



Minnesota Department of Natural Resources (DNR) Classification Summary for Invasive Species

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Classification Screening for Mitten crabs, *Eriocheir* spp.

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Introduction

This document is a guide to the Minnesota DNR’s authority under *Minnesota Statutes*, chapter 84D, to designate invasive species as prohibited or regulated invasive species. The conclusions and recommendations in this document are for information purposes only and do not require the DNR or any other entity to take a specific action.

More information about classifications of invasive species can be found on the [DNR website](http://www.dnr.state.mn.us/invasives/laws.html) (<http://www.dnr.state.mn.us/invasives/laws.html>) and in *Minnesota Statutes*, [chapter 84D](https://www.revisor.mn.gov/statutes/?id=84D) (<https://www.revisor.mn.gov/statutes/?id=84D>). Prohibited, regulated, and unregulated species are listed in Minnesota Rules, [chapter 6216](https://www.revisor.mn.gov/rules/?id=6216) (<https://www.revisor.mn.gov/rules/?id=6216>).

How to fill out this classification screening

For more detailed guidance on completing this document, see the DNR's "Guidance for Invasive Species Classification Summaries". The following is a brief guide:

- Fill out the Species Summary section with the species name and a brief description of the species and its current regulatory status in Minnesota.
- Answer the questions in the Eligibility Screening section to determine whether the species is eligible for regulation under *Minnesota Statutes*, chapter 84D.
- If the species is eligible for regulation under *Minnesota Statutes*, chapter 84D, continue to answer the questions in the Classification Screening section and characterize the certainty of the answer for each question.
- At the end of the classification screening questions, summarize the most important points from the answers and judge the overall certainty of the screening.
- Finally, you should make a recommendation for classifying the species, based on the findings of the classification screening.
- Update the table of contents when the document is completed.

Species Summary

Common name: mitten crabs

Scientific name: *Eriocheir* spp.

Brief description: The mitten crab is a small crustacean that reaches 3 inches (rarely 4 inches) in size. It looks like larger marine crabs, and has a thick patch of light brown hair-like growth on the claws, which have white tips. The four pairs of walking legs are about twice as long as the carapace width. The crab has a notch in the front of the carapace between the eyes, with four spines on the side margins. The color of the crab ranges from brownish-yellow to greenish-brown (Veilleux and de Lafontaine 2007, Benson and Fuller 2012).

Present classification in Minnesota: unlisted nonnative species

Proposed classification: prohibited invasive species

Eligibility Screening

These three questions determine whether the DNR has authority to regulate the species under *Minnesota Statutes*, chapter 84D.

1. Is the species an aquatic plant or wild animal? For the purposes of this question, “species” includes “subspecies, genotypes, cultivars, hybrids, or genera” (*Minnesota Statutes*, section 84D.04 subd. 1).
 - Choose Yes or No; if yes, continue.
2. Is the species a pathogen or terrestrial arthropod regulated under *Minnesota Statutes*, sections 18G.01 to 18G.15? (*Minnesota Statutes*, section 84D.14(1))
 - Choose Yes or No; if no, continue.
3. Is the species a mammal or bird defined as livestock in statute? (*Minnesota Statutes*, section 84D.14(1)).
 - Choose Yes or No; if no, continue.

Classification Screening

Is it nonnative?

To be classified as an invasive species under Minnesota Statutes, the species must be “nonnative”; that is, not “native” as defined in Minnesota Statutes, section 84D.01, subd. 11. This has two components.

1. Is the species nonnative in Minnesota?

1.1. Is the species naturally present or reproducing in Minnesota? No. This species is native to Asia.

1.2. Does the species naturally expand from its historic range into Minnesota? No. This species does not occur naturally in North America.

How certain are these answers? Very certain, supported by peer-reviewed literature.

Likelihood of introduction

This is a criterion for classification of an invasive species under Minnesota Statutes, section 84D.04, subd. 2(1). The terms “introduce” and “introduction” are defined in Minnesota Statutes, section 84D.01.

2. Is the species likely to be introduced to Minnesota if it is allowed to enter or exist in the state?

Uncertain. Mitten crabs require saltwater to complete their life cycle. Introductions to Minnesota waters may occur via ballast water in Great Lakes commercial shipping. Movement into the rest of the state would be unlikely. It is possible that mitten crab could be introduced by people illegally releasing them from aquariums.

How certain is this answer? Reasonably uncertain.

Likelihood of survival

This is a criterion for classification of an invasive species under Minnesota Statutes, section 84D.04, subd. 2(2). The term “naturalize” is defined in Minnesota Statutes, section 84D.01 as “to establish a self-sustaining population...in the wild.”

3. Is the species likely to naturalize in Minnesota if it were introduced? No. Mitten crabs require saltwater to reproduce. Additionally, larval stages of the crab are sensitive to low water temperature, with research suggesting that larval mortality is complete at water temperatures below 48 degrees Fahrenheit (Veilleux and de Lafontaine 2007, Blumenshine et al. 2012, Eberhardt et al. 2016). Because of lack of saltwater in Minnesota waters and the regular and extended temperatures below 48 degrees Fahrenheit, successful reproduction would be unlikely.

Adult mitten crabs could be introduced to a Lake Superior harbor area, where they may survive. Adult crabs can travel large distances to reproduce, so theoretically these could migrate through the St. Lawrence Seaway to saltwater habitats. Larval stages could be brought back to the harbor area via commercial shipping and ballast release. While this would not necessarily be a “self-sustaining population” it could, in theory, allow some crabs to persist. Any crabs which might be moved into inland waters could not establish populations.

How certain is this answer? Very certain – published literature.

Potential negative impacts

For a nonnative species to be defined as “invasive” under Minnesota Statutes, section 84D.01, subd. 9a, the species must: cause, or have the potential to cause economic or environmental harm, harm to human health; or threaten or have the potential to threaten the use of natural resources in the state. This question has four components: economic, environmental, health, and natural resources.

4. Is the nonnative species an invasive species as defined under Minnesota law?

4.1. Does the species cause, or may it cause, economic harm? Yes. Mitten crabs can damage commercial fishing gear, clog intake pipe screens if they occur in large numbers and burrow into sediments, possibly increasing turbidity or causing dike/levee damage (Eberhardt et al. 2016, Hanson and Sytsma 2005).

How certain is this answer? Reasonably certain; published literature.

4.2. Does the species cause, or may it cause, environmental harm? Yes. High numbers of crabs can compete in the food chain, may consume fish eggs and alter the physical habitat through their burrowing (Eberhardt et al. 2016, Hanson and Sytsma 2005).

How certain is this answer? Reasonably certain; published literature.

4.3. Does the species cause, or may it cause, harm to human health? No. The crab has been reported to be a secondary intermediate host of the oriental lung fluke. However, no transmission has been reported of this fluke in North America or Europe. Research on more than 13,000 crabs from San Francisco Bay did not show this fluke in any of the crabs. This fluke requires another host to complete its life cycle which is not present in North America and thus likely could not complete the life cycle (Veilleux and de Lafontaine 2007).

How certain is this answer? Very certain; published literature.

4.4. Does the species threaten, or may it threaten, the use of natural resources in the state? No. While high numbers of this crab could create problems for commercial fisheries and may impact sportfish populations, the inability to create sustaining populations suggests that these impacts are unlikely to be realized in Minnesota.

How certain is this answer? Very certain; published literature on life history.

Natural resource impacts

This is a criterion for classification of an invasive species under Minnesota Statutes, section 84D.04, subd. 2(3).

5. Would the species have potential adverse impacts in Minnesota, in particular on: native species, outdoor recreation, commercial fishing, and other uses of natural resources in the state?

- Choose Yes or No; if yes, continue to 5.1.

The life history requiring salt water for reproduction as well as the larval stage mortality at winter-time temperatures in Minnesota indicate that this crab could not establish self-sustaining populations and would likely never reach high enough densities to impact resources. Any numbers of crabs which might be released into state waters, while potentially surviving for a few years, would then die off without reproducing. Despite occasional findings in the Great Lakes over a number of years, the only large population currently in North America is in the San Francisco Bay Delta, along with a recent population in Chesapeake Bay (Blumenshine et al. 2012).

5.2. If so, what would be the magnitude of these adverse impacts? N/A

How certain is this answer? Reasonably certain; published literature.

Management options

This is a criterion for classification of an invasive species under Minnesota Statutes, section 84D.04, subd. 2(4).

6. Would we be able to eradicate, or control the spread of, the species once it is introduced in Minnesota? No. However, lack of salinity and low temperatures would prevent successful reproduction in Minnesota

How certain is this answer? Reasonably certain; published literature.

Other relevant information

This is a criterion for classification of an invasive species under Minnesota Statutes, section 84D.04, subd. 2(5). Information that may be included here includes, but is not limited to: economic impacts; regulations in other jurisdictions; and ongoing monitoring programs.

7. Are there other criteria the DNR commissioner deems appropriate? If so, discuss.

- Mitten crab are listed as Injurious Wildlife under the Lacey Act (18 U.S.C. § 42(a)(1)), which bans the import of injurious species into the United States and its territories. A court ruling in 2017 “struck down the longstanding interpretation of the U.S. Fish and Wildlife Service (FWS) that Title 18 also prohibited the shipment of injurious species across state lines” (Otts 2017); however, the U.S. Fish and Wildlife Service may still prohibit interstate transport of state-regulated species. Therefore, listing mitten crab as a prohibited invasive species in Minnesota will help to prevent its introduction and spread in the U.S. and to our neighboring jurisdictions.
- *Eriocheir sinensis* is regulated in the following Great Lakes jurisdictions (date): Illinois (2003); Wisconsin (2009); Quebec (2012); New York (2014); and Ohio (2016) (Tucker et al. 2017).

Summary

Summarize the findings of the screening form, including whether the species is nonnative and invasive as defined by Minnesota Statutes, chapter 84D, and characterize the overall certainty of the answers provided above.

Note that certain answers in the screening form may indicate that the species is not a good candidate for designating as a prohibited or regulated invasive species under *Minnesota Statutes*, chapter 84D:

- If you answered “Yes” to **either** 1a or 1b, the species is not “nonnative” as defined under *Minnesota Statutes*, chapter 84D; consider regulation under other authorities.
- If you answered “No” to **all** of 4a, 4b, 4c, and 4d, then the species is nonnative but may not be “invasive” as defined under *Minnesota Statutes*, chapter 84D; consider whether proposed introductions of this species should follow *Minnesota Rules*, part 6216.0290.

Summary: The mitten crab has been documented to cause economic and ecological harm where it has established high population densities. However, due to the life history of this crab, with saltwater being required for reproduction and typical winter water temperatures sustained in Minnesota waters

for extended periods of time being lethal to larval stages, it does not appear that this crab could establish self-sustaining populations in Minnesota. While crabs may be transported and/or released, the numbers of any of these incidents would likely be few and far below levels needed to cause harm. Unless a deliberate movement and release of very high numbers of this crab would occur, it is not likely to ever be seen at densities to cause any issues. However, listing as a prohibited invasive species in Minnesota will help to prevent its introduction and spread in the U.S. and to our neighboring jurisdictions because of the genus's status as federal injurious wildlife.

How certain is this classification summary, overall? Reasonably certain.

Recommendation

The DNR may choose to recommend whether to designate the species as a prohibited invasive species, a regulated invasive species, or whether the species should be an unlisted nonnative species (Minnesota Statutes, section 84D.06). Briefly justify this recommendation and include any additional information such as recommended deadlines for updating this screening form and revisiting this decision and gaps in our knowledge that could be addressed by researchers.

Recommendation: Designate as a prohibited invasive species.

Appendix

Qualitative uncertainty ratings

Uncertainty rating	Description	Abbreviation
Very certain	As certain as I am going to get	VC
Reasonably certain	Reasonably certain	RC
Moderately certain	More certain than not	MC
Reasonably uncertain	Reasonably uncertain	RU
Very uncertain	A guess	VU

Uncertainty ratings from: "Generic Nonindigenous Aquatic Organisms Risk Analysis Review Process", Risk Assessment and Management Committee report to the Aquatic Nuisance Species Task Force, 1996. Available [online](http://www.anstaskforce.gov/Documents/ANSTF_Risk_Analysis.pdf) (www.anstaskforce.gov/Documents/ANSTF_Risk_Analysis.pdf; accessed February 14, 2020).

Version notes

References to Minnesota Statutes are to the 2019 version.

References Cited

Benson, A. J., and P. L. Fuller, 2018, *Eriocheir sinensis*: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL. Available online:

<https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=182>.

Blumenshine, S. C., B. Tsukimura, A. Rice and D. A. Rudnick. 2012. Environmental factors influencing the dynamics of Chinese mitten crab zoeae in the San Francisco Bay-Delta. *Aquatic Invasions* 7(1): 111-124.

Eberhardt, A.; Pederson, J.; and Bisson, B., 2016. Rapid Response Plan for Management and Control of the Chinese Mitten Crab, Northeast United States and Atlantic Canada. *Maine Sea Grant Publications*. 119. https://digitalcommons.library.umaine.edu/seagrant_pub/119

Hanson, E. and M. Sytsma. 2005. The Potential for Mitten Crab Colonization of Estuaries on the West Coast of North America – Final Report. Center for Lakes and Reservoirs, Portland State University. 53 pp.

Otts, S. 2017. Federal invasive species prevention efforts suffer significant litigation defeat. The *SandBar* 16 (3): 4-6. Available online: <http://nsglc.olemiss.edu/SandBar/pdfs/sandbar16.3.pdf> Accessed April 15, 2019.

Tucker, Andrew; Chadderton, Lindsay; Hamilton, David; Jensen, Erika; and Weibert, Ceci. October 2017 Draft Paper: “Harmonizing Great Lakes Regulated Species: Progress towards reconciling a regional patchwork”.

Veilleux, E., and de Lafontaine, Y. 2007. Biological synopsis of the Chinese mitten crab (*Eriocheir sinensis*). *Can. Manusc. Rep. Fish. Aquat. Sci.* 2812: vi + 45 pp.

Additional References

U.S. Fish and Wildlife Service (USFWS). 2018. Chinese mitten crab (*Eriocheir sinensis*) Ecological Risk Screening Summary, Web Version, 03/22/2018. Available at: <https://www.fws.gov/fisheries/ANS/erss/highrisk/ERSS-Eriocheir-sinensis-FINAL.pdf>. Accessed June 12, 2018.