

Mitigating the Risks of Aquatic Invasive Species in Commerce

Legal Case Study: Marbled Crayfish



Introduction

The introduction and spread of aquatic invasive species (AIS) pose a threat to aquatic systems. One primary pathway aquatic invasive species are moved and introduced to new ecosystems is via commerce - the plant and animal trade. Reducing the risks of harmful aquatic invasive species in trade requires the cooperation and collaboration of each party in the supply chain, including producers, retailers, importers, buyers, and state and federal agencies. The National Sea Grant Law Center developed a case study series to explore the current legal framework governing commercial trade in several popular species and challenges to mitigating risks from this pathway.

Species Background

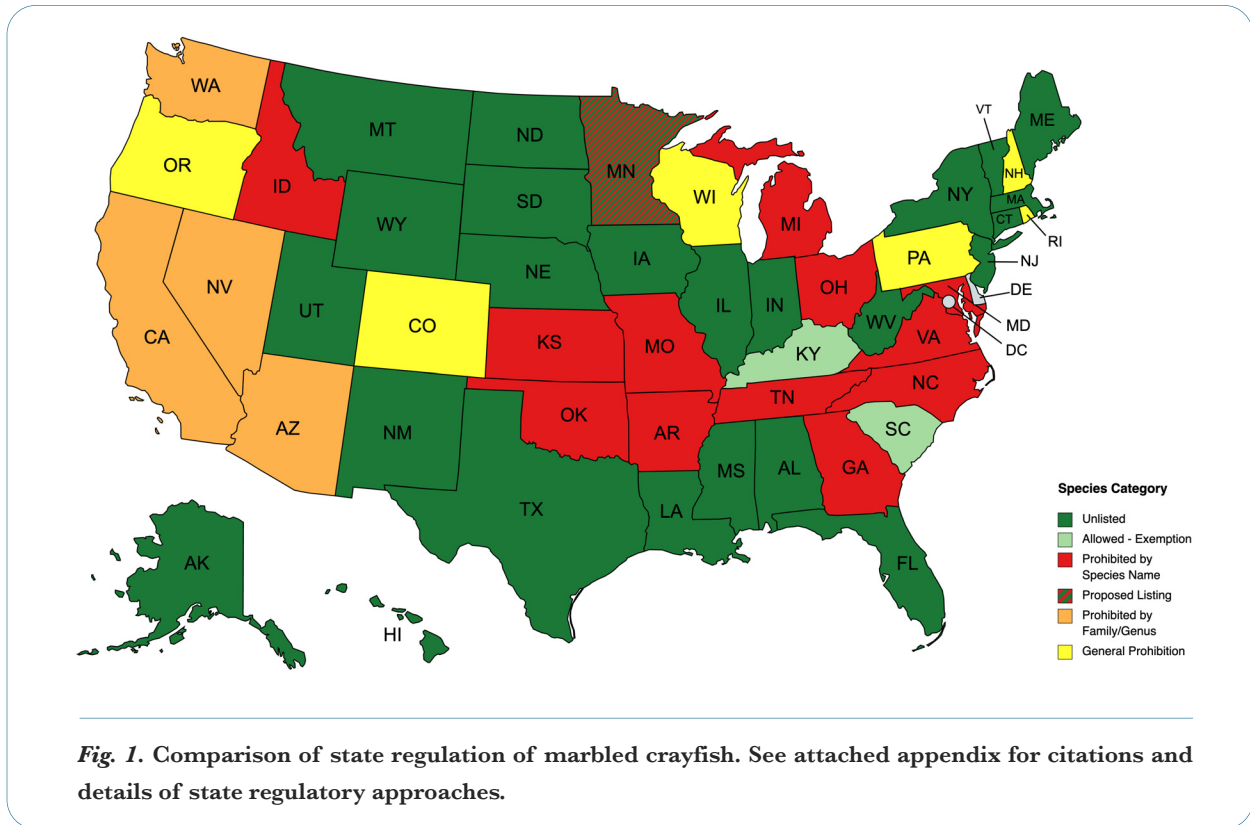
The marbled crayfish (*Procambarus virginalis*) is a popular crayfish in the aquarium and pet trade. Some estimates suggest marbled crayfish may account for about one-half of all crayfish sold online,¹ likely due to the novelty of the species. Marbled crayfish is a creation of the pet trade, and was first discovered in Germany in the 1990s.² Marbled crayfish is most closely related to *Procambarus fallax*, a crayfish species native to southern Georgia and Florida. Marbled crayfish was first sold into the North American market in the early 2000s.³ Marbled crayfish is the only known decapod crustacean to reproduce through parthenogenesis (i.e., self-cloning), and all specimens are female as a result. Their ability to reproduce asexually at high rates could present significant ecological risks if released into the environment.

¹ Faulkes, Z. 2015. Marmorcrebs (*Procambarus fallax* f. *virginalis*) are the most popular crayfish in the North American pet trade. *Knowledge & Management of Aquatic Ecosystems* 416, 20.

² Ewen Callaway, Geneticists Unravel Secrets of Super-Invasive Crayfish, *Nature* (February 2018).

³ Marbled Crayfish, Invasive Species Centre.

Regulatory Context



Marbled crayfish is listed as a prohibited or regulated species by name in twelve states. The earliest prohibited listing appeared in 2010 when Idaho banned the possession, cultivation, import, shipment, or transport of marbled crayfish without a permit.⁴ The states of Maryland and Missouri followed the next year, prohibiting import, sale, purchase, and possession in the state.⁵ Virginia prohibited marbled crayfish in 2012⁶ and Tennessee in 2015.⁷

There was a lull in state prohibited listings until 2019; however, several states have taken action in recent years. This may be a result of increased attention on the species due to its addition to the Great Lakes St. Lawrence Governors & Premiers list of “least wanted species” in 2018.⁸ Seven states have regulated the commercial trade in marbled crayfish in some way since 2019: Kansas in 2019,⁹ Michigan and Ohio in 2020,¹⁰ North Carolina in 2021,¹¹ Arkansas, Georgia, and Oklahoma in 2022.¹²

⁴ Idaho Admin. Code r. 02.06.09.140.

⁵ Md. Code Regs. 08.02.19.04, 3 Mo. Code of State Regulations 10-4.117.

⁶ 4 Va. Admin. Code 15-20-210.

⁷ Tenn. Comp. R. & Regs. 1660-01-18-.03.

⁸ Great Lakes St. Lawrence Governors & Premiers Add Five “List Wanted” AIS.

⁹ Kansas Admin. Reg. 115-18-10.

¹⁰ Michigan Invasive Species Order.

¹¹ 15A N.C. Admin. Code 10C.0211.

¹² Okla. Admin. Code 800:20-1-2, Ga Comp. R. & Regs. 391-4-8-.03, Ark. Admin. Code 002.01.1-J1.03; Ark. Admin. Code 002.01.1-J1.0.

Minnesota published a proposed rule in 2022 to add marbled crayfish to the state’s list of prohibited invasive species, but the rule has not been finalized as of date of publication.¹³

Four states (Arizona, California, Nevada, Washington) prohibit or restrict all species of crayfish in the family *Cambaridae* which includes marbled crayfish. An additional six states (Colorado, New Hampshire, Oregon, Pennsylvania, Rhode Island, Wisconsin) have a general prohibition on the possession of non-native or live species of crayfish, with some limited exceptions. This is a recommended policy approach compared to single-species listings. Research conducted on the effectiveness of state legislative policies to prevent the introduction of other invasive species, such as rusty crayfish, revealed that the most effective form of regulation is one that does not require individuals to distinguish among species.¹⁴

Marbled crayfish is unlisted in twenty-six states and exempted from regulation in two states. Kentucky’s prohibition on the purchase, sale, possession, and import of nonnative aquatic species exempts the trade in aquarium species.¹⁵ South Carolina exempts recognized pet trade species from its nonindigenous species prohibitions.¹⁶

In 2022, the U.S. Department of Justice (DOJ) successfully prosecuted a marbled crayfish seller for violations of the federal Lacey Act.¹⁷ Title 16 of the Lacey Act makes it illegal for any person “to import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce” ... “any fish or wildlife taken, possessed, transported, or sold” in violation of State law.¹⁸ Congress authorized criminal penalties up to \$10,000 fine or 1 year in jail.¹⁹ The illegal activity was identified and brought to the DOJ’s attention by the Ohio Department of Natural Resources. The defendant pled guilty to the charges and was sentenced to pay a \$5,000 fine, complete a two-year term of probation, and perform 80 hours of community service. Although this fine may seem insignificant, the defendant had received less than \$3,000 in gross profits from the illegal sales.

Regulating Marbled Crayfish in Commerce - Key Takeaways

Commercial trade in marbled crayfish continues despite its high risk of invasiveness. Although a growing number of states have taken action to restrict trade, these states represent only about a quarter of the U.S. states. This is a relatively small number considering the species has no native range in the United States. Increased interstate consistency is needed to reduce the sale, purchase, and possession of this (and other) high-risk species.

¹³ See, Minn. Department of Natural Resources, [DNR Rulemaking: Invasive Species](#).

¹⁴ Cassie Dressler and Bradley Swanson, Preemptive legislation inhibits the anthropogenic spread of an aquatic invasive species, the rusty crayfish (*Orconectes rusticus*), *Biological Invasions* 15:1049–1056 (2013).

¹⁵ 301 Ky. Admin. Regs. 1:122.

¹⁶ S.C. Code Ann. § 50-13-1630.

¹⁷ *U.S. v. Spaulding*, Judgment in a Criminal Case, Case: 2:22-cr-00060-CMV (S.D. Ohio, Aug. 8, 2022).

¹⁸ 16 U.S.C. § 3372(a)(2).

¹⁹ *Id.* §3373(d)(2).

Efforts to prioritize species listings by governmental entities and organizations could significantly improve the ability of states to lessen aquatic invasive species in commerce. Listing species, such as the marbled crayfish, which have no native range in any state, would advance harmonization of state invasive species lists. Prior to the addition of marbled crayfish on the “least wanted” AIS list, no Great Lakes state prohibited the species. Today, the species is listed in two Great Lakes states – Michigan and Ohio – and proposed by a third – Minnesota. Continued progress is needed in the region and throughout the country to address these important regulatory gaps.

The successful Lacey Act prosecution of a marbled crayfish seller is an important cautionary tale for individuals that might consider engaging in commercial trade of the species. The extent to which this case has deterred others from engaging in illegal sales is unknown, but it demonstrates that federal and state agencies are willing and able to enforce violations of state AIS laws.

October 2023

This research was supported by the U.S. Department of Interior under Award no. F22AP03009-00.

Appendix

Summary of State Regulation of Marbled Crayfish

Alabama: *Unlisted*

Alaska: *Unlisted*

Marbled crayfish is unlisted in Alaska. Alaska’s list of “banned invasive species” includes only signal, red swamp, and rusty crayfish. Alaska Admin. Code tit. 5, § 41.075

Arizona: *Prohibited by Genus/Family*

All freshwater crayfish species within the families *Astacidae*, *Cambaridae*, and *Parastacidae* are classified as “restricted live wildlife” in Arizona. A license from the Arizona Game and Fish Department is required to possess restricted live wildlife. Ariz. Admin. Code R12-4-406.

Arkansas: *Prohibited by Species Name*

Marbled crayfish is classified as a “prohibited species” in Arkansas. The species may not be imported for private lake or pond stocking. Ark. Admin. Code 002.01.1-J1.03. The species may not be imported for aquaculture. Ark. Admin. Code 002.01.1-J1.01.

California: *Prohibited by Genus/Family*

All species of the family *Cambaridea*, except *Procambarus clarkii* and *Orconectes virile*, are included on California’s list of “live restricted animals.” It is unlawful to import, transport, or possess live restricted animals except under a permit issued by the Department of Fish and Game. Crayfish were included on the list because they were deemed “detrimental animals” that pose a threat to native wildlife, agricultural interests, or public health or safety. Cal. Code Regs. tit. 14, § 671.

Colorado: *General Prohibition (Non-native aquatic wildlife)*

Colorado’s aquatic nuisance species list includes rusty crayfish. 2 Colo. Code Reg. 405-8:800 Although marbled crayfish is not classified as ANS, there is a general prohibition on the possession of any live native or nonnative aquatic wildlife in Colorado. Only certain listed crayfish species may be possessed east of the Continental Divide. Marbled crayfish is not an allowed species. 2 Colo. Code Reg. 406-0:012.

Connecticut: *Unlisted*

Marbled crayfish is unlisted in Connecticut. Connecticut’s list of “nuisance aquatic invertebrates” includes only rusty crayfish (*Orconectes rusticus*). Conn. Agencies Regs. 26-55-5

Delaware: *Unlisted*

Florida: *Unlisted*

Marbled crayfish is unlisted in Florida. Florida’s list of “conditional non-native species” includes only Australia red clay, red swamp, and white river crayfish. Fla. Admin. Code Ann. r. 68-5.004.

Georgia: *Prohibited by Species Name*

Marbled crayfish is included on Georgia’s list of “prohibited wild animals” and are prohibited in the state. Ga Comp. R. & Regs. 391-4-8-.03.

Hawaii: *Unlisted*

Hawaii’s list of restricted animals includes all crayfish species in the genus *Cambarus*. Haw. Admin. Rules § 4-71 Attachment 3. List of Restricted Animals (§ 4-71-6.5). A permit is required to possess or import restricted animals into the state. Haw. Rev. Stat. Ann. § 150A-6.2(c). However, as marbled crayfish is classified in the genus *Procambarus*, the species may not fall within the scope of the restricted animals list.

Idaho: *Prohibited by Species Name*

Marbled crayfish (*Procambarus fallax f. virginalis*) is a listed invasive species in Idaho. Marmorkrebs are also listed at the species level (*Procambarus sp.*). Idaho Admin. Code r. 02.06.09.140. No person may possess, import, ship, or transport any invasive species unless pursuant to a permit issued by the Idaho Department of Agriculture. Idaho Admin. Code r. 02.06.09.120.

Illinois: *Unlisted*

Marbled crayfish is unlisted in Illinois. Illinois’s list of “injurious species” includes only rusty crayfish. 17 Ill. Adm. Code 805.20. With the exception of rusty crayfish, all crayfish species are legal to possess in Illinois and used, consumed, and sold for bait. 17 Ill. Adm. Code 830.60.

Indiana: *Unlisted*

Iowa: *Unlisted*

Marbled crayfish is unlisted in Iowa. Iowa’s list of “aquatic invasive species” includes only rusty crayfish. Iowa Admin. Code r. 571-90.2(456A).

Kansas: *Prohibited by Species Name*

Marbled crayfish is a listed prohibited species in Kansas. Its importation, possession, or release is prohibited except as authorized by a wildlife importation permit issued by the Kansas Department of Wildlife and Parks. Kan. Admin. Regs. 115-18-10.

Kentucky: *Allowed (Aquarium Species Exception)*

With limited exceptions, the purchase, sale, possession, import, or release of any aquatic species not native or established in Kentucky waters is prohibited. Except for certain listed species, a person may buy, sell, import, or possess aquarium species. 301 Ky. Admin. Regs. 1:122. “Aquarium species” means the species of fish that are legally sold in the pet and ornamental trade business and not stocked into waters of the Commonwealth. 301 Ky. Admin. Regs. 1:001.

As marbled crayfish is generally recognized as an aquarium species and they are not listed on the prohibited species list, trade and possession of the species is likely allowed unless crayfish are excluded from the definition of aquarium species.

Louisiana: *Unlisted*

Maine: *Unlisted*

Maryland: *Prohibited by Species Name*

Marbled crayfish is included on Maryland’s list of “nonnative aquatic organisms.” It is unlawful to import, transport, purchase, possess, propagate, sell, or release nonnative aquatic organisms. Md. Code Regs. 08.02.19.04

Massachusetts: *Unlisted*

Michigan: *Prohibited by Species Name*

Marbled crayfish is a listed “prohibited species” in Michigan. [Michigan Invasive Species Order](#). It is unlawful to possess a live prohibited species in Michigan. Mich. Comp. Laws Ann. § 324.41303.

Minnesota: *Unlisted*

Marbled crayfish is unlisted in Minnesota. In October 2022, the Minnesota Department of Natural Resources published a proposed rule to add marbled crayfish to the list of prohibited invasive species. At the time of publication, this rule has not been finalized.

Mississippi: *Unlisted*

Missouri: *Prohibited by Species Name*

Marbled crayfish is a listed prohibited species in Missouri. Prohibited species may not be imported, exported, transported, sold, purchased, or possessed alive without written approval of the Missouri Department of Conservation. Mo. Code Regs. Ann. tit. 3, § 10-4.117.

Montana: *Unlisted*

Marbled crayfish is unlisted in Montana. Montana’s list of prohibited species includes only rusty crayfish. Mont. Admin. R. 12.6.2215.

Nebraska: *Unlisted*

Marbled crayfish is unlisted in Nebraska. Nebraska’s list of aquatic invasive species includes only white river, red swamp, and rusty crayfish. 163 Neb. Admin. Code Ch. 2, 012.

Nevada: *Prohibited by Family/Genus*

All species in the families Parastacidae, Cambaridae and Astacidae, except *Procambarus clarkii*, *Orconectes causeyi* and indigenous species of the genus *Pacifastacus*, are included on Nevada’s list of prohibited species. It is unlawful to import, transport, or possess live specimens of prohibited species. Nev. Admin. Code 503.110.

New Hampshire: *General Prohibition (Non-Indigenous Crayfish)*

New Hampshire includes “all non-indigenous crayfish” on its prohibited species list. Prohibited species may not be possessed or imported. N.H. Code Admin. R. Fis 804.03 and 803.04.

New Jersey: *Unlisted*

New Mexico: *Unlisted*

New York: *Unlisted*

Marbled crayfish is unlisted in New York. New York’s list of prohibited invasive species includes only rusty crayfish. N.Y. Comp. Codes R. & Regs. tit. 6, § 575.3.

North Carolina: *Prohibited by Species Name*

It is unlawful to transport, purchase, possess, sell, or stock in the public or private waters of North Carolina any live marbled crayfish or Marmorcrebs (*Procambarus virginalis* or *Procambarus fallax f. virginalis*) in North Carolina. 15A N.C. Admin. Code 10C.0211.

North Dakota: *Unlisted*

Ohio: *Prohibited by Species Name*

Marbled crayfish is listed as an “injurious aquatic invasive species” in Ohio. [Ohio Injurious AIS List](#). It shall be unlawful for any person to possess, import or sell live individuals of designated injurious aquatic invasive species. Ohio Admin. Code 1501:31-19-01.

Oklahoma: *Prohibited by Species Name*

Marbled crayfish is included on Oklahoma’s list of “restricted exotic species.” The import and possession of restricted exotic species is prohibited. Okla. Admin. Code 800:20-1-2.

Oregon: *Prohibited by Family/Genus*

The importation, possession, propagation, transportation, sale, purchase, exchange and disposition of non-native crayfish species in the families *Cambaridae* and *Parastacidea* is controlled in Oregon. Non-native crayfish may be harvested, possessed, and sold commercially by licensed fishers or harvested recreationally from state waters. Propagation is not allowed. Non-native crayfish may not be imported except by recognized educational institutions or for immediate consumption who apply for and receive authorization from the Oregon Department of Fish and Wildlife. Or. Admin. R. 635-056-0075.

Pennsylvania: *General Prohibition (All Species)*

The introduction, importation, possession or transport of all live species of crayfish is prohibited in Pennsylvania, with limited exceptions. 58 Pa. Code § 71.6 and 71a.11. Live crayfish may be possessed and used as bait in the water from which they were taken. Live crayfish may also be possessed or imported for testing and scientific purposes or restaurant consumption if adequate measures have been taken to prevent their escape. 58 Pa. Code § 71a.11.

Rhode Island: *General Prohibition (All Non-indigenous crayfish)*

The possession of all non-indigenous crayfish is prohibited in Rhode Island unless authorized pursuant to a valid exotic animal possession permit issued by Rhode Island Department of Environmental Management. 250 R.I. Code R. 40-05-3.17.

South Carolina: *Allowed (Pet Trade Exception)*

It is unlawful in South Carolina for a person to possess, sell, offer for sale, import, bring, cause to be brought or imported into this State, or release in this State rusty crayfish or other nonindigenous species not established, except by permit. This prohibition does not apply to recognized pet trade species. S.C. Code Ann. § 50-13-1630. As marbled crayfish is generally recognized as a pet trade species and they are not listed on the prohibited species list, trade and possession of the species is likely allowed pursuant to this exception.

South Dakota: *Unlisted*

Marbled crayfish is unlisted in South Dakota. South Dakota’s list of aquatic invasive species includes only rusty and red swamp crayfish. S.D. Admin. R. 41:10:04:01.

Tennessee: *Prohibited by Species Name*

Marbled crayfish is a listed “Class V” species in Tennessee. Tenn. Comp. R. & Regs. 1660-01-18-.03. Class V species are those designated by the Tennessee Fish and Wildlife Commission as injurious to the environment and may only be held in zoos under such conditions as to prevent the release or escape of such wildlife into the environment. Tenn. Code Ann. § 70-4-403.

Texas: *Unlisted*

Marbled crayfish is unlisted in Texas. Texas’s list of exotic harmful or potentially harmful species only includes crayfish in the family *Parastacidae* (Southern hemisphere freshwater crayfishes, including redclaw crayfish). 31 Tex. Admin. Code § 57.112.

Utah: *Unlisted*

Vermont: *Unlisted*

Marbled crayfish is unlisted in Vermont. Vermont’s list of aquatic nuisance species includes only rusty crayfish. Vt. Stat. Ann. tit. 10, § 1452.

Virginia: *Prohibited by Species Name*

Marbled crayfish is a listed nonindigenous aquatic nuisance species in Virginia. 4 Va. Admin. Code 15-20-210. It is unlawful to take, possess, transport, import, sell, or offer for sale any nonindigenous aquatic nuisance species unless authorized under a permit issued by the Virginia Department of Wildlife. VA Code Ann. § 29.1-574.

Washington: *Prohibited by Family/Genus*

All crayfish species of the family *Cambaridae* are classified as “prohibited level 3” species in Washington. Wash. Admin. Code 220-640-050. It is unlawful for any person or commercial entity to receive or possess any live prohibited level 3 species. Wash. Admin. Code 220-640-051. The Washington Department of Fish and Wildlife may issue permits to authorize the possession of prohibited level 3 species specimens for scientific research or display provided certain conditions are met. Wash. Admin. Code 220-640-100. An individual who possessed a prohibited level 3 species prior to the time of its classification may retain possession for the remainder of the animal’s life but the animal may not be transferred to another owner within the state and must be prevented from reproducing or its progeny destroyed. Wash. Admin. Code 220-640-130.

West Virginia: *Unlisted*

Wisconsin: *General Prohibition (All Nonnative Crayfish)*

Wisconsin’s list of prohibited invasive species includes all “nonnative fish and nonnative crayfish” except for established nonnative crayfish species. Wis. Adm. Code § NR 40.04. Rusty crayfish are regulated as Restricted in Wisconsin as they are considered an established nonnative crayfish species. A permit from the Wisconsin Department of Natural Resources is required to transport, possess, transfer or introduce a prohibited or restricted species. Wis. Admin. Code NR § 40.06.

Wyoming: *Unlisted*

Marbled crayfish is unlisted in Wyoming. Wyoming’s list of prohibited aquatic invasive species includes only rusty crayfish. Wyo. Admin. Code 040.0001.62 § 2.