NAME OF SPECIES: Quagga mussel (Dreissena bugensis)

A. CURRENT STATUS AND DISTRIBUTION	
1. In Wisconsin?	a. YES ☒ NO ☐
	b. Abundance: Abundant in Lake Michigan, even displacing zebra mussels in some areas, present in all Great Lakes
	c. Geographic Range: Throughout Lake Michigan, present in L. Superior, no know inland lake or river infestation in WI
	d. Type of Waters Invaded (rivers, ponds, lakes, etc): lakes (can also invade rivers and brackish waters)
	e. Historical Status and Rate of Spread in Wisconsin: First found in Lake Erie in 1989, then spread to and throughout L. Michigan, first found in L. Superior in Duluth/Superior harbor in 2005. Now well established in lower Great Lakes, but found in all. Seems to be following similar trend to zebra mussels in fist years after initial introduction
2. Invasive in Similar Climate Zones	YES ☒ NO ☐ Where: Great Lake and surrounding states
3. Similar Habitat Invaded Elsewhere	YES ☒ NO ☐ Where: Great Lake and some inland lakes (see below)
4. In Surrounding States	YES ☒ NO ☐ Where: Inland lakes in OH, NY, PN, MI; found in Mississippi River southern IL
5. Competitive Ability	High: Can live on a range of substrates and water conditions and at great depths, and reproduce rapidly; have the potential to have impacts similar to zebra mussels, but in more waters due to their ability to tolerate a wider range of conditions. Low:
B. ESTABLISHMENT POTENTIAL AND LIFE HISTORY TRAITS	
1. Temperature:	Range: large, 32 - 86 deg. F (0 - 30 de. C); prefer 39 - 68 deg. F (4 - 20 deg. C)
2. Spawning Temperature:	Range: young present at temps as low as 46 deg. F (8 deg. C)
3. Number of Eggs:	Range: single mature female can produce more than 1 million eggs per spawning season
4. Preferred Spawning Substrate:	can colonize and reproduce on both hard and soft substrates, unlike zebra mussels, quaggas can live directly on sandy or muddy substrates
5. Hybridization Potential:	Hybridization with zebra mussels is of some concern. Has worked in lab setting, but is thought to be rare in nature and, if present, hybrids will likely make up a very small percentage of the dreissenid community.
6. Salinity Tolerance	Fresh: ☒ Marine: ☐ Brackish: ☒

7. Oxygen Regime	Range: not found
8. Water Hardness Tolerance	Range: not found
9. Easily confused for Native Species?	List: none found; is easily confused with invasive zebra mussel
C. DAMAGE POTENTIAL	
1. Likelihood of Damage	a. Presence of Natural Enemies: migrating diving ducks, fish, crayfish; appears that any decrease in population size caused by predation is short lived.
	b. How well introductory and expansion pathways can be described and quantified: Initial introduction to and spread within Great Lakes attributed to ballast water; larvae spread by drift in currents; movement within waters and to new waters primarily attributed to recreational boaters and anglers transporting mussels/larvae on boats and equipment, in bilge and bait water
2. Environmental Impacts	a. Alteration of ecosystem composition, structure and function: Prodigious filter feeders - remove phytoplankton and particulates from water, disrupting the base of the food web.
	c. Damage to ecosystem resilience/sustainability: Damage to base of food web has potential to destabilize entire ecosystem.
	d. Loss of biological diversity: Potential for species diversity to change based on change in food availability
	e. Abiotic modifications (affects on turbidity, H2O chemistry, etc.): Increase water transparencey, decrease chlorophyll a concentrations, increase pseudofeces (waste product excreted) - decomposition of this waste lowers DO, makes pH more acidic, and produces toxic byproducts. Also, mussels accumulate organic toxins, then excreted in pseudofeces and passed up food chain. Since mussels can attach to/live on substrate in great numbers, they can alter the substrate itself, actually becoming the substrate.
	f. Biotic effects on other species (loss of cover, nesting sites, forage, changing competitive relationships: drastically change substrate and food availability; foul native mussels, inhibiting feeding
D. NET SOCIO/ECONOMIC IMPACT	
1. Positive aspects of the species to the economy/society:	Effect:
2. Direct and indirect effects of the invasive species:	Effect:
3. Type of damage caused by organism:	Effect: biofoulers, attach to structures in water and clog pipes, can damage recreational equipment and other property
Industries affected by invasive:	Effect: industries with water intake pipes, water recreation

4. Loss of aesthetic value affecting recreation and tourism:	Effect: beaches may become fouled with shells of dead mussles; mussles attach to boats, buoys, breakwalls, docks, etc.
5. Increased cost to a sector (monitoring, inspection, control, public education, modifying practices, damage repair, lower yield, loss of export markets due to quarantine:	Effect: cost in industries (passed along to consumers) to clean pipes; costs to boaters and riparian home owners to protect equipment and to deal with damage caused by mussels.
6. Cost of prevention or control relative to cost of allowing invasion to occur (cost of prevention is borne by different groups than cost of control):	Effect:
7. Cost at different levels of invasion:	Effect:
E. CONTROL AND PREVENTION POTENTIAL	
1. Costs of Prevention (including Education):	
2. Responsiveness to Prevention Efforts:	Spread between water bodies likely to be caused by recreational boaters and anglers, to an ideal group exists to target with prevention education.
3. Detection Capability:	
4. Control Tactics Effective:	Mechanical: ☒ Biological: ☐ Chemical: ☒ No large scale control available; methods only work to remove mussles from an individual structure or from within pipes.
5. Efficacy/Feasibility of Control (effort, # of staff):	not feasible in natural, large-scale setting
6. Cost of Control:	High: ☐ Medium: ☐ Low: ☐
7. Non-Target Effects of Control:	native mussles, other native species
8. Threshold at which control would be attempted:	
9 Efficacy of Monitoring:	