

# Regional Invasive Aquatic Plant Control Prioritization and Needs Assessment

# Development of IAP research agenda

- Organized around general research needs, followed by species-specific
- Research agenda focuses on operational control needs for species
- Additional research needs and knowledge are captured in an appendix to the research agenda
- Materials are available on the Research Coordination Committee website:  
<https://www.glpanel.org/committees/research/>
- Working on a manuscript to tie all deliverables together

**Evaluating Control of Priority  
Established Species:  
Species- and site-based  
analysis of control efforts in  
the Great Lakes region**

# Site-based analysis

- Using a series of search terms, have narrowed the list of projects from the publicly available GLRI database to identify relevant projects
  - Pending request with EPA for additional information from the EAGL database on those projects
- Requesting copies of management plans to inform site-based analysis of control activities
  - ANS/AIS management plans, habitat restoration plans, fisheries management plans, etc.

**Consideration of priority  
animal species for control**

# Scope

- Geographic: Great Lakes region (by HUC-2)
  - Includes Lake Champlain
  - Consistent with GLANSIS regional border for species records
- Taxonomic: fish, invertebrates (not microscopic), amphibians, reptiles
- Impact: environmental and social/cultural

# Criteria for consideration as priorities

- Impact: GLANSIS transformed total impact score of 4, 5, or 6 (possible range is 0-6), unless a 3 (high) in either environmental or social/cultural category.
- Impact: include those with uncertain impact in the GL for <30 years.
- Impact: exclude those with high beneficial impact (e.g., salmonids).
- Distribution:
  - Nonindigenous and range expander (RE) species (only RE with limited native distribution in GL, given those with extensive GL native distribution will have natural expansion due to climate change); or
  - Watchlist species with established populations.
- Include in list as established AIS, but exclude from analysis of control options, those species with regional control efforts (e.g., sea lamprey)
- Exclude virus/bacteria/microscopic species



# Implications for priority listing

- If a species is on the priority list, it will have a species-specific literature review on available control tools (and gaps/challenges) completed, and it will also be included in a site-based analysis and priority-setting assessment to prioritize future management actions.



# Included priority species

1. Faucet snail
2. Spiny waterflea
3. Fishhook waterflea
4. Golden clam
5. Round goby
6. Red swamp crayfish
7. Waterflea (*Daphnia galeata galeata*)
8. Chinese mystery snail
9. Banded mystery snail
10. Freshwater tubenose goby
11. Redbreast sunfish
12. Tench
13. Ruffe
14. Western mosquitofish
15. New Zealand mudsnail
16. Rudd
17. Rusty crayfish
18. Common carp
19. Flathead catfish
20. Bloody red shrimp
21. Goldfish
22. Marbled crayfish (potential)

# Species excluded after GLP survey

- Red eared slider
- Rainbow smelt

**Please share any past, ongoing, or otherwise funded control work targeting any of these species!**

# Red-eared slider (*Trachemys scripta elegans*)

- GLANSIS impact: uncertain (1) environmental; high (3) social/cultural
- ERSS: none
- Turtle expert Jim Harding indicates no impacts in Great Lakes, and likely native to at least MI and WI (though nonindigenous to Lake Ontario/Canada side of basin)
- Recommendation: exclude
- From Rochelle: After talking this over with NAS, we are going to accept a handful of Michigan locations as 'native relict' populations. This shifts the overall status of Red-eared sliders from nonindigenous to range expansion/cryptogenic for the State of Michigan and for the Great Lakes basin (similar to rusty crayfish, which has a small population in Sandusky Bay designated as native). I believe this is going to be relevant to Lake Michigan and Lake Erie (including Lake St. Clair basins) -- not yet sure about Huron basin. For impact: We discussed whether our assessment is appropriate in not comparing the health impact versus native species (likely all turtles are a salmonella risk) but we aren't willing at this point to change the assessment for a single species - especially when that risk is high enough to have triggered legislation (ban of sales of small RES due to salmonella risk).
- Important to Canadian provinces (Annick Drouin – threat to native herpetofauna; Jeff Brinsmead – on Ontario's radar)
- GLP vote: 7 exclude; 3 include

# RE: Rainbow smelt (*Osmerus mordax*)

- Native at eastern edge of GL (range expander)
- Established throughout GL
- GLANSIS impact: high/3 (env), low/0 (soc/cult)
- ERSS: none
- Rainbow smelt is highly valued in MN as a fishery, MI and IL manages as a sport fishery, ON noted they do not see it being managed, recreational fishery in QBC (and native)
- The majority of jurisdictions contacted for further information on this species indicated that control of this species is not a priority, and the focus of this project is better spent on high priority species
- Propose to exclude

# Established priority species

- Faucet snail
- Spiny waterflea
- Fishhook waterflea
- Golden clam
- Round goby
- Red swamp crayfish
- Waterflea
- Flathead catfish
- Chinese mystery snail
- Banded mystery snail
- Western (freshwater) tubenose goby
- Goldfish

# Faucet snail (*Bithynia tentaculata*)

- GLANSIS impact: high/3 (env); moderate/2 (soc/cult)
- ERSS: high risk



# Spiny waterflea (*Bythotrephes longimanus*)

- GLANSIS impact: high/3 (env); low/1 (soc/cult)
- ERSS: high risk

# Fishhook waterflea (*Cercopagis pengoi*)

- GLANSIS impact: high/3 (env); moderate/2 (soc/cult)
- ERSS: high

# Golden clam (*Corbicula fluminea*)

- GLANSIS impact: moderate/2 (env);  
moderate/2 (soc/cult)
- ERSS: high risk

# Round goby (*Neogobius melanostomus*)

- GLANSIS impact: high/3 (env); high/3 (soc/cult)
- ERSS: high

# Red swamp crayfish (*Procambarus clarkii*)

- GLANSIS impact: moderate/2 (env); moderate/2 (soc/cult)
- ERSS: high

# Waterflea (*Daphnia galeata galeata*)

- GLANSIS impact: high/3 (env); low/0 (soc/cult)
- ERSS: none

# Flathead catfish (*Pylodictis olivaris*)

- GLANSIS impact: high/3 (env); low/1 (soc/cult)
- ERSS: high
- GLP vote: 7 include, 3 exclude:
  - Annick Drouin: habitat requirement too far away from the habitat characteristic in Quebec
  - Sarah LeSage: I believe there's a recreational fishery in some of Michigan's larger rivers
  - Tim Campbell: I don't have strong feelings, I feel that the desirable recreational aspects of flathead catfish combined with limited resources doesn't make this a high priority for me.
- Decision: include



# Common carp (*Cyprinus carpio*)

- GLANSIS impact: high/3 (env); low/1 (soc/cult)
- ERSS: high
- GLP vote: 10 include, 1 exclude
- Decision: include

# Chinese mystery snail

- *Cipangopaludina chinensis* (Chinese mystery snail)
- Mystery snails are of concern in MN especially by Tribal entities
- ERSS for Chinese mystery snail is high
- GLANSIS: uncertain/uncertain
- Decision: include

# Banded mystery snail

- *Viviparus georgianus* (banded mystery snail)
- Mystery snails are of concern in MN especially by Tribal entities
- ERSS in process for banded mystery snail (draft has “uncertain”)
- GLANSIS: Banded: moderate/moderate impacts (latter was 0 when made spreadsheet)
- Decision: include

# *Proterorhinus semilunaris* (Western/freshwater tubenose goby)

- Jesica Goldsmit, [jesica.goldsmit@dfo-mpo.gc.ca](mailto:jesica.goldsmit@dfo-mpo.gc.ca) originally proposed adding at 5/4/22 meeting. It is expanding its range rapidly and has been found in QC and they will be trying to address the species this year (following up)
- Tubenose goby is also expanding its range in the Duluth-Superior harbor
- Brook noted Western Tubenose Goby has been reported from the Georgian Bay (Lake Huron) in Ontario as well. Definitely seeing a range expansion but may not be reported as often as it should since Round Gobies are lookalikes and people may not know the difference
- GLANSIS: low env and soc/cult
- ERSS: high
- Decision: include

# *Carassius auratus*, goldfish

- Uncertain environmental, low soc/cult
- GLP feedback: 7 include, 3 exclude
- Decision: include

# Range expander species: include

These species meet impact criteria and have part of their range in the Great Lakes basin

The following are native to a small part of the basin would likely rely on human spread (therefore include in our list):

- Rusty crayfish

## RE: Rusty crayfish

- Native to small part of basin
- GLANSIS impact: moderate/2 (env), moderate/2 (soc/cult)
- ERSS: high



# Watchlist species: include

- Includes species only established in inland waters (i.e., not established in the Great Lakes themselves – hence not considered by GLANSIS to be established)
- Most GLANSIS watchlist species are not established inland or Great Lakes, however some have reported populations in the basin – these were considered and included due to established:
  - Redbreast sunfish
  - Tench

# Watchlist: Redbreast sunfish (*Lepomis auritus*)

- Many GL records, 2007-2010, 'established' status
- ERSS: none
- Current recommendation: include due to established

# Watchlist: Tench (*Tinca tinca*)

- Many recent GL records, “established” status
- ERSS: high
- Current recommendation: include due to established

# Low GLANSIS impact: include

- These are below the impact threshold (threshold is total of 4, 5, 6, or 3 in either category) but were included based on committee feedback
  - Ruffe
  - Western mosquitofish
  - New Zealand mudsnail
  - Bloody red shrimp
  - Rudd

# Impact: Ruffe (*Gymnocephalus cernuus*)

- Original GLANSIS impact: moderate/2 (env), low/0 (soc/cult)
- Updated GLANSRA impact: high/3 (env), high/3 (soc/cult)
- ERSS: high
- Propose to include
- Support from QBC
- Some management data in Cuthbert et al. 2021

# Impact: Western mosquitofish (*Gambusia affinis*)

- GLANSIS impact: high/3 (env); low/1 (soc/cult)
- ERSS: high
- Propose to include

# Impact: New Zealand mudsnail (*Potamopyrus antipodarum*)

- GLANSIS impact: moderate/2 (env); low/1 (soc/cult)
- ERSS: high risk
- MI asked to include, and do our own assessment

# Impact: bloody red shrimp (*Hemimysis anomala*)

- GLANSIS impact: moderate/2 (env); low/1 (soc/cult)
- ERSS: high (Kate: ERSS high level and doesn't get into GL impacts)
- Review impacts – mostly based on European impacts
- What year introduced to GL? 2006
- Only impact data in GL recently:  
<https://www.sciencedirect.com/science/article/abs/pii/S0380133021002513>
- GLP feedback: 7 include, 3 exclude



# Impact: Rudd (*Scardinius erythrophthalmus*)

- GLANSIS impact: moderate/2 (env); low/0 (soc/cult)
- ERSS: high risk
- Include (Chadderton, abundant in upper Richelieu and Lake Champlain)

# Included in list but no literature review

- These species represent established AIS with high impact, but will not have a literature review of available control methods completed due to existing effort and understanding. However, they will be included in the site-based analysis and priority-setting assessment to prioritize future management actions
  - Grass Carp (diploid)
  - Grass carp (triploid)
  - Zebra mussel
  - Quagga mussel
  - Bighead carp
  - Sea Lamprey

# Range expander species: exclude

These species meet criteria and were originally considered. They have part of their range in the Great Lakes basin

The following are native to a small part of the basin would likely rely on human spread (therefore include in our list). However, RCC discussion recommended to exclude due to lack of priority and recreational importance:

- Gizzard shad
- Rainbow smelt
- The following are native to much of the basin, would likely spread north naturally due to climate change (therefore exclude from our list):
  - Freshwater drum
  - Calico crayfish
  - Northern clearwater crayfish
  - American bullfrog

# RE: Gizzard shad (*Dorosoma cepedianum*)

- Native to southeastern GL
- Established throughout
- GLANSIS impact: high/3 (env), low/0 (soc/cult)
- ERSS: none
- ON and MI confirm no interest in managing shad
- Native to much of GL (Holm et al.)
- Propose to exclude

# RE: Freshwater drum (*Aplodinotus grunniens*)

- Several GL records, established status
- Native to much of basin
- Uncertain GLANSIS impact
- ERSS: none
- Propose to exclude
- Support from Olivier (QBC) to exclude

# RE: Calico crayfish (*Faxonius immunis*)

- Native to much of basin
- GLANSIS impact: high/3 (env), low/1 (soc/cult)
- ERSS: uncertain
- Propose to exclude

## RE: Northern clearwater crayfish (*Faxonius propinquus*)

- Native to much of basin
- GLANSIS impact: high/3 (env), low/1 (soc/cult)
- ERSS: high
- Propose to exclude

# RE: American bullfrog (*Lithobates catesbeianus*)

- Native to much of basin
- GLANSIS impact: high/3 (env), low/1 (soc/cult)
- ERSS: high
- Propose to exclude



# Watchlist species: exclude

- Includes species only established in inland waters (i.e., not established in the Great Lakes themselves – hence not considered by GLANSIS to be established)
- Most GLANSIS watchlist species are not established inland or Great Lakes, however some have reported populations in the basin – these were considered but excluded due to not established
  - Steelcolor shiner
  - Blue catfish
  - Mississippi map turtle

# Watchlist: steelcolor shiner (*Cyprinella whipplei*)

- 1 GL record (2005) with unknown status
- ERSS: uncertain
- Current recommendation: exclude due to not established

# Watchlist: blue catfish (*Ictalurus furcatus*)

- 1 GL record (2006), unknown status
- ERSS: high
- Current recommendation: exclude due to not established

# Watchlist: Mississippi map turtle (*Graptemys pseudogeographica*)

- Not listed on GLANSIS yet
- One recent report in WI
- ERSS: none
- Propose to exclude due to not established

# Exclude: other

- Red-eared slider: cryptogenic and low/no impact
- Eastern mosquitofish: *Misclassified*

# Impact: Eastern mosquitofish (*Gambusia holbrooki*)

- Not scored in GLANSIS
- GLANSRA: high/3 (env); high/3 (soc/cult)
- ERSS: high
- GLANSIS lists Western (*G. affinis*); the specimens of Eastern (*G. holbrooki*) were considered to have been misidentified.
- Therefore not in Great Lakes basin.
- Exclude

# Excluded due to criteria:

These species have been considered due to status as established and high impact AIS, but excluded due to high beneficial impacts or status as a virus/bacteria

- White Perch
- Alewife
- Salmonid whirling disease
- Viral Hemorrhagic Septicemia Virus (VHSV-IVb)
- Bacterial kidney disease (BKD), Dee disease
- Spring viremia of carp (SVC)
- Rainbow Trout
- Chinook Salmon
- Brown Trout
- Digenean fluke (*Ichthyocotylurus pileatus*)
- Microsporidian parasite (*Heterosporis sutherlandae*)
- Largemouth bass virus (LMBV)

# Excluded due to criteria:

These species have been considered due to status as established but excluded due to low impact

- Muskie pox
- White River Crayfish
- Threespine Stickleback
- Pink Salmon
- Ischnus scud
- Big Water Crayfish
- Muskellunge
- Redear Sunfish
- Coho Salmon
- Atlantic Salmon
- a copepod



# Next steps

- Continue literature reviews
- Reach out to RCC members for control case studies (grey lit)
- Reach out to RCC members for review (based on interest/expertise)