

Introduction for the Great Lakes Panel Priority Invasive Species List, 2007

In 2003, the Great Lake Panel on Aquatic Nuisance Species identified the need to establish research priorities in order to provide information to agencies, universities, research institutes and funders regarding issues that the Panel considers to be of high priority for research in the Great Lakes-St. Lawrence Region. Over 180 non-native species are established in the Great Lakes (Ricciardi, 2006); many of which deserve some research attention. Realizing this, the Great Lakes Panel through its Research Coordination Committee, has developed a list of priority species recommended for research attention. The Panel's priority species list is intended to draw attention to those organisms with known and significant adverse impacts on the Great Lakes-St. Lawrence River ecosystem, its users and uses.

The list is intended to be dynamic, with changes occurring (e.g., additions and deletions) as the research develops, populations fluctuate, new impacts are identified and new organisms of concern appear on the horizon. This list will undergo semiannual reviews by the Research Coordination Committee to ensure that the list remains current and relevant given the above mentioned factors.

The overarching criterion for species to be included on the list is whether a species has been shown to have obvious and significant environmental and socioeconomic impacts to the Great Lakes-St. Lawrence ecosystem. It is the Panel's opinion that these species demand the region's immediate and focused attention and should receive the primary investment of research dollars.

Organisms not listed include intentionally stocked fishes, those organisms managed for sport fish forage and those with as yet unknown or unidentified harmful effects. It is not the recommendation of the Panel or the Research Coordination Committee that research on non-priority species be entirely unsupported. Although many of these non-included species do not appear to have a significant impact on the Great Lakes ecosystem, there are numerous species for which we have little information with which to assess possible future impacts. Research to compile what is known about the ecology of these species in their native ecosystems and properly documenting their life-cycles and activities in ecosystems to which they have spread would certainly be a useful investment.

Anyone can suggest organisms be added to or removed from the Panel's priority list by communicating to the Research Coordination in writing with justification as to why the species warrants or no longer warrants consideration as a research priority. Requests for listing or delisting can be submitted to the Research Coordination Committee Chair or the Great Lakes ANS Panel Secretariat at any time. Requests will be reviewed by the Research Coordination Committee and recommended changes will occur at one of the semiannual meetings of the Great Lakes Panel.

When considering whether to add a species to the list, the Research Coordination Committee uses the following criteria to guide the decisionmaking process:

- Species has a proven or potential ability for significant adverse impacts on the Great Lakes ecosystem, economy or human health
- Not an intentionally introduced or managed species
- Species has no demonstrated beneficial use in the Great Lakes
- Species appears to be an emerging threat to the Great Lakes
- There is no economically viable means of control for the species

When a species is proposed for delisting, the following criteria are used:

- There are reliable treatment or management options available for control
- The population is controlled or managed at an acceptable level in the Great Lakes-St. Lawrence River Region
- The species is widespread, common and has a long history in the Great Lakes-St. Lawrence River Region

The Great Lakes Panel on Aquatic Nuisance Species presents its 2007 list of Aquatic Invasive Species recommended for high priority for expanded research towards eradication and control in the Great Lakes ecosystem.

Great Lakes Panel on Aquatic Nuisance Species
Priority Invasive Species List - 2008

Tier 1 = established, harmful, non-native
Tier 2 = potential harmful invader

Grouping	Tier	Common Name	Taxon	Species	Origin	Date	Location	Mechanism	Justification
Fish	2	silver carp (Asian carp)	Cyprinidae	<i>Hypophthalmichthys molitrix</i>	Asia	ST	N/A	Release (Aquaculture, Accidental)	Closing in on the Great Lakes via river systems; significantly outcompetes native fish and greatly reduces or eliminates fish biodiversity; also a threat to human health by jumping impact
	2	bighead carp (Asian carp)	Cyprinidae	<i>Hypophthalmichthys nobilis</i>	Asia	ST	N/A	Release (Aquaculture, Accidental)	Closing in on the Great Lakes via river systems; significantly outcompetes native fish and greatly reduces or eliminates fish biodiversity; also a threat to human health by jumping impact
	2	black carp (Asian carp)	Cyprinidae	<i>Mylopharyngodon piceus</i>	Asia	ST	N/A	Release (Aquaculture, Accidental)	A voracious molluscivore, likely to threaten native mussel populations
	2	grass carp (Asian carp)	Cyprinidae	<i>Ctenopharyngodon idella</i>	Asia	ST	N/A	Release (Deliberate)	Can reduce submerged rooted vegetation to such degree that essential habitat & sediment stability are severely compromised.
	1	Eurasian ruffe	Percidae	<i>Gymnocephalus cernuus</i>	Eurasia	1986	St. Louis River (S)	Shipping (Ballast Water)	Competition for forage, predation on native species
	1	round goby	Gobiidae	<i>Neogobius melanostomus</i>	Eurasia	1990	St. Clair River (StC)	Shipping (Ballast Water)	Aggressive predator, outcompete native fish, raids native fish nests, takes over native fish habitat
	1	sea lamprey	Petromyzontidae	<i>Petromyzon marinus</i>	Atlantic	1830s	Lake Ontario	Canals, Shipping (Fouling)	Well documented threat to survival of Great Lakes sports fish (esp. trout and salmon); present control measures are costly and imperfect.
	1	white perch	Perichthyidae	<i>Morone americana</i>	Atlantic	1950	Cross Lake (O)	Canals	Competition for forage, predation on native species
	2	northern snakehead	Channidae	<i>Channa argus</i>	Asia and Russia	ST	N/A	Release (Fish Markets)	Adverse impact on native fisheries through direct predation, resource competition and the alteration of food webs
Zooplankton	1	fish-hook waterflea	Cladocera	<i>Cercopagis pengoi</i>	Black Sea	1998	Unknown	Unknown	Clogs fishing nets and lines, decreases nutrition in juvenile fish, competes with essential native zooplankton for food
	1	spiny water flea	Cladocera	<i>Bythotrephes longimanus</i>	Eurasia	1984	Lake Huron	Shipping (Ballast Water)	Competition for forage, predation on native species
Plants	2	Brazilian elodea	Hydrocharitaceae	<i>Egeria densa</i>	South America	N/A	N/A		Adverse habitat and recreation impacts
	1	curly pondweed	Potamogetonaceae	<i>Potamogeton crispus</i>	Eurasia	1879	Keuka Lake (O)	Release (Deliberate, Fishing)	Adverse habitat and recreation impacts
	1	Eurasian water milfoil	Haloragaceae	<i>Myriophyllum spicatum</i>	Eurasia	1952	Lake Erie	Release (Aquarium, Accidental)	Adverse habitat and recreation impacts
	1	European frog-bit	Hydrocharitaceae	<i>Hydrocharis morsus-ranae</i>	Eurasia	1972	Lake Ontario	Release (Aquarium, Delib.), Ship fouling	Adverse habitat and recreation impacts
	2	hydrilla	Hydrocharitaceae	<i>Hydrilla verticillata</i>	Eurasia	ST	N/A		Adverse habitat and recreation impacts
	1	water chestnut	Trapaceae	<i>Trapa natans</i>	Eurasia	<1959	Lake Ontario (T)	Release (Accidental, Aquarium)	Adverse habitat and recreation impacts
	1	phragmites, common reed and giant reed	Poaceae	<i>Phragmites australis</i>	North America and Europe	1800s	Unknown	Shipping (Ballast Water)	Outcompetes and eliminates other marsh species with similar habitat requirements
Macroinvert.	1	amphipod	Amphipoda	<i>Echinogammarus ischnus</i>	Black Sea	1995	Unknown	Unknown	Outcompetes and displaces native amphipod species in select habitats
	1	mud snail	Gastropoda	<i>Potamopyrgus antipodarum</i>	New Zealand	1991	Unknown	Unknown	Reduces diversity by competing with other macroinvertebrates for food and habitat
	1	quagga mussel	Dreissenidae	<i>Dreissena rostriformis bugensi</i>	Eurasia	1991	Lake Ontario	Shipping (Ballast Water)	Dominant benthic settler, crowds out other benthic organisms, changes character of benthic habitat, damages submerged structures, clogs unwater pipelines, eliminates native plankton at bottom of food web, diverts food energy to bottom habitat.
	1	zebra mussel	Dreissenidae	<i>Dreissena polymorpha</i>	Eurasia	1988	Lake St. Clair	Shipping (Ballast Water)	Dominant benthic settler, crowds out other benthic organisms, changes character of benthic habitat, damages submerged structures, clogs unwater pipelines, eliminates native plankton at bottom of food web, diverts food energy to bottom habitat.
Pathogens	1	parasite	Microsporidea	<i>Heterosporis spp.</i>	???	2000	Lake Ontario	Pet Release	Adverse fish condition and recreation impacts
	1	myxosporidian	Myxozoa	<i>Sphaeromyxa sevastopoli</i>	Black Sea	1994	Unknown	Unknown	Adverse fish condition impacts
	1	salmonid whirling disease	Protozoa	<i>Myxobolus cerebralis</i>	Unknown	1968	Ohio (E)	Release (Fishing)	Adverse population impacts
	1	VHS (viral hemorrhagic septicemia) virus	Rhabdoviridae	<i>Novirhabdovirus sp.</i>	North America	2006	Lake St. Clair	Unknown	Implicated in the mortality of significant numbers of fish, especially trout
Phytoplankton	1	Cylindro blue-green algae	Cyanobacteria	<i>Cylindrospermopsis raciborskii</i>	Unknown	1971	Lake Erie	Unknown	Forms large subsurface blooms; produces a toxin that may result in gastrointestinal illness in humans and potential chronic liver damage; some strains produce a neurotoxin (although so far these have only been found in Brazil); toxins also are detrimental to zooplankton and invertebrate grazers. Can co-occur with surface scum forming algae like Microcystis by taking up a niche lower in the water column (1-2 m deep).