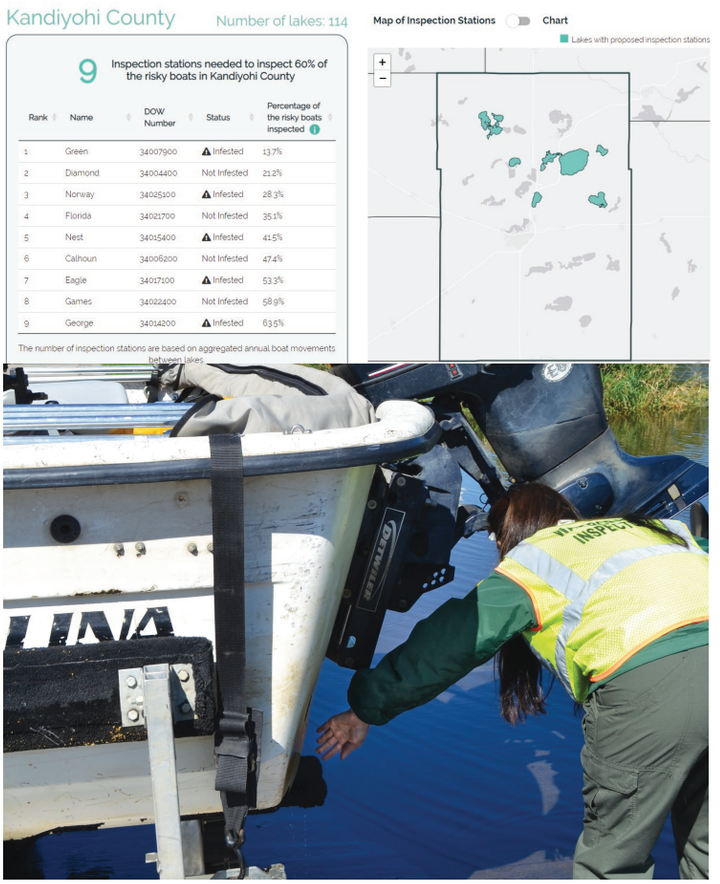
Infested waters list

"Risky" boats

Using an optimization modeling approach, the data sources are used to quantify the number of risky boats inspected given a set management threshold. The model is run at the county-level, for each county in Minnesota, considering the movement of boats into, within, and out of the county.

At the county level, managers can determine a management threshold, include/exclude specific lakes, and consider up to four aquatic invasive species (zebra mussels, starry stonewort, spiny water flea, and Eurasian watermilfoil).

The results rank lakes within a county that should be prioritized for watercraft inspection effort and provides a figure that displays the optimal balance of inspection resources to maximize the number of risky boats intercepted and visualizes the point of diminishing returns from added inspections.



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