



“It seems like a new lake [in Minnesota] gets them [Zebra Mussels] every week.”

--Daniel Kelly, Minnesota Environmental Journalist

Zebra Mussels: A Big Problem



Structural Problems

Ecosystem Problems

Economic Problems

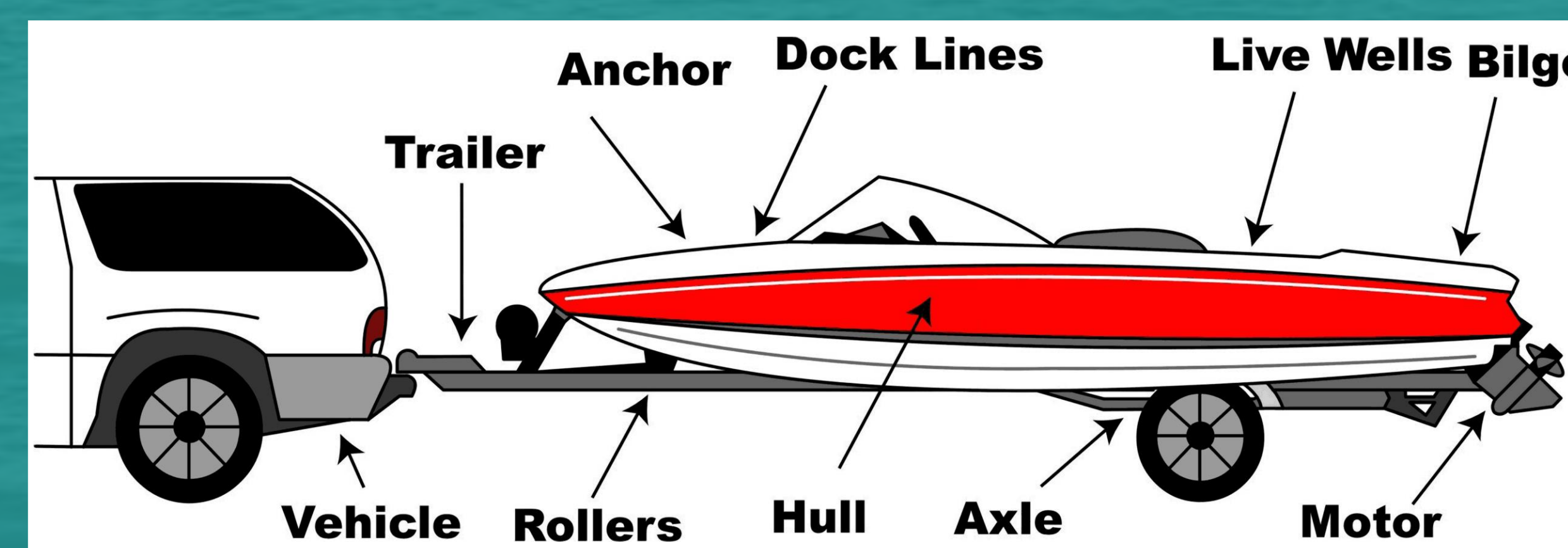


Zebra Mussel Spread

What Is Being Done Already

Minnesota Law Currently Requires Boat Owners To:

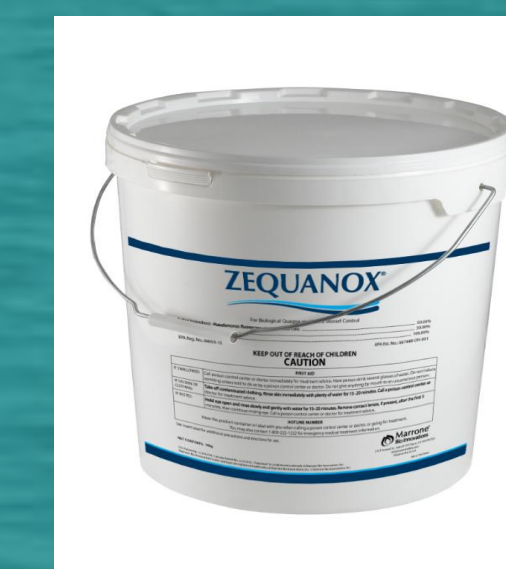
- **Clean** all equipment
 - **Drain** all water from vessel
 - **Dispose** of unwanted bait
- But Only Suggests:
- **Drying** all equipment



Direct Zebra Mussel Eradication

Chemical/Biological Solutions

	Zequanox	Copper Based	Potash
Cost	Very Costly	Medium Cost	Lowest Cost
Environmental Impact	Low Impact	Safe in small doses	Causes increase plant growth
Success Rate	Extremely High >95%	90%	90%

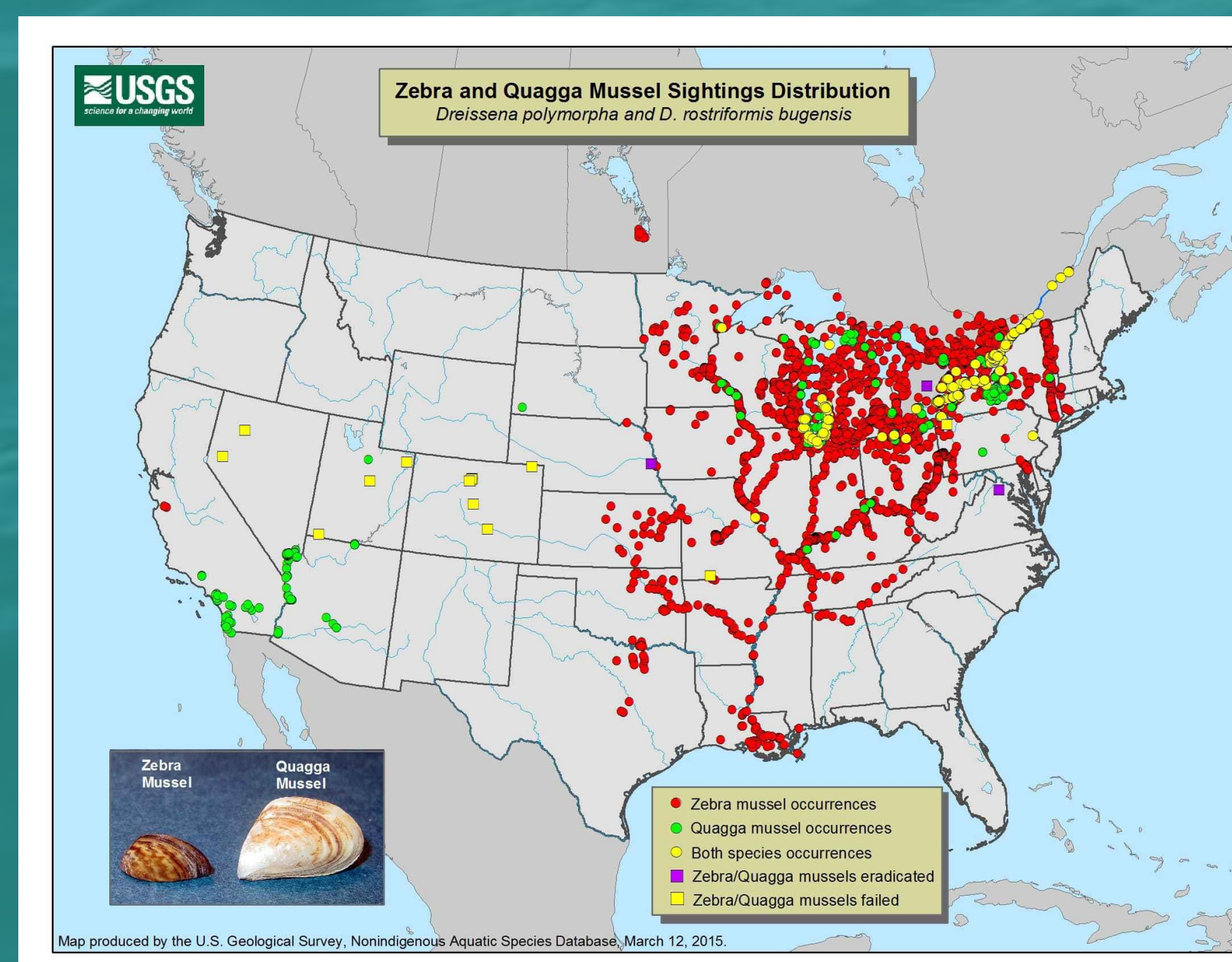


Visual Summary



STOP AQUATIC HITCHHIKERS!

Where Zebra Mussels Are



Our Management Plan

- More Watercraft Decontamination Units
- Certify Inspection Volunteers (Level 1)
- Specialized K9 Units and Inspectors (Level 2)
- Lake Association Specific Regulations

Acknowledgements

Abigail King(PLA), Elio Daci(PLA), Rebecca Zinno(Research Librarian), Daniel Kelly(Journalist), and April Londo(MN DNR Specialist)

REFERENCES

[Photograph]. Retrieved from <http://boatcatcher.net/zebra-mussels-on-boat-motor/>

ANS Task Force (n.d.). Harmful Aquatic Hitchhikers: Mollusks Zebra Mussel. Retrieved October 27, 2016, from http://www.protectyourwaters.net/hitchhikers/mollusks_zebra_mussel.php

Association, M. C. O. (2016). Specialty units. Retrieved December 6, 2016, from <http://www.mncoa.org/specialty-unit/>

Bailey, M. (2016). Zequanox: A Potential Solution to Zebra Mussels. *Aesthetics*, 7, 29-33. doi:<http://dx.doi.org/10.1080/10420150.2016.1158441>

Benson, A. J., D. Rowley, J. Larson, A. Feary, and A. B. Boudreau. 2016. *Dreissena polymorpha*. 1550. *Nonindigenous Aquatic Species Database*. Gainesville, FL. <https://nas.erdc.gov/species/FactSheet.aspx?speciesID=5> Revision Date: 6/26/2014

Bucket (Photo). (n.d.). Retrieved from <http://www.crossbasecoatings.com/images/bucket.jpg>

California Department of Fish and Wildlife. (n.d.). Retrieved from https://has.erdc.gov/taxgroup/mollusks/zebramussel/maps/current_zm_quagga_map.jpg

Chemical bucket (Photograph). (n.d.). Retrieved from <http://kalogist.com>

Commonwealth of Massachusetts. (2016). Zebra Mussels. Retrieved from October 3, 2016. From <http://www.mass.gov/eea/agencies/dcr/ha/zebra-mussels.html>

Copper Sulfate (Photograph). (n.d.). Retrieved from https://images-na.ssl-images-amazon.com/images/I/516G9YmQW-AC_UJ3Q2-SR263-263_001.jpg

Connelly, N. A., O'Neill, J. C., Knuth, B. A., & Brown, T. L. (2007). Economic impacts of Zebra Mussels on drinking water treatment and electric power generation facilities. *Environmental Management*, 40(1), 105-112. doi:10.1007/s00267-006-0296-0

Industrial pipe encrusted with mussels (Photograph). (n.d.). Retrieved from <http://www.pwweb.com/release/2013/7/pwrb10131599.htm>

Kelly, D. (2015, July 16). Surveys Confirm Zebra Mussels In Minnesota's Lake Umbagog. Retrieved October 10, 2016, from <http://www.lakescientist.com/surveys-confirm-zebra-mussels-lake-umbagog/> Retrieved from ACI Scholarly Blog Index.

Kelly, D. (2016, April 28). Zebra Mussels Impact Lake Minnetonka [Weblog post]. Retrieved October 10, 2016, from <http://www.lakescientist.com/zebra-mussels-impact-lake-minnetonka/> Retrieved from ACI Scholarly Blog Index.

Lower Bolton Lake Bottom (Photograph). (2003). Retrieved from http://www.ci.gov/sites/Files/Assets/zequanox_plant_program/pptimages/lower_bolton_lake.jpg

Minnesota Department of Natural Resources. (2015, November 15). Retrieved December 6, 2016, from http://files.dnr.state.mn.us/natural_resources/invasives/ais-annual-report.pdf

Mohr, J., Gambino, R., Revenig, C., & Spalding, M. (2006). Assessing the Global Threat of Invasive Species to Marine Biodiversity. *Frontiers in Ecology and the Environment*, 4(9), 485-492. Retrieved from <http://www.jstor.org/stable/20440991>

National Wildlife Federation. (2013). Invasive Mussels. Retrieved from October 5, 2016, from <https://www.nwf.org/Wildlife/Threats-to-Wildlife/Invasive-Species/Invasive-Mussels.asp>

Potash (Photograph). (n.d.). Retrieved from <http://www.wisegeeek.org/what-is-potash.htm>

RAAF, J. L., FOMG, P. P., & GARLON, D. W. (1998). Physiological aspects of Zebra Mussel reproduction: Maturation, spawning, and fertilization. *Integrative and Comparative Biology*, 36(3), 326-338. doi:10.1093/ich/36.3.326

Stop Aquatic Hitchhikers. (n.d.). Retrieved from http://www.cabot.com/assets/cms/img/doorway/USW5AP_061614_USW5_07.png

Stop sign (n.d.). Retrieved from https://upload.wikimedia.org/wikipedia/commons/thumb/9/d9/Stop_sign_light_red.svg/2000px-Stop_sign_light_red.svg.png

Watercraft Inspection Program. (2016). Retrieved December 6, 2016, from http://www.dnr.state.mn.us/invasives/watercraft_inspect.html

White, T. A., Perkins, S. E., & Dunn, A. (2012). The ecomorphology of invasive species. *Functional Ecology*, 26(6), 1313-1323. doi:10.1111/1365-2435.12012

University of Wisconsin Sea Grant Institute. (2013). Zebra mussel (*Dreissena polymorpha*). Retrieved November 2, 2016, from <http://www.seagrant.wisc.edu/Home/Topic/InvasiveSpecies/Details.aspx?PostID=655>

U.S. Geological Survey. (n.d.). Zebra mussel (Photograph). Retrieved from http://planeteart.com/cv/usa/usa/usa_documents/zebra_mussel.jpg